



State of Connecticut  
PUBLIC DOCUMENT No. 24

---

Fiftieth Report  
OF THE  
**CONNECTICUT**  
**AGRICULTURAL EXPERIMENT STATION**  
NEW HAVEN, CONN.

FOR THE YEAR

**1926**

---

PRINTED IN COMPLIANCE WITH STATUTE

---

NEW HAVEN  
PUBLISHED BY THE STATE  
1927



# CONNECTICUT AGRICULTURAL EXPERIMENT STATION

## OFFICERS AND STAFF

as of

October, 1926

### BOARD OF CONTROL

His Excellency, Governor John H. Trumbull, *ex-officio*, President.

Charles R. Treat, *Vice-President* ..... Orange  
George A. Hopson, *Secretary* ..... Mount Carmel  
Wm. L. Slate, *Treasurer* ..... New Haven  
Joseph W. Alsop ..... Avon  
Elijah Rogers ..... Southington  
Edward C. Schneider ..... Middletown  
Francis F. Lincoln ..... Cheshire

### STAFF.

E. H. JENKINS, PH.D., *Director Emeritus.*

#### ADMINISTRATION.

WM. L. SLATE, B.Sc., *Director and Treasurer.*  
MISS L. M. BRAUTLECHT, *Bookkeeper and Librarian.*  
MISS J. V. BERGER, *Stenographer and Bookkeeper.*  
MISS MARY E. BRADLEY, *Secretary.*  
G. E. GRAHAM, *In charge of Buildings and Grounds.*

#### CHEMISTRY: ANALYTICAL LABORATORY.

E. M. BAILEY, PH.D., *Chemist in Charge.*  
C. E. SHEPARD  
OWEN L. NOLAN  
HARRY J. FISHER, A.B. } *Assistant Chemists.*  
W. T. MATHIS  
FRANK C. SHELDON, *Laboratory Assistant.*  
V. L. CHURCHILL, *Sampling Agent.*  
MISS MABEL BACON, *Stenographer.*

#### BIOCHEMICAL LABORATORY.

T. B. OSBORNE, PH.D., *Chemist in Charge.*  
H. B. VICKERY, PH.D., *Biochemist.*  
MISS HELEN C. CANNON, B.S., *Dietitian.*

#### BOTANY.

G. P. CLINTON, Sc.D., *Botanist in Charge.*  
E. M. STODDARD, B.S., *Pomologist.*  
MISS FLORENCE A. MCCORMICK, PH.D., *Pathologist.*  
WILLIS R. HUNT, PH.D., *Assistant in Botany.*  
A. D. McDONNELL, *General Assistant.*  
MRS. W. W. KELSEY, *Secretary.*

#### ENTOMOLOGY.

W. E. BRITTON, PH.D., *Entomologist in Charge;*  
*also State Entomologist.*  
B. H. WALDEN, B.AGR. } *Assistant Entomologists.*  
M. P. ZAPPE, B.S. }  
PHILIP GARMAN, PH.D. }  
ROGER B. FRIEND, B.Sc., *Graduate Assistant.*  
JOHN T. ASHWORTH, *Deputy in Charge of Gipsy Moth Work.*  
R. C. BOTSFORD, *Deputy in Charge of Mosquito Elimination.*  
MISS GRACE A. FOOTE, B.A., *Secretary.*

#### FORESTRY.

WALTER O. FILLEY, *Forester in Charge.*  
H. W. HICOCK, M.F., *Assistant Forester.*  
J. E. RILEY, JR., M.F., *In charge of Blister Rust Control.*  
MISS PAULINE A. MERCHANT, *Stenographer.*

#### PLANT BREEDING

DONALD F. JONES, S.D., *Geneticist in Charge.*  
P. C. MANGELSDORF, S.D., *Assistant Geneticist.*  
H. R. MURRAY, B.S., *Graduate Assistant.*

#### SOIL RESEARCH.

M. F. MORGAN, M.S., *Investigator.*  
H. G. M. JACOBSON, M.S., *Assistant.*

#### TOBACCO SUB-STATION AT WINDSOR.

PAUL J. ANDERSON, PH.D., *Pathologist in Charge.*  
N. T. NELSON, PH.D., *Assistant Physiologist.*

### PUBLICATION

APPROVED BY

THE BOARD OF CONTROL



Agronomical Dept.

THE TUTTLE, MOREHOUSE & TAYLOR COMPANY  
New Haven, Conn.

## TABLE OF CONTENTS

	PAGE
Officers and Staff of the Station .....	iii
Table of Contents .....	iv
Report of the Board of Control .....	v
Report of Treasurer .....	xii
Report of Insect Pest Appropriation .....	xiv
Report of Expenses of Mosquito Control .....	xvi
Report of Tobacco Research Appropriation .....	xvii
Report on Fertilizers, Bulletin 282 .....	I
The Quality of Vegetable Seed Sold in Packets in Connecticut, Bulletin 283 .....	97
Index to Reports on Food Products and Drugs, 1915-1925, Bulletin 284 .....	III
Report of the State and Station Entomologist, Bulletin 285 .....	157
Report on Food Products and Drugs, Part I, Bulletin 286 .....	284
Report on Food Products and Drugs, Part II, Bulletin 287 .....	359
The Biology of the Birch Leaf Skeletonizer, Bulletin 288 .....	393
Report on Commercial Feeding Stuffs, Bulletin 289 .....	487
Index .....	577
Phosphorus on Tobacco Soils, Tobacco Station Bulletin 7 .....	IT
Report of Tobacco Station at Windsor, Tobacco Station Bulletin 8 ..	25T
Bulletins of Immediate Information, Nos. 55 to 60 .....	I

## Report of the Board of Control OF THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION

*To His Excellency, John H. Trumbull, Governor of Connecticut:*

The Board of Control of the Connecticut Agricultural Experiment Station herewith respectfully submits its fiftieth report for the year ending October 31, 1926.

The following changes in the Station Staff have occurred:

Mr. George D. Scarseth, B.S., Assistant in Soils, resigned in August, 1926, to take a position as Soil Investigator with the United Fruit Company in Honduras. Mr. H. G. M. Jacobson, M.S., Instructor in Soils at the Arkansas Agricultural College, has been appointed to fill this vacancy.

Mr. R. E. Andrew, M.A., for six years First Assistant in Analytical Chemistry, resigned in March, 1926, to take a commercial position.

Two years ago the Plant Breeding Department began an intensive study of the problems connected with the improvement of the vegetable crops. To assist in this work Mr. H. B. Murray, B.S., Assistant in Horticulture at the Experimental Farms, Ottawa, Canada, was appointed Assistant in Plant Breeding in May, 1926.

A very attractive exhibit was made at the Connecticut State Fair in Hartford. While such undertakings consume much time of members of the staff it furnishes a means of bringing before the people the work of the Station and much information is thus disseminated.

The Annual Field Day at the Mt. Carmel farm was held July 28th. It has been the custom for some years to develop the Field Day program around one of the important industries of the state and this year special attention was given to vegetable growing. The Connecticut Vegetable Growers' Association and the New Haven County Farm Bureau both joined in this Field Day and there was in attendance over 400 people. Director R. L. Watts of the Pennsylvania Experiment Station gave the principal address.

The Field Day at the Tobacco Station at Windsor was held on July 30th. Here again a very good attendance was recorded, farmers from all of the tobacco towns being present to inspect the plots and experiments.



Since the issuance of the last report the new greenhouse has been completed and has proven its value by making possible winter experiments in plant breeding and soil fertility. At the Mt. Carmel farm a small seed barn has been erected for the work in plant breeding.

Nine hundred volumes were added to the Library, which now numbers 16,400 volumes and includes a very complete list of scientific journals.

As usual the members of the Station staff have delivered frequent lectures before farmers' meetings and other groups and have handled the many inquiries for information that come in the mails. Forty-eight thousand bulletins have been mailed to the regular mailing list and others as requested.

The following brief summary will show the scope of the Station's work:

### CONTROL AND SERVICE ACTIVITIES.

**FERTILIZERS.** Four hundred and twenty-two brands were registered for sale in Connecticut, for the inspection of which 540 official samples were drawn. In addition 249 samples were received from farmers, making a total of 789. Considering official samples only, 87% of the guaranties have been substantially met or exceeded and of those below guaranty four percent showed a shortage of \$1.00 or more.

**FEEDING STUFFS.** Under the new statute (1925) 651 brands were registered by 161 firms. The laboratory analysed 755 samples, part of which were official and part submitted by farmers. Of the 488 official samples, 164 were proprietary poultry feeds, indicating the importance of this industry in the state.

**FOOD AND DRUGS.** In the task of protecting the public against adulterated and illegal foods and drugs the Station examined 1,700 samples. Most of these were drawn by the Dairy and Food Commissioner, who is charged with the administration of the statute. Of these some 300 were adulterated, below standard or otherwise illegal.

**SEED TESTING.** The Station was a pioneer in establishing seed testing in this country, the Report for 1877 including the results on 33 samples of grass, clover and vegetable seeds. Every year since that time a considerable number of samples have been examined for purity and germination. In 1926, through the coöperation of the Commissioner of Agriculture, a special study was made of the quality of vegetable seed sold in packets in the state. The results are published in Bulletin 283, herewith.

**INSECT PEST AND PLANT DISEASE CONTROL.** As usual the Station entomologists have carried out the careful inspection of

orchards and nurseries; the scouting for and suppression of the Gipsy Moth and the European Corn Borer and a special campaign against the Asiatic Beetle, which was discovered in New Haven and vicinity.

A new service was established for the benefit of fruit growers, the botanists and entomologists making special inspections of orchards in order to secure information to be used in the spray service distributed by the State Pomological Society and the Extension Service.

During the past year one of the botanists has collaborated in the orchard and nursery inspection, thereby providing extra protection against the spread of plant diseases.

The Station forester has continued to conduct the eradication of White Pine Blister Rust, the operations for the year having centered in the towns of Salisbury and Canaan.

### PROGRESS OF INVESTIGATIONS.

**BIOCHEMISTRY.** Studies on the effect of diet on rate of growth have been continued with surprising results. Not only is the rate greatly increased, but some of the rats under experiment have attained unusual size in a relatively short time. These experiments raise many new problems for investigation: What is the nature of the chemical substances that may be responsible? Are there specific stimulants to growth? The answers to these and other questions are being sought.

The nature of the vegetable proteins has continued to occupy much time and we are gradually arriving at a better knowledge of the substances present and methods for their quantitative determination. This work is of far-reaching economic importance for until our knowledge of plant composition is more complete, our methods of fertilization are without adequate foundation.

**BOTANY.** The mosaic disease of tobacco and other plants has been studied for many years by botanists in all parts of the world. As yet the cause is not definitely known. A most interesting discovery made at the Station this year is the fact that tobacco leaves, dried and preserved for 24 years, still carry the active principle and can be used to infect growing plants.

A complete list and description of the Rusts of Connecticut has been prepared for publication.

Comparisons of various dusts and sprays on apples have been continued as usual. Each year new products that appear on the market are added to the tests.

The control of celery blight has been studied for three years. The results favor spray rather than dust as a remedy.

The possibility of reëstablishing the chestnut is receiving atten-

tion. One thousand seedlings have been set out to determine if the danger of infection is yet past.

A new investigation begun this year is a thorough study of certain tree diseases, especially wood decays and their prevention.

ENTOMOLOGY. Progress is being made on the investigation of the plum curculio on apple. It appears that operations other than spraying may sometimes be necessary to obtain clean fruit.

The Asiatic beetle, which appeared last year in New Haven, has been very actively studied as this is a new pest in the United States. Up to the present its injury to plants is confined to lawns in which the grubs live.

The investigation of the birch leaf skeletonizer is completed and the results appear as part of this report as bulletin No. 288.

Continued efforts have been made to find better controls for the squash borer, cabbage maggot and spinach leaf miner.

The oriental peach moth is one of our worst peach pests and as yet no control has been discovered. Many experiments have been conducted with sprays, bait and poisons placed in the trees.

Other insects studied were the birch leaf miner, spruce gall aphid and imported currant worm.

PLANT BREEDING. A product of the investigation of sterility in corn is the discovery of a factor for sterile tassels, which is linked with color of the kernel. By separating these seeds according to color it is possible to grow plants that do not produce pollen and these may be used in the production of "crossed corn," thus relieving the grower of the labor of detasseling alternate rows.

A new mutation from red to white silk color has occurred in one of the pure inbred strains.

Two hundred crosses between inbred strains of sweet corn have been made. Some of these show marked improvement over the original variety.

Selection in self-fertilized lines is also being applied to a large number of vegetables with the aim of better adapting the standard varieties to local market requirements.

FORESTRY. The experimental plantings continue to yield valuable information on the relative value of different conifers for planting on poor sandy land. These stands have now reached a size that make them valuable also for many other observations and experiments in silviculture.

A survey of all the pine plantations in the state is now being made to learn what soils have given the best growth.

A tract on the Cockaponset State Forest in Haddam was selected for intensive study of the influence of soil on the composition and rate of growth of the forest. Good progress resulted on this project, the data proving very encouraging.

SOILS. The inventory of the soils of the state was practically completed. Sixteen type areas, comprising 300,000 acres, have been carefully studied, and 51 soil series classified. A key by which these can be identified has been devised.

In the laboratory these soils have been analyzed and new methods devised, especially one for determining acidity. This has made possible a study of hundreds of tobacco fields to determine the degree of acidity which is correlated with the quality of the tobacco and the possible outbreaks of root rot.

Old tobacco soils were found to contain an adequate supply of available phosphorus, this information offering growers an opportunity to reduce the cost of fertilizer.

TOBACCO SUB-STATION AT WINDSOR. The report for 1926 is included herewith as Tobacco Bulletins 7 and 8. The former gives the results of the investigation of the needs of phosphorus on old tobacco soils mentioned above. The latter bulletin is a report of all the experiments at Windsor. These include the fertilizer trials, studies of tobacco nutrition, diseases, curing, breeding, insect pests, topping and suckering, and tests of chemically treated shade cloth.

## PUBLICATIONS

### *Bulletins.*

- No. 270. Fertilizer Report for 1925.
- No. 271. Spray Bulletin.
- No. 272. Report on Commercial Insecticides and Fungicides 1925.
- No. 273. Crossed Corn.
- No. 274. Report of the Director for the Year Ending Oct. 31, 1925.
- No. 275. Report of the State Entomologist, for 1925.
- No. 276. Report on Food and Drug Products (1925).
- No. 277. Report on Commercial Feeding Stuffs (1925).
- No. 278. A Chemical Investigation of Some Standard Spray Mixtures.
- No. 279. The Genetics and Morphology of Some Endosperm Characters in Maize.
- No. 280. Semi-Centennial of the Connecticut Agricultural Experiment Station.
- No. 281. General Index to the Reports of the State Entomologist (1901-1925).

### *Tobacco Series.*

- No. 6. Report of the Tobacco Station at Windsor (1925).

### *Circulars of Immediate Information.*

- No. 51. Regulations Concerning the Transportation of Nursery Stock in the United States and Canada.
- No. 52. A New Pest of Lawns.
- No. 53. The Asiatic Beetle Quarantine.
- No. 54. The Gipsy Moth Quarantine.



*Journal Papers.*

- The Acceleration of Growth.  
Thomas B. Osborne and Lafayette B. Mendel.  
National Academy of Sciences, Science, 1926, LXIII, 528-529.
- The Relation of the Rate of Growth to Diet. I.  
Thomas B. Osborne and Lafayette B. Mendel.  
Journal of Biological Chemistry, 1926, LXIX, 661-673.
- Some Nitrogenous Constituents of the Juice of the Alfalfa Plant.  
IV. The Betaine Fraction.  
Hubert Bradford Vickery.  
Journal of Biological Chemistry, 1925, LXV, 81-89.
- Some Nitrogenous Constituents of the Juice of the Alfalfa Plant.  
V. The Basic Lead Acetate Precipitate.  
Hubert Bradford Vickery and Carl G. Vinson.  
Journal of Biological Chemistry, 1925, LXV, 91-95.
- Some Nitrogenous Constituents of the Juice of the Alfalfa Plant.  
VI. Asparagine and Amino Acids in Alfalfa.  
Hubert Bradford Vickery.  
Journal of Biological Chemistry, 1925, LXV, 657-664.
- On the Separation of Histidine and Arginine.  
Hubert Bradford Vickery and Charles S. Leavenworth.  
Journal of Biological Chemistry, 1926, LXVIII, 225-228.
- Simpler Nitrogenous Constituents of Yeast. I. Choline and Nicotinic Acid.  
Hubert Bradford Vickery.  
Journal of Biological Chemistry, 1926, LXVIII, 585-592.
- A Histological Study of the Sterility in the Albino Rat Due to a Dietary Deficiency.  
Karl E. Mason.  
Proceedings of the National Academy of Sciences, 1925, XI, 377-382.
- Testicular Degeneration in Albino Rats Fed a Purified Food Ration.  
Karl E. Mason.  
Journal of Experimental Zoology, 1926, XLV, 159-229.
- The Relation of Diet to the Eye.  
Arthur M. Yudkin.  
New York State Journal of Medicine, Jan. 15, 1926.
- Injuries and Diseases of the Peach in Connecticut.  
G. P. Clinton.  
Connecticut Pomological Society Report. (1925) 35: 29-38, 1926.
- Diseases of Vegetables; Spinach Blight; and Celery Spraying.  
G. P. Clinton.  
Conn. Vegetable Growers' Rpt., 1925: 19-29.
- Review of "The Production and Liberation of Spores in the Hymenomycetes and Uredineae, by A. H. Reginald Bullar."  
G. P. Clinton.  
Science LXIII, 571-2, 1925.
- Brief Notes on the Progress of Spraying and Dusting Experiments of the Past Season.  
E. M. Stoddard.  
Conn. Pom. Soc. Rpt. (1925) 35: 15-20, 1920.

- The Uredinales or Rusts of Connecticut and the Other New England States.  
W. R. Hunt.  
Conn. State Geol. & Nat. Hist. Sur. Bul. 36, 158 pages. In press.
- Borers in Relation to Cavities in Trees.  
W. E. Britton.  
Tree Talk, Spring Number, March, 1925.
- Red Mite and Railroad Worm.  
W. E. Britton.  
Rpt. of Thirty-second Annual Meeting of the Mass. Fruit Growers' Assoc., Inc., pp. 175-181, May, 1926.
- Rpt. of Committee on Injurious Insects.  
W. E. Britton.  
Proceedings of the Thirty-fifth Annual Meeting, Conn. Pom. Soc., pp. 38-43, April.
- Insects Attacking Vegetable Crops in Connecticut in 1925.  
W. E. Britton.  
Rpt. of Conn. Vegetable Growers' Assoc., for 1925, pp. 13-20, August.
- Three Injurious Insects Recently Introduced into Conn.  
W. E. Britton.  
Jour. of Economic Entomology, Vol. 19, pp. 540-545, June.
- Some Insects and Entomologists.  
W. E. Britton.  
Fifty-sixth Annual Report of Entomological Soc. of Ontario, pp. 55-63, Sept.
- The Oriental Peach Moth Problem in Conn.  
Philip Garman.  
Proceedings Thirty-fifth Annual Meeting, Conn. Pom. Soc., pp. 44-47, April.
- Effect of the Order of Mixing Various Spray Ingredients on the Formation of Injurious Compounds.  
R. E. Andrew and Philip Garman.  
Journal of Economic Entomology, Vol. 19, p. 671, August.
- Heritable Characters of Maize. XXIII—Silkless.  
D. F. Jones.  
Journal of Heredity, Vol. XVI, No. 9, Sept. 1925.

All of which is respectfully submitted,

GEORGE A. HOPSON,

*Secretary.*

# Report of the Treasurer

July 1, 1925—June 30, 1926

W. L. SLATE, in account with THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION for the fiscal year ended June 30, 1926.

## RECEIPTS.

Balance on hand, July 1, 1925:

State General (Current Expense Appropriation) .....		
Miscellaneous Receipts .....	\$157.38	
		\$157.38
State Appropriation (General or Current Expense) .....	\$53,000.00	
" " (General) (Additions) .....	1,537.06	
" " (Food) .....	7,500.00	
United States Appropriation (Hatch) .....	7,500.00	
" " (Adams) .....	7,500.00	
" " (Purnell) .....	10,000.00	
Fertilizer Analysis Fees .....	12,000.00	
Feed Analysis Fees .....	7,000.00	
Lockwood Trust Fund (including sales of tree seedlings and Mt. Carmel Farm produce) .....	10,000.00	
		116,037.06
Miscellaneous Receipts:		
Sales of gasoline .....	\$436.92	
Sales of automobile oil .....	26.36	
Mileage for use of automobiles .....	173.54	
Court Fees .....	1,286.13	
Sales of old iron and paper .....	32.29	
Sale of old mower .....	39.40	
Payment by C. G. Bartlett for part cost of wire fence .....	25.00	
Miscellaneous .....	5.00	
Interest on bank deposits .....	20.08	
		\$2,044.72
LESS MISCELLANEOUS RECEIPTS DEPOSITED WITH STATE TREASURER .....	1,544.70	
		500.02

## DISBURSEMENTS.

Salaries .....	\$70,990.00
Labor .....	13,734.72
Stationery and Office Supplies .....	845.81
Scientific Supplies (chemicals) .....	751.74
" " (other laboratory) .....	779.33
" " (photographic) .....	65.28
Feeding Stuffs .....	273.98
Insecticides, Fungicides, etc. ....	4.75
Lumber and Small Hardware .....	95.18
Miscellaneous Supplies .....	1,219.01

Automobile Oil .....	\$49.99
Food Samples .....	16.60
Fertilizers .....	642.80
Telegraph and Telephone .....	366.82
Postage .....	401.37
Travel (outlying investigations) .....	2,013.67
" (meetings, etc.) .....	533.50
" (gasoline) .....	1,005.30
Freight, Express and Parcels Post .....	186.04
Publications (bulletins, etc.) .....	392.15
" (miscellaneous) .....	81.33
Coal .....	1,483.80
Gas and Electricity .....	1,813.10
Water .....	147.05
Furniture and Fixtures (new) .....	508.57
" " (repairs) .....	116.24
Library (books and periodicals) .....	962.45
" (binding) .....	
Scientific Equipment (new) .....	539.28
" (repairs) .....	27.20
Automobiles (new) .....	765.00
" (repairs) .....	656.46
Tools, Machinery and Appliances (new) .....	1,051.02
" " (repairs) .....	79.10
New Buildings and Structures .....	4,558.46
Buildings (repairs and alterations) .....	2,213.99
Grounds .....	407.28
Insurance (fire, burglary and automobile) .....	1,128.07
Taxes .....	28.99
Miscellaneous Contingent Expenses .....	169.50

Total Disbursements (not including Insect Pest) \$111,104.93

Balance on hand, June 30, 1926:

State General Appropri. (in hands of State Comptroller) .....	\$4,932.13
Miscellaneous Receipts (in hands of Station Treas.) .....	657.40
	5,589.53
	<u>\$116,694.46</u>



**July 1, 1925—July 1, 1926**

Balance on Hand, July 1, 1925:		
Insect Pest Appropriation .....	\$17,500.00	
“ “ “ (additions) .....	40.18	
		<u>\$17,540.18</u>
Miscellaneous Receipts:		
Mileage for use of automobiles ...	\$38.52	
Sale of honey .....	8.20	
		<u>\$46.72</u>
LESS MISCELLANEOUS RECEIPTS DE-		
POSITED WITH STATE TREASURER ....	40.18	
		<u>6.54</u>
		<u>\$17,546.72</u>

Salaries .....	\$14,010.50
Labor .....	3,711.30
Stationery and Office Supplies .....	73.88
Scientific Supplies (chemical) .....	35.50
“ “ (other laboratory supplies) ..	62.59
“ “ (photographic) .....	30.48
Lumber and Small Hardware .....	8.55
Miscellaneous Supplies .....	203.64
Fuel Oil .....	1,700.47
Automobile Oil .....	5.85
Telegraph and Telephone .....	16.46
Postage .....	74.55
Travel (outlying investigations) .....	437.90
“ (meeting, conferences, etc.) .....	166.49
“ (gasoline for automobiles) .....	186.01
Freight, Express and Parcels Post .....	53.44
Furniture and Fixtures (new) .....	8.58
Library (books and periodicals) .....	38.23
Scientific Equipment (new) .....	57.40
Tools, Machinery and Appliances (new) .....	219.98
“ “ “ (repairs) .....	4.51
Automobiles (repairs) .....	390.83

\* Charged to allotment for second year of fiscal period.

**REPORT OF**  
**W. L. SLATE, Director**  
**IN ACCOUNT WITH**  
**Mosquito Elimination Appropriation**

For the Fiscal Year Ending June 30, 1926

RECEIPTS.

Balance on hand, July 1, 1925 (Petty Cash Fund) ..	\$ 500.00
State Appropriation .....	7,500.00
Additions to Appropriation (Contribution from Towns) .....	1,029.80
<b>Total .....</b>	<b>\$9,029.80</b>

EXPENDITURES.

Salary .....	\$2,300.00
Labor .....	5,359.17
Use of auto carrying men to work and back .....	296.53
Photographic Supplies .....	3.85
Stationery and Office Supplies .....	2.85
Hardware Supplies .....	6.41
Miscellaneous .....	36.05
Automobile Oil .....	4.59
Oil for Mosquito Spraying .....	7.00
Telephone and Telegraph .....	4.32
Postage (excluding parcels post) .....	24.36
Travel (outlying investigations) .....	53.91
" (meetings) .....	32.54
" (gasoline) .....	139.71
Freight, cartage and express .....	2.26
Publications .....	30.45
Furniture and Fixtures (new) .....	50.00
Automobiles (new) .....	1,125.00
" (repairs) .....	114.81
Tools, Machinery and Appliances (new) .....	58.22
" " (repairs) .....	11.30
Buildings (new culverts at Westbrook) .....	25.70
Repairs and alterations to structures .....	20.25
Insurance (automobile) .....	65.69
Contingent .....	4.00
<b>Balance on hand, July 1, 1926 (Petty Cash Fund) ..</b>	<b>\$9,778.97</b>
	<b>500.00</b>
	<b>\$10,278.97</b>
Charged to allotment for second year of fiscal period	<b>1,249.17</b>
	<b>\$9,029.80</b>

**REPORT OF**  
**W. L. SLATE, Director**  
**IN ACCOUNT WITH**  
**Tobacco Research Appropriation**

For the Fiscal Year Ending June 30, 1926

RECEIPTS.

State Appropriation .....	\$10,000.00
Additions to Appropriation (Sales of Tobacco, etc.) .....	9,565.57
<b>Total .....</b>	<b>\$19,565.57</b>

EXPENDITURES.

By the State Comptroller on vouchers submitted by	
W. L. Slate, Jr., Director:	
Salaries .....	\$6,649.98
Labor .....	4,634.39
Stationery and Office Supplies .....	82.01
Chemicals and Laboratory Supplies .....	8.37
Photographic Supplies .....	31.31
Insecticides and Fungicides .....	31.80
Lumber for repairs; small hardware; misc. supplies .....	704.44
Automobile Oil .....	5.70
Fertilizer .....	585.08
Telegraph and Telephone .....	99.73
Travel (outlying investigations) .....	8.70
" (meetings) .....	18.40
" (gasoline) .....	56.44
Postage .....	100.63
Freight, express and cartage .....	14.35
Coal .....	317.01
Electricity .....	168.44
Water .....	5.00
Furniture and Fixtures (repairs) .....	5.84
Books and Periodicals .....	16.00
Scientific Apparatus (new) .....	3,252.33
" (repairs) .....	10.48
Automobiles (new) .....	160.00
" (repairs) .....	77.25
Tools, Machinery and Appliances, (new) .....	31.60
" " (repairs) .....	5.23
Buildings (repairs and alterations) .....	670.02
Rent of Land .....	75.00
Insurance (on automobile, buildings and tobacco) .....	118.00
Contingent .....	1.50
	<b>\$17,945.03</b>
<b>Balance on hand, July 1, 1926 .....</b>	<b>\$1,620.54</b>



**Connecticut Agricultural Experiment Station**  
 New Haven, Connecticut

**Report on Inspection**  
 of  
**Commercial Fertilizers for 1926**

E. M. BAILEY, *Chemist in Charge of the*  
*Analytical Laboratory.*

CONTENTS.

	Page
The Fertilizer Law .....	3
Registrations .....	6
Inspection of 1926 .....	17
Raw Materials Containing Nitrogen .....	18
Raw Materials Containing Phosphoric Acid .....	33
Raw Materials Containing Potash .....	37
Raw Materials Containing Nitrogen and Potash .....	42
Raw Materials Containing Nitrogen and Phosphoric Acid.....	43
Mixed Fertilizers:	
Containing Nitrogen and Phosphoric Acid .....	50
Containing Nitrogen, Phosphoric Acid and Potash .....	50
Special Mixtures and Home Mixtures .....	74
Miscellaneous Fertilizers, Amendments, etc.:	
Wood Ashes .....	80
Sheep Manure, etc. ....	81
Lime, etc. ....	81
Other miscellaneous .....	89
Effect of Chlorides on Burning Quality of Tobacco .....	92

The Bulletins of this Station are mailed free to citizens of Connecticut who apply for them, and to other applicants as far as the editions permit.

# CONNECTICUT AGRICULTURAL EXPERIMENT STATION

## OFFICERS AND STAFF

as of

October, 1926

### BOARD OF CONTROL

His Excellency, Governor John H. Trumbull, *ex-officio*, President.

Charles R. Treat, *Vice President* .....Orange  
George A. Hopson, *Secretary* .....Mount Carmel  
Wm. L. Slate, Jr., *Treasurer* .....New Haven  
Joseph W. Alsop .....Avon  
Elijah Rogers .....Southington  
Edward C. Schneider .....Middletown  
Francis F. Lincoln .....Cheshire

### STAFF.

E. H. JENKINS, PH.D., *Director Emeritus.*

#### ADMINISTRATION.

WM. L. SLATE, JR., B.Sc., *Director and Treasurer.*  
MISS L. M. BRAUTLECHT, *Bookkeeper and Librarian.*  
MISS J. V. BERGER, *Stenographer and Bookkeeper.*  
MISS MARY E. BRADLEY, *Secretary.*  
G. E. GRAHAM, *In charge of Buildings and Grounds.*

#### CHEMISTRY: ANALYTICAL LABORATORY.

E. M. BAILEY, PH.D., *Chemist in Charge.*  
C. E. SHEPARD  
OWEN L. NOLAN  
HARRY J. FISHER, A.B. } *Assistant Chemists.*  
W. T. MATHIS  
FRANK C. SHELDON, *Laboratory Assistant.*  
V. L. CHURCHILL, *Sampling Agent.*  
MISS MABEL BACON, *Stenographer.*

#### BIOCHEMICAL LABORATORY.

T. B. OSBORNE, PH.D., *Chemist in Charge.*  
H. B. VICKERY, PH.D., *Biochemist.*  
MISS HELEN C. CANNON, B.S., *Dietitian.*

#### BOTANY.

G. P. CLINTON, Sc.D., *Botanist in Charge.*  
E. M. STODDARD, B.S., *Pomologist.*  
MISS FLORENCE A. McCORMICK, PH.D., *Pathologist.*  
WILLIS R. HUNT, PH.D., *Assistant in Botany.*  
A. D. McDONNELL, *General Assistant.*  
MRS. W. W. KELSEY, *Secretary.*

#### ENTOMOLOGY.

W. E. BRITTON, PH.D., *Entomologist in Charge;*  
also *State Entomologist.*  
B. H. WALDEN, B.AGR.  
M. P. ZAPPE, B.S. } *Assistant Entomologists.*  
PHILIP GARMAN, PH.D.  
ROGER B. FRIEND, B.Sc., *Graduate Assistant.*  
JOHN T. ASHWORTH, *Deputy in Charge of Gipsy Moth Work.*  
R. C. BOTSFORD, *Deputy in Charge of Mosquito Elimination.*  
MISS GRACE A. FOOTE, B.A., *Secretary.*

#### FORESTRY.

WALTER O. FILLEY, *Forester in Charge.*  
H. W. HICOCK, M.F., *Assistant Forester.*  
J. E. RILEY, JR., M.F., *In Charge of Blister Rust Control.*  
MISS PAULINE A. MERCHANT, *Stenographer.*

#### PLANT BREEDING

DONALD F. JONES, S.D., *Geneticist in Charge.*  
P. C. MANGELSDORF, S.D., *Assistant Geneticist.*  
H. R. MURRAY, B.S., *Graduate Assistant.*

#### SOIL RESEARCH.

M. F. MORGAN, M.S., *Investigator.*  
H. G. M. JACOBSON, M.S., *Assistant.*

#### TOBACCO SUB-STATION AT WINDSOR.

PAUL J. ANDERSON, PH.D., *Pathologist in Charge.*  
N. T. NELSON, PH.D., *Plant Physiologist.*

## Report on Inspection of Commercial Fertilizers, 1926

E. M. BAILEY,

*Chemist in Charge, Analytical Laboratory.*

### THE FERTILIZER LAW.

The provisions of the Connecticut fertilizer law have been discussed in previous reports but for more ready reference its essential features may be noted here.

#### SIGNIFICANCE OF THE TERM "COMMERCIAL FERTILIZERS"

Explaining what is meant by the term "commercial fertilizers" the law says:

"The term 'commercial fertilizers' shall be construed to mean any and every substance imported, manufactured, prepared or sold for fertilizing or manuring or soil amendment purposes, except barnyard manure and stable manure which have not been artificially treated or manipulated, marl and lime. Cottonseed meal, rapeseed meal, castor pomace and all other vegetable products used as fertilizers, including the ashes of cotton hulls and wood ashes, shall be included as fertilizers within the meaning of this act and separate analysis fees shall be paid on each different grade which is sold or offered for sale in the state. The person responsible for paying the fees above prescribed may deduct from the total tonnage sold such sales of cottonseed meal or other vegetable products as are made to anyone who gives a written certificate on a form supplied by the Connecticut Agricultural Experiment Station stating that the material bought by him was to be used exclusively for feed and not for fertilizer."

#### CONCERNING COTTONSEED MEAL.

Cottonseed meal is a fertilizer within the meaning of the Statute but it is provided that when this product is sold for feeding purposes only, it shall be exempt from the tonnage tax.

The status of cottonseed meal under the fertilizer law has been clearly stated in a bulletin<sup>1</sup> from this Station from which the following may be quoted:

*Registration and analysis fees.* "Each brand of cottonseed meal must be registered on forms provided by this Station and an analysis fee of ten dollars paid on it before it is sold, offered or exposed for sale, and on the first day of January annually thereafter."

<sup>1</sup> Bull. of Information No. 9, 1919.



"A distinctive name constitutes a distinct brand. If shipments have different guaranties of composition they are held to be different brands."

*Branding or tagging.* "Since nitrogen is the only fertilizer ingredient considered in the trade in cottonseed meal no guaranty of phosphoric acid or potash is required. If either is guaranteed by the manufacturer, however, an additional fee of ten dollars must be paid on each element. The statement of composition now legal for feeds may be used hereafter if the percentage of nitrogen is stated.

"Note that the law regarding feeding stuffs forbids the use of metal in attaching tags and requires that each package shall be branded or tagged with the statement required by law."

*Duties of shippers.* "It is assumed from correspondence with shippers outside the state that they will register the brands which they sell in Connecticut, will pay analysis fees as has been done in the past by manufacturers of commercial fertilizers, and will semi-annually thereafter pay the tonnage fees.

"They will report to this Station their total sales and if they wish, may report what part has been sold for feed exclusively. From the reports of dealers within the state it will be possible to determine quite closely the amounts of each brand actually used as feed.

"In the case the jobber outside the state neglects or refuses to register a brand, the dealer who sells it within the state is responsible under the law."

*Duties of dealers.* "Dealers are required to file with the director of the Station on July first of each year and semi-annually thereafter a sworn statement of their total sales of each brand of cottonseed meal and the amount of each sold exclusively for feed, during the preceding six months."

#### REQUIREMENTS TO BE COMPLIED WITH BY SELLERS OF COMMERCIAL FERTILIZERS.

The seller is responsible for the proper labeling of each package, for the registration at the Station of every brand sold by him and for the payment of the analysis fee, before offering for sale, and annually thereafter on January 1st.

The law specifies the information which shall be given on the label as follows:

1. *Weight of each package in pounds.*
2. *Brand name or trade mark.*
3. *Analysis:*
  - (a) *Available phosphoric acid, per cent.*
  - (b) *Total phosphoric acid, per cent.*
  - (c) *Nitrogen, per cent.*
  - (d) *Equivalent ammonia, per cent.*
  - (e) *Potash soluble in water, per cent.*
4. *Name and address of the manufacturer or of the person who is responsible for the statement of the guaranty.*

In the case of bone meal, tankage or other organic products, and in basic slag and mineral phosphates in which a large percentage of the phosphoric acid is not available by laboratory methods, the

phosphoric acid shall be claimed as total phosphoric acid unless it is desired to claim available phosphoric acid instead, in which case the guaranty shall take the form set forth above.

The label may be a tag attached to the package or a statement printed thereon. Percentages shall be minimum percentages only.

The presence of leather in its various forms, wool waste, hair, or any inert nitrogenous material shall be declared on the label unless, by processing, the activity of these materials has been rendered satisfactory as determined by official methods.

When potash is derived from sulphate or carbonate of potash it may be so claimed.

No claim or guaranty for less than 0.82 per cent of nitrogen or for less than 1 per cent of phosphoric acid, or for less than 1 per cent of potash shall be regarded in the registration or analysis of any commercial fertilizer.

The seller must also, on the 1st of January and July, report the tonnage of fertilizer sold within the preceding six months and pay to the director of the Station a tonnage fee of 6 cents per ton.

On request, copies of the law and blanks for registration and for tonnage reports will be supplied by the Station.

*If, however, proper labeling, registration and payments have been provided for by the manufacturer of the brands or by another responsible person all sellers of such brands are released from the above mentioned requirements. The retailer, therefore, should assure himself that the requirements of the law have been met by the manufacturers of the brands which he handles, or himself be prepared to meet all these requirements.*

#### PRECAUTIONS TO BE OBSERVED IN DRAWING SAMPLES FOR ANALYSIS.

The analysis of a fertilizer is of no value unless the sample analyzed represents as nearly as possible the stock from which the sample was drawn. The law prescribes the procedure to be followed by authorized agents of this Station when taking official samples for analysis as follows:

"When samples are taken from fertilizers in bags, a tube shall be used, and it shall be inserted at one end of the bag and shall pass substantially the entire length of the bag, so as to take a core of the material being sampled from substantially the entire length of the bag. Samples thus taken from individual bags shall be thoroughly mixed, and the official samples shall be taken from the mixture so drawn by the method known as 'quartering.' Samples of fertilizers taken as herein provided shall be taken from at least five per centum of the separate original unopened packages in the lot, for the mixture from which the official samples shall be taken. If less than one hundred bags are in the lot, at least five bags shall be sampled; if less than five bags, all shall be sampled. Broken packages shall not be sampled."

## GRATUITOUS ANALYSES.

Under the fertilizer law the Station is charged only with the analysis of samples drawn by its own agents. It does, however, each year analyze a considerable number of samples drawn by individuals, representing stock purchased by them for their own use. The object of the purchaser is to satisfy himself as to whether he has obtained goods of the grade represented and, perhaps, to obtain evidence upon which to base a claim for shortage should the materials not meet their guaranties. The Station assumes no responsibility for the sampling in case of such unofficial samples and can only vouch for the accuracy of the results obtained on the materials as submitted. Since a representative sample is as essential as an accurate analysis in judging the quality of a shipment of fertilizer, it is evident that a satisfactory adjustment will seldom be effected on the basis of an unofficial sample. Notwithstanding certain objections which may be raised to the practice of analyzing samples submitted by individuals, the Station is disposed to continue such work so long as there is evidence that it constitutes a useful service; it cannot, however, undertake for any one individual or group, work in such volume or with such frequency that it becomes a systematic control over current purchases. This clearly invades the field of the commercial laboratory.

## REGISTRATIONS.

## LATE REGISTRATIONS FOR 1925.

To the brands registered for 1925 in our last report should be added:

**A. W. Higgins, Inc., South Deerfield, Mass.**

Old Deerfield 7-6-6  
Old Deerfield 6-10-10

## REGISTRATIONS FOR 1926.

For 1926, 67 firms and individuals registered at this Station for sale in this State 422 brands of fertilizers. As required by Statute the brands so registered are listed as follows:

**American Agricultural Chemical Co., New Haven Sales Dept., New Haven, Conn.**

A. A. C. 16% Acid Phosphate  
Acme Fertilizer  
Aroostook Potato Manure  
Castor Pomace  
Complete General Fertilizer  
Double A Tobacco Fertilizer  
Dry Ground Fish

## REGISTRATIONS

Farmer's Friend Fertilizer  
Fine Ground Bone  
Gladiator Fertilizer  
Grass and Lawn Top Dressing  
Hi-Grade Tobacco Manure  
Monarch Fertilizer  
Muriate of Potash  
Nitrate of Soda  
Old Hickory Fertilizer  
Pulverized Sheep Manure  
South American Sheep and Goat Manure  
Sulphate of Potash  
Bowker's All Round Fertilizer  
Bowker's Market Garden Fertilizer  
Bowker's Potato and Vegetable Phosphate  
Bowker's Sure Crop Fertilizer  
Bradley's Blood, Bone and Potash  
Bradley's Complete Manure for Potatoes and Vegetables  
Bradley's Complete Tobacco Manure  
Bradley's Eclipse Fertilizer  
Bradley's Northland Potato Grower  
Bradley's Potato Fertilizer  
Bradley's Potato Manure  
Bradley's Superior Tobacco Compound  
Bradley's XL Superphosphate of Lime  
National Aroostook Special Fertilizer  
National Complete Tobacco Fertilizer  
National Market Garden Fertilizer  
National Pine Tree State Potato Fertilizer  
National Premier Potato Manure  
National White Ash Tobacco Grower  
Sanderson's Atlantic Coast Bone, Fish and Potash  
Sanderson's Complete Tobacco Grower  
Sanderson's Corn Superphosphate  
Sanderson's Formula A  
Sanderson's Formula B  
Sanderson's Potato Manure  
Sanderson's Top Dressing for Grass and Grain  
Stockbridge Early Crop Manure  
Stockbridge Hill and Drill Fertilizer  
Stockbridge Premier Tobacco Grower  
Stockbridge Tobacco Manure

**American Cyanamid Co., 511 Fifth Avenue, New York, N. Y.**  
Ammono-Phos**American Linseed Co., 297 Fourth Ave., New York, N. Y.**  
Alinco Old Process Linseed Meal**Apothecaries Hall Co., Waterbury, Conn.**

Acid Phosphate  
Animal Tankage  
Bone Meal 4-20  
Bone Meal 3-22  
Bone and Meat Tankage  
Carbonate Potash  
Castor Pomace



Cotton Seed Meal  
 Double Sulphate Potash and Magnesia  
 Dry Ground Fish  
 Liberty Corn and All Crops  
 Liberty Corn, Fruit and All Crops  
 Liberty Fish, Bone and Potash  
 Liberty High Grade Market Gardeners  
 Liberty High Grade Tobacco Manure 7-4-7  
 Liberty Onion Special (Potash as Sulphate)  
 Liberty Potato and General Crops  
 Liberty Potato and Market Gardeners' Special  
 Liberty Potato and Vegetable  
 Liberty Tobacco Special 5-4-5  
 Liberty Top Dresser for Grass and Grain  
 Muriate of Potash  
 Nitrate of Soda  
 Nitrate of Soda and Potash  
 Precipitated Bone  
 Sulphate Potash

**Armour Fertilizer Works, 50 Broad St., New York, N. Y.**

Armour's Big Crop Acid Phosphate  
 Armour's Big Crop Bone Meal  
 Armour's Big Crop Fertilizer 2-12-4  
 Armour's Big Crop Fertilizer 3-8-4  
 Armour's Big Crop Fertilizer 4-8-4  
 Armour's Big Crop Fertilizer 4-8-7  
 Armour's Big Crop Fertilizer 4-6-10  
 Armour's Big Crop Fertilizer 4-16-4  
 Armour's Big Crop Fertilizer 5-8-7  
 Armour's Big Crop Fertilizer 8-6-6  
 Armour's Big Crop Super-Phosphate 20%  
 Armour's Big Crop Tobacco Special 5-4-5  
 Armour's Corn Grower  
 Armour's Muriate of Potash  
 Armour's Nitrate of Soda  
 Armour's Sheep Manure  
 Cotton Seed Meal, 8%  
 Ground Tankage

**Ashcraft-Wilkinson Co., Atlanta, Ga.**

Helmet Brand  
 Monarch Brand  
 Paramount Brand

**Atlantic Packing Co., New Haven, Conn.**

Atlantic 4-8-7  
 Atlantic 5-8-7  
 Atlantic Grain Fertilizer 2-8-2  
 Atlantic Potato Phosphate 3-8-4  
 Atlantic Special Vegetable 4-8-4  
 Atlantic Tobacco Grower 5-4-5  
 Atlantic Tobacco Manure 5-8-6  
 Atlantic 5-4-16

**Baker Castor Oil Co., 120 Broadway, New York, N. Y.**  
 Castor Pomace

**The Barrett Co., 40 Rector St., New York, N. Y.**  
 Arcadian Sulphate of Ammonia

**F. A. Bartlett Tree Expert Co., Stamford, Conn.**  
 Bartlett's Green Tree Food

**Berkshire Fertilizer Co., Bridgeport, Conn.**

Berkshire Acid Phosphate  
 Berkshire Castor Pomace  
 Berkshire Complete Fertilizer  
 Berkshire Complete Tobacco  
 Berkshire Dry Ground Fish  
 Berkshire Economical Grass Fertilizer  
 Berkshire Fine Ground Bone  
 Berkshire Grass Special  
 Berkshire Ground Tankage  
 Berkshire Long Island Special  
 Berkshire Market Garden Fertilizer  
 Berkshire Potato and Vegetable Phosphate  
 Berkshire Sheep Manure  
 Berkshire Starter with 10% Potash  
 Berkshire Tobacco Special  
 High Grade Sulphate Potash  
 Muriate Potash  
 Nitrate of Soda

**F. E. Boardman, Middletown, Conn.**

Boardman's Fertilizer for Potatoes and General Crops  
 Boardman's Tobacco Fertilizer

**Amos D. Bridge's Sons, Inc., Hazardville, Conn.**

Corn, Onion and Potato and General Purpose  
 Special Tobacco Fertilizer

**Buckeye Cotton Oil Co., Cincinnati, Ohio.**

Buckeye Cottonseed Meal

**A. H. Case & Co., Inc., 965 William St., Buffalo, N. Y.**

Case's Brand of Pulverized Sheep Manure

**The E. D. Chittenden Co., Bridgeport, Conn.**

Acid Phosphate  
 Castor Pomace  
 Complete Grain 3% Potash  
 Dry Ground Fish  
 Fine Ground Bone  
 Fine Ground Tankage  
 High Grade Potato 7% Potash  
 High Grade Sulphate of Potash  
 High Grade Tobacco  
 Muriate of Potash  
 Nitrate of Soda  
 Potato Special  
 Sulphate of Ammonia  
 Tobacco Special

**Everett B. Clark Seed Co., Milford, Conn.**

16% Acid Phosphate  
Nitrate of Soda  
Special Mixture for General Use  
Special Mixture with 6% Potash  
Super Phosphate  
Tip-Top Brand

**Conn. Fat Rendering & Fertilizer Corp., West Haven, Conn.**  
Tankage**Consolidated Rendering Co., 40 North Market St., Boston, Mass.**

Acid Phosphate  
Castor Pomace  
Dry Ground Fish  
Ground Bone 2.5-25.18  
Ground Bone 3-22.9  
Muriate of Potash  
Nitrate of Soda  
Sulphate of Ammonia  
Sulphate of Potash  
Tankage 6-30  
Tankage 9-20

**C. A. Cowles, Plantsville, Conn.**

Cowles' Complete Corn and Potato

**C. & R. Sales Co., Worcester, Mass.**

C. & R. Lawn and Shrub Fertilizer

**S. P. Davis, Little Rock, Ark.**

Steerboy Brand Cottonseed Meal

**Davey Tree Expert Co., Kent, Portage County, Ohio.**

Davey Tree Food

**Eastern States Farmers' Exchange, 33 Lyman St., Springfield, Mass.**

Eastern States 3-12-3  
Eastern States 4-8-10  
Eastern States 5-8-7  
Eastern States 5-10-5  
Eastern States 8-6-6  
Eastern States 8-16-8  
Eastern States 8-16-20  
Eastern States 10-16-14  
Eastern States Acid Phosphate  
Eastern States Fine Bone Meal  
Eastern States Muriate of Potash  
Eastern States Nitrate of Soda  
Eastern States Sulphate of Ammonia  
Dried Ground Fish  
Ground Animal Tankage  
Open Formula A Tobacco Fertilizer  
Open Formula C Tobacco Fertilizer  
Precipitated Bone  
Sulphate of Potash

**Ed. Eggert, 245 State St., Hartford, Conn.**

Cotton Seed Hull Ashes

**Essex Fertilizer Co., 39 North Market St., Boston, Mass.**

Essex A1 Superphosphate 2-8-2  
Essex Complete Manure 5-8-7  
Essex Fish Fertilizer For All Crops 3-8-4  
Essex Market Garden 4-8-4  
Essex Potato Phosphate 4-8-7  
Essex Tobacco Grower

**Four Seasons Fertilizer Co., Inc., 135 West 29th St., New York, N. Y.**

Four Seasons Fertilizer

**The L. T. Frisbie Co., New Haven, Conn.**

Frisbie's 4-6-10  
Frisbie's 5-8-7  
Frisbie's Corn and Grain Fertilizer 2-8-2  
Frisbie's Fine Bone Meal  
Frisbie's 3/50 Bone Meal  
Frisbie's Market Garden 4-8-7  
Frisbie's Precipitated Bone  
Frisbie's Special 3-8-4  
Frisbie's Special Vegetable and Potato Grower 4-8-4  
Frisbie's Tobacco Grower 5-4-5  
Frisbie's Tobacco Manure 5-8-6  
Frisbie's Top Dresser 7-6-5

**Harris & Co., Portland, Ore.**

"Merino" Brand Ground Sheep Manure

**A. W. Higgins, Inc., South Deerfield, Mass.**

Old Deerfield 3-10-6  
Old Deerfield 4-8-4  
Old Deerfield 5-8-7  
Old Deerfield 7-4-7  
Old Deerfield Acid Phosphate  
Old Deerfield 10-16-14 Concentrated Fertilizer

**Humphreys-Godwin Co., Memphis, Tenn.**

Bull Brand  
Danish Brand  
Dixie Brand

**International Agricultural Corp., 126 State St., Boston, Mass.**

International Acid Phosphate  
International Connecticut Valley Special  
International Crop Grower  
International Economy  
International General Favorite  
International High Grade Manure  
International Ideal  
International Multiple-Strength 8-12-20  
International New England Special  
International Phosphate and Potash  
International Tobacco Producer



I. A. C. Top Dresser and Starter  
 Bone Meal  
 Castor Pomace  
 Cotton Seed Meal  
 Nitrate of Soda  
 Precipitated Bone  
 Sulphate of Potash  
 Tankage

John Joynt Co., Inc., Lucknow, Ontario, Canada.  
 The Joynt Brand Unleached Hardwood Ashes

Spencer Kellogg & Sons, Inc., Buffalo, N. Y.  
 Castor Pomace

King Chemical Co., Inc., Bound Brook, N. J.  
 King Acid Phosphate

Kuttruff, Pickhardt & Co., Inc., New York, N. Y.  
 Floranid (Urea B. A. S. F.)

L. B. Lovitt & Co., Memphis, Tenn.  
 "Lovit Brand" 43% Cotton Seed Meal

Lowell Fertilizer Co., 40 North Market St., Boston, Mass.  
 Lowell Animal Brand A High Grade Manure For All Crops 3-8-4  
 Lowell Bone Fertilizer 2-8-2  
 Lowell Corn and Vegetable 4-8-4  
 Lowell Market Garden Manure 5-8-7  
 Lowell Potato Grower 4-6-10  
 Lowell Potato Phosphate 4-8-7  
 Lowell Tobacco 5-4-5  
 Lowell Top Dressing 7-6-5

The Mapes Formula & Peruvian Guano Co., 270 Madison Ave., New York, N. Y.

The Mapes Connecticut Valley Special  
 The Mapes Corn Manure  
 The Mapes General Tobacco Manure  
 The Mapes General Truck Manure  
 The Mapes General Use Manure  
 The Mapes Grain Brand  
 The Mapes Onion Manure  
 The Mapes Potato Manure  
 The Mapes Special Formula Tobacco Manure  
 The Mapes Special Trucker  
 The Mapes Tobacco Ash Constituents  
 The Mapes Tobacco Manure, Wrapper Brand  
 The Mapes Tobacco Starter, Improved  
 The Mapes Top Dresser  
 Cotton Seed Meal  
 Nitrate of Soda  
 Pure Fine Ground Bone  
 Sulphate of Potash

Mehmel & Sarvi, Plantsville, Conn.  
 Mehmel's Corn, Potato and Onion Fertilizer

Memphis Cottonseed Products Co., Memphis, Tenn.  
 Durham Thirty-Six Cottonseed Meal

Natural Guano Co., Aurora, Ill.  
 "Sheep's Head" Pulverized Sheep Manure

R. N. Neal & Co., Memphis, Tenn.  
 "Triangle" Brand 43% Cottonseed Meal

N. E. By-Products Corp., 20 West St., Lawrence, Mass.  
 Pure Bone Meal

New England Fertilizer Co., 40A North Market St., Boston, Mass.  
 New England Corn Phosphate 2-8-2  
 New England Market Garden Manure 5-8-7  
 New England Potato Phosphate 4-8-7  
 New England Potato and Vegetable Manure 4-8-4  
 New England Superphosphate A High Grade Fertilizer For All Crops 3-8-4  
 New England Tobacco Manure 5-4-5

Olds & Whipple, Inc., Hartford, Conn.  
 O & W Acid Phosphate  
 O & W Castor Pomace  
 O & W Complete Market Garden Fertilizer  
 O & W Complete Tobacco Fertilizer  
 O & W Dry Ground Fish  
 O & W Grain and General Crop Fertilizer  
 O & W Grass Fertilizer  
 O & W High Grade Starter and Potash Compound  
 O & W High Grade Tobacco Starter  
 O & W High Grade Vegetable and Potato Fertilizer  
 O & W Nitrate of Soda  
 O & W Precipitated Bone  
 O & W Pure Bone Meal  
 O & W Tobacco Starter, Blue Label Brand  
 Double Manure Salts  
 High Grade Sulphate of Potash

Pacific Manure & Fertilizer Co., 429 Davis St., San Francisco, Cal.  
 Grozit (Pulverized Sheep Manure)

Parmenter & Polsey Fertilizer Co., 41 North Market St., Boston, Mass.  
 "P & P" Maine Potato Fertilizer 4-6-10  
 "P & P" Plymouth Rock Brand For All Crops 3-8-4

Piedmont-Mt. Airy Guano Co., Baltimore, Md.  
 Harvest Brand 2-8-2  
 Harvest Brand 3-8-4  
 Harvest Brand 4-6-10  
 Harvest Brand 4-8-4  
 Harvest Brand 5-8-7

Harvest Brand 6-8-6  
 Harvest Brand 8-6-6  
 Harvest Brand 16%  
 Muriate Potash  
 Nitrate of Soda  
 Steam Bone

Frank S. Platt Co., 450 State St., New Haven, Conn.  
 Platco Special 5-8-7

Premier Poultry Manure Co., 431 South Dearborn St., Chicago, Ill.  
 Premier Brand Poultry Manure  
 Premier Brand Sheep Manure

The Pulverized Manure Co., 828 Exchange Ave., Chicago, Ill.  
 Wizard Brand Manure  
 Wizard Brand Sheep Manure

Rackliffe Brothers Co., Inc., New Britain, Conn.  
 Rackliffe Brand 4-8-4  
 Rackliffe Brand 5-8-7  
 Rackliffe Brand Nitrate of Soda 18%

The Rogers & Hubbard Co., Portland, Conn.  
 Rogers & Hubbard's All Soils—All Crops Fertilizer  
 Rogers & Hubbard's Climax Tobacco Brand  
 Rogers & Hubbard's Corn and Grain Fertilizer  
 Rogers & Hubbard's High Potash Fertilizer  
 Rogers & Hubbard's Potato Fertilizer  
 Rogers & Hubbard's Tobacco Grower, Vegetable Formula  
 Hubbard's "Bone Base" Oats and Top Dressing  
 Hubbard's "Bone Base" Fertilizer for Seeding Down  
 Hubbard's "Bone Base" Soluble Corn and General Crops Manure  
 Hubbard's "Bone Base" Soluble Potato Manure  
 Hubbard's "Bone Base" Soluble Tobacco Manure  
 Hubbard's Pure Raw Knuckle Bone Flour  
 Hubbard's Strictly Pure Fine Bone  
 5-8-7  
 4-8-4  
 10-3-8  
 Acid Phosphate  
 Castor Pomace  
 Garden Fertilizer  
 Muriate of Potash  
 Nitrate of Soda  
 Tankage

F. S. Royster Guano Co., 602 Citizens National Bank Bldg., Baltimore, Md.

Royster's 16% Acid Phosphate  
 Royster's Fine Ground Bone Meal  
 Royster's Gem Guano  
 Royster's Quality Trucker  
 Royster's Rational Guano  
 Royster's Spearhead Guano  
 Royster's Top Dresser  
 Royster's Trucker's Delight

Royster's 5% Truck Guano  
 Royster's Valley Tobacco Formula  
 Nitrate of Soda  
 Sulphate of Ammonia

M. L. Shoemaker & Co., Inc., Venango St. and Delaware Ave., Philadelphia, Pa.

Shoemaker's "Swift-Sure" 16% Acid Phosphate  
 Shoemaker's "Swift-Sure" Bone Meal  
 Shoemaker's "Swift-Sure" Crop Grower  
 Shoemaker's "Swift-Sure" Special Tobacco Formula  
 Shoemaker's "Swift-Sure" Super Phos. Potato Special  
 Shoemaker's "Swift-Sure" Tobacco and General Use  
 Shoemaker's "Swift-Sure" Tobacco Starter

Springfield Rendering Co., Springfield, Mass.

Springfield Animal Brand 3-8-4  
 Springfield 4-8-7  
 Springfield Market Garden Grower and Top Dresser 5-8-7  
 Springfield Special Potato, Onion and Vegetable 4-8-4  
 Springfield Tobacco Special 5-4-5

I. P. Thomas & Son Co., 1000 Drexel Bldg., Philadelphia, Pa.

16% Acid Phosphate  
 Castor Pomace  
 Economy Fertilizer  
 High Grade Potato Manure  
 I. P. Thomas 5-8-7  
 Long Island Special  
 Muriate of Potash  
 Nitrate of Soda  
 Pure Ground Bone  
 Sulphate of Potash  
 7% Guano  
 Tankage  
 Thomas' Fish and Potash  
 Truckers' High-Grade  
 Thomas' Tobacco Grower (Sulphate of Potash)  
 Tip Top Super-Phosphate  
 Victor Potash Fertilizer

Triton Oil & Fertilizer Co., 101 Beekman St., New York, N. Y.

Triton 4-8-4 Fertilizer  
 Triton 4-8-7 Fertilizer

U. S. Fertilizer Chemical Co., Inc., 85 E. 10th St., New York, N. Y.

Volco Ideal

United States Guano Co., Baltimore, Md.

Standard United States 16% Acid Phosphate  
 Standard United States Bone Meal  
 Standard United States Evergreen Fish Guano  
 Standard United States Fish, Bone and Potash  
 Standard United States Mammoth Potato Grower  
 Standard United States Muriate of Potash  
 Standard United States Nitrate of Soda  
 Standard United States Old Fertility



Standard United States Royal Potato Grower  
 Standard United States 3-9-2  
 Standard United States 5-4-5  
 Standard United States 5-8-5

**Virginia-Carolina Chemical Co. (of Delaware), 120 Broadway, New York, N. Y.**

V-C Aroostook Potato Grower  
 V-C Double Owl Brand  
 V-C Rescue Brand  
 V-C Super-Thirty  
 Nitrate of Soda

**Wilcox Fertilizer Co., Mystic, Conn.**

Wilcox 5-8-7 Fertilizer  
 Wilcox 5-10-5 Fertilizer  
 Wilcox Corn Special  
 Wilcox Dry Ground Fish  
 Wilcox Fish and Potash (1924-25 Formula 4-8-4)  
 Wilcox Potato and Vegetable Phosphate  
 Wilcox Special 4-8-4 Fertilizer  
 Wilcox 7-6-5 Top Dresser  
 Acid Phosphate  
 Ground Blood and Meat Tankage  
 Ground Steamed Bone  
 Muriate of Potash  
 Nitrate of Soda

**Wilson-Martin Co., Philadelphia, Pa.**

Bantle's Wrapper Brand

**S. D. Woodruff & Sons, Orange, Conn.**

Woodruff's Home Mixed Fertilizer

**Worcester Rendering Co., Auburn, Mass.**

Prosperity Brand Complete Dressing  
 Prosperity Brand Corn and Grain Fertilizer  
 Prosperity Brand Market Garden Fertilizer  
 Prosperity Brand Potato and Vegetable Fertilizer

**Wm. P. Young & Son, 22-24 High St., Pottstown, Montgomery Co., Pa.**

Acid Phosphate  
 Ammonium Sulphate  
 Muriate of Potash

**INSPECTION OF 1926.**

During the year the Station inspector has visited 86 towns and villages in the State and drawn 540 official samples, representing all the registered brands which were found on sale. These together with samples submitted by purchasers, or others interested, may be classified as follows:

**CLASSIFICATION OF FERTILIZERS ANALYZED IN 1926.**

		Number of Samples	Page
<b>I. Containing Nitrogen as the chief active ingredient:</b>			
Nitrate of Soda .....	31	18	
Sulphate of Ammonia .....	7	21	
Castor Pomace .....	44	22	
Cottonseed Meal .....	134	26	
Linseed Meal .....	7	26	
<b>II. Containing Phosphoric Acid as the chief active ingredient:</b>			
Precipitated Bone Phosphate .....	8	33	
Dissolved Rock Phosphate or Acid Phosphate ..	21	35	
<b>III. Containing Potash as the chief ingredient:</b>			
Carbonate of Potash .....	11	37	
Muriate of Potash .....	12	37	
Sulphate of Potash .....	10	37	
Sulphate of Potash-Magnesia .....	2	38	
Cotton Hull Ashes .....	3	38	
<b>IV. Containing Nitrogen and Potash:</b>			
Nitrate of Potash and Soda .....	5	42	
Nitrate of Potash .....	1	42	
<b>V. Containing Nitrogen and Phosphoric Acid:</b>			
Dry Ground Fish .....	18	43	
Tankage .....	16	46	
Ground Bone .....	30	46	
<b>VI. Mixed Fertilizers:</b>			
Containing Nitrogen and Phosphoric Acid .....	3	50	
Containing Nitrogen, Phosphoric Acid and Potash .....	253	50	
Special and Home Mixtures .....	64	74	
<b>VII. Miscellaneous fertilizers, amendments, waste products, etc.:</b>			
Wood Ashes .....	20	80	
Sheep Manure, etc. ....	12	81	
Lime, etc. ....	16	81	
Miscellaneous .....	61	89	
<b>Total .....</b>		<b>789</b>	

# I. RAW MATERIALS CHIEFLY VALUABLE FOR NITROGEN.

## NITRATE OF SODA.

Nitrate of Soda is obtained from the west coast of South America, chiefly in Chili. Commercial grades of the salt contain from 91 to 97 per cent of sodium nitrate equivalent to from 15 to 16 per cent of nitrogen.

Thirty-one samples, twenty-three of which were drawn officially by the Station, were examined. Twenty-nine equalled or exceeded their guaranties. Sample 3812 showed the only notable deficiency, but a second sample from another source was not deficient.

Prices, based upon ten quotations, have ranged from \$64.00 to \$85.00 per ton, the average being about \$72.00. Nitrogen from this source has cost on an average about 24 cents per pound.

Analyses are given in Table I.

## OTHER CONCENTRATED AMMONIATES.

There is an increasing interest, both on the part of manufacturers and growers, in some of the newer raw materials which supply nitrogen in concentrated form. Field experience with some of these products is limited, but so far as they have been tried in this State and elsewhere they have produced generally good results. Director Slate has recently discussed<sup>1</sup> some of these newer ammoniates.

*Calcium Cyanamide.* This is an air-nitrogen product which has been manufactured in this country for some years, and is relatively cheap. The Muscle Shoals plant is designed to produce it. The commercial article usually contains 20 to 25 per cent of nitrogen, equivalent to 25 to 30 per cent of ammonia. For fertilizer purposes this form of nitrogen is regarded as of organic nature. It is rather slowly available in the soil and should be applied some time before planting seed. It cannot be used in large quantity in mixed goods containing acid phosphate.

*Ammonium Nitrate.* This salt, formerly made from nitric acid and ammonia, is now made more cheaply in Europe from air nitrogen. The commercial article contains about 41 per cent of ammonia. It leaves no residue in the soil and has given good results on crops so far as it has been tried. It tends to become moist on storage.

*Ammonium Chloride.* (Muriate of Ammonia.) This salt contains about 26 per cent of nitrogen equivalent to about 31 per cent of ammonia. It is seldom used in fertilizers because of

<sup>1</sup> Farmers' Week, Conn. Agr. College, August, 1926.

its relatively high cost. It is being used to some extent in Europe, however, for such purpose.

*Urea.* This is a recent commercial product and is the most concentrated of the newer ammoniates. It contains about 45 per cent of nitrogen, equivalent to 55 per cent of ammonia, and is made by a new process directly from ammonia and carbon dioxide. It leaves no residue in the soil and equals nitrate of soda in availability.

*"Leuna" Saltpeter.* This is a double salt, ammonium sulphate-nitrate, containing 26 per cent of nitrogen of which about  $\frac{1}{4}$  is nitrate nitrogen and  $\frac{3}{4}$  is ammonia nitrogen. It is hygroscopic but a product claimed to be drillable is being offered.

Other raw materials which supply both nitrogen and phosphoric acid are being offered. Of these may be mentioned the following:

*Ammonium Phosphate.* (Ammono-Phos.) This salt is being produced in this country and contains about 14 per cent of ammonia and 45 per cent of phosphoric acid. It has given good results as a fertilizer where tried.

*Urea Phosphate.* It contains 21 per cent of ammonia and 45 per cent of phosphoric acid. Its physical condition is satisfactory and, so far as tried, has given good results in the field.



TABLE I. ANALYSES OF NITRATE OF SODA.

Station No.	Manufacturer or Jobber.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
3752	American Agricultural Chemical Co., New York .....	Station agent. Stock of Bristol Grain & Supply Co., Bristol ....	15.04	15.22
3786	Armour Fertilizer Works, New York .....	Station agent. Stock of Harrison & Gould, Milford .....	15.12	14.81
3550	Apothecaries Hall Co., Waterbury .....	Hatheway & Steane, Inc., Hartford .....	15.34	14.80
3505	Apothecaries Hall Co., Waterbury .....	Hatheway & Steane, Inc., Hartford .....	15.50	14.80
3748	Apothecaries Hall Co., Waterbury .....	Station agent. Stock of J. A. Glasnap, West Cheshire .....	14.90	14.80
3842	Apothecaries Hall Co., Waterbury .....	Hatheway & Steane, Inc., Hartford .....	15.08	14.80
4761	Apothecaries Hall Co., Waterbury .....	American Sumatra Tobacco Co., Bloomfield .....	15.70	14.80
3792	Berkshire Fertilizer Co., Bridgeport .....	Station agent. Stock of Gabriel Dadio, Highwood .....	15.20	15.00
4300	Berkshire Fertilizer Co., Bridgeport .....	Station agent. Stock of E. N. Austin, Suffield .....	15.76	15.00
4216	E. D. Chittenden Co., Bridgeport .....	Station agent. Stock of E. J. Bantle, Glastonbury .....	15.54	15.00
3814	E. B. Clark Seed Co., Milford .....	Station agent. Stock of G. R. Russell, Branford .....	15.20	15.00
3744	Consolidated Rendering Co., Boston .....	Station agent. Stock of L. T. Frisbie Co., New Haven .....	15.50	15.22
3747	Consolidated Rendering Co., Boston .....	Station agent. Stock of Cheshire Reformatory, Cheshire .....	15.28	15.22
4399	Eastern States Farmers' Exchange, Springfield .....	Station agent. Stock of John Swan, Seymour .....	15.46	14.80
4279	International Agricultural Corp., Boston .....	Station agent. Stock of Mehmehl & Sarvi, Plantsville .....	15.52	15.00
4656	Mapes Formula & Peruvian Guano Co., New York ....	Station agent. Stock of Mapes Branch, Hartford .....	15.46	14.81
3759	Olds & Whipple, Inc., Hartford .....	Station agent at factory .....	15.06	15.00
4777	Olds & Whipple, Inc., Hartford .....	John M. Herr, Burnside .....	15.76	15.00
3918	Piedmont-Mt. Airy Guano Co., Baltimore .....	Station agent. Stock of Seymour Grain & Coal Co., Seymour ....	15.44	15.00
3922	Rackliffe Bros. Co., New Britain .....	Station agent at factory .....	15.60	14.80
3784	The Rogers & Hubbard Co., Portland .....	Station agent at factory .....	15.42	14.80
3808	The Rogers & Hubbard Co., Portland .....	Station agent. Stock of E. M. Wooding, North Haven .....	14.84	14.80

TABLE I. ANALYSES OF NITRATE OF SODA—*Concluded.*

Station No.	Manufacturer or Jobber.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
3812	F. S. Royster Guano Co., Baltimore .....	Station agent. Stock of Hitchcock Hardware Co., Watertown ....	14.00	15.00
4086	F. S. Royster Guano Co., Baltimore .....	Station agent. Stock of F. B. Newton, Plainville .....	15.64	15.00
3806	I. P. Thomas & Son, Philadelphia .....	Station agent. Stock of L. B. Wooding, North Haven .....	15.46	15.00
4575	United States Guano Co., Baltimore .....	Station agent. Stock of F. W. Wadhams, Torrington .....	15.64	15.00
4630	Virginia-Carolina Chemical Co., New York .....	Station agent. Stock of E. O. Chapman, North Haven .....	15.96	14.80
3927	The Wilcox Fertilizer Co., Mystic .....	Daigle Bros., Marion .....	15.22	15.00
4636	The Wilcox Fertilizer Co., Mystic .....	Station agent at factory .....	15.48	15.00
3289	38561 .....	American Sumatra Tobacco Co., Bloomfield .....	15.78	....
3290	36151 .....	American Sumatra Tobacco Co., Bloomfield .....	15.98	....

## AMMONIUM SULPHATE.

Ammonium sulphate is chiefly derived as a by-product in the process of manufacturing coke and illuminating gas. The ammonia liquor is distilled over lime, the free ammonia conducted into dilute sulphuric acid and the ammonium sulphate thus formed is separated and dried.

Commercial grades of this raw material contain about 20.5 per cent of nitrogen which is equivalent to 25 per cent of ammonia.

Seven samples were examined all of which equalled or exceeded the guaranties so far as given. All contained over 20.5 per cent of nitrogen, the average being 20.78 per cent.

The price per ton was quoted in only one instance which was \$78.00. On this basis the cost per pound of nitrogen is about 18.8 cents. Last year the cost per pound as calculated ranged from 9.8 to 19.3 and averaged 16.6 cents.

Analyses are given in Table II.

TABLE II. ANALYSES OF SULPHATE OF AMMONIA.

Station No.	Manufacturer or Jobber.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
3665	Apothecaries Hall Co., Waterbury .....	A. N. Shepard & Son, Hartford..	20.90	....
3753	The Barrett Co., New York..	Station agent. Stock of Olds & Whipple, Inc., Hartford .....	20.76	20.75
3926	The Barrett Co., New York..	Daigle Bros., Marion .....	20.86	20.75
4235	E. D. Chittenden Co., Bridgeport .....	Station agent. Stock of E. J. Bantle, Glastonbury .....	20.72	20.50
3882	Consolidated Rendering Co., Boston .....	Station agent. Stock of Geo. S. Jennings, Southport .....	20.86	20.50
4400	Eastern States Farmers' Exchange, Springfield .....	Station agent. Stock of H. H. Tomlinson, Bethany .....	20.80	20.55
4085	F. S. Royster Guano Co., Baltimore .....	Station agent. Stock of W. S. Brown, Trumbull .....	20.56	20.56

## CASTOR POMACE.

Castor pomace is the residue left after removing the oil from the castor bean. It is poisonous to stock and should be kept away from farm animals. It is chiefly valuable in fertilizer mixtures as a source of nitrogen but contains also about one per cent of potash and two per cent of phosphoric acid.

Forty-four samples were analyzed and in only three instances were there any considerable deficiencies in nitrogen, these being 0.17, 0.27 and 0.37 per cent.

Generally this material is sold on a guaranty of about 4.50 per cent nitrogen equivalent to 5.50 per cent of ammonia.

The average nitrogen content found this year is about 5.1 per cent. Last year it was 4.75 per cent.

Prices have ranged from \$23.00 to \$30.00 per ton and averaged \$26.00. If allowance is made for the phosphoric acid and potash present, nitrogen in this material has cost 23.2 cents per pound.

Analyses are given in Table III.

TABLE III. ANALYSES OF CASTOR POMACE.

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
	<b>The American Agricultural Chemical Co., New York City.</b>			
3810	.....	Station agent at factory, New Haven .....	4.86	4.53
4098	N. H. 73174 .....	Spencer Bros., Inc., Suffield .....	5.08	4.52
	<b>Apothecaries Hall Co., Waterbury, Conn.</b>			
4166	.....	Station agent at factory, East Windsor .....	5.34	4.52
4762	.....	American Sumatra Tobacco Co., Bloomfield .....	5.26	4.52
3498	566905 .....	Hatheway & Steane, Inc., Hartford .....	6.01	4.52
3500	38937 .....	Hatheway & Steane, Inc., Hartford .....	5.13	4.52
3501	61864 .....	Hatheway & Steane, Inc., Hartford .....	5.26	4.52
3504	66419 .....	Hatheway & Steane, Inc., Hartford .....	6.11	4.52
3613	20569 .....	Hatheway & Steane, Inc., Hartford .....	5.73	4.52
3672	11653 .....	Hatheway & Steane, Inc., Hartford .....	4.25	4.52
3673	44941 .....	Hatheway & Steane, Inc., Hartford .....	5.38	4.52
3841	83827 .....	Hatheway & Steane, Inc., Hartford .....	4.91	4.52
3955	46448 .....	Hatheway & Steane, Inc., Hartford .....	5.16	4.52
4259	.....	Paul & Ed. Rostek, Melrose .....	4.98	4.52
	<b>Ashcraft-Wilkinson Co., New York City.</b>			
3821	Erie 88563 .....	Spencer Bros., Inc., Suffield .....	5.02	4.52
	<b>Baker Castor Oil Co., New York City.</b>			
3560	35751 .....	American Sumatra Tobacco Co., Bloomfield .....	4.49	4.50
4519	98052 .....	American Sumatra Tobacco Co., Bloomfield .....	4.91	4.50
4520	83959 .....	American Sumatra Tobacco Co., Bloomfield .....	5.01	4.50



TABLE III. ANALYSES OF CASTOR POMACE—*Continued.*

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
4434	Baker Castor Oil Co., New York City.	Station agent, from stock of Apothecaries Hall Co., Water- bury	5.37	4.50
4670		Station agent, from stock of J. H. Reardan, South Windsor	5.06	4.50
2691	Berkshire Fertilizer Co., Bridgeport, Conn.	J. E. Phelps, Suffield	6.35	4.52
2692		J. E. Phelps, Suffield	5.20	4.52
3788		Station agent at factory	4.81	4.52
3824	N. Y. C. 220049	Spencer Bros., Inc., Suffield	4.74	4.52
4095	N. Y. C. 244751	Spencer Bros., Inc., Suffield	5.10	4.52
4298		Station agent, from stock of E. N. Austin, Suffield	4.15	4.52
4691		Station agent, from stock of Man- ning & Kahn, Manchester	5.50	4.52
3932	E. D. Chittenden Co., Bridgeport, Conn.	Allied Tobacco Co., Hartford	4.78	4.52
4456		Station agent, from stock of Allied Tobacco Co., Hartford	5.45	4.52
4214		Station agent, from stock of E. J. Bantle, Glastonbury	5.29	4.52
4488	Consolidated Rendering Co., Boston, Mass.	Station agent, from stock of Mrs. Frank Bantle, Glastonbury	4.35	4.52
4647	International Agricultural Corp., Boston, Mass.	Station agent, from stock of James T. Caffrey, Cromwell	4.64	4.53
4256	Spencer Kellogg & Sons, Inc., Edgewater, N. J.	Richard P. Jones, South Windsor	5.38	4.52
4288		Station agent, from stock of E. J. Bantle, Glastonbury	5.39	4.52

TABLE III. ANALYSES OF CASTOR POMACE—*Concluded.*

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
3901	Olds & Whipple, Inc., Hartford, Conn.	Station agent at factory	5.56	5.00
4211		R. C. Futtner, Burnside	5.30	5.00
4212		R. C. Futtner, Burnside	5.50	5.00
4650	The Rogers & Hubbard Co., Portland, Conn.	Station agent, from stock of John Heller, Glastonbury	4.98	4.75
3915	I. P. Thomas & Son, Philadelphia, Pa.	Station agent, from stock of L. M. Benham, Highwood	5.03	4.50
3587	Manufacturer Unknown. 13105	American Sumatra Tobacco Co., Bloomfield	4.38	....
3588	36179	American Sumatra Tobacco Co., Bloomfield	4.66	....
3589	17155	American Sumatra Tobacco Co., Bloomfield	4.51	....
2869	Long Island 3343	L. T. Frisbie Co., New Haven	4.56	....
2870	Long Island 3345	L. T. Frisbie Co., New Haven	4.56	....

## COTTONSEED MEAL.

One hundred and thirty-four samples of cottonseed meal have been examined. This number includes official samples and those submitted by purchasers.

The classification of samples and the average nitrogen found in each group are given in the following summary:

Grade	No. of Samples.	Average Nitrogen. %
36 per cent protein (5.76 N) .....	15	5.84
41 per cent protein (6.58 N) .....	68	6.60
43 per cent protein (6.88 N) .....	39	6.78
Odd per cent .....	I	...
No guaranty .....	II	6.64

Of one hundred and twenty-three samples with guaranties given, ninety-four exceeded, or substantially met, such guaranties and twenty-nine did not. In the 43 per cent protein group the guaranty of 6.88 per cent nitrogen was not maintained on an average.

The range in price based upon 57 quotations has been from \$33.50 to \$46.00 per ton and the average about \$41.00. On the basis of these figures nitrogen from this source has, therefore, cost about 31.2 cents per pound.

Analyses are given in Table IV.

## LINSEED MEAL.

Seven samples of linseed meal were analyzed. All fully satisfied their guaranties.

Analyses are given in Table IV.

TABLE IV. ANALYSES OF COTTONSEED AND LINSEED MEALS.

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
	<b>Apothecaries Hall Co., Waterbury, Conn.</b>	<b>Cottonseed Meal.</b>		
4168	.....	Station agent at factory, East Windsor .....	6.57	6.58
3497	Dixie, 48490 .....	Hatheway & Steane, Inc., Hartford .....	7.05	6.58
3551	Dixie, 33170 .....	Hatheway & Steane, Inc., Hartford .....	6.74	6.58
3552	Dixie, 35626 .....	Hatheway & Steane, Inc., Hartford .....	5.82	6.58
3553	Dixie, 47807 .....	Hatheway & Steane, Inc., Hartford .....	6.46	6.58
3614	Dixie, 342828 .....	Hatheway & Steane, Inc., Hartford .....	7.16	6.58
3615	Dixie, 174285 .....	Hatheway & Steane, Inc., Hartford .....	7.26	6.58
3616	Dixie, 48419 .....	Hatheway & Steane, Inc., Hartford .....	7.15	6.58
3617	Dixie, 173264 .....	Hatheway & Steane, Inc., Hartford .....	7.37	6.58
3618	Dixie, 120080 .....	Hatheway & Steane, Inc., Hartford .....	7.07	6.58
3670	Dixie, 79787 .....	Hatheway & Steane, Inc., Hartford .....	6.96	6.58
3838	Dixie, 47914 .....	Hatheway & Steane, Inc., Hartford .....	6.50	6.58
3839	Dixie, 16559 .....	Hatheway & Steane, Inc., Hartford .....	6.58	6.58
3957	Dixie, 3700 .....	Hatheway & Steane, Inc., Hartford .....	7.21	6.58
3958	Dixie, 72756 .....	Hatheway & Steane, Inc., Hartford .....	6.89	6.58
3662	249236 (Off Color) .....	A. N. Shepard & Son, Hartford ..	6.80	....
3663	94045 .....	A. N. Shepard & Son, Hartford ..	6.90	....
4081	Dixie (Dark) .....	Mrs. H. Hartz, Burnside .....	6.55	6.58
4131	Dixie .....	Allied Tobacco Co., Hartford ..	6.94	6.58
4441	Dixie (Brown), 158334 .....	C. D. Cannon, Windsor Locks ...	6.56	6.58
4442	Dixie (Brown), P. M. 24109 ..	C. D. Cannon, Windsor Locks ...	6.66	6.58
	<b>Ashcraft-Wilkinson Co., Atlanta, Ga.</b>			
4124	Paramount .....	Station agent, from stock of W. E. Fisk, Warehouse Point .....	5.65	5.75
4159	Monarch .....	Station agent, from stock of Geo. E. Ackley Co., New Milford ...	7.17	6.88



TABLE IV. ANALYSES OF COTTONSEED AND LINSEED MEALS—Continued.

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
	<b>Ashcraft-Wilkinson Co., Atlanta, Ga.</b>	<b>Cottonseed Meal.</b>		
4160	Helmet .....	Station agent, from stock of Geo. E. Ackley Co., New Milford ...	6.28	6.58
4163	Paramount .....	Station agent, from stock of Geo. S. Phelps & Co., Thompsonville	5.77	5.75
3412	39180 .....	American Sumatra Tobacco Co., Bloomfield .....	7.00	....
3413	27601 .....	American Sumatra Tobacco Co., Bloomfield .....	6.69	....
3517	Helmet, 166167 .....	American Sumatra Tobacco Co., Bloomfield .....	6.50	6.58
3561	48229 .....	American Sumatra Tobacco Co., Bloomfield .....	6.95	....
3590	Helmet, 51314 .....	American Sumatra Tobacco Co., Bloomfield .....	6.68	6.58
3591	Helmet, 57021 .....	American Sumatra Tobacco Co., Bloomfield .....	6.54	6.58
3592	Helmet, 25976 .....	American Sumatra Tobacco Co., Bloomfield .....	6.62	6.58
3593	Helmet, 41782 .....	American Sumatra Tobacco Co., Bloomfield .....	6.26	6.58
3594	Helmet, 48303 .....	American Sumatra Tobacco Co., Bloomfield .....	6.92	6.58
3595	Helmet, 95016 .....	American Sumatra Tobacco Co., Bloomfield .....	6.65	6.58
3596	Helmet, 85816 .....	American Sumatra Tobacco Co., Bloomfield .....	6.72	6.58
3597	Helmet, 94627 .....	American Sumatra Tobacco Co., Bloomfield .....	6.58	6.58
3598	Helmet, 340761 .....	American Sumatra Tobacco Co., Bloomfield .....	7.02	6.58
3599	Helmet, 1272 .....	American Sumatra Tobacco Co., Bloomfield .....	6.74	6.58
3600	Helmet, 164431 .....	American Sumatra Tobacco Co., Bloomfield .....	6.28	6.58
3601	Helmet, 518489 .....	American Sumatra Tobacco Co., Bloomfield .....	6.69	6.58
3602	Helmet, 155380 .....	American Sumatra Tobacco Co., Bloomfield .....	7.13	6.58
3603	Helmet, 7692 .....	American Sumatra Tobacco Co., Bloomfield .....	6.27	6.58
4522	Helmet, 75283 .....	American Sumatra Tobacco Co., Bloomfield .....	6.29	6.58

TABLE IV. ANALYSES OF COTTONSEED AND LINSEED MEALS—Continued.

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
	<b>Ashcraft-Wilkinson Co., Atlanta, Ga.</b>	<b>Cottonseed Meal.</b>		
4523	Helmet, 12005 .....	American Sumatra Tobacco Co., Bloomfield .....	6.88	6.58
4524	Helmet, 8159 .....	American Sumatra Tobacco Co., Bloomfield .....	6.47	6.58
4525	Helmet, 104117 .....	American Sumatra Tobacco Co., Bloomfield .....	6.92	6.58
4526	Helmet, 265774 .....	American Sumatra Tobacco Co., Bloomfield .....	7.00	6.58
4527	Helmet, 170170 .....	American Sumatra Tobacco Co., Bloomfield .....	6.42	6.58
2698	Paramount, S. A. L. 80784 ..	The Coles Company, Middletown.	6.28	5.75
3655	Helmet, A. C. L. 36329 .....	Spencer Bros., Inc., Suffield .....	6.58	6.58
3656	Helmet, C. of Ga. 50302 .....	Spencer Bros., Inc., Suffield .....	6.82	6.58
3819	Monarch, I. G. N. 9357 .....	Spencer Bros., Inc., Suffield .....	7.06	6.88
3820	Monarch, C. N. W. 114738 ..	Spencer Bros., Inc., Suffield .....	7.02	6.88
3822	Monarch, C. of Ga. 60227 ...	Spencer Bros., Inc., Suffield .....	6.98	6.88
3823	Monarch, C. C. C. 53209 ....	Spencer Bros., Inc., Suffield .....	7.02	6.88
4202	Paramount, B. & O. 174135 ..	Spencer Bros., Inc., Suffield .....	5.90	5.75
4203	Paramount, I. C. 755930 .....	Spencer Bros., Inc., Suffield .....	5.69	5.75
4204	Paramount, I. C. 162238 .....	Spencer Bros., Inc., Suffield .....	5.64	5.75
4205	Paramount, C. of Ga. 55546 ..	Spencer Bros., Inc., Suffield .....	5.73	5.75
4206	Paramount, R. D. G. 18086 ..	Spencer Bros., Inc., Suffield .....	6.18	5.75
4207	Paramount, N. Y. C. 243230 ..	Spencer Bros., Inc., Suffield .....	5.76	5.75
4208	Paramount, L. & N. 101250 ..	Spencer Bros., Inc., Suffield .....	5.83	5.75
4261	Paramount, C. of Ga. 55505 ..	Spencer Bros., Inc., Suffield .....	5.89	5.75
4262	Paramount, C. of Ga. 56730 ..	Spencer Bros., Inc., Suffield .....	5.72	5.75
	<b>Buckeye Cotton Oil Co., Little Rock, Ark.</b>			
4125	.....	Station agent, from stock of E. J. Bantle, Glastonbury .....	6.66	6.58
	<b>S. P. Davis, Little Rock, Ark.</b>			
3772	Steerboy .....	Amos D. Bridge's Sons, Inc., Hazardville .....	7.00	6.88
	<b>Humphreys-Godwin Co., Memphis, Tenn.</b>			
2917	101674 .....	American Sumatra Tobacco Co., Bloomfield .....	6.44	....
4299	Bull .....	Station agent, from stock of E. N. Austin, Suffield .....	6.77	6.88

TABLE IV. ANALYSES OF COTTONSEED AND LINSEED MEALS—Continued.

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
	<b>Humphreys-Godwin Co., Memphis, Tenn.</b>	<b>Cottonseed Meal.</b>		
3399	Dixie, I. & Gn. 6172 .....	L. B. Hass & Co., Hartford .....	6.87	6.58
3400	Dixie, N. P. 130268 .....	L. B. Hass & Co., Hartford .....	6.82	6.58
3401	Dixie, McP. 120063 .....	L. B. Hass & Co., Hartford .....	7.07	6.58
4776	Bull .....	John M. Herr, Burnside .....	6.46	6.88
4528	Dixie, C. B. & Q. 131429 ....	H. C. Nelson, West Suffield .....	6.58	6.58
4690	Dixie .....	Station agent, from stock of J. P. Norton, Broad Brook .....	7.02	6.58
4426	Bull .....	Edward Perkins, Suffield .....	6.68	6.88
2690	Dixie .....	J. E. Phelps, Suffield .....	6.88	6.58
3997	Bull, A. T. S. F. 46689 .....	Geo. S. Phelps & Co., Thompson- ville .....	6.91	6.88
4398	Dixie .....	J. E. Phelps & Co., Suffield .....	6.55	6.58
4470	Danish .....	Station agent, from stock of Geo. S. Phelps & Co., Thompsonville .....	5.85	5.76
4041	Bull, N. Y. 88340 & S. P. 34627	Spencer Bros., Inc., Suffield .....	6.55	6.88
4042	Bull, S. S. W. 31194 .....	Spencer Bros., Inc., Suffield .....	7.06	6.88
4043	Dixie, G. N. 11653 .....	Spencer Bros., Inc., Suffield .....	6.55	6.58
4044	Dixie, N. K. P. 18488 .....	Spencer Bros., Inc., Suffield .....	6.92	6.58
4096	Bull, N. Y. 77092 & T. P. 31149	Spencer Bros., Inc., Suffield .....	6.88	6.88
4097	Bull, I. C. 172572 .....	Spencer Bros., Inc., Suffield .....	7.02	6.88
4263	Danish, A. C. L. 29150 .....	Spencer Bros., Inc., Suffield .....	5.62	5.76
4264	Bull, W. of A. 977 .....	Spencer Bros., Inc., Suffield .....	6.87	6.88
4265	Bull, N. Y. 87441 & I. N. O. 52782	Spencer Bros., Inc., Suffield .....	6.79	6.88
4266	Bull, N. Y. 72768 & S. S. W. 65341	Spencer Bros., Inc., Suffield .....	7.09	6.88
4267	Bull, N. Y. 76082 & S. L. S. F. 150102	Spencer Bros., Inc., Suffield .....	7.12	6.88
4268	Bull, M. P. 35512 (Brown) ..	Spencer Bros., Inc., Suffield .....	6.77	6.88
4269	Bull, N. Y. 80550 & S. L. S. F. 150352	Spencer Bros., Inc., Suffield .....	7.21	6.88
4270	Bull (Brown), N. P. 48461 ..	Spencer Bros., Inc., Suffield .....	6.82	6.88
4460	Bull .....	Station agent, from stock of Spen- cer Bros., Inc., Suffield .....	7.01	6.88
4461	Dixie .....	Station agent, from stock of Spen- cer Bros., Inc., Suffield .....	6.59	6.58
4562	Bull, N. Y. 75574 & S. F. 20711 .	Spencer Bros., Inc., Suffield .....	6.90	6.88
4563	Bull, N. Y. 89758 & S. P. 22956 ..	Spencer Bros., Inc., Suffield .....	6.79	6.88
4564	Bull, B. & M. 66509 & S. P. 27875	Spencer Bros., Inc., Suffield .....	6.79	6.88
4565	Bull, N. Y. 70254 & S. P. 31139 ..	Spencer Bros., Inc., Suffield .....	6.74	6.88
3388	Dixie, D. L. & W. 39450 .....	Steane, Hartman & Co., Hartford .....	6.92	6.58
3389	Dixie, M. O. P. 38817 .....	Steane, Hartman & Co., Hartford .....	6.72	6.58
3391	Dixie, J. G. & N. 164182 ....	Steane, Hartman & Co., Hartford .....	6.87	6.58
3392	Dixie, S. S. W. 24574 .....	Steane, Hartman & Co., Hartford .....	6.94	6.58
3393	Dixie, Southern 337394 .....	Steane, Hartman & Co., Hartford .....	6.81	6.58

TABLE IV. ANALYSES OF COTTONSEED AND LINSEED MEALS—Continued.

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
Cottonseed Meal.				
Humphreys-Godwin Co., Memphis, Tenn.				
3394	Dixie, S. S. W. 30102 .....	Steane, Hartman & Co., Hartford	6.74	6.58
3395	Dixie, N. Y. C. 244610 .....	Steane, Hartman & Co., Hartford	6.73	6.58
3396	Dixie, L. & N. 101208 .....	Steane, Hartman & Co., Hartford	6.72	6.58
3398	Dixie, C. J. & W. 24114 .....	Steane, Hartman & Co., Hartford	7.02	6.58
3399	J. G. & N. 7312 .....	Steane, Hartman & Co., Hartford	6.92	....
3397	N. P. 24170 .....	Steane, Hartman & Co., Hartford	6.78	....
4070	Bull, 92503 .....	L. Wetstone & Sons, Inc., Hart- ford .....	6.70	6.88
4071	Bull, 17463 .....	L. Wetstone & Sons, Inc., Hart- ford .....	6.69	6.88
4072	Dixie, 165708 .....	L. Wetstone & Sons, Inc., Hart- ford .....	6.46	6.58
4073	Bull, 27986 .....	L. Wetstone & Sons, Inc., Hart- ford .....	6.58	6.88
4074	Dixie .....	L. Wetstone & Sons, Inc., Hart- ford .....	6.32	6.58
International Agricultural Corp., Boston, Mass.				
4649	.....	Station agent, from stock of James T. Caffrey, Cromwell .....	6.90	6.58
L. B. Lovitt & Co., Memphis, Tenn.				
3453	"Lovit" .....	E. H. Rollins, Granby .....	6.57	6.88
3585	"Lovit" .....	Fred H. Kendall, Granby .....	6.90	6.88
4046	"Lovit" .....	Henry E. Wells, Warehouse Point .....	7.00	6.88
4174	"Lovit" .....	Station agent, from stock of Louis C. Bunce, South Manchester ...	6.30	6.88
4182	"Lovit" (Off Grade) .....	Station agent, from stock of M. E. Thompson, Ellington .....	6.53	6.88
4183	"Lovit" (Off Grade) .....	Station agent, from stock of M. E. Thompson, Ellington.....	6.81	6.88
4232	"Lovit" .....	J. C. Dufford, Glastonbury .....	5.50	6.58
4561	"Lovit" .....	Edward Handel, Glastonbury ....	6.76	....
4457	"Lovit" .....	Station agent, from stock of Adolph Lanz, Ellington .....	6.48	6.88
4458	"Lovit" .....	Station agent, from stock of Mr. Rashall, Ellington .....	6.58	6.88
4701	"Lovit" .....	Albert P. Handel, Glastonbury ..	6.01	6.58



TABLE IV. ANALYSES OF COTTONSEED AND LINSEED MEALS—*Concluded.*

TABLE IV.				
Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
		<b>Cottonseed Meal.</b>		
4657	Memphis Cotton Seed Products, Memphis, Tenn. Durham 36% .....	Station agent, from stock of Fred C. Morse, Guilford .....	6.08	5.76
3622	R. N. Neal & Co., Memphis, Tenn. Triangle, No. 1 Del., L. & W. 12385 .....	Clark Bros., Windsor .....	6.84	6.74
3623	Triangle, No. 2 Chicago & N. W. 104494 .....	Clark Bros., Windsor .....	6.53	6.88
4228	<b>Manufacturers Unknown.</b> .....	The P. Schwartz Company, New London .....	5.29	6.88
4756	1067 .....	H. D. Haskins, Amherst, Mass. ..	5.33	....
4757	1068 .....	H. D. Haskins, Amherst, Mass. ..	6.50	....
		<b>Linseed Meal.</b>		
3956	American Linseed Co., Chicago, Ill. 79282 .....	Hatheway & Steane, Inc., Hart- ford .....	5.60	5.44
3840	20104 .....	Hatheway & Steane, Inc., Hart- ford .....	5.60	5.44
3674	79282 .....	Hatheway & Steane, Inc., Hart- ford .....	5.52	5.44
3496	19020 .....	Hatheway & Steane, Inc., Hart- ford .....	5.73	5.44
3495	18304 .....	Hatheway & Steane, Inc., Hart- ford .....	5.49	5.44
3494	18428 .....	Hatheway & Steane, Inc., Hart- ford .....	5.62	5.44
3661	36003 .....	A. N. Shepard & Son, Hartford..	5.75	5.44

II. RAW MATERIALS CHIEFLY VALUABLE FOR  
PHOSPHORIC ACID.

## PRECIPITATED BONE PHOSPHATE.

The phosphorus in this raw material is nearly all in the so-called "available" form. Precipitated bone phosphate is obtained as a by-product in the manufacture of gelatin.

Of the eight samples examined all exceeded their guaranties, so far as guaranties were given, with the exception of No. 3757. In four cases no guaranties were quoted to us, but the samples were of good quality.

So far as prices were quoted available phosphoric acid from this source has cost about 6.4 cents per pound.

Analyses are given in Table V.

TABLE V. ANALYSES OF PRECIPITATED BONE PHOSPHATE.

Station No.	Manufacturer or Wholesale Dealer.	Place of Sampling.	Phosphoric Acid.			
			Citrate- insoluble.	Total.	"Available."	
					Found.	Guaranteed.
			%	%	%	%
4431	<i>Sampled by Station:</i> Apothecaries Hall Co., Water- bury .....	At factory .....	2.08	38.40	36.32	36.0
3894	L. T. Frisbie Co., New Haven	At factory .....	1.38	36.75	35.37	35.0
3757	Olds & Whipple, Inc., Hart- ford .....	At factory .....	1.19	38.25	37.06	38.0
3372	<i>Sampled by Purchaser:</i> 81821 .....	American Sumatra To- bacco Co., Bloomfield	1.03	39.46	38.43	....
3373	62943 .....	American Sumatra To- bacco Co., Bloomfield	1.17	39.06	37.89	....
3499	Apothecaries Hall Co., Water- bury 49514 .....	Hatheway & Steane, Inc., Hartford .....	2.49	40.14	37.65	36.0
4779	Olds & Whipple, Inc., Hart- ford .....	John M. Herr, Burnside	0.60	39.85	39.25	38.0
3666	10274 .....	A. N. Shepard & Son, Hartford .....	1.89	41.28	39.39	....

## ACID PHOSPHATE.

Acid phosphate is the chief source of phosphoric acid in mixed fertilizers. It is obtained by treating ground phosphate rock with sulphuric acid which results in the formation of calcium phosphate of the soluble mono-calcium type and calcium sulphate or gypsum. This mixture is allowed to remain in a tank or "hot bin" where it solidifies after which it is broken up and ground to a suitable condition for use in fertilizer mixtures. This raw material is generally guaranteed to contain 16 per cent of available phosphoric acid.

Twenty-one samples were analyzed all except four of which equalled or exceeded their guaranties. In one case a second sample showed no deficiency.

The average content of available phosphoric acid is 16.4 per cent. On the basis of the average of prices quoted, viz., \$22.50, the cost of available phosphoric acid from this source has been about 6.9 cents per pound.

Analyses are given in Table VI.

## ACID PHOSPHATE

TABLE VI. ANALYSES OF ACID PHOSPHATE.

Station No.	Manufacturer or Wholesale Dealer.	Dealer or Purchaser.	Phosphoric Acid.			
			Total.	Found.	Guaranteed.	Station No.
			%	%	%	
3751	<i>Sampled by Station.</i> American Agricultural Chemical Co., New York .....	Bristol Grain & Supply Co., Bristol .....	16.85	16.50	16.00	3751
4165	Apothecaries Hall Co., Waterbury .....	Sampled at factory, East Windsor .....	17.85	15.71	16.00	4165
3883	Armour's Fertilizer Works, New York .....	F. A. Bartlett Co., Stamford .....	16.10	15.65	16.00	3883
4127	Armour's Fertilizer Works, New York .....	F. A. Bartlett Co., Stamford .....	15.96	15.37	16.00	4127
4410	Berkshire Fertilizer Co., Bridgeport .....	C. Ahearn, Stratford .....	17.65	16.92	16.00	4410
4236	E. D. Chittenden Co., Bridgeport .....	E. J. Bantle, Glastonbury .....	17.45	16.87	16.00	4236
3813	E. B. Clark Seed Co., Milford .....	G. R. Russell, Branford .....	17.35	16.77	16.00	3813
3742	Consolidated Rendering Co., Boston .....	L. T. Frisbie Co., New Haven .....	17.55	16.37	16.00	3742
4404	Eastern States Farmers' Exchange, Springfield, Mass. ....	Ridgewood Farm, North Haven .....	17.35	16.67	16.00	4404
4599	A. W. Higgins, South Deerfield, Mass. ....	J. D. Kelsey, Madison .....	19.10	17.27	16.00	4599
4467	International Agricultural Corp., Boston, Mass. ....	Wm. Colson, West Suffield .....	16.85	16.45	16.00	4467
4284	King Chemical Co., Bound Brook, N. J. ....	Meriden Farmers' Exchange, Meriden .....	16.75	16.52	16.00	4284
3756	Olds & Whipple, Inc., Hartford .....	Sampled at factory .....	18.15	17.00	16.00	3756
3920	Piedmont-Mt. Airy Guano Co., Baltimore, Md. ....	Seymour Grain & Coal Co., Seymour .....	17.30	16.05	16.00	3920
3790	The Rogers & Hubbard Co., Portland .....	H. D. Peters, Highwood .....	16.93	16.58	16.00	3790



TABLE VI. ANALYSES OF ACID PHOSPHATE—Concluded.

Station No.	Manufacturer or Wholesale Dealer.	Dealer or Purchaser.	Phosphoric Acid.				Station No.
			Citrate-insoluble.	Total.	Found.	Guaranteed.	
			%	%	%	%	
3794	<i>Sampled by Station.</i> I. P. Thomas & Son, Philadelphia, Pa. I. P. Thomas & Son, Philadelphia, Pa. F. S. Royster Guano Co., Baltimore, Md.	L. B. Wooding, North Haven	2.40	17.45	15.05	16.00	3794
4024		D. L. Clark & Sons, Milford	1.80	17.90	16.10	16.00	4024
3811		Hitchcock Hardware Co., Watertown	0.65	16.68	16.03	16.00	3811
4001	<i>Sampled by Purchaser.</i> United States Guano Co., Baltimore, Md. The Wilcox Fertilizer Co., Mystic	E. O. Chapman, North Haven	0.15	16.50	16.35	16.00	4001
4294		Henry Joy, Woodstock	0.33	17.90	17.57	17.00	4294
3925		Daigle Bros., Marion	0.24	16.88	16.64	16.00	3925

### III. RAW MATERIALS CHIEFLY VALUABLE FOR POTASH.

The potash ingredient of mixed fertilizers is supplied chiefly in the forms of muriate (chloride) and of sulphate, but the carbonate and nitrate are also used. Tobacco growers in the New England States prefer their potash supply in the form of carbonate or sulphate.

Potash salts are furnished chiefly from German and French sources, but high grade muriate is now produced in California and Utah.

#### CARBONATE OF POTASH.

When pure, carbonate of potash contains 68.2 per cent of actual potash ( $K_2O$ ), but commercial grades usually contain from 60 to 65 per cent.

The eleven samples examined this year all contained over 61 per cent, the range being from 61.1 to 66.6 per cent and the average 64.3 per cent.

Price quotations were limited, but at \$125.00 per ton, which was the price quoted in two cases, potash from this source has cost about 9.7 cents per pound.

Analyses are given in Table VII.

#### MURIATE OF POTASH.

This raw material as obtained in commercial grades contains about 80 per cent potassium chloride which is equivalent to about 50.5 per cent of actual potash ( $K_2O$ ). Guaranties for this salt are generally placed at 48 to 50 per cent potash.

Twelve samples were examined, all except one being official samples taken by the station agent. All samples exceeded 48 per cent of potash so that none can be regarded as inferior. However, four did not meet the guaranties under which they were sold. In one of these cases 4603, another sample, 3924, of the same goods submitted by a purchaser, considerably exceeded the guaranty.

Only two price quotations were obtained and these differed by \$16.00 per ton. The average potash content of the salts examined is 50.4 per cent which, on the basis of the average of quoted prices, makes the cost of potash about 5.1 cents per pound.

Analyses are given in Table VII.

#### SULPHATE OF POTASH.

Commercial grades of this salt contain about 90 per cent of potassium sulphate equivalent to about 48 per cent of potash ( $K_2O$ ), which is the usual guaranty.

Ten samples were examined and all exceeded 48 per cent and met higher guaranties where such were made. The average potash content is 49.29 per cent and the cost per pound has been about 6.6 cents.

Analyses are given in Table VII.

#### SULPHATE OF POTASH-MAGNESIA.

Two samples of this material were found to be of normal potash content and both met their guaranties.

Analyses are given in Table VII.

#### COTTON HULL ASHES.

Cotton hull ashes have not been used as fertilizer in this State to any considerable extent in recent years. They are obtained from the South where the hulls are used for fuel purposes.

They are variable in composition, containing from 10 to 40 per cent or more of potash, 2 to 12 per cent of phosphoric acid and about 10 per cent each of lime and magnesia. These ashes are free, or nearly so, from chlorides and were formerly used to a considerable extent in the Connecticut valley for growing tobacco.

Three samples were analyzed this year. Two of them, **4069** and **4173**, were of curious and unexplained composition. The potash content in these two samples, both of which represented the same stock, was between 8.50 and 9.00 per cent; they contained about 30 per cent of phosphoric acid and 4 and 11 per cent of lime and magnesia respectively.

Examination of the stock showed the material to consist largely of coarse fused masses or clinkers which were very high in phosphoric acid. The hulls had evidently been burned in such a way as to become largely mixed with phosphate.

Sample **4886** from a later shipment was of normal appearance and potash content.

Analyses are given in Table VII.

TABLE VII. ANALYSES OF POTASH SALTS, ETC.

Station No.	Manufacturer or Wholesale Dealer.	Dealer or Purchaser.	Potash.		Station No.
			Found.	Guaranteed.	
4167	Carbonate of Potash. Sampled by Station: Apothecaries Hall Co., Waterbury .....	Sampled at factory .....	% 63.16	% 61.00	4167
4759	Sampled by Purchaser: Apothecaries Hall Co., Waterbury .....	American Sumatra Tobacco Co., Bloomfield .....	63.95	61.00	4759
3671		Hatheway & Steane, Inc., Hartford .....	65.46	61.00	3671
3961		Hatheway & Steane, Inc., Hartford .....	64.35	61.00	3961
3554		American Sumatra Tobacco Co., Bloomfield .....	64.24	.....	3554
3555		American Sumatra Tobacco Co., Bloomfield .....	64.98	.....	3555
3556		American Sumatra Tobacco Co., Bloomfield .....	64.35	.....	3556
3557		American Sumatra Tobacco Co., Bloomfield .....	64.11	.....	3557
3558		American Sumatra Tobacco Co., Bloomfield .....	64.83	.....	3558
3559		American Sumatra Tobacco Co., Bloomfield .....	66.59	.....	3559
2689		P. J. Anderson, Tobacco Station, Windsor .....	61.12	.....	2689
3809	Muriate of Potash. Sampled by Station: American Agricultural Chemical Co., New York City .....	Sampled at factory, New Haven .....	50.53	50.00	3809
3761	Apothecaries Hall Co., Waterbury .....	Sampled at factory .....	50.65	50.00	3761
3787		Harrison & Gould, Milford .....	48.83	48.00	3787



TABLE VII. ANALYSES OF POTASH SALTS, ETC.—Continued.

Station No.	Manufacturer or Wholesale Dealer.	Dealer or Purchaser.	Potash.		Station No.
			Found.	Guaranteed.	
<b>Muriate of Potash.</b>					
<i>Sampled by Station:</i>					
4158	Berkshire Fertilizer Co., Bridgeport .....	Sampled at factory .....	51.68	50.00	4158
4297	Berkshire Fertilizer Co., Bridgeport .....	E. N. Austin, Suffield .....	53.48	50.00	4297
4215	E. D. Chittenden Co., Bridgeport .....	E. J. Bantle, Glastonbury .....	50.80	50.00	4215
3746	Consolidated Rendering Co., Boston, Mass.	Cheshire Reformatory, Cheshire .....	48.81	50.00	3746
4401	Eastern States Farmers' Exchange, Springfield, Mass. ....	Edward Myers, Bethany .....	48.88	50.00	4401
3851	The Rogers & Hubbard Co., Portland ....	H. D. Peters, Highwood .....	49.76	50.00	3851
4573	United States Guano Co., Baltimore, Md.	E. O. Chapman, North Haven .....	50.86	50.00	4573
4603	The Wilcox Fertilizer Co., Mystic .....	Sampled at factory .....	49.08	50.50	4603
<i>Sampled by Purchaser:</i>					
3924	The Wilcox Fertilizer Co., Mystic .....	Daigle Bros., Marion .....	51.40	50.50	3924
<b>Sulphate of Potash.</b>					
<i>Sampled by Station:</i>					
3766	American Agricultural Chemical Co., New York City .....	Geo. S. Phelps & Co., Thompsonville .....	49.78	48.00	3766
4430	Apothecaries Hall Co., Waterbury .....	Sampled at factory .....	48.60	48.00	4430
4296	Berkshire Fertilizer Co., Bridgeport .....	E. N. Austin, Suffield .....	49.04	48.00	4296
4217	E. D. Chittenden Co., Bridgeport .....	E. J. Bantle, Glastonbury .....	48.80	48.00	4217
3743	Consolidated Rendering Co., Boston, Mass.	L. T. Frisbie Co., New Haven .....	49.68	48.00	3743

TABLE VII. ANALYSES OF POTASH SALTS, ETC.—Concluded.

Station No.	Manufacturer or Wholesale Dealer	Dealer or Purchaser.	Potash.		Station No.
			Found.	Guaranteed.	
Sulphate of Potash.					
Sampled by Station:					
4499	The Mapes Formula & Peruvian Guano	S. J. Orr, West Suffield	50.26	48.00	4499
3754	Co., New York City Olds & Whipple, Inc., Hartford	Sampled at factory	49.65	48.65	3754
Sampled by Purchaser:					
3667	Apothecaries Hall Co., Waterbury	A. N. Shepard & Son, Hartford	48.51	48.00	3667
4760	Apothecaries Hall Co., Waterbury	American Sumatra Tobacco Co., Bloomfield	49.84	48.00	4760
4780	Olds & Whipple, Inc., Hartford	John M. Herr, Burnside	48.66	48.65	4780
Sulphate of Potash-Magnesia.					
Sampled by Station:					
4432	Apothecaries Hall Co., Waterbury	Sampled at factory	27.98	26.00	4432
3755	Olds & Whipple, Inc., Hartford	Sampled at factory	28.05	26.00	3755
Cotton Hull Ashes.					
Sampled by Station:					
4886	Ed. Eggert, Hartford	John Sullivan & Son, Suffield	15.04	....	4886
Sampled by Purchaser:					
4173	Ed. Eggert, Hartford	John Sullivan & Son, Suffield	8.92	12.75	4069
4069	Ed. Eggert, Hartford	John Sullivan & Son, Suffield	8.62	12.75	4173

#### IV. RAW MATERIALS CONTAINING NITROGEN AND POTASH.

Six samples of this group of materials have been examined, three taken by the station agent and three sent by purchasers.

Analyses are given in Table VIII.

**3762.** Nitrate of Soda and Potash. Apothecaries Hall Co., Waterbury. Sampled by station agent at factory.

**4180.** Nitrate of Soda and Potash. Apothecaries Hall Co., Waterbury. Sampled by station agent, stock of Chas. Cass, Wallingford.

**4181.** Nitrate of Soda and Potash. Apothecaries Hall Co., Waterbury. Sampled by station agent at factory, East Windsor.

**4610.** Nitrate of Soda and Potash. Apothecaries Hall Co., Waterbury. Submitted by Apothecaries Hall Co.

**4489.** Nitrate of Soda and Potash. Apothecaries Hall Co., Waterbury. Submitted by Jas. S. Burroughs Co., New York.

**2688.** Nitrate of Potash. Manufacturer unknown, stock of J. E. Phelps, Suffield.

TABLE VIII. ANALYSES OF NITRATE OF SODA AND POTASH, ETC.

Station No.	3762	4180	4181	4610	4489	2688
Nitrogen:	%	%	%	%	%	%
found .....	14.78	15.24	14.88	....	14.80	13.72
guaranteed .....	14.80	14.81	14.81	....	14.80	....
Equivalent to ammonia:						
found .....	17.97	18.53	18.09	....	17.99	16.68
guaranteed .....	18.00	18.00	18.00	....	18.00	....
Potash:						
found .....	10.08	10.99	11.21	11.56	12.06	46.28
guaranteed .....	12.00	12.00	12.00	12.00	12.00	....

The five samples of nitrate of potash and soda represent the same original stock. This stock was offered by Apothecaries Hall Co., Waterbury, and purchased by them through Jas. S. Burroughs Co., New York. It was sold on a guaranty of 12 per cent potash and 18 per cent ammonia.

The first sample taken by the station agent, **3762**, was considerably deficient in potash. Further official samples taken at the warehouse of Apothecaries Hall Co. and from the stock of a purchaser failed to substantiate the 12 per cent guaranty of potash but were found to be considerably higher in potash than our first sample. Exchanges of samples were made between the importers, the dealer and the Station for purposes of checking results. Numbers **4181**, **4610** and **4489** are portions of one official sample. Number **4489** represents the portion submitted first to Jas. S. Burroughs Co., New York, who afterwards sent us a subsample for a check analysis. Unfortunately, the package was damaged

in transit to us and our result is without significance so far as checking the analysis made for the importers is concerned. Their result for potash was reported to us at 12.88 per cent.

The stock in question was rather coarse and somewhat lumpy, hence sampling was more difficult than usual. Our first result is apparently too low to fairly represent these goods; but there is no evidence that the product as received here would average as much as 12 per cent of potash.

#### V. RAW MATERIALS CONTAINING NITROGEN AND PHOSPHORIC ACID.

##### DRY GROUND FISH.

Non-edible fish such as menhaden and dogfish and the offal from fish canneries are used in making this fertilizer material. The fish is steamed and pressed to remove oil and afterwards dried and ground.

Eighteen samples, ten of which were sampled by the station agent, were analyzed.

All samples equalled or exceeded guaranties for phosphoric acid and all, with one exception, **4635**, substantially met or exceeded the guaranties for nitrogen. This material has contained, on an average, 8.55 per cent of nitrogen and 6.92 per cent of phosphoric acid. At the price quoted, about \$70.00 per ton, and allowing 4 cents per pound for phosphoric acid, nitrogen from this source has cost about 37.7 cents per pound.

Analyses are given in Table IX.



TABLE IX. ANALYSES OF DRY GROUND FISH.

44

CONNECTICUT EXPERIMENT STATION

BULLETIN 282

Station No.	Manufacturer or Wholesale Dealer.	Dealer or Purchaser.	Nitrogen.		Ammonia equivalent to total nitrogen.	Phosphoric Acid.		Station No.
			Total found.	Total guaranteed.		Total found.	Total guaranteed.	
			%	%	%	%	%	
3878	<i>Sampled by Station:</i> American Agricultural Chemical Co., New York City .....	Sampled at factory, New Haven	8.18	8.23	9.95	8.13	6.00	3878
3764	Apothecaries Hall Co., Waterbury ....	Sampled at factory .....	8.38	8.20	10.19	7.13	5.00	3764
4671	Apothecaries Hall Co., Waterbury ....	J. P. Norton, Broad Brook .....	8.28	8.20	10.07	5.85	5.00	4671
3789	Berkshire Fertilizer Co., Bridgeport ..	Sampled at factory .....	8.39	8.22	10.20	6.35	6.00	3789
4295	Berkshire Fertilizer Co., Bridgeport ..	E. N. Austin, Suffield .....	8.66	8.22	10.53	6.28	6.00	4295
4301	Berkshire Fertilizer Co., Bridgeport ..	T. W. Ryan, Stratford .....	8.37	8.22	10.18	6.33	6.00	4301
4213	E. D. Chittenden Co., Bridgeport .....	E. J. Bantle, Glastonbury .....	8.42	8.00	10.24	6.90	6.00	4213
4238	Consolidated Rendering Co., Boston, Mass. ....	L. T. Frisbie Co., New Haven ..	8.54	8.22	10.38	6.90	6.40	4238
3902	Olds & Whipple, Inc., Hartford .....	Sampled at factory .....	9.10	8.23	11.06	7.05	5.00	3902
4635	The Wilcox Fertilizer Co., Mystic ....	Sampled at factory .....	8.56	9.04	10.41	7.10	6.00	4635
4763	<i>Sampled by Purchaser:</i> Apothecaries Hall Co., Waterbury ....	American Sumatra Tobacco Co., Bloomfield .....	8.34	8.20	10.14	5.70	5.00	4763
3503	Apothecaries Hall Co., Waterbury 49514	Hatheway & Steane, Inc., Hart- ford .....	8.94	8.20	10.87	7.72	5.00	3503

TABLE IX. ANALYSES OF DRY GROUND FISH.—Concluded.

Station No.	Manufacturer or Wholesale Dealer.	Dealer or Purchaser.	Nitrogen.		Ammonia equivalent to total nitrogen.	Phosphoric Acid.		Station No.
			Total found.	Total guaranteed.		Total found.	Total guaranteed.	
			%	%	%	%	%	
3549	<i>Sampled by Purchaser:</i> Apothecaries Hall Co., Waterbury (Truck) .....	Hatheway & Steane, Inc., Hart- ford .....	8.72	8.20	10.60	7.73	5.00	3549
3844	Apothecaries Hall Co., Waterbury 79527	Hatheway & Steane, Inc., Hart- ford .....	8.95	8.20	10.88	7.25	5.00	3844
4257	Berkshire Fertilizer Co., Bridgeport ..	Paul and Ed. Rostek, Melrose ..	8.65	8.22	10.52	6.60	6.00	4257
3414	Olds & Whipple, Inc., Hartford .....	American Sumatra Tobacco Co., Bloomfield .....	9.00	8.23	10.94	7.12	5.00	3414
4778	Olds & Whipple, Inc., Hartford .....	John M. Herr, Burnside .....	8.15	8.23	9.91	7.08	5.00	4778
3664	10274 .....	A. N. Shepard & Son, Hartford	8.26	....	10.04	7.30	....	3664

DRY GROUND FISH

45

## TANKAGE.

The material sold under this name is generally bone and meat refuse material which has been cooked with steam, defatted and dried. The analysis depends upon the relative amounts of bone and meat in the product; tankage containing less than 5 per cent of nitrogen and over 15 per cent of phosphoric acid has a considerable admixture of bone. High grade tankage contains 8 to 10 per cent of nitrogen and from 5 to 10 per cent of phosphoric acid.

Garbage tankage is obtained by processing city garbage and is of less value as a fertilizer. Such material will usually contain 2.5 to 3.5 per cent of nitrogen and from 2 to 5 per cent of phosphoric acid.

Sixteen samples were analyzed, all of the bone and meat variety. Samples **4237**, **3783** and **4120** did not meet guaranties for nitrogen, while one sample, **3745**, was deficient in phosphoric acid.

Analyses are given in Table X.

## GROUND BONE.

Thirty samples of ground bone or bone meal, twenty-one of which were sampled by the station agent, were analyzed.

All of the guaranties for phosphoric acid were met but samples **4477**, **4484**, **3793** and **4574** did not meet their guaranties for nitrogen.

Analyses are given in Table XI.

TABLE X. ANALYSES OF TANKAGE.

Station No.	Manufacturer.	Dealer or Purchaser.	Nitrogen		Ammonia equivalent to total nitrogen.	Phosphoric Acid.		Mechanical Analysis.		Station No.
			Total found.	Total guaranteed.		Found.	Guaranteed.	Finer than 1-50 inch.	Coarser than 1-50 inch.	
3749	<i>Sampled by Station:</i> Apothecaries Hall Co., Waterbury.. Apothecaries Hall Co., Waterbury.. Berkshire Fertilizer Co., Bridgeport .. E. D. Chittenden Co., Bridgeport .. Conn. Fat Rendering and Fertilizer Corp., New Haven .....	J. A. Glasnap, West Cheshire ... Sampled at factory .....	3.88	3.29	4.72	23.90	20.00	55.0	45.0	3749
3763			7.38	7.40	9.99	4.75	3.00	61.0	39.0	3763
4419			7.26	7.40	8.97	11.10	6.86	43.0	57.0	4419
4237			7.26	7.40	8.83	10.95	9.00	40.0	60.0	4237
3745			4.26	3.29	5.18	19.80	22.88	54.0	46.0	3745
3783	Consolidated Rendering Co., Boston Consolidated Rendering Co., Boston Consolidated Rendering Co., Boston Consolidated Rendering Co., Boston Consolidated Rendering Co., Boston International Agricultural Corp., Boston .....	Sampled at factory .....	7.15	7.41	8.69	14.60	9.15	32.0	68.0	3783
3795			10.77	....	13.09	7.35	....	21.0	79.0	3795
4061			3.90	....	4.74	17.68	....	37.0	63.0	4061
4487			5.22	4.94	6.35	15.53	14.00	27.0	73.0	4487
4681			7.50	7.41	9.12	10.25	9.15	27.0	73.0	4681
4655	The Rogers & Hubbard Co., Portland .....	Frank Flannigan, West Cheshire..	4.89	4.93	5.95	15.65	11.00	52.5	47.5	4655
4120			4.45	4.93	5.41	15.68	....	42.0	58.0	4120
4578			5.69	5.76	6.92	11.14	11.25	37.0	63.0	4578
4602	I. P. Thomas & Son, Philadelphia, Pa. .... Wilcox Fertilizer Co., Mystic .....	Frank Seaman, Milford .....	7.89	7.40	9.59	8.33	4.57	51.5	48.5	4602
3780			6.37	....	7.74	12.75	....	11.0	89.0	3780
3923	<i>Sampled by Purchaser:</i> Consolidated Rendering Co., Boston Wilcox Fertilizer Co., Mystic .....	C. R. Burr & Co., Inc., Manchester Daigle Bros., Marion .....	9.81	7.40	11.93	4.30	4.57	65.0	35.0	3923



TABLE XI. ANALYSES OF GROUND BONE.

Station No.	Manufacturer.	Dealer or Purchaser.	Nitrogen.		Ammonia equivalent to total nitrogen.	Phosphoric Acid.		Mechanical Analysis.		Station No.
			Found.	Guaranteed.		Found.	Guaranteed.	Finer than 1-50 inch.	Coarser than 1-50 inch.	
	<i>Sampled by Station:</i>		%	%	%	%	%	%	%	
3750	American Agricultural Chemical Co., New York .....	Bristol Grain & Supply Co., Bristol	2.64	2.47	3.21	23.60	22.88	61.5	38.5	3750
3765	Apothecaries Hall Co., Waterbury	Sampled at factory .....	3.96	3.29	4.81	22.70	20.00	50.0	50.0	3765
3875	Armour's Fertilizer Works, New York .....	Harrison & Gould, Milford .....	2.52	2.47	3.06	23.70	22.00	37.0	63.0	3875
3791	Berkshire Fertilizer Co., Bridgeport	W. D. Thomas, Highwood .....	2.76	2.47	3.36	22.75	20.00	51.0	49.0	3791
4218	E. D. Chittenden Co., Bridgeport ..	E. J. Bantle, Glastonbury .....	2.65	2.47	3.22	23.75	22.00	65.0	35.0	4218
3881	Consolidated Rendering Co., Boston	Herbert Grulich, Meriden .....	2.74	2.46	3.33	25.95	22.90	49.0	51.0	3881
4477	Consolidated Rendering Co., Boston	Rockville Milling Co., Rockville ..	1.87	2.05	2.27	28.20	25.18	56.5	43.5	4477
4484	Eastern States Farmers' Exchange, Springfield, Mass. ....	H. H. McKnight, Ellington .....	2.22	2.46	2.70	24.55	23.09	44.0	56.0	4484
3905	L. T. Frisbie Co., New Haven ....	Geo. S. Jennings, Southport .....	2.96	2.46	3.60	26.30	22.90	48.5	51.5	3905
4482	L. T. Frisbie Co., New Haven ....	Frank S. Platt Co., New Haven ..	4.05	3.28	4.92	22.32	22.00	42.0	58.0	4482
4286	International Agricultural Corp., Boston .....	James T. Caffrey, Cromwell .....	2.90	2.47	3.53	23.25	22.00	64.0	36.0	4286
4503	New England By-Products Co., Lawrence, Mass. ....	M. Kosenko, Plainville .....	3.90	3.75	4.74	26.30	25.00	77.0	23.0	4503
3760	Olds & Whipple, Inc., Hartford ...	Sampled at factory .....	3.20	2.50	3.89	25.45	22.00	47.0	53.0	3760
4696	Piedmont-Mt. Airy Guano Co., Baltimore .....	Seymour Grain & Coal Co., Seymour .....	2.44	2.47	2.97	25.35	22.90	62.5	37.5	4696
3782	The Rogers & Hubbard Co., Portland .....	Caúwell & Jones, Hartford .....	3.85	3.82	4.68	25.95	24.70	81.0	19.0	3782
3785	The Rogers & Hubbard Co., Portland .....	Sampled at factory .....	3.41	3.29	4.14	23.60	20.50	40.0	60.0	3785

TABLE XI. ANALYSES OF GROUND BONE—Concluded.

Station No.	Manufacturer.	Dealer or Purchaser.	Nitrogen.		Ammonia equivalent to total nitrogen.	Phosphoric Acid.		Mechanical Analysis.		Station No.
			Found.	Guaranteed.		Found.	Guaranteed.	Finer than 1-50 inch.	Coarser than 1-50 inch.	
	<i>Sampled by Station:</i>		%	%	%	%	%	%	%	
4002	F. S. Royster Guano Co., Baltimore	Hitchcock Hardware Co., Watertown .....	2.90	2.47	3.53	23.08	22.90	65.0	35.0	4002
3914	M. L. Shoemaker & Co., Philadelphia .....	Olds & Whipple, Inc., Hartford ..	5.67	4.51	6.89	20.50	20.00	37.5	62.5	3914
3793	I. P. Thomas & Son, Philadelphia ..	L. B. Wooding, North Haven ...	2.28	2.45	2.77	25.65	23.00	51.0	49.0	3793
4574	United States Guano Co., Baltimore	Rackliffe Bros. Co., New Britain	2.24	2.46	2.72	23.75	22.00	38.5	61.5	4574
4292	The Wilcox Fertilizer Co., Mystic ..	Henry Joy, Woodstock .....	2.84	2.46	3.45	23.73	22.00	49.0	51.0	4292
	<i>Sampled by Purchaser:</i>									
3502	Apothecaries Hall Co., Waterbury ..	Hatheway & Steane, Inc., Hartford	4.52	3.29	5.50	21.94	20.00	64.0	36.0	3502
3845	Apothecaries Hall Co., Waterbury ..	Hatheway & Steane, Inc., Hartford	4.13	3.29	5.02	22.45	20.00	49.5	50.5	3845
3846	Apothecaries Hall Co., Waterbury ..	Hatheway & Steane, Inc., Hartford	4.00	3.29	4.86	23.35	20.00	72.5	27.5	3846
3959	Apothecaries Hall Co., Waterbury ..	Hatheway & Steane, Inc., Hartford	3.88	3.29	4.72	20.80	20.00	45.0	55.0	3959
3513	29790 .....	American Sumatra Tobacco Co., Bloomfield .....	3.28	....	3.99	24.40	....	48.0	52.0	3513
3514	700444 .....	American Sumatra Tobacco Co., Bloomfield .....	3.18	....	3.87	25.09	....	43.0	57.0	3514
3515	40855 .....	American Sumatra Tobacco Co., Bloomfield .....	2.98	....	3.62	23.76	....	46.0	54.0	3515
3516	13323 .....	American Sumatra Tobacco Co., Bloomfield .....	2.76	....	3.36	23.22	....	39.0	61.0	3516
4521	93489 .....	American Sumatra Tobacco Co., Bloomfield .....	3.14	....	3.82	25.10	....	50.0	50.0	4521

## VI. MIXED FERTILIZERS.

MIXTURES CONTAINING ONLY NITROGEN AND  
PHOSPHORIC ACID.

Three samples of this group of materials were analyzed.

**3758.** Ammo Phos. American Cyanamid Co., New York. Sampled by the station agent from stock of Olds & Whipple, Inc., Hartford, Conn.

**4536.** Shoemaker's "Swift-Sure" Tobacco Starter. M. L. Shoemaker & Co., Philadelphia, Penn. Sampled by the station agent from stock of F. S. Bidwell Co., Windsor Locks.

**4501.** O & W High Grade Tobacco Starter. Olds & Whipple, Inc., Hartford, Conn. Sampled by the station agent from stock of E. O. Gates, Pine Meadow.

	3758	4536	4501
	%	%	%
Nitrogen, found .....	16.37	3.52	9.56
guaranteed .....	16.45	3.28	8.23
Ammonia equivalent to nitrogen ..	19.90	4.28	11.62
Phosphoric acid, total .....	22.30	11.45	4.68
available, found .....	21.72	9.95	4.53
guaranteed ..	20.00	10.00	3.00

Ammo Phos contains no organic nitrogen. The quality of the organic nitrogen in the two other samples was satisfactory as judged by the usual laboratory methods.

MIXTURES CONTAINING NITROGEN, PHOSPHORIC ACID  
AND POTASH.

Analyses of two hundred and forty-seven official samples of complete fertilizers, and of six samples submitted by purchasers or others interested, are given in Table XII.

In this table the "grade" of the fertilizer is given in addition to the brand name; and in the analysis the items of ammonia, available phosphoric acid and potash found are given in bold face type so that the comparison between the composition claimed and that found may be more readily seen. A brand represented as 4-8-4, for example, is guaranteed to contain not less than 4 per cent of ammonia, not less than 8 per cent of available phosphoric acid and not less than 4 per cent of potash.

Some of the conspicuous facts shown by the inspection this year may be seen in the following summary:

Total number of official samples analyzed .....	247
Samples considerably deficient in	
one item .....	69
two items .....	13
three items .....	1
total .....	83
Total deficiencies .....	98
Total of guaranties made (247 x 3) .....	741
Samples showing deficiencies in money value greater than \$1.00 per ton .....	11

This tabulated statement shows that about  $\frac{1}{3}$  of the samples examined have failed to fully satisfy their guaranties in all of the three items of plant food guaranteed; that of the total number of guaranties made (there being three for each sample), about 87 per cent have been substantially met or exceeded; that considerable losses in money value (greater than \$1.00 per ton), have not been involved, excepting eleven samples representing only about 4.5 per cent of the total number.

These data are in close accord with similar calculations made last year. One sample in three has failed to meet the claim in one or more of the three items of plant food guaranteed. While many of these shortages are relatively small, and perhaps within the limit of reasonable analytical differences, nevertheless *guaranties required by law are minimum guaranties and they ought to be met in all cases.*

## CONCERNING DEFICIENT SAMPLES.

In ten samples this year deficiencies in plant food have exceeded \$1.00 per ton.<sup>1</sup> In some cases second samples have not been found deficient or such deficiencies have not exceeded the above value. In other cases, however, second samples could not be secured.

TABLE XIII. SAMPLES SHOWING COMMERCIAL DEFICIENCIES.

No.	Brand.	Approximate deficiency in money value per ton.
4090	Stockbridge Early Crop Manure 5-8-7 .....	\$1.29
4223	Armour's Big Crop Fertilizer 5-8-7 .....	2.24
3986	Armour's Big Crop Fertilizer 5-8-7 .....	1.16
3884	Bartlett's Green Tree Food 6-8-4 .....	3.17 <sup>2</sup>
4483	Eastern States 8-16-20 .....	5.84
4511	Piedmont-Mt. Airy Harvest Brand 6-8-6 .....	2.45
4544	Rogers & Hubbard 10-3-8 .....	3.68 <sup>3</sup>
4539	Royster's 5% Truck Guano 5-8-7 .....	11.58 <sup>3</sup>
4547	Royster's Valley Tobacco Formula 5-4-5 .....	2.36
4579	U. S. Fertilizer Chemical Co. Volco Ideal 2-4-5-8 ..	3.41
3921	Woodruff's Home Mixed Fertilizer 4-8-6 .....	1.18

<sup>1</sup> In calculating these values, averages have been balanced against shortages and ammonia has been reckoned at 21 cents per pound, available phosphoric acid at 6 cents and potash at  $4\frac{1}{2}$  cents.

<sup>2</sup> Second sample not deficient.

<sup>3</sup> See page 52.



**3884.** Bartlett's Green Tree Food. Both this sample and a second sample, **4126**, were low in "available" phosphoric acid. The manufacturer explained that a good share of the phosphorus used was derived from bone. Since the conventional method for determining "available" phosphoric acid does not apply satisfactorily to bone and tankage, the low results reported may be thus explained.

**4539.** Royster's 5% Truck Guano. This sample was taken from a small lot of six bags. The analysis shows only about one-half as much nitrogen as is guaranteed and the manufacturer raised the question of a possible mixture with other goods when our sample was drawn. We are unable to find any error in the identity of the brand or in the sampling; and our analytical results have been checked by ourselves and substantially confirmed by the manufacturer. It is unfortunate, however, that other shipments of this brand could not be located and further analyses made.

**4510.** Piedmont-Mt. Airy Guano Co., Harvest Brand 4-6-10. This sample showed a deficiency of 2.5 per cent in potash.

**4023.** I. P. Thomas & Sons Economy Fertilizer. This sample was 1.49 per cent below guaranty in available phosphoric acid. If the phosphorus was derived from bone the explanation already given for No. **3884** applies here.

**4058, 4293.** Wilcox Potato and Vegetable Phosphate, 4-8-6. Both samples were deficient in potash.

**4178, 4453 and 4754.** Sanderson's Atlantic Coast Bone Fish and Potash. These three samples were all low in available phosphoric acid but all represented the same stock. Another sample, **4416**, from a different source was not deficient. Phosphoric acid in this mixture is derived from bone.

#### COMMERCIAL DEFICIENCIES FOR A PERIOD OF YEARS.

In a system of inspection where many brands are represented by a single analysis the products of the several manufacturers may not be fairly evaluated in any one year. Although it is our practice to examine at least two samples of any brand showing considerable deficiencies, a second sample is not always obtainable. Comparisons are more informing, therefore, if made upon data covering a period of years. A number of different bases might be chosen for such comparisons, but since it has been our practice for many years to cite brands in which commercial deficiencies amount to one dollar or more per ton, these data have been compiled for the 6-year period 1921-1926, and are tabulated in Table XIV. No manufacturer is included unless ten or more samples have been analyzed in the period covered. The compilation shows that of a total of about 1500 samples analyzed less than 10 per cent have fallen short of guaranties to any considerable extent

in commercial value. Or, in other words, purchasers have received commercial values represented by the guaranties in over 90 per cent of purchases made.

TABLE XIV. COMMERCIAL DEFICIENCIES 1921-1926 INCLUSIVE.

Manufacturer.	Total number of samples.	Number equaling or exceeding guaranties in money value.	Per cent for 6 yr. period.	Per cent for 1926.
American Agricultural Chemical Co. ....	259	247	95	98
Apothecaries Hall Co. ....	49	49	100	100
Armour Fertilizer Works ....	64	46	72	78
Atlantic Packing Co. ....	43	39	91	100
Berkshire Fertilizer Co. ....	51	51	100	100
Boardman, F. E. ....	12	12	100	100
Bowker Fertilizer Co. <sup>1</sup> .....	71	63	...	...
Bridges, A. D. & Sons ....	13	13	100	100
Chittenden, E. D. Co. ....	39	35	90	100
Clark, E. B. Seed Co. ....	28	26	93	100
Coe-Mortimer Co. ....	30	27	90	...
Eastern States Farmers' Exchange	56	47	84	86
Essex Fertilizer Co. ....	40	39	98	100
Frisbie, L. T. Co. ....	65	55	85	100
International Agricultural Corp.	53	48	91	100
Lowell Fertilizer Co. ....	61	53	87	100
Mapes Fertilizer and Peruvian Guano Co. ....	77	76	99	100
New England Fertilizer Co. ....	48	45	94	100
Nitrate Agencies Co. ....	14	11	79	...
Olds & Whipple, Inc. ....	37	37	100	100
Parmenter & Polsey Fertilizer Co.	21	20	95	100
Piedmont-Mt. Airy Guano Co. ...	24	15	63	80
Rogers & Hubbard Co., The ....	82	79	96	93
Royster, F. S. Guano Co. ....	45	33	73	75
Sanderson Fertilizer & Chemical Co. <sup>1</sup> .....	41	39	...	...
Shoemaker, M. L. & Co. ....	17	17	100	100
Springfield Rendering Co. ....	25	23	92	100
Thomas, I. P. & Son ....	12	12	...	100
Virginia-Carolina Chemical Co. ...	49	46	94	100
Wilcox Fertilizer Works ....	50	47	94	100
Worcester Rendering Co. ....	21	18	86	100
Total .....	1,497	1,368	91	96

<sup>1</sup> Included under American Agricultural Chemical Co. this year.

#### DECREASE IN PROPORTION OF FERTILIZER WITH LOW PLANT FOOD CONTENT.

In a previous report<sup>1</sup> it has been pointed out that nitrogen costs two to three times as much in low grade (1 per cent ammonia) fertilizers as in high grade mixtures.

<sup>1</sup> Conn. Exp. Sta., Bull. 241, p. 110, 1922.

A study of grades with reference to ammonia content, also cited in an earlier report,<sup>1</sup> shows that in the period 1921 to 1924 inclusive, the proportion of samples containing 1 per cent of ammonia decreased from 10 per cent to 2 per cent; that the proportion containing 3 per cent or less of ammonia decreased from 54 per cent to 30 per cent; and that the proportion containing 4 per cent or more of ammonia increased from 46 per cent to 70 per cent.

At the Massachusetts conference of the Soil Improvement Committee it was recently shown<sup>2</sup> that low analysis (less than 14 per cent of total plant food) mixtures have decreased both in number and tonnage. Thus, in 1922 there were 29 low analysis mixtures in Massachusetts representing a tonnage of about 8000; in 1925 there were only 9 such mixtures representing a tonnage of less than 2100. It was also shown that of the total registrations in New England in 1925, 784 were high analysis (14 per cent or over) brands and 126 were brands containing less than 14 per cent of plant food. On an average, low analysis brands comprised about 14 per cent of total registrations in New England, varying in the several States from 1/10 to 1/5 of their total registrations.

#### NEW ENGLAND "STANDARD NINE."

Nine standard grades have been recommended for use in New England. The experience in this State has been that in the three years following the proposal of these nine grades, the number of samples analyzed which corresponded exactly to the "standard nine" comprised in 1923, 32 per cent; in 1924, 36 per cent; and in 1925, 44 per cent, of the total. During the year just passed the proportion is 44 per cent. The data show an increasing number of samples each year excepting the last, falling in the selected grades, but the proportion is still less than 1/2 of the total.

Citing Director Haskell's report again it appears, from a tonnage standpoint, that in the four-year period 1922-1925 inclusive, five, of the "standard nine," viz., 4-8-4, 5-8-7, 5-4-5, 8-6-6, and 3-10-4, have maintained, or increased in, tonnage; three grades, viz., 0-12-6, 2-12-4 and 3-10-6 serve no evident necessity judging from tonnage returns; and one grade, 4-8-6, has shown a marked decrease in tonnage. Some of the standard grades have, moreover, been outstripped in tonnage by closely related formulas, such as 4-8-7, 3-8-4, and 3-8-6. The report concludes that there is apparent need of revision of the nine grades originally proposed.

<sup>1</sup> Conn. Exp. Sta., Bull. 261, p. 57, 1924.

<sup>2</sup> Report of S. B. Haskell, Director of the Massachusetts Experiment Station.

Our classification of samples this year with respect to the "Standard Nine" is as follows:

Grade.	No. of Samples.
0-12-6 .....	0
2-12-4 .....	4
3-10-4 .....	7
3-10-6 .....	3
4- 8-4 .....	35
4- 8-6 .....	4
5- 4-5 .....	24
5- 8-7 .....	31
8- 6-6 .....	1
Total .....	109

Other grades in which a considerable number of samples have fallen are as follows:

Grade.	No. of Samples
2-8-2 .....	8
3-8-4 .....	17
4-8-7 .....	17
7-6-5 .....	8
Total .....	50

#### QUALITY OF THE INSOLUBLE ORGANIC NITROGEN.

The present accepted methods of evaluating the insoluble organic nitrogen in fertilizer materials distinguishes between the better and the poorer forms of nitrogen. Activity values below 50 per cent by the alkaline method and below 80 per cent by the neutral method are accepted as indicating inferior nitrogenous material. Both methods should be applied before judgment is passed in any case.

During the past season four samples have shown activity values somewhat less than those mentioned, but in all of them the water-soluble nitrogen practically equalled or exceeded the guaranties of total nitrogen and the samples were passed.



TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station: American Agricultural Chemical Co., New York.</i>			
3877	Acme Fertilizer .....	1-9-4	North Haven .....
4221	Aroostook Potato Manure .....	5-8-7	Bloomfield .....
3938	Complete General Fertilizer .....	3-8-4	North Haven .....
4665	Double A Tobacco Fertilizer .....	5-4-5	Gaylordsville .....
3939	Farmers' Friend Fertilizer .....	2-12-4	North Haven .....
3935	Gladiator Fertilizer .....	4-8-7	New Britain .....
4093	Grass and Lawn Top Dressing .....	6-6-4	Stafford Springs ...
4668	Hi-Grade Tobacco Manure .....	7-4-7	Windsor .....
3934	Monarch Fertilizer .....	4-8-4	New Britain .....
4664	Old Hickory Fertilizer .....	2-8-10	Granby .....
4084	Bowker's All Round Fertilizer .....	3-8-4	New Milford .....
4091	Bowker's Market Garden Fertilizer .....	4-8-4	Mansfield Depot ...
4088	Bowker's Potato and Vegetable Phosphate ..	2-9-3	Willimantic .....
4089	Bowker's Sure Crop Fertilizer .....	1-9-4	Willimantic .....
4092	Bradley's Blood, Bone and Potash .....	5-8-7	Stafford Springs ...
4094	Bradley's Complete Manure for Potatoes and Vegetables .....	4-8-7	Stafford Springs ...
4414	Bradley's Complete Tobacco Manure .....	5-4-5	Glastonbury .....
3943	Bradley's Eclipse Fertilizer .....	1-9-4	Meriden .....
4412	Bradley's Northland Potato Grower .....	4-8-4	Simsbury .....
4219	Bradley's Potato Fertilizer .....	2-9-3	Stafford Springs ...
3937	Bradley's Potato Manure .....	3-8-4	Suffield .....
3936	Bradley's XL Superphosphate of Lime .....	3-10-4	Thompsonville .....
3941	National Aroostook Special Fertilizer .....	5-8-7	Silver Lane .....
4415	National Complete Tobacco Fertilizer .....	5-4-5	Simsbury .....
3942	National Market Garden Fertilizer .....	3-8-4	Silver Lane .....
4411	National Pine Tree State Potato Fertilizer ..	4-8-4	Warehouse Point ...
4755	National Pine Tree State Potato Fertilizer ..	4-8-4	New Haven .....
3944	National Premier Potato Manure .....	4-8-7	Greenwich .....
4178	Sanderson's Atlantic Coast Bone, Fish and Potash .....	3-10-4	West Cheshire .....
4416	Sanderson's Atlantic Coast Bone, Fish and Potash .....	3-10-4	Simsbury .....
4453	Sanderson's Atlantic Coast Bone, Fish and Potash .....	3-10-4	West Cheshire .....
4754	Sanderson's Atlantic Coast Bone, Fish and Potash .....	3-10-4	West Cheshire .....
4413	Sanderson's Complete Tobacco Grower .....	5-4-5	New Milford .....
4176	Sanderson's Corn Superphosphate .....	2-9-3	South Coventry .....
3940	Sanderson's Formula A .....	4-8-4	Guilford .....
4177	Sanderson's Formula B .....	4-8-7	West Cheshire .....
4179	Sanderson's Potato Manure .....	3-8-4	Durham .....

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH.

Nitrogen.					Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
In nitrates.	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As murate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	
0.07	0.39	0.41	0.19	1.06	1.29	0.35	9.43	9.08	4.36	4.36	3877
0.44	2.56	0.54	0.49	4.03	4.90	0.33	8.64	8.31	7.14	7.14	4221
0.15	1.45	0.49	0.46	2.55	3.10	0.50	8.73	8.23	4.05	4.05	3938
0.69	0.73	0.01	2.76	4.19	5.09	0.18	4.23	4.05	0.48	5.65	4665
0.10	0.90	0.36	0.40	1.76	2.14	0.50	12.50	12.00	4.04	4.04	3939
0.31	1.74	0.68	0.45	3.18	3.87	0.73	8.70	7.97	6.95	6.95	3935
1.63	2.50	0.40	0.55	5.08	6.18	0.38	6.60	6.22	3.84	3.84	4093
0.65	0.72	0.17	4.18	5.72	6.95	0.50	5.40	4.90	0.35	7.00	4668
0.46	1.73	0.37	0.62	3.18	3.87	0.38	8.19	7.81	4.02	4.02	3934
0.06	0.88	0.45	0.32	1.71	2.08	0.73	8.75	8.02	9.74	9.74	4664
0.10	1.36	0.55	0.54	2.55	3.10	0.83	8.98	8.15	4.05	4.05	4084
0.43	1.72	0.43	0.62	3.20	3.89	0.45	8.45	8.00	3.79	3.79	4091
0.02	0.78	0.50	0.38	1.68	2.04	0.66	9.68	9.02	3.38	3.38	4088
0.03	0.33	0.39	0.22	0.97	1.18	0.45	9.50	9.05	4.01	4.01	4089
0.35	2.50	0.64	0.53	4.02	4.89	0.40	8.57	8.17	7.11	7.11	4092
0.45	1.84	0.69	0.47	3.45	4.19	0.71	8.69	7.98	7.19	7.19	4094
0.52	0.58	0.15	2.65	3.90	4.74	0.31	4.00	3.69	0.41	5.80	4414
0.10	0.36	0.33	0.23	1.02	1.24	0.40	9.57	9.17	4.00	4.00	3943
0.38	1.78	0.64	0.49	3.29	4.00	0.95	8.95	8.00	3.90	3.90	4412
0.11	0.78	0.42	0.35	1.66	2.03	0.68	9.34	8.66	3.40	3.40	4219
0.06	1.45	0.59	0.42	2.52	3.06	0.55	8.55	8.00	4.03	4.03	3937
0.06	1.42	0.72	0.39	2.59	3.15	0.73	10.72	9.99	4.01	4.01	3936
0.37	2.60	0.52	0.46	3.95	4.80	0.51	8.47	7.96	6.86	6.86	3941
0.41	0.67	0.16	2.68	3.92	4.77	0.28	4.90	4.62	0.56	5.14	4415
0.13	1.40	0.47	0.45	2.45	2.98	0.48	8.51	8.03	3.96	3.96	3942
0.34	1.68	0.43	0.63	3.08	3.74	0.48	8.50	8.02	3.93	3.93	4411
0.36	1.82	1.22	3.40	4.13	0.98	9.00	8.02	3.78	3.78	3.78	4755
0.37	1.73	0.79	0.42	3.31	4.02	0.66	8.51	7.85	7.59	7.59	3944
0.46	1.74	0.50	0.57	3.27	3.98	0.66	8.60	7.94	4.04	4.04	4178
0.12	1.32	0.61	0.47	2.52	3.06	0.85	11.00	10.15	3.97	3.97	4416
0.36	1.62	0.55	0.49	3.02	3.67	0.73	9.50	8.77	3.95	3.95	4453
0.23	1.57	1.10	2.90	3.53	0.80	10.00	9.20	4.18	4.18	4.18	4754
0.42	0.56	0.25	2.83	4.06	4.94	0.23	4.28	4.05	0.47	5.30	4413
0.13	0.68	0.40	0.35	1.56	1.89	0.38	9.33	8.95	2.96	2.96	4176
0.45	1.79	0.44	0.61	3.29	4.00	0.42	8.42	8.00	3.97	3.97	3940
0.72	1.23	0.12	1.38	3.45	4.19	1.63	9.55	7.92	1.04	6.68	4177
0.12	1.46	0.39	0.53	2.50	3.04	0.53	8.53	8.00	3.98	3.98	4179

TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station:</i> <b>American Agricultural Chemical Co., New York—Concluded.</b>			
4175	Sanderson's Top Dressing for Grass and Grain	6-6-4	South Coventry
4090	Stockbridge Early Crop Manure	5-8-7	Mansfield Depot
3933	Stockbridge Hill and Drill Fertilizer	4-8-7	Bristol
4087	Stockbridge Tobacco Manure	5-4-5	Glastonbury
<b>Apothecaries Hall Co., Waterbury.</b>			
3880	Liberty Corn and All Crops 2-8-2	2-8-2	Branford
3885	Liberty Corn, Fruit and All Crops 2-12-4	2-12-4	Greenwich
3992	Liberty Fish, Bone and Potash 3-8-3	3-8-3	Branford
3985	Liberty High Grade Market Gardeners	5-8-7	West Cheshire
4433	Liberty High Grade Tobacco Manure 7-4-7	7-4-7	East Windsor
3990	Liberty Potato and Market Gardeners' Special 4-8-4	4-8-4	North Haven
3991	Liberty Onion Special (Potash as Sulphate) 4-8-7	4-8-7	North Haven
4436	Liberty Potato and General Crop 4-8-10	4-8-10	Rockville
4169	Liberty Tobacco Special 5-4-5	5-4-5	East Windsor
3995	Liberty Top Dresser for Grass and Grain 10-3-5-8	10-3-5-8	Greenwich
<b>Armour Fertilizer Works, New York.</b>			
4161	Armour's Big Crop Fertilizer 3-8-4	3-8-4	Thompsonville
4606	Armour's Big Crop Fertilizer 3-8-4	3-8-4	Waterbury
3987	Armour's Big Crop Fertilizer 4-8-4	4-8-4	Milford
4222	Armour's Big Crop Fertilizer 4-8-4	4-8-4	Madison
4429	Armour's Big Crop Fertilizer 4-6-10	4-6-10	Wallingford
3986	Armour's Big Crop Fertilizer 5-8-7	5-8-7	Milford
4223	Armour's Big Crop Fertilizer 5-8-7	5-8-7	Madison
4162	Armour's Big Crop Tobacco Special 5-4-5	5-4-5	Thompsonville
4428	Armour's Corn Grower 2-8-2	2-8-2	Danbury
<b>Atlantic Packing Co., New Haven, Conn.</b>			
4407	Atlantic 4-8-7	4-8-7	Glastonbury
4439	Atlantic 5-4-16	5-4-16	Glastonbury
4438	Atlantic Grain Fertilizer 2-8-2	2-8-2	South Windsor
4164	Atlantic Special Vegetable 4-8-4	4-8-4	Silver Lane
4408	Atlantic Tobacco Grower 5-4-5	5-4-5	East Hartford
4669	Atlantic Tobacco Grower 5-4-5	5-4-5	South Windsor
<b>F. A. Bartlett Tree Expert Co., Stamford, Conn.</b>			
3884	Bartlett's Green Tree Food	6-8-4	Stamford
4126	Bartlett's Green Tree Food	6-8-4	Stamford

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH—Continued.

Nitrogen.						Phosphoric Acid.			Potash.		Station No.
In nitrates.	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.	Ammonia equivalent to total nitrogen.	Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	
1.60	2.62	0.19	0.55	4.06	6.03	0.45	6.60	6.15	3.88	3.88	4175
0.36	2.45	0.66	0.46	3.93	4.78	0.63	8.65	8.02	6.56	6.56	4090
0.51	1.82	0.59	0.50	3.42	4.16	0.65	9.00	8.35	6.71	6.71	3933
0.48	0.54	0.14	2.77	3.93	4.78	0.13	3.80	3.67	0.58	5.82	4087
0.12	1.00	0.48	0.65	2.25	2.74	2.20	10.31	8.11	3.05	3.05	3880
0.00	1.35	0.43	0.14	1.92	2.33	1.38	13.36	11.98	4.32	4.32	3885
0.79	1.02	0.42	0.66	2.89	3.51	1.93	9.73	7.80	3.07	3.07	3992
0.84	2.00	0.28	0.16	4.18	5.08	0.85	9.05	8.20	7.14	7.14	3985
0.18	1.86	0.18	3.80	6.02	7.32	0.38	7.70	7.32	1.63	7.19	4433
0.84	2.08	0.25	0.30	3.47	4.22	1.28	9.43	8.15	4.00	4.00	3990
1.50	0.10	0.42	1.80	3.82	4.66	1.75	9.93	8.18	1.53	7.61	3991
2.39	0.98	0.24	0.09	3.70	4.50	0.88	9.63	8.75	9.60	9.60	4436
0.06	1.02	0.15	2.71	3.94	4.79	0.30	5.95	5.65	0.77	5.91	4169
1.07	7.07	0.03	0.06	8.23	10.01	0.25	3.85	3.60	8.28	8.28	3995
0.19	1.26	0.48	0.61	2.54	3.09	0.97	8.36	7.39	3.91	3.91	4161
0.13	1.18	0.46	0.71	2.48	3.02	0.93	8.89	7.96	4.24	4.24	4606
0.82	1.12	0.56	0.72	3.22	3.91	0.69	8.58	7.89	4.26	4.26	3987
0.82	1.24	0.56	0.62	3.24	3.94	0.78	8.70	7.92	4.21	4.21	4222
0.50	1.26	0.98	0.64	3.38	4.11	1.10	7.60	6.50	10.93	10.93	4429
0.94	1.66	0.51	0.75	3.86	4.69	0.83	8.90	8.07	7.06	7.06	3986
1.00	1.53	0.60	0.77	3.90	4.74	1.20	8.80	7.60	6.26	6.26	4223
0.70	0.10	0.26	3.09	4.15	5.05	0.50	5.00	4.50	0.48	5.41	4162
0.16	0.90	0.20	0.57	1.83	2.22	0.75	8.70	7.95	2.12	2.12	4428
1.57	0.54	0.70	0.49	3.30	4.01	1.28	9.39	8.11	6.71	6.71	4407
1.31	0.89	0.56	1.55	4.31	5.24	1.83	8.58	6.75	1.47	17.32	4439
0.65	0.03	0.46	0.53	1.67	2.03	1.41	9.55	8.14	2.04	2.04	4438
0.52	1.61	0.60	0.54	3.27	3.98	1.18	9.40	8.22	3.88	3.88	4164
1.67	0.07	0.51	1.89	4.14	5.03	0.93	5.68	4.75	0.23	5.55	4408
1.64	0.09	0.38	2.03	4.14	5.03	0.85	5.85	5.00	0.31	5.00	4669
0.03	3.79	0.04	0.79	4.65	5.65	3.61	10.18	6.57	4.02	4.02	3884
0.15	4.40	0.12	0.75	5.42	6.59	2.10	8.20	6.10	5.33	5.33	4126



TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station:</i>			
<b>Berkshire Fertilizer Co., Bridgeport, Conn.</b>			
4224	Berkshire Complete Fertilizer .....	3-8-3	Chester .....
4437	Berkshire Complete Tobacco .....	5-4-5	Hazardville .....
4435	Berkshire Economical Grass Fertilizer .....	10-3-8	Ellington .....
4667	Berkshire Economical Grass Fertilizer .....	10-3-8	Rockville .....
3993	Berkshire Grass Special .....	7-6-5	New Canaan .....
3989	Berkshire Long Island Special .....	5-8-7	Highwood .....
3988	Berkshire Market Garden Fertilizer .....	4-8-4	Highwood .....
3994	Berkshire Potato and Vegetable Phosphate ..	2-9-3	New Canaan .....
4405	Berkshire Tobacco Special .....	7-4-7	Suffield .....
4607	Berkshire Starter 10% Potash .....	5-8-10	Ellington .....
4683	Berkshire Starter 10% Potash .....	5-8-10	Rockville .....
<b>Frank E. Boardman, Middletown, Conn.</b>			
4684	Boardman's Complete Fertilizer, Potato and General Use .....	4-7-4	Middletown .....
4689	Boardman's Tobacco Fertilizer .....	4-7-4	Middletown .....
<b>Amos D. Bridge's Sons, Hazardville, Conn.</b>			
4220	Corn, Onion and Potato and General Use ..	4-8-4	Hazardville .....
4485	Special Tobacco Fertilizer .....	5-4-5	Hazardville .....
4688	Special Tobacco Fertilizer .....	5-4-5	Hazardville .....
<b>E. D. Chittenden Co., Bridgeport, Conn.</b>			
4406	Complete Grain 3% Potash .....	2-9-3	Bloomfield .....
4409	High Grade Potato with 7% Potash .....	5-8-7	Abington .....
4242	High Grade Tobacco .....	6.5-3-7.5	Glastonbury .....
4243	Potato Special .....	4-8-4	Glastonbury .....
4234	Tobacco Special .....	5-4-5	Glastonbury .....
<b>E. B. Clark Seed Co., Milford, Conn.</b>			
3858	Special Mixture for General Use .....	4-8-4	Branford .....
3856	Special Mixture with 6% Potash .....	4-8-6	Branford .....
3857	Superphosphate .....	5-8-7	Branford .....
3855	Tip Top Brand .....	5-10-5	Branford .....
4682	Tip Top Brand .....	5-10-5	Orange .....
<b>C. A. Cowles, Plantsville, Conn.</b>			
4402	Cowles' Complete Corn, Potato and Onion Fertilizer .....	4-8-4	Plantsville .....
<b>Davey Tree Expert Co., Kent, Ohio.</b>			
4685	Davy Tree Food .....	7-8-3.6	Greenwich .....

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH—Continued.

In nitrates.	Nitrogen.				Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	%
0.87	1.75	0.33	0.44	3.39	4.12	0.48	9.02	8.54	3.20	3.20	4224
0.17	1.12	0.69	2.56	4.54	5.52	0.48	5.35	4.87	1.10	5.73	4437
2.81	3.64	0.34	2.03	8.82	10.72	3.28	8.40	5.12	9.72	9.72	4435
1.94	4.01	1.53	2.18	9.66	11.74	3.70	8.90	5.20	8.06	8.06	4667
3.35	1.66	0.60	0.89	6.50	7.90	1.96	7.59	5.63	4.99	4.99	3993
0.53	2.50	0.28	0.92	4.23	5.14	0.55	8.85	8.30	7.00	7.00	3989
0.09	2.32	0.18	0.80	3.39	4.12	0.60	9.12	8.52	5.33	5.33	3988
0.04	1.56	0.09	0.23	1.92	2.33	0.50	10.15	9.65	3.43	3.43	3994
0.27	1.69	0.56	3.58	6.10	7.42	0.20	5.05	4.85	1.21	8.18	4405
0.01	3.01	0.03	1.39	4.44	5.40	1.25	9.88	8.63	2.11	10.74	4607
0.00	2.44	0.06	1.75	4.25	5.17	1.00	9.83	8.83	2.34	11.15	4683
0.58	1.36	0.67	1.04	3.65	4.44	0.87	7.70	6.83	4.85	4.85	4684
0.12	1.30	1.14	1.58	3.14	3.82	0.63	7.65	7.02	1.22	5.98	4689
0.94	1.20	0.52	0.79	3.45	4.19	1.18	9.55	8.37	4.33	4.33	4220
0.18	1.11	0.33	2.09	4.31	5.24	0.68	5.70	5.02	0.45	5.67	4485
0.11	1.13	0.18	2.84	4.26	5.18	0.55	5.65	5.10	0.39	6.32	4688
0.09	1.20	0.34	0.33	1.96	2.38	0.45	9.63	9.18	3.86	3.86	4406
0.00	3.50	0.37	0.33	4.20	5.11	0.20	8.63	8.43	7.81	7.81	4409
0.00	3.29	0.34	1.77	5.40	6.57	0.28	4.10	3.82	0.69	8.60	4242
0.06	3.20	0.26	0.80	4.32	5.25	0.30	8.19	7.89	4.45	4.45	4243
0.10	2.08	0.26	1.45	3.89	4.73	0.33	5.78	5.45	2.55	5.57	4234
0.05	2.41	0.15	0.60	3.21	3.90	0.83	8.63	7.80	4.22	4.22	3858
0.09	2.81	0.23	0.39	3.52	4.28	1.13	9.23	8.10	5.88	5.88	3856
0.46	2.81	0.05	0.81	4.13	5.02	2.04	9.49	7.45	7.04	7.04	3857
0.62	2.88	0.23	0.27	4.00	4.86	1.10	11.01	9.91	5.22	5.22	3855
0.04	2.58	0.53	0.83	3.98	4.84	0.56	10.45	9.89	6.39	6.39	4682
0.80	1.32	0.46	0.94	3.52	4.28	1.33	9.98	8.65	4.41	4.41	4402
0.17	3.88	0.15	1.52	5.72	6.95	4.20	14.05	9.85	3.40	3.40	4685

TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station:</i> <b>Eastern States Farmers' Exchange, Springfield, Mass.</b>			
4233	Eastern States 3-12-3 .....	3-12-3	Seymour .....
4244	Eastern States 4-8-10 .....	4-8-10	Farmington .....
4240	Eastern States 5-8-7 .....	5-8-7	North Haven .....
4241	Eastern States 5-10-5 .....	5-10-5	Guilford .....
4403	Eastern States 8-6-6 .....	8-6-6	North Haven .....
4483	Eastern States 8-16-20 .....	8-16-20	Farmington .....
4239	Eastern States 10-16-14 .....	10-16-14	Farmington .....
<b>Essex Fertilizer Co., Boston, Mass.</b>			
4478	Essex A1 Superphosphate 2-8-2 .....	2-8-2	Wallingford .....
4598	Essex Complete Manure 5-8-7 .....	5-8-7	Wallingford .....
4283	Essex Fish Fertilizer for All Crops 3-8-4 ..	3-8-4	Wallingford .....
4280	Essex Market Garden 4-8-4 .....	4-8-4	South Manchester ..
4281	Essex Potato Phosphate 4-8-7 .....	4-8-7	South Manchester ..
<b>L. T. Frisbie Co., New Haven, Conn.</b>			
3850	Frisbie's 5-8-7 .....	5-8-7	Wilson .....
4008	Frisbie's Corn and Grain Fertilizer 2-8-2 ..	2-8-2	Danbury .....
4481	Frisbie's Market Garden 4-8-7 .....	4-8-7	New Britain .....
4480	Frisbie's Special 3-8-4 .....	3-8-4	New Britain .....
4009	Frisbie's Special Vegetable and Potato Grower 4-8-4 .....	4-8-4	Danbury .....
4486	Frisbie's Tobacco Grower 5-4-5 .....	5-4-5	Buckland .....
4422	Frisbie's Tobacco Manure 5-8-6 .....	5-8-6	Burnside .....
4479	Frisbie's Top Dresser 7-6-5 .....	7-6-5	Wethersfield .....
<b>A. W. Higgins, South Deerfield, Mass.</b>			
4465	Old Deerfield 3-10-6 .....	3-10-6	Suffield .....
4651	Old Deerfield 4-8-4 .....	4-8-4	Madison .....
4601	Old Deerfield 5-8-7 .....	5-8-7	Madison .....
4600	Old Deerfield 10-16-14 .....	10-16-14	Madison .....
4464	Old Deerfield Tobacco Fertilizer 7-4-7 .....	7-4-7	Suffield .....
<b>International Agricultural Corp., Boston, Mass.</b>			
4466	I. A. C. Connecticut Valley Tobacco Special ..	7-4-7	West Suffield .....
4454	I. A. C. Crop Grower 5-8-7 .....	5-8-7	West Cheshire .....
4285	I. A. C. Ideal .....	4-8-4	Cromwell .....
4287	I. A. C. Multiple Strength 8-12-20 .....	8-12-20	Cromwell .....
4468	I. A. C. New England Special .....	2-12-4	East Granby .....
4469	I. A. C. Tobacco Producer .....	5-4-5	East Granby .....
4648	I. A. C. Top Dresser 7-6-5 .....	7-6-5	Cromwell .....

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH—Continued.

Nitrogen.					Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
In nitrates.	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	%
0.40	1.20	0.39	0.51	2.50	3.04	0.57	12.15	11.58	3.43	3.43	4233
0.27	2.27	0.52	0.60	3.66	4.45	1.18	9.48	8.30	9.81	9.81	4244
0.06	2.58	0.57	0.74	3.95	4.77	0.98	9.01	8.03	7.29	7.29	4240
0.02	2.94	0.55	0.55	4.06	4.94	0.78	10.46	9.68	5.26	5.26	4241
0.33	4.16	0.93	0.96	6.38	7.76	0.68	8.25	7.57	6.11	6.11	4403
0.50	4.88	0.31	0.73	6.42	7.81	0.48	16.90	16.42	13.85	13.85	4483
1.10	6.16	0.25	0.86	8.37	10.18	0.45	15.90	15.45	13.52	13.52	4239
0.08	0.81	0.37	0.57	1.83	2.22	0.90	9.73	8.83	2.13	2.13	4478
0.43	3.00	0.14	0.58	4.15	5.05	0.85	9.40	8.55	7.22	7.22	4598
0.18	1.63	0.16	0.56	2.53	3.08	0.76	9.02	8.26	4.03	4.03	4283
0.40	1.84	0.37	0.79	3.40	4.13	0.56	8.74	8.18	4.17	4.17	4280
0.41	1.91	0.40	0.66	3.38	4.11	0.78	8.90	8.12	6.86	6.86	4281
0.22	2.80	0.49	0.60	4.11	5.00	0.99	8.90	7.91	6.95	6.95	3850
0.14	0.85	0.33	0.60	1.92	2.33	0.88	9.55	8.67	2.17	2.17	4008
1.34	0.70	0.75	0.49	3.28	3.99	1.40	9.73	8.33	6.59	6.59	4481
1.35	0.04	0.62	0.51	2.52	3.06	1.44	9.10	7.66	4.30	4.30	4480
0.36	2.25	0.27	0.40	3.28	3.99	0.55	9.00	8.45	3.91	3.91	4009
1.53	0.09	0.42	1.08	4.02	4.89	0.80	5.65	4.85	0.17	5.56	4486
1.88	0.00	0.79	1.61	4.28	5.20	1.15	10.83	9.68	0.74	6.27	4422
2.68	0.64	1.32	1.01	5.65	6.87	1.78	7.70	5.92	5.06	5.06	4479
0.16	1.50	0.56	0.58	2.80	3.40	0.93	10.28	9.35	6.40	6.40	4465
0.57	1.41	0.59	0.97	3.54	4.30	1.30	9.50	8.20	5.46	5.46	4651
0.80	1.23	0.54	1.28	3.85	4.68	0.83	8.46	7.63	8.12	8.12	4601
0.72	5.07	0.90	1.70	8.39	10.20	0.88	18.25	17.37	14.52	14.52	4600
1.56	0.50	0.50	3.28	5.84	7.10	0.38	6.00	5.62	0.66	8.41	4464
0.15	1.91	0.45	3.21	5.72	6.95	0.13	4.23	4.10	0.76	7.10	4466
0.37	2.10	0.48	1.02	3.97	4.83	0.18	8.25	8.07	6.93	6.93	4454
0.26	1.66	0.59	0.86	3.37	4.10	0.23	8.40	8.17	4.28	4.28	4285
0.60	4.41	0.69	0.84	6.54	7.95	0.65	12.75	12.10	2.30	20.44	4287
0.37	0.93	0.00	0.60	1.90	2.31	0.28	12.43	12.15	3.93	3.93	4468
0.18	1.37	0.07	2.42	4.04	4.91	0.13	4.08	3.95	0.65	5.01	4469
1.34	2.18	0.51	1.31	5.34	6.49	0.23	7.03	6.80	1.42	5.04	4648



TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station:</i>			
<b>Lowell Fertilizer Co., Boston, Mass.</b>			
3848	Lowell Animal Brand, A High Grade Manure for All Crops 3-8-4 .....	3-8-4	Cheshire .....
4686	Lowell Animal Brand, A High Grade Manure for All Crops 3-8-4 .....	3-8-4	Southington .....
4007	Lowell Bone Fertilizer 2-8-2 .....	2-8-2	Saugatuck .....
4005	Lowell Corn and Vegetable 4-8-4 .....	4-8-4	Southport .....
4006	Lowell Market Garden Manure 5-8-7 .....	5-8-7	Southport .....
4278	Lowell Potato Grower 4-6-10 .....	4-6-10	Shelton .....
3849	Lowell Potato Phosphate 4-8-7 .....	4-8-7	Cheshire .....
4463	Lowell Tobacco 5-4-5 .....	5-4-5	Warehouse Point ..
3847	Lowell Top Dressing 7-6-5 .....	7-6-5	Cheshire .....
4674	Lowell Top Dressing 7-6-5 .....	7-6-5	Wethersfield .....
<b>Mapes Formula and Peruvian Guano Co., New York.</b>			
4459	The Mapes Connecticut Valley Special .....	6-4-7	Hazardville .....
3904	The Mapes Corn Manure .....	3-8-3	Meriden .....
4462	The Mapes General Tobacco Manure .....	5-4-5	West Suffield .....
4282	The Mapes General Truck Manure .....	5-6-5	Hazardville .....
3896	The Mapes General Use Manure .....	3-6-4	Windsor Locks .....
4496	The Mapes Onion Manure .....	4-6-4	Hazardville .....
3897	The Mapes Potato Manure .....	4-7-5	Windsor Locks .....
4492	The Mapes Special Trucker .....	5-8-7	Hartford .....
4498	The Mapes Tobacco Ash Constituents .....	1-4-15	Suffield .....
4497	The Mapes Tobacco Manure Wrapper Brand .....	7-5-2-10-5	Hazardville .....
4494	The Mapes Tobacco Starter Improved .....	5-6-1	Hartford .....
4493	The Mapes Top Dresser .....	10-4-2	Hartford .....
<b>Mehmel &amp; Sarvi, Plantsville, Conn.</b>			
4680	Mehmel's Complete Corn, Potato and Onion Fertilizer .....	4-8-4	Plantsville .....
<b>New England Fertilizer Co., Boston, Mass.</b>			
3900	New England Corn Phosphate 2-8-2 .....	2-8-2	Rockville .....
4004	New England Market Garden 5-8-7 .....	5-8-7	Rockville .....
3899	New England Potato and Vegetable Manure 4-8-4 .....	4-8-4	Meriden .....
4653	New England Potato Phosphate 4-8-7 .....	4-8-7	Unionville .....
4500	New England Tobacco 5-4-5 .....	5-4-5	Warehouse Point ..
3898	New England Superphosphate, A High Grade Fertilizer for All Crops 3-8-4 .....	3-8-4	Meriden .....

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH—Continued.

Nitrogen.					Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
In titrates.	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	%
0.14	1.60	0.05	0.62	2.41	2.93	0.93	9.17	8.24	3.69	3.69	3848
0.03	1.79	0.26	0.54	2.62	3.19	0.90	9.20	8.30	4.07	4.07	4686
0.16	0.82	0.23	0.55	1.76	2.14	0.85	9.43	8.58	2.04	2.04	4007
0.64	2.36	0.02	0.48	3.50	4.26	0.73	8.95	8.22	3.91	3.91	4005
0.00	2.77	0.75	0.61	4.13	5.02	0.73	9.50	8.77	6.80	6.80	4006
0.26	1.56	0.68	1.08	3.58	4.35	1.08	7.50	6.42	9.72	9.72	4278
0.49	1.75	0.40	0.82	3.46	4.21	0.78	8.87	8.09	6.95	6.95	3849
1.00	0.12	0.72	2.30	4.14	5.03	1.13	5.90	4.77	1.26	5.48	4463
0.00	5.60	0.05	0.19	5.84	7.10	0.10	6.37	6.27	4.75	4.75	3847
0.09	5.57	0.09	0.17	5.92	7.20	0.30	6.70	6.40	5.19	5.19	4674
2.65	0.29	0.51	2.17	5.62	6.83	0.88	5.43	4.55	0.65	7.56	4459
0.72	2.10	0.08	0.76	3.66	4.45	2.50	10.03	7.53	3.68	3.68	3904
1.52	0.14	0.61	2.13	4.40	5.35	1.03	5.80	4.77	0.45	6.02	4462
0.61	1.51	1.33	0.90	4.35	5.29	0.85	8.90	8.05	4.65	5.42	4282
1.17	1.00	0.21	0.68	3.06	3.72	2.38	9.50	7.12	5.15	5.15	3896
0.71	1.52	0.99	0.48	3.70	4.50	2.53	9.13	6.60	0.27	4.37	4496
1.19	1.58	0.17	0.84	3.78	4.60	0.90	9.28	8.38	4.98	4.98	3897
1.70	1.74	0.13	0.76	4.33	5.26	2.85	10.88	8.03	7.38	7.38	4492
0.02	0.12	0.17	0.53	0.84	1.02	1.50	6.73	5.23	1.10	16.84	4498
2.21	0.24	0.70	3.17	6.32	7.68	1.25	5.60	4.35	1.09	11.38	4497
1.38	1.62	0.38	1.04	4.42	5.37	3.28	10.78	7.50	0.35	1.54	4494
5.28	2.00	0.25	0.66	8.19	9.96	1.10	7.23	6.13	0.23	2.47	4493
0.68	1.32	0.50	0.87	3.37	4.10	1.10	10.10	9.00	4.72	4.72	4680
0.05	0.80	0.19	0.64	1.68	2.04	0.83	9.55	8.72	1.93	1.93	3900
0.35	2.89	0.52	0.67	4.43	5.39	0.55	8.60	8.05	7.37	7.37	4004
0.45	2.05	0.28	0.46	3.24	3.94	0.73	8.85	8.12	4.07	4.07	3899
0.17	1.90	0.70	0.71	3.48	4.23	0.83	9.25	8.42	6.98	6.98	4653
1.28	0.08	0.17	2.45	3.98	4.84	0.50	5.30	4.80	0.69	6.22	4500
0.08	1.48	0.25	0.53	2.34	2.84	0.95	9.45	8.50	3.67	3.67	3898

TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station:</i>			
<b>Olds &amp; Whipple, Inc., Hartford, Conn.</b>			
4507	O & W Complete Market Garden Fertilizer	4-8-4	South Manchester ..
4502	O & W Complete Tobacco Fertilizer .....	5-4-5	Rockville .....
4687	O & W Complete Tobacco Fertilizer .....	5-4-5	Hazardville .....
4121	O & W Grain and General Crop Fertilizer ..	2-9-3	South Windsor .....
3903	O & W Grass Fertilizer .....	6-6-4	Hartford .....
4512	O & W High Grade Vegetable and Potato Fertilizer .....	5-8-7	Plantsville .....
4516	O & W High Grade Starter and Potash Compound .....	5-4-15	Burnside .....
4495	O & W Tobacco Fertilizer, Blue Label Brand	6-3-6	Manchester .....
<b>Parmenter &amp; Polsey Fertilizer Co., Boston, Mass.</b>			
4646	P & P Maine Potato Fertilizer 4-6-10 .....	4-6-10	Wallingford .....
4517	P & P Plymouth Rock Brand For All Crops 3-8-4 .....	3-8-4	Plainville .....
<b>Piedmont-Mt. Airy Guano Co., Baltimore, Md.</b>			
4509	Harvest Brand 3-8-4 .....	3-8-4	Seymour .....
4508	Harvest Brand 4-8-4 .....	4-8-4	Seymour .....
4510	Harvest Brand 4-6-10 .....	4-6-10	Seymour .....
3919	Harvest Brand 5-8-7 .....	5-8-7	Seymour .....
4511	Harvest Brand 6-8-6 .....	6-8-6	Seymour .....
<b>Frank S. Platt Co., New Haven, Conn.</b>			
4513	Platco Special 5-8-7 .....	5-8-7	New Haven .....
<b>Rackliffe Bros. Co., New Britain, Conn.</b>			
4049	Rackliffe Complete Corn, Potato and Onion Fertilizer .....	4-8-4	New Britain .....
4050	Rackliffe High Grade Potato Fertilizer .....	5-8-7	New Britain .....
<b>The Rogers &amp; Hubbard Co., Portland, Conn.</b>			
3998	4-8-4 .....	4-8-4	Hartford .....
4054	5-8-7 .....	5-8-7	North Haven .....
4544	10-3-8 .....	10-3-8	Rockfall .....
4119	Rogers & Hubbard's All Soils All Crops Fertilizer .....	4-10-4	Highwood .....
4051	Garden Fertilizer .....	2-8-4	Hartford .....
3999	Hubbard's "Bone Base" Fertilizer for Seeding Down .....	3-5-6	Portland .....

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH—Continued.

Nitrogen.					Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
In nitrates.	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	
0.88	1.16	0.44	0.86	3.34	4.06	1.20	9.73	8.53	4.74	4.74	4507
0.05	1.13	0.18	2.84	4.20	5.11	0.60	6.20	5.60	0.40	6.00	4502
0.16	1.02	0.06	2.92	4.16	5.06	0.48	5.95	5.47	0.47	5.75	4687
0.26	1.02	0.07	0.42	1.77	2.15	1.83	11.45	9.62	0.47	3.15	4121
1.71	2.05	0.56	1.00	5.32	6.47	1.10	7.43	6.33	4.36	4.36	3903
1.11	1.57	0.48	1.03	4.19	5.09	1.33	10.13	8.80	0.45	7.94	4512
0.86	1.04	0.05	2.30	4.25	5.17	0.60	5.85	5.25	1.08	16.25	4516
0.15	1.10	0.07	3.90	5.22	6.35	0.35	4.20	3.85	0.28	6.93	4495
0.24	1.38	0.74	0.98	3.34	4.06	0.93	7.50	6.57	9.74	9.74	4646
0.05	1.78	0.30	0.54	2.67	3.25	0.75	9.05	8.30	3.73	3.73	4517
0.17	1.47	0.29	0.75	2.68	3.26	1.23	9.35	8.12	4.28	4.28	4509
0.01	2.11	0.37	0.67	3.16	3.84	1.15	9.18	8.03	3.96	3.96	4508
0.11	2.69	0.28	0.42	3.50	4.26	0.90	7.95	7.05	7.50	7.50	4510
0.10	3.55	0.37	0.64	4.66	5.67	0.80	8.23	7.43	6.95	6.95	3919
0.13	3.35	0.57	0.30	4.35	5.29	0.93	9.75	8.82	5.50	5.50	4511
1.89	0.65	0.96	0.58	4.08	4.96	1.33	9.50	8.17	6.94	6.94	4513
0.68	2.02	0.00	0.68	3.38	4.11	0.65	9.28	8.63	5.12	5.12	4049
0.94	1.55	1.01	1.05	4.55	5.53	1.53	10.15	8.62	0.45	7.78	4050
1.06	1.42	0.56	0.21	3.25	3.95	1.13	9.93	8.80	4.13	4.13	3998
1.30	1.82	0.59	0.24	3.95	4.80	0.98	9.43	8.45	6.58	6.58	4054
1.43	5.01	0.56	0.30	7.30	8.88	0.48	4.15	3.67	8.24	8.24	4544
0.15	1.92	0.77	0.33	3.17	3.85	1.25	11.48	10.23	4.28	4.28	4119
0.59	0.47	0.64	0.20	1.90	2.31	0.60	8.87	8.27	4.13	4.13	4051
0.22	0.15	0.62	1.77	2.76	3.36	7.55	13.25	5.70	6.18	6.18	3999



TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station: The Rogers &amp; Hubbard Co., Portland, Conn.—Concluded.</i>			
4000	Hubbard's "Bone Base" Oats and Top Dressing .....	10-3-8	Highwood .....
4003	Hubbard's "Bone Base" Soluble Corn and General Crops Manure .....	3-8-6	Branford .....
4055	Hubbard's "Bone Base" Soluble Potato Manure .....	6-8-5	Branford .....
4515	Hubbard's "Bone Base" Soluble Tobacco Manure .....	6-8-10	Glastonbury .....
4518	Rogers & Hubbard's Climax Tobacco Brand .....	5-4-5	Granby .....
4056	Rogers & Hubbard's Corn and Grain Fertilizer .....	1-10-3	New Britain .....
4545	Rogers & Hubbard's High Potash Fertilizer .....	3-8-10	Torrington .....
4542	Rogers & Hubbard's Potato Fertilizer .....	2-10-4	Willimantic .....
4514	Rogers & Hubbard's Tobacco Grower, Vegetable Formula .....	6-4-4	Glastonbury .....
<b>F. S. Royster Guano Co., Baltimore, Md.</b>			
4538	Royster's Gem Guano .....	2-12-4	Watertown .....
4540	Royster's Quality Trucker .....	4-8-7	Plainville .....
4546	Royster's Rational Guano .....	1-9-4	New Canaan .....
4543	Royster's Spearhead Guano .....	3-8-4	Thompsonville .....
4537	Royster's Top Dresser .....	7-6-5	Waterbury .....
4541	Royster's Truckers' Delight .....	4-8-4	Plainville .....
4539	Royster's 5% Truck Guano .....	5-8-7	Trumbull .....
4547	Royster's Valley Tobacco Formula .....	5-4-5	Simsbury .....
<b>M. L. Shoemaker &amp; Co., Philadelphia, Pa.</b>			
4695	5-8-7 Potato Special .....	5-8-7	New Milford .....
4570	Swift-Sure Crop Grower .....	4-8-4	Glastonbury .....
4580	Shoemaker's "Swift-Sure" Special Tobacco Formula .....	4-8-5	New Milford .....
4569	Shoemaker's "Swift-Sure" Tobacco and General Use .....	3-10-3	Glastonbury .....
<b>Springfield Rendering Co., Springfield, Mass.</b>			
4571	Springfield Animal Brand 3-8-4 .....	3-8-4	Stafford Springs .....
4576	Springfield Market Garden Grower and Top Dresser 5-8-7 .....	5-8-7	Hazardville .....
4572	Springfield Special Potato, Onion and Vegetable 4-8-4 .....	4-8-4	Stafford Springs .....

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH—Continued.

In nitrates.	Nitrogen.				Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash:		Station No.
	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	
7.58	0.03	0.45	0.30	8.36	10.16	3.38	9.15	5.77	5.69	8.08	4000
0.24	1.29	0.67	0.50	2.70	3.28	2.23	10.33	8.10	6.31	6.31	4003
0.97	1.95	1.26	0.82	5.00	6.08	1.98	10.15	8.17	0.80	4.83	4055
0.93	1.86	1.37	0.74	4.90	5.96	1.55	10.08	8.53	0.74	10.41	4515
1.11	0.14	0.05	2.82	4.12	5.01	0.40	5.60	5.20	0.69	5.54	4518
0.07	0.19	0.41	0.25	0.92	1.12	0.98	11.33	10.35	3.12	3.12	4056
0.14	1.29	0.69	0.32	2.44	2.97	0.85	8.80	7.95	10.72	10.72	4545
0.13	0.66	0.79	0.37	1.95	2.37	1.05	11.28	10.23	4.38	4.38	4542
0.73	0.11	0.36	3.79	4.99	6.07	0.75	4.54	3.79	0.43	4.32	4514
0.04	0.91	0.10	0.69	1.74	2.11	1.12	12.85	11.73	4.31	4.31	4538
0.00	2.08	0.16	0.97	3.21	3.90	1.10	9.58	8.48	6.38	6.38	4540
0.05	0.43	0.00	0.38	0.86	1.05	0.75	9.80	9.05	4.14	4.14	4546
0.13	1.44	0.04	0.82	2.43	2.95	1.03	9.20	8.17	4.11	4.11	4543
0.58	2.74	0.62	1.58	5.52	6.71	0.73	7.18	6.45	5.02	5.02	4537
0.01	1.99	0.19	1.03	3.22	3.91	1.31	8.90	7.59	4.00	4.00	4541
0.03	1.02	0.13	0.63	1.81	2.20	1.05	9.53	8.48	6.56	6.56	4539
0.29	0.73	0.16	2.34	3.52	4.28	0.31	4.20	3.89	0.40	5.88	4547
0.46	1.53	0.69	1.19	3.87	4.71	1.58	9.80	8.22	8.63	8.63	4695
0.44	1.50	0.48	0.63	3.05	3.71	0.98	9.85	8.87	5.11	5.11	4570
0.48	1.34	0.19	1.36	3.37	4.10	1.28	9.29	8.01	0.52	5.85	4580
0.42	1.04	0.34	1.00	2.80	3.40	1.35	11.16	9.81	3.49	3.49	4569
0.09	1.43	0.52	0.54	2.58	3.14	0.68	8.97	8.29	4.00	4.00	4571
0.35	2.10	0.85	0.74	4.04	4.91	0.88	9.43	8.55	6.62	6.62	4576
0.41	1.71	0.70	0.50	3.32	4.04	0.70	9.08	8.38	3.86	3.86	4572

TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station:</i>			
<b>I. P. Thomas &amp; Son, Philadelphia, Pa.</b>			
4015	7% Guano .....	7-6-5	Highwood .....
4023	Economy Fertilizer .....	3-12-3	Plainville .....
3853	High Grade Potato Manure 4-8-10 .....	4-8-10	North Haven .....
4017	Long Island Special .....	4-8-7	Highwood .....
4026	I. P. Thomas 5-8-7 .....	5-8-7	Milford .....
3852	Thomas Fish and Potash .....	5-8-5	North Haven .....
4025	Thomas Fish and Potash .....	5-8-5	Milford .....
4577	Thomas Tobacco Grower 5-4-5 (Sulphate of Potash) .....	5-4-5	Simsbury .....
3854	Tip-Top Superphosphate .....	3-10-6	North Haven .....
4016	Tip-Top Superphosphate .....	3-10-6	Highwood .....
4020	Truckers' High Grade .....	4-8-4	Ansonia .....
4019	Victor Potash Fertilizer 2-8-5 .....	2-8-5	Ansonia .....
<b>Triton Oil and Fertilizer Co., New York.</b>			
4652	Triton 4-8-4 Fertilizer .....	4-8-4	New London .....
4697	Triton 4-8-7 .....	4-8-7	New London .....
<b>U. S. Fertilizer Chemical Co., New York.</b>			
4579	Volco Ideal .....	2-4-5-8	Whitneyville .....
<b>United States Guano Co., Baltimore, Md.</b>			
4638	Standard United States 3-9-2 .....	3-9-2	Torrington .....
4633	Standard United States 5-4-5 .....	5-4-5	New Britain .....
4018	Standard United States 5-8-5 .....	5-8-5	North Haven .....
4022	Standard United States Evergreen Fish Guano .....	4-8-4	Guilford .....
4021	Standard United States Fish, Bone and Potash .....	5-8-7	Guilford .....
4052	Standard United States Mammoth Potato Grower .....	2-8-10	North Haven .....
4637	Standard United States Old Fertility .....	2-8-3	Torrington .....
4053	Standard United States Royal Potato Grower .....	4-8-7	North Haven .....
4054	Standard United States Royal Potato Grower .....	4-8-7	Torrington .....
<b>Virginia-Carolina Chemical Co., New York.</b>			
4628	V-C Aroostook Potato Grower .....	5-8-7	North Haven .....
4629	V-C Double Owl Brand .....	4-8-7	North Haven .....
4632	V-C Rescue Brand .....	3-8-4	North Haven .....
4631	V-C Super-Thirty .....	6-18-6	North Haven .....
<b>The Wilcox Fertilizer Co., Mystic, Conn.</b>			
4060	Wilcox 5-8-7 Fertilizer .....	5-8-7	Willimantic .....
4291	Wilcox 5-10-5 Fertilizer .....	5-10-5	Woodstock .....

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH—Continued.

In nitrates.	Nitrogen.				Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	%
1.23	3.82	0.00	0.63	5.68	6.91	1.10	7.80	6.70	5.39	5.39	4015
0.30	1.22	0.43	0.70	2.65	3.22	3.27	13.78	10.51	3.10	3.55	4023
0.89	1.52	0.22	0.65	3.28	3.99	2.28	10.33	8.05	9.45	9.45	3853
0.72	1.58	0.40	0.65	3.35	4.07	2.28	10.30	8.02	7.04	7.04	4017
0.30	2.28	0.87	0.90	4.35	5.29	2.17	9.89	7.72	6.66	7.05	4026
0.81	1.97	1.05	3.83	4.66	5.29	2.35	10.55	8.20	4.70	4.70	3852
0.80	2.20	0.38	0.81	4.19	5.09	2.63	10.20	7.57	5.02	5.02	4025
0.79	0.96	0.30	2.05	4.10	4.98	1.50	9.03	7.53	0.64	5.65	4577
0.50	1.05	0.21	0.76	2.52	3.06	2.75	12.60	9.85	6.18	6.18	3854
0.44	1.18	0.12	0.80	2.54	3.09	3.03	12.79	9.76	6.20	6.20	4016
0.80	1.55	0.26	0.65	3.26	3.96	2.15	10.38	8.23	3.93	3.93	4020
0.45	0.75	0.03	0.62	1.85	2.25	1.80	9.93	8.13	4.90	4.90	4019
0.44	1.24	0.69	0.93	3.30	4.01	1.00	9.23	8.23	4.88	4.88	4652
0.61	1.18	0.56	0.89	3.24	3.94	1.13	8.58	7.45	7.05	7.05	4697
0.09	1.77	0.03	0.01	1.90	2.31	0.40	5.17	4.77	0.00	4.94	4579
0.04	1.28	0.21	0.92	2.45	2.98	1.03	9.29	8.26	3.09	3.09	4638
0.04	0.20	0.19	3.29	3.72	4.52	0.38	5.65	5.27	0.00	6.12	4633
0.34	2.24	0.41	1.29	4.28	5.20	1.23	9.33	8.10	4.95	4.95	4018
0.12	2.28	0.29	0.61	3.30	4.01	0.70	8.95	8.25	4.52	4.52	4022
0.07	3.62	0.22	0.46	4.37	5.31	0.50	8.73	8.23	6.64	6.64	4021
0.14	1.30	0.07	0.47	1.98	2.41	0.63	8.85	8.22	9.86	9.86	4052
0.20	1.28	0.24	2.04	3.76	4.57	1.30	8.92	7.62	4.55	4.55	4637
0.22	3.38	0.08	0.80	4.48	5.45	0.72	8.78	8.06	5.86	5.86	4053
0.22	2.56	0.15	0.62	3.55	4.32	1.00	9.28	8.28	7.19	7.19	4654
0.11	3.53	0.31	0.16	4.11	5.00	0.65	8.61	7.96	7.05	7.05	4628
0.00	2.62	0.53	0.20	3.35	4.07	0.68	9.10	8.42	6.96	6.96	4629
0.18	2.10	0.08	0.27	2.63	3.20	1.02	8.90	7.88	4.17	4.17	4632
0.11	3.94	0.52	0.08	4.65	5.65	0.63	18.69	18.06	6.35	6.35	4631
1.40	1.50	0.27	1.12	4.29	5.22	0.55	9.02	8.47	5.97	7.10	4060
1.38	1.52	0.41	1.03	4.34	5.28	0.88	11.38	10.50	0.58	5.13	4291



TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station:</i>			
<b>The Wilcox Fertilizer Co., Mystic, Conn.</b>			
<i>—Concluded.</i>			
4639	Wilcox 7-6-5 Top Dresser .....	7-6-5	Ellington .....
4059	Wilcox Corn Special .....	3-10-4	Willimantic .....
4290	Wilcox Corn Special .....	3-10-4	Woodstock .....
4634	Wilcox Fish and Potash (1924-25 Formula 4-8-4) .....	4-8-4	Mystic .....
4058	Wilcox Potato and Vegetable Phosphate ....	4-8-6	Willimantic .....
4293	Wilcox Potato and Vegetable Phosphate ....	4-8-6	Woodstock .....
4057	Wilcox Special 4-8-4 Fertilizer .....	4-8-4	Willimantic .....
<b>Wilson-Martin Co., Philadelphia, Pa.</b>			
4184	Bantle's Wrapper Brand 7-4-7 .....	7-4-7	Glastonbury .....
<b>S. D. Woodruff &amp; Sons, Orange, Conn.</b>			
3921	Woodruff's Home Mixed Fertilizer .....	4-8-6	Orange .....
<b>Worcester Rendering Co., Auburn, Mass.</b>			
4608	Prosperity Brand Complete Dressing .....	6-6-4	Putnam .....
4605	Prosperity Brand Corn and Grain Fertilizer ..	2-8-2	Groton .....
4604	Prosperity Brand Market Garden Fertilizer ..	5-8-7	Groton .....
4609	Prosperity Brand Potato and Vegetable Fertilizer .....	4-8-4	Moosup .....
<i>Sampled by Purchaser:</i>			
<b>F. A. Bartlett Tree Expert Co., Stamford, Conn.</b>			
3563	Bartlett's Green Tree Food .....	6-8-4	Greenwich .....
<b>C. &amp; R. Sales Co., Worcester, Mass.</b>			
4773	C. & R. Lawn and Shrub Fertilizer 6-5-5 ....	6-5-5	Taftville .....
<b>Davey Tree Expert Co., Kent, Ohio.</b>			
3562	Davey Tree Food .....	7-8-3	Greenwich .....
<b>U. S. Fertilizer Chemical Co., Inc., New York.</b>			
3305	Volco Imperial Fertilizer .....	3-8-6	New York .....
3306	Volco Ideal Fertilizer .....	2-5-8	New York .....
3307	Volco Superior Fertilizer .....	3-5-7	New York .....

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH—*Concluded.*

In nitrates.	Nitrogen.				Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	
1.74	2.36	0.82	1.16	6.08	7.39	0.93	7.28	6.35	3.81	5.00	4639
1.26	0.68	0.62	0.92	2.88	3.50	0.68	10.75	10.07	4.26	4.26	4059
1.26	0.08	0.71	0.93	2.98	3.62	0.83	10.61	9.78	4.48	4.48	4290
1.60	0.40	0.62	0.78	3.40	4.13	0.61	8.65	8.04	2.83	4.10	4634
1.85	0.07	0.78	0.82	3.52	4.28	0.90	9.00	8.10	3.77	4.88	4058
1.83	0.08	0.73	0.88	3.52	4.28	0.93	9.00	8.07	4.07	4.93	4293
0.98	1.36	0.58	0.62	3.54	4.30	0.48	8.74	8.26	4.17	4.17	4057
1.39	0.16	1.08	4.13	6.76	8.22	1.80	7.20	5.40	0.85	8.49	4184
1.70	0.00	0.06	1.30	3.06	3.72	0.33	7.82	7.49	6.68	6.68	3921
0.78	1.77	1.23	1.12	4.90	5.96	1.15	7.43	6.28	3.95	3.95	4608
0.07	0.87	0.47	0.52	1.93	2.35	0.77	8.79	8.02	2.20	2.20	4605
0.35	2.63	0.56	0.51	4.05	4.92	0.54	8.69	8.15	6.90	6.90	4604
0.35	1.73	0.53	0.62	3.23	3.93	0.57	8.56	7.99	3.94	3.94	4609
0.16	4.82	1.17		6.15	7.48	2.28	9.59	7.31	2.39	2.39	3563
0.15	0.63	0.44	3.90	5.12	6.22	1.73	7.73	6.00	5.50	5.50	4773
0.13	3.32	3.79		7.24	8.80	0.69	9.29	8.60	3.50	3.50	3562
0.04	2.92	0.00		2.96	3.60	0.52	9.11	8.59	0.00	5.10	3305
0.00	1.84	0.02		1.86	2.26	0.38	6.12	5.74	0.00	5.88	3306
0.00	3.23	0.05	0.04	3.32	4.04	0.32	5.32	5.00	0.00	5.74	3307

## SPECIAL MIXTURES AND HOME MIXTURES.

Sixty-four samples have been analyzed for purchasers. These represent, generally, fertilizers mixed to order according to special formulas.

Analyses are given in Table XV.

TABLE XV. ANALYSES OF SPECIAL MIXTURES AND HOME MIXTURES.

Station No.	Manufacturer.	Place of Sampling.	Total nitrogen.	Ammonia equivalent to total nitrogen.	Phosphoric Acid.		Potash.		Station No.
					Citrate-insoluble.	Total.	So-called "available."	As muriate.	
			%	%	%	%	%	%	
4420	Sampled by Station:	Cornelius Ahearn, Stratford ...	4.17	5.97	1.60	10.88	9.28	5.31	4420
4421	Atlantic Packing Co., New Haven	Cornelius Ahearn, Stratford ...	2.43	2.95	1.15	11.25	10.10	5.00	4421
4663	L. T. Frisbie Co., New Haven	Frank Roberts, Silver Lane ...	5.73	6.97	0.53	6.30	5.77	8.26	4663
4640	Haven	Hickey Bros., East Hartford ..	4.71	5.73	1.33	6.73	5.40	9.36	4640
4641	L. T. Frisbie Co., New Haven	Hickey Bros., East Hartford ..	4.80	5.84	0.83	5.83	5.00	8.68	4641
4672	L. T. Frisbie Co., New Haven	Manning & Kahn, Manchester ..	6.36	7.73	1.28	5.15	3.87	5.70	4672
4122	Olds & Whipple, Inc., Hartford	Leslie W. Newberry, South Windsor	3.22	3.91	0.95	6.50	5.55	5.81	4122
4123	Olds & Whipple, Inc., Hartford	Leslie W. Newberry, South Windsor	5.68	6.91	0.33	6.33	6.00	8.45	4123
4673	Olds & Whipple, Inc., Hartford	Manning & Kahn, Manchester ..	6.00	7.29	1.10	5.55	4.45	6.31	4673
4417	.....	T. W. Ryan, Stratford ..	2.50	3.04	1.33	11.88	10.55	4.80	4417
4418	.....	T. W. Ryan, Stratford ..	4.63	5.63	1.28	8.35	7.07	6.60	4418
3721	Sampled by Purchaser:	American Sumatra Tobacco Co., Bloomfield	7.06	8.58	0.47	3.32	2.85	1.32	3721
3586	Formula AA	American Sumatra Tobacco Co., Bloomfield	5.18	6.30	0.78	5.00	4.22	0.19	3586
	Formula A	American Sumatra Tobacco Co., Bloomfield							



TABLE XV. ANALYSES OF SPECIAL MIXTURES AND HOME MIXTURES—Continued.

Station No.	Manufacturer.	Place of Sampling.	Total nitrogen.	Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
					Citrate-insoluble.	Total.	So-called "available."	As muriate.	Total.	
	<i>Sampled by Purchaser:</i>		%	%	%	%	%	%	%	
3834	Formula A .....	American Sumatra Tobacco Co., Bloomfield .....	5.20	6.32	0.73	4.98	4.25	....	7.10	3834
3833	Formula B .....	American Sumatra Tobacco Co., Bloomfield .....	6.32	7.68	0.73	4.68	3.95	....	5.84	3833
3657	Formula C .....	American Sumatra Tobacco Co., Bloomfield .....	6.07	7.38	0.66	3.92	3.26	....	5.72	3657
3658	Formula D .....	American Sumatra Tobacco Co., Bloomfield .....	5.80	7.05	0.51	3.80	3.29	....	4.75	3658
4758	Formula CC .....	American Sumatra Tobacco Co., Bloomfield .....	6.12	7.44	0.48	4.70	4.22	0.11	6.48	4758
4141	Formula A.G. ....	American Sumatra Tobacco Co., Bloomfield .....	5.19	6.31	0.70	4.78	4.08	0.15	7.12	4141
4142	Formula B.G. ....	American Sumatra Tobacco Co., Bloomfield .....	5.25	6.38	0.83	4.80	3.97	....	7.28	4142
3832	Formula C.G. ....	American Sumatra Tobacco Co., Bloomfield .....	5.62	6.83	0.63	4.23	3.60	....	7.56	3832
4135	Formula C.G. ....	American Sumatra Tobacco Co., Bloomfield .....	5.96	7.25	0.63	4.15	3.52	....	7.94	4135
4136	Formula D.G. ....	American Sumatra Tobacco Co., Bloomfield .....	5.74	6.98	0.43	3.95	3.52	....	5.86	4136
4138	Formula E .....	American Sumatra Tobacco Co., Bloomfield .....	5.58	6.78	0.25	4.48	4.23	0.74	5.78	4138
4790	Formula E .....	American Sumatra Tobacco Co., Bloomfield .....	5.70	6.93	1.45	6.83	5.38	0.20	6.30	4790
4140	Formula F .....	American Sumatra Tobacco Co., Bloomfield .....	5.76	7.00	0.23	4.80	4.57	0.78	6.31	4140

TABLE XV. ANALYSES OF SPECIAL MIXTURES AND HOME MIXTURES—Continued.

Station No.	Manufacturer.	Place of Sampling.	Total nitrogen.	Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
					Citrate-insoluble.	Total.	So-called "available."	As muriate.	Total.	
	<i>Sampled by Purchaser:</i>		%	%	%	%	%	%	%	
3831	Formula G .....	American Sumatra Tobacco Co., Bloomfield .....	6.44	7.83	0.65	4.45	3.80	....	6.68	3831
4137	Formula H .....	American Sumatra Tobacco Co., Bloomfield .....	6.02	7.32	0.73	6.25	5.52	0.49	5.75	4137
4139	Formula I .....	American Sumatra Tobacco Co., Bloomfield .....	6.51	7.91	0.83	5.03	4.20	0.48	6.27	4139
4143	Formula <i>Du Bons</i> I ....	American Sumatra Tobacco Co., Bloomfield .....	6.10	7.42	0.53	3.93	3.40	0.48	7.35	4143
4791	Formula P .....	American Sumatra Tobacco Co., Bloomfield .....	5.60	6.81	0.18	4.80	4.62	0.57	7.68	4791
4145	Fertilizer for Drill .....	American Sumatra Tobacco Co., Bloomfield .....	9.95	12.10	0.88	4.43	3.55	0.39	1.04	4145
4144	Tobacco Bed Fertilizer ..	American Sumatra Tobacco Co., Bloomfield .....	7.58	9.22	4.18	9.90	5.72	0.47	0.47	4144
3722	Mr. Hale's Mixture .....	American Sumatra Tobacco Co., Bloomfield .....	8.90	10.82	0.45	2.70	2.25	....	1.37	3722
4227	Welsh Farm Fertilizer ...	Allied Tobacco Co., Hartford ..	5.93	7.21	0.13	2.45	2.32	....	4.85	4227
4490	Apothecaries Hall Co., Waterbury .....	A. N. Shepard & Son, Hartford	5.50	6.69	....	5.50	....	....	8.24	4490
4491	Apothecaries Hall Co., Waterbury .....	A. N. Shepard & Son, Hartford	5.70	6.93	....	5.08	....	....	6.86	4491
2748	Berkshire Fertilizer Co., Bridgeport .....	E. N. Austin, Suffield .....	4.63	5.63	....	5.32	....	....	5.48	2748
4258	Berkshire Fertilizer Co., Bridgeport .....	Paul and Ed. Rostek, Melrose ..	6.40	7.78	0.58	7.95	7.37	....	9.52	4258

TABLE XV. ANALYSES OF SPECIAL MIXTURES AND HOME MIXTURES—Continued.

Station No.	Manufacturer.	Place of Sampling.	Total nitrogen.	Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
					Citrate-insoluble.	Total.	So-called "available."	As muriate.	Total.	
	<i>Sampled by Purchaser:</i>		%	%	%	%	%	%	%	
4304	Berkshire Fertilizer Co., Bridgeport .....	Tobacco Station, Windsor .....	4.58	5.57	0.30	5.20	4.90	....	5.99	4304
4302	The Mapes Formula & Peruvian Guano Co., New York .....	Tobacco Station, Windsor .....	4.52	5.50	0.90	6.08	5.18	0.66	5.73	4302
4660	Olds & Whipple, Inc., Hartford .....	L. B. Hass & Co., Hartford ....	5.98	7.27	0.48	9.18	8.70	0.33	11.10	4660
4661	Olds & Whipple, Inc., Hartford .....	L. B. Hass & Co., Hartford ....	7.38	8.97	0.45	7.35	6.90	0.70	7.10	4661
4452	Olds & Whipple, Inc., Hartford .....	Stephen Potwine, Warehouse Point .....	5.14	6.25	0.33	4.80	4.47	....	5.93	4452
4047	Olds & Whipple, Inc., Hartford .....	Harry E. Wells, Warehouse Point .....	4.08	4.96	0.08	8.68	8.60	1.10	14.38	4047
3930	The Rogers & Hubbard Co., Portland .....	Allied Tobacco Co., Hartford ..	6.08	7.39	0.58	4.60	4.02	....	4.16	3930
3931	The Rogers & Hubbard Co., Portland .....	Allied Tobacco Co., Hartford ..	6.41	7.79	0.45	4.50	4.05	....	4.26	3931
4128	The Rogers & Hubbard Co., Portland .....	Allied Tobacco Co., Hartford ..	6.08	7.39	....	4.75	....	....	4.14	4128
4129	The Rogers & Hubbard Co., Portland .....	Allied Tobacco Co., Hartford ..	5.79	7.04	....	4.85	....	....	4.20	4129
4130	The Rogers & Hubbard Co., Portland .....	Allied Tobacco Co., Hartford ..	6.00	7.29	0.48	4.88	4.40	....	4.29	4130
4172	The Rogers & Hubbard Co., Portland .....	Allied Tobacco Co., Hartford ..	5.09	6.19	0.53	6.65	6.12	....	6.00	4172

TABLE XV. ANALYSES OF SPECIAL MIXTURES AND HOME MIXTURES—Concluded.

Station No.	Manufacturer.	Place of Sampling.	Total nitrogen.	Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
					Citrate-insoluble.	Total.	So-called "available."	As muriate.	Total.	
	<i>Sampled by Purchaser:</i>		%	%	%	%	%	%	%	
4226	The Rogers & Hubbard Co., Portland .....	Allied Tobacco Co., Hartford ..	5.02	6.10	0.63	6.60	5.97	....	6.46	4226
4225	The Rogers & Hubbard Co., Portland (In Fire) ..	Allied Tobacco Co., Hartford ..	0.04	0.05	6.85	15.70	8.85	....	13.68	4225
4275	The Rogers & Hubbard Co., Portland .....	Allied Tobacco Co., Hartford ..	5.15	6.26	0.70	6.53	5.83	....	6.09	4275
4276	The Rogers & Hubbard Co., Portland .....	Allied Tobacco Co., Hartford ..	5.13	6.24	0.38	7.13	6.75	0.15	6.49	4276
4303	The Rogers & Hubbard Co., Portland .....	Tobacco Station, Windsor .....	4.99	6.07	0.78	5.40	4.62	....	3.89	4303
4305	The Rogers & Hubbard Co., Portland .....	Tobacco Station, Windsor .....	5.00	6.08	0.65	5.18	4.53	0.35	3.99	4305
4884	Woodruff's Fertilizer ....	Yale Athletic Association .....	2.03	2.47	0.70	7.30	6.60	....	0.45	4884
4885	Stump & Walters Fertilizer ..	Yale Athletic Association .....	4.78	5.81	0.15	12.90	12.75	....	0.29	4885
2682	.....	E. N. Austin, Suffield .....	4.49	5.46	1.38	5.10	3.72	1.34	6.21	2682
4764	.....	E. N. Austin, Suffield .....	5.79	7.04	0.60	3.63	3.03	2.27	11.59	4764
3796	.....	Allan J. Bartlett, Greenwich ...	5.46	6.64	3.83	11.65	7.82	....	3.50	3796
3928	.....	Daigle Bros., Marion .....	4.15	5.05	0.53	9.73	9.20	....	7.46	3928
3773	.....	Frank Flannigan, Cheshire .....	3.67	4.46	....	8.83	....	....	5.78	3773



# VII. MISCELLANEOUS FERTILIZERS, AMENDMENTS AND WASTE PRODUCTS.

## WOOD ASHES.

Twenty samples of wood ashes were analyzed. With the exception of two samples, **2648** and **2744**, which were very inferior, probably leached ashes, all were of good quality. Excepting the two samples mentioned, water-soluble potash ranged from 4.53 per cent to 7.92 per cent and averaged 6.23 per cent. Phosphoric acid ranged from 1.33 per cent to 2.78 per cent. Wood ashes will usually contain 30 per cent or more of lime. The prevailing price has been \$5.00 per unit of potash. Canada is practically the only source of the commercial wood ashes used in this State.

Analyses are given in Table XVI.

TABLE XVI. ANALYSES OF WOOD ASHES.

Station No.	Manufacturer or Dealer.	Submitted or Purchased by.	Phosphoric acid.	Water-soluble potash.
			%	%
3510	John Joynt, Lucknow, Canada	The Allied Tobacco Co., Hartford	....	5.21
2648	.....	L. M. Chapman, Danbury .....	1.50	1.14
2744	.....	L. M. Chapman, Danbury .....	1.33	0.92
4080	John Joynt, Lucknow, Canada	A. A. Clark, Windsor .....	1.90	4.94
2620	John Joynt, Lucknow, Canada	John M. Clark, Simsbury .....	2.56	5.21
3843	John Joynt, Lucknow, Canada	Hatheway & Steane, Inc., Hartford .....	2.23	5.41
3960	John Joynt, Lucknow, Canada	Hatheway & Steane, Inc., Hartford .....	2.48	7.09
4132	John Joynt, Lucknow, Canada	Hatheway & Steane, Inc., Hartford .....	2.78	6.92
4133	John Joynt, Lucknow, Canada	Hatheway & Steane, Inc., Hartford .....	2.05	6.57
4134	John Joynt, Lucknow, Canada	Hatheway & Steane, Inc., Hartford .....	2.10	6.30
4254	John Joynt, Lucknow, Canada	Hatheway & Steane, Inc., Hartford .....	1.88	6.25
4255	Olds & Whipple, Inc., Hartford .....	Max Lavitt, Ellington .....	2.20	6.90
4082	John Joynt, Lucknow, Canada	Joseph Rostek, Jr., Melrose .....	1.63	6.20
3668	.....	A. N. Shepard & Son, Hartford ..	2.26	6.33
3829	John Joynt, Lucknow, Canada	Steane, Hartman & Co., Hartford	1.88	6.32
3830	John Joynt, Lucknow, Canada	Steane, Hartman & Co., Hartford	2.13	6.96
4210	John Joynt, Lucknow, Canada	Steane, Hartman & Co., Hartford	2.05	7.68
3416	John Joynt, Lucknow, Canada	J. B. Stewart, Windsor .....	....	4.53
4075	John Joynt, Lucknow, Canada	L. Wetstone & Sons, Hartford ...	1.70	5.34
4076	John Joynt, Lucknow, Canada	L. Wetstone & Sons, Hartford ...	1.78	7.92

## SHEEP MANURE, ETC.

Twelve samples of sheep and other farm manures were analyzed. There were no considerable deficiencies except in **3876** which contains about  $\frac{3}{4}$  of one per cent less than the guaranteed amount of potash.

These materials will contain, on an average, about 130 lbs. of plant food per ton, but they have additional agricultural value as conditioners and as suitable culture media for the growth of soil bacteria.

Analyses are given in Table XVII.

## LIME.

Sixteen samples of liming materials have been analyzed during the year for purchasers and others interested. Results are given in Table XVIII.

The following discussion on the use of lime for soil amendment purposes should be of interest and is contributed by the Department of Soil Research.

## THE USE OF LIME IN ADJUSTING THE SOIL REACTION.

M. F. MORGAN, *Soil Investigator.*

Ever since the state was first settled a few farmers have given some attention to the problem of "sour soils," and some form of lime has occasionally been applied to certain fields; but the problem of soil acidity was not keenly felt as long as good yields of the standard crops, such as timothy, corn, tobacco and potatoes, could be obtained without the use of lime. Excellent growth of such crops have been produced with heavy applications of manure or commercial fertilizers alone.

In recent years there has been an awakened interest in the soil reaction and its proper adjustment. Alfalfa and other legumes have begun to receive more attention. Vegetable crops are becoming increasingly important. The nature of certain plant diseases, such as potato scab and the black root rot of tobacco, is now more accurately known. Under such conditions it becomes imperative that the farmer should have definite knowledge of the reaction of his soil and how it may best be corrected to meet the demands of the particular crops in which he is most interested.

The older ideas of determining whether a field is "sour" from its general appearance are mostly very poor "guess work." Pastures which produce practically nothing but moss, cinquefoil, everlasting, broomsedge or poverty grass are supposed to be too acid to grow anything else. When one fails to get a stand of

TABLE XVII. ANALYSES OF

Station No.	Manufacturer or Brand.	Place of Sampling.
<i>Sampled by Station:</i>		
3874	Pulverized. American Agricultural Chemical Co., New York City ...	Bristol Grain & Supply Co., Bristol .....
4083	So. American. American Agricultural Chemical Co., New York City	American Agricultural Chemical Co., New Haven Sales Dept. ....
3879	Armour Fertilizer Works, New York .....	Charles Templeton, Waterbury Factory .....
3876	Berkshire Fertilizer Co., Bridgeport	Southington Lumber & Feed Co., Southington .....
3913	Groz-It. Pacific Manure & Fertilizer Co., San Francisco, Cal. ....	Lightbourn & Pond, New Haven .....
3911	Premier Poultry Manure. Premier Poultry Manure Co., Chicago, Ill.	Lightbourn & Pond, New Haven .....
3912	Premier Sheep Manure. Premier Poultry Manure Co., Chicago, Ill.	Wizard Brand Manure. Pulverized Manure Co., Chicago, Ill. ....
3916	Wizard Brand Manure. Pulverized Manure Co., Chicago, Ill. ....	S. P. Strople, New Britain ..
3917	Wizard Brand Sheep Manure. Pulverized Manure Co., Chicago, Ill.	S. P. Strople, New Britain ..
3895	"Sheep's Head." Natural Guano Co., Aurora, Ill. ....	F. S. Blish Hardware Co., So. Manchester .....
<i>Sampled by Purchaser:</i>		
2700	.....	S. D. Woodruff & Sons, N. Y.
2735	American Agricultural Chemical Co., New York City .....	S. D. Woodruff & Sons, N. Y.

SHEEP MANURE, ETC.

Total nitrogen.	Ammonia equivalent to total nitrogen.		Phosphoric acid.				Potash.		Station No.
			Available.		Total.		Found.	Guaranteed.	
	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.			
%	%	%	%	%	%	%	%	%	
1.54	1.87	1.75	....	....	0.88	0.75	1.95	2.00	3874
1.29	1.57	1.50	....	....	0.95	1.00	2.74	2.50	4083
1.57	1.91	1.50	....	....	1.55	1.00	3.39	2.00	3879
1.76	2.14	2.18	1.10	1.00	1.33	....	1.26	2.00	3876
1.57	1.91	1.82	0.80	0.75	0.90	1.25	2.85	3.00	3913
5.68	6.91	6.00	2.53	2.50	2.58	2.75	1.25	1.30	3911
1.88	2.29	2.43	0.75	1.00	0.83	1.20	2.40	2.00	3912
2.11	2.57	2.10	1.25	1.00	1.45	....	1.99	1.00	3916
2.03	2.47	2.43	1.57	1.25	1.65	....	3.40	2.00	3917
2.50	3.04	2.73	1.85	1.00	2.10	1.25	2.41	2.00	3895
1.57	1.91	....	....	....	0.63	....	2.96	....	2700
1.92	2.33	1.50	....	....	1.24	1.00	3.42	2.50	2735



grass, and red sorrel appears in the mowing lots, then the soil is thought to be "sour." Probably these diagnoses are correct, but they are not necessarily so. Many wet fields in limestone regions "look sour," but actually contain an abundance of lime. A serious phosphorus deficiency can produce the characteristic symptoms of acidity as shown by the character of pasture vegetation, and several pasture fertilization trials in this state have shown that in limed plots without other treatment the type of growth is unchanged. Sorrel thrives luxuriantly on a soil which has been heavily limed, if for any reason there is not a complete stand of grass or clover. A large number of soil tests by the Soils Department of this Station have shown that practically every field in the state is acid to some degree, unless it has been limed recently. Except for a few small areas in the western part of the state the rocks from which our soils are derived contain no lime carbonate, and even in these areas the limestone is so local in occurrence as to influence the soil to a very slight extent. Our common rocks, when weathered under conditions of normal rainfall, normally produce acid soils. The degree of acidity will be determined by the exact nature of the rock from which the soil is derived, the climate, the leachiness of the soil, the amount of organic matter and colloidal material (very fine particles) which the soil contains, and the agricultural practice followed on the field. All farmed soils of humid regions tend to become more and more acid, due to the constant removal of basic material through leaching and crops taken from the field.

The true measure of the degree of soil acidity is the concentration of the acid-reacting matter technically known as "hydrogen-ions." To express this in a simple way, scientists have devised the "pH" scale. On this basis, a neutral soil, neither acid or alkaline, has a reaction of 7 pH. (The figure 7 has a definite mathematical significance as related to the actual concentration of hydrogen-ions.) Below 7 pH indicates acidity, above 7 indicates alkaline conditions. As applied to Connecticut soils, the scale operates as follows:

Below 4 pH, extremely acid soils of rare occurrence.

4-5 pH—Very acid soils.

5-6 pH—Moderately acid soils, growing good crops of corn, timothy, tobacco, potatoes, etc., when other conditions of fertility are favorable, but too acid for alfalfa, beets, cabbage, onions, cauliflower, and other "acid-sensitive" crops.

6-7 pH—Slightly acid soils, favorable for growth of most crops.

7 pH—Neutral soils.

7-8 pH—Slightly alkaline soils, rare in this state unless heavily limed at a recent date.

Fortunately it is now possible by rapid field or laboratory tests to determine quite accurately the "pH" of a soil, so that the exact conditions of soil acidity may be known, and after taking into proper consideration the amount of organic matter, drainage conditions and fertilizer treatment, one can estimate fairly closely the need for lime of a particular crop on that soil.

It is not always necessary or desirable to lime a soil which has been found to be acid. Certain crops, such as strawberries, are not affected by soil acidity, while corn, potatoes and timothy do well on moderately acid soils (5-6 pH). Recent investigations have shown that the black root rot of tobacco is most prevalent on soils which are neutral or only slightly acid (5.9 to 7 pH). Potato scab is prevented by a moderate degree of acidity (below 5.6 pH). Lawn experiments at the Rhode Island Station have demonstrated that "weedless" lawns of the finest fine-leaved grasses are best secured on fairly acid soils. Soil acidity may be either injurious, of no consequence, or beneficial, depending upon what we wish to grow.

If it is necessary to make a soil less acid or correct the acidity entirely in order to produce certain crops, some form of lime-bearing material must be incorporated with the soil. In common practice, three liming materials are used: burnt lime ("stone lime" or "quick lime"), hydrated lime ("slaked lime") and ground limestone (lime carbonate).

The relationship between the chemically pure forms of the above materials is as follows: 100 lbs. of ground limestone = 74 lbs. of hydrated lime = 56 lbs. burnt lime. None of these materials are pure, and usually there is more or less of the corresponding forms of magnesium, similar in value to lime.

Commercial liming materials are judged on the basis of actual lime and magnesia (oxides of calcium and magnesium), which they contain, and upon their degree of fineness. The various products are quite variable in composition, but in general they will contain mixed oxides about as follows:

Material.	Oxide of Calcium and Magnesium. %
Limestone .....	45-55
Oyster shells .....	40-50
Burnt lime .....	85-90
Hydrated lime, high grade .....	65-75
Hydrated lime, low grade, containing over 10% carbonates .....	55-60
Lime ashes .....	50-60

The rapidity of action of lime in the soil will depend upon its degree of fineness. It is necessary that the material shall be ground sufficiently fine to produce relatively quick effect without prohibitive cost of grinding. For average conditions, a medium

TABLE XVIII. ANALYSES OF

Station No.	Manufacturer or Brand.	Sampled by.
4427	Coe Lime Works, Northford. Ground Limestone .....	Sidney Edwards, Middletown .....
4099	Conn. Agricultural Lime Co., New Haven. Hydrated Lime No. 1 .....	E. Mehmel & F. Sarvi, Plantsville .....
4100	Hydrated Lime No. 2 .....	E. Mehmel & F. Sarvi, Plantsville .....
3807	Conn. Agstone Co., Danbury. Ground Limestone .....	Station agent from stock of L. B. Wooding, North Haven .....
4117	Ground Limestone .....	Station agent from stock of Geo. S. Jennings, Southport .....
4118	Ground Limestone .....	Station agent from Factory .....
4273	Ground Limestone .....	Comstock & Ferry, Wethersfield .....
4274	Ground Limestone .....	S. Ellsworth Hall, East Wallingford .....
4666	Ground Limestone .....	Station agent from stock of H. B. Brownson, Shelton .....
4440	Farnam Cheshire Lime Co., Farnams, Mass. Agricultural Lime .....	Amos D. Bridge's Sons, Hazardville .....
2797	Grangers Mfg. Co., West Stockbridge, Mass. Ground Limestone .....	Chas. R. Treat, Orange .....
4101	Ground Limestone .....	Chas. R. Treat, Orange .....
4277	Ground Limestone .....	Station agent from stock of Edward Myers, Bethany .....
4200	International Agricultural Corp., Boston, Mass. Hydrated Lime .....	Benj. G. Southwick, Hartford .....
4455	Hydrated Lime .....	Station agent from stock of Frank Flannigan, West Cheshire .....
3669	Manufacturer Unknown. 10274 .....	A. N. Shepard & Son, Hartford .....

LIMESTONE, ETC.

Chemical Analysis.						Mechanical Analysis.					
Lime (CaO).		Magnesia (MgO).		Total Oxides.	Insoluble in acid.	20 mesh.	40 mesh.	50 mesh.	80 mesh.	100 mesh.	Station No.
Found.	Guaranteed.	Found.	Guaranteed.								
%	%	%	%	%	%	%	%	%	%	%	
50.12	....	0.78	....	50.90	8.10	84.00	66.00	55.00	46.00	42.00	4427
49.02	....	32.17	....	81.19	3.06	88.00	65.50	48.00	32.00	29.00	4099
67.63	....	3.77	....	71.40	2.62	93.00	70.00	49.00	30.00	24.00	4100
44.10	45.00	4.61	3.00	48.71	....	99.50	91.00	80.00	68.50	64.00	3807
43.04	45.00	5.50	3.00	48.54	11.70	99.50	91.00	83.50	74.00	69.00	4117
44.02	45.00	4.54	3.00	49.46	10.50	99.50	92.00	82.00	72.00	66.00	4118
44.76	....	5.91	....	50.67	10.14	99.50	92.00	83.00	71.00	66.50	4273
43.75	....	5.75	....	49.50	10.56	99.50	92.00	83.00	71.00	66.00	4274
45.32	45.00	3.86	3.00	49.18	11.39	99.00	91.00	81.00	70.50	67.50	4666
68.65	....	1.06	....	69.71	0.71	88.50	54.00	30.00	14.00	11.00	4440
51.50	....	1.02	....	52.52	....	99.80	99.50	97.50	84.00	77.00	2797
53.34	....	0.77	....	54.11	3.93	100.00	100.00	98.00	89.50	84.00	4101
42.14	35.00	6.92	1.00	49.06	10.80	96.50	83.00	70.00	55.00	50.00	4277
62.45	....	7.23	....	69.68	2.07	98.00	90.00	76.00	60.00	55.00	4200
48.88	....	33.10	....	81.98	0.96	84.00	55.50	42.50	31.50	29.00	4455
48.36	....	32.44	....	80.80	....	100.00	100.00	99.50	95.00	93.00	3669



ground lime or limestone seems to be the most desirable commercial product. A reliable authority states that pulverized limestone, all of which will pass a 10 mesh sieve, 70% of which will pass a 50 mesh sieve, and 50% of which will pass a 100 mesh sieve, should give excellent results, and yet be cheap enough to make its use worth while. In Ohio the standard required by law for agricultural ground limestone is that 95% of the material shall pass a 10 mesh screen, 50% shall pass a 50 mesh screen, and 30% shall pass a 100 mesh screen. If immediate results are desired in the use of a moderate amount of lime for a special crop of high money value, extreme fineness may be desirable, regardless of the greatly increased cost.

The exact amount of lime to be applied to properly adjust the soil reaction is not easily determined, even in the laboratory, and only general recommendations can be made. The following are safe quantities which should give good results on average Connecticut soils:

TONS LIMESTONE PER ACRES.

Crop.	Extreme Acidity.	Strong Acidity.	Moderate Acidity.	Slight Acidity.
Alfalfa .....	4-6	3-4	2-3	1/2-2
Asparagus .....	4-6	3-4	2-3	1/2-2
Barley .....	3-4	2-3	1/2-2	0
Beets .....	4-6	3-4	2-3	1/2-2
Cabbage .....	4-6	3-4	2-3	1/2-2
Carrots .....	3-4	2-3	1/2-2	0
Clover, red .....	3-4	2-3	1/2-2	0
Clover, alsike .....	2-3	1/2-2	0	0
Corn .....	2-3	1/2-2	0	0
Lettuce .....	4-6	3-4	2-3	1/2-2
Oats .....	2-3	1/2-2	0	0
Onions .....	4-6	3-4	2-3	1/2-2
Potatoes .....	1-2	1/2-1	0	0
Radishes .....	3-4	2-3	1/2-2	0
Red top .....	1-2	1/2-1	0	0
Rye .....	1-2	1/2-1	0	0
Spinach .....	4-6	3-4	2-3	1/2-2
Strawberries .....	0	0	0	0
Timothy .....	2-3	1/2-2	0	0
Tobacco .....	2-3	1/2-2	0	0

(Use other forms of lime in equivalent amounts.)

## MISCELLANEOUS.

In this group are included thirteen samples of check fertilizers in the coöperative program of the Royster Guano Co., and thirty samples of check cottonseed meal in a similar program of the American Oil Chemists' Society.

Eighteen other samples of a miscellaneous character have been analyzed, making the total for this group sixty-one.

**3996. Four Seasons Fertilizer.** This product is apparently intended for greenhouse use although it is recommended for lawns, golf greens, etc. It consists largely or entirely of waste cacao material, chiefly cacao shells. It contains 2.3 per cent of nitrogen, all of which is organic and largely (1.9 per cent) insoluble in water; about 1 per cent of phosphoric acid; and 2.2 per cent of water-soluble potash. One ton of this material, therefore, contains about 110 lbs. of plant food, 46 lbs. of which is nitrogen, largely in insoluble and inactive forms. The use of this material as a conditioner or amendment might be justified if it could be obtained at reasonable cost.

**2618, 2619. Guano** from Hobbies Keys, off the Nicaragua coast. Submitted by C. L. Beach of Storrs.

Analyses:

	2618 Light.	2619 Dark.
Nitrogen .....	1.06%	2.40%
Available phosphoric acid .....	7.93	5.37
Total phosphoric acid .....	27.28	14.47
Total potash .....	0.07	0.12

At average commercial valuations of nitrogen and phosphoric acid the plant food in these materials is worth about \$25.00 per ton. They are rather inferior as guanos, however, since they are poor in nitrogen, the element for which such materials are chiefly valuable. Guanos of fair quality will contain from 5 to 8 per cent of nitrogen while good guanos will contain 10 per cent, or over, of this constituent.

**2636. Rock Bone**, submitted by C. R. Burr and Co., Inc., Manchester.

This was rather coarse bone containing 1.53 per cent of nitrogen and 30.80 per cent of phosphoric acid.

**3349. Horn Shavings.** Griffin Button Co., Shelton. This waste material contains 14.59 per cent of nitrogen and a trace of phosphoric acid. The nitrogen is practically all insoluble but activity values by laboratory methods were high, 80 to 90 per cent. Some authorities regard horn as inferior because of its slow decomposition; others regard it as an effective fertilizer. On the basis of "activity" values for nitrogen by present methods it cannot be regarded as inferior.

**3659.** *Bone Meal* which had been used hardening steel. Submitted by E. W. Aspelin, Bristol. The nitrogen of the bone had been burned away but the material contained 21.12 per cent of phosphoric acid. It could be used as a source of phosphorus for fertilizer purposes.

**3907.** *Wool Waste.* Submitted by the Somersville Mfg. Co., Somersville. Material of this sort may contain considerable and varying amounts of nitrogen and small amounts of potash, usually from 1 to 3 per cent. This sample contained 14.59 per cent of nitrogen. The nitrogen is slowly available, however, and in the fertilizer industry such material is treated with sulphuric acid which makes the nitrogen more active. After this treatment it is suitable for mixing with other base goods in commercial fertilizer mixtures.

Wool waste has been used directly on the farm, spreading it broadcast and plowing under in preparation for seeding down. It can also be utilized in compost heaps mixed with wet stable manure.

**3801, 3929.** *Sewage Sludge.* **3802.** *Incinerator ashes.* Submitted by F. C. Oefinger, Stamford.

Analyses of materials as received:

	3801	3929	3802
	%	%	%
Nitrogen .....	0.73	0.80	...
Phosphoric acid (total) .....	0.26	0.36	0.85
Potash (total) .....	0.07	0.07	0.27

Sample **3801**, as received, was about  $\frac{2}{3}$  water, so that 3 tons would yield about 1 ton of air-dry material and contain about 60 pounds of plant food. Sample **3929** was about  $\frac{1}{2}$  water, hence 2 tons would yield 1 ton of air-dry material and contain about 50 pounds of plant food.

In addition to the plant food contained in it such material has some value as a conditioner on light soils, but the cost of carting, drying, etc., is likely to exceed its agricultural worth.

The incinerator ashes are poor in fertilizer ingredients, the phosphoric acid and potash in them being worth less than a dollar per ton.

**4185.** *Tobacco Stems.* Tobacco By-Products and Chemical Corporation, Richmond, Va. Sampled by the station agent from stock of E. J. Bantle, Glastonbury.

Analysis:

Nitrogen in nitrates .....	0.29%
total .....	1.19
Phosphoric acid, total .....	0.60
Potash, total .....	4.78

**3056.** "*Black Tobacco*" and **3057** *Light Tobacco.* Submitted by Dr. P. J. Anderson, Tobacco Station, Windsor.

In the curing of tobacco "black" leaves sometimes occur which as compared with normal (light) leaves are of poor quality and of little commercial value.

Comparative analyses of "black" and light leaves are given in Table XIX.

The analyses were made partly because of the fact that some growers felt that the occurrence of black leaves was possibly due to the increased use of magnesia in their fertilizer materials. While the black leaves show about twice as much magnesia as the light leaves, there appears to be no special significance in this since old analyses show considerably larger amounts of this ingredient than was found in either of these samples.

**2918.** *Humus.* Submitted by H. S. Coe, Waterbury.

Analysis:

Water .....	19.38%
Ash (sand, etc.) .....	53.03
Organic and volatile .....	27.59
Nitrogen .....	1.46
Phosphoric acid .....	0.20
Potash soluble in water .....	0.73

This material would be useful as an absorbent but contains no considerable plant food other than about 1.5 per cent of nitrogen.

**4765.** *Apparently peat or muck.* Submitted by Geo. D. Shedd, Willimantic.

TABLE XIX. ANALYSES OF TOBACCO (LEAVES).<sup>1</sup>

	No. 3056		No. 3057	
	Black Tobacco. As rec'd.	Dry basis.	Light Tobacco. As rec'd.	Dry basis.
Moisture .....	21.09	0.00	21.10	0.00
Total Ash .....	21.21	26.88	19.18	24.31
Nitric Nitrogen .....	0.66	0.84	0.62	0.79
Ammonic Nitrogen .....	0.62	0.79	0.72	0.91
Total Nitrogen .....	3.39	4.30	3.77	4.78
Sand .....	1.28	1.62	1.05	1.33
Soluble Silica (SiO <sub>2</sub> ) .....	0.18	0.23	0.13	0.17
Ferric Oxide (Fe <sub>2</sub> O <sub>3</sub> ) .....	0.27	0.34	0.23	0.30
Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> ) .....	0.12	0.16	0.01	0.01
Mangano-Manganic Oxide (Mn <sub>2</sub> O <sub>4</sub> ) .....	0.12	0.16	0.16	0.20
Calcium Oxide (CaO) .....	4.23	5.36	3.68	4.66
Magnesium Oxide (MgO) .....	1.96	2.49	0.94	1.19
Sodium Oxide (Na <sub>2</sub> O) .....	0.07	0.10	0.10	0.13
Potassium Oxide (K <sub>2</sub> O) .....	5.61	7.11	6.05	7.69
Sulphur (S) .....	1.01	1.28	1.07	1.36
Phosphorus Pentoxide (P <sub>2</sub> O <sub>5</sub> ) .....	0.45	0.56	0.60	0.76
Chlorine .....	0.24	0.31	0.18	0.23

<sup>1</sup> Analyses by H. J. Fisher.



TABLE XIX. ANALYSES OF TOBACCO (LEAVES)—*Concluded*.  
Ash constituents in percentages of the total (crude) ash.

	No. 3056	No. 3057
Sand .....	6.02	5.45
Silica (SiO <sub>2</sub> ) .....	0.86	0.70
Ferric Oxide (Fe <sub>2</sub> O <sub>3</sub> ) .....	1.26	1.23
Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> ) .....	0.60	0.04
Manganese Oxide (Mn <sub>2</sub> O <sub>4</sub> ) .....	0.60	0.82
Calcium Oxide (CaO) .....	19.94	19.11
Magnesium Oxide (MgO) .....	9.26	4.88
Sodium Oxide (Na <sub>2</sub> O) .....	0.37	0.53
Potassium Oxide (K <sub>2</sub> O) .....	26.45	31.53
Sulphur (S) .....	4.76	5.58
Phosphorus Pentoxide (P <sub>2</sub> O <sub>5</sub> ) .....	2.08	3.12
Chlorine (Cl) .....	1.15	0.94
Undetermined, chiefly Co <sub>2</sub> .....	26.65 <sup>1</sup>	26.07 <sup>1</sup>

<sup>1</sup> Co<sub>2</sub> may be 20-25%.

The sample contained about 0.8 per cent of nitrogen and only traces of phosphoric acid and potash. It is worthless as a fertilizer so far as plant food is concerned.

**2750. Fertilizer.** Submitted by Walter T. Clark, County Agent, Norwich, to be tested for borax. No borax was found.

**1752** and **4936** were two samples of soil thought to contain valuable metals. They were both mica.

#### THE EFFECT OF CHLORIDES UPON THE BURNING QUALITY OF TOBACCO.<sup>1</sup>

E. H. JENKINS, *Director Emeritus*.

Regarding the use of muriates (chlorides) as tobacco fertilizers the opinion and practice of New England tobacco growers developed probably in large measure from the account of the experiments of Nessler and others in Germany which was set forth by Prof. S. W. Johnson, then chemist of the Connecticut Board of Agriculture, in the report of the Board, 1872, p. 384. He concluded:

"It is a result of observation in our state as well as in Europe that the use of salt (muriates) increases the crop, but with detriment to its burning quality.

"We must in general avoid employing fertilizers which contain salt or other chlorine compounds in raising wrapping or smoking tobacco."

At the same time Johnson notes that chlorine is not the only cause of poor burn.

"It is most probable that burning quality is the result of the coincidence of several conditions.

<sup>1</sup> The renewed interest in the question of chlorides in fertilizer materials, and the proposed limitations for chlorine in raw materials and in mixed goods intended for use in tobacco culture, make this brief review by Dr. Jenkins of particular interest. (E. M. B.)

"Abundance of organic potash in the leaf (that is potash combined with organic acids), abundance of cellulose (woody fiber), abundance of sulphates,<sup>1</sup> are evidently favorable to easy burning. On the other hand, sugar, gum (pectic acid) and albuminous matters are difficult of combustion. Mineral salts, which fuse at a burning temperature, chlorides and phosphates of potash and soda, hinder free burn."

Fermentation, which reduces the quantity of sugar and probably other ingredients, acts on the whole to improve burn. The results given in our Bulletin 180, however, prove that in no case was the fire-holding capacity of a poor burning sort made satisfactory by fermentation.

Garner observes that the compounds in the leaf which are of importance in producing a good burn are the potash salts of the organic acids such as malate and citrate, and these are only formed from the potash which remains over after the mineral radicals, such as chlorine and sulphuric acid, have been neutralized.

While the harmful effects of chlorine under certain conditions is everywhere admitted, the question has been raised whether the experiments made in other countries, on soils different from ours, with different strains of tobacco and under methods of growing and harvesting unlike our own, were strictly applicable to our conditions; and it has been asked what definite and careful tests have been made in this country which prove that muriates injure the burning quality of the leaf. It is worth while to consider the question and note the observations of different experimenters.

The Virginia Station<sup>2</sup> reports that experiments conducted since 1906 indicate that "The sulphate is preferable as a source of potash for flue-cured tobacco. . . . Muriate and kainit contain chlorine; experiments have established the fact that chlorine tends to impair the burning quality of the leaf." Fifty to one hundred and fifty pounds of sulphate, i. e., 25 to 75 pounds of potash, are recommended.

T. K. Wolfe, Professor of Agronomy, Virginia Polytechnic Institute, says:<sup>3</sup>

"Five years results with dark tobacco and two years results with light tobacco show that tobacco produced from the use of muriate was equal and usually superior to that produced from the use of sulphate of potash. The selling price of the muriate and sulphate tobacco was identical. From the standpoint of yield and selling price muriate of potash is to be preferred to sulphate especially since the former is cheaper. In tobacco, the burning quality has to be considered as well as the yield. Burning tests<sup>4</sup> conducted with tobacco from the

<sup>1</sup> Further observation make more than questionable the value of "abundance of sulphates."

<sup>2</sup> Bull. 205, 1914.

<sup>3</sup> Tobacco, Vol. XLII, No. 1, p. 30, April 29, 1926.

<sup>4</sup> Tests made on rolled cigars.

Virginia Station showed that the sulphate of potash held fire for  $3\frac{1}{2}$  minutes while the muriate of potash held fire for  $1\frac{3}{4}$  minutes or exactly one-half as long as the sulphate tobacco."

In the report of the North Carolina Station, 1919, p. 32, it is stated that while there is some evidence that muriate may give good results, from the standpoint of the grower its use is not advocated because without doubt it injures the burning quality. In the experiments as high as 160 pounds of potash were used but from 36 to 40 pounds pays best.

Practically the same is said in the North Carolina report for 1920, i. e., muriate in quantities up to 80 pounds per acre of potash gave larger yields but poorer quality.

In the report of the same Station, 1921, p. 30, larger yield from muriate is reported and market value the same as from tobacco grown on sulphate, but muriate does not improve the burning quality.

A letter from the chemist of a fertilizer company doing a large business in the southern tobacco regions says that the Virginia and North Carolina tobacco regions recommend a fertilizer supply of potash of one half muriate and one half sulphate of potash.

The Ohio Station<sup>1</sup> states, in experiments with tobacco grown alone or in rotation with other crops, but with the fertilizers applied on tobacco, covering six, five and four year periods, 60 pounds of muriate were applied per acre. When the amount of muriate was increased the yield was not increased and the quality was reduced.

These observations were made in regions where pipe and cigarette tobaccos are produced and where "burn" is not so vital a thing as with us where wrapper and binder leaf is the only kind grown at present.

With us in New England a good burn is about the first essential. The leaf must hold fire well, not burning too fast or too slowly. It must not coal on the cigar and it must leave a clear white or light gray—not "muddy"—ash. These requirements for the most part do not apply to other types of leaf. Moreover, the quantity of potash used at the south, 40 to 75 pounds to the acre, is much less than is used here, 150 to 200 pounds—which is perhaps in some cases excessive. Under our conditions, therefore, it is evident that the risk of damage in using muriate is very much greater than with other types of tobacco.

At the same time some growers have been unnecessarily anxious to exclude even quite small quantities from the fertilizer. It is certain that a certain small quantity is necessary to the normal development of the crop.

<sup>1</sup> Bull. 285, p. 210.

Dr. Garner<sup>1</sup> concludes from his laboratory tests that while chlorine is undoubtedly injurious the experiments indicate "that it requires larger quantities to seriously affect the burning quality than is commonly supposed."

Dr. Anderson of the Tobacco Sub-Station at Windsor kindly permits the following statement in advance of his printed report.

Plots under test, each made in triplicate, had identical applications of nitrogen and phosphoric acid. All received the same amount of actual potash, 172 pounds per acre, but in different forms. From each set of three, 160 burning tests<sup>2</sup> were made, after fermentation, with these results.

Tobacco fertilized with sulphate of potash burned .....	34.3 sec.
Tobacco fertilized with carbonate of potash burned .....	44.9 sec.
Tobacco fertilized with muriate of potash burned .....	4.8 sec.
Tobacco fertilized with $\frac{2}{3}$ nitrate, $\frac{1}{3}$ carbonate burned .....	43.1 sec.
Tobacco fertilized with $\frac{1}{2}$ sulphate, $\frac{1}{2}$ carbonate burned .....	38 sec.
Tobacco fertilized with $\frac{1}{3}$ carbonate, $\frac{1}{3}$ nitrate, $\frac{1}{3}$ sulphate ..	43.5 sec.

Tobacco experts who examined the leaves also agreed that the chlorine (muriate) sample had bad burning quality and that all the others were good. Thus the evidence of experiment and observation of intelligent growers indicate that to use any considerable amount of muriate of potash in tobacco fertilizers is sure to damage or ruin its quality but no damage is likely to be done by the very small quantities of chlorine unavoidably present in commonly used fertilizer materials. The desire of some growers to exclude even these small quantities is not justified. Let it also be borne in mind that poor burn may also be caused by the accidents of the season and is not always to be ascribed to a fault in the fertilizer.

<sup>1</sup> Bull. 105, Bureau of Plant Industry.

<sup>2</sup> Tests made by ignition of single leaves with electric match.



## Connecticut Agricultural Experiment Station

New Haven, Connecticut

# The Quality of Vegetable Seed Sold in Packets in Connecticut

In coöperation with

The Commissioner of Agriculture

The Bulletins of this Station are mailed free to citizens of Connecticut who apply for them, and to others as far as the editions permit.

# CONNECTICUT AGRICULTURAL EXPERIMENT STATION

## OFFICERS AND STAFF

### BOARD OF CONTROL

His Excellency, Governor John H. Trumbull, *ex-officio*, President.

Charles R. Treat, *Vice President* .....Orange  
George A. Hopson, *Secretary* .....Mount Carmel  
Wm. L. Slate, Jr., *Treasurer* .....New Haven  
Joseph W. Alsop .....Avon  
Elijah Rogers .....Southington  
Edward C. Schneider .....Middletown  
Francis F. Lincoln .....Cheshire

### STAFF.

E. H. JENKINS, PH.D., *Director Emeritus*.

#### ADMINISTRATION.

WM. L. SLATE, JR., B.Sc., *Director and Treasurer*.  
MISS L. M. BRAUTLECHT, *Bookkeeper and Librarian*.  
MISS J. V. BERGER, *Stenographer and Bookkeeper*.  
MISS MARY E. BRADLEY, *Secretary*.  
G. E. GRAHAM, *In charge of Buildings and Grounds*.

#### CHEMISTRY: ANALYTICAL LABORATORY.

E. M. BAILEY, PH.D., *Chemist in Charge*.  
C. E. SHEPARD  
OWEN L. NOLAN  
HARRY J. FISHER, A.B. } *Assistant Chemists*.  
W. T. MATHIS  
FRANK C. SHELTON, *Laboratory Assistant*.  
V. L. CHURCHILL, *Sampling Agent*.  
MISS MABEL BACON, *Stenographer*.

#### BIOCHEMICAL LABORATORY.

T. B. OSBORNE, PH.D., *Chemist in Charge*.  
H. B. VICKERY, PH.D., *Biochemist*.  
MISS HELEN C. CANNON, B.S., *Dietitian*.

#### BOTANY.

G. P. CLINTON, Sc.D., *Botanist in Charge*.  
E. M. STODDARD, B.S., *Pomologist*.  
MISS FLORENCE A. MCCORMICK, PH.D., *Pathologist*.  
WILLIS R. HUNT, PH.D., *Assistant in Botany*.  
A. D. McDONNELL, *General Assistant*.  
MRS. W. W. KELSEY, *Secretary*.

#### ENTOMOLOGY.

W. E. BRITTON, PH.D., *Entomologist in Charge*;  
also *State Entomologist*.  
B. H. WALDEN, B.AGR. } *Assistant Entomologists*.  
M. P. ZAPPE, B.S.  
PHILIP GARMAN, PH.D.  
ROGER B. FRIEND, B.Sc., *Graduate Assistant*.  
JOHN T. ASHWORTH, *Deputy in Charge of Gipsy Moth Work*.  
R. C. BOTSFORD, *Deputy in Charge of Mosquito Elimination*.  
MISS GRACE A. FOOTE, B.A., *Secretary*.

#### FORESTRY.

WALTER O. FILLEY, *Forester in Charge*.  
H. W. HICOCK, M.F., *Assistant Forester*.  
J. E. RILEY, JR., M.F., *In Charge of Blister Rust Control*.  
MISS PAULINE A. MERCHANT, *Stenographer*.

#### PLANT BREEDING

DONALD F. JONES, S.D., *Geneticist in Charge*.  
H. R. MURRAY, B.S., *Graduate Assistant*.

#### SOIL RESEARCH.

M. F. MORGAN, M.S., *Investigator*.  
H. G. M. JACOBSON, M.S., *Assistant*.

#### TOBACCO SUB-STATION AT WINDSOR.

PAUL J. ANDERSON, PH.D., *Pathologist in Charge*.  
N. T. NELSON, PH.D., *Plant Physiologist*.

## The Quality of Vegetable Seed Sold in Packets in Connecticut

By E. M. STODDARD and A. D. McDONNELL.

Connecticut has no "pure seed law," but for many years the Experiment Station has made a practice of examining seed for germination and purity. The Report for 1877 contains a table giving the results on 33 samples of vegetable, grass and clover seed and from time to time the Reports of the Station have included the data on tests of seeds for a given year or a series of years. In fact, the Station was a pioneer in this field, having made in the early years a special study of methods and has always made seed tests for farmers and growers as a part of its educational and service work.

Citizens of the state may send samples for testing with the understanding that the results will be published but the number and distribution of such samples is not sufficient to furnish real information as to the quality of seed offered for sale on the open market. The quality of field and vegetable seeds has steadily risen as farmers have learned to demand better seeds, but there is occasionally a suggestion that some seed, especially that sold in small packets, is not as good as it should be. With the purpose of examining such seed and determining its quality this study was made.

The seed was purchased in sealed packets at retail prices ranging from 5 cents to 20 cents each. The tests made were for germination only, there being no consideration given to the purity of the sample; to the size of the packets; to the weight of the seed; to its freedom from disease; or to any other point.

The standard methods of procedure were followed in making the tests. In brief, 200 seeds were selected from each sample to be germinated. These seeds were put in a standard germinating chamber in duplicate lots of 100 seeds each, the smaller seeds being placed on a substratum of blotting paper, and the larger seed such as corn, peas, and beans, on flannel cloth. The substratum was kept moist by daily applications of unsterilized water. Each sample of seed was kept in the germinating chamber for the standard number of days required to germinate such seed. In no case was any sample allowed any special consideration.

### SEASON OF 1925.

In 1925, the Station agent purchased in the course of his sampling trips 57 samples representing the stock of 14 growers or distributors. These were tested for germination and the results are given in Table I.



TABLE I. SEED GERMINATION TESTS OF 1925.

Test Number	Grower or Distributor; and Variety of Seed	Sold by	Per cent of Germination
	<b>F. T. Bliss Hardware Co., South Manchester.</b>		
2447	Carrot, Danvers Half Long .....	F. T. Bliss Hardware Co.,	72.0
2446	Lettuce, Hartford Bronze Head .....	" " South Manchester.	85.5
2445	Spinach, Long Standing .....	" " " "	82.5
	<b>W. A. Burpee &amp; Co., Philadelphia, Penn.</b>		
2470	Carrot, Long Orange .....	Harrison & Gould, Milford.	73.5
2472	Lettuce, Big Boston .....	" " " "	74.5
2471	Onion, Yellow Globe .....	" " " "	91.0
	<b>Clapp &amp; Treat, Hartford, Conn.</b>		
2465	Cucumber, White Spine .....	S. P. Strople, New Britain.	95.0
2464	Lettuce, Big Boston .....	" " " "	75.0
2466	Onion, Danvers Yellow Flat .....	" " " "	91.0
	<b>D. M. Ferry, Detroit, Mich.</b>		
2435	Carrot, Imp. Long Orange .....	F. B. Newton, Plainville.	71.0
2437	Corn, Early Sweet .....	" " " "	92.0
2433	Lettuce, Simpson's Early Curled .....	" " " "	94.5
2436	Onion, Imp. Yellow Globe .....	" " " "	93.5
2438	Peas, Nott's Excelsior .....	" " " "	87.5
2434	Spinach, Thick Leaf Round Seeded .....	" " " "	76.5
	<b>Chas. C. Hart Seed Co., Wethersfield, Conn.</b>		
2422	Carrot, Danvers Half Long Stump Root ..	G. W. Thorpe, West Cheshire.	82.0
2420	Corn, Hart's Early Dawn .....	" " " "	92.5
2421	Peas, Nott's Excelsior Early Dwarf .....	" " " "	77.0
2454	Lettuce, Big Boston .....	Bacon Bros., Middletown.	83.5
2456	Onion, Red Wethersfield .....	" " " "	94.5
	<b>Lake Shore Seed Co., Buffalo, N. Y.</b>		
2475	Corn, Ea. Minnesota .....	Collins & Freeman, Branford.	91.0
2473	Lettuce, Salamander .....	" " " "	82.0
2476	Onion, Southport Yellow Globe .....	" " " "	83.5
2474	Spinach, Round Leaf .....	" " " "	63.5
	<b>D. Landreth Seed Co., Bristol, Penn.</b>		
2469	Carrot, Danvers Half Long .....	Stillman Hardware Co.,	77.0
2468	Lettuce, Salamander .....	" " New Canaan.	82.0
2467	Onion, Sport Red Globe .....	" " " "	85.5
	<b>Lyman Seed Co., Springfield, Mass.</b>		
2453	Cucumber, White Spine .....	Bacon Bros., Middletown.	96.5
2455	Spinach, Thick Leaf .....	" " " "	76.0

TABLE I. SEED GERMINATION TESTS OF 1925—Concluded.

Test Number	Grower or Distributor; and Variety of Seed	Sold by	Per cent of Germination
	<b>New Britain Seed Store, New Britain, Conn.</b>		
2457	Carrot, Danvers Half Long .....	S. P. Strople, New Britain.	74.5
2459	Lettuce, Big Boston .....	" " " "	84.0
2458	Onion, Red Wethersfield .....	" " " "	57.5
	<b>Northrup-King Co., Minneapolis, Minn.</b>		
2426	Beet, Early Blood Turnip .....	F. W. Woolworth Co.,	78.0
2423	Carrot, Imp. Danvers Half Long .....	" " " Winsted.	84.0
2424	Lettuce, Grand Rapids .....	" " " "	51.5
2425	Lettuce, Round Thick Leaf .....	" " " "	80.5
2427	Onion, Large Wethersfield .....	" " " "	87.0
2428	Peas, American Wonder .....	" " " "	95.5
	<b>Olds &amp; Whipple, Hartford, Conn.</b>		
2461	Cucumber, Boston Pickling .....	S. P. Strople, New Britain.	93.5
2460	Lettuce, Early Curled Silesia .....	" " " "	74.0
2462	Onion, Southport Red Globe .....	" " " "	94.5
2463	Spinach, Long Standing .....	" " " "	73.5
	<b>Page Seed Co., Greene, N. Y.</b>		
2448	Carrot, Chantenay .....	R. W. Hine, Cheshire.	76.5
2451	Corn, Stowell's Evergreen .....	" " " "	86.0
2449	Lettuce, Grand Rapids .....	" " " "	91.0
2450	Onion, Wethersfield .....	" " " "	83.0
2452	Spinach, Thick Leaved .....	" " " "	61.0
	<b>J. B. Rice Seed Co., Cambridge, N. Y.</b>		
2442	Carrot, Danvers Half Long .....	Bristol Grain Co., Bristol.	73.5
2444	Corn, Country Gentleman .....	" " " "	72.5
2440	Lettuce, Big Boston .....	" " " "	81.0
2441	Onion, Wethersfield Large Red .....	" " " "	83.0
2439	Peas, Premium Gem Dwarf .....	" " " "	89.5
2443	Spinach, Bloomsdale Savoy .....	" " " "	78.5
	<b>Ross Bros. Co., Worcester, Mass.</b>		
2432	Beet, Crosby's Egyptian .....	W. R. Bosworth, Woodstock.	80.5
2430	Carrot, Danvers Half Long .....	" " " "	77.5
2431	Lettuce, Big Boston .....	" " " "	81.0
2429	Onion, Yellow Globe Danvers .....	" " " "	90.0





TABLE II. SEED GERMINATION TESTS OF 1926—Continued.

Test Number	Grower or Distributor; and Variety of Seed	Sold by	Per cent of Germination
	<b>W. Atlee Burpee &amp; Co., Philadelphia, Penn.—Cont.</b>		
2979	Spinach, Norfolk Savoy-leaved .....	Jackson-Marvin Hdw. Co.,	43.5
3006	" Burpee's Princess Juliana .....	Westville.	84.0
	<b>Clapp &amp; Treat, Inc., Hartford, Conn.</b>		
2961	Beans, Golden Wax .....	Clapp & Treat, Inc., Hartford.	98.0
2962	" Six Weeks .....	" " " "	97.0
2969	Beet, Eclipse .....	" " " "	77.5
2970	" Early Blood Turnip .....	" " " "	82.5
2971	" Crosby's Egyptian .....	" " " "	75.5
2972	" Bassano .....	" " " "	85.5
2959	Carrot, Improved Long Orange .....	" " " "	*
2960	" Danvers Half Long .....	" " " "	66.5
2951	Cucumber, Improved White Spine .....	" " " "	80.5
2952	" Green Cluster .....	" " " "	90.5
2953	" Early Frame .....	" " " "	85.5
2954	" Improved Long Green .....	" " " "	82.5
2965	Lettuce, Hartford Bronze Head .....	" " " "	3.5
2966	" Cos Trianon .....	" " " "	*
2967	" Simpson's Early Curled .....	" " " "	9.5
2968	" May King .....	" " " "	1.0
2955	Radish, Early Scarlet Turnip .....	" " " "	76.0
2956	" French Breakfast .....	" " " "	83.5
2957	" Icicle .....	" " " "	69.0
2958	" Round Black Spanish .....	" " " "	80.0
2947	Spinach, New Zealand .....	" " " "	76.0
2948	" Thick Leaved .....	" " " "	*
2949	" Long Standing .....	" " " "	*
2950	" Round .....	" " " "	85.0
	<b>D. M. Ferry &amp; Co., Detroit, Mich.</b>		
3029	Beans, Golden Wax Bush .....	A. H. Watt, Redding Ridge.	78.0
3030	" Dwarf Unrivalled Wax Bush .....	" " " "	97.0
3055	Beet, Early Blood Turnip .....	" " " "	61.5
3056	" Detroit Dark Red .....	" " " "	60.0
3057	" Crosby's Egyptian .....	" " " "	66.0
3054	Cabbage, Mammoth Rock Red .....	" " " "	68.5
3034	Carrot, Early Scarlet Horn .....	" " " "	58.5
3035	" Chantenay .....	" " " "	70.0
3036	" Half Long Scarlet .....	" " " "	54.0
3037	" Danvers .....	" " " "	57.5
3044	Cucumber, Boston Pickling .....	" " " "	46.0
3045	" Improved Long Green .....	" " " "	47.5
3046	" Early White Spine .....	" " " "	84.0
3047	" Short Green .....	" " " "	68.0
3038	Lettuce, Mammoth Black Seeded Butter..	" " " "	80.5
3039	" Ferry's Early Prize Head .....	" " " "	90.5
3041	" California Cream Butter .....	" " " "	86.0
3042	" May King .....	" " " "	90.0

TABLE II. SEED GERMINATION TESTS OF 1926—Continued.

Test Number	Grower or Distributor; and Variety of Seed	Sold by	Per cent of Germination
	<b>D. M. Ferry &amp; Co., Detroit, Mich.—Cont.</b>		
3043	Lettuce, Big Boston .....	A. H. Watt, Redding Ridge.	94.5
3040	" Black Seeded Simpson .....	" " " "	97.5
3049	Radish, Icicle .....	" " " "	88.5
3050	" Early Scarlet Turnip White Tip..	" " " "	86.5
3051	" .....	" " " "	87.0
3052	" French Breakfast .....	" " " "	85.5
3053	" Improved Chartier .....	" " " "	84.5
3031	Spinach, Long Standing Prickly Seeded..	" " " "	63.5
3032	" New Zealand .....	" " " "	3.0
3033	" Thick Leaved Round .....	" " " "	68.0
3048	Squash, Summer Crookneck .....	" " " "	62.0
	<b>The Chas. C. Hart Seed Co., Wethersfield, Conn.</b>		
2940	Beet, Early Dewing's Blood Turnip .....	H. E. Meekers, Danbury.	73.0
2941	" Detroit Dark Red .....	" " " "	89.5
2932	Carrot, Danvers Half Long .....	" " " "	60.5
2928	Cucumber, Improved White Spine .....	" " " "	82.0
2929	" Boston Pickling .....	" " " "	70.5
2930	" Davis Perfect .....	" " " "	76.0
2935	Lettuce, Early Prize Head .....	" " " "	97.5
2936	" Simpson's Early Curled .....	" " " "	77.0
2937	" Big Boston Head .....	" " " "	93.0
2931	Parsnip, Long Smooth Sugar .....	" " " "	48.0
2945	Radish, Early Round Scarlet .....	" " " "	83.5
2934	Sage .....	" " " "	84.0
2946	Squash, Giant Summer Crookneck .....	" " " "	85.5
2933	Spinach, Early Giant Thick Leaf .....	" " " "	76.0
	<b>Lake Shore Seed Co., Dunkirk, N. Y.</b>		
3025	Beans, Henderson's Bush Lima .....	W. E. Daley, Bethel.	79.0
3026	" Red Valentine .....	" " " "	33.0
3014	Beet, Dewing's Improved Blood .....	" " " "	67.0
3015	" Detroit Dark Red .....	" " " "	56.0
3020	Carrot, Oxheart .....	" " " "	16.5
3021	" Danvers .....	" " " "	67.0
3023	Corn, Stowell's Evergreen .....	" " " "	62.0
3024	" Golden Bantam .....	" " " "	77.0
3016	Cucumber, Peerless White Spine .....	" " " "	86.5
3018	" Improved Long Green .....	" " " "	43.5
3017	" Boston Pickling .....	" " " "	61.5
3011	Lettuce, Prize Head .....	" " " "	0
3012	" Cos .....	" " " "	42.5
3013	" Wilson's Early Cabbage .....	" " " "	0
3028	Radish, Early Red Turnip .....	" " " "	37.5
3019	" Assorted .....	" " " "	22.0
3027	Squash, Golden Summer Crookneck .....	" " " "	26.5
3022	Spinach, Round Leaf .....	" " " "	57.5

TABLE II. SEED GERMINATION TESTS OF 1926—Continued.

Test Number	Grower or Distributor; and Variety of Seed	Sold by	Per cent of Germination
<b>Northrup-King Co., Minneapolis, Minn.</b>			
2834	Beans, Kentucky Wonder Pole .....	F. W. Woolworth Co.,	82.0
2835	“ Early Dwarf Black Wax .....	“ “ Hartford.	93.0
2852	Beet, Edmund's Improved Blood Turnip..	“ “ “	95.5
2853	“ .....	“ “ “	86.5
2826	Carrot, Chantenay .....	“ “ “	62.5
2827	“ .....	“ “ “	59.5
2828	“ Oxheart .....	“ “ “	73.5
2829	Cucumber, Improved White Spine .....	“ “ “	89.0
2830	“ Long Green .....	“ “ “	79.5
2836	“ Chicago Pickling .....	“ “ “	98.0
2847	Lettuce, Grand Rapids .....	“ “ “	98.0
2848	“ Black Seeded Simpson .....	“ “ “	100.0
2849	“ Improved Hanson Head .....	“ “ “	92.5
2823	Radish, Early Scarlet Turnip .....	“ “ “	90.0
2824	“ French Breakfast .....	“ “ “	98.0
2825	“ Sterling White Tip .....	“ “ “	96.5
2831	Spinach, Round Thick Leaved .....	“ “ “	*
2837	Squash, Golden Summer Crookneck .....	“ “ “	94.0
2832	Sweet Corn, Peep o' Day .....	“ “ “	90.0
2833	“ Golden Bantam .....	“ “ “	90.0
<b>Olds &amp; Whipple, Inc., Hartford, Conn.</b>			
2887	Beans, Burpee's Stringless .....	Olds & Whipple, Inc.,	97.0
2888	“ Golden Wax .....	“ “ Hartford.	97.5
2905	Beet, Dewing's Blood .....	“ “ “	71.5
2906	“ Crosby's Egyptian .....	“ “ “	76.0
2907	“ Detroit Dark Red .....	“ “ “	70.5
2908	“ Swiss Chard .....	“ “ “	82.5
2872	Carrot, Early Half Long Scarlet .....	“ “ “	55.0
2873	“ Danvers Half Long .....	“ “ “	65.5
2886	“ Early Half Long Scarlet .....	“ “ “	54.5
2882	Cucumber, London Long Green .....	“ “ “	86.5
2883	“ Davis Perfect .....	“ “ “	86.0
2884	“ White Spine .....	“ “ “	96.0
2885	“ Boston Pickling .....	“ “ “	94.0
2874	Lettuce, New York .....	“ “ “	100.0
2878	“ Crisp-as-ice .....	“ “ “	91.0
2879	“ Early Curled Silesia .....	“ “ “	97.0
2880	“ Hanson Head .....	“ “ “	*
2881	“ Tom Hannock .....	“ “ “	98.0
2865	Radish, Early Scarlet Turnip .....	“ “ “	69.0
2866	“ French Breakfast .....	“ “ “	52.5
2867	“ Early Scarlet White Tip .....	“ “ “	59.5
2870	“ Long Scarlet .....	“ “ “	76.5
2868	Spinach, New Zealand .....	“ “ “	52.0
2869	“ Large Viroflay .....	“ “ “	78.0
2871	“ Round Thick Leaf .....	“ “ “	68.5

TABLE II. SEED GERMINATION TESTS OF 1926—Concluded.

Test Number	Grower or Distributor; and Variety of Seed	Sold by	Per cent of Germination
<b>The Page Seed Co., Greene, N. Y.</b>			
2912	Beans, Page's Golden .....	H. E. Meekers, Danbury.	86.0
2913	“ Davis White .....	“ “ “	86.0
2900	Beet, Crosby's Egyptian .....	“ “ “	66.5
2901	“ Detroit Dark Red .....	“ “ “	75.0
2902	“ Early Blood Turnip .....	“ “ “	83.0
2889	Carrot, Oxheart .....	“ “ “	52.5
2890	“ Improved Long Orange .....	“ “ “	54.5
2891	“ Danvers Half Long .....	“ “ “	41.0
2909	Corn, Golden Bantam .....	“ “ “	83.5
2910	“ Stowell's Evergreen .....	“ “ “	72.0
2911	“ Early White Cory .....	“ “ “	91.0
2895	Cucumber, Long Green .....	“ “ “	82.5
2896	“ Early White Spine .....	“ “ “	95.0
2897	“ Paris Evergreen .....	“ “ “	90.5
2903	Lettuce, Grand Rapids .....	“ “ “	74.0
2904	“ Early Prize Head .....	“ “ “	95.0
2893	Radish, French Breakfast .....	“ “ “	83.5
2894	“ Early Scarlet White Tip .....	“ “ “	96.0
2892	Squash, Summer Crookneck .....	“ “ “	70.0
2898	Spinach, Bloomsdale .....	“ “ “	56.5
2899	“ Thick Leaved .....	“ “ “	*
<b>The Rice Seed Co., Cambridge, N. Y.</b>			
2925	Beans, Dwarf Rust-proof Golden Wax ..	H. E. Meekers, Danbury.	87.0
2926	“ Black Butter .....	“ “ “	93.0
2942	Beet, New Dark Red Eclipse .....	“ “ “	76.5
2943	“ Dewing's Early Blood Turnip .....	“ “ “	58.0
2944	“ Long Smooth Dark Blood .....	“ “ “	62.0
2917	Carrot, True Danvers Half Long .....	“ “ “	52.0
2918	“ Early French Short Horn .....	“ “ “	45.0
2927	“ Rice's Improved Long Orange ..	“ “ “	*
2923	Corn, Golden Bantam .....	“ “ “	*
2924	“ Crosby's Early .....	“ “ “	63.0
2919	Cucumber, Improved Long Green .....	“ “ “	*
2920	“ “ Early White Spine..	“ “ “	91.0
2921	“ Extra Early Green Prolific ..	“ “ “	50.5
2938	Lettuce, Early Curled Silesia .....	“ “ “	78.5
2939	“ Black Seeded Simpson .....	“ “ “	91.5
2914	Radish, True French Breakfast .....	“ “ “	70.5
2915	“ Extra Early Scarlet Turnip .....	“ “ “	67.5
2916	“ Early Scarlet Turnip White Tip..	“ “ “	82.0
2922	Squash, Giant Early Summer Crookneck..	“ “ “	79.0

\*NOTE: This sample showed a variance of 10% or more between the duplicate tests. An insufficient quantity of seed on hand prevented retesting of the sample.



### GERMINATION STANDARDS FOR VEGETABLES.

In the absence of official standards of germination for vegetable seed we present in Table III a standard of comparison for this particular study. These standards were obtained by plotting a frequency curve of tests made in our laboratory for a period of ten years of the several seeds, and taking the classes between which the largest number of units occurred as the standard. This method may be somewhat inaccurate, especially where only a few samples are taken, but it at least gives a good indication of what good seed should germinate under favorable conditions. The following chart of onion seed illustrates the method described above.

RESULTS OF GERMINATION TESTS OF 779 SAMPLES OF ONION SEED

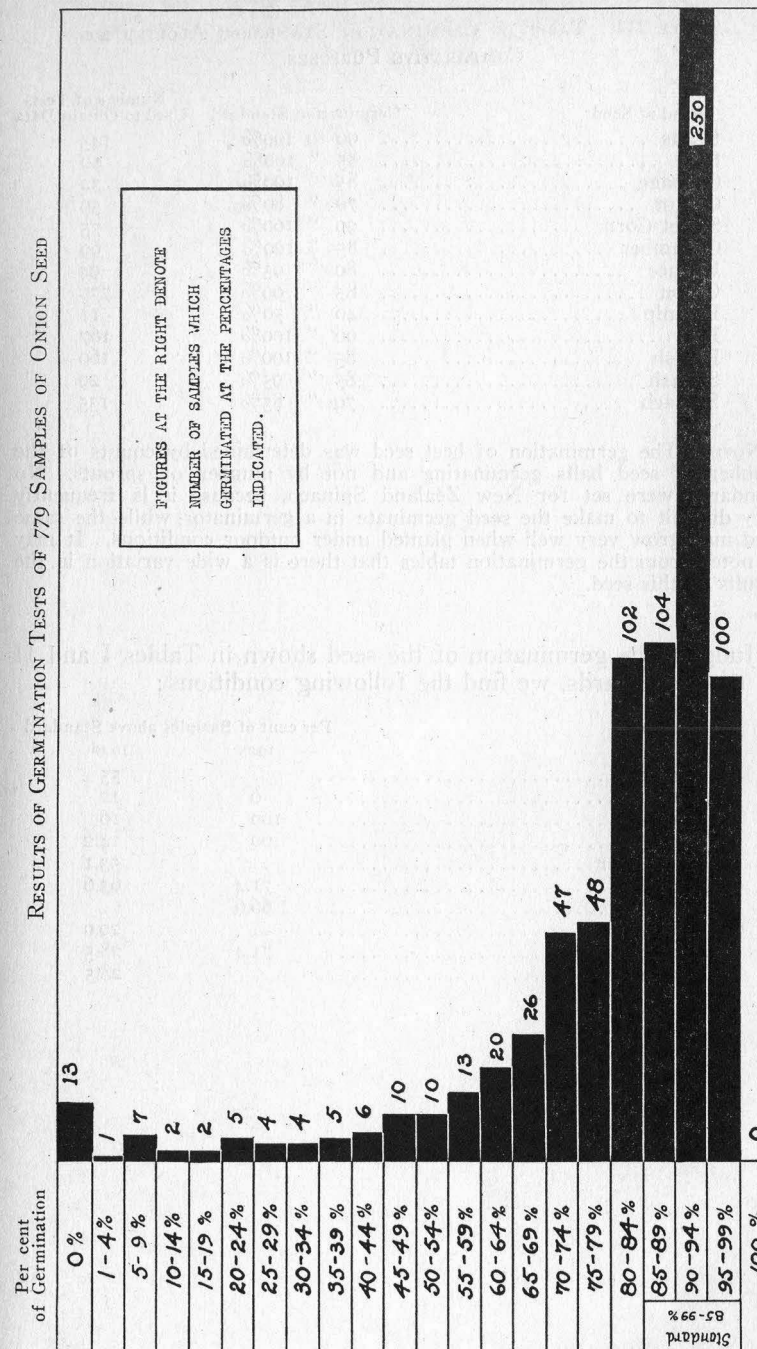


TABLE III. TABLE OF GERMINATION STANDARDS ADOPTED FOR COMPARATIVE PURPOSES.

Kind of Seed	Germination Standard	Number of Tests Used to Obtain Data
Beans .....	90 to 100%	145
Beet .....	85 " 100%	99
Cabbage .....	85 " 100%	32
Carrot .....	70 " 80%	59
Sweet Corn .....	90 " 100%	75
Cucumber .....	85 " 100%	69
Lettuce .....	80 " 95%	94
Onion .....	85 " 99%	779
Parsnip .....	40 " 50%	11
Peas .....	90 " 100%	167
Radish .....	85 " 100%	160
Squash .....	85 " 95%	29
Spinach .....	70 " 85%	135

NOTE: The germination of beet seed was determined by counts of the number of seed balls germinating and not by number of sprouts. No standards were set for New Zealand Spinach, because it is frequently very difficult to make the seed germinate in a germinator while the same seed may grow very well when planted under outdoor conditions. It may be noted from the germination tables that there is a wide variation in the results on this seed.

Judging the germination of the seed shown in Tables I and II by these standards, we find the following conditions:

Seed	Per cent of Samples above Standard	
	1925	1926
Beans .....	..	55
Beet .....	0	12
Carrot .....	100	16
Corn .....	60	14.2
Cucumber .....	..	53.1
Lettuce .....	71.4	63.6
Onion .....	66.6	..
Radish .....	..	29.0
Spinach .....	71.4	28.5
Squash .....	..	28.5



**Connecticut Agricultural Experiment Station**

New Haven, Connecticut

**INDEX**

TO REPORTS ON

**FOOD PRODUCTS AND DRUGS****1915-1925**

The Bulletins of this Station are mailed free to citizens of Connecticut who apply for them, and to other applicants as far as the editions permit.

# CONNECTICUT AGRICULTURAL EXPERIMENT STATION

## OFFICERS AND STAFF

as of  
January, 1927

## BOARD OF CONTROL

His Excellency, Governor John H. Trumbull, *ex-officio*, President.  
Charles R. Treat, *Vice President* ..... Orange  
George A. Hopson, *Secretary* ..... Mount Carmel  
Wm. L. Slate, Jr., *Treasurer* ..... New Haven  
Joseph W. Alsop ..... Avon  
Elijah Rogers ..... Southington  
Edward C. Schneider ..... Middletown  
Francis F. Lincoln ..... Cheshire

## STAFF.

E. H. JENKINS, PH.D., *Director Emeritus*.

ADMINISTRATION.  
WM. L. SLATE, JR., B.Sc., *Director and Treasurer*.  
MISS L. M. BRAUTLECHT, *Bookkeeper and Librarian*.  
MISS J. V. BERGER, *Stenographer and Bookkeeper*.  
MISS MARY E. BRADLEY, *Secretary*.  
G. E. GRAHAM, *In charge of Buildings and Grounds*.

CHEMISTRY:  
ANALYTICAL  
LABORATORY.  
E. M. BAILEY, PH.D., *Chemist in Charge*.  
C. E. SHEPARD  
OWEN L. NOLAN  
HARRY J. FISHER, A.B. } *Assistant Chemists*.  
W. T. MATHIS  
FRANK C. SHELDON, *Laboratory Assistant*.  
V. L. CHURCHILL, *Sampling Agent*.  
MISS MABEL BACON, *Stenographer*.

BIOCHEMICAL  
LABORATORY.  
T. B. OSBORNE, PH.D., *Chemist in Charge*.  
H. B. VICKERY, PH.D., *Biochemist*.  
MISS HELEN C. CANNON, B.S., *Dietitian*.

BOTANY.  
G. P. CLINTON, Sc.D., *Botanist in Charge*.  
E. M. STODDARD, B.S., *Pomologist*.  
MISS FLORENCE A. McCORMICK, PH.D., *Pathologist*.  
WILLIS R. HUNT, PH.D., *Assistant in Botany*.  
A. D. McDONNELL, *General Assistant*.  
Mrs. W. W. KELSEY, *Secretary*.

ENTOMOLOGY.  
W. E. BRITTON, PH.D., *Entomologist in Charge*;  
also *State Entomologist*.  
B. H. WALDEN, B.Agr.  
M. P. ZAPPE, B.S. } *Assistant Entomologists*.  
PHILIP GARMAN, PH.D.  
ROGER B. FRIEND, B.Sc., *Graduate Assistant*.  
JOHN T. ASHWORTH, *Deputy in Charge of Gipsy Moth Work*.  
R. C. BOTSFORD, *Deputy in Charge of Mosquito Elimination*.  
MISS GRACE A. FOOTE, B.A., *Secretary*.

FORESTRY.  
WALTER O. FILLEY, *Forester in Charge*.  
H. W. HICOCK, M.F., *Assistant Forester*.  
J. E. RILEY, JR., M.F., *In Charge of Blister Rust Control*.  
MISS PAULINE A. MERCHANT, *Stenographer*.

PLANT BREEDING  
DONALD F. JONES, S.D., *Geneticist in Charge*.  
H. R. MURRAY, B.S., *Graduate Assistant*.

SOIL RESEARCH.  
M. F. MORGAN, M.S., *Investigator*.  
H. G. M. JACOBSON, M.S., *Assistant*.

TOBACCO SUB-STATION  
AT WINDSOR.  
PAUL J. ANDERSON, PH.D., *Pathologist in Charge*.  
N. T. NELSON, PH.D., *Plant Physiologist*.

THE TUTTLE, MOREHOUSE & TAYLOR COMPANY

## INDEX

## TO THE REPORTS OF THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION

ON

## FOOD PRODUCTS AND DRUGS

1915—1925

E. M. Bailey

## INTRODUCTION

Examination of foods was begun by the Station as early as 1882, and was carried on under the provisions of special statutes which regulated the sale of milk, butter, vinegar and molasses, but not until 1896, under the general food law of 1895, was a separate report upon food products issued by the Station. With the passage of the Federal Food and Drugs Act in 1906 the Connecticut law was revised to include the inspection of drugs, and the annual report of 1908 contains the first account of systematic drug examination in this State.

From 1896 to 1925 inclusive some 52,000 samples of food products and drugs have been examined and reported upon. Bulletin 187, issued in June 1915, is an index to the food and drug reports of the Station from 1896 to 1914 inclusive. The present index covers the period 1915 to 1925 inclusive and represents the examination of about 23,000 samples.

The data contained in this long series of reports and bulletins is not entirely routine in character but include a considerable amount of investigational work. These two indices provide a key to this work as well as to the routine examinations made for the more immediate purpose of food and drug control.

In general, the plan and arrangement of the earlier index has been followed. The brand names of the more common foods and drugs may not always be found; but distinctive products are listed under their special names.

In the preparation of this index acknowledgment is particularly due to Richard T. Merwin and Gladys M. Finley, formerly members of the Station staff.



# INDEX

## TO REPORTS ON FOOD PRODUCTS AND DRUGS

1915—1925\*

(Figures in bold-faced type refer to the year of the report.)

- Acetanilid, compounds, analyses, **24**, 472.  
in cold remedies, **15**, 365.
- Acetasol, analyses, **17**, 161; **24**, 472.
- Acetone, as denaturant, **25**, 386, 390.
- Acetphenetidine, in cold remedies, **15**, 365.
- Acid, acetic, analyses, **22**, 436.  
in salad dressing, **23**, 207.  
standards, **22**, 436.
- acetylsalicylic, see aspirin.
- arachidic, in Covo, **19**, 226.
- arsenous, analyses, **24**, 471; **25**, 372.
- benzoic, in soda water syrups, **15**, 344.  
in magnesium citrate, **15**, 354.  
See proprietary remedies.
- boracic. See acid, boric.
- boric, analyses, **24**, 482.
- caffetannic, in coffee, **15**, 276; **16**, 187.
- citric, in magnesium citrate, **15**, 355.  
See carbonated beverages, fruit juices, soda water syrups.
- hydriodic, syrup of, analyses, **17**, 181; **21**, 290.
- hydrobromic, dilute, analyses, **23**, 210.
- hydrochloric, dilute, analyses, **22**, 439; **24**, 471.  
standards, **22**, 438.
- hypophosphorous, dilute, analyses, **23**, 210.
- malic. See maple syrup.
- phosphoric, analysis, **24**, 471.  
See various foods and drugs.
- quercitannic. See allspice, **22**, 422.
- salicylic, in aspirin, **15**, 347.
- sulphurous, in Hamburg steak, **17**, 145.
- Acid, sulphuric, dilute, analyses, **22**, 440.  
standards, **22**, 440.
- Acidity. See canned beans, onion extract, various acids and vinegar.
- Aconite, tincture of, **22**, 437.
- Adler-i-ka treatment, analysis, **15**, 390.
- A. D. S. preparations. See hair remedies, headache remedies and skin remedies.
- Akoll Biscuits, analysis, **16**, 193.  
See diabetic foods (Huntley & Palmer Co.).
- A-Lax tablets, analysis, **16**, 273.
- Albolene, analysis, **15**, 361.
- Alcohol, in buttermilk, **24**, 453.  
in cordials, **17**, 147.  
in near beer, **17**, 154; **19**, 238.  
in whiskey, **15**, 406-408.  
See also bay rum, beef, wine and iron, bitters, brandies, carbonated beverages, cider, cod liver oil emulsions and wines, cordials, cough medicines, diabetic beverages, elixirs, fig syrups, flavoring extracts, hair remedies, kümmel, near beer, proprietary medicines, spirit of camphor, spirit of nitrous ether, skin remedies, tinctures, tonics, whiskey, wine, and witch hazel.
- isopropyl, as denaturant, **25**, 386, 390.  
wood, in toilet preparations, **19**, 250; in liquors, **15**, 405; **20**, 259; **25**, 389-92.
- Aleuronat preparations, analyses, **19**, 300, 302, 312, 314, 316, 320, 324, 326, 330; **23**, 176; **24**, 432.
- Alimentary pastes. See macaroni and noodles; also diabetic foods.

\* Index for the years 1896-1914 was issued as Bull. 187.

Alkaloids, extraction from proprietary medicines, 15, 387.  
 Allenrhu, analysis, 20, 262.  
 Allen's Ideal Face Cream, analysis, 19, 251.  
 Allison flour. See diabetic foods (Schulenberg Oil Mills).  
 Allspice, analyses, 16, 209; 22, 420. brands, A. & P. Red Front, 16, 208; 22, 420; Acker, Merrall and Condit, 16, 208; 22, 420; Austin, Nichols & Co., Republic and Sunbeam, 16, 208; A. F. Beckmann & Co., Crown Aster, 16, 208; Boardman & Sons, 16, 208; Butler's Peerless, 16, 208; A. Colburn Co., 16, 208; 22, 420; Andrew Davey, Atlas, 16, 208; Davey Bros., 16, 208; Direct Importing Co., Benefit, 16, 208; E. R. Durkee & Co., Gauntlet, 16, 208; 22, 420; East India Tea Co., 16, 208; B. Fisher, 22, 420; R. T. French Co., 22, 420; Globe Grocery Stores, 22, 420; Grand Union Tea Co., 16, 208; 22, 420; F. H. Leggett & Co., 22, 420; Chas. G. Lincoln & Co., Capitol Mills, 16, 208; 22, 420; Logan Bros., L. B. C., 16, 208; McCormick & Co., 22, 420; Mohican Co., Mohican, 16, 208; Seeman Bros., White Rose, 16, 208; Shartenberg and Robinson, Alliance, 16, 208; Stickney and Poor, 16, 208; 22, 420; Union Pacific Tea Co., Sovereign, 16, 208; Village Store Mardor, 16, 208; Williams and Carleton, 16, 208.  
 net weights, 16, 209.  
 standards, 16, 208; 22, 422.  
 Almon Biscuit, analysis, 19, 318.  
 Almond, extract, analyses, 15, 282; 17, 142.  
 brands, A. & P., 15, 282; Austin, Nichols, 15, 282; Baker Extract Co., 15, 282; Beckmann & Co., 15, 282; Burnett Co., Superior, 15, 282; Calumet Tea and Coffee Co., 17, 142; Gillies and Co., 15, 282; Howland's Howco, 15, 282; Mohican, 15, 282; W. B. Riker & Son Co., 15, 282; Schlotterbeck & Foss Co., 15, 282; R. C. Williams & Co., 15, 282; Williams and Carleton Co., 15, 282.

Almond, extract—*cont.*  
 net volume, 15, 283.  
 standards, 15, 281.  
 butter, analysis, 19, 336.  
 paste, analysis, 19, 336.  
 Alpha Diabetic Wafers. See diabetic foods (Health Food Co.).  
 Ammonia, aromatic spirits of, analyses, 17, 181; 25, 373, 374.  
 household, analyses, 23, 217.  
 brands, A. & P. Tea Co., A. & P., 23, 217; Austin, Nichols & Co., Polo, 23, 217; Capitol Pickling Works, Capitol, 23, 217; Columbia Chemical Works, Parson's, 23, 217; Eagle, 23, 217; Empire Bottling Works, Empire, 23, 217; Great Northern Pacific Grocery Co., 23, 217; Hartshorn, 23, 217; Ideal Chemical Co., Gold Seal, 23, 217; Arthur Leslie Co., Leslie's, 23, 217; Salem Chemical & Supply Co., 23, 217; Sun Chemical Co., Sun, 23, 217.  
 powdered, analysis, 23, 216.  
 water, analyses, 22, 437.  
 standards, 22, 437.  
 Ammonium acetate, solution, analyses, 23, 209.  
 standards, 23, 209.  
 chloride, in bread, 17, 129.  
 salicylate compound, analysis, 17, 162.  
 Am-O-Tone, analysis, 15, 366.  
 Analax, analysis, 16, 274.  
 Analytical methods, alkaloids, phenolphthalein preparations, 15, 387.  
 ammoniacal nitrogen, in eggs, 23, 187.  
 bile acids, phenolphthalein preparations, 15, 389.  
 caffeine, in tea, 18, 183; 21, 278.  
 cryoscopy of milk, 21, 251; 22, 411.  
 fat, in bread, 17, 133.  
 in ice cream, 19, 216.  
 hot water extract, from tea, 18, 182.  
 iodine in Basy Bread, 20, 226.  
 iron, in Hemo, 20, 254.  
 nitrogen distribution in colostrum, 25, 363.  
 phenolphthalein preparations, 15, 379-390.  
 soap analysis, 20, 264.  
 vitamine tests, 22, 6; 25, 385.  
 Anisette cordial, analysis, 17, 146.

Antikamnia tablets. See headache preparations.  
 Antiseptic tablets, analyses, 16, 230; 17, 162.  
 Apples, canned, analyses, 15, 299.  
 brands, Depew & Co., Social, 15, 298; Oswego Pres. Co., Oswego, 15, 298; Seeman Bros., Waverly, 15, 298; Geo. C. Smith, Mt. Parnassus, 15, 298; R. C. Williams, Robin Hood, 15, 298.  
 net weight, 15, 298.  
 Apricots, canned, analyses, 15, 299.  
 brands, F. H. Davis and Co., Davisco, 15, 298; Hunt Bros. Co., Hunt's, 15, 298; Leggett and Co., Nabob, 15, 300; Libby, McNeill and Libby, Libby's, 15, 300; Seeman Bros., Warfield, 15, 300; R. C. Williams & Co., Royal Scarlet, 15, 300.  
 net weights, 15, 298, 300.  
 Apricot cordial, analysis, 17, 146.  
 Arbolone, analysis, 18, 234.  
 Argyn, analyses, 25, 376.  
 Argyrol, analyses, 25, 376, 382.  
 Arkady yeast food, analysis, 17, 115.  
 rôle in bread baking, 17, 115-133.  
 rôle of mineral salts in, 17, 128.  
 Arsenic, in hair tonics, 24, 484.  
 in Manola, 15, 396.  
 See gelatin and baking powder.  
 Arsenious iodide compound, analysis, 17, 163.  
 Ash, acid-insoluble, see coffee, rice, spices and tea.  
 alkalinity of, see chocolate, cider, cocoa, coffee, cordials, cream, diabetic foods, figs, syrups, tea, various flavoring extracts, and vinegar.  
 total, see beer, biscuits, bouillon, bread, breakfast foods, canned fruits and vegetables, cheese, cider, clams, cocoa, cocoa shells, coffee, colloidal silver preparations, confections, cooking fats, crackers, cream, desiccated foods, diabetic foods, eggs, figs, flours, gelatin, honey, ice cream cones, infant foods, jams, jellies, maple sugar, margarines, meats, milk, noodles, oysters, peanut butter, proprietary remedies, rice, soups, spices, syrups, tea, various flavoring extracts, vinegar.

Ash—*cont.*  
 water-insoluble, see coffee, tea and vinegar.  
 water-soluble, see breakfast foods, chocolate, cocoa, coffee, cordials, spices and tea.  
 Aspirin, analyses, 15, 347; 16, 231; 17, 164; 19, 247; 24, 472; 25, 368.  
 Auto-Laks, analyses, 15, 416; 16, 274.  
 Ayer's Hair Vigor, analysis, 19, 248.  
 Ayos. See diabetic foods (Waukesha Health Product Co.).  
 Babcock glassware, acid measures, 22, 441; 23, 218; 24, 491.  
 cream test bottles, 22, 441; 23, 218; 24, 491.  
 lactometers, 24, 491.  
 milk test bottles, 22, 441; 23, 218; 24, 491.  
 pipettes, 22, 441; 23, 218; 24, 491.  
 skim milk test bottles, 22, 441.  
 thermometers, 24, 491.  
 Bad-Em-Salz, analysis, 15, 391.  
 Baking powders, analyses, 17, 157; 19, 219.  
 brands, A. & P., 19, 218; Boston Baking Powder Co., 19, 218; Cleveland Baking Powder Co., 19, 218; R. B. Davis, 19, 218; Direct Importing Co., 19, 218; Disco, 19, 218; General Chemical Co., Ryzon, 17, 157; 19, 218; Grand Union, 19, 218; Hartford Market Co., 19, 218; W. A. Higgins, 19, 218; Howco, 19, 218; Loveday's, 19, 218; Manhattan Baking Powder Co., 19, 218; Mohican, 19, 218; New York Baking Powder Co., 19, 218; Rumford, 19, 218; Southern Mfg. Co., 19, 218; Van Dyke, 19, 218.  
 net weights, 19, 219.  
 standards, 19, 217.  
 Baking tests, 17, 115; 22, 393.  
 formula, 17, 119, 120.  
 losses of dry matter, 17, 120.  
 materials, analyses, 17, 117.  
 proximate composition of dough before and after baking, 22, 393.  
 record, 17, 121, 122.  
 Banana extract (imitation), analyses of, 15, 295.  
 brands, Seeman's, 15, 294.  
 net volume, 15, 294.



- Barbo compound, analysis, 15, 366.  
 Barry's Tricopherous, analysis, 19, 248.  
 Basy bread, analysis, 20, 227.  
 Baudouin test. See olive oil.  
 Bay rum, analyses, 16, 209; 17, 192; 20, 271; 21, 285.  
 Bazilika Ukor, analysis, 17, 146.  
 Beans, Carob, analysis of, 24, 437.  
   canned, acidity of liquor, 17, 112. analyses, 17, 109.  
   baked brands, Diamond, 21, 283.  
   kidney, analyses, 17, 108.  
     brands, Oak Orchard, 17, 106; Bert Olney, 17, 106; Oneida Chief, 17, 106; Sunbeam, 17, 106; Van Camp, 17, 106.  
     net weight, 17, 106.  
 Lima, analyses, 17, 108.  
   brands, Acker, Merrill, and Condit, 17, 106; Austin, Nichols, 17, 106; Beckmann, 17, 106; A. Brakeley, 17, 106; J. Brakeley, 17, 106; Burnham and Morrill, 17, 106; Butler, 17, 106; Curtice Bros., 17, 106; Davis, 17, 106; DeGraff, 17, 106; Geneva Pres. Co., 17, 106; Granger (Gold Leaf), 17, 106; Granger (Royal Seal), 17, 106; Green Mountain, 17, 106; Portland Packing Co., 17, 106; Roach, 17, 106; Rochester Pres. Co., 17, 106; Seeman Bros., Portia, 17, 106; Seeman White Rose, 17, 106; Webster's, 17, 106; Winebrenner, 17, 106; William's, 17, 106; Winters & Prophet, 17, 106.  
   net weight, 17, 106.  
 tin in, 17, 111.  
 wax and string, analyses, 17, 109.  
   brands, Bridal Wax, 17, 107; Conewago String, 17, 107; Eagle Refugee, 17, 107; Economy String, 17, 107; Empire Wax, 17, 107; Epicure Stringless, 17, 107; Essie Stringless, 17, 107; Fredonia Refugee, 17, 107; Forest King Refugee, 17, 107; Golden Wedding Refugee, 17, 107; Green Beans, wax and string—*cont.*  
     Mountain Stringless, 17, 107; Hartstring, 17, 107; Hatchet Refugee, 17, 107; Health Wax, 17, 107; Helmet Wax, 17, 107; Hermitage Stringless, 17, 107; Iona String, 17, 107; Lusitania String, 17, 107; Meadow Brook Wax, 17, 107; Medina Wax, 17, 107; Noreca, 17, 107; Oneida Chief Refugee, 17, 107; Oneida Chief Wax, 17, 107; Royal Scarlet Stringless, 17, 107; Royal Seal String, 17, 107; Royal Seal Wax, 17, 107; Shield String, 17, 107; Shriver Stringless, 17, 107; Silver Key Wax, 17, 107; Sultana String, 17, 107; Waldorf Wax, 17, 107; White Rose String, 17, 107; White Rose Wax, 17, 107.  
     net weight, 17, 107.  
 Beer, near, analyses, 17, 154; 18, 223; 19, 238.  
   brands, Anzac, 17, 152, 195; 19, 238; B. B., 19, 238; Bevo, 17, 153; 19, 238; Bunny Dry, 19, 238; Cerva, 19, 238; Colda, 19, 238; Delphia, 19, 238; Ebblings Extra, 19, 238; E-Moh, 19, 238; Fifty-fifty, 19, 238; Hormo, 19, 238; Iron Brew, 17, 153; Kovar, 19, 238; Mello, 19, 238; Moro, 19, 238; Nebco, 19, 238; Pablo, 18, 223; 19, 238; Sterling, 19, 238; We-No, 19, 238; Weiss, 18, 223; Wesco, 17, 154.  
 Belfield test, 21, 247.  
   See also cooking fats, lard.  
 Belladonna leaves, powder, analyses, 21, 286.  
   tincture of, analyses, 21, 286.  
 Benzol, as denaturant, 25, 386, 390.  
 Biscuits, analyses, 17, 156.  
   brands, Homo Whole Wheat, 17, 155; India, 17, 155.  
 Bismuth, milk of, 21, 287.  
   glycerite of, 23, 209.  
 Bisurated magnesia, analysis, 15, 392.  
 Bisuroids, analysis, 16, 275.  
 Blancoline, liquid, analysis, 15, 361.  
 Blaud's Compound, analysis, 16, 232; 17, 164.  
 Blaud's—*cont.*  
   Iron Pills, analysis, 16, 232; 24, 474.  
 Bleaching powder. See lime, chlorinated.  
 Bliss Native Herbs, analysis, 20, 261.  
 Bologna. See sausage.  
 Bonalax, analysis, 16, 275.  
 Boncilla Clasmic Pack, analysis, 24, 485.  
 Bon-Opto, analysis, 18, 238.  
 Bouillon, analyses, 19, 234.  
   brands, Campbell's Beef, 19, 234; Campbell's Clam, 19, 234; Cudahy's Clam, 19, 234; Depew's Beef, 19, 234; Direct Importing Co's Beef, 19, 234; Franco-American Co's Clam, 19, 234; Frank's Beef Broth with Barley, 19, 234; Gorton-Pew's Clam Extract, 19, 234; Steero Beef, 19, 234; Underwood's Clam, 19, 234.  
 Bran, washed, 19, 286; 21, 240; 25, 342. See also diabetic foods.  
 Bran Zos, 17, 139.  
 Brandy, analysis, 17, 146.  
   brands, Old Abbey Apricot, 17, 146.  
 Brauneberger (Moselle Wine). See diabetic foods.  
 Brazilian Balm, analysis, 18, 236.  
 Bread, ammonium chloride in, 17, 129.  
   analyses, 17, 118, 155; 25, 336.  
   brands, Cotton Seed, 17, 155; Gilbert's Butter-Krust, 17, 135; Gilbert's Holsum, 17, 135; Glutten, 15, 280; S. S. Thompson's Better-Yet, 17, 134; S. S. Thompson's Health, 17, 134; Ward Baking Co., 17, 116; Wheat-A-Laxa, 17, 155.  
   bromine in, 17, 119.  
   calcium sulphate in, 17, 128.  
   composition, 17, 126.  
   dry matter in, 17, 123.  
   experiments with, 17, 113-138.  
   fat in, methods, 17, 133.  
   lime, sulphates and ammonia in, 17, 118.  
   losses of food nutrients in baking, 17, 130.  
   materials, dry matter in, 17, 123.  
   potassium bromate in, 17, 130.  
   saying in dough ingredients, 17, 125.  
   weights and losses, 17, 135.  
   See also diabetic foods.  
 Breakfast foods, analyses, 15, 266; 17, 138; 18, 204; 19, 224; 20, 225; 22, 388; 24, 426.  
   brands, Albers Wheat Flakes Mush, 17, 138; American Barley Co., 18, 204; Battle Creek Whole Wheat Wafers, 15, 266; Battle Creek's Zep, 22, 388; Battle Creek Zwieback, 15, 266; Bennett, Simpson & Co., 17, 139; Bestovotes, 17, 138; Bran-eat Biscuits, toasted, 17, 138; Bufcoco, 17, 138; Capitol Health, 17, 138; Cerag, 17, 138; Dr. Vons' Health Biscuit, 18, 204; F. B. A. Laxative Health Biscuit, 15, 266; Fruited Oats, 20, 225; Fruited Wheat, 20, 225; Fruit Nut Cereal, 17, 138; Greer & Green Co., Edgemont Crackers, 24, 426; Hecker's Cream Oatmeal, 17, 138; Hygienic Health Food, 18, 204; Jersey Corn Flakes, 17, 138; Keen and Robinson's, 17, 138; Kellogg's Cero-vita, 15, 266; Kellogg's Granose Flakes, 15, 266; Kellogg's Krumbles, 17, 139; Kellogg's Laxa, 15, 266; Kellogg's Sanitas Granuto, 15, 266; Kellogg's Toasted Rice Biscuit, 15, 266; Kellogg's Toasted Rice Flakes, 15, 266; Kellogg's Toasted Rye Flakes, 15, 266; Kellogg's Toasted Wheat Biscuit, 15, 266; Kellogg's Toasted Wheat Flakes, 15, 266; Marshall's Dairy Maid Hominy, 15, 345; McCann's Irish Oat Meal, 17, 139; Minneapolis Cereal Co., 18, 204; Mother's Wheat Hearts, 17, 139; Muffits Corp., Muffits, 24, 426; Peterson's Cinnamon Rusks, 17, 138; Pillsbury's Vitos, 17, 138; Post Tavern Porridge, 17, 139; Purina Sterilized Bran Zos, 17, 139; Purity Rolled Oats, 17, 139; Quaker Corn Puffs, 17, 139; Quaker Oats Co., 18, 204; Ralston Wheat Food, 17, 139; Robinson's Patent Groats, 17, 139; Scott's Porage Oats, 17, 139; Seaboard's Comet Cereal, 15, 266; Sea Moss Farine, 17, 139; Shred-

Breakfast foods—*cont.*

- ded Wheat Co., Triscuit, 24, 426; Stokely Bros., Lye Hominy, 18, 227; Sunbeam Hominy, 17, 139; Sunrise Rice Cake Co., 18, 206; Sunseal Cream Corn Meal, 19, 224; Sunseal Improved Hominy Grits, 19, 224; Sunseal Sunny Corn, 19, 224; Trufood, 22, 388; Uncle Sam Health Food, 15, 266; Washington Corn Crisps, 17, 139; Whole Grain Wheat Co., 18, 204; Zim, 17, 139.
- net weights, 15, 267; 17, 138, 139.
- See also diabetic foods.
- Brewer's yeast, dry, analysis, 22, 8.
- Bromides, in tonics, 15, 400.
- Bronchitis tablets, analysis, 17, 165.
- Brosia meals, analyses, 17, 139.
- Brownatone, analysis, 16, 264.
- Broths. See diabetic foods.
- Butter, analyses, 18, 201; 19, 226; 20, 235; 22, 397; 24, 438; 25, 350.
- standards, 20, 234.
- Buttermilk, analysis, 24, 453.
- Cactico Hair Tonic, analysis, 15, 367.
- Cadomene, analysis, 18, 235.
- Cafab. See coffee, hygienic.
- Caffeine, citrated, analyses, 23, 209.
- methods, 18, 183.
- standards, 23, 209.
- See also cocoa and chocolate, coffee, coffee substitutes, tea.
- Caffetan acid. See coffee.
- Cakes, analyses, 23, 169, 170.
- Calcidin, analysis, 24, 474.
- Calcium, hydroxide. See lime water.
- iodized, analysis, 17, 174; 24, 474.
- oxide in flour, 17, 144.
- sulphate, in aspirin tablets, 15, 347.
- in bread, 17, 118, 128.
- Calcreose, analysis, 17, 166.
- Caldwell's Syrup Pepsin and Herb Laxative Compound, analyses, 15, 393; 20, 261.
- Calol, liquid petrolatum, analysis, 15, 361.
- Calomel, analyses, 24, 474.
- and soda tablets, analyses, 17, 168.
- tablets, analyses, 16, 232-234; 17, 166-168; 24, 482.
- Camphor, monobromated, 24, 482.
- spirit of, analyses, 15, 348; 19, 244.
- standard, 15, 348.

Cane sugar. See sucrose.

Canning compound, 19, 241.

Capsicum, in carbonated beverages, 20, 222.

Capudine, analysis, 19, 252.

Carbohydrates. See cocoa and chocolate, coffee, diabetic foods, infant foods.

Carbokill, 19, 258.

Carbonated beverages, analyses, 18, 208-211; 19, 239; 20, 222; 21, 232; 22, 387; 23, 171; 24, 423; 25, 336.

brands, Bacon, 18, 209; John Clancy, 18, 209; Clysmic Spring Co., 18, 209; Ginger Ale, Standard, 20, 223; Golden Eagle Bottling Works, 19, 239; Greater New York, 18, 209; Hamilton Bottling Works, 19, 239; Kaplan, 18, 209; Kenney & Ross, 18, 209; Leggett, 18, 209; R. G. Lyons Co., 18, 210; New York Bottling Works, 19, 238; Orange Whistle Co., 18, 210; Shanbrom's, 18, 209; Shanbrom Bottling Works, 19, 239; I. Silver Bottling Works, 19, 239; Standard Bottling Works, 19, 239; Star Bottling, 18, 209; Tropical Fruit Juice Co., 18, 209; West End Bottling Co., 18, 209; Yolens, Dranoff & Co., 18, 209.

Cargentos, analysis, 25, 376.

Carnrick's Soluble Food, analysis, 15, 328. See also 15, 280.

Casca Beans, analysis, 16, 276.

Cascara Compound, analysis, 17, 169.

Casearine Compound, 25, 366.

Casein, analysis, 23, 171.

preparations. See diabetic foods (Loeb).

Casein and calcium caseinate, analyses, 21, 233.

Casoid preparations. See diabetic foods (Callard, Stewart and Watt).

Cassina, analyses, 22, 434.

Catarrh medicines, analyses, 15, 401; 17, 194.

brands, Mucol, 15, 401; Watkin's Catarrh Relief, 17, 194.

Cathartic Compound, analyses, 17, 169.

Celery, extract, analyses, 15, 293; 17, 143.

Celery, extract—*cont.*

brands, H. C. Bibeau, 15, 292; Burnett's, 15, 292; Calumet Tea & Coffee Co., 17, 143; Grand Union Tea Co., 15, 292.

net volume, 15, 293.

oil, 15, 293.

standards, 15, 291.

roots, analysis, 15, 414.

Cera, 17, 138.

Cereal products, analyses, 24, 426.

brands, Greer & Green Co., Edgemont Crackers, 24, 426; Muffits Corp., Muffits, 24, 426; Shredded Wheat Co., Triscuit, 24, 426.

See breakfast foods.

Cerevisine, analysis, 22, 10.

Cero-Vita, analysis, 15, 266.

Champagne Vin Nature Sans Sucre. See diabetic foods.

Charlock in mustard, 16, 212.

Cheese, analyses, 15, 270; 24, 237.

brands, cream, 15, 270; Jewish Cottage, 24, 437; Swiss, 15, 270; Whole Milk, 15, 270.

standards, 15, 269.

Cherry Fam-ly-ade, analysis, 20, 259.

Cherry (imitation) extract, analysis, 15, 295.

net volume, 15, 294.

cordials, analyses, 17, 146.

Cherries, canned, analyses of, 15, 301.

brands, A. & P., Sultana, 15, 302; Acker, Merrill & Condit, Noreca, 15, 300; Austin, Nichols & Co., Preferencia, 15, 300; A. F. Beckmann & Co., Crown Aster, 15, 300; Booth Packing Co., Oval, 15, 300; Burt Olney Canning Co., American Club, 15, 300; Lewis DeGraff, Blue Seal, 15, 300; Egypt Canning Co., Pride of Egypt, 15, 302; Golden Gate Packing Co., Ajax, 15, 302; H. F. Hemingway, Anchor, 15, 302; Liberty, 18, 223; Libby, McNeill & Libby, Libby's, 15, 302; Monroe Canning Co., Monro-Co., 15, 302; Platt & Co., Tiger, 15, 302; Sodus Canning Co., White Birch, 15, 302; Stoddard, Gilbert & Co., Hermitage, 15, 302; Victor Preserving Co., Big Elm White, 15, 302; Webster-

Cherries, canned—*cont.*

Butterfield Co., Webster's Best, 15, 302; R. C. Williams & Co., Red Line, 15, 304.

net weight, 15, 300.

Chicaros, analysis, 18, 227.

Child's Witch Hazel Lotion, analysis, 19, 248.

Chloride, ferric, tincture of, analyses, 19, 246; 21, 289.

Chlorine, in deodorant, etc., 15, 402.

See lime chlorinated, and flour.

Chloroform, 22, 438.

Chocolate analyses, 17, 140; 25, 337.

cordial (confection), 16, 295.

extract, analysis of, 15, 295.

brand, Colton's, 15, 294.

net volume, 15, 294.

milk, analyses, 23, 199; 24, 452.

brands, Angel Drink, "400," 23, 197; Sagalou, 24, 452.

preparations (diabetic) analyses, 19, 338.

See milk-chocolate mixtures.

Chocolate Toddy, analysis, 24, 428.

Cho-Lay, analysis, 24, 428; 25, 337.

Cibrola, analysis, 23, 178.

Cider, analyses, 20, 228; 21, 234; 22, 389.

Cinchona, tincture of. See tinctures.

Cinnamon, extract, analyses, 15, 293.

brand, Burnett, 15, 292.

standard, 15, 291.

ground, analyses, 22, 422.

brands, Burnette Co., 22, 422; Butler's Peerless, 22, 422; Durkee & Co., Gauntlet, 22, 422; R. T. French, 22, 422; Globe Grocery Stores' Pocomo, 22, 422; Grand Union Tea Co., 22, 422; Great A. & P. Tea Co., 22, 422; Leggett & Co., Premier, 22, 422; Lincoln & Co., Capitol, 22, 422; McCormick & Co., Bee, 22, 422; Miner, Read & Tullock, Sunrise, 22, 422; Mohican Co., 22, 422; D. & L. Slade Co., 22, 422; Jas. P. Smith & Co., 22, 422; Stickney & Poor Spice Co., 22, 422; Weir and Co., Tiger Head, 22, 422.

standards, 22, 423.

Cinot, analysis, 20, 262.

Citrated caffeine, analyses, 23, 209.

Citrate of magnesia. See magnesium citrate.



Clam extract. See bouillon.  
 Clams, analyses, 16, 294.  
   canned, analyses, 22, 389.  
 Clearola, analysis, 15, 376.  
 Cloves, ground, analyses, 16, 211;  
   17, 151; 22, 424.  
   brands, A. and P., Sultana, 16,  
   210; Acker, Merrill and  
   Condit, 16, 210; 22, 424;  
   Austin, Nichols, Sunbeam,  
   16, 210; A. F. Beckmann and  
   Co., Crown Aster, 16, 210;  
   Bennett, Simpson and Co.,  
   16, 210; W. F. Brennan, 17,  
   151; Joseph Burnett Co., 22,  
   424; Butler, Peerless, 16,  
   210; 17, 151; 22, 424; Carlson  
   Tea Co., 17, 151; Clark, Chapin  
   and Bushnell's Elite, 16,  
   210; Andrew Davey, Atlas,  
   16, 210; Davey Bros., 16,  
   210; Lewis DeGraff & Son,  
   Health, 16, 210; Direct Im-  
   porting Co., Benefit, 16, 210;  
   17, 151; 22, 424; Durkee's  
   Gauntlet, 16, 210; East India  
   Tea Co., 16, 210; B. Fischer  
   and Co., 16, 210; 22, 424;  
   R. T. French Co., 22, 424;  
   Gager-Crawford Co., 17, 151;  
   Gilbert & Son, 17, 151;  
   Grand Union Tea Co., 16,  
   210; Great A. & P. Tea Co.,  
   22, 424; Edw. E. Hall and  
   Son, 16, 210; Knickerbocker  
   Mills, 22, 424; Leggett's Pre-  
   mier, 16, 210; Chas. G. Lin-  
   coln, Capitol Mills, 16, 210;  
   22, 424; Logan Bros., L. B.  
   C., 16, 210; McCormick &  
   Co., Bee, 22, 424; Miner,  
   Reed & Tullock, Sunrise, 22,  
   424; Mohican Co., Mohican,  
   16, 210; 22, 424; S. Satriano,  
   17, 151; D. and L. Slade Co.,  
   16, 210; Jas. P. Smith Co.,  
   22, 424; Stickney and Poor,  
   16, 210; 22, 424; Union Pa-  
   cific Tea Co., Sovereign, 16,  
   210; Village Store, Mardor,  
   16, 210; Weir & Co., Tiger  
   Head, 22, 424; Williams and  
   Carleton, 16, 210; Yale Tea  
   & Coffee Co., 17, 151.  
   net weight, 16, 211.  
   standards, 16, 209; 22, 423.  
 Clove, extract, analyses, 15, 293;  
   17, 132.  
   brands, Burnett's, 15, 292; Cal-

Clove, extract—*cont.*  
   umet Tea & Coffee Co., 17,  
   143.  
   standards, 15, 291.  
 Cocoa, analyses of, 15, 272; 17, 140;  
   19, 340; 20, 228; 21, 235; 23,  
   171; 24, 427, 428; 25, 337.  
   brands, Achor's Choco-Lactine,  
   15, 272; Alkethrepta, 17, 140;  
   Baker & Co., Baker's Break-  
   fast, 24, 427; Bartlett Co., Hav-  
   some, 24, 428; Bartlett & Co.,  
   Hollandia, 24, 428; Beacon  
   Chocolate Co., Ace High, 24,  
   428; Bensdorp's Amsterdam  
   Holland, Royal Dutch, 24, 428;  
   Boston Butter House, 24, 427;  
   Brewster's Sons Co., L. B. C.,  
   24, 427; Cocatina, 17, 140;  
   Connecticut Butter Co., Reli-  
   able Breakfast, 24, 427; Direct  
   Importing Co., Benefit, 24,  
   427; Droste's Cocoa Works,  
   Droste's, 24, 428; Dr. Thein-  
   hardt's Hygiama Food-Recup-  
   erative, 15, 272; Ghiradelli's,  
   17, 140; Grand Union Tea Co.,  
   Grand Union, 24, 427; Great A.  
   & P. Tea Co., A. & P., and  
   Red Front, 24, 427; Hershey  
   Chocolate Co., Hershey's, 21,  
   234; 24, 427; Howland Dry  
   Goods Co., Crown, 24, 427;  
   Huyler's, 24, 427; International  
   Sugar Corp., Cuba, 24, 427;  
   Kellogg's Health Koko Mix-  
   ture, 15, 272; A. E. Lamb,  
   Lamb's Quality, 24, 427; Lib-  
   erty Milk, 20, 228; Lipton, Inc.,  
   Lipton's Instant Cocoa, 24,  
   428; Lowney's, 21, 234; Massa-  
   chusetts Chocolate Co., Wan-  
   eta, 24, 427; F. L. McClellan,  
   My Own, 24, 427; Michaelis'  
   Acorn-Cocoa, 17, 140; Mohi-  
   can, 24, 427; Northern Pacific  
   Grocery Co., Perfection, 24,  
   427; Page & Shaw Natural  
   Cocoa, 24, 427; Park and Til-  
   ford, 24, 427; Pierce's Broken  
   Cocoa (nibs), 15, 272; Pilgard  
   Co., Sterling, 24, 427; Royal  
   Cocoa Co., Economy, 24, 427;  
   Royal Cocoa Co., Royal, 24,  
   428; Runkel's, 24, 427; Stoll-  
   werck Chocolate Co., Gold  
   Brand, 24, 427; Van Dyke Co.,  
   Ambassador, 24, 427; Van  
   Houten's Cocoa, 21, 234; 24,

Cocoa—*cont.*  
   428; Whitman & Son, Instan-  
   taneous Sweet Chocolate, 24,  
   428; Wilbur & Sons, Wilbur-  
   Dutch, 24, 428; Williams &  
   Carleton, William's, 24, 428;  
   Ziegler's Breakfast Cocoa, 15,  
   272.  
   infusion method, 15, 274.  
   net weight, 17, 140.  
   shells, analysis of, 24, 428.  
   See also diabetic foods.  
 Cocoanut biscuit, analysis, 19, 318.  
   sticks, analysis, 15, 345.  
 Codein Compound, syrup of, anal-  
   ysis, 16, 247.  
 Cod liver oil, extract of. See  
   gadual.  
 Coffee, analyses, 15, 275; 16, 186;  
   20, 229; 25, 338.  
   brands, Austin, Nichols & Co.,  
   Sunbeam, 20, 229; 25, 338;  
   Baker Importing Co., Barring-  
   ton Hall, 25, 338; Beech-Nut  
   Packing Co., Beech Nut, 25,  
   338; Boardman & Son's Gold  
   Star, 20, 229; 25, 338; Board-  
   man & Son's Putnam, 20, 229;  
   Brownell & Field Co., Auto-  
   crat, 20, 229; 25, 338; Brown-  
   Thompson & Co., 25, 338; F. C.  
   Bushnell Co., Golden Star, 20,  
   229; Cheek-Neal Coffee Co.,  
   Maxwell House, 25, 338; Clark  
   & MacKasick Co., Garden of  
   Allah, 20, 229; Andrew Davey,  
   Inc., Atlas, 25, 338; Direct Im-  
   porting Co., Benefit, 20, 229;  
   Dwinnell-Wright Co., White  
   House, 20, 229; 25, 338; B.  
   Fischer & Co., Astor, 25, 338;  
   Hartford Market Co., 25, 338;  
   Hodes Bros., Hodbro, 20, 229;  
   Leggett & Co., Premier, 25,  
   338; Chas. G. Lincoln & Co.,  
   Union Club, 20, 229; Lipton's  
   Yellow Label, 25, 338; Logan  
   Bros. Co., Midas and Mojav,  
   25, 338; Reynold's & Co., Rey-  
   nold's Reliance Steel Cut, 25,  
   339; E. Schoenberger & Sons  
   Ground Coffee, 25, 339; Stod-  
   dard, Gilbert & Co., Inc., Her-  
   mitage, 20, 229; United States  
   Stores System, Rex Blend, 25,  
   339; R. C. Williams & Co.,  
   Royal Scarlet, 25, 339.  
   caffeine-free, analyses, 15, 275; 16,  
   186.

Coffee—*cont.*  
   extract, analysis of, 15, 295.  
   brand, Colton's, 15, 294.  
   hygienic brands, Café des Inva-  
   lides, 15, 274, 276; 16, 186;  
   "Cafab Certified 25," 16, 186;  
   "Cafab Certified 30," 16, 186;  
   "Cafab Certified 35," 16, 186;  
   De-Tan-Ated, 15, 275; Digesto,  
   15, 275; Hübner's Health, 16,  
   186; Java, 15, 276; Kaffee Hag,  
   15, 276; 16, 186; 20, 228; 21, 235;  
   25, 339; Mocha, 15, 275; Pura  
   Café Presque sans Caffeine, 16,  
   186; Richelieu, 15, 275; 16, 186;  
   Rio, 15, 275; Royal Dutch, 15,  
   275.  
 Coffee, prepared, analysis, 15, 276;  
   19, 241.  
   brands, Barrington Hall, 20,  
   229; Borden's Coffee, 19, 240;  
   Faust Instant, 20, 229; G.  
   Washington, 15, 277; 16, 186.  
   substitutes, analyses, 15, 279; 17,  
   141; 21, 235; 25, 339.  
   brands, Barley Coffee, 17, 141;  
   Calumet Cereal, 17, 141;  
   Delisco, 21, 235; Drinket, 17,  
   140; Hartford Market Co.,  
   Coffee Substitute, 25, 339;  
   Jaffee, 17, 141; Kellogg's  
   Caramel Cereal, 15, 279;  
   Kellogg's Minute Brew, 15,  
   279; 20, 228; Monroe Co.,  
   Monco, 15, 279; Old Grist  
   Mill, 17, 141; Postum Cereal,  
   17, 141.  
 Coffeotoxins, 15, 278.  
 Colchicum Seed, tincture of, anal-  
   yses, 21, 287.  
 Cold tablets, analyses, 17, 170, 174.  
   brand, La Grippe Saratoga, 17,  
   174.  
 Colgate's Cashmere Boquet, anal-  
   ysis, 19, 248.  
 Lily of the Valley Toilet Water,  
   19, 251.  
 Quinol, analysis, 19, 250.  
 Shampoo, analysis, 19, 248.  
 Collodion, analysis, 24, 483.  
 Colloidal silver preparations, anal-  
   yses, 25, 375-382.  
 Colonol paraffin oil, analysis, 15,  
   361.  
 Colors, artificial, in banana extract,  
   15, 295.  
   in carbonated beverages, 18,  
   209-211.  
   in cherry extract, 15, 295.  
   in cordials, 17, 147.

- Colors, artificial—*cont.*  
 in egg powders, 18, 213.  
 in fruit juices, 17, 144.  
 in gelatin, 19, 222.  
 in jelly and junket powders, 17, 148.  
 in lemon extract, 15, 286.  
 in noodles, 15, 340.  
 in pineapple extract, 15, 295.  
 in raspberry extract, 15, 297.  
 in soda water syrups, 15, 344.  
 in strawberry extract, 15, 297.  
 in whiskey, 15, 410; 25, 391.  
 in wintergreen extract, 15, 290.
- Colostrum, 25, 363.
- Conalbin-Mehl No. 1. See diabetic foods (Goldscheider).
- Condensed milk. See milk.
- Conglutinbrot. See diabetic foods (Fromm & Co.).
- Cooking fats, analyses, 18, 200; 19, 226; 20, 234; 21, 247; 23, 188.  
 brands, Cottolene, 18, 200; 21, 247; Covo, 19, 226; Crisco, 18, 200; Flake White, 21, 247; Kuxit, 18, 200; Mazola, 18, 200; Nut-z-all, 23, 188; Peerless Puff Paste, 20, 234; 21, 247; Puff Paste, 21, 247; Sawtay, 18, 200; Selex, 21, 247; Snowdrift, 20, 234; 21, 247; Vegetole, 18, 200; Wesson oil, 18, 200.  
 phosphoric acid content in, 23, 188.
- Copper in gelatin, 19, 223.
- Cordials, analyses, 17, 146.  
 net volume, 17, 146.
- Corn Crisps. See breakfast foods.
- Corn Flakes. See breakfast foods.
- Corn meal, analyses, 18, 226; 22, 388.  
 brands, Eastern Flour and Merchandise Co., 18, 226; Great Atlantic & Pacific Tea Co., 22, 388; Quaker Oats Co., Quaker White, Quaker Yellow, 22, 388; Stoddard, Gilbert, 18, 226.
- Corrosive sublimate. See mercuric chloride.
- Coryza No. 2, analysis, 24, 476.
- Cottolene, 18, 200; 21, 247.
- Cottonseed oil, 22, 397.  
 brand, Wesson oil, 22, 397.
- Cough medicine, analysis, 17, 193.  
 brand, Watkin's, 17, 193.
- Coumarin, in vanilla extract, 15, 405; 22, 399.
- Covo, analysis, 19, 226.
- Crackers, analyses, 17, 156; 24, 426.  
 brands, Greer & Green Co., Edgemont, 24, 426; Loose-Wiles Whole Wheat, 17, 155.
- Cream, analyses, 17, 141; 18, 216; 22, 420; 24, 452.  
 evaporated, analyses, 20, 250; 25, 361.  
 brand, Walter Jahn's Super-Cream, 20, 250; 25, 361.
- Cream of tartar, analyses, 16, 190; 19, 218.  
 brands, A. & P., 16, 190; Acker, Merrill and Condit Co., 16, 190; Austin, Nichols and Co., 16, 190; Bennett, Simpson and Co., 16, 190; E. R. Durkee and Co., 16, 190; B. Fisher and Co., 16, 190; J. H. Folkins Co., 16, 190; Grand Union Tea Co., 16, 190; Miner, Read and Tullock, 16, 190; Mohican Co., 16, 190; 19, 218; D. and L. Slade, 16, 190; James P. Smith and Co., 16, 190; Stickney and Poor, 16, 190; Union Pacific Tea Co., 16, 190.  
 substitute, analysis, 16, 191.  
 brand, Revere Cream Tartar, 16, 191.
- Creme de Cerises, analysis, 17, 146.
- Coffee, analysis, 17, 146.
- Menthe, analyses, 17, 146.
- Rose, analyses, 17, 146.
- Violet, analysis, 17, 146.
- Creme Tokalon, analysis, 16, 272.
- Crisco, 18, 200.
- Curacao sec, analysis, 17, 146.
- Cutex, analysis, 15, 398.
- Cuticura Resolvent, analysis, 15, 395.
- Cystogen, analysis, 16, 267.
- Dahlia tubers, analysis, 21, 242.
- Dainty Fluffs, analysis, 19, 328.
- Dakol, analysis, 24, 487.
- Danderine, analysis, 19, 248.
- Hair Tonic, analysis, 19, 248.
- Davies, Rose and Co's Dearco, analysis, 19, 248.
- Deodorant, analysis, 15, 402.  
 brand, Odo-Ro-No, 15, 402.
- Desiccated foods, analyses, 20, 230.  
 brands, Cheshire Kitchens, Inc., Cheshire Rabbit, 20, 230; Keystone Instant Food Co., Chicken Gumbo, Clam Broth, Corned Beef Hash, Rice Pudding, Roast Beef Hash, Vegetable Soup, 20, 230.
- DeWitt's Toilet Cream, 19, 250.
- Dextrose. See cocoa and chocolate, coffee, flavoring extracts and infant foods.
- Diabetic foods:  
 alimentary pastes, analyses, 23, 178.  
 brands, Callard & Co., Casoid Flakes, Casoid Vermicelli, 23, 178.  
 artificial and modified milks, 19, 295.  
 brands, Rose's 19, 340; Whiting's, 19, 340; 22, 392.  
 bran. See breakfast foods.  
 bread equivalents, 19, 269.  
 breads, hard, and bakery products, analyses, 15, 280; 16, 191; 19, 279; 20, 231; 21, 239-243; 22, 392; 25, 342.  
 brands, Aird's Gluten Bread, 19, 316; American System of Bakeries, Gluten Bread, Gluten Bread A, Gluten Bread B, 21, 238; Barker System of Bakeries, Gluten Bread, 25, 343; Beroth Bread Shop, Gluten Bread, 25, 343; Bibeau's Gluten Bread, 25, 343; Brusson Jeune, Gluten Bread, 21, 238; Callard & Co., Almond Biscuits, No. 15, 23, 174; Bran and Agar Biscuits, 25, 344; Bran and Almond Biscuits, No. 13; Casoid Biscuits, No. 17A; Casoid Rusks, No. 8, 23, 174; Chocolate Biscuits "Casoid," 25, 344; Gluten and Almond Biscuits, No. 11; Gluten Biscuits, No. 9; Gluten Cracknells, No. 7; Gluten Dinner Rolls, No. 6; Kalari Batons, No. 5; Parmesan Cheese Straws, No. 17; Ponos Biscuits, No. 14; Prolacto Biscuits, No. 12; Soup Sippets, 23, 174; Starchless Ginger Biscuits, 25, 344; Callard, Stewart & Watt's Almond Biscuit, Plain; Almond Shortbreads; Casoid Biscuits; Casoid Dinner Rolls; Casoid Lunch Biscuit; Casoid Rusk; Cocanut Biscuit and Saccharin; Ginger Biscuit and Saccha-
- Diabetic foods: breads, hard—*cont.*  
 rin; Kalari Batons; Kalari Biscuits; Prolactic Biscuits, 19, 318; Canada Bread Co., Gluten Health Bread, 19, 318; Cheltine Food Co., Cheltine Assorted Biscuits; Cheltine Brown Rusks; Cheltine White Rusks; Manhu Diabetic Biscuits, 23, 174; Chicago Dietetic Supply House, Bran Agar Agar Wafers; Cellu Bran Wafers; Cellu Cheese Wafers; Cellu Chocolate Wafers, 25, 344; Community Bake Shop, Gluten Bread, 25, 344; Fougerson, Pain Antidiabétique, 25, 344; Freres, Longuets de Lausanne, 17, 142; Spinach Bread, 17, 142; Frank & Co., Erdnuss-Kakes, 19, 318; Fritz, Braunes Luftbrot "B," Mandelbrot, 19, 318; Fromm & Co., Eiweissbrot; Uni Bread, 19, 320; Gericke, Doppel-Porterzwieback; Mandelbrot; Porterbiskuits; Porterzwieback; Sifarbiskuits, 19, 320; Groetzsch, Diabetiker-Salzbrezch; Pfeffernüsse, 19, 320; Gumpert's Diabetiker-Stangen; Doppel-Diabetiker-Zwieback, 19, 320; Gunther, Aleuronat-Kakes, 19, 320; Hallinan's Bakery Gluten Bread, 25, 344; H. and R. Diabetic Foods, Bread of low food value; Bran Biscuit; Bran Biscuits, spiced and sweetened; Cellu Lemon Cookies, 24, 432; Health Food Co., Alpha; Alpha No. 1 Best Diabetic Wafer; Alpha No. 2 Best Diabetic Wafer; Bran Biskue; Gluten Cracker-Dust; Glutona Bread Sticks, 19, 276; Glutosac Bread, 19, 224, 276; Glutosac Butter Wafers, 19, 276; Gluten Nuggets; Glutosac Rusk; Glutosac Wafers Plain; Glutosac Zwieback; Pronireu; Protosac Bread No. 1; Protosac Bread No. 2; Proto-



Diabetic foods: breads, hard—*cont.*

Puffs No. 1; Protosac Rusk; Protosoy (Cereal); Protosoy Diabetic Wafer; Salvia Almond Sticks, 19, 276; Heintz Gluten Biscuits, 19, 324; Howland Co., Gluten Bread, 21, 238; Hundhausen's Aleuronat-zwieback, Aleuronat-Biscuits; Aleuronat-Kakes, 19, 324; Huntley and Palmer, Akoll Biscuits, 16, 191; 19, 276; Jackson's Dia-Biskit, 19, 280; Jacob & Co., Plasmon Oat Biscuit; Plasmon Plain Biscuit; Plasmon Sweet Biscuit; Plasmon Whole Meal Biscuit, 23, 176; Johnson Educator Food Co., Gluten Cookies; Glutine, Greseni Gluten, 19, 324; Kellogg's 40% Gluten Biscuit, Kellogg's Pure Gluten Biscuit, 16, 192; 19, 278; Potato Gluten Biscuit, 19, 326; Pure Gluten Biscuit, 19, 278, 326; Kirche Aleuronat-Kakes, 19, 326; Klopfer, Glidinebrot, 19, 326; Keney Tower Bakery, Gluten Bread, 25, 345; Laboratoire E. Storage, Madelines Lucullus; Vichy Gaufrettes; Gaufrettes Vanilles; Nougatines de Vichy, 24, 432; Laporte and Gauthier, Croustils (Dechloridized); Croustils (Simple); Croustils (Glutenized), 21, 238; Levine Bros., Gluten Bread, 23, 174; Loeb 'Diabetic Food Bakery, Aerated Gluten Bread, 19, 278; 23, 176; Genuine Gluten Bread, 23, 176; Diabetic Almond Macaroons, 16, 192, 19, 278; Almond Breadsticks, 19, 278; Breadsticks, 16, 192; 19, 278, 326; Butter Cookies, 16, 192; 19, 278; Lady Fingers, 16, 192; 19, 278; Sponge Cookies, 16, 192; 19, 278, 328; Caseine Bread, 19, 224, 278; Caseine Muffins, 19, 278; Gluten Bread, 19, 224; Genuine Gluten Bread, 16,

Diabetic foods: breads, hard—*cont.*

192; 19, 278; Gluten Luft Bread, 16, 192; Gluten Noodles, 16, 192; 19, 278; Gluten Zwieback, 15, 280; 16, 192; 19, 278; Gluten Almond Zwieback, 15, 280; 16, 192; 19, 278; Lyster Bros., Casein Bread, 15, 280; Miscellaneous bakery products, analyses, 24, 436; Mory's Bakery, Gluten Bread, 25, 345; Mrs. Root's Food Shop, Gluten Bread, 25, 345; Nasmith's Diabetic Bread, 19, 328; Norton-Truax, Diaprotein, 19, 278; John Norton Co., Diaprotein, No. 2, 22, 392; Nutrivoide Diabetic Flour Co., Nutrivoide Bran Wafers, 25, 345; Pierce Co., Svea Wafers, 19, 280; Pure Gluten Food Co., Dainty Fluffs, 19, 328; Hoyt's Gluten Granules over 40% protein, 19, 280; Rademann's Diabetiker-Biscuits; Diabetiker-Cakes; Diabetiker-Chokolade-Biscuits; Diabetiker-Stangen; Diabetiker-Zwieback; Erdnuss Biscuits; Kasestangen; Makronen; Sanitäts-zwieback, 19, 328, 330; Schaeffer Bros. Inc., Gluten Bread, 25, 345; Schelle, Aleuronat-Kakes, 19, 330; R. M. Scott, Gluten and Almond Biscuits, 23, 176; Seidl, Kleberzwieback, 19, 330; La Societe L'Aliment "Essential," Heudebert's Bread of Gluten, Aleurone Bread; Heudebert's Special Diabetic Bread; Heudebert's Rolls with Gluten; Heudebert's Rusks of Gluten, 21, 238; Strachen, Gluten Bread, 19, 330; Therapeutic Food Co., Aleurone Bread, 24, 432; Bread of Gluten, 24, 432; 25, 345; Dr. Charrasse Gluten Bread; Dr. Charrasse Gluto-Kola Bread; Dr. Charrosse Gluto-Soja Bread; Dr. Charrasse Supreme Bread; Energen

Diabetic foods: breads, hard—*cont.*

New Natural Gluten Bread, 23, 176; Special Diabetic Bread; Brusson Jeune Gluten Bread, 24, 432; Unknown Manufacturer, Passover Bread, 21, 240; Van Abbott & Sons, Soya Biscuits, 23, 176; Washburn-Crosby Co., Gluten Bread, 25, 345; Waukesha Health Products Co., Hepco Dodgers; Hepco Grits, 19, 280-330; Weston's Bakery, Gluten Bread; Gluten Cookies, 15, 280; Woman's Baking Co., Anise Bran Cookies; 21, 240; Bran Muffins, 20, 231; 21, 240; Caraway Bran Cookies, 20, 231; 21, 240; Cellu Biscuit, 20, 231; 21, 240; Cellu Caraway Cookies, 20, 231; 21, 240; Cellu Kisses, 20, 231; 21, 240; Cellu Lemon Cookies, 20, 231; 21, 240; Cellu Muffins, 20, 231; 21, 240; Cellu Nuts, 20, 231; 21, 240; Cellu Soup Wafers, 20, 231; 21, 240; Cellu Vanilla Cookies, 20, 231; 21, 240; Cocoa Nib Cookies, 20, 231; 21, 240; Spice Bran Cookies, 20, 231; 21, 240.

breads, soft, analyses, 19, 312, 314, 316; 23, 176.

brands, Canada Bread Co., Gluten Bread, 19, 312; Cestus Bread, 23, 176; Frank & Co., Protein-Roggenbrot; Protein-Weizenbrot, 19, 312; Fritz' Aleuronat; Kleberbrot; Litonbrot, 19, 312; Fromm & Co., Conglutinbrot; Litonbrot, 19, 312; Gericke's Doppel-Porterbrot; Dreifach-Porterbrot; Sifarbrot, 19, 314; Goldscheider's Sinamylbrot, 19, 314; Gumpert's Diabetiker-Doppel-Schwarzbrot; Diabetiker-Doppel-Weissbrot; Einfach-Schwarzbrot; Einfach-Weissbrot; Ultrabrot, 19, 314; Gunther's Kleberbrot, 19, 314; Hundhausen's

Diabetic breads, soft—*cont.*

Aleuronatbrot, low Gluten, 19, 314; Rademann's Diabetiker-Grahambrot; Diabetiker-Schwarzbrot; Diabetiker-Weissbrot; "D-K" Brot; Erdnuss Brot, Litonbrot, 19, 316; Schelte Aleuronatbrot, 19, 316; Seidl, Aleuronatbrot; Kleberbrot, 19, 316; Slinn-Shouldis Gluten Bread, 19, 316; Troponwerke, Tropon-Brot, 19, 316.

breakfast foods, analyses, 19, 330; 23, 176; 24, 433.

brands, Arnaud Inc., Starchless Breakfast Food, Cassava Cakes, 21, 238; Battle Creek Food Co., Cooked Bran, 24, 431; Curdolac Food Co., Krinkles, 24, 433; Efficiency Products Co., Nut Flakes, 24, 433; H. and R. Co., Diabetic Cellu Cocoa Nibs, 24, 433; Hazard Co., Wheat Protein, 19, 332; Health Food Co., Manana Gluten Breakfast Food, 19, 276; Kellogg's Bran Cooked and Krumbled, 23, 176; Lister Bros., Inc., Lister's Starch-free Bran, 24, 433; Loeb's Diabetic Food Bakery, Loeb's Casein Breakfast Cereal, 19, 278; Loeb's Gluten Breakfast Cereal, 19, 278; Plasmon, Ltd., Plasmon Oats, 23, 176; Pure Gluten Food Co., Gluten Breakfast Food; Gum Gluten Breakfast Food, Gum Gluten Granules, 19, 332; Hoyt's Gluten Flakes, 23, 176; Hoyt's Protein Cereal; Hoyt's Special Gluten Flakes, 24, 433; Pure Gluten Breakfast Cereal, 19, 332; The Spa, Malted Bran, 24, 434; Gerda H. Wagner's Diabetic Cereal, 24, 433.

broths, analyses, 19, 294.

carbohydrate, rôle of, 19, 265.

chocolate and chocolate preparations, brands, Groetzsch, Esschokolade (orange); Kochs-

Diabetic foods: chocolate—*cont.*

chokolade, 19, 338; Plasmon Chocolate, 19, 338; Rademann's Diabetiker-Chokolade, 19, 338; Troponwerke's Tropon-Chokolade, 19, 338.

cocoa, analyses, 23, 176.

brands, Callard & Co., Biogene Cocoa, 23, 178; Cheltine Food Co., Cheltine Milk-Cocoa, 23, 178; Freres, Cocoa Factory Residue, 17, 142; Loeb's Diabetic Food Bakery, Diabetic Cocoa, 23, 178; Plasmon, Ltd., Plasmon Cocoa, 23, 178.

confections, analyses, 18, 227; 19, 278; 23, 178; 24, 434; 25, 346.

brands, Callard & Co., "Casoid" Chocolates; "Casoid" Dessert Chocolate; "Casoid" Nut Chocolate; Chocolate Biscuit, 23, 178; Chocolate Creams; Chocolate Peppermints; Chocolate Truffles; Marzipan Chocolate, 25, 346; "Ponos" Cocoanut Ice, 23, 178; Ponos Marzipan, 25, 346; Sugarless Chocolate; Sugarless Jujubes; Sugarless Glycerine Jujubes; Sugarless Table Jelly, 23, 178; Fritz, Plain Chocolate Bars and Cakes; Cakes with Chocolate Icing; Dr. Fromm's Conglutin Schokolade; Ferment Scho-Kolade; Nut Chocolate; Peppermint Menthol Bonbons; Saccharin-Schokolade, 24, 434; Genesee Pure Food Co., D-Zerta, 24, 435; Laboratoire E. Storage, Croquettes de Chocolat Sucre; Pastilles de Chocolat, 24, 434; Lister Bros., Sugar Free Candy, 23, 178; Loeb Diabetic Food Bakery, Almond Chocolate Bars, 18, 227; 19, 278; Almond Macaroons, 19, 278; Chocolate, 19, 278; Plasmon Ltd., Plasmon Chocolate, 23, 178.

fat, rôle of, 19, 266.

federal definition, 19, 271.

standards for gluten, 19, 271.

flours, analyses, 15, 280; 16, 191; 19, 276-281, 298-341; 20, 231; 21, 238; 22, 390; 23, 174.

Diabetic foods: flours—*cont.*

brands, Acme Mills Co., Acme Diabetic Flour, 19, 298; Amthor & Co., Weizen-Protein, 19, 298; Barker's Gluten Food, "A," "B," and "C," 19, 276; Battle Creek Food Co., Gluten Flour, 25, 342; Battle Creek Sanitarium Co., Gluten Meal, 19, 298; Callard, Stewart & Watt Co., Casoid Flour; Gluten Flour, 19, 298; Canada Cereal & Flour Co., Gluten Flour, 19, 298; Cereal Meal Corp. Cereal Meal, 23, 174; Cereco Co., Soy Bean Gruel Flour, 19, 276; Cheltine Food Co., Cheltine Diabetic Food, 23, 174; Curdolac Flour Co., Curdolac, 24, 431; Dietetic Cellulose Co., Cellu flour, 20, 231; Efficiency Products Co., Ecmo flour, 24, 431; Empire Flour Mills, Gluten Flour, 19, 298; Farwell & Rhines, Genuine Gluten Flour 40%, 19, 276; 19, 300; 23, 174; 25, 342; Federal Mill & Elevator Co., Gluten Flour, 23, 174; Freres, Genteel Flour, 17, 142; Gericke, Aleuronat, 19, 300; Golden Rod Milling Co., Acme Special, 19, 276; Gluten, 19, 300; Goldscheider, Conalbin-Mehl No. 1, 19, 300; Gumpert, Ultramehl; Wheat Protein, 19, 300; Health Food Co., Almond Meal; Diabetic Casein Flour, 19, 276; Glutosac Gluten Flour, 19, 276, 302; Protosoy Soy Flour, 19, 276; Pure Washed Gluten Flour, 19, 276, 302; 22, 392; Snow Flake Diabetic Casein Flour, 19, 276; Hebert, Gluten Flour, 19, 302; Hundhausen, Aleuronat, 19, 302; Jireh Diabetic Food Co., Gluten Flour; Jireh Flour, 19, 302; Jireh "Starch Treated" Flour, 25, 342; Soyprotein Flour, 24, 431; Johnson Educator Food Co., Gluten Flour, 19, 304; Kellogg's 80% Gluten, 19, 304; 40% Gluten Flour, 16, 191; 19, 278, 304; 40% Gluten Flour Self-Raising, 19, 304;

Diabetic foods: flours—*cont.*

20% Gluten Meal, 16, 191; 19, 304; 40% Gluten Meal, 16, 191, 19, 278, 304; Pure Gluten Meal, 16, 191; 19, 278; Lister's Diabetic Flour, Self-Raising, 17, 142; 19, 278; Low Calorie Flour, 24, 431; E. Loeb and Co., Gluten Flour, 19, 306; Loeb Diabetic Food Bakery, Gluten Cracker Meal, 16, 192; 19, 278, 306; Pure Gluten Flour, 16, 192; 19, 278, 306; 23, 174; Special Gluten, 23, 174; Lyster's Casein, 15, 280; Diabetic, 19, 304; Maple Leaf Milling Co., Gluten Flour, 19, 306; Mayflower Mills, Gluten Flour, 19, 278; MacDowell Bros., Diaban Diabetic Flour, 25, 342; McFarlane Co., Gluten Flour, 19, 306; McIntosh Co., Gluten Flour, 19, 306; Niemöller, Roborat, 19, 306; North Western Cereal Co., Gluten Flour, Gluten Flour 40%, 19, 308; Nutrivoid Diabetic Flour Co., Nutrivoid Flour, 24, 431; Pierce Co., Roman Meal, 16, 191; Pieser-Livingston, Genuine Gluten Flour, 19, 278; 25, 343; Potter & Wrightington, Diet-Ease, Gluten Flour, 19, 278; 25, 342; Pure Gluten Food Co., Gum Gluten, Ground; Gum Gluten, Self-Raising, 19, 308; Hoyt's Gluten Flour Over 40% Protein, 19, 280; 23, 174; 25, 343; Hoyt's Gluten Self-Raising Flour, Over 40% Protein, 19, 280; Hoyt's Gluten Special Flour, 80% Protein, 19, 280; Plain Gluten Flour; Pure Gluten Flour, 19, 308; Ralston Health Food Co., Gluten Flour, 19, 310; Schulenburg Oil Mill, Allison's Cotton Seed Flour, 15, 280; 19, 280; 21, 238; La Societe L'Ailment "Essential," "Essential" Flour, 21, 242; Heudebert's Gluten Flour with Cacao; Heudebert's Surazotized Gluten Flour, 21, 238; Lacteous Flour, 21, 242; Soy Bean Food Products Co.,

Diabetic foods: flours—*cont.*

Soy Bean Flour "A" and "B," 19, 280; Still Rock Spa, Curdolac Flour, 19, 280; Vitae Health Food Co., Cellulose Flour, 25, 343; Soya Manna, 24, 431; Waukesha Health Product Co., Ayos, Improved Soya Bean Flour, 17, 142; Hepco Flour, 19, 280; 19, 310; White Swan Spice Co., Diet Flour; Gluten Flour, 19, 310; Wilson Bros., Genteel Brand Flour, 19, 280; Gluten Flour, 19, 280, 310; Gluten Flour 4/7 Standard, 19, 310.

cellulose flour from corn cobs, 23, 174.

gluten and gluten flour, standards, 23, 172.

soy bean meal, 25, 348.

wheat flour, 23, 174.

fruits and vegetables for diabetics, analyses, 21, 242; 23, 182; 24, 435, 436; 25, 346, 347.

brands, Diaprotein Co., Apple Sauce; Beans, Cut, Wax; Beans, Refugee, Green; Blackberries; Cherries, Red, Pitted; Cherries, White; Peaches, Yellow; Pears, Bartlett; Raspberries, Red; Strawberries, 21, 240; Peas, Green; Rhubarb; Spinach; Tomatoes, 21, 242.

glucose formation from protein, 19, 268, 269.

See Diabetic Biscuit; Glidine; 40% and 80% Gluten Biscuits; Plasmon and Sana-togen, 19, 269.

gluten-bran bread and muffins, analyses, 19, 290.

interpretation of analyses, 19, 274; nitrogen-free extract; protein, 19, 274.

jams and marmalades, analyses, 25, 348.

nuts and nut preparations, analyses, 16, 191; 19, 336; 23, 182.

brands, Beardsley's Sons, Acme Peanut Butter, 19, 280; Beechnut Packing Co., Peanut Butter, 19, 280; Chapman's Almond Paste, 19, 336; Christian's Natural Food Co., Protoid Nuts, 16, 191; Heide's Almond Paste,



Diabetic foods: nuts—*cont.*  
 19, 336; **Kellogg's** Almond Butter (Sanitas); Malted Nuts, 19, 336; **Spencer's** Almond Paste, 19, 336.  
 protein, rôle of, 19, 266.  
 protein preparations, analyses, 19, 312; 23, 176.  
 brands, **Callard & Co.**, Cibrola, 23, 178; **Cheltine Food Co.**, Cheltine Milk Protein, 23, 176; **Eiweiss Extrakt Co.**, Soson, 19, 312; **Glogau & Co.**, Aleuronat, 23, 176; **Krecke & Co.**, Energin, 19, 312; **Plasmon Co.**, Plasmon, 19, 312; **Plasmon Milk Proteid**, 23, 176; **Troponwerke's** Tropon, 19, 312.  
 protein-glucose factors, 19, 267.  
 special preparations, 19, 285; 21, 242.  
 brands, **La Societe L'Ailment "Essentiel,"** Cacao and Oat Cakes; "Essential" Food, Cacao Flavor; "Regimette" Dessert Cake; "Roburol" with Cacao; Vegetable Broth, 21, 242.  
 vegetables, thrice-cooked, 19, 290.  
 methods, 19, 292.  
 See also fruits and vegetables for diabetics.  
 wines, analyses, 15, 280.  
 brands, **Pierlot & Cie**, Champagne Vin Nature Sans Sucre, 15, 280; **Wilhelmi, Hock & Co.**, Brauneberger (Moselle) Weine, 15, 280.  
 Diabetina, analysis, 19, 253.  
 Dia-Biskit. See Diabetic Foods (Jackson).  
 Diaprotein. See Diabetic Foods (Norton-Truax).  
 Diethylphthalate as denaturant in toilet preparations, 25, 386, 390.  
 in alcoholic liquors, 25, 390.  
 Digestive Aromatic Tablets, analysis, 16, 235.  
 Dionin in eye solution, 21, 299.  
 "D-K" Bread. See Diabetic Foods (Rademann).  
 Domino Kanelasses, 18, 223.  
 Dovitam, analysis, 16, 225.  
 Dr. Edward's Olive Tablets, analysis, 24, 487.  
 Dr. True's Elixir, analysis, 21, 284.

Drinket. See coffee substitutes.  
 Drugs, analyses, 15, 346-363; 16, 229-257; 17, 161-191; 18, 232; 19, 243-247; 20, 273-280; 21, 284-299; 22, 436-441; 23, 209-218; 24, 461-490; 25, 365-392.  
 Dryco, analysis, 22, 408.  
 Eggs, analyses, 23, 185; 24, 438; 25, 349.  
 ammoniacal nitrogen in, 23, 187.  
 method, 23, 187.  
 characteristics of fresh, 22, 394.  
 stale, 22, 395.  
 shells, analyses, 20, 232.  
 substitutes, analyses, 18, 213; 20, 233.  
 brands, Aigo Baking & Cooking Compound, 20, 233; Atlas, 20, 234; Centenegg, 18, 213; Community, 20, 234; Egg-Nu, 18, 213; Ecc-O-Gene, 18, 213; Yelco, 18, 213.  
 regulations, 18, 213.  
 Egg-flour mixtures, analyses, 23, 167, 189.  
 Einfach-Schwarzbröt. See diabetic foods (Gumpert).  
 -Weissbröt. See diabetic foods (Gumpert).  
 Eiweissbröt. See diabetic foods (Fromm & Co.).  
 Elixirs, analyses, 17, 180; 19, 256; 25, 368.  
 Catnip and Fennel Compound, 19, 256; Iodin and Potassium Iodid, analysis, 17, 181; Iron, Quinine, Strychnin, analyses, 17, 180; Lactated Pepsin, analysis, 17, 180; Reed & Carnrick Peptenzyme, 25, 368.  
 Empress Instantaneous Hair Color Restorer, analysis, 20, 271.  
 En-Ar-Co Oil, analysis, 15, 399.  
 Energin. See diabetic foods (Krecke & Co.).  
 Epsom Salt, 16, 255.  
 in magnesium citrate, 15, 355.  
 Erbjus, analysis, 24, 487.  
 Erdnuss Brot. See diabetic foods (Rademann).  
 Kakes. See diabetic foods (Frank & Co.).  
 Eskay's Food, analysis, 22, 408.  
 Eskimo Pie, analyses, 22, 396.  
 Esters, in banana extract, 15, 295.  
 in cherry extract, 15, 295.  
 in chocolate extract, 15, 295.  
 in onion extract, 15, 295.  
 in peach extract, 15, 295.

Esters—*cont.*

in pineapple extract, 15, 295.  
 in pistachio extract, 15, 297.  
 in raspberry extract, 15, 297.  
 in strawberry extract, 15, 297.  
 Ether extract. See breakfast foods, butter, canned fruits and vegetables, cheese, cocoa and chocolate, coffee, coffee substitutes, cooking fats, diabetic foods, eggs, figs, flour, gelatine, graham flour, infant foods, margarines, milk, noodles, peanut butter, rice, soup and various spices.  
 non-volatile. See various spices.  
 Ether, Spirit of Nitrous, analyses, 16, 247; 18, 240; 23, 212.  
 standards, 23, 212.  
 Eureka Hair Tonic, analysis, 16, 265.  
 Ex-Lax, analysis, 16, 276.  
 Eye Lotions, analyses, 15, 403; 18, 238.  
 brands, Bon Opto, 18, 238; Optona, 15, 403.  
 Fairbanks Rock Cordial, analysis, 18, 233.  
 Falconjel, analysis, 17, 148.  
 Farr's Gray Hair Restorer No. 1, analysis, 15, 368.  
 Fat, determination of in baked products, 19, 273.  
 in gelatin, 19, 221.  
 See ether extract.  
 Fatoff Obesity Cream, analysis, 15, 369.  
 F. B. A. Laxative Health Biscuit, analysis, 15, 266.  
 Feinste Schlag-Sahne, analysis, 17, 158.  
 Ferric Subsulphate, solution, 22, 438.  
 standard, 22, 438.  
 Ferrous Carbonate, Saccharated, 22, 439.  
 standard, 22, 439.  
 Iodide, syrup of. See Iodide.  
 Fiber. See breakfast foods, canned fruits and vegetables, cocoa, and chocolate, coffee, coffee substitutes, diabetic foods, egg substitutes, figs, flour, graham flour, infant foods, noodles, rice, tea and various spices.  
 Fig preparations, analyses, 15, 281.  
 brands, Cudahy Orchard Co., Marmalade, 15, 281; Kellogg's Bromose, 15, 281;

Fig preparations—*cont.*

Black Fig Marmalade, 15, 281; White Fig Marmalade, 15, 281.  
 Fish, analyses, 24, 437.  
 Five fruit, 17, 144.  
 Flavoring Extracts. See various extracts, as almond, clove, lemon, vanilla, etc.  
 Fleischmann's Yeast, analysis, 22, 12.  
 Flour, barley, analyses, 18, 205.  
 corn, analyses, 18, 205.  
 gluten, 23, 172; 25, 340. See also diabetic foods.  
 standard, 19, 271; 23, 172.  
 graham, analyses, 15, 325; 24, 442, 444.  
 brands, A. and P. Grandmother's, 15, 324; 24, 444; Austin, Nichols & Co., Sunbeam; Ballard & Ballard Co., Obelisk; Banner Milling Co., Banner; Dayton Milling Co.; Farwell & Rhines, 15, 324; Grand Union Tea Co., Wheatsworth, 24, 444; Hecker Cereal Co.; 15, 324; Laramer Co., 24, 444; Pillsbury's, 24, 444; Potter & Wrightington Big "G," 15, 324; Quaker Oats Co., Schumacher, xxx, 15, 324; 24, 444; Thornton & Chester Mill Co., 15, 324.  
 net weight, 15, 325.  
 malt, analyses, 17, 114.  
 brands, Advance Malt Products Co., Malzo; Cabell Co., Maltora; Chas. E. Mechel, Diasto; Plymouth Milling Co., Plymco, 17, 114.  
 miscellaneous brands, Good Health, 17, 156; Smith & Ashton's Nu-Food Health, 15, 345.  
 non-nutritive, 25, 340.  
 oat, analyses, 18, 205.  
 potato, analyses, 18, 205.  
 prepared, brands, A. & P., 22, 402; Aunt Jemima, 19, 225; D. and C. Self-raising, 17, 143; 19, 225; 22, 402; Gold Medal, 22, 402; Grandma's Pancake, 17, 143; Hecker's, 19, 225; 22, 402; Jersev, 22, 402; Jim-Dandy, 19, 225; Kaple-Quality, 19, 225; Mohican, 19, 225; Pillsbury's, 22, 402; Presto, 17, 143; 19, 225; Quaker, 22, 402;



Flour, prepared—*cont.*

- Reliable, 17, 143; 19, 225; 22, 402; Swans Down, 17, 143; Teco, 17, 143; Victory, 19, 225.  
 rice, analysis, 18, 226.  
 rye, analysis, 18, 226.  
 substitutes, analysis, 18, 205.  
 wheat, analyses, 22, 401; 23, 189.  
   brands, Austin, Nichols & Co., Palo and Snow Flake, 22, 401; Duluth-Superior Mill Co., Imperial, 22, 401; Eagle Roller Mill Co., Daniel Webster, 22, 401; Farwell & Rhines, Inc., Pansy (pastry flour), 22, 401; James Frazee Mill Co., Cremo (winter patent), 22, 401; Great A. & P. Tea Co., A. & P. Family Flour, 22, 401; Hecker-Jones-Jewell Mill Co., Superlative, 22, 401; Iglehart Bros., Swans Down (cake flour), 22, 401; Niagara Falls Mill Co., Bridal Veil, 22, 401; Pillsbury Flour Mills Co., XXXX, 22, 401; Potter-Wrightington, Inc. (cake and pastry flour), 22, 401; Russell-Miller Mill Co., Occident, 22, 401; Van Vechten Mill Co., Van Vex, 22, 401; Washburn-Crosby Co., Gold Medal, 22, 401.  
   whole wheat, analyses, 15, 345; 22, 444.  
 Flowers of Oxzoin, analysis, 15, 377.  
 Forbidden Fruit Liqueur, analysis, 17, 146.  
 Fowler's Asthma Cure, 15, 413.  
   Solution, analysis, 16, 247.  
 Frankfurts, analyses, 23, 201; 24, 448; 25, 359.  
 Freezone, analysis, 19, 254.  
 Fruitatives, analysis, 18, 235.  
 Fruits, canned, analyses of, 15, 298.  
   See apples, apricots, cherries, peaches, pears, pineapples and plums.  
   See also diabetic foods.  
 Fruit juices, analyses, 17, 144; 18, 208.  
   brands, Austin, Nichols, 18, 208; Cleveland Fruit Juice Co., 18, 208; DeGroff, 18, 208; Dole's Pineapple Juice, 17, 144; DuBelle Grape Juice, 17, 144; Fremont, 18, 208;

Fruit juices—*cont.*

- Hay's Five Fruit, 17, 144; Jones Bros., 18, 208; Pheasant, 18, 208; Phez, 17, 144; Puritan, 18, 208; Randall, 18, 208; Sills Sons, 18, 208; Tim-Pine, 17, 144.  
 products, concentrated, analyses, 19, 241.  
 syrups, 20, 225.  
 Fulton's Renal Compound, analysis, 16, 267.  
 Fusel Oil in En-Ar-Co Oil, 15, 399.  
 Gaduol, analysis, 25, 383.  
   biological tests, 25, 384.  
 Gasoline, motor, analyses, 20, 282.  
   specifications, 20, 281.  
 Gelatine, analyses, 19, 222; 20, 235; 23, 189; 24, 446; 25, 358.  
   brands, Atlantic Gelatin Co., 24, 446; Baker's, 19, 222; Boston Brand Crystal, 25, 358; Cooper's, 19, 222; Peter Cooper's Clarified, 25, 358; Cox's Instant Powdered, 25, 358; Crystal, 19, 222; Direct Importing Co., Benefit, 19, 222; James W. Dunn, 24, 446; Grandmother's, A. & P., 19, 222; 25, 358; Gray-slake Gelatin Co., 23, 189; Knox, 19, 222; Knox Plain Sparkling, 25, 355; Minute Tapioca Co., 19, 222; Plain Minute, 25, 358; Plymouth Rock, 19, 222; Plymouth Rock Phosphated, 25, 358; Swampscott, 19, 222; Williams, 19, 222.  
   methods, 19, 221.  
   standards, 19, 221; 24, 446.  
 Gelatine capsules, analysis, 17, 194.  
 Gets It, analysis, 15, 400.  
 Gilbert's Grenadine Cordial, analysis, 17, 146.  
 Gill's Lilac Toilet Water, analysis, 19, 251.  
 Lustro, analysis, 19, 248.  
 Sage Lotion, analysis, 19, 250.  
 Ginger, extract, analyses, 15, 284.  
   brands, Calumet Tea and Coffee Co., 17, 143; Colton's, 15, 284; Direct Importing Co., Benefit, 15, 284; Grand Union Tea Co., 15, 284; Lee and Osgood, 15, 284; C. F. Sauer, 15, 284; Van Duzer, 15, 284.  
   net volume, 15, 285.  
   standards, 15, 282.  
   ground, analyses, 17, 151-152; 22, 425.

Ginger, ground—*cont.*

- brands, Acker, Merrill & Condit Co., 22, 425; A. Colburn Co., 22, 425; Direct Importing Co., Benefit, 17, 152; 22, 425; Durkee & Co., Gauntlet, 22, 425; B. Fisher & Co., 22, 425; Grand Union Tea Co., 22, 425; Great A. & P. Tea Co., Red Front, 17, 152; 22, 425; Jones Bros. Tea Co., Pocono, 22, 425; McCormick & Co., Bee, 22, 425; Mohican Co., 22, 425; L. B. C., 22, 425; Yale Tea & Coffee Co., 17, 152.  
   standards, 22, 423.  
   tincture of, analyses, 23, 210.  
 Giroux's Parisian Sage Hair Tonic, analysis, 19, 249.  
 Glass, in foods examined, 18, 229.  
 Glidinebrot, analysis, 19, 326.  
 Gloriol Glowene, analysis, 15, 378.  
 Glucose, in rice, 15, 343.  
   from protein, 19, 268.  
 Gluten preparations, bread, biscuits and flour. See diabetic foods.  
 Glutine. See diabetic foods (Johnson Educator Food Co.).  
 Glutona Bread Sticks. See diabetic foods (Health Food Co.).  
 Glutosac Preparations. See diabetic foods (Health Food Co.).  
 Glycerin, in chocolate, 15, 295.  
   in onion extract, 15, 295.  
   in peach extract, 15, 295.  
   in pineapple extract, 15, 295.  
   in pistachio extract, 15, 297.  
   in raspberry extract, 15, 297.  
   in strawberry extract, 15, 297.  
 Glycerite of Bismuth, analyses, 23, 209.  
 Glymol, analysis, 15, 360.  
 Goldine, analysis, 19, 256.  
 Graham Flour. See flour.  
 Graham's Hair Color, analysis, 19, 250.  
 Grande Liqueur Saine-Martial, analysis, 17, 146.  
 Granose flakes, analyses, 15, 266.  
 Granuto, analysis, 15, 266.  
 Green's Muscadine Punch, analysis, 23, 208.  
 Grimault's Cinchona & Iron Wine, analysis, 18, 233.  
 Grissin, analysis, 17, 157.  
 Grove's Laxative Bromo-Quinine, analysis, 15, 364.

- Guilmartin's Eau de Quinine, analysis, 19, 250.  
 Violet Water, analysis, 19, 248.  
 Gums, as dextrose. See dextrose.  
 Hair and Scalp Remedies, analyses, 15, 366; 16, 265; 17, 192; 19, 248; 20, 272; 21, 299; 24, 484.  
   arsenic in, 24, 484.  
   brands, A. D. S. Shampoo, 19, 248; Am-O-Tone Co., Am-O-Tone, 15, 366; Associated Pharmacies' Royal Ibis, 19, 249; Ayer's Hair Vigor, 19, 248; Barbo Mfg. Co., Barbo Compound, 15, 366; Barry's Tricopherous, 19, 248; Cactico Hair Tonic, 15, 367; Circassion Hair Dressing, 17, 192; Colgate's Quinol, 19, 250; 20, 272; Colgate's Shampoo, 19, 248; Davies, Rose and Co., Dearco, 19, 248; DeFree's San-Tox, 19, 249; 251; Duncan's Eureka Hair Tonic, 16, 265; Empress Instantaneous Hair Color Restorer, 20, 271; Farr's Gray Hair Restorer No. 1, 15, 368; Gill's Lustro, 19, 249; Gill's Sage Lotion, 19, 250; Giroux's Parisian Sage, 19, 249; Graham's Hair Color, 19, 250; Guilmartin's Eau de Quinine, 19, 250; Hale's Ton-A-Quin, 19, 250; Hall's Vegetable Hair Renewer, 19, 250; Hay Specialties Co., Coconut Oil Shampoo, 19, 250; Hay Specialties Co., Hair Health, 15, 368; Hay Specialties Co., Harfina, 16, 265; Hobson's Dandruff Remedy, 19, 249; Hoffman's Hair Tonic, 17, 192; 19, 250; Jergen's Violet Shampoo, 19, 249; K. D. X. Dandruff Extremator, 24, 484; Kelton's Emulsified Coconut Oil Shampoo, 19, 251; Kenton Pharmacal Co., Brownatone, 16, 264; Kickapoo Sage Tonic, 19, 249; Knowlton's Danderine and Danderine Tonic, 19, 248; Koch's Celebrated Hair Dye, 17, 194; Lavallie's Pine Needle Shampoo, 19, 250; Lenroth's Glacier Scalp Rub, 17, 192; Mason's Old English Hair



Hair and Scalp Remedies—*cont.*

- Tonic, 16, 266; Merton's Tonic, 19, 249; Modene, 15, 401; Mrs. Potter's Walnut Tint Hair Stain, 21, 299; Newbro's Herpicide, 19, 251; Nyal's Hirsutone, 19, 249; Parker-Belmont & Co., Liquid Silmerine, 16, 266; 20, 272; Pinaud's Eau de Quinine, 19, 249; Pompeian Hair Massage, 19, 249; Q-Ban Hair Color Restorer, 15, 369; Q-Ban Tonic, 19, 251; Remo Quinine Hair Tonic, 17, 192; Rexall Hair Tonic, 19, 249; Sage Head Rub, 17, 192; Seidman's Carnation, 19, 249; Seidman's Compound Tonic, 19, 251; Seidman's Eau de Quinine, 17, 192; 19, 251; Seidman's Genuine Sage, 19, 250; Seidman's Germicide, 19, 251; Sisson's Quinine Tonic, 19, 252; Superior Hair Tonic, 17, 192; Warshaw's Carnation Hair Tonic, 16, 300; Whitman's Quinine Tonic, 19, 250; Wildroot Dandruff Remedy, 19, 250; Wildroot Hair Tonic, 24, 484.
- Hale's Royal Pearl, analysis, 19, 251.
- Ton-A-Quin, analysis, 19, 250.
- Hall's Vegetable Sicilian Hair Renewer, analysis, 19, 250.
- Halphen test. See cooking fats, olive oil and salad dressing.
- Hamamelis Water. See witch hazel.
- Hamburg Steak, analyses, 17, 145; 22, 409; 23, 200; 24, 447; 25, 359.
- Hammond's Tonic, analysis, 17, 170.
- Hanford's Balsam of Myrrh, analysis, 17, 194.
- Hank's Chemical, 24, 490.
- Harfina, analysis, 16, 265.
- Hay's Coconut Oil Shampoo, analysis, 19, 250.
- Hair Health, analysis, 15, 368.
- Headache remedies, analyses, 16, 235; 17, 170.
- brands, Anti-Kamnia, 16, 302; Brewer and Co., 17, 170; Harvey Co., 16, 235; National Drug Co., 17, 171; E. L. Patch Co., 17, 172; Surgeons and Physicians Supply Co., 17, 172; Tailby-Nason Co., 16, 236; 17, 172;

Headache remedies—*cont.*

- Tracy Co., 16, 236, 239; Yates Drug and Chem. Co., 16, 237; 17, 173.
- Health foods, analyses, 20, 227.
- See also breakfast foods and diabetic foods.
- Hebe, analysis, 18, 224.
- Hemo, analysis, 20, 253; 22, 408.
- Henbane, fluid extract of. See hyoscyamus.
- Hepco Products. See diabetic foods (Waukesha Health Products Co.).
- Herring, analysis, 24, 437.
- Hexaform tablets, analysis, 17, 173.
- Hexamethylenamine, analysis, 24, 476.
- Hexamethylenetetramine tablets, analyses, 16, 238; 17, 173.
- Hex-Iodine Lozenges, analysis, 24, 476.
- Hexpo, analysis, 20, 280.
- Hex-uro-gen, analysis, 17, 173.
- Higby's Witch Hazel and Almond Lotion, analysis, 19, 251.
- Higgin's Nut Product, analysis, 25, 350.
- Hill's Cascara-Bromide-Quinine, analysis, 15, 365.
- Hobson's Dandruff Remedy, analysis, 19, 249.
- Hoffman's Hair Tonic, analysis, 19, 250.
- Hominy. See breakfast foods.
- Honey, analyses, 23, 190; 24, 456.
- Horke Vino, analysis, 23, 214.
- Hot Water extract. See tea.
- Hudnut's Liquid Green Soap, analysis, 19, 250.
- Hydrastine-Strychnine Triturate, analysis, 24, 476.
- Hydriodic Acid, syrup of, analyses, 17, 181; 21, 290.
- Hydrobromic Acid, dilute, analyses, 23, 210.
- Hydrochloric Acid, dilute, analyses, 22, 439; 24, 471.
- Hydrogen Dioxide, analyses, 20, 274.
- brands, A. D. S., 20, 274; Albany Chemical Co., 20, 274; Brewer & Co., 20, 274; Butler Bros., 20, 274; Earle & Co., 20, 274; Eastern Drug Co., 20, 274; Eimer & Amend, 20, 274; Goodwin's Drug Co., 20, 274; Mallinckrodt Chemical Works, 20, 274;

Hydrogen Dioxide—*cont.*

- Merck & Co., 20, 274; National Peroxide Co., 20, 274; Oakland Chemical Co., 20, 274; Parke, Davis Co., 20, 274; Powers, Weightman, Rosengarten, 20, 274.
- in hair remedies, 20, 271, standards, 20, 274.
- Hygiama Food Recuperative, 15, 271.
- Hyoscyamus, fluid extract of, 22, 439.
- standard, 22, 439.
- Hypo-Nuclane, analysis, 18, 235.
- Hypophosphites compound, analysis, 17, 174.
- Hypophosphorous Acid, dilute, analyses, 23, 210.
- Ice Cream, analyses, 19, 217; 20, 237; 21, 248; 22, 404-407; 23, 190; 24, 446; 25, 358.
- brands, Anderson & Patterson, 20, 245; Atlas Confectionery Co., 20, 241; J. H. Bouthillier, 20, 239; Bristol Candy Kitchen, 20, 238; College Pharmacy, 25, 358; Combis Candy Kitchen, 20, 244; Crown Confectionery Co., 20, 241; Crystal Palace Confectionery Co., 20, 238; Danbury Candy Co., 20, 239; DeKlym, 20, 244; Dolby Ice Cream Co., 20, 246; Eagle Confectionery Co., 20, 238; J. F. Furman, 20, 242; Hackney, 20, 247; 23, 190; Harris-Hart, 20, 238; Hartford Ice Cream Co., 20, 241; Hipp's Ice Cream Co., 21, 250; Homer Ice Cream Co., 20, 248; Horton Ice Cream Co., 20, 239; Huber Ice Cream Co., 20, 238; 22, 407; Huntington Confectionery Co., 24, 446; Huyler's, 20, 243; International Ice Cream Co., 21, 250; 22, 407; Lane Confectionery Co., 20, 238; Liberty Confectionery Co., 20, 241; Maine Creamery Co., 20, 246; Manchester Dairy Co., 20, 241; 21, 250; Marathon Ice Cream Co., 22, 407; Nectar Products Co., 20, 244; Neilsons, 20, 239; New England Ice Cream Co., 20, 238; New Haven Dairy, 20, 238;

Ice Cream—*cont.*

- 21, 250; Newton-Robinson & Co., 20, 241; Olympia Candy Co., 25, 358; Paris Confectionery Co., 22, 407; Pickwick Shop, 20, 240; Progress Manufacturing Co., 20, 245; Purity Confectionery Co., 25, 358; Purity Ice Cream Co., 20, 240; Reicherts, 22, 407; Royal Candy Co., 20, 241; Royal Candy Kitchen, 20, 238; Chas. Ryder Ice Cream Co., 20, 239; Semon Ice Cream Co., 20, 243; Smith Bros., 20, 245; Star Confectionery Co., 20, 246; 22, 407; St. Clair Confectionery Co., 20, 239; Strand Confectionery Co., 20, 238; Stratford Candy Kitchen, 20, 238; Stratford Ice Cream Co., 20, 238; Superior Ice Cream Co., 22, 407; Tait Bros., 20, 245; Torrington Creamery, 20, 247; Union Confectionery Co., 21, 250; United Candy Co., 20, 246; White Rock Ice Cream Co., 20, 240; Xanthos Candy Co., 20, 246.
- cones, analysis, 20, 258.
- brand, Repeater Cone Co., 20, 258.
- dressing, analysis, 17, 158.
- methods, 19, 216; 23, 192.
- Ideal Face Cream, Allen, analysis, 19, 251.
- Ilasol, analysis, 19, 249.
- Imperial Granum Food, analysis, 22, 408.
- Peach Cordial, analysis, 17, 146.
- Infant and Invalid Foods, analyses, 15, 329; 335, 337; 17, 147; 18, 225; 22, 408.
- brands, A. D. S. Malted Milk, 15, 324, 328; Allenbury's Milk Food No. 1, 15, 325, 328; No. 2, 15, 325, 328; No. 3, 15, 325, 328; Benger's Food, 15, 325, 328; Borden's Malted Milk, 15, 325, 328; 22, 408; Borden's Malted Milk with Cocoa, 22, 408; Borden's Meadow Brand Malted Milk, 15, 327, 328; Brook's Baby Barley, 15, 326, 328; 22, 408; Carnricks Lacto-Preparata, 15, 326, 328; Carnricks Soluble Food, 15, 326, 328; Cereo Co., Barley, Oats,

Infant and Invalid Foods—*cont.*

Wheat, 15, 326, 328; Cereo Co., Mellazea, 15, 327, 328; Dryco, 22, 408; Eskay's Albumenized Food, 15, 326, 328; Eskay's Food, 22, 408; Fairchild Bros. & Foster, Peptogenic Milk Powder, 15, 327, 328; 22, 408; Horlick's Malted Milk, 15, 326, 328; 22, 408; Imperial Granum Co., Imperial Granum, 15, 326, 328; 22, 408; Johnson's Baby Barley, 22, 408; Justfood Co., Justfood, 15, 326, 328; 22, 408; Lacnut Food Co., Lacnut, 15, 327, 328; Mammala, 18, 225; 22, 408; Mead's Dextrin-maltose No. 1, No. 2, No. 3, 22, 408; Mellin's Food Co., Mellin's Food, 15, 327, 328; 22, 408; Neave's, 17, 147; Nestle's Milk Food, 15, 327, 328; 22, 408; Ridge's Food Co., 15, 327, 328; 22, 408; Robinson's Patent Barley, 15, 327, 328; 22, 408; Savory and Moore's, 17, 147; Thompson's Hemo-Malted, Peptonized Food, 22, 408; Wampole's Milk Food, 15, 327, 328; Wells, Richardson & Co., Lactated Food, 15, 327, 328; Cereal Milk, 15, 326, 328.  
 comparative composition, 15, 328.  
 composition of feeding mixtures, 15, 332-335.  
 inspection, 15, 329.  
 Invalid foods. See diabetic foods and infant foods.  
 Interol, analysis, 15, 361.  
 Inulin, commercial, analysis, 22, 393.  
 Iodide, syrup of ferrous, analyses, 15, 349; 16, 247; 21, 289; 24, 483. standard, 15, 348.  
 of potassium, analyses, 20, 277; 24, 471; 25, 370.  
 Iodine, tincture of, analyses, 16, 248; 19, 245; 21, 290; 22, 439; 23, 211; 24, 483; 25, 369.  
 number. See Covo.  
 Ipecac, fluid extract of, analyses, 21, 291; 22, 439.  
 Ironized yeast, analysis, 22, 14.  
 Iron, quinin and strychnin, solution, 17, 180.  
 Iro-Nux, analysis, 19, 254.  
 Irving's Phos-pho Vitamine, analysis, 22, 24.  
 Jams and preserves, analyses, 19, 236. See also diabetic foods.

Jayne's Denteen, analysis, 19, 250.  
 Jellies, analyses, 19, 236.  
 Jelly powders, analyses, 17, 148.  
 brands, Falconjel, 17, 148; Jiffy-Jell, 17, 148; Nesnah, 17, 148.  
 Jergen's Benzoin and Almond, 19, 249.  
 Violet Shampoo, analysis, 19, 249.  
 Justfood, analysis, 22, 408.  
 Kaffee Hag, analyses, 15, 276; 16, 186; 20, 228; 21, 235; 25, 339.  
 Kalari Biscuits, 19, 318.  
 Kalpho, analysis, 20, 261.  
 Kara Kara Compound, 25, 367.  
 Karo, analysis, 18, 223.  
 K. D. X. Dandruff Exterminator, analysis, 24, 484.  
 Kellogg's Sanitone Wafers, analyses, 15, 384; 16, 285.  
 Kelton's Emulsified Coconut Oil Shampoo, analysis, 19, 251.  
 Kephir. See buttermilk, 24, 452.  
 Keratin, method for in gelatin, 19, 221.  
 Kickapoo Sage Tonic, analysis, 19, 249.  
 Kidney medicines, analyses, 16, 267.  
 brands, Cystogen, 16, 267; Fulton's Renal Compound, 16, 267; Pierce's Anuric Tablets, 16, 269; Uricol, 16, 270; Warner's Safe Remedy, 16, 271.  
 Ki-moids, analysis, 19, 254.  
 Kleberbrot. See diabetic foods (Fritz).  
 Knowlton's Danderine, analysis, 19, 248.  
 tonic, analysis, 19, 248.  
 Koch's Celebrated Hair Dye, 17, 194.  
 Kremette Ice Cream Dressing, analysis, 17, 158.  
 Krystalak, analysis, 18, 225.  
 Kumiss. See buttermilk, 24, 452.  
 Kummel, analysis, 17, 146.  
 Kuxit, analysis, 18, 200.  
 Lactora, analysis, 18, 225.  
 Lactose. See cocoa and chocolate.  
 Lard, analyses, 25, 351.  
 brands, Albany Packing Co., 25, 351; Armour & Co., 25, 351; Cudahy Packing Co., 25, 351; Danahy Packing Co., 25, 351; Federal Packing Co., 25, 351; Gobel's, 25, 351; Great A. & P. Tea Co., 25, 351; Independent Packing Co., 25, 351; International Provision Co., 25, 351; Morello & Co., 25, 351; Morris & Co., 25, 351; Parker,

Lard—*cont.*

Webb, 25, 351; Sperry & Barnes, 25, 351; Otto Stahl, 25, 351; Swift & Co., 25, 351; Wilson & Co., 25, 351.  
 Lavallie's Pine Needle Shampoo, analysis, 19, 250.  
 Laxa, analysis, 15, 266.  
 Laxative preparations, 15, 266.  
 See also proprietary medicines.  
 Lax-a-tone, analysis, 16, 277.  
 Laxol, analysis, 16, 278.  
 Lead acetate, in hair remedies, 15, 366, 368, 369.  
 number. See maple syrup.  
 Lecithin phosphoric acid. See Dovitam, 16, 225; also eggs and noodles.  
 Lemon extract, analyses, 15, 284; 17, 143; 22, 398; 25, 354.  
 brands, Acker, Merrill & Condit Co., 15, 284; 22, 398; Armour & Co., 22, 398; Austin, Nichols & Co., 15, 284; Baker Extract Co., 22, 398; 25, 354, 355; C. H. Baldwin & Son, 22, 398; 25, 356; A. F. Beckmann Co., Crown Aster, 15, 284; Belmont Co., 25, 354; H. C. Bibeau's Surpassing Brand, 15, 284; Boardman & Sons Co., 25, 354; Brewer & Co., 25, 354; Jos. Burnett & Co., Burnett's, 15, 284; 25, 355; James Butler, Inc., 25, 355; Calumet Tea and Coffee Co., 17, 143; Cloverdale Co., 25, 355; Colton's, 15, 284; Andrew Davey, Inc., 25, 355; Direct Importing Co., Benefit, 15, 284; 22, 398; John T. Doyle Co., Country Club, 15, 284; Albert Ehlers, 25, 355; Garrett & Co., Virginia Dare, 22, 398; 25, 355; Globe Grocery Stores' Pocono, 22, 398; Grand Union Tea Co., 25, 355; Great A. & P. Tea Co., Red Front, 15, 284; 22, 398; 25, 355; Hallock-Denton Co., 25, 354; Hance Bros. & White, 25, 355; F. E. Harris Co., 25, 354; Helwig & Leitch, 25, 356; Howland's Howco, 15, 286; 22, 398; Loomis & Wilson Co., Phoenix, 22, 398; 25, 354; McCormick and Co., Bee, 22, 398; 25, 355; McMonagle & Rogers, 15, 286; Millers

Lemon extract—*cont.*

Manufacturing Co., 15, 286; Mohican Co., Mohican, 15, 286; 22, 398; 25, 355; Monogram, 15, 284; Nichols & Harris Co., 25, 356; A. H. Phillips, Inc., 25, 354; C. F. Sauer Co., Sauer, 22, 398; 25, 356; Schlotterbeck and Foss, 15, 286; 25, 354; Seeman Bros., 15, 286; 25, 356; Sisson Drug Co., 25, 354; C. F. Slade Co., 25, 356; G. W. Smith, 15, 286; Sprague, Warner & Co., 25, 355; Standard Pickle Co., Standard, 15, 286; Stoddard, Gilbert & Co., 15, 286; Temple Garden Co., Temple Garden, 22, 398; J. E. Thompson's, 15, 286; Union Pacific Tea Co., 15, 286; Van Dyke Co., Ambassador, 22, 398; 25, 355; R. T. Whiting's, 15, 286; Williams & Carleton, 15, 286; 25, 354; Williams & Carleton, Charter Oak and William's Pure, 22, 398; R. C. Williams & Co., 25, 354; Wise, Smith & Co., 15, 286.  
 net volume, 15, 285, 287; 22, 398.  
 oil, 15, 285; 17, 143; 22, 398; 25, 354.  
 standards, 15, 285; 22, 397.  
 terpeneless, analyses, 15, 286; 22, 398; 25, 355.  
 brands, Blackstone Mfg. Co., 25, 356; Boyce Extract Co., 25, 356; Burrill's, 25, 357; Andrew Davey, 15, 286; Diamond Seal Products Co., 25, 356; East India Tea Co., Premium, 15, 286; St. John & Co., 15, 286; Union Tea Co., 15, 286; Ross W. Weir & Co., 25, 356.  
 Les Fruits, analysis, 21, 283.  
 Lime, chlorinated, analyses, 15, 350; 21, 292.  
 brands, A. D. S., 15, 350; Archibald & Lewis Co., Black Diamond, 15, 350; Hudson, 21, 292; Mendelson's Sons Acme, 15, 350; 21, 292; Wander's, 21, 292.  
 net weight, 15, 350.  
 standards, 15, 351.



Lime—*cont.*

water, analyses, 20, 275; 21, 287; 22, 438; 24, 482; 25, 369.  
standards, 20, 275; 22, 437; 24, 482; 25, 369.

Limestone phosphate, analysis, 16, 278.

Linonine, analysis, 18, 236.

Linseed oil, analyses, 21, 292.  
standards, 21, 292.

Lipoid phosphoric acid, in flour, 23, 189.

Liquid petrolatum. See mineral oil.

Liquid Silmerine, analyses, 20, 272; 16, 266.

Litonbrot. See diabetic foods (Fritz).

Longuets de Lausanne. See diabetic foods (Freres).

Louisenbad Reduction Salt, analysis, 15, 370.

Lourie's Formula, 23, 167.

Lowe's Liquid Green Soap, 19, 250.

Luftbrot "B." See diabetic foods (Fritz).

Lydia Pinkham Vegetable Compound, analysis, 16, 263.

Macaroni, analyses, 19, 332; 23, 168.  
brand, Warner's, 23, 168.

Magic Yeast, analysis, 22, 16.

Magnesium (magnesia), bisurated, analysis, 15, 392.

citrate, solution of, analyses, 15, 355, 356; 20, 276; 23, 211; 24, 483.

standards, 15, 352; 20, 276.  
magma, analyses, 21, 293; 23, 211.

milk of. See magnesia magma.  
oxide. See magnesium citrate and proprietary medicines.

sulphate. See Epsom salt.

Malic acid. See maple syrup.

Malted milk. See milk.

nuts, analysis, 19, 336.

Malt, extracts, analyses, 17, 114.  
brands, American Diamalt Co.,

Diamalt, 17, 114; Corby Co.,

Roloco, 17, 114; Freihofer

Baking Co., 17, 114; Malt-

Diatase Co., O. P., 17, 114.

flour, analyses, 17, 114.

brands, 17, 114.

Mammala, analyses, 18, 225; 22, 408.

Mandelbrot. See diabetic foods (Fritz).

Mangini's Bay Rum, analysis, 19, 252.

Mangini's—*cont.*

Lavender Toilet Water, analysis, 19, 252.

Lilac Toilet Water, analysis, 19, 252.

Manola, analysis, 15, 395.

Maple syrup, analyses, 15, 339; 22, 430; 24, 456.

brands, Acker, Merrall & Con-

dit Co., 22, 430; Austin,

Nichols & Co., Sunbeam, 15,

338; 22, 430; Bay State

Maple Syrup Co., Mount

Washington, 15, 338; Curtice

Bros. Co., 22, 430; Lewis

DeGroff & Son's Health

Brand, 15, 338; 22, 430; Great

A. & P. Tea Co., 22, 430; 24,

456; F. H. Leggett's Pre-

mier, 15, 338; Leslie, Dun-

ham & Co., Maple Twig, 15,

338; New England Maple

Syrup Co., New England, 15,

338; Rigney & Co., Colonial,

15, 338; 24, 456; Seaman

Bros., White Rose, 24, 456;

Stoddard, Gilbert & Co.,

Hermitage, 15, 338; C. M.

Tice & Co., Sugar Notch, 15,

338; Towle Maple Products

Co., Vermont Maid and

Green Mountain, 15, 338;

Vermont Farmers Co.,

Square Deal and Our Finest,

15, 338; 22, 430; Vermont

Maple Sugar and Syrup Co.,

15, 338; Vermont Maple

Syrup Co., Favorite S & S,

15, 338; Welch Bros., Green

Mountain Boy, 15, 338; 24,

456; R. C. Williams & Co.,

Royal Scarlet, 15, 338; 24,

456.

net volume, 15, 339.

Mark Tonic Bitters, analysis, 16, 280.

Marmalade. See jam.

Mason's Old English Hair Tonic, analysis, 16, 266.

Mazola, 18, 200.

Mead's Dextrin-maltose food, analysis, 22, 408.

McElree's Wine of Cardui, analysis, 16, 262.

Meat extracts. See Dovitam.

Medicinal tablets, analyses, 16, 251; 17, 161; 24, 472, 481; 25, 366.

Medic yeast, analysis, 22, 18.

Mellins' Food, analysis, 22, 408.

Mercks Medicinal Yeast, powder, analysis, 22, 20.

tablets, analysis, 22, 20.

Mercurial Ointment, analyses, 15, 358; 21, 293.

diluted, analyses, 21, 294.

Mercuric chloride, analyses, 24, 474.

in antiseptic tablets, 16, 230.

Mercury protoiodid tablets, analysis, 17, 175.

with chalk (powder), 22, 439.

standard, 22, 439.

Merton's Hair Tonic, analysis, 19, 249.

Metagen, analysis, 22, 22.

Methyl salicylate. See wintergreen oil.

Migraine tablets, analyses, 24, 476.

Miles' Restorative Nervine, analysis, 15, 400.

Milk, analyses, 17, 149; 18, 217-221; 19, 229-231; 20, 251; 21, 272; 22,

416; 23, 193-197; 24, 450; 25,

362-364.

artificial and modified, formulas, 19, 295.

chocolate-milk mixtures, analyses, 23, 199; 24, 452.

brands, Angel Drink, 23,

197; "400," 23, 199; Saga-

lou Farm, 24, 452.

condensed, composition for general use, 16, 204.

for infant feeding, 16, 204.

degree of condensation: sweet-

ened, 16, 202; unsweetened,

16, 202.

net weight, 16, 197.

condensed, sweetened, analyses, 16, 197, 201; 24, 451; 25, 361.

brands, Aylmer Condensed

Milk Co., Canada, 16, 200;

Berna Milk Co., Swiss

Milk Berna, 16, 200; Ber-

nese Alps Milk Co., Swiss

Milk, 16, 200; Borden's Ba-

bby, Challenge, Daisy, De-

fiance, Dime, Dixie, Eagle

and Magnolia, 16, 200; Di-

rect Importing Co., Bene-

fit, 16, 200; Holland Food

Corp., Milkman, 16, 200;

Hudson Condensed Milk

Co., Kitten, 16, 200;

Libby, McNeil and Libby,

Libby's, 16, 200; Mohawk

Condensed Milk Co., Gold

Milk, condensed, sweetened—*cont.*

Medal, and Sweet Clover,

16, 200; New England

Products Co., 25, 361;

Seminole Condensed Milk

Co., Butler's, and Essie,

16, 200; Sheffield Farm

Milk Co., 24, 451; Wiscon-

sin Condensed Milk Co.,

Grandmother's A. & P.,

and Lion, 16, 200.

composition for general use,

16, 204.

composition for infant feed-

ing, 16, 204.

net weight, 16, 197.

skimmed, analyses, 16, 201.

brands, Darlington's Sons,

Marvel, 16, 200; Foster

Packing Co., Target, 16,

200; Hires Condensed

Milk Co., Square, 16,

200; South Holland Milk

Corp., Van Troup, 16,

200.

unsweetened, analyses, 16, 197-

198; 23, 193, 198; 24, 451.

brands, A. and P., 16, 198;

23, 198; Armour's Veribest,

16, 198; 23, 198; Austin,

Nichols & Co., Sunbeam,

23, 198; Borden's Peerless,

16, 198; 23, 198; 24, 451;

Carnation Milk Products

Co., Carnation, 23, 198;

Condensed Milk Co., Page,

23, 198; Dairyman's League

Coöperative Assoc.'s Dai-

rylea, 23, 198; Defiance

Dairy Products Co., Daisy,

23, 198; Delavan's Beauty,

16, 198; Fonda, 23, 198;

Helvetia, Our Pet, 16, 198;

23, 198; Highland Milk

Condensing Co., Honor,

16, 198; Hires Condensed

Milk Co., Hires, 16, 198;

Indiana Condensed Milk

Co., Wilson's, 16, 198;

John F. Jelke Co., Good

Luck, 23, 198; Jones Bros.

Tea Co., Pocono, 23, 198;

H. D. Lee's Mercantile

Co., Lee, 23, 198; 24, 451;

Libby, McNeil & Libby,

Libby's, 23, 198, 24, 451;

Mohawk Condensed Milk

Co., Gold Cross, 16, 198;

Mohican Co., Mohican

Milk, condensed, unsweetened—*cont.*  
 Special, 23, 198; Morris & Co., Supreme, 16, 198; National Condensed Milk Co., Globe, 16, 198; Nestle's Food Co., Every Day, 23, 198; New England Milk Products Co., 25, 361; Pacific Coast Condensed Milk Co., Carnation, 16, 198; Rogers Milk Corporation, 24, 451; Seminole Condensed Milk Co., Belle Brook and Lake View, 16, 198; Sheffield Condensed Milk Co., Sealect, 23, 198; 24, 451; Van Camp Packing Co., Van Camp, 16, 198; 23, 198; James Van Dyke Co., Van Dyke, 23, 198; Vogel & Sons Connecticut Valley, 23, 198; Wisconsin Condensed Milk Co., Lion and Mohican, 16, 198.  
 skimmed, analysis, 23, 198.  
 brand, Carolene Products Co., Carolene, 23, 198.  
 cryoscopy of, 21, 251; 22, 411.  
 classification of results, 21, 253.  
 freezing point of abnormal milk, 22, 415.  
 from tubercular cows, 22, 414.  
 influence of acidity on freezing point depression, 22, 412.  
 range in freezing point depressions, 21, 265.  
 variations in freezing point depressions, 21, 263.  
 evaporated. See condensed foods.  
 for infants and invalid foods.  
 for diabetics, analyses, 19, 340.  
 human, analyses, 15, 415; 18, 228; 19, 232; 20, 255; 21, 275-277; 22, 421; 23, 199; 24, 454; 25, 364.  
 imitation, analyses, 20, 250.  
 brands, Carolene, 20, 252; Enzo, 20, 252.  
 iron (in malted milk), methods, 20, 254.  
 malted, analyses, 15, 329; 20, 254; 21, 274; 22, 408; 25, 363.  
 brands, A. D. S., 15, 328; Borden's, 15, 325, 328; 22, 408; Borden's Malted Milk with Cocoa, 22, 408; Horlick's, 15,

Milk, malted—*cont.*  
 326-328; 20, 253; 22, 408; Niana Pure Food Co., Tiffy Malted, 25, 363; Thompson's, 20, 253; 22, 408; Thompson's Hemo, 20, 253.  
 powders, analyses, 18, 225; 20, 253; 21, 275.  
 brands, Beebe's Modified Buttermilk, and Protein Milk, 21, 275; Lactora, 18, 225; Mammala, 18, 225; Merrell-Soule Co., Klim Brand Powdered Whole Milk and Powdered Modified Milk, 20, 253.  
 skimmed, analyses, 17, 150; 18, 219; 19, 231; 20, 252; 21, 274; 22, 417; 23, 196; 24, 451; 25, 362.  
 powdered, analyses, 16, 206; 18, 225; 20, 253; 22, 420.  
 brands, Borden's White Cross, 16, 205; Krystalak, 18, 225; Merrell-Soule Co., Klim, 20, 253; National Dry Milk Co., 20, 253; Randel's Soluble Dry, 16, 206.  
 sugar-free, analyses, 19, 340; 22, 392.  
 watered, analyses, 17, 150; 18, 217; 19, 229; 20, 251; 21, 272; 22, 416; 23, 194, 195; 24, 450; 25, 362.  
 Milks Emulsion, analysis, 21, 285.  
 Mineral oil, analyses, 15, 361.  
 standard, 15, 359.  
 Mineral water, analysis, 24, 489.  
 Mixed treatment, analysis, 17, 175.  
 Modene, analysis, 15, 401.  
 Modified buttermilk, analysis, 21, 275.  
 Molasses, analyses, 22, 431; 24, 456.  
 brands, Henry Adams, Jr., Atlantic, 22, 431; Alexander Molasses Co., Cherry Grove, 22, 431; 24, 457; Alexander Molasses Co., Dove, 22, 431; American Molasses Co., Amolco, 24, 457; American Molasses Co., New Home, 22, 431; American Molasses Co., Rosemere, 24, 457; American Sugar Refining Co., Dixiano, 22, 431; Boston Molasses Co., Grandma's, 24, 457; Dunbar Molasses and Syrup Co., Dunbar's Old Fashioned and Pure Sugar House, 24, 457; New Orleans Coffee Co., Belle Rose,

Molasses—*cont.*  
 24, 457; New Orleans Packing Co., Woman's Club, 22, 431; Penick & Ford's Brer Rabbit, Aunt Dinah, 22, 431; 24, 457; Southern Molasses Co., B. & O., Moro, 22, 431; 24, 457; Wickes & Son, Giltedge, 22, 431; 24, 457.  
 Monco, 15, 279.  
 Monobromated camphor. See camphor.  
 Monopal Vodka, analysis, 17, 146.  
 Moovie Oil, analysis, 15, 361.  
 Mosso's Oil of Salt, 15, 403.  
 Morphine sulphate, analysis, 24, 476.  
 Mother Gray's Sweet Powders for Children, analysis, 15, 394.  
 Mu-Col, analysis, 15, 401.  
 Muffins, analysis, 24, 426.  
 Mustard, ground, analyses, 16, 213; 22, 426.  
 brands, A. and P.'s Red Front, 16, 212; Acker, Merrill and Condit, 16, 212; Austin, Nichols, Republic, 16, 212; Butler's Peerless, 16, 212; Clark, Chapin and Bushnell's Elite, 16, 212; J. and J. Colman's Double Superfine, 16, 212; Colburn's, 22, 426; Andrew Davey's Atlas, 16, 212; Davey Bros., 16, 212; Lewis DeGross, Health, 16, 212; Direct Importing Co., Benefit, 16, 212; E. R. Durkee & Co., 16, 212; 22, 426; East India Tea Co., 16, 212; B. Fischer and Co., 16, 212; Gillies & Co., Tiger Head, 16, 212; Grand Union Tea Co., 16, 212; Edw. E. Hall, 16, 212; Howland's Howco, 16, 212; E. S. Kibbe Co., 16, 212; Leggett's Premier, 16, 212; Chas. G. Lincoln's Capitol Mills, 16, 212; Lincoln, Seyms and Co., Union Club, 16, 212; Logan Bros., L. B. C., 16, 212; Mohican Co., Mohican, 16, 212; Seeman Bros., White Rose, 16, 212; D. and L. Slade Co., 16, 212; Stickney & Poor, 22, 426; Union Pacific Tea Co., Sovereign, 16, 212; Van Dyck's Ambassador, 16, 212; Village Store Co., Mardor, 16, 212; Wil-

Mustard—*cont.*  
 Iiams and Carleton Co., 16, 212.  
 net weights, 16, 213.  
 standards, 16, 211; 22, 423.  
 Musterole, analysis, 15, 402.  
 Myalgia, analysis, 17, 175.  
 Nature's Vital Food, analysis, 24, 486.  
 Nesnah, analysis, 17, 148.  
 Neuralgie No. 5, analysis, 17, 176.  
 Neurosol, Tracy, analysis, 16, 239.  
 Neutrone Prescription 99, analysis, 15, 372.  
 Newbro's Herpicide, analysis, 19, 251.  
 Nitric acid test. See cooking fats, margarines and olive oil.  
 Nitrogen-free extract. See breakfast foods, canned fruits and vegetables, cocoa and chocolate, coffee, coffee substitutes, diabetic foods, eggs, figs, flour, graham flour, infant foods, noodles, rice and soup.  
 Nitroglycerine tablets, analyses, 16, 239; 24, 476.  
 Nitrous ether, spirit of. See ether.  
 Noodles, analyses, 15, 341; 20, 233; 23, 168.  
 brands, A. & P., 15, 340; 23, 168; Anger's, 23, 168; Anger Baking Co., Baby Head, 15, 340; Austin, Nichols & Co., Republic, 15, 340; American Macaroni Co., Brown Hen, 20, 233; Cleveland Macaroni Co., Golden Egg, 15, 340; Pfaffman, 20, 233; Freihofer Baking Co., Egg Soup Pastels, 15, 340; 20, 233; 23, 168; Goodman & Son, 15, 340; Hotaling-Warner Co., Warner's, 15, 340; Maas Baking Co., Gold Medal, 15, 340; Mohican Co., Superior, 15, 340; 20, 233; Mueller Co., 15, 340; 20, 233; 23, 168; Quaker, 20, 233; 23, 168; Warner's, 20, 233; 23, 168; Zarega's, 15, 340.  
 for diabetics, analysis, 19, 332.  
 methods, egg noodles, 23, 165.  
 comparative results for phosphoric acid, 23, 167.  
 net weight, 15, 341.  
 standards, 15, 340.  
 Nourry's Wine, analysis, 18, 233.  
 Nu-Food Health Flour, analysis, 15, 345.  
 Nujol, analysis, 15, 361.



Nut Margarine, analyses, 17, 156; 18, 203, 228; 20, 237.  
 brands, Armour's Nut-Ola, 18, 203; 20, 237; Delicia, 20, 237; Downey Farrell Co., 18, 203; 20, 237; Kellogg Products, Kingnut, 18, 203; 20, 237; Nucoa Butter Co., 18, 203; 20, 237; Nut Marigold, 20, 237; Palmine, 20, 237; Providence Churning Co., 18, 203; 20, 237; Sweet Nut Butter Co., Benefit, 18, 203; 20, 237; Swift and Co., Gem, 18, 203; 20, 237.  
 Nutmeg, extract, analysis, 15, 293.  
 brand, Burnett, 15, 292.  
 net volume, 15, 293.  
 oil, 15, 293.  
 standard, 15, 291.  
 ground, analyses, 24, 455.  
 brands, Austin, Nichols & Co., Sunbeam, 24, 455; Bennett, Simpson & Co., 24, 455; James Butler, Inc., 24, 455; E. R. Durkee, 24, 455; Grand Union Tea Co., 24, 455; Great A. & P. Tea Co., 24, 455; Leggett & Co., Premier, 24, 455; Chas. G. Lincoln Capitol Mills, 24, 455.  
 standards, 24, 454.  
 Nuts, analyses, 23, 182.  
 Brazil, 23, 184.  
 cashew, 23, 184.  
 pignolia, 23, 184.  
 pistache, 23, 184.  
 for diabetics, analyses, 19, 336.  
 Nuttose, analysis, 15, 345.  
 Nut-z-all, analyses, 23, 188; 25, 350.  
 Nuxated Iron, analysis, 16, 281.  
 Nux Vomica. See tincture of.  
 Nyal's Hirsutone, analysis, 19, 249.  
 Nylotis Shaving Lotion, analysis, 19, 249.  
 Oat flour. See flour.  
 Oatmeal. See breakfast foods.  
 Odo-Ro-No, analysis, 15, 402.  
 Oil, almond. See almond extract.  
 celery. See celery extract.  
 cinnamon. See cinnamon extract.  
 clove. See clove extract.  
 cottonseed, analysis, 22, 397.  
 in olive oil, 19, 225; 22, 397.  
 lemon. See lemon extract.  
 nutmeg. See nutmeg extract.  
 of Korlin, capsules, analyses, 15, 371.

## Oil—cont.

olive, analyses, 18, 193-199; 19, 225; 21, 247; 22, 397; 24, 439; 25, 351.  
 brands, A. & P., 22, 397; Anita, 18, 195; B. B. brand, Lucca, 24, 439; Beaumarchand, 18, 193; Bernagozzi, 18, 197; Bitonto-Bari, 18, 198; Carmela, 18, 196; Carmelo, 18, 194; Castel & Fils Nectar Cream, 22, 397; Crisafulli, 18, 197; Domino, 18, 195; Domino Extra, 18, 193, 196; Economon & Theodos, 18, 195; Elysee Palace, 18, 194; Emeri Brand, 22, 397; Extra Fine, 18, 199; Extra-Lucca, 18, 195; Extra No. 1, 18, 198; Frate del Bosco, 18, 198; Gloria, 18, 193; Gloria Virgini, 18, 193; Italia, 18, 195; Italian Lucca, 18, 197; Italy, 18, 197; Italy Pure, 18, 197; Kleckner's, 22, 397; Lalance, 18, 195; Lazeran, 18, 196; Lucca, 18, 198; Luida, 18, 196; Makris, 18, 196; Mariani, 18, 193; Olio D'Puro, 18, 195; Olio Finissimo, 18, 197; Olio Puro, 18, 199; Partenope, 18, 195; Pasco, 18, 197; Passco, 18, 194; Pericles, 18, 193; Phoenix, 18, 193; Poletico, 18, 194; Pompeian, 18, 195; P. P. brand, 22, 397; Prodetti Italiano, 18, 196; Purissimo di Bitonto Bari, 18, 198; Purity Superfine, 18, 193; Puro D'Oliva, 18, 198; Red Lion, 18, 193; Rivera, 18, 193, 199; Romanza, 18, 193; Romanzo, 18, 193; Rome, 18, 195; Rome Superfine, 18, 193; Soprafina, 18, 193; Soprafina Italia, 18, 199; Soprafina Marco Toredor, 18, 196; Spanish, 18, 194; Stella d'Oro, 18, 196; Superfine Alba, 18, 196; Taygete, 18, 196; Termini Imerese, 18, 194; 19, 225; Tipo Termini Imerese, 18, 199; Tripolitana, 18, 197; Tripolitania, 18, 198; Tuscany Supreme, 18, 197; Cavanna & Co., Valca, 18, 194; Virgin Oil, 18, 194; White Horse, 18, 195.

## Oil—cont.

peanut, analysis, 19, 242.  
 peppermint. See peppermint extract.  
 rose. See rose extract.  
 spearmint. See spearmint extract.  
 wintergreen. See wintergreen extract.  
 Oleomargarine, analyses, 18, 203; 21, 249; 25, 350.  
 brands, Armour, 18, 203; Higgins Manufacturing Co., 25, 350; Jelke, 18, 203; Swift & Co., 18, 203; Verco Nut Products Co., 25, 350.  
 Olives, green, analysis, 24, 437.  
 ripe, analysis, 24, 437.  
 Onion extract, analyses, 15, 295; 22, 392.  
 brands, Baker's, 15, 294; Burnett's, 15, 294; Williams & Carleton Co., 15, 294.  
 net volume, 15, 294.  
 Optona, analysis, 15, 403.  
 Orangeade Paste, analyses, 19, 240; 20, 258.  
 Orange extract, analyses, 15, 289; 17, 143; 25, 357.  
 brands, A. & P., 15, 289; 25, 357; Austin, Nichols & Co., 25, 357; Burnett's, 15, 289; Calumet Tea & Coffee Co., 17, 143; Foss', 15, 289; Grand Union Tea Co., 25, 357; Howco, 15, 289; Imperial, 15, 289; Miller Mfg. Co., Cabinet, 15, 289; C. E. Sauer Co., 15, 289; Seeman Bros., White Rose, 15, 289; D. & L. Slade Co., 15, 289; Union Pacific Tea Co., Sovereign, 15, 289; Van Duzer Extract Co., 15, 289; 25, 357; Van Dyke Co., 25, 357; R. C. Williams & Co., 25, 357; Williams & Carleton, Williams, 15, 289.  
 net volume, 15, 289.  
 oil, 15, 289.  
 Ovaltine, analysis, 17, 154.  
 Ovelmo Blood Tonic and Restorative, analysis, 24, 488.  
 Digestive Tablets, analysis, 24, 488.  
 Oysters, analyses, 15, 343; 16, 298; 17, 157; 21, 277.  
 Packer's Liquid Tar Soap, analysis, 19, 251.

Paine's Celery Compound, analysis, 16, 282.  
 Palmer's Violet Toilet Water, analysis, 19, 252.  
 Paragoric Tablets, analyses, 16, 240.  
 Paraphenylenediamine, in hair color restorer, 20, 271.  
 Parisian Sage Hair Tonic, analysis, 19, 249.  
 Parke, Davis and Co., Larkspur Lotion, 19, 249.  
 Parmint, analysis, 16, 287.  
 Partola, analysis, 15, 386.  
 Peaches, canned, analyses, 15, 305; 21, 283.  
 brands, Acker, Merrill & Condit Co., Noreca, 15, 304; Austin, Nichols & Co., Scottish Chief, 15, 304; A. F. Beckmann & Co., Crown Aster, 15, 304; Burt Olney Canning Co., American Club, 15, 304; Cobb Preserving Co., Navy, 15, 304; Curtice Bros. Co., Yellow Extra, 15, 304; Andrew Davey's Atlas, 15, 304; Lewis DeGroff & Son's Health, 15, 304; Emery Food Co., California, 15, 304; Golden Gate Canning Co., Fiesta, 15, 304; Nysa, 15, 306; Lawson Pink Food Products Co., 15, 306; Leggett & Co., Nabob, 15, 306; Libby, McNeill & Libby's, 15, 306; J. F. Pyle & Son's, Pala, 15, 306; Robin Hood & White Top, 15, 306; Stoddard, Gilbert & Co., Hermitage, 15, 306; V-W, 21, 283; R. C. Williams' Brownie, 15, 306.  
 net weight, 15, 304.  
 Peach extract, analyses, 15, 295; 22, 392.  
 brands, Baker's, 15, 294; Burnett's, 15, 294.  
 net volume, 15, 294.  
 Peanut butter, analysis, 17, 196.  
 brand, A. & P., 17, 196.  
 for diabetics, analyses, 19, 334, 336.  
 Pears, canned, analyses, 15, 309.  
 brands, A. & P.'s Iona, 15, 308; Assan Canning Co., Garland, 15, 308; Austin, Nichols & Co., Staple, 15, 308; Clinton B. Ayer's Bridgeton, 15, 308; Byron Bartlett, 15, 308;

Pears, canned—*cont.*

Cherry Creek Canning Co., Prize Winner, 15, 308; Cobb Preserving Co., Navy, 15, 308; Curtice Bros. Co., Bartlett, 15, 308; Foote & Co., Compass, 15, 308; Fruit Farm Preserving Co., Pride of Cedarville, 15, 308; Wm. H. Geer's Triacan, 15, 308; H. F. McGrath Co., Champion, 15, 310; T. F. Myer & Co., Capitol, 15, 310; Oswego Preserving Co., Huntress, 15, 310; Rochester Preserving Co., Monroe, 15, 310; Sodus Canning Co., White Birch, 15, 310; Stoddard, Gilbert & Co., Polo, 15, 310; A. J. Tanner Co., Golden Tip, 15, 310; Victor Preserving Co., Big Elm, 15, 310.  
net weight, 15, 308.

Peas, India, analysis, 21, 242.  
large yellow. See Chicaros.  
split, analysis, 17, 157.

brand, Mission Garden, 17, 157.  
Pepper, black, analyses, 16, 215; 17, 151; 22, 426.

brands, Acker, Merrall and Condit, 16, 214; 22, 426; Austin, Nichols Co., Republic, 16, 214; 22, 426; A. F. Beckmann and Co., Crown Aster, 16, 214; Bennett, Simpson and Co., 16, 214; A. C. Blenner and Co., Diamond, 16, 214; Boston Branch Co., 22, 426; Jos. Burnette Co., 22, 426; Butler's Peerless, 16, 214; Clark, Chapin and Bushnell's Elite, 16, 214; Colburn Co., 16, 214; 22, 426; Davey Bros., 16, 214; Direct Importing Co., Benefit, 16, 214; 22, 426; Durkee's Gauntlet, 16, 214; 22, 426; East India Tea Co., 16, 214; B. Fischer and Co., 16, 214; Grand Union Tea Co., 16, 214; Great A. and P. Co., Red Front, 16, 214; 22, 426; Edw. E. Hall, 16, 214; Hanley & Kinsella, 22, 426; Hartford Market, 22, 426; E. S. Kibbe, 16, 214; Knickerbocker Mills Co., 22, 426; A. LaRacca, 22, 426; Leggett's Premier, 16, 214; Lin-

Pepper, black—*cont.*

coln & Co., Capitol, 22, 426; Logan Bros. L. B. C., 16, 214; Miner, Read and Tullock's Sunrise, 16, 214; Mohican Co., Mohican, 16, 214; Seeman Bros., White Rose, 16, 214; 22, 426; D. and L. Slade Co., 16, 214; 22, 426; Jas. P. Smith Co., 22, 426; Sprague, Warner and Co., Richelieu, 16, 214; Stickney and Poor, 16, 214; Union Pacific Tea Co., Sovereign, 16, 214; Village Store Co., Mardor, 16, 214; Van Dyk's Ambassador, 16, 214; 17, 151; Weir and Co., Tiger Head, 16, 214; 17, 151; 22, 426; Williams and Carleton Co., William's, 16, 214; 22, 426.

net weights, 16, 215; 22, 426.  
standards, 16, 214; 22, 427.  
cayenne, analyses, 16, 219; 17, 151; 22, 428.

brands, A. and P. Co., Red Front, 16, 218; Acker, Merrall and Condit, 16, 218; Austin, Nichols Co., Republic, 16, 218; Butler's Peerless, 16, 218; Clark, Chapin and Bushnell's Elite, 16, 218; Colburn, 16, 218; Andrew Davey's Atlas, 16, 218; 17, 151; Davey Bros., 16, 218; Direct Importing Co., Benefit, 16, 218; 17, 151; Durkee & Co., Gauntlet, 16, 218; 22, 428; East India Tea Co., 16, 218; 17, 151; B. Fischer and Co., 16, 218; Grand Union Tea Co., 16, 218; 17, 151; Edw. E. Hall and Son, 16, 218; Kibbe, 16, 218; Leggett and Co., Premier, 16, 218; Chas. G. Lincoln's Capitol Mills, 16, 218; Logan Bros. Co., L. B. C., 16, 218; McCormick & Co., 17, 151; Miner, Read and Tullock Co., Sunrise, 16, 218; Mohican Co., Mohican, 16, 218; 17, 151; Newton, Robertson & Co., 17, 151; Seeman Bros., White Rose, 16, 218; Serv-Us, 16, 218; Shartenberg & Robinson, 17, 151; James P. Smith & Co., 22, 428; Union Pacific Tea Co., Sovereign, 16, 218; 17, 151;

Pepper, cayenne—*cont.*

Van Dyk's Ambassador, 16, 218; Village Store Co., Mardor, 16, 218; 17, 151; R. C. Williams & Co., Royal Scarlet, 16, 218; Williams and Carleton Co., William's, 16, 218; Yale Tea and Coffee Co., 17, 151.

net weights, 16, 219; 22, 428.  
red, analyses, 22, 428.  
brands, Direct Importing Co., 22, 428; Durkee & Co., 22, 428; R. T. French Co., 22, 428; Knickerbocker Mills Co., 22, 428; Leggett & Co., 22, 428; Lincoln & Co., 22, 428; Logan Bros. Co., L. B. C., 22, 428; Mohican Co., 22, 428.

white, analyses, 16, 217, 221; 17, 152; 22, 428.

brands, A. and P. Co., Red Front, 16, 220; Acker, Merrall and Condit, 16, 220; Austin, Nichols and Co., Republic, 16, 220; A. F. Beckmann and Co., Crown Aster, 16, 220; Bennett, Simpson and Co., 16, 220; Butler's Peerless, 16, 220; 22, 428; Clark, Chapin and Bushnell Co., Elite, 16, 220; Andrew Davey's Atlas, 16, 220; Davey Bros., 16, 220; Direct Importing Co., Benefit, 16, 220; 22, 428; Durkee Co., Gauntlet, 16, 220; 22, 428; B. Fischer and Co., 16, 220; Gillies and Co., 16, 220; Globe Grocery Stores, 22, 428; Grand Union Tea Co., 16, 220; Edw. E. Hall and Son, 16, 220; Hartford Market, 22, 428; Chas. G. Lincoln Co., Capitol Mills, 16, 220; 17, 152; Lincoln and Co., 22, 428; Lincoln, Seyms and Co., Union Club, 16, 220; Logan Bros. Co., L. B. C., 16, 220; 22, 428; McCormick & Co., 22, 428; Miner, Read and Tullock's Sunrise, 16, 220; Mohican Co., Mohican, 16, 220; Seeman Bros., White Rose, 16, 220; D. and L. Slade, 16, 220; Sprague, Warner and Co., Richelieu, 16, 220; Stickney and Poor,

Pepper, white—*cont.*

16, 220; 22, 428; Union Pacific Tea Co., Sovereign, 16, 220; Van Dyk's Ambassador, 16, 220; Village Store Co., Mardor, 16, 220.

net weight, 16, 221; 22, 426.  
Peppermint, extract, analyses, 15, 293; 17, 143.  
brands, A. and P., 15, 292; Calumet Tea & Coffee Co., 17, 143; Colton's, 15, 292; Direct Importing Co., Benefit, 15, 292; Nichols and Harris, 15, 292; C. F. Sauer's, 15, 292.  
net volume, 15, 293.  
oil, 15, 293.  
spirit of, analyses, 21, 295; 24, 483; 25, 369.  
standard, 15, 291.

Pepsin, lactated, 17, 180.  
Pepsodent, analysis, 20, 272.  
Peptenzyme, analysis, 25, 368.  
Peptogenic Powder, analysis, 22, 408.

Petrolatum, liquid. See mineral oil.  
Pfeffernüsse. See diabetic foods (Grovetzsch).

Phenacetine. See acetphenetidine.  
Phenoloin Tablets (Woods), 15, 387.

Phenolax Wafers, analysis, 15, 385.  
Phenolphthalein preparations, 15, 379; 17, 176.

analyses, 15, 385-390; 17, 176.  
extraction methods, 15, 379-385.  
tablets, analyses, 16, 233, 240; 24, 476.

Phez. See fruit juices.  
Phosphates. See Cero-Vita, Dovitam.

in breakfast foods, 15, 267.  
Phosphoric acid. See acids.  
Phos-pho Vitamin (Irving's), analysis, 22, 24.

Phytamin, analysis, 22, 26.  
Pierce's Anuric Tablets, analysis, 16, 269.

Pills. See tablets.  
Pinaud's Eau de Quinine, analysis, 19, 249.

Pineapple, canned, analyses, 15, 311.

brands, Austin, Nichols & Co., Carmelo Hawaiian, 15, 310; Clark, Chapin & Bushnell's Elite, 15, 310; Emery Food Co., Hills-Dale, 15, 310;



- Pineapple, canned—*cont.*  
 D. E. Foote & Co., San Marcos, 15, 310; Leggett & Co., Nabob, 15, 312; Libby, McNeill & Libby, Libby's, 15, 312; D. D. Mallory & Co., Wm. Maxwell, 15, 312; J. Menist, Dist., J. M., 15, 312; Thomas Roberts & Co., Crown, 15, 312; Seeman Bros., White Rose, 15, 312; Stoddard, Gilbert & Co., Hermitage, 15, 312; R. C. Williams & Co., Robin Hood, Royal Scarlet, 15, 312.  
 net weight, 15, 310.  
 extract, analyses, 15, 295; 22, 392.  
 brands, Baker's, 15, 294; Burnett's, 15, 294; Gillies, Tiger Head, 15, 294; Miller Mfg. Co., 15, 294; Mohican Co., 15, 294; Schlotterbeck & Foss Co., 15, 294; Wightman's, 15, 294.  
 net volume, 15, 294.
- Pinkham's Vegetable Compound, analysis, 16, 263.
- Pistachio extract, analysis, 15, 297.  
 brand, Colton's, 15, 296.  
 net volume, 15, 296.
- Plasmon. See diabetic foods (Plasmon Co.).
- Plums, canned, analyses, 15, 313.  
 brands, A. and P. Co., Sultana, 15, 314; Ames Fruit Products Co., Monogram, 15, 312; California Fruit Cannery Assn., Mt. Hamilton, 15, 312; Egypt Canning Co., Pride of Egypt, 15, 314; Fruit Belt Preserving Co., Clover Orchard, 15, 314; Golden Gate Packing Co., Pickwick Club, 15, 314; Lockport Canning Co., Bewley, 15, 314; Sodus Canning Co., Sodus and White Birch, 15, 314; Springfield Canning Co., Crescent, Robin, 15, 314; Stoddard, Gilbert & Co., Hermitage, 15, 314.  
 net weight, 15, 312.
- Poisons, materials examined for, 15, 417; 16, 302; 17, 197; 18, 231; 20, 260; 21, 284; 22, 436; 23, 208; 24, 460; 25, 364, 387.
- Polarization. See cocoa and chocolate, cordials and figs.
- Pompeian Hair Massage, analysis, 19, 249.
- Porterbiskuits. See diabetic foods (Gericke).
- Porterzwieback. See diabetic foods (Gericke).
- Postum Cereal. See coffee substitutes.
- Potassium bromate, in bread, 17, 130.  
 hydroxide, analyses, 23, 213.  
 iodide, solution of, analyses, 20, 277; 24, 471; 25, 370.  
 oxide. See bisurated magnesia, flour and magnesium citrate.
- Poultry seasoning, analyses, 22, 430.  
 brands, Wm. G. Bell Co., 22, 430; Colburn Co., 22, 430; Durkee & Co., 22, 430; B. Fischer & Co., 22, 430; Globe Grocery Stores, Inc., Pocomo, 22, 430; Stickney & Poor Spice Co., 22, 430.  
 net weight, 22, 430.
- Preservative, in canning compound, 19, 241.  
 in carbonated beverages, 18, 209.
- Probalin, analysis, 15, 389.
- Proganol, analysis, 25, 376.
- Prolactic Biscuits, analysis, 19, 318.
- Pronireu. See diabetic foods (Health Food Co.).
- Proprietary medicines and miscellaneous remedies, analyses, 15, 365-404; 16, 257-293; 17, 193; 18, 234; 19, 255; 20, 261; 21, 285; 22, 7; 23, 214; 24, 485; 25, 386.  
 brands, Adler-i-ka Treatment, 15, 390; A-Lax Tablets, 16, 273; Allenrhu, 20, 262; Am-O-Tone, 15, 366; Analax, 16, 274; Arboline, 18, 234; Auto-Laks Chocolates, 16, 274; Bad-Em-Salz, 15, 391; Barbo Compound, 15, 366; Bisurated Magnesia, 15, 392; Bisuroids, 16, 275; Bliss Native Herbs, 20, 261; Bonalax, 16, 275; Bon Opto, 18, 238; Brazilian Balm, 18, 236; Brown Medicine Co., Tescum Powders, 19, 255; Cadomene, 18, 235; Caldwell's Syrup Pepsin and Herb Laxative Compound, 15, 393; 20, 261; Casca Beans, 16, 276; Chief Two Moon Herb Co., Chief Two Moon Bitter Oil, 25, 386; Cinot, 20, 262; Clearola, 15, 376; Cutex, 15, 398; Cuticura Resolvent, 15, 395; Cystogen, 16, 267; Dakol, 24, 488; Diabetina, 19, 253; Dovitam, 16, 225; Dr. Edward's Olive Tablets, 24, 487; En-Ar-Co Oil, 15, 399; Erbjus, 24, 487; Ex-Lax, 16, 276; Fatoff Obesity Cream, 15, 369; Flowers of Oxzoin, 15, 377; Fowler's Asthma Cure, 15, 413; Freezone, 19, 254; Fruitatives, 18, 235; Fulton's Renal Compound, 16, 267; Gets-It, 15, 400; Gloriot Glowene, 15, 378; Grove's Laxative Bromo-Quinine, 15, 364; Hicks' Capudine, 19, 252; Hill's Cascara Bromide-Quinine, 15, 365; Horke-Vino, 23, 214; Hypo-Nuclane, 18, 235; Iron Remedy, A Phosphorated Iron, 21, 285; Iro-Nux, 19, 254; Kalpho, 20, 261; Kellogg's Sanitone Wafers, 15, 384; 16, 285; Laxaphen, 15, 390; Lax-a-tone, 16, 277; Laxol, 16, 278; Limestone Phosphate, 16, 278; Linonine, 18, 236; Louisenbad Reduction Salt, 15, 370; Manola, 15, 395; McElree's Wine of Cardui, 16, 262; Mellier Drug Co., Tongaline and Quinine Tablets, 19, 255; Merck's Gadual, 25, 383; Miles' Restorative Nervine, 15, 400; Milks Emulsion, 21, 285; Modene, 15, 401; Mosso's Oil of Salt, 15, 403; Mother Gray's Sweet Powders for Children, 15, 394; Mu-Col, 15, 401; Musterole, 15, 402; Nature's Vital Food, 24, 486; Neutrone Prescription 99, 15, 372; Odo-Ro-No, 15, 402; Oil of Korein Capsules, 15, 371; Optona, 15, 403; Ovelmo Blood Tonic and Restorative, 24, 488; Ovelmo Digestive Tablets, 24, 488; Parment, 16, 287; Partola, 15, 386; Phenaloin Tablets (Wood's), 15, 387; Phenolax Wafers, 15, 385; Pierce's Anuric Tablets, 16, 269; Pinkham's Vegetable Compound, 16, 263; Probalin, 15, 389; Protone, 16, 288; Prunoids, 15, 386; Purgen, 15, 386; Pyorrhocide, 16, 290; Quaker Herb Extract, 16, 292; Radway's Ready Relief, 18, 237; Regulin, 15, 304; Rexall Orderlies, 15, 388; Rheuma, 23, 215; Rose-Kayloin Compound, 15, 378; Russell Emulsion, 21, 284; Scott and Browne's Kidneys, 19, 254; Seng, 18, 237; Solvax, 15, 373; S. S. S., 18, 237; Stuart's Calcium Wafers, 16, 279; Sun and Moon Sacred Anointing Oil and Ointment, 24, 485; Tanlac, 16, 279; Tanlac Laxative Tablets, 16, 280; Taps, 18, 238; Toris Compound, 15, 374; Dr. True's Elixir, 21, 284; Uricol, 15, 375; Uricol, 16, 270; Var-ne-sis, 15, 375; Veracolate, 15, 388; Vin Mariani, 15, 397; Vitalitas, 19, 255; Vitalitas Laxatives, 19, 256; Volta, 24, 487; Warner's Safe Remedy, 16, 271; Watkins, Cough Remedy, and Catarrh Remedy, 17, 193, 194; Wincarnis, 15, 398.  
 See also elixirs, hair and scalp remedies, skin and complexion remedies, tonics and vitamins.
- Protargentum, analysis, 25, 376.
- Protargol, analyses, 25, 376-382.
- Protein. See breakfast foods, canned fruits and vegetables, cocoa and chocolate, coffee, coffee substitutes, cooking fats, diabetic foods, eggs, figs, flour, graham flour, infant foods, margarines, milk, noodles, rice and soup.
- Protoid Nuts. See diabetic foods (Christian's Natural Food Co.).
- Protone, analysis, 16, 288.
- Proto Puffs, analysis, 19, 276.
- Protosac preparations. See diabetic foods (Health Food Co.).
- Protose vegetable meat, 15, 345.
- Prunoids, analysis, 15, 386.
- Purgen, analysis, 15, 386.
- Purslain, canned, analysis, 21, 284.
- Pyorrhocide tablets, analysis, 16, 290.
- Pyroxylin. See collodion.
- Q-Bar Hair Color Restorer, analysis, 15, 369.  
 Tonic, analysis, 19, 251.
- Quaker Herb Extract, analysis, 16, 292.
- Quina Laroche, analysis, 18, 234.
- Quince, fresh, green, analysis, 24, 437.  
 ripe, analysis, 24, 437.
- Quinine and Nux Vomica, analysis, 17, 177.

- Quinine sulphate tablets, analyses, 16, 240; 17, 177; 24, 476.
- Radway's Ready Relief, analysis, 18, 237.
- Raspberry extract, analyses, 15, 297; 22, 392.
- brands, Burnett's, 15, 296; Colton's, 15, 296; Gillies Tiger Head, 15, 296; Schlotterbeck & Foss, 15, 296; Seeman, 15, 296; Union Pacific, 15, 296.
- net volume, 15, 297.
- Raspberry Fam-ly-ade, analysis, 20, 259.
- Refractive index. See butter, chocolate, cocoa, cooking fats, lemon extract, margarines, olive oil, orange extract, peppermint extract and turpentine.
- Regulin, analysis, 15, 394.
- Reichert-Meissl number. See butter, chocolate, cocoa, cooking fats and margarines.
- Rexall Celery and Iron Tonic, analysis, 16, 284.
- Hair Tonic, analysis, 19, 249.
- Orderlies, analysis, 15, 388.
- Tan and Freckle Lotion, analysis, 16, 273.
- Tooth Wash, analysis, 19, 249.
- Wine and Peruvian Bark, analysis, 16, 284.
- Rheuma, analysis, 23, 215.
- Rice, analyses, 15, 343.
- brands, Seaboard Rice Milling Co., Comet and Comet Unkoted, 15, 343.
- Rice Flakes. See breakfast foods.
- Rice flour. See flour.
- Ridge's Food, analysis, 15, 327, 328.
- Infant Food, analysis, 22, 408.
- Riker-Hegeman's Ilasol, analysis, 19, 249.
- Septone Soap, analysis, 19, 251.
- Rinso, 23, 218.
- Robertson's Velvet Skin Lotion, analysis, 19, 252.
- Robinson's Patent Barley, analysis, 22, 408.
- Roborat. See diabetic foods (Niemoller).
- Roggenbrot. See diabetic foods (Frank & Co.).
- Roloco, analysis, 17, 117.
- Rose extract, analyses, 15, 293.
- brands, Burnett, 15, 292; Colton's, 15, 292; Leggett's, 15, 292; Seeman's, 15, 292.
- net volume, 15, 293.
- Rose extract—*cont.*
- oil, 15, 293.
- standard, 15, 291.
- Rose-Kayloin Compound, analysis, 15, 378.
- Royal Ibis, analysis, 19, 249.
- Russell Emulsion, analysis, 21, 284.
- Ry-Krisp, analysis, 20, 226.
- Rye Flakes. See breakfast foods.
- Ryzon, analysis, 17, 157.
- Saccharated Ferrous Carbonate, analyses, 22, 439.
- Saccharin in carbonated drinks, 18, 209-211; 20, 222.
- in pie, 18, 216.
- in soda water syrups, 15, 344.
- Sage, analyses, 16, 223; 22, 430; 24, 455.
- brands, Acker, Merrall and Condit, 16, 222; Austin, Nichols, 16, 222; Bennett, Simpson and Co., 16, 222; 24, 455; Boardman & Sons, 16, 222; W. Burton and Co., 16, 222; Butler's Peerless, 16, 222; 24, 455; Crosse and Blackwell, 16, 222; Durkee's Gauntlet, 16, 222; 24, 455; Fischer & Co., 16, 222; 24, 455; Grand Union Tea Co., 16, 222; 24, 455; Great A. & P. Tea Co., 16, 222; 24, 455; Edw. E. Hall & Son, 16, 222; Kibbe Co., 16, 222; 22, 430; Leggett & Co., Premier, 24, 455; Chas. G. Lincoln, Capitol Mills, 16, 222; Miner, Read and Tullock's Sunrise, 16, 222; D. and L. Slade, 16, 222; John S. Sills & Sons, 16, 222; Stickney and Poor, 16, 222; Union Pacific Tea Co., Sovereign, 16, 222; Williams and Carleton, William's, 16, 222; 24, 455.
- net weight, 16, 223; 22, 430.
- standard, 16, 218; 22, 429; 24, 454.
- Salad dressing, analyses, 23, 206.
- brands, Jas. A. Aicarde's I-Carde, 23, 206; Austin, Nichols & Co., Sunbeam, 23, 206; M. W. Booth Co., Booth's, 23, 206; F. C. Bushnell & Co., French's, 23, 206; Canton-Maid Products Co., Canton Maid, 23, 206; Challenge Products Co., Challenge, 23, 206; Crombie's Puro, 23, 206; Cruikshank Bros. Co., Crubo, 23, 206; Direct Importing Co., Benefit, 23, 206; Durkee & Co., Picnic Lunch, 23, 206;

- Salad dressing—*cont.*
- Gilbert J. Easton's Easton's, 23, 206; Elizabeth Food Products Co., El-Food, 23, 206; Empire Delicatessen Co., Empire, 23, 206; Fred Fear's, My Wife's, 23, 206; Gelfand Co., Gelfand, 23, 206; John Gilbert & Son's, J. Gilbert's, 23, 206; Great A. & P. Tea Co., A. & P., 23, 206; Richard Hellmann Inc., Blue Ribbon, 23, 206; J. G. Howard's, 23, 206; Leggett & Co., Premier, 23, 206; Libby, McNeil & Libby's, 23, 206; Liggett's Drug Stores, Riker's, 23, 206; Park & Tilford's P. & T., 23, 206; Otto Seidner, Seidner's, 23, 206; Svirdoff & Brochin's Country Club, 23, 206; Van Camp Packing Co., Van Camp, 23, 206; W. W. Walker Co., Our Best, 23, 206; Wallack & Co., Wallack's, 23, 206.
- Salicylates as denaturants, 25, 386.
- Salicylic acid. See acids.
- Salmon, 24, 437.
- Salt, table, analyses, 23, 204.
- brands, Austin, Nichols & Co., Sunbeam, 23, 204; Crystalline Salt Co., Crystalline, 23, 204; Diamond Crystal Salt Co., Diamond, 23, 204; Direct Stores, Inc., Benefit, 23, 204; Great A. & P. Tea Co., Grandmother's and Iona, 23, 204; E. C. Greening's Mardor, 23, 204; Independent Salt Co., Red Cross, 23, 204; International Salt Co., Columbia, Purity, and Yorkshire, 23, 204; Logan Bros. Co., L. B. C., 23, 204; Miner, Read and Tullock's Nutmeg, 23, 204; Remington Salt Co., Remington, 23, 204; Rock Glen Salt Co., Big 4, 23, 204; Union Salt Co., U. S., 23, 204; Wadsworth Salt Co., White Lily, 23, 204; Watkins Salt Co., Watkin's, 23, 204; Worcester Salt Co., Worcester, 23, 204.
- in oysters, 15, 343.
- standards, 23, 203.
- See also bouillon, butter and soup.
- Salvia Almond Sticks. See diabetic foods (Health Food Co.).
- Salzbrech. See diabetic foods (Groetzsch).
- Sanitas Granuto, analysis, 15, 266.
- San-Tox Hair Tonic, analysis, 19, 251.
- Liquid Green Soap, analysis, 19, 252.
- Scalp Wonder, analysis, 19, 249.
- Saponins in carbonated beverages and fruit syrups, 20, 225.
- Saratoga Goldens, analysis, 16, 235.
- Sardines, analysis, 24, 437.
- Sausage, analyses, 17, 150; 18, 221; 22, 410; 23, 201; 24, 449; 25, 360.
- Sawtay, 18, 200.
- bologna and beef, analyses, 25, 360.
- Schieffelin's Florida Water, analysis, 19, 249.
- Schwarzbrot. See diabetic foods (Gumpert).
- Sea Moss Farine, 17, 139.
- Sedative Pills, analysis, 16, 241; 24, 478.
- Seidman's Carnation, analysis, 19, 249.
- Compound Tonic, analysis, 19, 251.
- Eau de Quinine, analysis, 19, 251.
- Genuine Sage, analysis, 19, 250.
- Germicide, analysis, 19, 251.
- Semolina, analysis, 17, 196.
- Seng, analysis, 18, 237.
- Sifarbiskuits. See diabetic foods (Gericke).
- Silmerine, Liquid, analysis, 16, 266.
- Silver nitrate, in hair remedies, 15, 368.
- Silver-protein preparations. See colloidal silver preparations.
- Sinamylbrot. See diabetic foods (Goldscheider).
- Sisson's Quinine Tonic, analysis, 19, 252.
- Skin and Complexion Remedies, analyses, 15, 378; 16, 272; 17, 192; 18, 238; 19, 248; 20, 272.
- brands, A. D. S. Almond Cream, 19, 248; Allen's Ideal Face Cream, 19, 251; Bay Toilet Water, 17, 192; Blackburn Products Co., Rose-Kayloin, 15, 378; Boncilla Clasmic Pack, 24, 485; Boquet de Fleurs, 17, 192; Boquet Toilet Water, 17,



Skin and Complexion Remedies—*cont.*  
 192; Carpenter's Clearola, 15, 376; Child's Witch Hazel Lotion, 19, 248; Colgate's Cashmere Boquet, 19, 248; Colgate's Lily of the Valley Toilet Water, 19, 251; 20, 272; Creme Tokalon, 16, 272; DeWitt's Toilet Cream, 19, 250; DePree's San-Tox Liquid Green Soap, 19, 252; Floral Boquet Toilet Water, 17, 192; Gill's Lilac Toilet Water, 19, 251; Guilmartin's Violet Water, 19, 248; Hale's Royal Pearl, 19, 251; Higby's Witch Hazel and Almond Lotion, 19, 251; Hudnut's Liquid Green Soap, 19, 250; Jergen's Benzoin and Almond, 19, 249; Lemroth's Unexcelled Herb Rub, 17, 192; Lesslie Co., Gloriot Glowene, 15, 378; Letonneaux Eau de Quinine, 17, 192; Lowe's Liquid Green Soap, 19, 250; Mangini's Toilet Water, 17, 192; Mangini's Bay Rum, Lavendar Toilet Water and Lilac Toilet Water, 19, 252; Ny-lotis Shaving Lotion, 19, 249; Orchard White, 18, 238; Packer's Liquid Tar Soap, 19, 251; Palmer's Violet Toilet Water, 19, 252; Parke, Davis and Co., Larkspur Lotion, 19, 249; Quinine Tonic Compound, 17, 192; Rexall Tan and Freckle Lotion, 16, 273; Riker-Hege-man's Ilasol, 19, 249; Riker-Hege-man's Septone Soap, 19, 251; Robertson's Velvet Skin Lotion, 19, 252; Schief-felin's Florida Water, 19, 249; Snow's Eau Vegetal, 19, 249; Toiletine, 19, 251; To-kalon Mfg. Co., Flowers of Oxzoin, 15, 377; Vernas Lo-tion, 19, 251; Violet Toilet Water, 17, 192; Virginia Clover Toilet Water, 19, 252; Vivandon Lotion Vegetole, 19, 251; Westphal's Auxilia-tor, 19, 251; William's Khush-Amadi Toilet Water, 19, 252; Wyeth's Sage and Sulphur Compound, 19, 251.

Snowdrift, 20, 234; 21, 247.  
 Snow's Eau Vegetal, analysis, 19, 249.  
 Soap, analyses, 20, 263; 23, 218.  
 brands, Armour's Miona Witch Hazel and Venetian Verbena, 20, 268; Babbitt's Best, 20, 268; Cincinnati Soap Co., Castile, Monarch Oatmeal, Sternes Buttermilk, Sternes 47 Trans-parent Glycerine, 20, 268; Col-gate's Bee, Coleo and Palm, 20, 268; Crystal Soap Co., Lu-cerne Rose, 20, 268; Fairbank's Sunny Monday, 20, 268; Fair-child & Sheldon Co., Ozone, 20, 268; Fels Naphtha, 20, 268; Globe Soap Co., Pearl and White Rose, 20, 268; Globe's U. S. Mail, 20, 268; Holman Soap Co., Oatmeal, Pure, 20, 268; Jergen's Violet Glycerine, 20, 268; Kendall's Borax, 20, 268; Kirk & Co., Glycerine, Jap Rose Glycerine, 20, 268; Kirkham's Borax, 20, 268; Lever Bros. Co., Lifebuoy, 20, 268; Liggetts & Co., Harmony Rose (glycerine), 20, 268; Lye-less Soap Corporation's Deeva, 23, 218; Palmolive Co., Rose Bath, 20, 268; Proctor & Gam-ble Co., Ivory, Lenox, Star and White Naphtha, 20, 268; Rinso, 23, 218; Stanley's Oat-meal, 20, 268; Swift's Arrow Borax and Pride, 20, 268; U. S. Soap Co., Cucumber Cream, 20, 271; Waltke & Co., Violet Spray Glycerine, 20, 268; Wel-come Borax, 20, 268; J. B. Williams Co., Jersey Cream, 20, 268; Wrisley Co., Floren-tine Carnation, 20, 268.  
 methods of analysis, 20, 264-266.  
 standards, 20, 267.  
 Sodium benzoate, in fruit juices, 17, 144.  
 in magnesium citrate, 15, 355.  
 in nut-margarine, 17, 156.  
 bromide, analysis, 17, 178.  
 bromide tablets, analyses, 16, 241; 24, 478.  
 hydroxide, analyses, 23, 213.  
 standard, 23, 213.  
 phosphate, 16, 256, 257.  
 salicylate, analyses, 17, 178.  
 tablets, analyses, 16, 242; 24, 478.  
 silicate, analysis, 17, 194.

Solargentum, analysis, 25, 376.  
 Solids, non-volatile. See extracts of almond, chocolate, coffee, onion, peach, pineapple, pistachio, raspberry and straw-berry.  
 total. See cordials, ginger ex-tract, maple syrup, milk, vine-gar and whiskey.  
 water-soluble. See coffee, coffee substitutes, ginger extract and infant foods.  
 Solox Mineral Oil, analysis, 15, 361.  
 Solvax, analysis, 15, 373.  
 Soson. See diabetic foods (Eiweiss Extrakt Co.).  
 Soups, canned, analyses, 19, 235.  
 brands, Campbell's Oxtail, 19, 234; Depew's, 19, 234; Direct Importing Co., Oxtail, 19, 234; Franco-American Co., Consomme, Mock Turtle and Oxtail, 19, 234; Mohican Co., Mock Turtle, 19, 234; Sill's Mock Turtle, 19, 234; Van Camp's Mock Turtle, 19, 234.  
 net weights, 19, 235.  
 Spearmint, extract, analysis, 15, 293.  
 brand, Colton's, 15, 292.  
 net volume, 15, 293.  
 oil, 15, 293.  
 standard, 15, 291.  
 Specific gravity of extracts, etc. See almond, apricots, banana, canned apples, celery, cherry, chocolate, cinnamon, clove, coffee, cordials, extracts, fer-rous iodide, ginger, lemon, mineral oils, nutmeg, onion, orange, peach, pears, pepper-mint, pineapples and plums, pistachio, raspberry, rose, spearmint, strawberry, turpen-tine, wine, and wintergreen.  
 Spices, analyses, 16, 207-225; 17, 150.  
 percentage of purity, 16, 207.  
 See also various spices, as all-spice, cloves, ginger, pepper, etc.  
 S. S. S., analysis, 18, 237.  
 Starch. See aspirin, aspirin tab-lets, breakfast foods, cocoa and chocolate, diabetic foods, eggs, infant foods and various spices.  
 Stark's Reducine, analysis, 20, 280.  
 Stomach and Bowel Remedies, analyses, 15, 390; 16, 273.  
 brands, Adler-I-Ka, 15, 390; A-lax Tablets, 16, 273; Ana-lax, 16, 274; Auto-lax, 16, 274; Bad-em-salts, 15, 391; Bisurated Magnesia, 15, 392; Bisuroids, 16, 275; Bonolax, 16, 275; Caldwell's Syrup Pepsin, 15, 393; Casca Beans, 16, 276; Ex-lax, 16, 276; Lax-A-Tone, 16, 277; Laxol, 16, 278; Limestone Phosphate, 16, 278; Mother Gray's Sweet Powders for Children, 15, 394; Stuart's Calcium Wafers, 16, 279; Regulix, 15, 394; Tanlac, 16, 279; Tanlac Laxative Tablets, 16, 280.  
 Strontium salicylate tablets, anal-yses, 17, 178.  
 Strawberry extract, analyses, 15, 296; 22, 392.  
 brands, A. & P., 15, 296; Bur-nett, 15, 296; Colton's, 15, 296; Gillies, 15, 296; Hart-ford Extract Co., 15, 296; Mohican, 15, 296; Schlotter-beck & Foss, 15, 296; Union Pacific Tea Co., 15, 296.  
 net volume, 15, 296.  
 Strychnine, in Bland's Compound, 16, 232.  
 in Manola, 15, 396.  
 sulphate, tablets, analyses, 16, 242; 17, 179; 24, 478.  
 Stuart's Calcium Wafers, analysis, 16, 279.  
 Sucrose. See carbonated bever-ages, cocoa and chocolate, cof-fee, cordials, extracts of al-mond, ginger, lemon, orange and wintergreen.  
 Sugar, cane. See sucrose.  
 invert. See carbonated bever-ages, cocoa and chocolate, coffee, diabetic wines.  
 milk, analyses, 16, 199, 201.  
 See canned apples, apricots, cherries, peaches, pears, pine-apple and plums.  
 reducing, in canned fruit liquids, 15, 298-315.  
 See extracts of chocolate, coffee, onion, peach, pine-apple, pistachio, raspberry and strawberry, and infant foods.  
 Sulphite, in hamburg steak, 23, 200.  
 in vinegar, 22, 435.

Sulphuric acid, dilute. See acids.  
 Sun and Moon Sacred Anointing Oil, analysis, 24, 485.  
 Ointment, analysis, 24, 486.  
 Sunny Corn, 19, 224.  
 Svea Wafers. See diabetic foods (Pierce Co.).  
 Swedish Health Bread, analysis, 20, 226.  
 Sweet oil. See olive oil.  
 Syromal, analysis, 20, 256.  
 Syrup of ferrous iodide, analyses, 21, 290.  
   of hydriodic acid, analyses, 17, 181; 21, 290.  
 Syrups, bakers', analyses, 20, 256.  
   brands, Syromal, 20, 256.  
   Cane, Domino Kanelasses, 18, 223.  
   Corn, Karo, 18, 223.  
   for beverages, brand, Green's Muscadine Punch, 23, 208.  
   soda water, analyses, 15, 344.  
   See maple syrup.  
 Tablets, pills, etc., medicinal, analyses of, 16, 230; 17, 161; 24, 472; 25, 366.  
   acetanilid, 17, 170; 24, 472.  
   Acetasol, 17, 161.  
   acetphenetidin, 24, 472.  
   ammonium salicylate, 17, 162.  
   antiseptic, 16, 230; 17, 162.  
   arsenious iodide, 17, 163.  
   aspirin, 15, 347; 16, 231; 17, 164; 19, 247; 24, 472; 25, 368.  
   Blaud's compound, 16, 232; 17, 164; 24, 474; 25, 368.  
   bronchitis, 17, 165.  
   Calcidin, 24, 474.  
   Calcreose, 17, 166.  
   calcium iodized, 17, 174; 24, 474.  
   sulphide, 24, 474.  
   calomel, 16, 232; 17, 166; 24, 474, 482.  
   and phenolphthalein, 16, 233; 17, 176.  
   and soda, 16, 234; 17, 168.  
   carthartic comp., 17, 169; 25, 367.  
   cascara compound, 17, 169.  
   Cascarine comp., 25, 366.  
   cold tablets, 17, 170; 25, 366.  
   Coryza, 24, 464.  
   hexamethylenamine, 24, 476.  
   hexamethylenetetramine, 16, 238; 17, 173; 24, 476.  
   Hex-iodine, 24, 476.  
   hydrastin-strychnine, 24, 476.

Tablets, pills, etc.—*cont.*  
   hypophosphites compound, 17, 174.  
   infantile colic, 25, 366.  
   Kara Kara comp., 25, 367.  
   manufacturers, lists of, 16, 229; 17, 161; 24, 463; 25, 366.  
   mercuric chloride, 24, 474, 476.  
   mercury protoiodide, 17, 175.  
   migraine, 16, 235; 17, 172; 24, 476.  
   morphine sulphate, 18, 241; 24, 476; 25, 368.  
   nephritic, 25, 366.  
   nitroglycerin, 16, 239; 24, 476.  
   nux vomica, 17, 177.  
   paregoric, 16, 240.  
   phenolphthalein, 16, 240; 17, 176; 24, 476.  
   quinine sulphate, 16, 240; 17, 177; 24, 476.  
   rhubarb and ipecac compound, 25, 367.  
   sedative, 16, 241; 24, 478.  
   sodium bromide, 16, 241; 17, 178; 24, 478.  
   salicylate, 16, 242; 17, 178; 24, 478.  
   strontium salicylate, 17, 178; 24, 480.  
   strophanthus, 25, 367.  
   strychnine sulphate, 16, 242; 17, 179; 24, 480.  
   thyroid (desiccated), 24, 480.  
   Tono Effervescent, 25, 367.  
   triple bromides, 24, 478.  
   valerian compound, 24, 480.  
   variations, in medicament, 16, 251; 17, 185; 24, 466.  
   in weight, 16, 249; 17, 184; 24, 462.  
 Tanlac, analysis, 16, 279.  
 Laxative Tablets, analysis, 16, 280.  
 Tannin. See tea.  
 Tapioca, analysis, 17, 155.  
   brand, Austin, Nichols, 17, 155.  
 Taps, analysis, 18, 238.  
 Tartar emetic, 18, 239.  
 Tartrates in flour, 17, 144.  
 Tea, analyses, 18, 189-190; 19, 223; 22, 434; 24, 458.  
   botanical character, 18, 178.  
   caffeine, comparison of methods, 18, 183; 19, 223; 20, 257; 21, 276.  
   definition, 18, 178.  
   experimental work, 18, 181.  
   hot water extract, analysis, 22, 432.  
   methods, 18, 181-182; 22, 433.

Tea—*cont.*  
   inspection of, 18, 180-181.  
   legislation, 18, 180.  
   origin, 18, 178.  
   production, 18, 179.  
   quality and classification, 18, 179.  
   U. S. standard, analyses, 18, 189.  
 Temperance beverages. See carbonated beverages and near beers.  
 Terraline, analysis, 15, 361.  
 Tescum powders, analysis, 19, 255.  
 Theobromine. See cocoa and chocolate.  
 Thyme, analyses, 16, 225.  
   brands, Acker, Merrill and Condit, 16, 224; Austin, Nichols Co., Sunbeam, 16, 224; Bennett, Simpson & Co., 16, 224; Butler's Peerless, 16, 224; A. Colburn Co., 16, 224; Durkee's Gauntlet, 16, 224; B. Fischer & Co., 16, 224; Gillies & Co., Tiger Head, 16, 224; Grand Union Tea Co., 16, 224; Edw. E. Hall, 16, 224; Lincoln, Seyms and Co., 16, 224; D. and L. Slade, 16, 224; Stickney and Poor, 16, 224; Williams and Carleton Co., William's, 16, 224.  
   net weights, 16, 225.  
   standards, 16, 224.  
 Thyroid (desiccated) tablets, 24, 480.  
 Tim Pine. See fruit juices.  
 Tincture of, aconite, 22, 437.  
   standards, 22, 437.  
   belladonna leaves, analyses, 21, 286.  
   cinchona, analyses, 20, 273; 22, 438.  
   compound, 20, 273; 22, 438.  
   standards, 20, 273.  
   colchicum seed, analyses, 21, 287.  
   ferric chloride, analyses, 18, 239; 19, 246; 21, 289.  
   ginger, analyses, 23, 210.  
   iodine, analyses, 18, 239; 19, 245; 21, 290; 22, 439; 23, 211; 24, 483; 25, 369.  
   standards, 22, 439.  
   nux vomica, analyses, 20, 277; 21, 293.  
 Toiletine, analysis, 19, 251.  
 Tongaline and quinine tablets, analysis, 19, 255.  
 Tonics, analyses, 15, 395; 16, 243.  
   brands, Bristol, Myers Co., 16, 243; Buffington Pharmacy, 16, 243; Coleman & Co., Wincarnis, 15, 398; Independent Pharmaceutical Co., 16, 244; Manola Co., Manola, 15, 395; Mariani & Co., Vin Mariani, 15, 397; Mark Tonic Bitters, 16, 280; National Drug Co., 16, 246; Nuxated Iron, 16, 281; Paine's Celery Compound, 16, 282; Potter Drug & Chemical Corp., Cuticura Resolvent, 15, 395; Rexall's Celery and Iron, and Wine and Peruvian Bark, 16, 284; Tailby-Nason Co., 16, 244; Tilden Co., 16, 245.  
   See also proprietary medicines.  
 Tono Effervescent, 25, 367.  
 Toris compound, analysis, 15, 374.  
 Triscuit, analysis, 24, 426.  
 Tropon. See diabetic foods (Troponwerke).  
 Trufood, analysis, 22, 388.  
 Turmeric, in lemon extract, 15, 287.  
 Turpentine, analyses, 17, 194; 21, 294; 25, 386.  
 Turtle meat, canned, analysis, 24, 437.  
 Ultrabrot, analysis, 19, 314.  
 Ultramehl, analysis, 19, 300.  
 Uncle Sam Health Food, analysis, 15, 266.  
 Uni Bread, analysis, 19, 320.  
 Uricol, analysis, 16, 270.  
 Urisol, analysis, 15, 375.  
 Usoline Oil, analysis, 15, 361.  
 Valerian Compound, analysis, 24, 478.  
 Vanilla extract, analyses, 17, 143; 19, 222, 399; 24, 441; 25, 352.  
   brands, Acker, Merrill & Condit, 22, 399; Armour & Co., Veribest, 22, 399; Austin, Nichols & Co., Sunbeam, 24, 440; Baker Extract Co., Baker's Pure Extract, 22, 399; 24, 440; Baldwin & Sons, Baldwin's, 22, 399; 25, 352; Boyce Extract Co., Puritan, 24, 440; 25, 352; Bridgeport Public Market's Monogram, 24, 440; Joseph Burnett Co., Burnett's, 24, 440; James Butler, Inc., Essie, 24, 440; Calumet Tea & Coffee Co., 17, 143; Cloverdale Co., Benefit, 24, 440; J. W. Colton



- Vanilla extract—*cont.*  
 Co., Colton's, 24, 440; Andrew Davey's Atlas, 22, 399; 24, 440; Davey Bros.' Champion, 24, 440; 25, 352; Diamond Seal Product Co., Concord, 24, 440; Flagg and Co., Nilla, 24, 440; Garrett & Co., Virginia Dare, 22, 399; 24, 440; Grand Union Tea Co., Vanilla and Tonka, 24, 440; Great A. & P. Tea Co., Red Front, 22, 399; 24, 440; Hallock-Denton's, 22, 399; Hartford Extract Co., Stuart, 22, 399; Howland's Howco, 22, 399; 24, 440; Jones Bros. Tea Co., Pocomo, 22, 399; McCormick & Co., 22, 399; 24, 440; Mohican Co., Mohican, 22, 399; 24, 440; Morrow & Co., Morrrows, 22, 399; 24, 440; 25, 352; Newton Tea & Spice Co., Red Seal, 22, 399; Royal Scarlet, 25, 352; C. E. Sauer & Co., Sauer's Pure Concentrated, 22, 399; 24, 440; Schlotterbeck & Foss Co., Foss, 22, 399; 24, 440; Seeman Bros.' White Rose, 24, 440; St. John & Co., 22, 399; Stuart Brand, Imitation, 24, 440; James Van Dyke Co., Ambassador, 22, 399; 24, 440; Virginia Dare Extract Co., Little Brown Jug, Imitation, 24, 440; R. C. Williams & Co., 24, 440; Williams & Carleton Co., Williams Pure Extract, 22, 399; 24, 440.  
 standard, 22, 398; 24, 439.  
 paste, analyses, 20, 258.  
 tincture of, 15, 404.  
 Vanillin in vanilla extracts, 17, 143, 196; 22, 399; 24, 441; 25, 352.  
 Vargol, analysis, 25, 376.  
 Var-ne-sis, analysis, 15, 375.  
 Vaseline, white liquid, analysis, 15, 361.  
 Vegetables. See diabetic foods.  
 Vegetable extracts, analyses, 16, 228.  
 brands, Millennium, 16, 228; Savora Vegetable Meat, 16, 228; Vegex, 17, 157; Vegex Cubes, 17, 157.  
 drying experiments, 17, 158.  
 Vegetole, 18, 200.
- Vegex, analysis, 17, 157; 22, 28.  
 cubes, analysis, 17, 157.  
 Veracolate, analysis, 15, 388.  
 Vermouth, 21, 242.  
 Vernas Lotion, analysis, 19, 251.  
 Victor Butter Preserver, analysis, 18, 228.  
 Vinegar, analyses, 17, 153; 18, 222; 21, 282; 22, 433; 23, 208; 24, 460; 25, 364.  
 brands, A. & P., 17, 153; American Grocers Society, 17, 153; Apple Product Co., 17, 153; G. N. Ayer, 22, 435; Berkshire Products Co., 17, 153; Blenner and Co., 17, 153; Canandaigua Products Corp., 22, 435; Cary & Son, 17, 153; Cascade Cider Co., 17, 153; DeGross, 17, 153; Doyle, 17, 153; Duffy, 17, 153; Eagle Oil & Supply Co., 17, 153; Empire, 17, 153; Empress Mfg. Co., 17, 153; Glautz & Sulkind, 17, 153; Hartford Market Co., 22, 435; Humphrey & Cornell, 17, 153; Leggett, 17, 153; Mowry, 17, 153; National Fruit Products Co., 22, 435; Pen Yan, 17, 153; Powell Corp., 22, 435; Rocco, 17, 153; Scutonia, 17, 153; Silver Boy Packing Co., 17, 153; Silver Lane Pickling Co., 17, 153; Standard Pickle Co., 17, 153; Thompson & Son, 17, 153; R. C. Williams, 17, 153; Woodworth, 17, 153.  
 standards, 17, 154.  
 Vin Mariani, analysis, 15, 397.  
 Virginia Clover Toilet Water, analysis, 19, 252.  
 Virocacao, analysis, 18, 224.  
 Vi-ta-co, analysis, 22, 30.  
 Vitalitas, analysis, 19, 255.  
 Vitamines, biological tests for, 22, 6, 50; 25, 383.  
 brands, Cerevisine, 22, 10; Dry Brewers' Yeast, 22, 8; Fleischmann's Yeast, 22, 12; Gaduol, 25, 383; Ironized Yeast, 22, 14; Irving's Phospho Vitamine, 22, 24; Magic Yeast, 22, 16; Medic Yeast, 22, 18; Merck's Medicinal Yeast (powder and tablets), 22, 20; Metagen, 22, 22; Norwich Yeastamine, 22, 36; Phytamin, 22, 26; Vegex, 22, 28; Vitaco, 22, 30; Vitamon, Mastin's, 22, 32; Vita Zest, 22,
- Vitamines—*cont.*  
 34; Yeast Foam Tablets, 22, 38; Yeastone, 22, 40; Yeastonic, 22, 42; Yeast-Vitamine-Harris (tablets), 22, 44; (powder), 22, 46; Yeast Vitamine, Nuxated brand, 22, 48.  
 Vitamon (Mastin's), analysis, 22, 32.  
 Vita Zest, analysis, 22, 34.  
 Vitos, 17, 138.  
 Vivandon Lotion Vegetole, analysis, 19, 251.  
 Volta, analysis, 24, 487.  
 Warner's Safe Remedy, analysis, 16, 271.  
 Water. See breakfast foods, butter, canned fruits and vegetables, cheese, cocoa and chocolate, coffee, coffee substitutes, cooking fats, diabetic foods, figs, flour, gelatin, graham flour, infant foods, maple syrup, margarines, milk, noodles, peanut butter and rice.  
 distilled, analyses, 22, 440.  
 standard, 22, 440.  
 Weissbrot. See diabetic foods (Gumpert).  
 Welch's Aegopodium, 19, 256.  
 Wesson oil, 18, 200; 22, 397.  
 Westphal's Auxiliator, analysis, 19, 251.  
 Wheat-A-Laxa, analysis, 15, 345.  
 Whey mixtures, analyses, 22, 392.  
 Whiskey, analyses, 15, 406-408; 20, 259; 21, 242; 25, 391.  
 color, 15, 410; 25, 391.  
 denaturants, 25, 392.  
 net volume, 15, 411.  
 odor and taste of residue, 25, 391.  
 solids, 15, 409; 25, 391.  
 Whitman's Quinine Hair Tonic, analysis, 19, 250.  
 Wild Cherry Cordial, analysis, 17, 146.  
 Wildroot Dandruff Remedy, analysis, 19, 250.  
 Hair Tonic, analysis, 24, 484.  
 William's Khush-Amadi Toilet Water, analysis, 19, 252.  
 Wincarnis, analysis, 15, 398.
- Wine, analyses, 15, 416; 18, 222; 19, 240; 20, 259.  
 of Colchicum, analyses, 18, 240.  
 medicated, analyses, 18, 232; 23, 214.  
 brands, Fairbanks Rock Cordial, 18, 232; Grimault's Cinchona and Iron Wine, 18, 233; Horke Vino, 23, 214; Nourry's Wine, 18, 233; Quina Laroche, 18, 234.  
 Wintergreen, analyses, 15, 290; 17, 143.  
 brands, A. & P., 15, 290; Burnett's, 15, 290; Calumet Tea & Coffee Co., 17, 143; Colton's, 15, 290; Direct Importing Co., Benefit, 15, 290; East India Tea Co., Acme, 15, 290; Grand Union Tea Co., 15, 290; Mohican Co., 15, 290; Union Pacific Tea Co., Sovereign, 15, 290.  
 net volume, 15, 290.  
 oil, 15, 290.  
 standards, 15, 289.  
 Witch hazel, water, analyses, 19, 246; 20, 278; 21, 296; 22, 441; 23, 214.  
 standards, 19, 246; 20, 278.  
 Wyeth's Sage and Sulphur Compound, analysis, 19, 251.  
 Yeast, as source of vitamines. See vitamines.  
 food, analysis, 17, 115.  
 brand, Ward Baking Co., Arcady, 17, 115.  
 Yeastamine (Norwich Pharmacal Co.), analysis, 22, 36.  
 Yeast Foam Tablets, analysis, 22, 38.  
 Yeastone, analysis, 22, 40.  
 Yeastonic, analysis, 22, 42.  
 Yeast-Vitamine-Harris (powder), analysis, 22, 46.  
 (tablets), analysis, 22, 44.  
 Yoghurt. See buttermilk, 24, 452.  
 Zim, 17, 139.  
 Zinc ointment, analyses, 21, 296.  
 oxide, in skin remedies, 15, 377.  
 stearate, analyses, 21, 298.  
 sulfocarbolate, as denaturant, 25, 386.  
 Zwieback, analyses, 15, 266; 19, 320.

Connecticut Agricultural Experiment Station

New Haven, Connecticut

---

TWENTY-SIXTH REPORT  
OF THE  
STATE ENTOMOLOGIST  
OF  
CONNECTICUT  
1926

W. E. BRITTON, Ph.D.  
State Entomologist

The Bulletins of this Station are mailed free to citizens of Connecticut who apply for them, and to other applicants as far as the editions permit.



# CONNECTICUT AGRICULTURAL EXPERIMENT STATION

## OFFICERS AND STAFF

as of  
February 1927

### BOARD OF CONTROL

His Excellency, John H. Trumbull, *ex-officio*, President

Charles R. Treat, *Vice-President* .....Orange  
George A. Hopson, *Secretary* .....Mount Carmel  
Wm. L. Slate, Jr., *Director and Treasurer* .....New Haven  
Joseph W. Alsop .....Avon  
Elijah Rogers .....Southington  
Edward C. Schneider .....Middletown  
Francis F. Lincoln .....Cheshire

### STAFF.

E. H. JENKINS, PH.D., *Director Emeritus*.

Administration. WM. L. SLATE, JR., B.Sc., *Director and Treasurer*.  
MISS L. M. BRAUTLECHT, *Bookkeeper and Librarian*.  
MISS J. V. BERGER, *Stenographer and Bookkeeper*.  
MISS MARY E. BRADLEY, *Secretary*.  
G. E. GRAHAM, *In charge of Buildings and Grounds*.

Chemistry. E. M. BAILEY, PH.D., *Chemist in Charge*.  
Analytical C. E. SHEPARD  
Laboratory. OWEN L. NOLAN } *Assistant Chemists*.  
HARRY J. FISHER, A.B. }  
W. T. MATHIS }  
FRANK C. SHELDON, *Laboratory Assistant*.  
V. L. CHURCHILL, *Sampling Agent*.  
MISS MABEL BACON, *Stenographer*.

Biochemical T. B. OSBORNE, PH.D., *Chemist in Charge*.  
Laboratory. H. B. VICKERY, PH.D., *Biochemist*.  
MISS HELEN C. CANNON, B.S., *Dietitian*.

Botany. G. P. CLINTON, Sc.D., *Botanist in Charge*.  
E. M. STODDARD, B.S., *Pomologist*.  
MISS FLORENCE A. MCCORMICK, PH.D., *Pathologist*.  
WILLIS R. HUNT, PH.D., *Assistant in Botany*.  
A. D. McDONNELL, *General Assistant*.  
MRS. W. W. KELSEY, *Secretary*.

Entomology. W. E. BRITTON, PH.D., *Entomologist in Charge; State Entomologist*.  
B. H. WALDEN, B.Agr. } *Assistant Entomologists*.  
M. P. ZAPPE, B.S. }  
PHILIP GARMAN, PH.D. }  
ROGER B. FRIEND, B.Sc., *Graduate Assistant*.  
JOHN T. ASHWORTH, *Deputy in Charge of Gipsy Moth Work*.  
R. C. BOTSFORD, *Deputy in Charge of Mosquito Elimination*.  
MISS GRACE A. FOOTE, B.A., *Secretary*.

Forestry. WALTER O. FILLEY, *Forester in Charge*.  
H. W. HICOCK, M.F., *Assistant Forester*.  
J. E. RILEY, JR., M.F., *In charge of Blister Rust Control*.  
MISS PAULINE A. MERCHANT, *Stenographer*.

Plant Breeding. DONALD F. JONES, S.D., *Geneticist in Charge*.  
H. R. MURRAY, B.S., *Graduate Assistant*.

Soil Research. M. F. MORGAN, M.S., *Investigator*.  
H. G. M. JACOBSON, M.S., *Assistant*.

Tobacco Sub-station at Windsor. PAUL J. ANDERSON, PH.D., *Pathologist in Charge*.  
N. T. NELSON, PH.D., *Assistant Physiologist*.

THE TUTTLE, MOREHOUSE & TAYLOR COMPANY

## CONTENTS

	PAGE
Twenty-sixth Report of the State Entomologist of Connecticut .....	161
Letter of Submittal .....	161
Summary of Inspection and Office Work .....	161
Publications of the Entomological Department, 1926 .....	162
Report of Receipts and Expenditures .....	163
Department Staff and Work .....	164
Insect Collection .....	166
Entomological Features of 1926 .....	166
Insect Pests .....	167
General Index to Reports .....	179
Convention of Entomological Workers .....	179
Inspection of Nurseries in 1926 .....	181
Nursery Firms Receiving Certificates in 1926 .....	184
Inspection of Imported Nursery Stock .....	189
Inspection of Apiaries in 1926 .....	192
Gipsy Moth Work in Connecticut in 1926 .....	199
Quarantines .....	216
The Spruce Gall Aphid .....	223
Further Reports on Spraying and Dusting of Apples .....	228
Work with the Oriental Peach Moth in 1926 .....	234
European Corn Borer Clean-up Work in 1926 .....	239
Federal Corn Borer Quarantine .....	242
The Japanese Beetle in Connecticut .....	244
Quarantines .....	247
A Co-operative Project in Controlling the Asiatic Beetle .....	252
Quarantine Order .....	255
Report of Quarantine and Control Work for the Asiatic Beetle during 1926 .....	257
The Satin Moth in Connecticut .....	264
Abundance of <i>Ormenis pruinosa</i> Say on Ibota Privet .....	267
Mosquito Control Work in Connecticut, Season of 1926 .....	268
Miscellaneous Insect Notes .....	276
Leaf-Roller on Hickory .....	276
Dingy Cutworm Injuring Apple Trees .....	276
Spruce Scale .....	276
Beets Attacked by Greenhouse Leaf-Tyer .....	276
European Grain Beetle in Connecticut .....	276
Japanese Scale Insect .....	276
Flight of Cotton Moth .....	277
Persimmon Psyllid in Connecticut .....	277
European Pine Shoot Moth .....	277
Silky Robber Fly .....	278
Index .....	281

## CONTENTS

### AUTHORSHIP

For bibliographical purposes all material published in this Report (Bulletin 285), unless otherwise indicated, should be credited to W. E. Britton.

### ILLUSTRATIONS

The illustrations in this Report (Bulletin 285) are from the following sources: Figs. 1, 3, 5, and 8, outline maps shaded by B. H. Walden; Fig. 7 drawn by J. P. Johnson; Fig. 10 drawn by R. C. Botsford; Fig. 2 after Federal Horticultural Board; Figs. 4, 6, 9, and 11, drawn by Dr. Philip Garman. Plates are all from photographs; XII, b and c, XIII, b and c, after U. S. Bureau of Entomology; XV, by R. C. Botsford; II, VII, a, XI, a, and XIV, b, by W. E. Britton; IV, by R. B. Friend; VIII, b, by J. P. Johnson; all others by B. H. Walden.

## BULLETIN 285

### TWENTY-SIXTH REPORT

OF THE

### State Entomologist of Connecticut

*To the Director and Board of Control of the Connecticut Agricultural Experiment Station:*

I have the honor to transmit herewith my twenty-sixth annual report as State Entomologist of Connecticut. As usual, this report gives a full account of the activities of the Department of Entomology, particularly the inspection and control work prescribed by Statute, and also the various lines of research and observation dealing with economic insects, which have engaged the attention of the members of the Department staff during the year.

Respectfully submitted,

W. E. BRITTON,

*State and Station Entomologist.*

### SUMMARY OF INSPECTION AND OFFICE WORK

- 230 samples of insects received for identification.
- 182 nurseries inspected.
- 174 regular certificates granted.
- 3 special raspberry certificates granted.
- 94 nursery dealers' permits issued.
- 181 shippers' permits issued to nurserymen in other states.
- 202 duplicate certificates furnished to be filed in other states.
- 121 parcels of nursery stock inspected and certified.
- 565 bales of mountain laurel and other decorative material inspected and certified for shipment.
- 25,000 narcissus bulbs inspected and certified.
- 45 orchards and gardens examined.
- 32 shipments, containing 347 cases, 3,443,357 plants, imported nursery stock inspected.
- 13 shipments, or 40.6 per cent, found infested with insects or fungi.
- 814 apiaries, containing 7,923 colonies, inspected.
- 26 apiaries and 68 colonies found infested with European foul brood.
- 14 apiaries and 23 colonies found infested with American foul brood.
- 3,143 letters written on official work.
- 915 circular letters.
- 418 post cards.
- 58 reports to Federal Horticultural Board.
- 3,262 bulletins, etc., mailed on request or to answer inquiries.
- 67 packages sent by mail and express.
- 26 lectures and addresses at institutes, granges, and other meetings.



PUBLICATIONS OF THE ENTOMOLOGICAL DEPARTMENT,  
1926

By W. E. BRITTON:

Twenty-fifth Report of the State Entomologist of Connecticut (Bulletin 275), 120 pages, 13 figures, 20 plates; 10,500 copies distributed in April.  
Inspection of Nurseries in 1925, 16 pages, 3 figures; reprinted from the Report; 300 copies, April.  
A New Pest of Lawns, Bulletin of Immediate Information No. 52, December 15, 1925; 4 pages, 1 figure; 3,250 copies, sent in March to all families in region infested.  
Asiatic Beetle Quarantine, Bulletin of Immediate Information No. 53, 2 pages; 1,500 copies, April.  
Borers in Relation to Cavities in Trees, *Tree Talk*, Spring Number, 2½ pages, 2 figures, March.  
Red Mite and Railroad Worm, Report of Thirty-second Annual Meeting of the Massachusetts Fruit Growers' Association, Inc., page 175, 6 pages, May, 1926.  
Report of Committee on Injurious Insects, Proceedings of the Thirty-fifth Annual Meeting, Connecticut Pomological Society, page 38, 5 pages, April.  
Insects Attacking Vegetable Crops in Connecticut in 1925, Report of Connecticut Vegetable Growers' Association for 1925, page 13, 7 pages, August.  
Three Injurious Insects Recently Introduced into Connecticut, *Journal of Economic Entomology*, Vol. 19, page 540, 5 pages, June.  
Some Insects and Entomologists, Fifty-sixth Annual Report of the Entomological Society of Ontario, page 55, 8½ pages, September.  
The Gypsy Moth Quarantine, Bulletin of Immediate Information No. 54, 5 pages, 1 figure, 3,225 copies, October.  
General Index to the Reports of the State Entomologist (Bulletin 281), 53 pages; 3,775 copies, October.

By W. E. BRITTON AND G. P. CLINTON:

Spray Bulletin (271), 50 pages, 104 figures, January.

By W. E. BRITTON AND P. J. ANDERSON:

Tobacco Insects Observed in Connecticut in 1925 (Tobacco Station Bulletin 6), page 74, 20 pages, 16 figures, March.

By PHILIP GARMAN:

The Oriental Peach Moth Problem in Connecticut, Proceedings Thirty-fifth Annual Meeting, Connecticut Pomological Society, page 44, 3 pages, April.

By R. E. ANDREW AND PHILIP GARMAN:

A Chemical Investigation of Some Standard Spray Mixtures (Bulletin 278), 20 pages, July.  
Effect of the Order of Mixing Various Spray Ingredients on the Formation of Injurious Compounds, *Journal of Economic Entomology*, Vol. 19, page 671, 1 page, August.

By R. C. BOTSFORD:

Progress of Mosquito Control Work in Connecticut during the Past Year, Proceedings Thirteenth Annual Meeting, New Jersey Mosquito Extermination Association, page 85, 2 pages, 1926.

INSECT PEST ACCOUNT

REPORT OF RECEIPTS AND EXPENDITURES OF THE STATE  
ENTOMOLOGIST

FROM JULY 1, 1925, TO JUNE 30, 1926

RECEIPTS

Insect Pest Appropriation (biennial) .....	\$35,000.00
additions (miscellaneous receipts) ..	40.18*
	<hr/> \$35,040.18

EXPENDITURES

Salaries .....	\$14,010.50
Labor .....	3,711.30
Stationery and Office Supplies .....	73.88
Scientific apparatus (Chemicals) .....	35.54
" " (Other laboratory supplies) ..	62.59
" " (Photographic) .....	30.48
Lumber and small hardware .....	8.55
Miscellaneous supplies .....	203.64
Fuel oil .....	1,700.47†
Automobile oil .....	5.85
Telegraph and Telephone .....	16.46
Postage .....	74.55
Travel (Outlying investigations) .....	437.90
" (Meetings, Conferences, etc.) .....	166.49
" (Gasoline for automobiles) .....	186.01
Freight, Express and Parcel Post .....	53.44
Furniture and Fixtures (New) .....	8.58
" " (Repairs) .....	....
Library (Books and Periodicals) .....	38.23
Scientific Equipment (New) .....	57.40
Tools, Machinery and Appliances (New) .....	219.98
" " (Repairs) .....	4.51
Automobiles (Repairs) .....	390.83
New Buildings and Structures .....	337.05
Rent of Land .....	66.66
Insurance (Automobile) .....	172.07
Miscellaneous Contingent Expenses .....	35.15
Total .....	<hr/> \$22,108.11
Balance .....	12,932.07
	<hr/> \$35,040.18

\* Use of automobiles at 6 cents per mile .... \$31.98  
Sale of honey ..... 8.20

\$40.18

† For burning around European Corn Borer infestations.

## DEPARTMENT STAFF AND WORK

W. E. BRITTON, PH.D., *State and Station Entomologist.*  
 B. H. WALDEN, B.AGR., *Photographic and General Work* } Assistant  
 M. P. ZAPPE, B.S., *Inspection and General Work* } Entomologists.  
 PHILIP GARMAN, PH.D., *Research Work*  
 ROGER B. FRIEND, B.Sc., *Graduate Research Assistant.*  
 J. PETER JOHNSON, B.S., *Deputy in Charge of Asiatic Beetle Quarantine and Soil Treatment Work.*  
 JOHN T. ASHWORTH, *Deputy in Charge of Gipsy Moth Work.*  
 JAMES A. MCEVOY, *Assistant in Gipsy Moth Work.*  
 ROBERT C. BOTSFORD, *Deputy in Charge of Mosquito Work.*  
 MISS GLADYS M. FINLEY, *Clerk and Stenographer.*<sup>1</sup>  
 MISS GRACE A. FOOTE, B.A., *Secretary.*<sup>2</sup>  
 H. W. COLEY, Westport } *Apiary Inspectors.*  
 A. W. YATES, Hartford }

Mr. Walden has continued to serve as chief photographer, has had charge of exhibits for the department, has been in charge of the office during the absence of the Entomologist, and has assisted in scoring fruit and in the general work of the department. He has also continued his researches on the imported currant worm, *Pteronidea ribesi* Scop.

Mr. Zappe has continued in charge of the inspection of nursery stock, and of the clean-up work around infestations of the European corn borer, in co-operation with the Federal Bureau of Entomology. He has collaborated with Dr. Garman in the study of the plum curculio in apple orchards, and with Mr. E. M. Stoddard of the Botany Department, in dusting and spraying experiments in apple orchards.

Dr. Garman has continued his researches on the Oriental peach moth, and in co-operation with Mr. Zappe has carried on the investigations of the plum curculio in apple orchards, on the five-year program begun in 1922. Dr. Garman has given much attention to the chemical changes taking place in combination spray mixtures, and in collaboration with Mr. R. E. Andrew of the Department of Analytical Chemistry, published the results as Bulletin 278, entitled, "A Chemical Investigation of Some Standard Spray Mixtures," issued in May, 1926. Dr. Garman has also given some attention to treatment for the American foul brood of bees, and observations on the European red mite and other species of mites, but his studies on the Oriental peach moth and the plum curculio have required most of his time. Dr. Garman has constantly revised and added to his manuscript on the Odonata or dragonflies of Connecticut, which will soon be published as a bulletin of the State Geological and Natural History Survey of Connecticut.

Mr. Friend has nearly completed his studies of the bionomics of

<sup>1</sup> Resigned May 1.

<sup>2</sup> Beginning May 1.

the birch leaf skeletonizer, and is now preparing it as his thesis for the degree of doctor of philosophy, and it will later be published as a Station bulletin. Mr. Friend has experimented in controlling the spruce gall aphid, and the results are published in this report. Mr. Friend was also in charge of the life-history investigations of the Asiatic beetle, and was assisted by Mr. Paul A. Davis, who was employed from April 6 to November 30 on this work. Mr. Friend has made some tests, at the Station farm at Mount Carmel, for the control of the cabbage maggot, squash vine borer, and several other insects attacking vegetable crops.

The gipsy moth work has been carried on efficiently as in former years under Deputy John T. Ashworth and his assistant, James A. McEvoy, with headquarters at Danielson. This work is done in co-operation with the Federal Bureau of Entomology.

Mr. Botsford has continued to serve as Deputy to Director Slate in charge of mosquito elimination work.

Mr. J. Peter Johnson, formerly connected with the Japanese beetle laboratory of the Bureau of Entomology, at Riverton, N. J., was employed, beginning April 12, in charge of quarantine enforcement and soil treatment on account of the Asiatic beetle. During the season for soil treatment, about 21 men were employed, these being largely high-school boys, as they were the most readily available form of help that could be obtained at short notice.

Mr. J. Leslie Rogers was employed in nursery inspection and as general assistant until the middle of September, when he entered college. Messrs. A. E. Warren, a graduate student in Yale University, and B. W. McFarland also helped inspect nurseries, as did Dr. W. R. Hunt of the Botany Department.

Messrs. A. W. Yates, Hartford, and H. W. Coley, Westport, have continued to inspect apiaries, as in former seasons, working on a *per diem* basis.

Miss Gladys M. Finley, who for seven years served very acceptably as clerk and stenographer, resigned May 1, and was married in September. Miss Grace A. Foote, who was employed in the department from 1915 to 1918, was appointed Secretary, beginning May 1.

All members of the staff have served faithfully, and to them in no small measure is due whatever degree of success has been reached in the work of the department during the year.

The Entomologist has directed the work of the department and attended to the office correspondence. He has continued to serve as Associate Editor of the *Journal of Economic Entomology*, as Insect Pest Reporter in Connecticut for the Insect Pest Survey of the Bureau of Entomology, and as Chairman of the Tree Protection Examining Board. Since October, 1925, he has also been Superintendent of the Geological and Natural History Survey of Connecticut.



The chief activities of the department are described in the following pages of this report.

### INSECT COLLECTION

The Station collection of Connecticut insects is believed to be the most complete of any in existence and has been accumulated during the past twenty-five years. About 90 per cent. is Connecticut material. The following table shows the statistics based upon an inventory made in November, 1926:

STATISTICS OF INSECT COLLECTION

Order	No. of Conn. Species and Varieties	Extra Conn. Species and Varieties	Total	Type Material
Thysanura .....	9	..	9	
Isoptera .....	1	..	1	
Corrodentia .....	8	..	8	
Plecoptera .....	11	..	11	
Ephemera .....	8	..	8	
Mallophaga .....	1	..	1	
Neuroptera .....	15	..	15	
Mecoptera .....	6	..	6	
Trichoptera .....	26	..	26	
Odonata .....	114	..	114	
Euplexoptera .....	2	..	2	
Orthoptera .....	100	3	103	
Thysanoptera .....	10	..	10	
Homoptera .....	474	24	498	1 type; 5 co-types
Heteroptera .....	324	50	374	20 Conn. paratypes; 25 ex-Conn.
Leidoptera .....	968	259	1,227	1 co-type
Siphonaptera .....	1	..	1	
Diptera .....	771	27	798	
Coleoptera .....	1,874	235	2,109	1 type
Hymenoptera .....	924	40	964	129 types; 12 para- types
	5,647	638	6,285	131 types; 32 Conn. paratypes 6 co-types; 25 ex- Conn. paratypes.

### ENTOMOLOGICAL FEATURES OF 1926

The beginning of the season was cool, and all plant development was retarded. Nearly all kinds of insects were from one to three weeks later than usual in making their seasonal appearance. Low temperatures and scanty rainfall prevailed until after the middle of July. Consequently it was not a favorable season for early crops.

### FRUIT INSECTS

The notes and observations upon which this report is based were gathered from various sources. Some came from the members of the committee on injurious insects of the Connecticut Pomological Society, and others from correspondence, but the majority were gleaned by Messrs. Zappe and Stoddard on their visits to more than fifty orchards during the spring and summer.

The rosy apple aphid, *Anuraphis roseus* Baker, was less prevalent than usual in most orchards. Though present in many of them, real injury occurred in only a few localities. In the vicinity of Rockville some injury was observed on June 23, and at Ledyard, August 17, in one orchard there were many curled leaves and injured fruit clusters. A few aphids were noticed at Southington and Farmington April 28, Cheshire and Middlefield May 7, Milford May 17, Cannondale May 18, New Britain May 21, Thomaston and Washington May 24, Cornwall May 25, Branford and Guilford June 8, Wallingford and Southington June 16, Pomfret, Woodstock and Lebanon June 18, Niantic, Montville and Mystic June 18, and Hazardville June 23. In most places this pest was well controlled by natural enemies.

The green apple aphid, *Aphis pomi* De Geer, was very plentiful at Meriden, June 16.

The woolly apple aphid, *Eriosoma lanigerum* Hausm., was received on apple from West Haven, May 7, and West Hartford, October 20.

The apple red bug, *Lygidea mendax* Reut., was very scarce and no traces of it were observed in 33 orchards visited. Slight indications of its work were noticed at Milford, May 26, Southington, June 16, Woodstock, June 17, and Montville, June 18.

The grape phylloxera, *Phylloxera vitifoliae* Fitch, was received from New Britain, June 29.

The European red mite, *Paratetranychus pilosus* C. & F., caused some injury in orchards not receiving a dormant spray of miscible oil: there was little indication of its presence in orchards receiving such treatment. This pest was abundant at North Farms, Wallingford, May 14, Cheshire, May 17, Cannondale and Greenwich, May 18, New Britain, May 21, Thomaston, May 24, Milford, May 26, and Meriden, June 16. A few were noticed at Middlefield, May 7, Milford, May 17, Farmington and Newington, May 21, Litchfield and Torrington, May 24, Cornwall, May 25, North Farms, Wallingford, and Southington, June 16, and Montville, June 18. Specimens of eggs on apple were received from West Hartford, October 20.

Leafhoppers, *Empoia rosae* Linn., were unusually abundant in apple orchards, and caused some injury by spotting the leaves, and the excrement soiled the fruit late in the season. Though

apparently not present at all in some orchards, it was abundant at Milford, May 26, and was present at North Farms, Wallingford, May 14, Greenwich and Cannondale, May 18, Farmington, New Britain and Newington, May 21, Thomaston, Torrington and Washington, May 24, Cornwall and Bantam, May 25, Wallingford and Clintonville, June 2, Branford and Guilford, June 8, Meriden and Southington, June 16, Pomfret, Woodstock and Lebanon, June 17, Montville and Mystic, June 18, and Rockville, June 23. Mr. Drew thinks that leafhoppers were more abundant on trees treated with dust than on sprayed trees, but in the experiments of Zappe and Stoddard little difference could be detected.

The pear psylla, *Psylla pyricola* Forst., was rather more abundant than usual, particularly at Greenwich, at Mystic, June 18, and on one tree at Hazardville, June 23. Eggs and adults were present at Farmington, April 28, and a few nymphs were noticed at Newington, May 21. It was absent from the orchard visited at Washington, May 24.

The pear midge, *Contarinia pyrivora* Riley, was present and caused some injury at Meriden, June 16, where about 80 per cent of the fruit was infested.

Specimens of the pear leaf blister mite, *Eriophyes pyri* Nal., were received from Waterbury on May 25, and the pest was reported from Union by Mr. Tucker.

The sinuate pear borer, *Agrilus sinuatus* Oliv., has now spread eastward as far as New Haven, and two trees injured by the larvae were observed in September.

The Eastern tent caterpillar, *Malacosma americana* Fabr., was extremely abundant throughout the State, though from the history of former outbreaks we expected to see signs of subsidence. The caterpillars were numerous in orchards at Farmington, April 28, Middlefield, May 7, and Wallingford, June 2. Egg-masses were received at the Station from Wallingford, January 26, Milford, March 3, Branford, March 30, New Haven, July 15, and West Hartford, October 20.

The plum curculio, *Conotrachelus nenuphar* Hbst., was late in appearing but caused about the usual amount of damage, though perhaps better control was obtained by spraying than heretofore. No injury was reported from 27 orchards visited, but this insect or its work was observed at Wallingford, June 2, Branford, June 8, Southington, June 16, Pomfret and Lebanon, June 17, Niantic, Montville and Mystic, June 18, and Hazardville, June 23. Specimens of injury were received from New Haven, June 26, Norwalk, July 9 and November 15, Milford, November 17, and Danbury, November 24. Curculio grubs in almond were received from Stamford, July 11. These were probably plum curculio grubs, but the adults have not been reared.

The San José scale, *Aspidiotus perniciosus* Comstock, is not

troublesome in orchards receiving a dormant spray of lime-sulphur or miscible oils, but still causes some injury on untreated trees and shrubs. Specimens were received at the Station on apple from West Haven, May 7, New Haven, September 3, and Old Saybrook, December 2. The scurfy scale, *Chionaspis furfura* Fitch, was received from Guilford on apple, September 1. *Lecanium corni* Bouché was received from Seymour, March 29, on grape.

The apple maggot, *Rhagoletis pomonella* Walsh, was present as usual and infested fruit was noticed in many localities. Material was received from Saugatuck, October 13, Mystic, November 13, and Milford, November 17. Late spraying with lead arsenate with two applications in July, one just after July 4, and another soon after July 20, will usually control this pest. We have even made an application during the first week in August, but this is recommended only on the late-ripening varieties.

The fall canker worm, *Alsophila pometaria* Harris, was present as usual in certain localities, but perhaps caused less injury than in 1925. Slight injury was noticed in Greenwich, May 18, Milford, May 26, Wallingford, June 2, and Rockville, June 23.

There were complaints from Bolton of climbing cutworms eating grape buds and strawberry crowns, on May 17. Specimens submitted proved to be *Noctua unicolor* Walk. Also at Wallingford May 14, climbing cutworms ate the buds from young apple trees budded the preceding summer; adults were reared and proved to be *Feltia subgothica* Haworth.

At North Farms, Wallingford, May 14, a few specimens of the bud moth, *Tmetocera ocellana* Schiff., were noticed. The red-banded leaf-roller, *Eulia velutinana* Walk., was present in orchards as usual late in the season, though probably somewhat less than in 1925. On sprayed trees this injury was less than one-third that of the check or untreated trees. The apple leaf-crumpler, *Mineola indiginella* Zell., was more abundant than usual on unsprayed apples and quinces in New Haven and Hamden. Spraying with lead arsenate is the remedy for these leaf feeders.

The Oriental peach moth, *Laspeyresia molesta* Busck, was prevalent to about the same extent as in 1925, causing more injury in some orchards and less in others. The average infestation of the fruit of late varieties was probably not much above 10 per cent. No good control measures have yet been found.

The apple and thorn skeletonizer, *Hemerophila pariana* Clerck, which in 1923 caused all unsprayed apple trees to become brown in July, caused no noticeable injury in 1926, though traces of it could be found nearly everywhere.

Injury to twigs through the oviposition of tree crickets was received on apple from Collinsville, June 3, and on cherry from Mystic, October 30. *Ecanthus nigricornis* Walker is the species



responsible. Twigs are apt to break off at the point where the eggs are laid.

Specimens of the spotted grape-vine beetle, *Pelidnota punctata* Linn., were received from Woodbridge, August 5, where they were feeding upon grape foliage.

The larva of the leopard moth, *Zeuzera pyrina* Linn., tunneling in the wood of a young apple tree was received from Danbury, August 12.

The rose chafer, *Macrodactylus subspinosus* Fabr., was less abundant than usual, and nearly a week later in appearing. The first beetle was noticed in New Haven on June 17.

The codling moth, *Carpocapsa pomonella* Linn., was somewhat less abundant than usual.

#### INSECTS ATTACKING VEGETABLE CROPS

For many of the notes and observations regarding vegetable insects I am indebted to Mr. A. E. Wilkinson, vegetable specialist of the Extension Department, Connecticut Agricultural College, Storrs.

Injury by cutworms was serious during the month of May, and reports were received from all eight counties in the State. The first report came from New Haven County on May 1, and on May 12 one Westville grower reported that he had lost 5,000 out of 6,000 tomato plants. It is certain that vegetable growers could greatly reduce their losses if they would each year distribute poisoned bran mash in their fields a few days before setting their plants, or in case of seeding in the field, before much injury has occurred.

Mr. Wilkinson reported injury by wireworms at Mount Carmel, May 1, and to potatoes at Vernon in September.

The pea aphid, *Illinoia pisi* (Kalt.), was prevalent and caused great damage in June in many sections of the State. Mr. Wilkinson observed it at Southington, Plainville, Glastonbury, Wethersfield, Windsor and East Granby, June 22; he found it very abundant in New Haven County June 26, and a heavy infestation throughout Fairfield and Litchfield Counties, July 10. In my own garden, some late-planted peas, when about four inches tall, were noticed to be heavily infested. I killed nearly all the aphids by directing a spray of nicotine downward upon the plants but the growth of the plants had already been checked and a very light crop resulted.

The imported cabbage worm, *Pieris rapae* Linn., was about as abundant as usual, particularly late in the season. Mr. Wilkinson reported few at Danbury and Stratford, June 5, but found them abundant everywhere September 25.

The cabbage looper, *Autographa brassicae* Riley, was everywhere abundant in September. The larvae eat holes into the center of the heads.

The cabbage aphid, *Brevicoryne brassicae* Linn., was not very injurious but was reported by Mr. Wilkinson as being present in a field of 56,000 plants at Northfield, July 10. At the Station farm, Mount Carmel, the insect was noticed, but it caused no injury.

The cabbage maggot, *Hylemyia brassicae* Bouché, caused about the usual amount of damage, and was reported from Danbury, June 5, Wethersfield, June 22, and New Haven County, June 26. It was present in abundance at the Station farm at Mount Carmel, where Mr. Friend carried on his experiments. So far he has not found any method of control that gives better results than treating the plants with corrosive sublimate, one ounce in ten gallons of water.

The diamond-back moth, *Plutella maculipennis* Curtis, was more prominent than usual. The first specimens that came to my attention were on a head of cabbage brought from Southington by Mr. Wilkinson and given to me at the annual Field Day at the Station farm, July 28. Mr. Wilkinson also reported this pest as being present on cabbage and cauliflower at Cheshire, Wapping and Taftville on September 25. It was also present at the Station farm at Mount Carmel. This is a European pest, and there are two or three generations each year in the northern states. In Colorado there are seven broods and in the South breeding is almost continuous. The larvae eat holes on the under side of the leaves. They do not eat entirely through but leave the upper epidermis. The holes show as transparent spots when held to the light. Heavily spraying the under surface of the leaves with lead arsenate is the remedy. Possibly dusting with powdered lead arsenate may control this pest but I have not had an opportunity to try it.

The striped cucumber beetle, *Diabrotica vittata* Fabr., was reported as being less common than usual at East Hartford, Glastonbury, and Plainville, June 22. In my own garden at Mount Carmel where squashes were grown the year before, there were no beetles until late in June when the plants were about six inches high; then the beetles came upon them in great numbers and did fair to ruin the plants. On June 28, the plants were dusted with calcium fluosilicate, which cleaned out the beetles without injuring the plants. Some of the plants, however, were injured by the grubs tunneling in the main root; this was followed by wilt and the vines died.

The squash bug, *Anasa tristis* De Geer, was very abundant at Mount Carmel late in July. It was reported from Vernon,

Ellington, Woodstock, Brooklyn, Canterbury and Ledyard on July 17. The young bugs can be killed by a spray of 40 per cent nicotine solution, 1 part in 150 parts of water.

The squash lady beetle, *Epilachna borealis* Fabr., was reported from Ledyard July 17, by Mr. Wilkinson. I also observed it in a garden in Ledyard, August 17. Both larvae and adults were present. The larvae are yellow, with black spines on the back. They have the habit of marking out on the upper side of a leaf a circular or oval area half or three-fourths of an inch in diameter, and then eating off the green tissue within the area outlined. Spraying with lead arsenate is a remedy.

The squash borer, *Melittia satyriniformis* Hubn., continues to be a serious pest and was apparently more abundant than usual in 1926. In normal seasons, nearly all eggs have been laid by August 1, but the past season the adults were present on the vines during the first half of August and I found one moth at Ledyard on August 17. As a rule early-planted summer crook-necks will produce a crop before the squash borer attacks them. Experiments at the Massachusetts Station a few years ago showed that by spraying the bases of the vines once a week during July with 40 per cent nicotine sulphate solution, one part in 150 parts of water, the eggs will be killed. In Mr. Friend's experiments at the Station farm at Mount Carmel, he found that many eggs were laid on the vines at points from four to ten feet from the base or beyond the portion covered by the spray. It is very difficult to spray all parts of a vine after it has begun to run. Even with such a spray treatment it is advisable to cut out the borers, and to cover each vine with soil, thus enabling it to make new roots.

The potato flea beetle, *Epitrix cucumeris* Harris, was common nearly everywhere. Mr. Wilkinson reported it on lettuce and carrots at Mount Carmel May 1; on tomatoes and egg-plants at North Haven, New Haven, Hamden, Branford and Milford, May 29; on tomatoes at Stratford, Westport, Danbury, Bethel and Thomaston, June 5; on cucumber at East Hartford, Glastonbury and Plainville, and on potatoes and tomatoes at Glastonbury, June 22. This is a hard pest to control but on a few plants in the home garden I have freed the plants by spraying them with nicotine sulphate solution.

Asparagus beetles were present in about the usual numbers. The common asparagus beetle, *Crioceris asparagi* Linn., is the one which is responsible for most of the injury to foliage and new shoots. The spotted asparagus beetle, *Crioceris 12-punctata* Linn., causes some injury by the adult beetles feeding on the new shoots and foliage, but the grubs feed chiefly on the seeds in the berries. Mr. Wilkinson reported the 12-spotted beetle more common than the other in New Haven County June 26, and also found it present at Groton, Pawcatuck, Norwich, Canterbury,

Wauregan and Danielson on July 17. He also reported the common asparagus beetle from Hamden, North Haven, Cheshire and Branford, May 29; Southington, Plainville, Bristol, Wethersfield, Windsor, Windsor Locks, East Granby, East Hartford, South Windsor and Storrs, June 22; and from Groton, Pawcatuck, Norwich, Canterbury, Wauregan and Danielson, July 17. Larvae and eggs were received from Ridgefield, June 22. As a rule clean cutting over the field as long as the cutting season lasts is a good practice, though some growers leave a few trap plants around the margins, to be destroyed later. After the cutting season ends, and on new beds, the foliage can be heavily sprayed with lead arsenate, with a casein spreader to kill both adults and larvae. The latter may be killed in the home garden by spraying with nicotine solution.

The horse-radish flea beetle, *Phyllotreta armoraciae* Koch, was reported from East Hartford, Wethersfield, and Storrs, June 22.

The black blister beetle, *Epicauta pennsylvanica* (De Geer), was received at the Station, July 27, feeding on Swiss chard, and the margined blister beetle, *Epicauta marginata* Fabr., from Wethersfield, July 28, feeding upon tomato.

The corn ear worm, *Heliothis obsoleta* Fabr., was apparently less troublesome than usual, and the only specimens received at the Station came from New Britain, October 9, on sweet corn.

The parsley stalk-weevil, *Listronotus latiusculus* Boh., was received from New Haven, July 15.

The stalk borer, *Papaipema nitela* Guen., was present and caused the usual amount of injury in all kinds of herbaceous plants. One specimen in corn was received at the Station from New Haven, July 22. Its work was observed in many places.

#### SHADE AND FOREST TREE INSECTS

Two of the most important features concerning shade tree insects are the discovery of the satin moth in the State and the prevalence of the birch leaf miner. The satin moth, *Stilpnotia salicis* Linn., has now invaded Connecticut, and one egg-mass was found in Thompson and another in Stonington by Federal men, and these two towns are now under Federal quarantine on account of this insect. No poplar or willow trees may be moved interstate from these towns without a Federal inspection and certificate.

The birch leaf miner, *Fenusa pumila* Klug, has now spread throughout southern New England and southeastern New York, and is beginning to attract considerable attention. Specimens have been received at the Station from Fairfield, June 15, Norwalk, June 18, East Haven, June 24, Hartford, July 28 and August 30, Westport, August 11, Waterford, August 13, and Danbury, August 19.



The elm sawfly leaf miner, *Kaliofenusa ulmi* Sund., continues to attack elm trees in the northwestern portion of the State. Specimens were received from Norfolk on June 30.

The imported pine sawfly, *Diprion simile* Hart., occurs here and there on white pine but causes little damage. Specimens were received from New Haven, July 21 and September 29. An allied species, *Neodiprion lecontei* Fitch, was received from Danbury, September 10. This species attacks pitch pines and other three-leaved species. Spraying with lead arsenate will protect the trees from being devoured by sawfly larvae.

The fall webworm, *Hyphantria cunea* Drury, was observed in late summer on fruit, shade, and forest trees in all parts of the State. It was seemingly more abundant than usual, particularly in Fairfield and Hartford Counties.

The European pine shoot moth, *Rhyacionia buoliana* Schiff., was received on red pine from Greenwich, April 9, and on Scotch pine from Southport, June 17.

The walnut caterpillar, *Datana integerrima* S. & A., was present as usual, and specimens were received from Saybrook, August 24, and from Collinsville, September 8.

The spruce bud worm, *Harmaloga fumiferana* Clem., is responsible for occasional damage to spruce trees in Connecticut, and specimens were received from West Haven, June 14.

The white-marked tussock moth, *Hemerocampa leucostigma* S. & A., attacks fruit, shade, and forest trees, and specimens were received from Middletown, April 27, and from Granby, June 16.

The pine tube moth, *Eulia pinatubana* Kearf., occasionally causes partial defoliation of white pine trees, and specimens were received from New Haven, October 5. Spraying with lead arsenate is the remedy.

The blotch leaf miner of white oak, *Lithocolletis hamadryadella* Clem., frequently injures and disfigures white oak trees by mining the leaves. No remedy can be advised. Specimens were received from Hartford, July 30.

The pine leaf scale, *Chionaspis pinifoliae* Fitch, continues to be a rather important pest on various species of pines in ornamental plantings, particularly in sheltered situations. Specimens were received on Scotch pine from Hartford, April 5, from New Haven, April 19, and from Watertown, May 17.

The spruce gall aphid, *Adelges abietis* Linn., commonly disfigures Norway and other spruce trees in Connecticut, and in nurseries and ornamental plantings spraying must now be practiced to prevent the formation of galls. Specimens were received from Bolton, February 5, New Preston, June 14, Middlebury, July 15, Middletown, August 18, Norwich, September 15, and Forestville, October 4. Experiments in controlling this pest were

conducted by Mr. Friend of this Department, and are described on page 223 of this Report.

The gall aphid of the blue spruce, *Gillettea cooleyi* Gillette, forms terminal galls larger than the preceding. A variety of *cooleyi* (var. *coweni* Gillette) appears as a woolly aphid on Douglas fir, and specimens were received from Cheshire, July 5.

The spiny aphid gall of witch hazel, *Hamamelistes spinosus* Shimer, was received from Naugatuck, October 5.

A woolly aphid on maple, *Neoprociphilus aceris* Mon., was received from Winsted, July 22.

A gall-forming aphid, *Colopha ulmicola* Fitch, was received from New Britain, on elm, July 8.

The oyster-shell scale, *Lepidosaphes ulmi* Linn., is one of the most common scale insects in Connecticut and attacks a large number of different kinds of trees and shrubs. This insect was received on box from New London, February 24, and on *Juglans* from Plantsville, June 8.

The oak-gall scale, probably *Kermes pubescens* Bogue, was received on oak from Norwalk, August 16.

The tulip tree scale, *Toumeyella liriodendri* Gmel., is rather common on tulip trees, and a specimen was received from Middletown, August 2, and from New London, December 20.

The cottony maple scale, *Pulvinaria vitis* Linn., which has been quite common on silver maples around Stamford for the past few years, was received from Westport, August 11, and from New Haven, July 21.

Specimens of a Japanese scale, *Leucaspis japonica* Cockerell, were received from Greenwich, December 14, on maple.

The oak twig pruner, *Hypermallus villosus* Fabr., is responsible for the cutting of small twigs of oak and some other trees, and these twigs fall upon the lawn, making more or less litter. The insect usually falls in the stem of the severed twig, and gathering and burning the twigs promptly is one method of control. Specimens were received from Greenwich, August 16.

The maple borer, *Glycobius (Plagionotus) speciosus* Say, is present each year in Connecticut and causes much injury to sugar maple trees, whether cultivated or growing wild. A specimen of the adult beetle was received from New Haven, July 15.

The locust leaf miner, *Chalepus (Odontota) dorsalis* Thunb., was received from Danbury, August 19. The larvae mine the leaves, which turn brown in July and August.

Specimens of red pine were received from Clark's Corners, July 21, the leaders of which had been eaten in a peculiar manner. Though no insect could be found on the specimen twigs, it appeared to be the work of insects, and the pales weevil, *Hylobius pales* Boh., is suspected of having caused the injury.

The elm leaf beetle, *Galerucella xanthomelaena* Schrank (*luteola* Müll.), was moderately abundant throughout the southern portion of the State, and in many towns and cities the trees were sprayed with lead arsenate to prevent defoliation.

The following dipterous galls on shade trees have been sent to the Station during the season: the ash midrib gall, *Contarinia canadensis* Felt, on leaves of white ash, Ridgefield, June 16; maple leaf spot, *Cecidomyia ocellaris* O. S., on leaves of red maple, Ridgefield, June 16; linden wart gall, *Cecidomyia verrucicola* O. S., on leaves of linden, Guilford, July 15; oak spangles, *Cecidomyia poculum* O. S., on leaves of white oak, Danbury, August 19, Guilford, September 14, and Salisbury, September 20.

Mites often cause injury to shade trees, and one species, *Schizotetranychus schizopus* Zacher, was received from Old Lyme, May 10, on willow. The maple bladder gall, *Phyllocoptes quadripes* Shimer, is common on the leaves of silver maple, and specimens were received from Woodmont, June 11, Greenwich, July 22, Waterford, August 13, and Fairfield, August 24.

#### INSECTS ATTACKING ORNAMENTAL SHRUBS AND PLANTS

The mealy flatas, *Ormenis pruinosa* Say, and *septrionalis* Spin., are often found on woody vines and shrubs, and sometimes on herbaceous stems. An outbreak of *O. pruinosa* in Bridgeport on Ibota privet is described elsewhere in this Report. Specimens of both species were received from Bridgeport, August 3, and of *O. septrionalis* from Hartford, September 8.

The white peach scale, formerly known as the West Indian peach scale, *Aulacaspis pentagona* Targ.-Tozz., was received from Stamford, on lilac, December 14.

The euonymus scale, *Chionaspis euonymi* Comst., which causes serious injury to certain species of Euonymus, was received from Norwalk, November 15.

The rhododendron lace bug, *Leptobyrsa rhododendri* Horv., which sucks the sap from the under surface of the leaves of certain species and varieties of rhododendron, was received from New Haven, May 3, and from Stamford, September 3. The remedy is to spray with nicotine solution and soap, directing the spray against the immature bugs on the lower side of the leaves.

Larvae of the iris borer, *Macronoctua onusta* Grote, were received from Guilford, July 15, and from Old Saybrook, August 7. As the eggs are laid on iris leaves in October, gathering and burning the leaves in spring is a means of control.

Specimens of the juniper webworm, *Dichomeris marginellus* Fabr., were received from New Haven, July 15. Spraying with lead arsenate is the remedy.

The garden millipede, *Julus hortensis* Wood, was received from

Hartford, June 23, where tulip bulbs had been injured and many immature millipedes were present.

The cyclamen mite, *Tarsonemus pallidus* Banks, now causes injury to several kinds of plants, particularly cyclamen, chrysanthemum, delphinium and snapdragon, causing the young leaves to become swollen and distorted. Specimens were received on delphinium from Danbury, June 1, New Haven, June 8, and on snapdragon from West Hartford, June 11. One remedy is to spray with nicotine solution and soap.

The bulb mite, *Rhizoglyphus hyacinthi* Banks, was received in tulip bulbs from Hartford, June 3.

#### HOUSEHOLD INSECTS

The black carpet beetle, *Attagenus piceus* Oliv., was received from New Britain, June 25. The larvae are found in the cracks of floors, where they feed upon lint and small particles of animal or vegetable matter. The adult beetles, as well as the larvae, often eat holes in clothing in closets. One method of preventing injury to clothing is to place woollen rags on the floor and walls of the closet, as these rags will often be eaten instead of the clothes.

The spotted silver fish, *Thermobia domestica* Pack, was received from New Haven, October 9. This insect, like its close relative, lives in houses where it hides away in cracks of the woodwork and feeds upon the paste of books, often greatly disfiguring them.

The dog flea, *Ctenocephalus canis* Curtis, was received from South Meriden, August 5.

Specimens of cracked corn were brought to the laboratory from New Haven on February 24, upon which were feeding three kinds of small beetles commonly attacking stored grains. These were the rice weevil, *Calendra oryzae* Linn., the saw-toothed grain beetle, *Silvanus surinamensis* Linn., and *Laemophlaeus pusillus* Schr.

#### INSECTS ATTACKING FIELD CROPS

The Eastern field wireworm, *Limonus agonus* Say, which caused much injury in tobacco fields in 1925, was present in the same fields in 1926, although the injury was less. One grower tried the method practiced in California, namely, of planting every fourth or fifth row with corn as a trap crop. When most of the wireworms had been attracted to the corn, Cyanogas or calcium cyanide compound was drilled in along the rows at the rate of about 100 pounds per acre. This, of course, killed the corn and nearly all of the wireworms. The tobacco plants were then set and were not injured. This system can be employed by the vegetable grower.

In 1925, the European corn borer, *Pyrausta nubilalis* Hubn.,



was found in twenty separate fields and gardens in the five towns of Bridgeport, Saybrook, New London, Groton, and Stonington. Clean-up work was done around each infestation in late fall and spring. The entire region was again scouted in 1926 and no signs of the pest found at Bridgeport and Saybrook, but one infestation was found at Woodmont in the town of Milford, and several were found in East Lyme, Waterford, New London, Groton and Stonington. These five towns in New London County will soon be placed under Federal quarantine.<sup>1</sup> No other part of the state has as yet become generally infested, and we aim to prevent this as far as possible, particularly on account of the important seed-corn interests of the state. But our control work depends somewhat on the size of our appropriations, and probably the time will soon come when it cannot entirely be held back, even with large appropriations.

Much progress has been made during the year in a study of the life history, habits, and methods of control of the Asiatic beetle, *Anomala orientalis* Waterhouse, mentioned in my last report, the grubs of which feed upon the roots of grass in lawns in the western part of the city of New Haven. It is found that the beetles fly somewhat and feed slightly in the flowers of roses, hollyhocks, etc. Some 43 acres of lawns and gardens in New Haven were treated with a specially prepared emulsion of carbon disulphide. The area has been placed under quarantine in order to prevent, so far as possible, the spread of the insect through artificial means.

The Japanese beetle, *Popillia japonica* Newman, which has been such a nuisance on fruit, flower and vegetable crops in New Jersey, Pennsylvania, and northern Delaware, has now spread northward, infesting the western end of Long Island and Westchester County in New York, and in late summer a few of the beetles were found in Stamford, Conn. As Port Chester, N. Y., is also infested, it was necessary to include Greenwich with Stamford in the Federal quarantine, and both towns have since been placed under State quarantine. Though control measures may retard the natural spread of this insect, I doubt if it is humanly possible to prevent it from infesting the entire State within a few years if it continues to spread at the same rate that it has since it was discovered in this country ten years ago. The beetles feed upon the foliage, flowers, and fruit of many kinds of trees and plants, including fruit trees, roses, sweet corn, beans, etc. In the region around Philadelphia, not only must the vegetables be inspected and certified before shipment, but some of them must be given special packages and stored under screens, and during

<sup>1</sup> A Federal quarantine, effective March 1, 1927, has been placed on the towns of East Lyme, Waterford, New London, Groton and Stonington.

the period when the beetles fly about in swarms, vegetable shipments are stopped entirely for a few days.

The Colorado potato beetle, *Leptinotarsa decemlineata* Say, was rather less abundant than usual throughout the State.

White grubs, *Phyllophaga* sp., were reported as injuring potatoes at Vernon in September.

#### MISCELLANEOUS INSECTS

Specimens of the American cockroach, *Periplaneta americana* Linn., were brought to the Station on August 5, from a dump along the Boulevard, New Haven, where they were present in large numbers; also from a factory restaurant in New Haven, October 4.

The large garden slug, *Limax maximus* Linn., was received from New Haven, June 14. This slug often does considerable damage by feeding upon the leaves of vegetable and flowering plants in gardens, and leaves a slimy trail wherever it crawls. These animals feed chiefly at night and hide away during the daytime. When found, they can easily be destroyed by shaking a little table salt upon them. Foliage which is not for food may be sprayed with lead arsenate, and food plants may be protected by surrounding them with a barrier of air-slaked lime or fine coal or wood ashes.

#### GENERAL INDEX TO REPORTS

A general index to the first twenty-five reports of the State Entomologist of Connecticut has been prepared and published as Bulletin 281 of this Station. Though each Report has its own index, for ready reference this general index is of great assistance, as it saves consulting the indices of the separate Reports. There are now many scientific and public libraries, and individuals, particularly entomologists, that bind these Reports together, and wherever such plans are contemplated, the general index should be secured and made a part of the set. It also contains a list of errata and an index to all text figures and plates which have appeared in the twenty-five Reports.

#### CONVENTION OF ENTOMOLOGICAL WORKERS

The third convention of Entomologists working in Connecticut was held at the Connecticut Agricultural College, Storrs, October 29, 1926. The program was similar to that of last year and, besides containing papers of Connecticut entomologists and those of Federal men working co-operatively within the State, included also papers by Dr. E. P. Felt, State Entomologist, Albany, N. Y.,

and Professor A. I. Bourne, Agricultural Experiment Station, Amherst, Mass., on subjects of much interest to Connecticut workers. The meeting was held in the pleasant assembly room of the new Community House, and an excellent luncheon was served in the College dining hall. About 54 attended this meeting. Mr. Loren B. Smith was unable to be present, and his place was filled very acceptably by Mr. E. Avery Richmond. The program was as follows:

## PROGRAM

- A. M.
- 10:00 Greetings.  
C. L. Beach, President, Connecticut Agricultural College, Storrs, Conn.
- 10:15 The Training of Entomological Investigators.  
Prof. G. H. Lamson, Jr., Connecticut Agricultural College, Storrs, Conn.
- 10:30 Summary of Six Years' Experiments in Orchard Dusting and Spraying.  
M. P. Zappe, Connecticut Agricultural Experiment Station, New Haven, Conn.
- 11:00 Some Insect Pests Which Have Recently Appeared in Connecticut.  
W. E. Britton, State Entomologist, New Haven, Conn.
- 11:15 The Occurrence of *Autoserica japonica* in the United States.  
E. P. Felt, State Entomologist, Albany, N. Y.
- 11:30 Present Status of the European Corn Borer in the United States.  
L. H. Worthley, In Charge of Federal Control Work, Arlington, Mass.
- 12:00 Recent Developments in the Control of the Japanese Beetle.  
Loren B. Smith, In Charge of Federal Work, Riverton, N. J.
- P. M.
- 1:00 Luncheon.
- 2:00 Present Status of the Gipsy Moth, Brown-tail Moth and Satin Moth.  
A. F. Burgess, In Charge of Federal Moth Work, Melrose Highlands, Mass.
- 2:45 Recent Observations on the Codling Moth in Massachusetts.  
A. I. Bourne, Agricultural Experiment Station, Amherst, Mass.
- 3:00 Habits and Life History of the Asiatic Beetle, *Anomala orientalis*.  
R. B. Friend, Agricultural Experiment Station, New Haven, Conn.
- 3:30 Soil Treatment and Scouting for the Control of the Asiatic Beetle.  
J. Peter Johnson, Agricultural Experiment Station, New Haven, Conn.
- 4:00 Work of the Season with the Oriental Peach Moth.  
Philip Garman, Agricultural Experiment Station, New Haven, Conn.
- 4:30 Recent Studies on the Bean Weevil.  
J. A. Manter, Agricultural College, Storrs, Conn.

The following were present: William J. Ahearn, Westerly, R. I.; John T. Ashworth, Danielson, Conn.; Ellery Atwood, Thomaston, Conn.; C. L. Beach, Storrs, Conn.; H. L. Blaisdell, Melrose Highlands, Mass.; A. I. Bourne, Amherst, Mass.; W. E. Britton, New Haven, Conn.; A. F. Burgess, Melrose Highlands, Mass.; C. A. Clark, Greenwich, Conn.; G. M. Coddington, Mount Vernon, N. Y.; C. W. Collins, Melrose Highlands, Mass.; W. A. Collins, New Milford, Conn.; O. B. Cook, Danielson, Conn.;

H. E. Cooke, Danielson, Conn.; R. G. Cooper, Colebrook, Conn.; S. S. Crossman, Melrose Highlands, Mass.; P. A. Davis, New Haven, Conn.; William W. Eells, Manchester, Conn.; C. M. Emerson, Hartford, Conn.; E. P. Felt, Albany, N. Y.; R. B. Friend, New Haven, Conn.; C. W. Frink, Brooklyn, Conn.; Philip Garman, New Haven, Conn.; A. J. Gilbert, Jewett City, Conn.; S. P. Hollister, Storrs, Conn.; H. C. Hockett, Riverhead, N. Y.; J. Peter Johnson, New Haven, Conn.; John F. Keough, Willimantic, Conn.; Dolor La Belle, Ballouville, Conn.; G. H. Lamson, Jr., Storrs, Conn.; A. J. Lannon, Providence, R. I.; Allen Latham, Norwichtown, Conn.; J. W. Longo, Danielson, Conn.; Edwin T. Lundberg, Greenwich, Conn.; J. A. Manter, Storrs, Conn.; W. E. Mattson, Colebrook, Conn.; S. E. May, Canaan, Conn.; J. A. McEvoy, Putnam, Conn.; B. W. McFarland, New Haven, Conn.; H. L. McIntyre, Albany, N. Y.; W. B. Mix, Stamford, Conn.; R. C. Newton, Storrs, Conn.; W. J. Powers, Boston, Mass.; F. C. Rich, Ansonia, Conn.; E. Avery Richmond, Riverton, N. J.; J. B. Riley, Killingly, Conn.; W. L. Slate, Jr., New Haven, Conn.; R. A. Spencer, Hartford, Conn.; O. W. Spicer, Stamford, Conn.; A. E. Stene, Kingston, R. I.; B. H. Walden, New Haven, Conn.; J. R. Ward, New London, Conn.; L. H. Worthley, Boston, Mass.; M. P. Zappe, New Haven, Conn.

## INSPECTION OF NURSERIES IN 1926

W. E. BRITTON AND M. P. ZAPPE

The annual inspection of growing nursery stock was commenced July 6 and finished in September except for a few scattered nurseries, the final inspection being made November 16. This work was in charge of Mr. Zappe, who was assisted by J. L. Rogers, A. E. Warren, and Dr. W. R. Hunt. Assistance in a few nurseries was rendered by B. W. McFarland, A. D. McDonnell, B. H. Walden, E. M. Stoddard, J. E. Riley, J. T. Ashworth, R. C. Botsford, and W. E. Britton.

Dr. Hunt of the Botany Department was assigned to this work in order to give special attention to plant diseases which might be found in the nursery, and on certain days when he could not be present, Mr. A. D. McDonnell was detailed to go in his place.

In addition to the inspections made by the nursery inspectors, the gipsy moth scouts were instructed to make careful examinations for gipsy moth eggs in and around all nurseries in the quarantined area, and to report to the office in case any were found. No gipsy moth infestations were discovered in or near any Connecticut nursery in 1926.

In 46 nurseries no important pests were found. A list of insects and plant diseases found in nurseries during the annual inspection of 1926, together with the number of nurseries infested by each, is given below:

## PESTS FOUND IN NURSERIES IN 1926

Nurseries uninfested ..... 46



## INSECTS

Name	No. Nurseries	Name	No. Nurseries
Aphids, apple, green .....	43	Maple worm, green-striped ....	1
woolly .....	35	Mite, European red .....	5
on caragana .....	1	pear blister .....	20
catalpa .....	1	spruce .....	2
cherry .....	1	on <i>Amelanchier</i> .....	1
currant .....	1	birch .....	1
spiraea van Houtei..	1	cedar .....	1
viburnum .....	1	silver maple .....	2
willows .....	2	willow .....	1
Spruce gall <i>Chermes abietis</i> ..	35	Oriental peach moth .....	14
" <i>cooley</i> ..	7	Pear psylla .....	7
Larch <i>Chermes</i> .....	5	Poplar flea beetle <i>Crepidodera</i>	
Pine bark <i>Chermes</i> .....	7	<i>helxines</i> .....	2
Apple and thorn skeletonizer ..	19	leaf beetle <i>Lina scripta</i> ..	6
Birch leaf miner .....	20	Red-humped caterpillar .....	7
Borer in apple .....	1	Rose chafer .....	2
ash .....	1	stem girdler .....	1
Mugho pine .....	1	Sawfly <i>Diprion simile</i> .....	1
lilac .....	2	on birch .....	1
maple .....	1	currant .....	2
peach .....	1	plum .....	1
poplar .....	1	white pine .....	1
red pine shoots .....	1	Scale, elm .....	14
rose .....	1	euonymus .....	2
willow .....	2	<i>Lecanium</i> on oak .....	1
Cecropia caterpillar .....	1	<i>Leucaspis</i> on lilac .....	1
Cherry and pear slug .....	17	oak gall .....	5
Curculio, walnut .....	1	oyster-shell .....	39
Elm leaf beetle .....	4	pine leaf .....	5
Fall webworm .....	11	rose .....	10
Lace bugs on linden .....	1	San José .....	19
quince .....	1	scurfy .....	2
oak .....	1	tulip tree .....	1
rhododendron ..	23	white peach on <i>Catalpa</i>	
sycamore .....	1	<i>bungei</i> ..	1
<i>Janus abbreviatus</i> .....	2	Spiny elm caterpillar .....	1
Juniper webworm .....	2	Tarnished plant bug .....	1
Leafhoppers on apple .....	35	Tent caterpillar .....	10
grape .....	1	<i>Thecodiplosis lirioidendri</i> ..	2
pear .....	1	White-marked tussock moth ..	1
rose .....	1	White pine weevil .....	8
Leaf miners in <i>Catalpa bungei</i> ..	9	Willow leaf beetle <i>Plagiodera</i>	
magnolia .....	1	<i>versicolora</i> ..	6
maple .....	1	galls .....	2
peach .....	2	Yellow-necked caterpillar .....	2
tulip tree .....	1		

## PLANT DISEASES

Name	No. Nurseries	Name	No. Nurseries
Anthrachnose on currant .....	1	Blight on horsechestnut .....	1
Apple scab .....	38	Brown rot .....	5
Black knot .....	3	Canker, poplar .....	32
rot on apple .....	26	on willow .....	1
cherry .....	1	Chestnut blight .....	1

Name	No. Nurseries	Name	No. Nurseries
Crown gall .....	2	Mildew on phlox .....	3
Leaf spot on catalpa .....	21	rose .....	40
cherry .....	8	<i>Symphoricarpus</i> ..	1
linden .....	1	walnut .....	1
maple .....	2	Peach yellows .....	1
quince .....	7	Raspberry anthracnose .....	3
rose .....	38	mosaic .....	7
strawberry .....	6	Rust on apple .....	61
tulip tree .....	1	ash .....	1
Mildew on apple .....	10	cedar .....	1
catalpa .....	19	<i>Crataegus</i> .....	4
gooseberry .....	1	quince .....	6
grape .....	4	white pine blister on <i>Ribes</i>	9
lilac .....	12		

From an examination of the preceding list it will be seen that the green apple aphid was found in more nurseries (43) than any other insect pest, though this does not mean that it causes the most injury. Next in number of nurseries infested comes the oyster-shell scale (39), followed by the woolly apple aphid (35), leafhoppers on apple (35), spruce gall aphid (35), lace bugs on rhododendron (23), birch leaf miner (20), pear blister mite (20), San José scale (19), apple and thorn skeletonizer (19), and cherry and pear slug (17).

Among the plant diseases found in nurseries, seemingly the rust on apple leads in prevalence (61), followed in the order given, by mildew on rose (40), apple scab (38), leaf spot on rose (38), poplar canker (32), black rot on apple (26), leaf spot on catalpa (21), mildew on catalpa (19), mildew on lilac (12), and mildew on apple (10).

In order to show how the prevalence of certain nursery pests in 1926 compares with preceding seasons, the record of them for the past seven years is given as reported by the nursery inspectors:

## SEVEN-YEAR RECORD OF SERIOUS AND COMMON NURSERY PESTS

Pest	1920	1921	1922	1923	1924	1925	1926
Oyster-shell scale .....	38	36	44	42	44	38	39
San José scale .....	11	28	19	20	32	32	19
Spruce gall aphids .....	21	31	21	28	40	27	42
White pine weevil .....	1	1	19	17	5	5	8
Apple and thorn skeletonizer ..	..	..	1	18	2	8	19
Poplar canker .....	13	21	31	34	25	34	32
Pine blister rust (on <i>Ribes</i> ) ...	..	2	9	6	8	7	9
Nurseries uninfested .....	46	36	36	32	33	34	46

The figures in the preceding table are not absolutely comparable because the number of nurseries inspected in 1925 and 1926 was about 50 per cent greater than during the other years imme-

diately preceding. Though the number of nurseries infested with a given pest may be greater in 1926 than in 1923, the percentage may be considerably less.

#### NUMBER OF NURSERIES

The law passed in 1925 requiring nurserymen to register has operated to increase the number of nursery firms known to the State Entomologist. This increase was marked in 1925, and further increases have been noted in 1926. During the calendar year of 1926, 182 nursery inspections were made. The list contains 162 names; 12 of these were inspected twice, once in the spring and again in the fall, and 174 regular certificates have been granted. Eight inspections were made where the owners either have not qualified for receiving certificates or have since decided that they do not need certificates.

In addition to these regular inspections and certificates, 121 separate parcels of nursery stock have been inspected and package certificates furnished; 202 duplicate certificates have been furnished to the regular nurserymen for filing in other states.

The area of nurseries in Connecticut in 1926 was about 2,106 acres, as against 2,731 in 1925. These figures are for the most part taken from the registration blanks, and where not filled out by the owner, the inspector obtains the information, or if this is not possible, he estimates the area. All nurseries of less than an acre are given as one acre. Likewise, wherever a fraction is given, the next whole number is recorded. The list of nursery firms for 1926 contains 162 names, and is as follows:

#### NURSERY FIRMS IN CONNECTICUT RECEIVING CERTIFICATES IN 1926

Name of Firm	Address	Acreage	Certificate Issued	No. of Certificate
Alius, Adolf .....	Stamford .....	1	Nov. 1	299
Amelunxen & De Wyn .....	Yalesville .....	3	Sept. 3	235
Baby Blue Spruce Gardens (E. C. Pomeroy, Prop.) ..	New Milford .....	2	Aug. 14	182
Barnes Bros. Nursery Co....	Yalesville and Durham .....	150	Aug. 6	169
Barnes Nursery & Orchard Co. ....	Wallingford .....	50	Oct. 21	204
Barton, Robert .....	Hamden .....	1	Dec. 7	311
Beattie, W. H. ....	New Haven .....	1	Dec. 22	319
Benbow, A. ....	Norfolk .....	1	Aug. 21	192
Berkshire Nurseries (C. B. Myers, Mgr.) .....	Milford .....	10	Dec. 30	324
Bernson, Gosta M. ....	Cromwell .....	1	Aug. 21	203
Bertana, Louis (2) .....	Glenbrook .....	1	Sept. 15	264
Bertolf Bros. ....	Greenwich .....	40	Sept. 15	263
Booy, H. W. ....	Yalesville .....	3	Aug. 21	199
Brainard Nursery & Seed Co.	Thompsonville .....	12	Aug. 20	188
Braley & Co. S. A. ....	Burnside .....	3	Aug. 31	216

Name of Firm	Address	Acreage	Certificate Issued	No. of Certificate
Branford Nurseries .....	Branford .....	4	Aug. 31	217
Bretschneider, A. ....	Danielson .....	1	Sept. 4	236
Bridgeport Hydraulic Co....	Bridgeport .....	100	Oct. 26	295
Bristol Nurseries, Inc. ....	Bristol .....	30	Sept. 7	240
Brooklawn Conservatories (Julius Reck, Prop.) .....	Bridgeport .....	1	Aug. 27	212
Brouwer's Nurseries .....	New London .....	2	Aug. 21	194
Brown, Edgar M. ....	Hartford .....	1	Oct. 26	296
Bulpitt, Henry F. ....	Darien .....	4	Nov. 17	307
Burke, P. J. (2) .....	Rockville .....	2	Aug. 21	196
Burr & Co., C. R. ....	Manchester, Ellington and Durham .....	300	Aug. 19	183
Burr, Morris L. ....	Westport .....	1	Oct. 19	291
Burroughs, Thomas E. ....	Deep River .....	4	Aug. 5	168
Burwell, E. E. (2) .....	New Haven .....	1	Sept. 30	281
Cant, Alexander .....	Springdale .....	1	Sept. 27	277
Cardarelli, E. J. ....	Cromwell .....	2	Sept. 8	250
Case, Louis L. (2) .....	Simsbury .....	1	Sept. 7	244
Chapman, C. B. ....	Groton .....	1	Sept. 16	268
Chapman, C. E. ....	North Stonington ..	1	Sept. 8	247
Clinton Nurseries (Warren W. Richards, Prop.) .....	Clinton .....	4	Sept. 14	257
Conine Nursery Co. ....	Stratford .....	50	Sept. 2	222
Conn. Agricultural College (Prof. S. P. Hollister) ...	Storrs .....	1	Sept. 11	255
Conn. Agr. Expt. Station (W. O. Filley, Forester) ..	Mt. Carmel, New Haven and Norwich ..	2	Sept. 18	273
Corrigan, James J. ....	West Haven .....	1	Aug. 27	215
Dallas, Inc., Alexander ....	Waterbury .....	2	Oct. 27	297
Dawson's Nursery .....	Willimantic .....	1	Sept. 14	261
Dunlap, Daniel S. ....	Cromwell .....	3	Aug. 21	202
Eager, Edward M. ....	Bridgeport .....	1	Sept. 21	275
East Rock Nursery Co. (S. Palmieri, Prop.) .....	New Haven .....	1	Sept. 28	278
Edgewood Nursery (Vidal Mackintosh, Inc.) .....	Stamford .....	1	Dec. 6	310
Bells & Sons .....	Manchester .....	1	Aug. 14	181
Elfgren, I. P. (2) .....	East Killingly .....	1	Aug. 21	205
Elm City Nursery Co. (Wood- mont Nurseries, Inc.) ....	Woodmont .....	150	Aug. 25	207
Elm Grove Cemetery Asso- ciation .....	Mystic .....	1	Dec. 4	309
Ensign-Bickford Co. (S. W. Eddy, Supt.) .....	Avon .....	10	Dec. 28	323
Evergreen Nursery Co. ....	Wilton and South Wilton .....	14	Aug. 14	180
Farmington Valley Nursery (Harry D. Wilcox, Prop.) ..	Avon .....	1	Aug. 31	221
Fraser's Nurseries & Dahlia Gardens .....	Willimantic .....	2	Aug. 21	204
Galligan, C. W. ....	North Haven .....	2	Sept. 3	233
Gardner's Nurseries .....	Rocky Hill .....	4	Aug. 25	206
Geduldig's Greenhouses ....	Norwich and Ledyard ..	2	Sept. 9	251
Geremia, Joseph .....	Yalesville .....	1	Sept. 7	241
Glen Terrace Nursery (J. H. Everett, Prop.) .....	Mount Carmel .....	20	Oct. 4	285



Name of Firm	Address	Acreage	Certificate Issued	No. of Certificate
Golden Hill Nurseries (Andrew Johnson, Prop.)	Shelton	2	Sept. 7	243
Hallock, H. G.	Washington	1	Sept. 3	228
Hanford, R. G.	Norwalk	2	Aug. 31	219
Hansen, Peter	Fairfield	2	Sept. 10	253
Hawes, F. M.	West Hartford	1	Sept. 3	225
Hearn, Thomas H.	Washington	3	Sept. 3	229
Heath & Company	Manchester	1	Aug. 6	172
Hill Top Nursery (2) (F. W. Langstroth, Prop.)	Danbury	2	Sept. 3	224
Hilliard, H. J.	Sound View	1	Aug. 31	220
Hiti Nurseries (J. H. Bowditch, Prop.)	Pomfret Center	8	Aug. 6	170
Holcomb, Irving	Simsbury	1	Aug. 11	178
Holdridge, S. E.	Ledyard	4	Aug. 19	185
Horan, James & Son	Bridgeport	1	Oct. 6	287
Houston's Nurseries	Mansfield	12	Oct. 19	292
Hoyt's Sons Co., Inc., Stephen	New Canaan	300	Aug. 26	211
Hubbard, S. C.	Cromwell	2	Aug. 21	201
Hull, Curtis M.	Wallingford	4	Sept. 15	266
Hunt & Co., W. W.	Hartford	8	Sept. 3	223
Intravaia, Joseph	Middletown	2	Aug. 21	197
Jennings, G. S.	Southport	1	Sept. 7	242
Johnson, Tom	Stratford	1	Apr. 14	156
Jones, William	Norwalk	1	Sept. 11	254
Kelley, James J. & Son	New Canaan	4	Sept. 8	245
Kerner, Eugene	Woodbury	2	Dec. 31	325
Keystone Nurseries (H. H. Kellner, Prop.)	Danbury	1	Aug. 25	208
Leghorn, John J.	Cromwell	5	Aug. 19	186
Lewis & Valentine, Inc.	Darien	5	Oct. 27	298
Long Hill Nursery (John E. Eckner, Prop.)	Burnside	1	Sept. 3	226
Malavasi, Sam	New Haven	1	Sept. 30	282
Mallett Co., George A.	Bridgeport	1	Sept. 14	259
Maplewood Nurseries (T. H. Peabody, Mgr.)	Norwich	2	Sept. 27	276
Marigold Farm (Henry Kelley, Prop.)	New Canaan	10	Sept. 18	271
Marshall, Robert	Wethersfield	1	Sept. 4	238
Massara, Anthony	Yalesville	1	Aug. 21	200
Merwin Lane Nursery (J. W. Marvin, Jr., Prop.)	Fairfield	5	Oct. 2	283
Middleleer, Inc.	Darien	6	Nov. 6	303
Millane Tree Expert Co.	Middletown and Cromwell	2	Dec. 1	308
Minge, G. H. (2)	Rocky Hill	1	Sept. 28	279
Moraio Bros.	Stamford	1	Apr. 14	157
Morgan, William F. (Westerly, R. I.)	North Stonington	4	Sept. 8	249
New Britain Board of Water Commissioners (2)	New Britain and Southington	50	Nov. 6	302
New Haven Nurseries (Louis A. Soldan, Mgr.)	New Haven	1	Dec. 8	313
New Haven Park Commission (G. X. Amrhyn, Supt.)	New Haven	16	Sept. 8	246

Name of Firm	Address	Acreage	Certificate Issued	No. of Certificate
New London Cemetery Assn. (E. E. Rogers, Pres.)	New London	1	Sept. 14	260
New London County Nurseries (W. J. Schoonman, Prop.)	New London, Norwich and Waterford	5	Sept. 29	280
Newington Gardens (Julius Rottenberg, Prop.)	Newington	1	Sept. 15	267
Nicolson & Thurston	Litchfield	1	Aug. 21	191
North-Eastern Forestry Co. (F. S. Baker, Mgr.)	Cheshire	56	July 30	166
Norwood Nursery	Hamden	1	Sept. 18	272
Oakland Nurseries	Manchester	5	Aug. 6	173
Ostergren, Herbert	Cromwell	2	Aug. 21	193
Outpost Nurseries (L. D. Conley, Prop.)	Ridgefield	35	Oct. 4	286
Ouwkerk & Van der Stam	Yalesville	12	Aug. 19	187
Parfitt, Mary T.	New Milford	1	Nov. 1	300
Pedersen, Anthon	Stamford	2	Dec. 7	312
Pequod Nursery Co.	Yalesville	15	Aug. 5	167
Phelps & V. T. Hammer Co., The J. W.	Branford	2	Nov. 15	304
Pierson, A. N., Inc.	Cromwell	100	Aug. 11	174
Plumley, D. L.	Clintonville	1	Sept. 3	234
Polish Orphanage Farm	New Britain	1	Dec. 8	314
Reuman, Theodore H.	Stamford	1	Sept. 3	232
Ridgefield Florist & Nursery (W. Pinchbeck, Prop.)	Ridgefield	4	Sept. 15	262
Rockfall Nursery Co. (Philip Marotta, Prop.)	Rockfall	70	Aug. 26	210
Rowayton Greenhouses	Rowayton	1	Aug. 31	218
Rushworth, Edwin	Yalesville	1	Aug. 21	198
Russell, C. B.	Newington	1	Sept. 4	239
Saxe & Floto	Waterbury	2	Nov. 16	306
Schaeffer Bros. Nursery	Ledyard	3	Aug. 21	195
Scheepers, Inc., John	Stamford	15	Aug. 11	177
Schulze, Charles T.	Bethel	1	Nov. 15	305
Scott's Nurseries	Hartford	5	Dec. 11	317
Sierman, C. H.	Hartford	8	Sept. 20	274
Simonson, H. C. (2)	Plainville	2	Sept. 3	230
Snelgrove, S. J. (2)	Windsor	1	Sept. 3	231
Sniffin, Charles R. (2)	Granby	12	Aug. 27	213
South Wilton Nurseries (J. C. Van Heiningen, Prop.)	South Wilton	3	Aug. 19	184
Southport Nursery (L. Coari, Prop.)	Southport	15	Aug. 25	209
State Forest Nursery (A. F. Hawes, State Forester)	Simsbury	3	Sept. 4	237
State Street Nursery (John Natyzon, Mgr.)	New Haven	2	Sept. 17	269
Steck, Charles A.	Newtown	6	Oct. 20	293
Steck, Charles A., Jr.	Bethel	5	Dec. 23	320
Steck, Harold W.	Farmington	10	Dec. 8	315
Steck, Mrs. Sarah B.	Bethel	1	Dec. 23	321
Stratfield Nurseries (George R. Godfrey, Prop.)	Bridgeport	20	Dec. 13	318
Stratford Florist Co. (C. A. Cooper, Prop.)	Stratford	1	Sept. 10	252

Name of Firm	Address	Acreage	Certificate Issued	No. of Certificate
Stratford Rose Nurseries (John Barrow, Prop.) ...	Stratford .....	2	Sept. 3	227
Szibik & Co., George .....	New Haven .....	1	Dec. 10	316
Tanner's Nursery Co. ....	Burnside .....	5	Sept. 14	258
Thomas, D. W., 2d .....	Hamden .....	1	Aug. 27	214
Upson, R. E. ....	Marion .....	4	Sept. 18	270
Van Wilgen Nurseries ....	Branford .....	8	Nov. 6	301
Vanderbrook & Son, Charles L.	Manchester .....	17	Aug. 6	171
Vasileff, Nicholas .....	Greenwich .....	2	Sept. 11	256
Verkade's Nurseries .....	New London and Chesterfield .....	15	Aug. 11	176
Wallace Nursery .....	Wallingford .....	8	Sept. 15	265
Wayside Farm Gardens (Miss I. E. Aldrich, Prop.) .....	Thomaston .....	2	Aug. 21	190
Wegner, Conrad F. ....	Noroton Heights ...	1	Dec. 28	322
Wheeler, Charles B. ....	North Stonington ..	1	Sept. 8	248
Wild, Henry .....	Greenwich and Nor- walk .....	26	Aug. 20	189
Wilson & Co., C. E. ....	Manchester .....	75	Aug. 11	175
Woodruff, C. V. ....	Orange .....	1	Oct. 2	284
Wyllie, David (2) .....	Whitneyville .....	1	Oct. 6	288
Yale University Landscape Department (G. A. Cromie)	New Haven .....	3	Oct. 18	289
Yale University School of Forestry .....	New Haven .....	2	Oct. 18	290
Zack Co., H. J. ....	Deep River .....	5	Aug. 12	179
Total 162 nurseries .....		2,106	acres	

Bulletin of Immediate Information No. 57, on "Regulations Concerning the Transportation of Nursery Stock in the United States and Canada," was published in November and sent to all nursery firms on the preceding list. It gives a résumé of all Federal quarantines and of the requirements of each state concerning the shipping of nursery stock.

#### INSPECTION OF RASPBERRY PLANTATIONS

Several raspberry growers and nurserymen applied for the special inspection and certificate in order to be able to sell plants free from mosaic. This inspection and certificate is necessary to meet the requirements of the states of Michigan, Minnesota, New York and Vermont. Consequently two inspections of each of three plantations were made by both entomologists and botanists. These were mostly in nurseries and some of them contained too much mosaic to warrant certification, but special certificates were granted to three firms on varieties as follows:

#### SPECIAL CERTIFICATES ON RASPBERRY PLANTS

Name of Firm	Address	Variety	Certificate Date of issue	Number
Barnes Nursery & Orchard Co. ....	Wallingford	{ Erskine Park Plum Farmer }	Sept. 17	13
Burr & Co., C. R. ....	Manchester	{ Columbian Cumberland Cuthbert Golden Queen Marlboro Ohio }	Sept. 17	14
Conine Nursery Co. ....	Stratford	{ Columbian Cuthbert La France Latham }	Sept. 17	12

#### NURSERY DEALERS

According to Chapter 265, Public Acts of 1925, dealers in nursery stock must also register with the State Entomologist, giving the chief sources of their nursery stock. During the calendar year, 94 dealers were registered and permits granted. These dealers' permits were issued only for the remainder of the current year and all expired on December 31. The list of dealers is not printed in this Report.

#### OUT-OF-STATE NURSERYMEN

Nurserymen in other states desiring to ship nursery stock into Connecticut are required to file copies of their inspection certificates and make application for permits to ship stock into the State. Such permits are valid only for the period covered by the certificates placed on file. During the year 181 permits have been issued to nurserymen in other states, but the list of nurserymen receiving them is not included in this report.

#### INSPECTION OF IMPORTED NURSERY STOCK

W. E. BRITTON AND M. P. ZAPPE

During the past seven years the nursery stock entering Connecticut from foreign countries has been entirely fruit and rose seedlings for propagation. As in preceding seasons, this stock has been inspected mostly by Mr. Zappe, though he has been assisted in certain instances by Messrs. B. H. Walden and J. L. Rogers. The number of plants was greater than in 1925 and has been exceeded only in 1924, as the following table giving the statistics for the past seven years will show:



Year	No. of shipments	No. of cases	No. of plants
1920 .....	17	87	814,491
1921 .....	21	126	1,228,560
1922 .....	30	159	1,997,595
1923 .....	35	179	1,981,895
1924 .....	33	313	3,489,170
1925 .....	27	277	2,977,346
1926 .....	32	347	3,443,357

These 32 shipments were imported by nine different Connecticut firms, 21 shipments being consigned to two firms. Of the total number of shipments, 21 shipments contained only rose stocks, six shipments contained only fruit stocks, and five shipments contained both rose and fruit stocks.

The time required to inspect this stock is equivalent to one man working 36 days, and this time, together with the cost of travel and other necessary expenses, amounts to about \$500.00.

Of this plant material inspected, 1,889,507 or about 55 per cent were fruit seedlings, and 1,553,850 or about 45 per cent were rose stocks. The number of each variety is shown in the following table:

## KINDS OF STOCKS IMPORTED

## FRUIT STOCKS

Variety	Number of Plants	Total
Apple .....	860,507	
Apple, dwarf (Doucin) .....	20,000	
Cherry (Mahaleb) .....	372,000	
Cherry (Mazzard) .....	25,000	
Pear .....	413,000	
Plum (Myrobolan) .....	185,000	
Quince .....	14,000	1,889,507

## ROSE STOCKS

<i>Rosa manetti</i> .....	1,279,050	
<i>Rosa multiflora japonica</i> .....	24,000	
<i>Rosa rugosa</i> .....	255,800	1,553,850
		3,443,357

Though the greatest number of shipments came from Holland, the greatest number of cases and plants came from France, as the following table will show:

## SOURCES OF IMPORTED NURSERY STOCK, 1925-1926

Country	No. shipments	No. cases	No. plants
France .....	8	193	2,098,400
Holland .....	19	149	1,326,950
Ireland .....	2	2	8,000
England .....	1	1	10,000
Canada .....	2	2	7
	32	347	3,443,357

The following table shows the quantities of stock as inspected by months:

Month	No. shipments	No. cases	No. plants
November ....	1	2	15,000
December ....	6	35	303,000
January .....	8	108	919,400
February .....	8	161	1,859,000
March .....	2	4	41,900
April .....	3	21	160,050
May .....	4	16	145,007
	32	347	3,443,357

In addition to the material enumerated and tabulated above, there was one shipment of seven cases which was probably received and unpacked through a mistake, though the number of plants was not given, and 25 shipments containing 32 packages of seeds, mostly of trees and palms, which were not inspected in Connecticut.

Of the 32 shipments inspected, 13 shipments, or about 40 per cent, were found infested with insects or plant diseases, some of which are well-known pests. Details regarding these pests are given below.

## PESTS FOUND ON IMPORTED NURSERY STOCK

## 13 Shipments Infested

## INSECTS

- Acronycta* sp. on apple (1 shipment). Andre Choplin, Angers, France.  
*Acronycta rumicis* on pear (1 shipment). Andre Choplin, Angers, France.  
*Emphytus cinctus* Linn. on rose (9 shipments). Felix & Dykhuis, Boskoop, Holland; A. Fermaud, Franco-American Seedling Co., Angers, France; Oudyk Bros., Boskoop, Holland; Fa. As. Ouwerkerk, Boskoop, Holland; Aug. Rolker & Sons, Veendam, Holland.  
*Euproctis chrysorrhoea* Linn. egg mass on pear (1 shipment). A. Fermaud, Franco-American Seedling Company, Angers, France.  
*Notolophus antiqua* Linn. (3 shipments) 2 on rose, 1 on apple. Andre Choplin, Maze, France; (egg mass) A. Fermaud, Franco-American Seedling Co., Angers, France; C. Klijn & Co., Boskoop, Holland.  
*Rhabdophaga salicis* Schrank galls on tying willows (1 shipment). Oudyk Bros., Boskoop, Holland.  
Rose scale on manetti (1 shipment). A. Fermaud, Franco-American Seedling Co., Angers, France.  
Woolly aphid on apple (2 shipments). Andre Choplin, Maze, France; A. Fermaud, Franco-American Seedling Co., Angers, France.

## PLANT DISEASES

- Crown gall on pear (1 shipment). A. Fermaud, Franco-American Seedling Co., Angers, France.

## INSPECTION OF APIARIES IN 1926

In 1926, as for several years past, the apiary inspection work has been done by Messrs. H. W. Coley of Westport and A. W. Yates of Hartford, on a *per diem* basis. Mr. Coley covers the southern half of the State (Fairfield, New Haven, Middlesex, and New London Counties), and Mr. Yates the northern half (Litchfield, Hartford, Tolland, and Windham Counties).

This work required a total of 194 man days and the entire cost for the season of 1926 was \$1,918.35. In all, 814 apiaries, containing 7,923 colonies, were inspected in 1926 as against 766 apiaries containing 8,257 colonies in 1925. The apiaries averaged 9.7 colonies each in 1926, and 10.7 each in 1925.

The following table shows the number of apiaries and colonies inspected and the average number of colonies per apiary, as well as the cost per apiary and colony for each year since the inspection work was commenced in 1910:

SEVENTEEN-YEAR RECORD OF APIARY INSPECTION IN CONNECTICUT

Year	No. of Apiaries	No. of Colonies	Average		Average Cost of Inspection Per Colony
			No. Colonies Per Apiary	Per Apiary	
1910	208	1,595	7.6	\$2.40	.28
1911	162	1,571	9.7	1.99	.21
1912	153	1,431	9.3	1.96	.21
1913	189	1,500	7.9	1.63	.21
1914	463	3,882	8.38	1.62	.19
1915	494	4,241	8.58	1.51	.175
1916	467	3,898	8.34	1.61	.19
1917	473	4,506	9.52	1.58	.166
1918	395	3,047	7.8	1.97	.25
1919	723	6,070	11.2	2.45	.29
1920	762	4,797	6.5	2.565	.41
1921	751	6,972	9.2	2.638	.24
1922	797	8,007	10.04	2.60	.257
1923	725	6,802	9.38	2.55	.27
1924	953	8,929	9.4	2.42	.25
1925	766	8,257	10.7	2.45	.22
1926	814	7,923	9.7	2.35	.24

In 1926, apiaries were inspected in 137 towns, as against 118 towns in 1925, and 149 towns in 1924.

Inspections were made in the following 30 towns in 1926 which were not visited in 1925: Fairfield County—Brookfield, Fairfield, Newtown; New Haven County—East Haven, Middlebury, North Branford, Orange; Middlesex County—Middlefield; New London County—Ledyard, North Stonington; Litchfield County—Bridgewater, Kent, New Milford, Roxbury, Washington, Woodbury; Hartford County—Enfield, New Britain, Plainville, Southington; Tolland County—Bolton, Ellington, Somers, Stafford,

Tolland, Union, Vernon, Willington; Windham County—Ashford, Pomfret.

On the other hand, the following 12 towns, where inspections were made in 1925, were not visited by the inspectors in 1926: Shelton in Fairfield County; Cheshire and Seymour in New Haven County; Essex and Saybrook in Middlesex County; Plymouth in Litchfield County; Marlborough, South Windsor and Windsor Locks in Hartford County; Hebron in Tolland County; Chaplin and Thompson in Windham County.

## EUROPEAN FOUL BROOD

This bacterial disease of the young larvae caused by *Bacillus pluton* is known as European foul brood, and is more troublesome in spring and early summer than at other periods of the year. Usually the cell contents are not ropy or gelatinous, and though often with the odor of fermentation, it is not very offensive. The common treatment is to requen the diseased colonies with Italian queens, and to unite two or more weak colonies in order to make them all as strong as possible.

Of the 814 apiaries and 7,923 colonies inspected in 1926, 26 apiaries and 68 colonies were found infested with European foul brood. This is 3.19 per cent of the apiaries and .858 per cent of the whole number of colonies inspected during the season—a somewhat larger percentage of both apiaries and colonies than has been found diseased with European foul brood since 1922.

The following table shows the records regarding European foul brood in Connecticut since the inspection work began in 1910:

RECORD OF EUROPEAN FOUL BROOD

Year	Percentage of Infestation		Year	Percentage of Infestation	
	Apiaries	Colonies		Apiaries	Colonies
1910	75.9	49.7	1919	6.6	1.2
1911	51.8	27.4	1920	4.3	1.5
1912	47.7	23.5	1921	3.91	1.26
1913	44.4	24.5	1922	4.14	.85
1914	32.6	13.9	1923	2.34	.36
1915	26.1	10.3	1924	1.78	.526
1916	18.8	7.05	1925	2.48	.507
1917	16.7	4.86	1926	3.19	.858
1918	9.8	3.3			

During 1926, European foul brood was found only in the following towns: Naugatuck in New Haven County; North Stonington in New London County; Brooklyn, Killingly, Plainfield and Putnam in Windham County; Coventry in Tolland County; Canton and New Britain in Hartford County; Harwinton, Kent, Roxbury, Thomaston and Winchester in Litchfield County. None was found in Fairfield or Middlesex Counties, as was the case in 1925.



## AMERICAN FOUL BROOD

This is also a bacterial disease of the larvae, and is caused by *Bacillus larvae*, but it attacks the brood at a later stage of its development than does the disease called European foul brood. It usually shows when the larvae are mature and pupating after the cells are sealed. The diseased cells are shrunk, and if broken open, the contents have a peculiar ropy or stringy consistency and give off a very offensive odor. The treatment has been to shake the colonies into clean hives, destroy the infected combs, and disinfect the old hives. Now it is feasible to sterilize the diseased combs by soaking them in an alcohol-formalin solution containing 20 per cent of formalin, after which they may safely be used.

Of the 814 apiaries and 7,923 colonies inspected in 1926, 14 apiaries and 23 colonies were found diseased with American foul brood. This is 1.72 per cent of the apiaries and .29 per cent of the whole number of colonies inspected in 1926. This is a smaller percentage of both apiaries and colonies than was found in 1925.

The following table gives a complete record regarding American foul brood since apiary inspection was initiated in Connecticut in 1910:

RECORD OF AMERICAN FOUL BROOD

Year	Percentage of Infestation Apiaries	Colonies	Year	Percentage of Infestation Apiaries	Colonies
1910	0	0	1919	3.	1.1
1911	0	0	1920	1.18	.25
1912	0	0	1921	2.5	.56
1913	0	0	1922	1.38	.27
1914	1.07	.7	1923	.965	.323
1915	.8	.18	1924	1.04	.22
1916	1.07	.15	1925	3.26	.424
1917	.42	.17	1926	1.72	.29
1918	1.01	.32			

During 1926, American foul brood was found in the following towns: Greenwich and Stamford in Fairfield County; Madison and Middlebury in New Haven County; Bozrah, Ledyard and Norwich in New London County; Litchfield and Watertown in Litchfield County; Suffield in Hartford County; Andover in Tolland County.

## SACBROOD

Sacbrood or pickled brood is a disease often mistaken for American or European foul brood. The cause is considered to be a filterable virus. The larvae die about the time the cells are capped and lie on their backs with heads turned upward. The body is swollen and contents watery, but there is no ropiness, and the entire cell contents may easily be removed intact as if enclosed

in a sac. The color is variable, though often light yellow or brown, with head nearly black. The usual treatment is to make strong colonies by uniting the weak ones. In certain rare cases where whole apiaries become infected, new queens should be supplied to all the colonies.

The following table shows the record of sacbrood since apiary inspection in Connecticut started in 1910:

RECORD OF SACBROOD

Year	Percentage of Infestation Apiaries	Colonies	Year	Percentage of Infestation Apiaries	Colonies
1910	0	0	1919	1.24	.19
1911	..	.51	1920	1.18	.229
1912	..	Several	1921	1.06	.157
1913	..	2.8	1922	1.37	.187
1914	2.59	.721	1923	.53	.086
1915	2.02	.47	1924	1.78	.52
1916	.428	.051	1925	3.39	.836
1917	1.48	.199	1926	1.1	.138
1918	.253	.032			

## STATISTICS OF INSPECTION

The statistics of apiary inspection by towns and counties may be found in the following pages, with summary on page 198:

INSPECTION OF APIARIES, 1926

Town	Apiaries		Colonies		Foul Brood		
	Inspected	Diseased	Inspected	Diseased	American	European	Sacbrood
Fairfield County:							
Bethel .....	6	1	63	1	0	0	1
Brookfield .....	2	0	68	0	0	0	0
Danbury .....	5	0	80	0	0	0	0
Darien .....	4	0	49	0	0	0	0
Easton .....	4	0	99	0	0	0	0
Fairfield .....	6	0	93	0	0	0	0
Greenwich ....	14	1	128	1	1	0	0
New Canaan ..	6	1	76	1	0	0	1
Newtown .....	5	0	112	0	0	0	0
Norwalk .....	7	1	91	1	0	0	1
Redding .....	2	0	8	0	0	0	0
Ridgefield .....	6	0	61	0	0	0	0
Stamford .....	15	1	201	1	1	0	0
Westport .....	1	0	8	0	0	0	0
Wilton .....	8	0	170	0	0	0	0
	91	5	1,307	5	2	0	3

## New Haven County:

Beacon Falls ..	2	0	52	0	0	0	0
Branford .....	3	0	25	0	0	0	0
Derby .....	3	0	17	0	0	0	0
East Haven ...	2	0	13	0	0	0	0
Guilford .....	2	0	23	0	0	0	0
Madison .....	2	1	26	3	3	0	0

Town	Apiaries		Colonies		Foul Brood		
	Inspected	Diseased	Inspected	Diseased	American	European	Sacbrood
New Haven County—cont.							
Meriden .....	7	0	137	0	0	0	0
Middlebury ...	3	1	31	1	1	0	0
Naugatuck ....	4	1	45	2	0	2	0
North Branford	1	0	26	0	0	0	0
North Haven ..	5	1	43	2	0	0	2
Orange .....	2	0	8	0	0	0	0
Prospect .....	5	1	35	1	0	0	1
Wallingford ...	14	1	101	1	0	0	1
Waterbury ....	4	0	28	0	0	0	0
	59	6	610	10	4	2	4

## Middlesex County:

Chester .....	4	0	39	0	0	0	0
Clinton .....	4	1	60	2	0	0	2
Cromwell .....	3	0	22	0	0	0	0
Durham .....	5	0	103	0	0	0	0
East Haddam ..	7	0	230	0	0	0	0
East Hampton... 12	0	0	167	0	0	0	0
Haddam .....	3	0	67	0	0	0	0
Killingworth ..	2	0	9	0	0	0	0
Middlefield ....	3	0	58	0	0	0	0
Middletown ...	5	0	61	0	0	0	0
Old Saybrook... 2	0	0	20	0	0	0	0
Portland .....	5	0	35	0	0	0	0
Westbrook ....	2	1	4	1	0	0	1
	57	2	875	3	0	0	3

## New London County:

Bozrah .....	3	2	109	4	3	0	1
Colchester ....	6	0	44	0	0	0	0
East Lyme ....	2	0	55	0	0	0	0
Franklin .....	1	0	24	0	0	0	0
Griswold .....	4	0	92	0	0	0	0
Groton .....	4	0	48	0	0	0	0
Lebanon .....	10	0	129	0	0	0	0
Ledyard .....	3	1	30	1	1	0	0
Lisbon .....	2	0	30	0	0	0	0
Lyme .....	1	0	42	0	0	0	0
Montville ....	3	0	29	0	0	0	0
North Stonington	4	1	47	1	0	1	0
Norwich .....	11	1	464	1	1	0	0
Old Lyme .....	4	0	67	0	0	0	0
Preston .....	2	0	22	0	0	0	0
Salem .....	2	0	24	0	0	0	0
Sprague .....	1	0	12	0	0	0	0
Stonington ....	5	0	58	0	0	0	0
Voluntown ....	2	0	15	0	0	0	0
Waterford ....	2	0	52	0	0	0	0
	72	5	1,393	7	5	1	1

## Litchfield County:

Barkhamsted ..	3	1	22	1	1	0	0
Bethlehem .....	10	0	33	0	0	0	0
Bridgewater ...	5	0	92	0	0	0	0

Town	Apiaries		Colonies		Foul Brood		
	Inspected	Diseased	Inspected	Diseased	American	European	Sacbrood
Litchfield County—cont.							
Canaan .....	1	0	6	0	0	0	0
Colebrook .....	6	0	35	0	0	0	0
Cornwall .....	11	0	76	0	0	0	0
Goshen .....	5	0	41	0	0	0	0
Harwinton ....	6	2	25	4	0	4	0
Kent .....	6	1	57	4	0	4	0
Litchfield .....	14	2	172	6	6	0	0
Morris .....	5	0	12	0	0	0	0
New Hartford..	5	0	20	0	0	0	0
New Milford ..	14	0	121	0	0	0	0
Norfolk .....	2	0	11	0	0	0	0
North Canaan..	2	0	61	0	0	0	0
Roxbury .....	3	1	16	1	0	1	0
Salisbury .....	6	0	24	0	0	0	0
Sharon .....	5	0	87	0	0	0	0
Thomaston ....	2	1	14	1	0	1	0
Torrington ....	9	0	85	0	0	0	0
Washington ...	8	0	137	0	0	0	0
Watertown ....	14	1	47	1	1	0	0
Winchester ....	8	1	52	1	0	1	0
Woodbury ....	6	0	76	0	0	0	0
	156	10	1,322	19	8	11	0

## Hartford County:

Avon .....	3	0	22	0	0	0	0
Berlin .....	10	0	153	0	0	0	0
Bloomfield ....	2	0	45	0	0	0	0
Bristol .....	14	0	75	0	0	0	0
Burlington ....	6	0	25	0	0	0	0
Canton .....	12	1	56	2	0	2	0
East Granby ...	5	0	25	0	0	0	0
East Hartford..	6	0	33	0	0	0	0
East Windsor ..	6	0	12	0	0	0	0
Enfield .....	8	0	45	0	0	0	0
Farmington ...	12	0	41	0	0	0	0
Glastonbury ...	16	0	152	0	0	0	0
Granby .....	5	0	58	0	0	0	0
Hartford .....	5	0	24	0	0	0	0
Hartland .....	2	0	28	0	0	0	0
Manchester ...	12	0	84	0	0	0	0
New Britain ...	13	2	103	7	0	7	0
Newington ....	9	0	47	0	0	0	0
Plainville ....	3	0	12	0	0	0	0
Rocky Hill ....	6	0	38	0	0	0	0
Simsbury .....	6	0	40	0	0	0	0
Southington ...	14	0	46	0	0	0	0
Suffield .....	14	1	80	3	3	0	0
West Hartford	8	0	84	0	0	0	0
Wethersfield ..	5	0	30	0	0	0	0
Windsor .....	11	0	58	0	0	0	0
	213	4	1,416	12	3	9	0

## Tolland County:

Andover .....	4	1	17	1	1	0	0
Bolton .....	1	0	6	0	0	0	0



Town	Apiaries		Colonies		Foul Brood		
	Inspected	Diseased	Inspected	Diseased	American	European	Sacbrood
Tolland County—cont.							
Columbia .....	3	0	16	0	0	0	0
Coventry .....	16	1	98	2	0	2	0
Ellington .....	10	0	35	0	0	0	0
Mansfield .....	4	0	31	0	0	0	0
Somers .....	3	0	6	0	0	0	0
Stafford .....	13	0	29	0	0	0	0
Tolland .....	4	0	38	0	0	0	0
Union .....	3	0	8	0	0	0	0
Vernon .....	6	2	39	2	0	2	0
Willington .....	14	0	56	0	0	0	0
	81	4	379	5	1	4	0

Windham County:							
Ashford .....	2	0	13	0	0	0	0
Brooklyn .....	2	1	134	10	0	10	0
Canterbury .....	6	0	41	0	0	0	0
Hampton .....	3	0	55	0	0	0	0
Killingly .....	12	2	55	2	0	2	0
Plainfield .....	22	7	100	18	0	18	0
Pomfret .....	9	0	55	0	0	0	0
Putnam .....	5	2	39	11	0	11	0
Scotland .....	6	0	24	0	0	0	0
Sterling .....	6	0	17	0	0	0	0
Windham .....	8	0	57	0	0	0	0
Woodstock .....	4	0	31	0	0	0	0
	85	12	621	41	0	41	0

## SUMMARY

County	No. Towns	Apiaries		Colonies		Foul Brood		
		Inspected	Diseased	Inspected	Diseased	American	European	Sacbrood
Fairfield ...	15	91	5	1,307	5	2	0	3
New Haven ..	15	59	6	610	10	4	2	4
Middlesex ..	13	57	2	875	3	0	0	3
New London ..	20	72	5	1,393	7	5	1	1
Litchfield ..	24	156	10	1,322	19	8	11	0
Hartford ..	26	213	4	1,416	12	3	9	0
Tolland ....	12	81	4	379	5	1	4	0
Windham ..	12	85	12	621	41	0	41	0
	137	814	48	7,923	102	23	68	11

## No. Apiaries No. Colonies

Inspected .....	814	7,923
Infested with European foul brood .....	26	68
Per cent infested .....	3.19	.858
Infested with American foul brood .....	14	23
Per cent infested .....	1.72	.29
Infested with sacbrood .....	9	11
Average number of colonies per apiary ...		9.73
Cost of inspection .....		\$1,918.35
Average cost per apiary .....		2.35
Average cost per colony .....		.24

## GIPSY MOTH WORK IN CONNECTICUT IN 1926

By W. E. BRITTON AND JOHN T. ASHWORTH

The work has been continued in about the same manner as during the past few years, and is carried on co-operatively—by the State and the Federal Bureau of Entomology. As in former years the Federal forces, being interested particularly in preventing the further spread of the pest, have taken over the scouting of the territory along the boundary of the infested area, and the State forces, for the most part, have worked back from the margin in the territory known to be infested. We here express our thanks and appreciation to Messrs. A. F. Burgess and H. L. Blaisdell, in charge of Federal gipsy moth work, in acknowledgment of many courtesies and of their hearty co-operation.

Perhaps the outstanding features of the work during the season were the discovery of an infestation in Greenwich, near the boundary of New York State, and of another rather large one in Woodstock, both of which it is believed can be handled without unusual difficulty.

## PRESENT EQUIPMENT

At present the force consists of 48 men, eleven of whom are rated as foremen, and work as eight scouting crews. The work is supervised by Messrs. Ashworth and McEvoy. During the season for spraying, in May and June, as many men as are needed are detailed to operate the spray outfits.

The present motor vehicle equipment consists of one Buick six-cylinder touring car, one Dodge four-cylinder touring car, eight Ford light delivery trucks, and two Netco trucks fitted with Fitzhenry-Guptill power sprayer outfits.

A horse-drawn power sprayer purchased many years ago is still available for use if needed. About 3,150 feet of one-inch high-pressure spray hose and 150 feet of suction hose are also on hand.

The storehouse rented on North Main Street, Danielson, is fitted with rented gasoline tank and pump, and is well equipped with small tools, Ford parts, tires and tubes, so that most of the repair work can be done by our own men.

## FINANCIAL STATEMENT

## RECEIPTS

Appropriation for biennial period ending June 30, 1927 ..... \$100,000.00

## CLASSIFIED EXPENDITURES FOR THE YEAR ENDING JUNE 30, 1926

Salaries and Wages .....	\$45,868.97
Printing and Illustrations .....	70.44
Postage .....	21.26

Stationery and Office Supplies .....	\$ 41.01	
Telegraph and Telephone .....	91.15	
Insurance .....	805.80	
Spraying Supplies .....	58.78	
Machinery, Tools and Supplies .....	227.44	
Express, Freight and Cartage .....	5.56	
Automobiles: Rental and Storage .....	586.80	
Repairs and Supplies .....	4,711.38	
Traveling Expenses .....	377.36	
Heat and Light .....	183.94	
Inspection of Imported Nursery Stock .....	54.32	
Miscellaneous .....	21.35	
Balance .....		\$53,125.56
		40,874.44
		<hr/> \$100,000.00

#### DETAILS OF WORK BY COUNTIES AND TOWNS

The following pages give a detailed account of the scouting, spraying, and other control measures in towns. All egg-clusters found were treated with creosote to prevent hatching. The statistics are given in the tables beginning on page 212 and are summarized on page 215.

#### WINDHAM COUNTY

All the work in Windham County this year was done by men being trained, and both State and Federal men were taught different phases of the work in the towns named below. Conditions as to degree of infestation were found to be about the same as in the previous two or three years; it will be noted that in other years this section of the State has been the most heavily infested. Following is a detailed report of the work done in the towns of Windham County:

##### Brooklyn—11 Infestations—943 Egg-clusters

From the large number of egg-clusters found, Brooklyn would seem to be badly infested, but of this total, 790 egg-clusters were in two colonies. The largest one was in oak and birch growth on land owned by B. Marott, on the south slope of Allen Hill, where 700 egg-clusters were found; the other colony of 90 egg-clusters was on a maple tree on land owned by Edward Caffery, on the west side of Church Street. The other colonies were all small and not considered dangerous. The scouting in this town was done by Federal men, and the spraying by State men, nine of the eleven colonies being sprayed.

##### Eastford—59 Infestations—1,407 Egg-clusters

Eastford was one of the towns used for training men and was only about two-thirds covered, the work being confined to the northern portion of the town or the territory north of Phoenix-

ville. Three colonies were discovered, each of which contained more than 100 egg-clusters, but all were small in area. The largest had 194 egg-clusters, and was on an oak tree on land owned by J. B. Tatum, just north of the Eastford Post Office; another of 117 egg-clusters was on apple and elm trees owned by Mrs. Andert, about one mile east of the Cemetery. The third colony contained 113 egg-clusters, and was on four oaks owned by Mr. King on the same road and one-fourth of a mile farther east than the colony last mentioned. Twenty-nine of the infestations were sprayed during the summer by State men.

##### Hampton—6 Infestations—437 Egg-clusters

About thirty-four miles of roadside work were covered in the town of Hampton by State men being trained for this work. Two large colonies were discovered, one of 317 egg-clusters in woodland owned by Messrs. Smith and Stahkne, in the southeast corner of the town near the Canterbury line, and the other in apple trees in pasture owned by Mr. McLaughlin, in the south-central part of the town, near the Scotland line. The other four colonies were small, twenty egg-clusters being the largest, on fifteen white oaks owned by J. L. Goodwin, on the western border of the town just north of the State road. Three of the six colonies were found close together in this vicinity. Two of the six were sprayed by State men.

##### Killingly—56 Infestations—3,856 Egg-clusters

Killingly was used as a training school by Federal men, and several large colonies were discovered while scouting the town. At two of the places over 300 egg-clusters each were found, both colonies being on oak trees. The largest was on property owned by Mrs. Kanes, in the Goodyear district, where 350 egg-clusters were found and treated. The other colony was on land owned by Mr. Clark in South Killingly, containing 347 egg-clusters. The next largest was a colony of 217 egg-clusters scattered in woodland owned by A. A. Tillinghast, in the southeast corner of the town near what is known as the "Line Store" district; another colony of 167 egg-clusters was found on oak trees and in a stone wall on property owned by William Davis, near the "Old Furnace." These colonies were the largest, but several other colonies were found, ranging from thirty-five to fifty egg-clusters each, and scattered through all parts of the town. Thirty-five of the worst colonies were sprayed with arsenate of lead by State men.



## Plainfield—6 Infestations—653 Egg-clusters

In scouting Plainfield, Federal men discovered two large colonies; one of 312 egg-clusters on oaks in a pasture owned by H. B. Brown, on the west slope of "Black Hill" near the Canterbury line, and the other in "Ekonk Hill" district, where 120 egg-clusters were found. All six of the colonies were in the southern half of the town. Several single egg-clusters were discovered in the northern half of the town, but no colonies. Four of the six colonies were sprayed by State men.

## Putnam—30 Infestations—863 Egg-clusters

One colony of 144 egg-clusters and one of 78 egg-clusters were the two largest colonies found in Putnam. Both were on oaks, near the Windham County Children's Home. That of 144 egg-clusters was on land owned by A. Paquin, and that of 78 egg-clusters was on the property of the Home. A colony of 48 egg-clusters was found in oaks owned by A. Tourtellotte on Putnam Heights, and another colony of 48 egg-clusters was found in an oak grove, on the state road leading to Mechanicsville. Scouting in the town was done by Federal men. Twenty-six colonies were sprayed by the State crews.

## Thompson—100 Infestations—7,158 Egg-clusters

Thompson was also used as a school for training men, by the Federal force. Two exceptionally large colonies in woodland were discovered. One containing 1,600 egg-clusters was found on property owned by W. Cassidy near Fabyan village. The other was in woodland owned by the Grosvenordale Company in North Grosvenordale, where 1,500 egg-clusters were found. Several colonies containing about 100 egg-clusters each were discovered. Two colonies of 200 egg-clusters each, and one of 225 egg-clusters were also found, all in oak woodland. Both of the 200 egg-cluster colonies were located in North Grosvenordale, one on land owned by Mr. Keegan, the other on land owned by the Grosvenordale Company. The 225 egg-cluster colony was on land owned by C. Cassidy near Fabyan. Thompson continues to be the most heavily infested town in the State, but it is very gratifying to know that the Tachinid parasites have become established and their work was noted this year. In the summer, spraying was done at 72 infestations by State men.

## Woodstock—24 Infestations—5,848 Egg-clusters

In scouting Woodstock, Federal men discovered a colony of 5,000 egg-clusters in willow trees, on land owned by Messrs. Lowe and Ericson, at the south end of Roseland Pond. This was the

largest colony found in the state this year, though it was in low land and can be easily handled. Another colony of 200 egg-clusters was found in oaks in a pasture, about one mile north of the colony just mentioned. The next largest colony contained 150 egg-clusters on a pasture oak, on land owned by John Clark, about one mile northwest of the two colonies mentioned above. These three colonies were the only ones found in Woodstock which we consider of sufficient importance to mention in this report. Seventeen of the 24 colonies were sprayed by State men.

## NEW LONDON COUNTY

All work done in New London County this year was done by State crews, but when this territory was reached it was so late in the season that scouting in some of the towns was not completed until larvae were hatched and crawling. In Groton, Norwich, Old Lyme, and Waterford, scouting was carried on throughout the summer. The following is a summary of the work in this County:

## Colchester—2 Infestations—266 Egg-clusters

The work done in Colchester consisted of scouting around last year's infestations. Two places were reinfested. At the woodland colony owned by Edwin Brown, in the south-central part of the town, 256 egg-clusters were found, and 10 egg-clusters at Nicholas Clement's place, in the extreme southeastern corner of the town. Both colonies were sprayed about the middle of June, nearly 17 acres of woodland being treated.

## Franklin

The work in Franklin this year, as in Colchester, consisted merely in scouting around the old infestations. About five miles of roadside work were covered but no infestations found.

## Groton—9 Infestations—363 Egg-clusters

State men scouted Groton this year during the late spring and early summer. Four moderate-sized colonies were found. One of 123 egg-clusters was on roadside trees on property owned by W. T. Whyman, G. S. Avery, and the Spicer Coal and Ice Company in Groton village; another of 68 egg-clusters was found on apple and cherry trees owned by Mrs. Wagner and B. Porter in West Mystic. The third colony of 65 egg-clusters was on apple trees and in a stone wall on property owned by H. E. Bentley, in Noank village. The fourth colony of 50 egg-clusters was on apple and maple trees owned by the Sea Sled Company in West Mystic. The other five colonies were all small. Three of these places were sprayed in the summer by State men.

## Ledyard—1 Infestation—6 Egg-clusters

Through a lucky accident, an infestation of six egg-clusters was discovered in the town of Ledyard this year. One of the men in the crew scouting in Groton wandered over the line into Ledyard and found this colony, which was sprayed on June 28.

## Norwich—2 Infestations—20 Egg-clusters

Scouting was carried on in Norwich throughout the summer months, and two infestations were found. One of 19 egg-clusters was on willow trees owned by the New England Metal Company on Shipping Street. The other was a single egg-cluster, found on a maple in a yard owned by Thomas Heetman, near the Bozrah town line. The colony first mentioned was sprayed on the 26th and 28th of June.

## Old Lyme

About one-third of the town was scouted and, no trace of the gipsy moth being found, the crew was then transferred to other work in the northeastern corner of the State.

## Waterford

About three-quarters of the town of Waterford was scouted during the late spring and early summer. One single egg-cluster was found in an orchard along the north side of the New London-New Haven State road, just east of Jordan Brook. This crew was moved on July 15th, to take up other work in the northeastern corner of the State.

## TOLLAND COUNTY

The same methods were used in Tolland County as in New London County; that is, scouting was confined to the areas around last year's infestations. This was necessary on account of the lateness in the season and the lack of men and money when this territory was reached. Nothing was found in Andover, Bolton, Coventry, Hebron, and Vernon. Other towns where scouting was done and gipsy moth colonies were found are as follows:

## Columbia—3 Infestations—920 Egg-clusters

Three colonies were found in Columbia, all within an area of approximately one-half square mile. Two were on land owned by D. Topple, one in a stone wall and woodland containing 210 egg-clusters, and another of 35 egg-clusters in an old rail fence and mixed woodland. The third and largest colony was found in apple trees and a stone wall on land owned by Jake Ketsewitz,

where 675 egg-clusters were creosoted. These colonies were situated in the southwestern part of the town, and all three colonies were sprayed by State men.

## Ellington—5 Infestations—25 Egg-clusters

Five small infestations were found in Ellington, the largest containing 21 egg-clusters. This colony was in white oaks in a pasture owned by Frank Gordiza, near the Somers' town line. All the other infestations were single egg-clusters. Spraying was not thought necessary.

## Stafford—10 Infestations—228 Egg-clusters

Stafford was used by the Federal men as a training school and about one-half of the town was scouted. Ten colonies were found, the largest containing 81 egg-clusters, in pasture oaks owned by N. Cumber, about halfway between Orcuttville and Stafford Post Office. Another colony of 37 egg-clusters was found in an oak woodland border owned by J. Michlec, in the southeastern corner of the town near the Union and Willington town lines. The next largest colony was one of 22 egg-clusters in an orchard owned by J. Waytas, in the northeast corner of the town near the Massachusetts line. The other colonies were small. Seven of the ten colonies were sprayed by State men.

## Tolland—1 Infestation—5 Egg-clusters

One colony of five egg-clusters was discovered on white oak trees on land owned by John E. Klough, near the center of the town. This colony was sprayed by State men.

## HARTFORD COUNTY

Work was done in 25 of the 29 towns in Hartford County this year. Following is a summary of the work done in the towns:

## Avon

Avon was scouted by State men but no trace of the gipsy moth found.

## Bloomfield—2 Infestations—11 Egg-clusters

Two small infestations were discovered by State men. One of ten egg-clusters was in a woodland margin owned by George O. Sellew, on the western side of the town, along the State road leading over Simsbury Mountain. The other was a single egg-cluster on oak, on land owned by J. G. Hawley, about one-half mile south of Bloomfield depot. About two acres of woodland were sprayed by Federal men at Mr. Sellew's.



## Bristol

State men scouted approximately fifty miles of roadway in Bristol, and, finding no trace of the gipsy moth, were transferred on May 15 to territory further east.

## Burlington—3 Infestations—52 Egg-clusters

The scouting in Burlington was done by State men and was completed January 12. One colony and two small infestations were found, all three in apple orchards. The colony, containing 49 egg-clusters, was on property owned by Mr. Schuster, situated in the northwestern corner of the town. The other two infestations were small, containing one and three egg-clusters respectively. One hundred and fifty-eight shade and apple trees were sprayed at the colony noted above, by Federal men.

## Canton—4 Infestations—1,342 Egg-clusters

In scouting Canton this year, the State men discovered four large colonies, three in woodland, and one in an apple orchard. The three woodland colonies were all situated in the northern end of the town; one of 1,033 egg-clusters on property owned by H. Smith and W. Freytag; one of 150 egg-clusters, owner unknown; and one of 107 egg-clusters on land owned by Arthur Sweeten. The fourth colony was one of 52 egg-clusters in an apple orchard, owned by L. B. Worth, near the center of the town. All four colonies were sprayed by Federal men.

## East Granby—3 Infestations—42 Egg-clusters

State men scouted East Granby, the work being completed December 11. Thirty-seven of the 42 egg-clusters were on two willow trees and a fence rail, on property owned by Mr. Viets, about a half-mile east of East Granby Post Office.

## East Hartford—3 Infestations—677 Egg-clusters

Three colonies were discovered by State men in East Hartford, all being situated in the southern end of the town. The largest colony was one of 654 egg-clusters, found on apple trees owned by John Penny, near the Glastonbury line. The other two were small colonies, about a mile northeast of the first, on land owned by F. W. Sheafer and H. E. Keeney. All three of these places were sprayed by State men.

## East Windsor

The work in East Windsor this year consisted of scouting around the areas where infestations occurred last year. About fifteen miles of roadway were scouted and no infestations found, all work being done by State men.

## Farmington—1 Infestation—11 Egg-clusters

A state crew scouted about two-thirds of the town and only one colony was found. This contained 11 egg-clusters and was in woodland owned by Roy Barnes, in the northeast corner of the town. This colony was sprayed by Federal men.

## Glastonbury—2 Infestations—2 Egg-clusters

Scouting in Glastonbury was confined to the northern part of the town, in the section near the East Hartford and Manchester town lines. Thirty-eight miles of roadway were scouted and two single egg-cluster infestations were found. No further work was attempted in Glastonbury, as the season of scouting was getting late and the men were needed in other sections of the State.

## Granby—20 Infestations—1932 Egg-clusters

In scouting Granby the State men discovered several large colonies this year. Three of them contained more than 300 egg-clusters each. One colony of 446 egg-clusters and another of 397 egg-clusters were in woodland owned by A. Luprun, and one of 378 egg-clusters in woodland and abandoned orchard owned by Max Shinder. All three of these colonies were situated in the extreme southwestern corner of the town. Another colony of 167 egg-clusters was found in woodland owned by A. R. Carpenter, about two miles west of West Granby Post Office. These four colonies were the largest in the town, the others being small—numbering 25 egg-clusters each. Twelve of the worst colonies were sprayed by Federal men, more than a ton and a quarter of lead arsenate being used.

## Hartford—8 Infestations—1,151 Egg-clusters

Three large colonies were discovered in the City of Hartford by State men. The largest contained 798 egg-clusters, and was on property owned by A. Mather, on Windsor Avenue; the second, of 171 egg-clusters, was on an apple tree and shed owned by Kagan Brothers, on Windsor Avenue; the third, of 118 egg-clusters, was on poplar trees on Whitney Street. Five other small colonies were discovered and six of the eight infestations were sprayed by Federal men.

## Hartland—13 Infestations—360 Egg-clusters

In scouting Hartland, State men discovered 13 infestations distributed over all parts of the town. There were only two colonies of moderate size: one of 120 egg-clusters on old apple trees in woodland owned by William Peck, in the northeast corner of the town, and another of 80 egg-clusters in a stone wall and trees in woodland owned by T. A. Howell, in the northwestern corner of the town. Five infestations were sprayed during the early summer by Federal men.

## New Britain—2 Infestations—121 Egg-clusters

Two infestations were found in New Britain by State men. One of 118 egg-clusters was on land owned by the Polish Orphanage, on North Burritt Street, and the other was on apple and cherry trees owned by Messrs. Dynkowski and Bednan, on High Street. Both were sprayed by Federal men.

## Simsbury—6 Infestations—166 Egg-clusters

Of the six infestations found by State men, only two of them contained more than ten egg-clusters each. One on oaks, at the Ethel Walker School, contained 112 egg-clusters, and the other on roadside trees on town property near Tariffville Post Office, contained 37 egg-clusters. Both of these colonies were sprayed by Federal men.

## Suffield—13 Infestations—122 Egg-clusters

The 13 colonies found by State men were all small, the largest infestation containing 35 egg-clusters. This colony was on five oak trees in a field owned by Henry Sheldon, on the east side of the State road leading from West Suffield to East Granby, near the town line. The next largest was a colony of 19 egg-clusters in a woodland margin owned by Andrew Barrow, about two miles north of West Suffield village. The third largest colony was one of 18 egg-clusters on property owned by Jean Roy, situated about a mile north of West Suffield village. Most of the other infestations found in the town were single egg-clusters. Four infestations were sprayed by Federal men.

## West Hartford—3 Infestations—364 Egg-clusters

State men scouted West Hartford this year and found three infestations, with a total of 364 egg-clusters: 361 were found on 11 willow trees owned by Mrs. J. F. Ryan, in the southern end of the town near the Newington line. All three colonies were within an area of half a square mile. The willow trees were all sprayed by Federal men.

## Windsor—1 Infestation—2 Egg-clusters

State men discovered one infestation of two egg-clusters in the southern part of the town just north of the Fuller Brush Company's land. No further work was thought necessary at this infestation, as the egg-clusters were not broken, and when creosoted there was no danger of spread.

The work done in Newton, South Windsor and Wethersfield consisted of scouting around infested territory of previous years. Although approximately seventy miles of roadway were covered in these three towns, no trace of the gipsy moth was found. The following towns in Hartford County were completely scouted and no gipsy moth egg-clusters found: Manchester, Plainville, Rocky Hill, and Windsor Locks.

## MIDDLESEX COUNTY

The four following towns in Middlesex County were scouted this year by State men and no trace of the gipsy moth was found: Cromwell, Durham, East Hampton and Middlefield.

## NEW HAVEN COUNTY

The three towns of Meriden, Waterbury and Wolcott were scouted by State men, and the rest of the work in this County was done by Federal men. In Waterbury no gipsy moth infestations were discovered. Following is a description of the work done in the other two towns:

## Meriden—2 Infestations—14 Egg-clusters

Both infestations found in Meriden were on street shade trees, one on East Main Street, containing 13 egg-clusters, and the other on Miller Street, of one egg-cluster; 215 trees were sprayed in the vicinity of East Main Street by Federal men.

## Wolcott—3 Infestations—1,016 Egg-clusters

The three infestations found in Wolcott contained 1,016 egg-clusters, one of 997 egg-clusters being found in woodland owned by Thomas Zstko, about a half mile north of Wolcott Post Office; the other two infestations were about a quarter of a mile away. All three places were sprayed by Federal men.

The following towns in New Haven County were scouted by Federal men and no infestations found: Bethany, Cheshire, East Haven, Hamden, Middlebury, Naugatuck, New Haven, Orange, Prospect, Wallingford, and Woodbridge.



## LITCHFIELD COUNTY

Seven towns in Litchfield County were found to be infested; five were scouted by State men, the other two by Federal men. The following is a detailed report of the work done in these seven towns:

## Barkhamsted—10 Infestations—827 Egg-clusters

State men scouted Barkhamsted and found several large colonies, most of which were in woodland. The largest one contained 441 egg-clusters, in woodland owned by Michael Marek, situated about a mile south of Barkhamsted Post Office; the next largest colony was in woodland owned by Charles LeGeyt, in the north central part of the town near the Hartland line, where 34 egg-clusters were found. A cluster of three colonies was found on land owned by A. Malanchuk, about a mile east of the first colony mentioned, 139 egg-clusters being found on this property. Another colony of 90 egg-clusters was found in woodland about a quarter of a mile east of the last-mentioned colony. The other infestations were all small, 12 egg-clusters being the largest. Owing to bad roads and the distance of the infestations from the road, only five places were sprayed by Federal men. The spraying machines were equipped with about a half-mile of hose, but this was insufficient to reach to the colonies from the nearest point where the truck could be driven.

## Colebrook—5 Infestations—28 Egg-clusters

Five small colonies were discovered by State men while scouting Colebrook this year, all of them situated along the western border of the town. One colony of 17 egg-clusters was on land owned by L. J. Phelps, and another of 7 egg-clusters was in woodland owned by G. T. Pentecost. Both of these colonies were sprayed by Federal men.

## Harwinton—1 Infestation—414 Egg-clusters

Harwinton was scouted by State men. One infestation of 414 egg-clusters was found in woodland owned by Charles Delay, near Campville Post Office. This colony was sprayed by Federal men in the summer.

## New Hartford—2 Infestations—117 Egg-clusters

Two large colonies were discovered by State men while scouting New Hartford this year. One of 66 egg-clusters was in a wood margin on property owned by Fred Weingart, near Bakersville

Post Office, and the other, of 51 egg-clusters, was in woodland owned by M. F. Ganon, in the Nepaug district. Both places were sprayed by Federal men in the summer.

## Norfolk—3 Infestations—57 Egg-clusters

Norfolk was scouted by Federal men, and three infestations were found. All three were situated in the northeastern corner of the town and were woodland colonies. The largest, of 34 egg-clusters, was in birch growth, on land owned by Henry Lossin; the next, of 15 egg-clusters, was in birch growth on property owned by Mr. Laitinen; the third and smallest colony contained 8 egg-clusters and was on land owned by the Ansonia Produce Company. Spraying was done at two of these places by Federal men.

## North Canaan—1 Infestation—12 Egg-clusters

Only one infestation was found in North Canaan by Federal men this year. This was a reinfestation of the large colony found on property owned by Charles Rosier, situated in the eastern end of the town near the Norfolk line; 12 egg-clusters were found just outside the territory sprayed last year. Six of the 12 egg-clusters were old and it was not thought necessary to do any spraying.

## Plymouth—1 Infestation—5 Egg-clusters

The State men, while scouting Plymouth, discovered one small colony of 5 egg-clusters, on white oaks and an old rail fence on land owned by Mrs. Tolles, in the southeastern corner of the town, about one mile from the Wolcott town line. This colony was sprayed by Federal men.

Torrington and Winchester were both scouted by State men and nothing found. The following towns were scouted by Federal men and no infestations found: Bethlehem, Bridgewater, Canaan, Cornwall, Goshen, Kent, Litchfield, Morris, New Milford, Roxbury, Salisbury, Sharon, Warren, Washington, Watertown, and Woodbury.

## FAIRFIELD COUNTY

All work in Fairfield County this year was done by Federal men. Ten towns were completely scouted and only one town, Greenwich, was found to be infested.

## Greenwich—I Infestation—328 Egg-clusters

A large colony was found in Greenwich in the extreme southwestern corner, 328 egg-clusters being found and creosoted. This colony was scattered over quite a large area, extending around the dump in that section of the town. There were several property owners, namely, S. Remella, Jos. Santera, Stewart Smart, Thomas Dopson, Thomas Fox and Bria Recio. A large area around this colony was sprayed in the summer in an endeavor to eradicate this colony this year, as the spread of the gipsy moth to this district is considered unnatural. Probably it was brought here by artificial means, as it is over fifty miles from the nearest infestation, which is in Wolcott. The accompanying photographs (Plates I and II) show some of the conditions around the Greenwich infestation.

The other nine towns scouted in Fairfield County were: Brookfield, Darien, New Canaan, New Fairfield, Norwalk, Ridgefield, Sherman, Stamford, and Wilton. No traces of the gipsy moth were found in these towns.

Tabulated statistics covering all towns worked during the year are given on the following pages, with a county summary on page 215:

## STATISTICS OF INFESTATIONS, 1925-1926

Towns	No. Infestations Found	No. Egg-clusters Creosoted	No. Colonies Sprayed	No. Lbs. Poison Used	No. Larvae and Pupae Killed	No. Miles Roadway Scouted
Windham County:						
Brooklyn ..G	11	943	9	200	8	73
Eastford ..	59	1,407	29	1,383	0	48
Hampton ..	6	437	2	175	211	34
Killingly ..G	56	3,856	35	626	1,498	94
Plainfield ..G	6	653	4	100	2,052	94
Putnam ...G	30	863	26	534	325	47
Thompson ..G	100	7,158	72	2,047	292	106
Woodstock G	24	5,848	17	586	527	78
	292	21,165	194	5,651	4,913	574
New London County:						
Colchester ...	2	266	2	875	145	5
Franklin ....	0	0	0	0	0	5
Groton .....	9	363	3	25	907	60
Ledyard ....	1	6	1	25	0	1
Norwich ....	2	20	1	100	84	53
Old Lyme ...	0	0	0	0	0	25
Waterford ..	1	1	0	0	0	69
	15	656	7	1,025	1,136	218

G, work done by Federal men.

Towns	No. Infestations Found	No. Egg-clusters Creosoted	No. Colonies Sprayed	No. Lbs. Poison Used	No. Larvae and Pupae Killed	No. Miles Roadway Scouted
Tolland County:						
Andover ....	0	0	0	0	0	6
Bolton .....	0	0	0	0	0	7
Columbia ....	3	920	3	225	230	2
Coventry ....	0	0	0	0	0	11
Ellington ...	5	25	0	0	114	29
Hebron .....	0	0	0	0	0	13
Stafford ...G	10	228	7	273	746	44
Tolland .....	1	5	1	75	0	17
Vernon .....	0	0	0	0	0	3
	19	1,178	11	573	1,090	132

## Hartford County:

Avon .....	0	0	0	0	0	61
Bloomfield ..	2	11	1	150	6	77
Bristol .....	0	0	0	0	0	50
Burlington ..	3	53	1	250	0	86
Canton .....	4	1,342	4	725	54	73
East Granby ..	3	42	0	0	34	38
East Hartford	3	677	3	225	0	64
East Windsor	0	0	0	0	0	15
Farmington ..	1	11	1	50	0	55
Glastonbury ..	2	2	0	0	0	38
Granby .....	20	1,932	12	2,850	1,106	94
Hartford ....	8	1,151	6	1,512	35	171
Hartland ....	13	380	5	550	149	66
Manchester ..	0	0	0	0	0	88
New Britain ..	2	121	2	125	199	56
Newington ..	0	0	0	0	0	23
Plainville ...	0	0	0	0	0	32
Rocky Hill ...	0	0	0	0	0	32
Simsbury ....	6	166	2	437	3	85
South Windsor	0	0	0	0	0	17
Suffield .....	13	122	4	150	568	85
West Hartford	3	364	1	225	0	100
Wethersfield ..	0	0	0	0	0	28
Windsor ....	1	2	0	0	0	64
Windsor Locks	0	0	0	0	0	32
	84	6,376	42	7,249	2,154	1,530

## Middlesex County:

Cromwell ...	0	0	0	0	0	54
Durham ....	0	0	0	0	0	61
East Hampton	0	0	0	0	0	81
Middlefield ..	0	0	0	0	0	54
	0	0	0	0	0	250

## New Haven County:

Bethany ....G	0	0	0	0	0	62
Cheshire ....G	0	0	0	0	0	93
East Haven...G	0	0	0	0	0	40
Hamden ....G	0	0	0	0	0	105
Meriden ....	2	14	1	275	0	129

G, work done by Federal men.



Towns	No. Infestations Found	No. Egg-clusters Creosoted	No. Colonies Sprayed	No. Lbs. Poison Used	No. Larvae and Pupae Killed	No. Miles Roadway Scouted
New Haven County—cont.						
Middlebury..G	0	0	0	0	0	61
Naugatuck..G	0	0	0	0	0	60
New Haven..G	0	0	0	0	0	187
Orange ....G	0	0	0	0	0	51
Prospect ...G	0	0	0	0	0	41
Wallingford G	0	0	0	0	0	136
Waterbury ..	0	0	0	0	0	125
Wolcott ....	3	1,016	3	275	0	60
Woodbridge G	0	0	0	0	0	54
	5	1,030	4	550	0	1,204

## Litchfield County:

Barkhamsted	10	827	5	1,200	19	99
Bethlehem ..G	0	0	0	0	0	50
Bridgewater G	0	0	0	0	0	50
Canaan .....G	0	0	0	0	0	60
Colebrook ..	5	28	2	200	106	74
Cornwall ...G	0	0	0	0	0	107
Goshen .....G	0	0	0	0	0	99
Harwinton ..	1	414	1	775	0	111
Kent .....G	0	0	0	0	0	92
Litchfield ...G	0	0	0	0	0	140
Morris .....G	0	0	0	0	0	51
New Milford G	0	0	0	0	0	172
New Hartford	2	117	2	200	0	96
Norfolk ....G	3	57	1	50	0	90
North CanaanG	1	6	0	0	0	55
Plymouth ...	1	5	1	100	0	84
Roxbury ...G	0	0	0	0	0	73
Salisbury ...G	0	0	0	0	0	113
Sharon .....G	0	0	0	0	0	143
Torrington ..	0	0	0	0	0	128
Warren ....G	0	0	0	0	0	62
Washington G	0	0	0	0	0	105
Watertown ..G	0	0	0	0	0	87
Winchester ..	0	0	0	0	0	13
Woodbury ..G	0	0	0	0	0	103
	23	1,454	12	2,525	125	2,257

## Fairfield County:

Brookfield ..G	0	0	0	0	0	68
Darien .....G	0	0	0	0	0	49
Greenwich ..G	1	328	1	1,175	0	143
New Canaan G	0	0	0	0	0	71
New FairfieldG	0	0	0	0	0	52
Norwalk ...G	0	0	0	0	0	105
Ridgefield ..G	0	0	0	0	0	95
Sherman ...G	0	0	0	0	0	49
Stamford ...G	0	0	0	0	0	125
Wilton .....G	0	0	0	0	0	75
	1	328	1	1,175	0	832

G, work done by Federal men.

## SUMMARY OF STATISTICS

County	No. Towns Covered	No. Infestations Found	No. Egg-clusters Creosoted	No. Colonies Sprayed	No. Lbs. Poison Used	No. Larvae and Pupae Killed	No. Miles Roadway Scouted
Windham	8	292	21,165	194	5,651	4,913	574
New London	7	15	656	7	1,025	1,136	218
Tolland	9	19	1,178	11	573	1,090	132
Hartford	25	84	6,376	42	7,249	2,154	1,530
Middlesex	4	0	0	0	0	0	250
New Haven	14	5	1,030	4	550	0	1,204
Litchfield	25	23	1,454	12	2,525	125	2,257
Fairfield	10	1	328	1	1,175	0	832
	102	439	32,187	271	18,748	9,418	6,997

## PARASITES

For many years the Federal Bureau of Entomology has had men in various foreign countries where the gipsy moth occurs, and all parasites discovered have been introduced into the United States. Altogether, some three dozen species attacking the gipsy and brown-tail moths have been brought into this country and reared at the Gipsy Moth Parasite Laboratory at Melrose Highlands, Mass. Most of them have been liberated somewhere within the infested area. Some of them have never been recovered, but certain species have withstood our New England winters, and have not only been recovered but have spread some distance from the points where liberated. About a dozen species of parasites of the gipsy and brown-tail moths have apparently become acclimated, and their combined attacks have undoubtedly checked the gipsy moth in many localities. A somewhat detailed account of these parasites was given in the Report of this Station for 1922, pages 314-317, and need not be repeated here. The species and number of individuals of each liberated each year in Connecticut since then have been published in the Reports as follows:

1923, page 265; 1924, page 271; 1925, page 271.

During the period covered by the present Report, only one species (*Anastatus bifasciatus*) was liberated in Connecticut. The number of individuals liberated in each of the towns where placed (a total of 400,000) is given in the following table:

Colebrook .....	5,000
Plymouth .....	2,000
Wolcott .....	9,000
New Britain .....	10,000
New Hartford .....	10,000
Burlington .....	9,000
Harwinton .....	10,000
Canton .....	43,000
Barkhamsted .....	60,000
East Hartford .....	3,000
West Hartford .....	5,000

Bloomfield .....	2,000
Simsbury .....	14,000
Stafford .....	9,000
Killingly .....	21,000
Suffield .....	6,000
Granby .....	82,000
Hartland .....	35,000
Hampton .....	41,000
Eastford .....	24,000
<hr/>	
	400,000

### THE GIPSY MOTH QUARANTINE\*

(Revision Effective September 20, 1926)

From time to time it is necessary to revise the gipsy moth quarantine to meet changing conditions and to bring it into

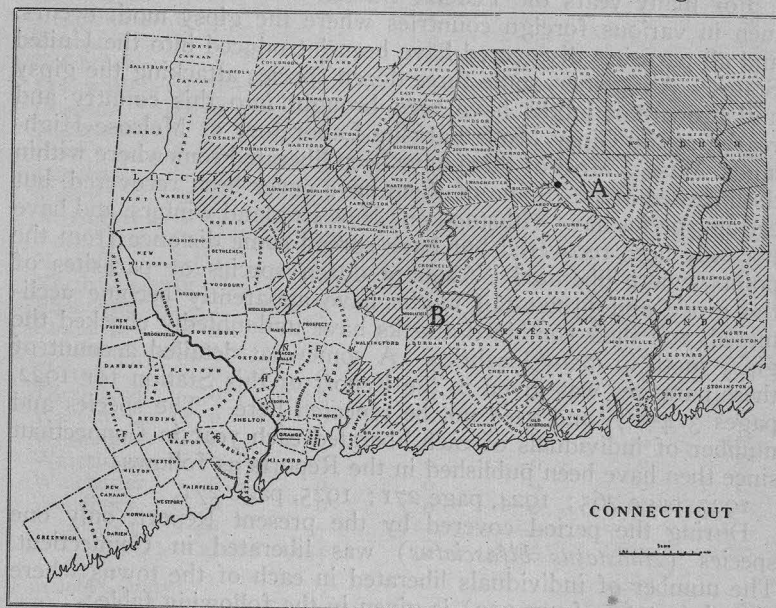


FIG. 1. Map of Connecticut; shaded area quarantined on account of the gipsy moth; (A) Generally infested; (B) Lightly infested.

harmony with the Federal quarantine. The Federal Horticultural Board of the United States Department of Agriculture has recently revised the Federal quarantine relating to the gipsy and brown-tail moths (effective July 1, 1926). The authority for establishing quarantines in Connecticut (Section 2106 of the

\* Published as Bulletin of Immediate Information No. 54, October 1, 1926.

General Statutes) was amended by the last General Assembly, Chapter 107, Public Acts of 1925, so that stone, quarry products, and other materials liable to carry dangerous pests may now be included instead of plant products only.

After due notice, a public hearing was held in Hartford on September 9, 1926, and the subject discussed. There was no opposition expressed. The preceding quarantine order relating to the gipsy moth became effective July 20, 1924. Seven towns then placed under quarantine are now released by the present order, namely: Salisbury, Canaan, North Canaan, Norfolk, Cornwall, Cheshire and Wallingford. The two areas (A) and (B) are shown on the accompanying map, and the quarantine order follows:

### STATE OF CONNECTICUT AGRICULTURAL EXPERIMENT STATION NEW HAVEN, CONN.

#### QUARANTINE ORDER No. 9 CONCERNING GIPSY MOTHS

Inasmuch as it is necessary from time to time to revise the quarantine regulations, to protect the uninfested parts of Connecticut from danger of infestation by the Gipsy Moth, and as the Federal Horticultural Board has made such revision, effective July 1, 1926, and shown on a map published by the United States Department of Agriculture, whereon two areas are designated: (1) a generally infested area, colored red, and (2) a lightly infested area, colored green; by authority given in Chapter 107, Public Acts of 1925, I do hereby proclaim the same areas to be under State quarantine, as follows:

#### GENERALLY INFESTED AREA (A)

##### WINDHAM COUNTY:

All of the fifteen towns as follows:

Ashford	Hampton	Scotland
Brooklyn	Killingly	Sterling
Canterbury	Plainfield	Thompson
Chaplin	Pomfret	Windham
Eastford	Putnam	Woodstock

##### TOLLAND COUNTY:

The ten northernmost towns as follows:

Bolton	Somers	Union
Coventry	Stafford	Vernon
Ellington	Tolland	Willington
Mansfield		

##### HARTFORD COUNTY:

Five towns east of the Connecticut River as follows:

East Hartford	Enfield	South Windsor
East Windsor	Manchester	



## LIGHTLY INFESTED AREA (B)

## NEW LONDON COUNTY:

All of the twenty-one towns as follows:

Bozrah	Ledyard	Old Lyme
Colchester	Lisbon	Preston
East Lyme	Lyme	Salem
Franklin	Montville	Sprague
Griswold	New London	Stonington
Groton	North Stonington	Voluntown
Lebanon	Norwich	Waterford

## MIDDLESEX COUNTY:

All of the fifteen towns as follows:

Chester	East Hampton	Middletown
Clinton	Essex	Old Saybrook
Cromwell	Haddam	Portland
Durham	Killingworth	Saybrook
East Haddam	Middlefield	Westbrook

## NEW HAVEN COUNTY:

Seven towns as follows:

Branford	Meriden	Waterbury
Guilford	North Branford	Wolcott
Madison	North Haven	

## TOLLAND COUNTY:

Three towns as follows:

Andover	Hebron	Columbia
---------	--------	----------

## HARTFORD COUNTY:

Twenty-four towns as follows:

Avon	Glastonbury	Rocky Hill
Berlin	Granby	Simsbury
Bloomfield	Hartford	Southington
Bristol	Hartland	Suffield
Burlington	Marlborough	West Hartford
Canton	New Britain	Wethersfield
East Granby	Newington	Windsor
Farmington	Plainville	Windsor Locks

## LITCHFIELD COUNTY:

Ten towns as follows:

Barkhamsted	Litchfield	Thomaston
Colebrook	New Hartford	Torrington
Goshen	Plymouth	Winchester
Harwinton		

1. It shall therefore be unlawful to remove any woody nursery stock, trees, shrubs, lumber, cordwood, telegraph or telephone poles, railroad ties, Christmas trees, "Christmas greens," tree branches for decoration, or other forest plant products, or stone or quarry products, or any material likely to carry the gipsy moth, from the generally infested to the lightly infested area, or from either infested area to the non-infested area of the State, except under certificates or permits issued by authorized State or Federal inspectors.

2. In view of possible future changes in the lines between the generally infested, lightly infested, and non-infested areas of the State, the areas quarantined by the State shall conform to those quarantined by the Federal Horticultural Board of the United States Department of Agriculture; furthermore, the Federal regulations covering interstate shipments of materials cited in Section 1 are hereby adopted for the regulation of shipments within the State of Connecticut.

3. This order shall take effect from its date.

Dated September 20, 1926.

W. L. SLATE, JR., *Director,*  
*Connecticut Agricultural Experiment Station.*

Approved:

JOHN H. TRUMBULL,  
*Governor.*

It will be seen that the present quarantine involves fewer towns than the preceding quarantine (Quarantine Order No. 6) and that it follows the Federal quarantine in dividing Connecticut territory into two parts (A), generally infested, and (B), lightly infested, these areas being colored red and green respectively on the Federal map. It also differs from Quarantine Order No. 6 in that it includes stone, quarry products, and any other materials liable to carry the gipsy moth.

## MATERIALS AND PRODUCTS REQUIRING INSPECTION

The materials requiring inspection under both Federal and State quarantines may be roughly divided into four classes as follows:

1. **Christmas Greens and Decorations:**—Coniferous trees, such as spruce, hemlock, fir, pine, juniper or red cedar, arbor vitae or white cedar, or foliage thereof, and decorative plants such as holly and laurel or parts thereof known and described as Christmas greens or greenery.

Movement of materials in this class originating in the generally infested area (A) may be moved within the area without inspection, but will not be allowed to points outside of the area. If originating in the lightly infested area (B), they may be moved to other points in the same area or to points in the generally infested area (A) without inspection, but cannot be shipped outside the quarantined area without a Federal certificate or permit.

2. **Nursery Stock:**—Trees, shrubs, vines, cuttings, and florists' stock if woody and field-grown, but not including florists' greenhouse-grown stock or herbaceous plants.

Nursery stock grown within the generally infested area (A) may be moved within the area without inspection, but in order to move it to points within the area lightly infested (B) or to points

outside the quarantine limits it must be accompanied by a certificate of inspection or permit issued by the United States Department of Agriculture. From points in the lightly infested area (B) plants may be moved to other points in the same area or to points in the generally infested area (A) without inspection; to points outside the quarantined area a Federal certificate or permit is necessary. Regular nurseries must hold State inspection certificates or this Federal inspection may be refused.

**3. Forest Products:**—Logs, poles, posts, ties, car stakes, cordwood, lumber, tanbark, etc., but not including square-edged lumber direct from the saw, or lumber direct from the mills and finished on all faces, boxes, shooks, staves, etc., which have not been exposed to infestation by piling or storing out of doors.

Forest products may be moved between points within the generally infested area (A) and from points in the lightly infested area (B) to points within both areas without inspection; but must bear Federal certificates or permits if moved from within the generally infested area (A) into the lightly infested area (B) or from either area to points outside the quarantine limits.

**4. Stone and Quarry Products:**—Field stone, paving, building or monumental stone, etc., brick, tile, drain or sewer pipe.

Such materials may move between points in the same area or from points in the lightly infested area (B) to points in the generally infested area (A) without inspection; but from the generally infested area (A) to points in the lightly infested area (B) or from points in both areas to points outside the quarantine limits, they must be accompanied by Federal certificates or permits.

It is understood that most of these inspections will be made by Federal inspectors, but State inspectors are also qualified to make inspections and issue certificates. Each frequent shipper should procure a Federal map showing these areas in colors, and learn the name, address, and telephone number of the Federal inspector detailed to cover his locality. The Federal inspection service is in charge of

J. N. SUMMERS, 408 Atlantic Avenue, Boston, Mass.

to whom applications for maps and inspections should be made.

The State inspection service is in charge of W. E. BRITTON, Agricultural Experiment Station, New Haven, Conn.

#### BARRIER ZONE

Some three or four years ago it was suggested that for the protection of New York and other states westward a barrier strip or zone be established, in and beyond which the gipsy moth

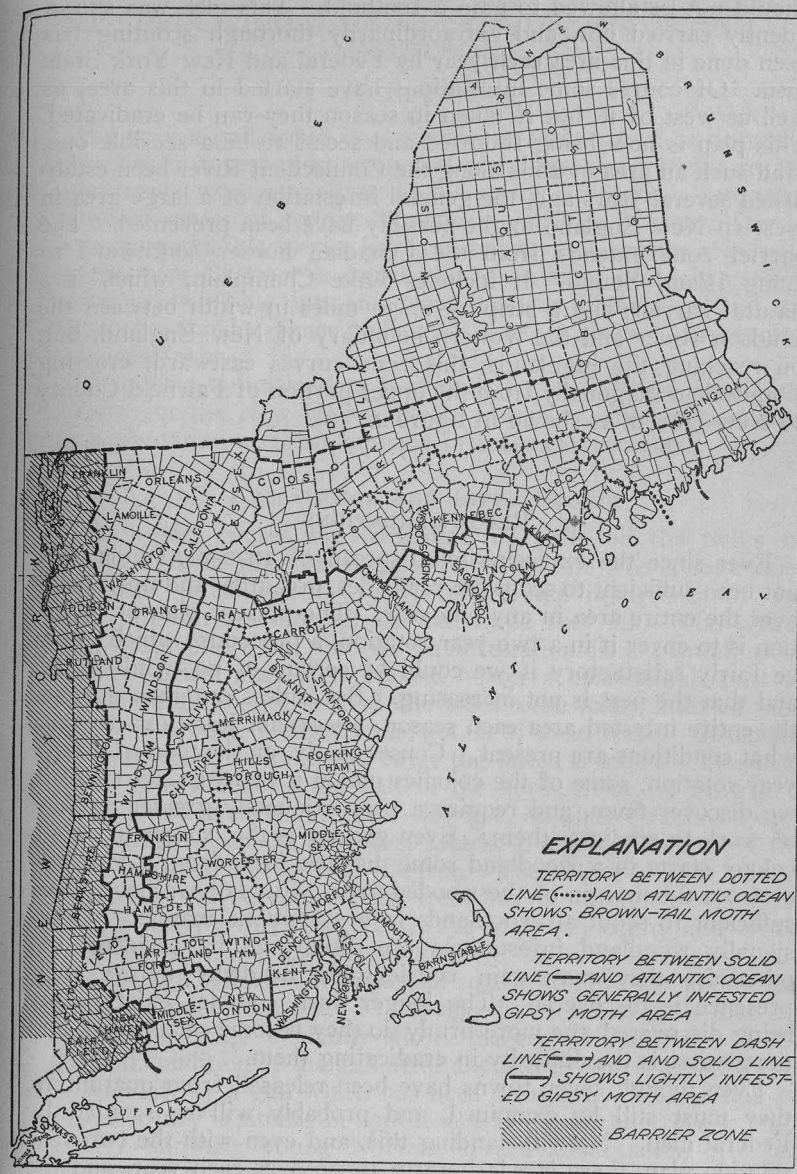


FIG. 2. Map of the New England States showing barrier zone, and generally and lightly infested gipsy moth areas (After Federal Horticultural Board, U. S. Dept. of Agriculture).



should not be allowed to gain a foothold. This idea was subsequently carried out, and extraordinarily thorough scouting has been done in this area each year by Federal and New York State men. Of course some infestations have started in this area, as well as west of it, but if taken in season they can be eradicated. This plan is now being followed and seems to be a sensible one. Had such an area or zone along the Connecticut River been established several years ago, the general infestation of a large area in western New England might possibly have been prevented. The barrier zone extends from the Canadian border southward to Long Island Sound. It includes Lake Champlain, which is a natural barrier, and a strip 25 to 30 miles in width between the Hudson River and the western boundary of New England, but, on reaching the highlands, this zone curves eastward, crossing Connecticut diagonally from the upper portion of Fairfield County to New Haven, as shown in figure 2.

#### RECOMMENDATIONS

Ever since the extensive wind-spread of 1920-21, funds have not been sufficient to scout the roadsides, orchards, and open fields over the entire area in any one year. The present plan of operation is to cover it in a two-year rotation, a procedure which might be fairly satisfactory if we could be certain of no wind-spread, and that the pest is not increasing. But unless our men go over the entire infested area each season, we cannot learn exactly just what conditions are present. Consequently, on the plan of a two-year rotation, some of the colonies obtain a two-year start before we discover them, and require a proportionately greater amount of work to eradicate them. Even greater is the danger in case a colony starts in a woodland some distance back from a highway or from the margin of the wooded area. Funds have never been sufficient to scout all woodlands in a systematic manner. Occasionally woodland infestations are discovered by accident, but otherwise they may gain considerable headway before their presence is discovered. The longer such colonies exist before being discovered, the more firmly do they become established, and the greater is the difficulty in eradicating them.

Even though seven towns have been released from quarantine, they must still be examined, and probably will be scouted by Federal men. Notwithstanding this, and even with the two-year rotation plan, there is a large area to go over each year, and the appropriation of \$100,000 for the biennial period ending June 30, 1927, has not been adequate to do the work necessary to control this pest. We therefore respectfully recommend an appropriation of \$120,000 for the biennial period ending June 30, 1929.

## THE SPRUCE GALL APHID (*Adelges abietis* L.) AND ITS CONTROL

R. B. FRIEND

The spruce gall aphid is sometimes a serious pest in nurseries as well as in forest and ornamental plantings, and for this reason experiments were carried on in the spring of 1926 to determine the effectiveness of certain common insecticides in controlling it. In recent years this species has been known as *Chermes abietis* L., but the term *Chermes* is considered to be more properly used in connection with the jumping plant lice, the Chermidae, and the older name for the spruce gall aphid, *Adelges abietis* L., is coming back into favor.

The writer is indebted to Professor R. C. Hawley, consulting forester for the New Haven Water Company, for permission to use a plantation of this Company in these experiments.

#### APPEARANCE AND LIFE HISTORY

This insect causes the formation of galls on the twigs of spruces, and the number of galls found on one tree is sometimes enormous. Miss Patch (1909) reports the occurrence of 990 fresh galls on a white spruce tree three feet tall. The writer made observations in 1926 on an infestation in a plantation of Norway spruce near New Haven. Over a considerable part of the plantation 30 per cent of the trees were badly infested, and some bore several hundred galls, not all of them fresh. When the gall completely encircles the twig, the latter is killed. The twig always grows beyond the gall in the spring, but its growth is retarded, and in the fall it dies. Twig a, on plate IV, shows such a condition. Leaders are often attacked, and the killing of the leader retards the growth of the tree. The killing of both leaders and laterals may develop bushy trees but on account of the dead twigs, a heavily infested tree always looks unhealthy and weak. If the gall does not completely encircle the twig, the latter may live, although distorted in shape and retarded in growth, and finally slough the gall. On plate IV, b, may be seen two galls that did not kill the twig; c plainly shows the typical distortion of the twig and condition of the gall after about four years, and d shows the scar left by a gall which has been sloughed. The healing of the gall injury is similar in appearance to the healing of a wound. Plate V shows a young Norway spruce about seven feet tall with typical gall injury. The leader and most of the tips of the upper laterals have been killed. In the Norway spruce plantation above referred to, a large number of gall-bearing twigs were examined on five trees taken at random and the per cent of dead

twigs calculated. Of 852 gall-bearing twigs examined, 132 were alive and 720 were dead, a mortality of 84.5 per cent of the twigs infested. This represents a serious condition as regards the growth of the tree and its appearance. In this plantation most of the injury was found on trees under ten feet in height. Where the trees were thickly planted, most of the galls were confined to the upper branches, but in more open planting the galls were on all parts of the tree. The number of fresh galls on a tree sometimes increases with the duration of the infestation until practically every twig is infested. Although many of the trees infested were seriously injured and worthless for any future use, in none of the observed cases had death occurred due to galls alone. Herrick and Tanaka (1926) report the death of spruces in hedges as due mainly to the attack of this aphid.

In the United States the principal hosts are Norway spruce (*Picea excelsa*), and white spruce (*P. canadensis*). Britton (1924) reports the presence of galls on red spruce, black spruce, and occasionally hemlock. The galls found on the Colorado blue spruce are caused by a different species, *Gillettea cooleyi* Gill. This latter species makes a large gall on the tip of the twig, whereas the gall of *Adelges abietis* is smaller and is always at the base of the twig. The habits of the two species also differ in that *Gillettea cooleyi* spends part of its life cycle on the leaves of the Douglas fir but does not form galls on this tree. On plate VI, is shown the form on Douglas fir and that on Colorado blue spruce. On the Sitka spruce this is also a serious pest. Although it is a generation in the life cycle of *Gillettea cooleyi*, the form on Douglas fir is known as *Gillettea cooleyi* var. *coweni* Gill. Control measures are the same as for *Adelges abietis*.

The life history has been worked out by Fernald and Cooley (1898) and by Herrick and Tanaka (1926), and these authors may be consulted for a detailed study. Only those facts bearing on control will be mentioned here. The young wingless females hibernate on the under side of the spruce twigs close to the buds. They are at this time about 0.4 mm. in length and a dark slaty gray in color. The presence of a few white waxy threads secreted by the insect gives it a slightly woolly appearance. The last of April the young females molt and become sexually mature. The woolly appearance becomes accentuated by an increased secretion of white waxy threads which cover the insect and eggs completely. On plate III, a, center, part of the waxy covering has been removed to show the eggs; right view is normal. The period of oviposition seems to coincide with the breaking open of the spruce buds and occurs during the first and second weeks of May. Each female lays about 100-200 eggs, and these hatch in about one week. By this time the young needles have appeared on the twigs, and the newly hatched young crawl to the bases of the new needles

and attach themselves permanently. Although it has been claimed that the gall is started by the feeding of the hibernating female, certainly no gall develops unless the young feed on the needles. The irritation brought about by the feeding of the young causes the bases of the needles to swell until they touch each other. The final result is one continuous gall with the young aphids enclosed in pockets inside. These galls break open in August, and the fully grown nymphs come out and crawl to the needles. They molt once and transform to sexually mature winged females which lay eggs on the needles, about 40-50 eggs per female, and from these in about two weeks the overwintering forms hatch. After wandering about a short time, these hibernating females settle on the twigs for the winter. Plate III, a, at left, shows the young on the twigs, but the photograph does not represent the typical location, for the insects tend to cluster about the bases of the buds. There is a very heavy winter mortality, comparatively a small per cent of the overwintering nymphs surviving. However, the survival of one young female at the base of a bud is sufficient to cause the formation of a gall in the spring. To the best of our knowledge there are no males of this species, all reproduction being parthenogenetic.

### CONTROL

Laboratory tests with various insecticides were made by dipping Norway spruce twigs bearing hibernating nymphs in the insecticide for an instant. The twigs were examined 24 hours later. These tests were carried on the last week in March, 1926, and the results are indicated in the following table:

LABORATORY TESTS		
Insecticide	Dilution	Per cent dead
Carbolic acid emulsion .....	1-15	96
	1-20	100
	1-25	100
Kerosene emulsion .....	1-25	100
	1-30	100
	1-35	100
Nicotine sulphate (40%) .....	1-800 (+ soap)	100
Scalecide .....	1-30	100
Sunoco .....	1-25	100
	1-30	100
	1-35	100
Volck (80% oil) .....	1-25	100
Whale oil soap .....	1 lb. in 10 gals.	96
	1 " " 7.5 "	100
	1 " " 5 "	100
Check—water .....		none
Check—no treatment .....		none



The nicotine sulphate contained enough whale oil soap to make 0.5% of the weight of the diluted material. Three to five twigs were used in each trial, each bearing 10-25 live aphids.

On the basis of these tests, field spraying experiments were made on Norway spruce trees during the first part of April, 1926. The trees were from three to eight feet high and were all heavily infested with galls. Three trees were sprayed with each insecticide. Six days after the first application the trees were examined, and some of the treatments were apparently not as effective as was desired. Stronger sprays of the same material were then applied to one or two of the three trees previously treated and to one additional tree not previously treated. The sprayed trees thus fall into three groups: (1) receiving one application of the weaker spray; (2) receiving two applications, one of the weaker, and one of the stronger spray; (3) receiving one application of the stronger spray. Six trees were kept untreated as controls. The trees were all examined at intervals for nine months after spraying, and no injury to foliage was detected that could be attributed to the insecticide. Not all the materials tested in the laboratory were applied in the field. The following table gives those that were used.

FIELD APPLICATIONS				Galls
Insecticide	Dilution	Applied	Trees	developed
Carbolic acid emulsion..	1-20	April 3	2	22
	{ 1-20	" 3 }	1	none
	{ 1-20	" 16 }		
	1-20	" 16	1	12
Nicotine sulphate (Black Leaf 40) .....	1-800 + 0.5% soap	" 3	2	75
	{ 1-800 + 0.5% "	" 3 }	1	3
	{ 1-500 + 0.7% "	" 16 }		
	1-500 + 0.7% "	" 16	1	none
Scalecide .....	1-30	" 3	1	none
	{ 1-30	" 3 }	2	none
	{ 1-30	" 16 }		
	1-30	" 16	1	none
Sunoco oil .....	1-35	" 3	1	30
	{ 1-35	" 3 }	2	none
	{ 1-25	" 16 }		
	1-25	" 16	1	none
Whale oil soap .....	1 lb. in 8 gals.	" 3	1	none
	{ 1 lb. " 8 "	" 3 }	2	1
	{ 1 lb. " 5 "	" 16 }		
	1 lb. " 5 "	" 16	1	none
Control trees .....	No treatment			100-200 per tree

The number of infested twigs per tree was not determined before the sprays were applied, so no percentages are given as regards control. The carbolic acid emulsion gave indefinite

results. The three galls found on the tree receiving two applications of nicotine sulphate, and the one gall found on the tree receiving two applications of whale oil soap were probably due to missing the twigs in the spraying operation. The soap was added to the nicotine sulphate to act as a spreader, and the amount given is per cent of the diluted spray as applied. Nicotine sulphate diluted 1 to 500, Scalecide diluted 1 to 30, and Sunoco oil diluted 1 to 25 gave excellent results with one application. Other miscible oils and oil emulsions would probably give just as good control if diluted to the same relative strength. If spruce mites are present on the trees, the miscible oils are preferable, as they control mites as well as aphids.

Dr. Garman of this Station sprayed some spruce trees in the same block with lime-sulphur (commercial, testing 32 degrees Baumé) diluted 1 to 16 and 1 to 40. No galls developed on the trees and the foliage was not injured. This insecticide adheres to the foliage for weeks and may be objectionable under some conditions for this reason. The trees were sprayed April 3. The 1 to 40 strength was just as effective as the 1 to 16.

The trees must be sprayed while dormant in order to obtain good results. If the trees are sprayed after the buds open, not only is there danger of foliage injury, but at this time the aphids are covered by a very thick coat of waxy threads which protects them from the insecticide. It is useless to spray after the galls are formed. The spray should be applied between the first of November and the middle of April, and the twigs must be thoroughly covered, especially on the under side. One good application of the insecticide will keep the trees free of galls for the season.

#### EXPERIMENTS OF OTHER WORKERS

For the detailed results of other workers in spraying for this aphid, the bibliography may be consulted. Fernald and Cooley (1898) recommend whale oil soap at the rate of 1 pound in 2 gallons of water. Herrick (1925) recommends miscible oils diluted 1 to 20, or powdered lime-sulphur at the rate of 16.5 pounds in 50 gallons of water, and Herrick and Tanaka (1926) obtained good results with lime-sulphur (32° Baumé) diluted 1 to 8. Britton (1924) states that spring or fall applications of miscible oils diluted 1 to 20 are effective and have caused no foliage injury when used several successive seasons. Bourne (1926) obtained excellent control with an oil emulsion (Volck) diluted 1 to 25, and with miscible oils diluted 1 to 25. These insecticides were used at slightly greater strengths than those used by the writer, and no injury to the trees resulted. However, for several reasons, the weakest *effective* spray is the best and should be used.

## RECOMMENDATIONS

For the control of this insect it is recommended that the trees be sprayed *while dormant*, preferably during the first two weeks of April, with any one of the following materials:

Miscible oils diluted 1-25.

Whale-oil soap 1 pound in 8 gallons of water.

Nicotine sulphate, containing 40 per cent nicotine, diluted 1-500 plus soap (enough to make 0.5 per cent, by weight of the diluted spray):

Commercial lime-sulphur, testing 32 degrees Baumé, diluted 1-40.

The tips of the twigs must be thoroughly covered, particular attention being given to the under side.

## LITERATURE

- Fernald, C. H., and Cooley, R. A., 1898. "The spruce gall-louse." Mass. Agr. Coll. Rept. 34: 1-12.  
 Patch, E. M., 1909. "Chermes of Maine Conifers." Maine Agr. Expt. Sta. Bull. 173: 290-4.  
 Britton, W. E., 1924. 23d Report of the State Entomologist of Connecticut: 240-1.  
 Herrick, G. W., 1925. "Methods of control of two shade tree pests." Jour. Econ. Ent. 18: 630-2.  
 Herrick, G. W., and Tanaka, T., 1926. "The spruce gall-aphid." Cornell Univ. Agr. Expt. Sta. Bull. 454.  
 Bourne, A. I., 1926. "Oil sprays control the spruce gall louse." Mass. Agr. Review, July 15, 1926.

## FURTHER REPORTS ON SPRAYING AND DUSTING OF APPLES

E. M. STODDARD AND M. P. ZAPPE

This is the seventh report we have made on spraying and dusting experiments in Connecticut, and six of these have data on the orchard on which we are reporting this year. Besides the comparison of a complete spraying schedule with a complete dusting schedule, we have continued trials on the most promising combination treatments. These combination treatments have proven quite successful, and are being used in a number of commercial orchards.

The results of previous experiments made by this Station have been reported in the following Station publications: Entomologist's Report 1920, page 168; Bulletin 235; Bulletin 245; Entomologist's Reports for 1923, 1924, and 1925.

## ORCHARD UNDER EXPERIMENT

The orchard of Mr. Frank N. Platt, in Milford on which experiments were started in 1921, was used in 1926. The trees in this orchard are 22 years old, growing in sod, and with nitrate of soda as a fertilizer, and are in good growing condition. The varieties used were Baldwin, Greening, Gravenstein and McIntosh.

## MATERIALS AND APPARATUS USED

The following materials were used in this experiment:

## SPRAY

Dry Lime-sulphur .....	6 pounds
Lead Arsenate .....	3 pounds
Water .....	100 gallons

No nicotine was used in any of the treatments.

## POMODUST

Sulphur .....	90 parts by weight
Lead Arsenate .....	10 " " "

## KOLOTEX DUST

Sulphur .....	85 parts by weight
Lead Arsenate .....	15 " " "

This is a new dust manufactured by the Niagara Sprayer Co., after a new process which produces a very fine dust, which is more economical to use than coarser dust and is said to have excellent sticking qualities.

We have no data on the sticking qualities, but per unit of weight it seemed to cover more area than Pomodust with which it was compared.

A new Sulphur-Lead Arsenate Dust known as Naco Dust, put out by the Nitrate Agencies Co., was tried in a limited way, but not sufficiently to warrant making any comment on its physical properties, or its insecticidal or fungicidal value.

## ARRANGEMENT OF PLOTS

The orchard was divided into seven plots of two rows each running across all the varieties. One of these plots was a spray barrier to prevent dust blowing onto the check plot, and the data were not used in making comparisons.

The arrangement of plots and schedule of treatment are shown in the following table:



	No. 1 Pink May 11	No. 2 Calyx May 27	No. 3 1st after calyx June 9	No. 4 2d after calyx July 1
Plot 1	Spray	Spray	Spray	Spray
Plot 2	Pomodust	Pomodust	Pomodust	Pomodust
Plot 3	Kolotex Dust	Kolotex Dust	Kolotex Dust	Kolotex Dust
Plot 4	Spray	Spray	Pomodust	Pomodust
Plot 5	Spray	Pomodust	Pomodust	Spray
Plot 6	Check	Check	Check	Check
	No treatment	No treatment	No treatment	No treatment

All varieties received the four applications.

#### METHOD OF RECORDING DATA

The data on the results of treatment were taken as in previous years, which in brief consisted of examining all the apples from selected trees in each plot, and recording the several injuries and perfect fruit on a series of tally registers arranged on a board so placed on the sorting table that each person scoring fruit could record his own data. This scoring device is described in detail on page 273 of the Entomologist's Report for 1925. A total of 275,968 apples were scored on the four varieties for all the treatments.

#### RESULTS OF TREATMENT ON MCINTOSH

	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6
	Spray	Pomodust 90-10	Kolotex Dust 85-15	Spray 1, 2 Dust 3, 4	Spray 1, 4 Dust 2, 3	Check
Good .....	82.0	81.06	81.06	81.20	78.55	42.15
Aphis .....	5.44	8.13	11.06	10.62	12.72	12.38
Red bug .....	1.84	1.82	1.70	1.41	2.18	13.21
Codling moth .....	1.50	.32	.07	.04	.01	2.5
Curculio .....	3.68	1.78	1.59	1.38	1.74	23.06
Eulia .....	.5	.85	.79	.68	.58	1.67
Other chewing insects ..	5.91	4.71	3.06	3.81	3.57	6.22
Scab .....	.08	1.04	.35	1.51	1.35	23.99
Sooty blotch .....	0	0	0	0	0	0
Fruit speck .....						

#### DISCUSSION OF RESULTS

It will be noted that all the treatments gave approximately the same percentage of good fruit. Scab infection on the treated plots was a negligible quantity and even on the check the per cent of infection was remarkably low. This was due to the lack of rain in May and a later development of the foliage than usual, so that the young leaves matured during a period of scant rainfall and low humidity. Judging from a series of experiments designed to show when infection occurred there was only one period of two days, May 14 and 15, when there was any appreciable amount of infection.

#### RESULTS OF TREATMENT ON GREENING

	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6
	Spray	Pomodust 90-10	Kolotex Dust 85-15	Spray 1, 2 Dust 3, 4	Spray 1, 4 Dust 2, 3	Check
Good .....	83.56	82.1	79.68	87.86	78.58	5.99
Aphis .....	10.73	9.67	12.96	4.2	10.57	12.94
Red bug .....	.38	.47	.15	.19	.21	11.3
Codling moth .....	.26	.1	.12	.12	.21	4.49
Curculio .....	2.47	2.06	2.22	2.12	3.3	60.68
Eulia .....	1.85	2.72	2.00	2.45	3.17	11.5
Other chewing insects ..	1.37	2.3	1.41	2.16	3.07	5.99
Scab .....	.08	.07	0	.09	.09	2.8
Sooty blotch .....	.20	.58	1.11	.23	.38	22.65
Fruit speck .....	.05	.28	.84	.4	.42	20.29

#### DISCUSSION OF RESULTS

With this variety we note a difference in the value of the treatments judging by the per cent of good fruit. In Plot 4 the higher per cent of perfect fruit is explained by the marked decrease in aphid infection which is unaccounted for, as there were no control treatments for aphid used. In Plot 5 the decrease of good fruit is due to a slight increase in curculio, Eulia and other chewing insects. All treatments showed good control of red bug, which must have been due to repellent action of the materials, as no nicotine was used. This variety showed more Eulia damage than did the other varieties; also sooty blotch, fruit speck and curculio showed higher percentages of injury on the check plot, but were well controlled on all the treated plots.

#### RESULTS OF TREATMENT ON GRAVENSTEIN

	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6
	Spray	Pomodust 90-10	Kolotex Dust 85-15	Spray 1, 2 Dust 3, 4	Spray 1, 4 Dust 2, 3	Check
Good .....	80.1	79.4	70.84	86.42	77.3	17.67
Aphis .....	15.96	15.07	21.78	10.06	18.31	35.55
Red bug .....	1.22	.96	.78	1.0	.99	13.85
Codling moth .....	.12	.12	.07	.14	.04	1.97
Curculio .....	1.32	2.03	4.49	.74	1.61	48.58
Eulia .....	.49	.96	.71	.46	.75	1.61
Other chewing insects ..	1.26	1.74	1.72	.10	1.47	8.87
Scab .....	.08	.31	.27	.15	.24	2.41
Sooty blotch .....	.04	.37	.09	.52	.16	.4
Fruit speck .....	0	0	0	0	0	0

## DISCUSSION OF RESULTS

Plot 4 showed an appreciably higher per cent of good fruit which can be accounted for by reduction of the damage by curculio and other chewing insects and a decrease in aphid injury. This variety had the heaviest infestation of aphid of any of the varieties on both treated and untreated plots, a usual and expected condition.

## RESULT OF TREATMENT ON BALDWIN

	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6
	Spray	Pomodust 90-10	Kolotex Dust 85-15	Spray 1, 2 Dust 3, 4	Spray 1, 4 Dust 2, 3	Check
Good .....	87.38	88.43	95.89	90.94	87.3	14.12
Aphis .....	9.98	3.87	4.2	4.38	5.99	4.66
Red bug .....	.74	.16	.09	.08	.16	2.66
Codling moth .....	.26	.27	.23	.14	.09	4.3
Curculio .....	.88	2.63	1.49	1.15	1.57	48.84
Eulia .....	.42	1.5	1.05	.9	1.84	4.06
Other chewing insects ..	.94	3.44	2.28	2.58	3.39	41.15
Scab .....	0	0	0	0	0	0
Sooty blotch .....	0	0	0	0	0	8.66
Fruit speck .....	0	0	0	0	0	

On this variety the treatments on Plots 3 and 4 gave the highest per cent of good fruit which was mostly due to the lesser amount of aphid infestation. It will be noted that spraying controlled codling moth, Eulia and other chewing insects better than any other treatment. Scab was not present on this variety at all, and fruit speck and sooty blotch occurred only on the check plot. We do not account for the very high percentage of injury by other chewing insects on the check plot, and the insect causing this injury was not determined. It evidently occurred early in the season and may have been caused by canker worms.

## SUMMARY AND COMMENT

As a method of comparison of the relative value of the different treatments we present the following table. In this table the varieties are arranged opposite the several injuries under the treatment which gave the best control, and in the case of good fruit under the treatment giving the highest percentage, e. g., our data show that curculio was best controlled on Baldwin by spraying, this being indicated in the table by the letter B under "Spray" and opposite "Curculio." If several treatments gave the same control the variety is listed under each one.

	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
Good .....	M		B	G Gr	
Aphis .....	M	B		G Gr	
Red bug .....			G Gr	B M	
Codling moth .....		Gr			B G M
Curculio .....	B	Gr		G M	
Eulia .....	B M Gr			G	
Other chewing insects	B Gr		M	G	
Scab .....	B G M	B	B Gr	B	B
Sooty blotch .....	B G M Gr	B M	B M	B M	B M
Fruit speck .....	B G M Gr	B G M	B G M	B G M	B G M
Total score .....	19	9	11	16	9

B—Baldwin. M—McIntosh. G—Gravenstein. Gr—Greening.

From this comparison we find spraying to have three points more to its credit than its nearest competitor, which was the combination treatment on Plot 4. This result tallies with the results obtained in 1925 and further confirms our belief that spraying is necessary, in the early treatments at least, to ensure a high per cent of perfect fruit. The failure of the combination on Plot 4 was due to lack of control of sooty blotch and fruit speck on Greening and Gravenstein, and this we believe is its weak point and would necessitate the substitution of spraying for the last dust treatment in a year of abundant rainfall in the latter part of the summer. Dusting did not give as good results compared with spraying as it did in 1925, which seems to be accounted for by lack of control of curculio, Eulia and other chewing insects.

It will be noted that only four treatments were given this year, the pre-pink and last summer treatment being omitted on all varieties. The pre-pink was deemed unnecessary on the McIntosh because of the dry weather prevailing at the time it would have ordinarily been applied. There did not seem to be any real need of the last summer treatment as weather conditions did not presage a serious infection of sooty blotch and fruit speck. A scarcity of insects made treatment for their control unnecessary. This forecast proved correct except in the case of Greenings, where a light infection of sooty blotch and fruit speck developed following eight days of rain in August, which infection might have been controlled by an extra treatment in the early part of August. Other than this our data do not show that there was lack of control of any pest more than is normally expected.

Among the insect pests curculios and aphid caused the largest amount of damage, but the curculios were well controlled by all treatments, and the aphid did no real damage except on Gravenstein, and perhaps here they were a blessing in disguise, as the trees were so heavily set with fruit that the 15-20 per cent of aphid apples took the place of thinning which the trees did not have.



## ACKNOWLEDGMENTS

The writers are indebted to Mr. Frank N. Platt for the use of the orchard, power sprayer and assistance in conducting the experiments, also to Messrs. B. H. Walden, J. L. Rogers, and A. D. McDonnell who assisted in scoring the fruit at harvest time. We also wish to acknowledge the assistance rendered by Dr. Florence A. McCormick in examining scab material.

## WORK WITH THE ORIENTAL PEACH MOTH IN 1926

PHILIP GARMAN

1. **Distribution.** The present distribution of the Oriental peach moth in Connecticut remains much the same as reported two years ago except for the fact that the population seems to be increasing in density in Fairfield and New Haven Counties. An infestation of considerable severity was observed on the Massachusetts line, and it has been reported from nurseries in the vicinity of Storrs. Outside the State the pest has now been reported from New York, New Jersey, Delaware, Maryland, Virginia, Pennsylvania, North and South Carolina, Florida, Alabama, Texas, Arkansas, Missouri, Georgia, Tennessee, Ohio, Indiana, and perhaps others. It has also been found in Ontario, Canada. So far it seems to be most destructive in New Jersey and Pennsylvania, although word has been received that the Canadian infestation is very severe. It seems probable, therefore, that the insect may extend its range northward in the eastern United States as far as peaches are grown.

2. **Life History Studies.** Three broods were evident this year, and there was no sign of a fourth as in 1925. Bait-pan records indicate three distinct periods of maximum abundance corresponding in general with life history studies made in the insectary. Four field cages placed over individual trees were maintained, and these also indicated a three-brooded condition for 1926. An interesting point in connection with field cage records is the increased length of time occupied by the later generations even if started from a few individuals placed in a cage on a given date early in the summer. Thus, in our cages where adults were liberated early in June or July, adults were continually present from the first week in August until the tenth of September. Records from bait pans indicate that moths are present in the orchard until the latter part of September, which means an even longer period of activity than occurred in field cages. For the last brood it appears that their flight extends from about the fifth of August until about September 25, and reaches its maximum abundance near the first of September.

3. **Control Studies.** Through the courtesy of the Barnes Nursery & Orchard Company of Wallingford, Conn., several plots of Elberta were made available for control studies. Bait pans were used as a means of control, the material employed as bait being diluted molasses (1 part in 20 parts water). The pans were refilled once a month and fresh molasses added about once a week. Pails of the sort used (two-quart tin pails) require almost constant attention to be kept in working order, since they dry out rapidly in dry weather, fill up and run over in wet weather, become choked with other species of moths during certain periods of fermentation, and if not fastened to a rigid part of the tree, will spill over with a slight wind. In addition to actual work in the orchard, a three-gallon enameled pail was provided with bait and hung in the center of one of our field cages. Eleven moths were then liberated in this cage. None were caught in the pail and the twigs and fruit became generally infested with larvae. Later two smaller pails were hung in the same tree, but placed higher than the large enameled pail just described. These pails caught a number of moths, but by no means all of them, and many eggs were laid within a few feet of the pails.

It seems difficult to reconcile these facts with field experience where large numbers of moths are caught daily, but the only choice we have is to reason that the total Oriental peach moth population in an orchard is very great, and that relatively few are caught by the pail method. However, should any degree of control be obtained in orchard practice, it would certainly be encouraging. Our results are shown in Table I and indicate no advantage from the use of pails over plots without pails. A decided change in our present methods of bait-pan control, therefore, seems to be desirable. It also appears that workers in Pennsylvania and New Jersey have not obtained satisfactory control, so we are still much at sea regarding control of the Oriental peach moth by this means.

In addition to bait-pan work, two plots were sprayed with special preparations consisting of (1) lime-fluoride-sulphur-casein, and (2) lime-lead-arsenate-sulphur-casein mixture followed by a thorough spray of nicotine sulphate in August. A continuous coating was maintained on the fruit from June until late in August, but in spite of this coat no substantial increase in sound fruit was obtained. The main part of the infestation seems to have come after August 25, or after much of the spray had disappeared from the fruit and foliage. Herein, it seems to me, lies one of the greatest difficulties in controlling the Oriental peach moth, at least by means of any known sprays.

It was noticed this year that there was much less of an infestation on the same trees than last year. What caused this reduction can only be surmised, but there are several things which undoubt-

edly helped bring it about. Cultivation and parasitism were important factors. A third, perhaps much less important, may be found in the cool, rainy period during the time when the third brood was at its height. Our score indicated 10% to 20% less wormy fruit than was encountered last year, which shows that certain agencies were at work reducing the number of insects in the orchard.

#### PARASITES

The parasite *Trichogramma minuta* Riley was obtained from eggs of the Oriental peach moth at New Haven. A considerable number of eggs laid on quinces near the laboratory were found with parasites, but only one adult specimen was obtained. They were seen in August and September.

TABLE I. RECORD OF FIELD TREATMENTS FOR CONTROL OF THE ORIENTAL PEACH MOTH

		PICKED FRUIT			
Plot	Treatment	Cut Fruit % Injured	Uncut Fruit % Injured	Total No. Cut Open	No. Examined without Cutting
A	Pail in every tree.....	12.7	7.2	1,024	3,345
B	Pail in every other tree	9.7	5.8	1,370	5,791
C	Check—No pails .....	10.5	5.4	928	4,366
D	Fluoride, Lime, Sulphur, Casein-lime—4 treat- ments .....	16.5	7.0	1,586	7,639
E	Lead Arsenate, Lime, Casein-lime—2 sprays; Lime, Casein-lime—1 spray; Nicotine sul- phate—1 spray .....	22.7	10.4	1,304	6,326
F	Check—Fungicide only	18.6	12.7	1,331	6,295

NOTES.—Eight to ten count trees were selected in each plot and representative samples were examined from each. The variation in percentages of infested cut fruit from different trees is as follows:—(A) 4.9-20.2%, (B) 1.8-14.0%, (C) 3.2-19.6%, (D) 5.9-20.7%, (E) 5.6-34.2%, and (F) 8.2-33.3%. If thinnings are included in the count D and F average nearly the same, while E averages nearly four per cent higher than D and F. No thinnings were made on plots A, B, and C and the number of peaches per tree at picking time was greater than was found on D, E, and F. The plots were laid out so that the prevailing winds blew across them and not from one to another. In the sprayed plot the check (F) formed a figure H, the count trees being located in both uprights and crossbar while the sprayed plots D and E were located between the uprights and on either side of the crossbar. About 50 trees were used in each plot including those with bait pans, the trees being approximately the same size as those used in 1925 and shown in Bull. 275, Pl. VI, a. The spray materials used on D and E con-

sisted of a very large percentage of hydrated lime, 30 pounds per 100 gallons and the trees were fairly whitewashed with it. The original mixture also contained 20 per cent calcium fluoride. No injury could be seen except a slight burn from the early applications on E. D remained throughout the season without any sign of injury either in the form of dropped foliage or bark cankers. Dates of spray applications June 8, July 10, August 2, August 19.

#### NOTES ON THE FEEDING HABITS OF THE ORIENTAL PEACH MOTH WITH SPECIAL REFERENCE TO ARTIFICIAL FOODS

Since the Oriental peach moth larva has not been successfully poisoned by any insecticide in common use to-day, it was thought advisable to study artificial foods upon which the larva might be induced to feed and develop, with a view of incorporating some poison with whatever food might prove acceptable. With this in view, agar was first tried alone and as a medium for various sugars and acids but proved too soft. No combination stiff enough for the purpose could be made. Flour dough was next tried and it was observed immediately that the larvae would feed on this material. Consequently feeding tests were begun, mixing with the dough certain sugars, acids, and other compounds, and the following notes relate to this work. Pure flour dough was found to ferment too rapidly to be of much use, but mixtures containing citric and malic acid were more permanent, although even here the material became moldy, and it is probable that some of the difficulty encountered in carrying the larvae through a number of instars was due to this factor. It was noted in the course of the work that larvae would not feed much until they had dug into the food and had spun a thin web over the point of entrance. There was some difficulty at first in determining whether the larvae actually fed upon the materials offered, but it was soon found that the color of the excretory pellets is quite different when the insect is fed artificial food than when fed upon natural foods. It is also fairly easy to distinguish excrement from pellets taken in the mouth and then laid aside before beginning to feed. Plate XVI, b, shows a larval tunnel in one of the artificial mixtures described.

It will be seen from the following notes that while the insects did not develop naturally on any of the foods, in several cases they passed through complete instars and survived for as much as three weeks on the artificial media. Probably the most successful mixture used was No. 10, containing two acids and two sugars, but it may be possible to simplify and improve this so that still greater development will be apparent. Some success will be noted with several other combinations, but none of them is completely satisfactory in promoting growth in the Oriental peach moth larva.



- (1) July 27. A mixture of flour, water, casein and malic acid (5%); four larvae used; all entered in 24 hours.

- (2) July 28. Flour ..... 50 gm.  
Casein ..... 5 gm.  
Water ..... 35 cc.

Two larvae used; both entered and fed; a mixture of 50 gm. flour and 35 cc. water was also fed to three larvae.

- (3) July 29. Flour ..... 50 gm.  
Malic acid ..... 5 gm.  
Amygdalin ..... 1 gm.  
Water ..... 35 cc.

The material was divided and larvae placed as follows: (1) two nearly full grown and one half grown, one larva spun July 30; (2) one two-thirds grown, three recently hatched; (3) one nearly full grown; (4) one about two-thirds grown and one very young—all larvae entered and fed inside of five hours.

- (4) August 7. Flour ..... 50 gm.  
Malic acid ..... 2 gm.  
Cane sugar ..... 5 gm.  
Peach leaf juice<sup>1</sup> ..... 35 cc.

The material was divided as follows: (1) two half grown larvae were used but both were lost August 13; (2) two larvae, one of which was nearly mature; one of these spun August 16.

- (5) August 17. Flour ..... 50 gm.  
Dextrose ..... 10 gm.  
Malic acid ..... 1 gm.  
Peach leaf juice<sup>1</sup> ..... 35 cc.

Three larvae were used. On August 18 two were found feeding and continued alive until August 23, when two larvae spun; one became sick on August 27 and was removed. One adult emerged September 9 and one September 12.

- (6) August 24. Flour ..... 50 gm.  
Dextrose ..... 10 gm.  
Citric acid ..... 1 gm.  
Malic acid ..... 1 gm.  
Water ..... 38 cc.

One larva about two-thirds grown was introduced and fed readily on the material; continued alive until September 1 and spun on this date.

- (7) August 24. Flour ..... 50 gm.  
Dextrose ..... 10 gm.  
Citric acid ..... 1 gm.  
Malic acid ..... 1 gm.  
Dried peach leaf extract ..... 38 cc.

Two larvae 5 to 7 mm. long were used; still alive August 30 and apparently nearly ready to spin September 2; lost after this day but a cast head capsule was found August 30 among the frass of the mixture.

<sup>1</sup> Peach leaves macerated in water.

- (8) September 1. Flour ..... 50 gm.  
Citric acid ..... 1 gm.  
Malic acid ..... 1 gm.  
Cane sugar ..... 10 gm.  
Water ..... 38 cc.

One larva used—width of head September 1, .33 mm.; molted September 3, width of head as near as could be determined .44 mm.; still alive September 9 but sick and stopped feeding.

- (9) September 3. Flour ..... 50 gm.  
Cane sugar ..... 10 gm.  
(Certo) pectin ..... 40 cc.

Two larvae used in separate containers but neither of them fed.

- (10) September 9. Flour ..... 50 gm.  
Citric acid ..... 1 gm.  
Malic acid ..... 1 gm.  
Dextrose ..... 5 gm.  
Amygdalin ..... 5 gm.  
Water ..... 38 cc.

One larva used; width of head capsule .66 mm.; O. K. September 18; molted September 23; size of head capsule .77-.8 mm.; still O. K. September 29; molted October 4, head .99 mm. wide—observed shortly after molt on October 4; died about a week later.

- (11) September 9. Flour ..... 50 gm.  
Citric acid ..... 1 gm.  
Malic acid ..... 1 gm.  
Dextrose ..... 10 gm.  
Benzaldehyde (1 drop  
in 100 cc.) ..... 38 cc.

One larva, head .66 mm. wide, was used; still alive on September 14 but not seen after that day.

- (12) September 28. Flour ..... 50 gm.  
Citric acid ..... 1 gm.  
Malic acid ..... 1 gm.  
Water ..... 38 cc.

One larva with head .5 mm. wide, length 5-6 mm.; molted September 30; still alive October 22 when head capsule measured .88 mm. in width; this was evidently the last instar, was considerably undersize, but pink in color.

## EUROPEAN CORN BORER CLEAN-UP WORK IN 1926

W. E. BRITTON AND M. P. ZAPPE

The fall work in cleaning up the 1925 European corn borer infestations was suspended late in December on account of inclement weather, and was described in the Report of this Station for 1925, page 303. The remaining clean-up work was done in the spring of 1926 and was all in the towns of Stonington and Groton, where 5,091 gallons of furnace oil were used in burning, and 97 man days of labor expended.

Corn stalks and weeds lose much of their moisture during the

winter months and consequently burn more readily in spring, and require much less oil per acre. Where there is considerable work to be done, however, it is hardly safe to leave it all until spring, because the season then comes on with a rush, labor is in greater demand, and the work may not be finished. It seems best, therefore, to do some of the burning in the fall, even if more difficult, and it precludes the possibility of infested material being scattered during the winter.

#### INFESTATIONS DISCOVERED IN 1926

During the summer of 1926, Federal men scouted all of the shore towns of Connecticut, and also the towns of North Stonington, Ledyard, Montville, Essex, North Branford, North Haven, Hamden, Orange, Woodbridge, and New Canaan. As a result of this scouting, one infestation was found near Woodmont in the town of Milford, and several others in the towns of East Lyme, Waterford, New London, Groton, and Stonington. A second scouting was given around all infestations, but no borers could be found in Old Saybrook or Bridgeport, which were infested in 1925, though both places were scouted twice. Certain portions of Groton and Stonington infested in 1925 were not found infested in 1926.

#### MILFORD

The infestation in Milford was discovered in a five-acre field of sweet corn near the house of the owner, Mr. J. R. Quirk, in the eastern or Woodmont section of the town. In all, only four borers were found. Three were found at the time of the first examination, August 27, and another was found on September 7, when the field was rescouted. Altogether 257 fields, or about 472 acres of corn were scouted in the town of Milford.

Late in November, all corn stalks, weeds and trash in the infested field, and also in a two-acre field close by, and all weeds and trash around both fields were burned by State and Federal men working together. About 1,800 gallons of furnace oil were used, and the labor amounted to 45 man days.

#### EAST LYME

Corn borer infestations were found in East Lyme in 1923 and 1924, but none in 1925. Those of 1923 and 1924 were perhaps two miles apart. In 1926, six separate infestations were found, having a total of 28 borers. Four of these infestations were in small adjoining gardens, one on the Morton farm only a stone's throw away, and the sixth was in a two-acre field of corn about two miles to the eastward beside the State road and with no other

corn fields or weed areas near it. All these infestations are in or near the village of Niantic.

Clean-up burning work was started at the Morton farm, December 1, by State and Federal men. The small back-yard gardens were also completed on December 3, and the sixth or last infestation in the town was burned on December 4, but on account of a snowfall followed by more snow, it was necessary to postpone all further clean-up efforts until the spring of 1927. The work already accomplished in East Lyme required 49 man days, 2,373 gallons of oil were used, and about 12 acres of corn fields and weed areas were burned over. Only a small amount of work will be necessary to finish cleaning up the infestations in this town.

#### WATERFORD

For the first time the town of Waterford was found infested by the European corn borer in 1926. Four separate infestations occur in the southwestern or Millstone section of the town. Three of them are on one farm, and the fourth is in a small garden about a quarter of a mile away. Altogether 37 borers were found. Clean-up operations will involve burning some fairly large fields of corn and adjacent weed areas.

#### NEW LONDON

In 1925, a corn field of about one-half acre on Park Street, owned by Mr. J. J. Higgins, was found infested, and all corn, weeds and trash on it were burned, and similar treatment was given six other small gardens in the neighborhood. In 1926, eleven borers were found in corn on the same field at Mr. Higgins'. A second infestation was discovered in the rear of the Pequot Colony Dairy Farm, on Montauk Avenue, where a bottling plant is maintained in a residential section. Three borers were found here, and it will be necessary to burn over a large field of weeds in the spring clean-up.

#### GROTON

The European corn borer has been found in Groton each year since 1923. Though burning has been the clean-up method practiced each year, 50 borers were found in 1926, one in the borough of Groton, and the others in the village of Noank, where the infestation was rather general last year. In fact, all infested yards in Noank may be considered as belonging to one rather large infestation. Considerable clean-up work will be necessary here in the spring. Last year three infestations were found in Groton in the village of Mystic, but this year no borers could be found there.



## STONINGTON

In 1926, a total of 36 European corn borers was found in eight separate infestations in Stonington. With one exception, all were in small back yard gardens in the eastern portion of the village of Mystic, where infestations were found in 1925. The other infestation is situated on the farm of James E. Lord, on Lord's Hill at Quiambog, where two borers were found, and where a small infestation occurred in 1925. Control measures will begin in the spring as soon as weather conditions permit. In 1925, infestations occurred near Old Mystic and Lower Pawcatuck, but no borers could be found at these places in 1926.

It is interesting to note that in certain cases isolated infestations in several towns have apparently been completely eradicated, as no borers could be found in the vicinity the following year. In certain other cases similar infestations have not been eradicated, and this is particularly true where borers occurred in several adjoining yards in Mystic and Noank. Here the householders often clean up their back yards by dumping corn stalks, weeds and rubbish into the water. This is a poor practice, as it leaves the material on the shore or it may be washed away by the tides and other infestations started. In one case in Noank, the clean-up men had to fish the wet material out of the water and place it upon the shore above high-water mark to let it dry for a few days before it could be burned.

The following table shows the results of scouting by the Federal men, to whom we are greatly indebted for their help and co-operation:

SUMMARY OF SCOUTING FOR EUROPEAN CORN BORER, 1926

County	No. Acres Corn Scouted	No. Fields Scouted	No. Man Days	No. Borers Found
New London .....	1,335	1,815	287	165
Middlesex .....	517	1,168	62.5	0
New Haven .....	1,687	1,324	166.5	4
Fairfield .....	866	1,208	104	0
Total .....	4,405	5,515	620	169

## FEDERAL CORN BORER QUARANTINE

Since preparing this Report for publication, a Federal quarantine has been placed upon the towns of East Lyme, Waterford, New London, Groton, and Stonington, on account of the European corn borer. This quarantine became effective March 1, 1927, and the quarantined area is shown in figure 3. Evidently this area is connected through Rhode Island with the large infestation in eastern New England, but we expect that clean-up measures will

be taken wherever infestations are found, in the hope that the spread of the pest may be materially retarded by such means.

The quarantine restrictions provide that corn on the ear and broom corn (including all parts of the stalk), sorghums, sudan grass, celery, green beans in the pod, beets with tops, rhubarb, oat and rye straw as such or when used as packing, cut flowers or entire plants of chrysanthemum, aster, cosmos, zinnia, hollyhock, and cut flowers or entire plants of gladiolus and dahlia,

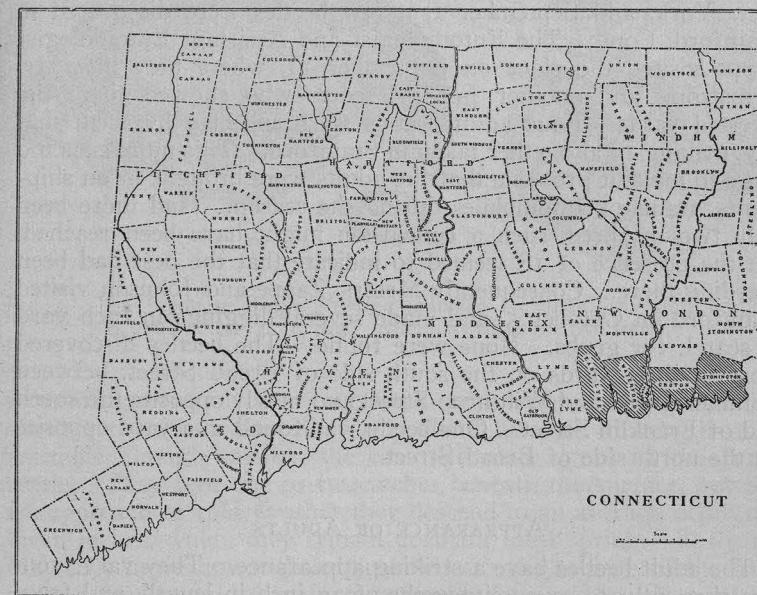


FIG. 3. Map of Connecticut; shaded area shows towns now under Federal quarantine on account of European corn borer.

except the bulbs or tubers thereof without stems, cannot be shipped interstate without inspection and certification by a Federal inspector.

Corn on the ear may be shipped within the infested area but will not be inspected and certified for shipment outside of such area. Shelled corn for seed will be examined and certified.

It is understood that a Federal inspector will soon be placed at New London or some other convenient point to take care of inspections within the quarantined area in Connecticut.

It is probable that a State quarantine will soon be placed upon this same area, to prevent the transportation of the pest in infested material to other points within the state of Connecticut.

## THE JAPANESE BEETLE IN CONNECTICUT

The Japanese beetle, *Popillia japonica* Newman, was first discovered in America at Riverton, New Jersey, in 1916, and notwithstanding the enforcement of State and Federal quarantines and various other suppressive measures, it has continued to spread until it now covers a large area, including most of the states of New Jersey, northern Delaware, eastern Pennsylvania, the western end of Long Island, a portion of Westchester County, New York, and September 1, a few beetles were discovered in Stamford, Conn. The Entomologist and Assistant Entomologist Zappe visited the place on September 14, where they met Mr. Armstrong and another Federal scout, who showed them the infested yards. Four adult beetles were collected by them that day, making 18 altogether taken in Stamford. This number is too large to make it probable that the adults were brought in on shipments, trains or automobiles during the season. Had there been only two or three, such a conclusion might have been reached, but the presence of 18 seemed to indicate that the pest had been breeding there. Consequently Messrs. Zappe and Johnson visited Stamford on October 5, and made several diggings in each yard in search for grubs. None were found. The beetles discovered were in three yards on the south side of Broad Street, between Summer Street and Winthrop Street and nearly opposite the south end of Franklin Street. One beetle was found in a yard opposite on the north side of Broad Street.

### APPEARANCE OF ADULTS

The adult beetles have a striking appearance. They vary from five-sixteenths to seven-sixteenths of an inch in length, and from three-sixteenths to nine thirty-seconds in width, or an average of three-eighths in length and one-fourth in width. The upper surfaces of head, thorax, abdomen and legs are bright and shining metallic green, with wing-covers duller and coppery-brown. The wing-covers do not project to the end of the abdomen, which shows five lateral spots on each side and two posterior spots composed of white hairs, as is shown in figure 4 and plate XIII, a. The under surface generally, including legs, is dark metallic green, and the body bears short gray hairs.

### LIFE HISTORY

The Japanese beetle has an annual life cycle, and the adults begin to emerge about the middle of June and are usually present until the middle of October, though the period of greatest abundance extends only to about the middle of August. The females

each deposit in the soil between forty and fifty eggs, usually at the rate of four or five per day. The eggs are white, elliptical in shape, about one-sixteenth of an inch long and two-thirds as thick. They are laid separately between two and four inches beneath the surface and hatch in about two weeks. The tiny grubs are at first only one-sixteenth of an inch long, but they feed upon the

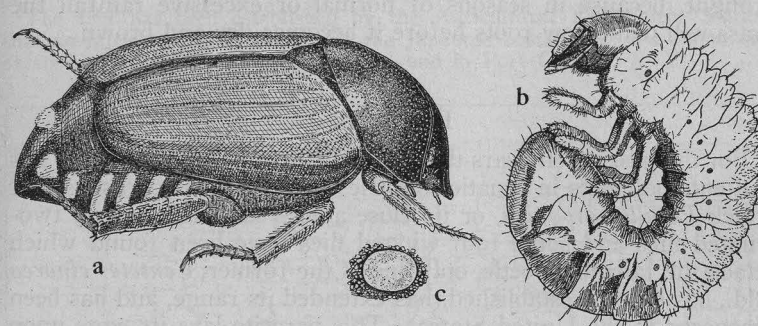


FIG. 4. The Japanese Beetle *Popillia japonica* Newman. a, adult beetle; b, grub or larva; c, egg. All enlarged about five times.

roots of grass and other vegetation and become full grown in about six weeks, when they are about an inch in length and resemble, though smaller, the common white grubs of the June beetle. They feed one or two inches beneath the surface, but on the approach of cold weather they descend to an average depth of seven inches, where they remain dormant until spring. Early in May they move upward, and just beneath the surface of the soil resume feeding and transform to pupae late in May or early in June. From two to four weeks later the adults appear.

### HABITS OF THE BEETLE

About two hundred different kinds of plants, including practically all of the economic crops grown in the area, have been recorded as food plants for the Japanese beetle in New Jersey. A preference seems to be shown for apple, sweet cherry, plum, grape, blackberry, clover, soy bean, and corn. Certain shade trees are attacked, especially linden, birch, elm, horse-chestnut, sassafras, willow, and white oak. Among the ornamental shrubs, rose and althea are preferred. Many kinds of flowering plants and weeds are also attacked. Not only do the beetles feed upon the foliage, but they eat the petals of flowers, and cluster and feed upon the fruit of apple and peach trees, as shown on plate XIII, b. As many as 278 have been recorded as clustering upon a single apple.



Shallow cavities are eaten on the surface of fruits, as shown on plate XIII, c. Foliage is not wholly eaten but is skeletonized in much the same manner as by the rose chafer (see plate XIV, a).

The grubs are a serious pest in lawns, golf courses, and pastures, if they are sufficiently abundant. Wherever the infestation does not exceed one hundred larvae per square yard, as a rule no great injury follows. The injury is much more apparent in seasons of drought, because in seasons of normal or excessive rainfall the grass will make new roots before it becomes dry and brown.

#### PARASITES

For the past seven years the Federal Bureau of Entomology has had entomologists in Asiatic countries searching for parasites that attack *Popillia japonica*, or its close allies. Though several two-winged flies and some four-winged flies have been found which attack the Japanese beetle, only one of the former, *Centeter cinerea* Ald., has become established, has extended its range, and has been recovered in the United States. This parasite lays its eggs upon the adult beetle, and the maggots kill their host in about five days.

#### CONTROL MEASURES

The grubs in the soil may be killed by flowing upon the surface a specially prepared emulsion of carbon disulphide as is used against the grubs of the Asiatic beetle, and described on page 260.

The adult beetles may be attracted by certain chemical odors and collected in large numbers. They can then be killed by a spray formed of oleoresin or pyrethrum and a sodium oleate soap which has recently been developed in New Jersey.

Foliage and fruit may be protected by heavy applications of specially prepared arsenical mixtures, one of the most promising of which is a coated lead arsenate.

#### QUARANTINES

A Federal quarantine was placed upon the towns of Stamford and Greenwich, effective October 11, 1926. Though no beetles were found in Greenwich, an infestation was discovered in the adjacent town of Port Chester, N. Y., and in order to quarantine Stamford it was almost necessary to include Greenwich. Based on a public hearing at the Station, October 19, a State quarantine was also placed upon these two towns, becoming effective November 10. The quarantined area is shown in figure 5, and the quarantine order follows:

### STATE OF CONNECTICUT AGRICULTURAL EXPERIMENT STATION NEW HAVEN, CONN.

#### QUARANTINE ORDER No. 11\*

#### JAPANESE BEETLE QUARANTINE

The fact has been established by the Agricultural Experiment Station that an injurious insect known as the Japanese beetle (*Popillia japonica*) exists in the town of Stamford, Conn., and in Port Chester, N. Y.

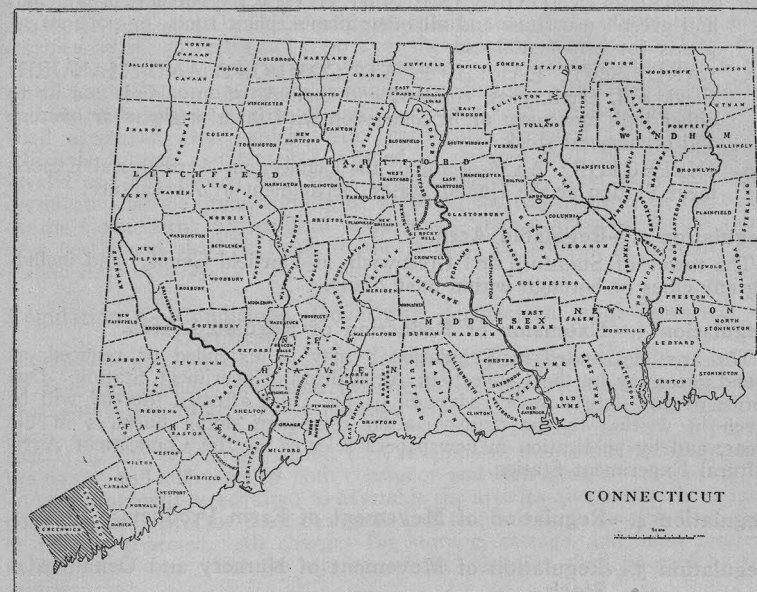


FIG. 5. Map of Connecticut; shaded area shows towns now under State and Federal quarantines on account of the Japanese beetle.

Now, therefore, I, Director of the Connecticut Agricultural Experiment Station, pursuant to the provisions of Chapter 107, Public Acts of 1925, do hereby proclaim the towns of Stamford and Greenwich to be under State quarantine, and that it shall be unlawful to move from these towns to other points within the State (1) farm, garden, and orchard products of all kinds; (2) grain and forage crops of all kinds; (3) nursery, ornamental, and greenhouse stock, and all other plants; and (4) sand, soil, earth, peat, compost, and manure, except under the conditions prescribed in the following rules and regulations supplemental to this quarantine.

\* Published in Bulletin of Immediate Information, No. 56, November 10, 1926.

## RULES AND REGULATIONS

**Regulation 1.—Definitions.**

For the purpose of these regulations, the following words, names and terms shall be construed, respectively, to mean:

1. **JAPANESE BEETLE:** The insect known as the Japanese beetle (*Popillia japonica* Newman) in any stage of its life cycle.
2. **REGULATED AREA:** Those portions of the State quarantined on account of the Japanese beetle and designated as being infested or immediately threatened with such infestation.
3. **FARM PRODUCTS:** Farm, garden and orchard products of all kinds, and grain and forage crops of all kinds.
4. **NURSERY AND ORNAMENTAL STOCK:** Nursery, ornamental and greenhouse stock and all other plants, plant roots, or portions of plants for ornamental use.
5. **SAND, SOIL, EARTH, PEAT, COMPOST AND MANURE:** Sand, soil, earth, peat, compost and manure of any kind, and as to either bulk movement or in connection with farm products or nursery and ornamental stock.
6. **INSPECTOR:** An inspector of the Connecticut Agricultural Experiment Station or the United States Department of Agriculture.

**Regulation 2.—Regulated Area.**

The towns of Stamford and Greenwich, in Fairfield County, and including any cities or borough within their limits.

**Regulation 3.—Extension or Reduction of Regulated Area.**

The area designated in Regulation 2 may be extended or reduced, as found necessary by the Connecticut Agricultural Experiment Station. Due notice of any extension or reduction of the areas affected thereby will be given in writing to the transportation companies doing business in the areas, and by publication in newspapers selected by the Connecticut Agricultural Experiment Station.

**Regulation 4.—Regulation of Movement of Farm Products.****Regulation 5.—Regulation of Movement of Nursery and Ornamental Stock.**

All movement of nursery and ornamental stock from the regulated area to other points outside such area, but within the State, shall be subject to the details of regulation and control indicated in the Appendix of Federal Quarantine No. 48 (Fifth Revision), and shall be permitted only upon full compliance with Regulations 6, 7 and 8 of this order: Provided, that such movement of nursery stock originating within or being transported through the regulated area during the period June 15 to October 15, inclusive, is prohibited to points outside such area within the State, unless protected from possible infestation in a manner or by a method approved by the inspector. All movement of nursery stock within the regulated area shall be subject to the details of regulation and control indicated in the Appendix of Federal Quarantine No. 48 (Fifth Revision).

**Regulation 6.—Regulation of Movement of Sand, Soil, Earth, Peat, Compost and Manure.**

(1) As a condition of certification of sand, soil, earth, peat, compost or manure for shipment both within the regulated area and from the regulated

area to other points within the State, all such movements of such articles shall be subject to the details of regulation and control indicated in the Appendix of Federal Quarantine No. 48 (Fifth Revision).

(2) The movement of any sand, soil, earth, peat, compost and manure originating within, or being transported through the regulated area to other points outside such area within the State, during the period June 15 to October 15, inclusive, is prohibited unless protected from possible infestation in a manner or by a method approved by the inspector.

**Regulation 7.—Inspection, Certification and Marking a Condition of Transportation.**

Each car, vehicle, box, basket, or other container of any of the articles, in process of any movement which is restricted by Regulations 4, 5 and 6, shall be plainly marked with the name and address of both consignor and consignee, and shall bear a certificate stating that the contents have been certified by the inspector, as free from the Japanese beetle: Provided, that in case of such article moved in carload or other bulk shipments the certificate shall accompany the way-bills, conductors' manifests, memoranda, or bills of lading, or in case of truck or other road vehicles, the certificate shall accompany the vehicle. Any certificate, provided for in this act, which is forged, counterfeited, altered or defaced shall be considered as invalid and any person who shall forge, counterfeit, alter or deface such certificate shall be deemed guilty of violating the requirements of the order of the Connecticut Agricultural Experiment Station applying to the Japanese beetle and shall be liable to the penalty as outlined in Chapter 107, Public Acts of 1925.

**Regulation 8.—Conditions Governing Inspection and Issuance of Certificate.**

Whenever it is intended to move any of the articles or materials restricted by this quarantine order from the regulated area to points outside such area within the State, application for inspection and certification shall be made as far as possible in advance of the probable date of shipment, specifying the article and quantity to be shipped, method of shipment, and the names and addresses of both consignor and consignee.

Applicants will be required to assemble the articles and materials at such points as the inspector shall designate and to place them so that they may be readily inspected. All charges for storage, cartage, and labor incident to inspection other than the services of the inspector shall be paid by the shipper.

In case of any of the articles enumerated, where absolute freedom from infestation cannot be determined by the inspector, certification will be refused.

**Regulation 9.—Cleaning of Cars, Trucks, Boats, Wagons and Other Vehicles.**

Railway cars, trucks, boats, wagons, and other vehicles which have been used in transporting any article covered by this quarantine within the regulated area, must be thoroughly swept and cleaned before they will be allowed to move in transportation to other points outside the regulated area within the State.

**Regulation 10.—Moving or Receiving Articles in Violation of Regulations.**

No person shall move or direct any other person to move any article in violation of these regulations. No person shall receive or direct any other person to receive any article moved in violation of these regulations.



**Regulation 11.—Carrying or Transporting Living Japanese Beetles outside the Regulated Area.**

No person shall move or carry, or direct any other person to move or carry, a living Japanese beetle to any point outside the regulated area.

This order shall take effect November 10, 1926.

W. L. SLATE, JR.,  
Director, Connecticut Agricultural  
Experiment Station

Approved:

JOHN H. TRUMBULL,  
Governor

**PENALTY**

Chapter 107, Public Acts of 1925, provides that "Any person interfering with the performance of such duty or violating the quarantine regulations established under this act shall be fined not less than ten nor more than fifty dollars."

**APPENDIX**

Copies of the Appendix to Federal Quarantine No. 48 (Fifth Revision), which relates specifically to shipments of nursery or ornamental stock, and sand, soil, manure, etc., may be obtained by applying to any of the following:

Japanese Beetle Office, 42 West First Street, Mount Vernon, N. Y.

Japanese Beetle Laboratory, Riverton, N. J.  
Federal Horticultural Board, Washington, D. C.

**APPLICATIONS FOR INSPECTIONS**

Applications for inspections and certificates or permits to move nursery or ornamental stock, sand, soil, manure, etc., should be made to the Japanese Beetle Office, 42 West First Street, Mount Vernon, N. Y.

**LITERATURE**

- Britton, W. E., The Japanese Beetle Quarantine. Conn. Agr. Expt. Station, Bull. of Immediate Information No. 56, November 1926 (Illus.).
- Clausen, C. P., and King, J. L., A Preliminary Report on the Foreign Parasites of *Popillia japonica*. Jour. Econ. Ent., Vol. 17, page 76, February 1924.
- Davis, John J., The Green Japanese Beetle. N. J. State Dept. of Agr., Circ. No. 30, February 1920 (Illus.).
- The Green Japanese Beetle Problem. Jour. Econ. Ent., Vol. 13, page 185, April 1920.
- The Green Japanese Beetle. Jour. Econ. Ent., Vol. 13, page 432, October 1920.
- Fleming, Walter E., Fumigation of Potting Soil with Carbon Bisulfide for the Control of the Japanese Beetle. N. J. Agr. Expt. Station, Bull. 380, January 1923 (Illus.).

- Ortho-Toluidine as a Contact Insecticide. Jour. Econ. Ent., Vol. 19, page 511, June 1926.
- Goodwin, W. H., Japanese Flower Beetle. Jour. Econ. Ent., Vol. 12, page 247, June 1919.
- Hadley, C. H., The Green Japanese Beetle Quarantine. Jour. Econ. Ent., Vol. 13, page 198, April 1920.
- The Status of the Work against the Japanese Beetle. Jour. Econ. Ent., Vol. 14, page 249, June 1921.
- The Japanese Beetle. N. J. State Dept. of Agr., Circ. No. 46, February 1922 (Illus.).
- Outline and Progress of Work Being Conducted against the Japanese Beetle, *Popillia japonica* Newm. Jour. Econ. Ent., Vol. 15, page 62, February 1922.
- Hadley, C. H., and Smith, L. B., Spread of the Japanese Beetle, *Popillia japonica* Newm. Jour. Econ. Ent., Vol. 16, page 349, August 1923.
- Jaynes, H. A., and Gardner, T. R., Selective Parasitism by *Tiphia* sp. Jour. Econ. Ent., Vol. 17, page 366, June 1924.
- Kelly, R. W., and Moore, William, Sprays for the Control of the Japanese Beetle. N. J. State Dept. of Agr., Circ. No. 61, May 1923 (Illus.).
- King, J. L., and Hallock, H. C., A Report on Certain Parasites of *Popillia japonica* Newm. Jour. Econ. Ent., Vol. 18, page 351, April 1925 (Illus.).
- Leach, B. R., Emulsions of Wormseed Oil and of Carbon Disulfide for Destroying Larvae of the Japanese Beetle in the Roots of Perennial Plants. U. S. Dept. of Agr., Dept. Bull. No. 1332, May 1925 (Illus.).
- Control of Japanese Beetles in Lawns. Penn. Dept. of Agr., General Bull. No. 410, August 1925 (Illus.).
- Leach, B. R., and Brinley, F. J., Experiments with Contact Insecticides for the Control of the Japanese Beetle (*Popillia japonica*). Jour. Econ. Ent., Vol. 15, page 302, August 1922.
- Leach, B. R., and Fleming, W. E., The Fumigation of "Balled" Nursery Stock. Jour. Econ. Ent., Vol. 18, page 362, April 1925 (Illus.).
- Leach, B. R., Fleming, W. E., and Johnson, J. P., Soil Insecticide Investigations at the Japanese Beetle Laboratory during 1923. Jour. Econ. Ent., Vol. 17, page 361, June 1924.
- Leach, B. R., and Thomson, J. W., A Control for Japanese Beetle Larvae in Golf Greens. Jour. Econ. Ent., Vol. 16, page 312, June 1923.
- Smith, L. B., Larval Food Habits of the Japanese Beetle (*Popillia japonica* Newm.). Jour. Econ. Ent., Vol. 15, page 305, August 1922.
- Feeding Habits of the Japanese Beetle which Influence Its Control. U. S. Dept. of Agr., Dept. Bull. No. 1154, April 1923 (Illus.).
- The Japanese Beetle Status in 1923. Jour. Econ. Ent., Vol. 17, page 107, February 1924.
- Status of the Japanese Beetle in 1924. Jour. Econ. Ent., Vol. 18, page 616, August 1925.
- Japanese Beetle Control. N. J. State Dept. of Agr., Circ. No. 90, December 1925 (Illus.).
- Smith, L. B., and Hadley, C. H., The Japanese Beetle, U. S. Dept. of Agr., Dept. Circ. 363, March 1926 (Illus.).
- Stockwell, C. W., The Japanese Beetle Quarantine. Jour. Econ. Ent., Vol. 14, page 350, August 1921.
- The Japanese Beetle Quarantine. Jour. Econ. Ent., Vol. 18, page 488, June 1925.
- Thomas, C. A., Observations on the Life History of *Popillia japonica* Newm. Jour. Econ. Ent., Vol. 18, page 357, April 1925.
- Van Leeuwen, E. R., Sprays for the Japanese Beetle, Penn. Dept. of Agr., General Bull. No. 406, June 1925 (Illus.).
- A Preliminary Note on the Attractiveness of Acetic Acid to the Japanese Beetle. Jour. Econ. Ent., Vol. 19, page 190, February 1926.

- Sodium Oleate-Olearesin of Pyrethrum Spray. N. J. State Dept. of Agr., Circ. No. 92, March 1926.
- A Contact Spray for the Control of the Japanese Beetle, *Popillia japonica* Newm. Jour. Econ. Ent., Vol. 19, page 786, October 1926.
- Van Leeuwen, E. R., and Van der Meulen, P. A., Coated Arsenate of Lead. Jour. Econ. Ent., Vol. 18, page 744, October 1925.
- Weiss, H. B., The Control of Imported Pests Recently Found in New Jersey. Jour. Econ. Ent., Vol. 11, page 124, February 1918.

## A CO-OPERATIVE PROJECT IN CONTROLLING THE ASIATIC BEETLE, *Anomala orientalis* Waterh.

Late in the summer of 1925, the grubs of the Asiatic beetle had injured so many lawns that numerous complaints were made to the Station. At our request, some specialists from the Federal Bureau of Entomology visited New Haven and examined the conditions. Later they submitted a report recommending that life history studies and suppressive measures be inaugurated, and that the work be done co-operatively by the State and the Bureau of Entomology. Congress was asked to appropriate funds for the purpose and finally made \$5,000 available July 1, 1926. No special appropriation had been made by the State for this work but the general appropriation for the State Entomologist can be used for the study or control of any insect. Though most of this had been allotted to various projects, it was thought best, if needed, to use some of it on the Asiatic beetle. Some of the property owners expressed a willingness to contribute toward a fund to help defray the costs of the treatment, and the matter was therefore brought before the executive committee of the Edgewood Civic Association. The writer was invited to address the Association at its annual meeting November 10. Lantern slides were shown of the different stages of the insect and its injury to lawns, and a description given of its discovery in this country at New Haven, together with all available information regarding its life history, habits, injury, probable spread and means of control. The Association passed a resolution authorizing the president to appoint a committee to raise funds for control work, to be disbursed by the treasurer on vouchers approved by the Entomologist.

Bulletin of Immediate Information No. 52 was distributed to every house in the infested area. The names of residents and owners were checked carefully by the committee and a certain number assigned to each of some fifty workers who were asked to solicit and collect funds from that region. On March 25, a public meeting in the Sheridan Junior High School was addressed by Messrs. Loren B. Smith and W. E. Britton. About \$4,500 was collected from owners and residents. The Association also

asked the Board of Aldermen for an appropriation of \$2,500, which was granted. Thus funds were obtained from four different sources.

The advisory committee, consisting of Messrs. A. L. Quaintance and L. B. Smith of the Bureau of Entomology, and W. L. Slate, Jr., and W. E. Britton of this Station, conferred on the matter and

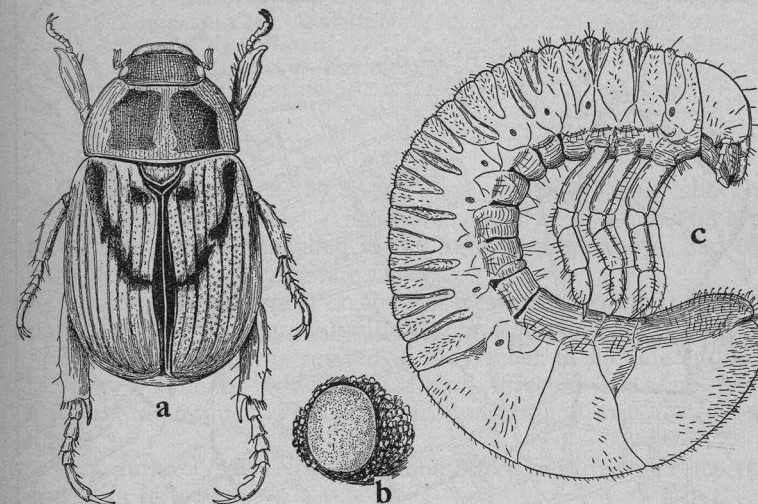


FIG. 6. The Asiatic beetle, *Anomala orientalis*. a, adult beetle. b, egg. c, grub or larva. All enlarged about five times.

decided that some very careful and thorough studies should be made on the life history and habits of the insect; that a State quarantine should be established; and that an attempt should be made to eradicate the pest.

After due notice, a public hearing was held at the Station on April 5, and a quarantine established, effective April 15, including the area between Yale Avenue, Willard Street, Forest Road, Cleveland Road, Central Avenue, and Chapel Street.

Mr. J. Peter Johnson, who had been for four years connected with the Japanese beetle work in New Jersey, was engaged to take charge of the soil treatment and to enforce the quarantine. The research work was placed in charge of Mr. R. B. Friend, assistant entomologist of this Station, and Mr. Paul A. Davis was employed to assist him.

The premises at 132 West Elm Street were leased for the season and used as headquarters. A small barn on the premises was readily adapted to serve as an office and for storage purposes. In



the rear a small insectary was built for life history investigations. This is about 10' x 22' and constructed in two sections, one about 10' x 10' and the other about 10' x 12', the former having a boarded roof covered with roofing felt, and the latter having a roof of hot-bed sash, which is easily removed. These two sections

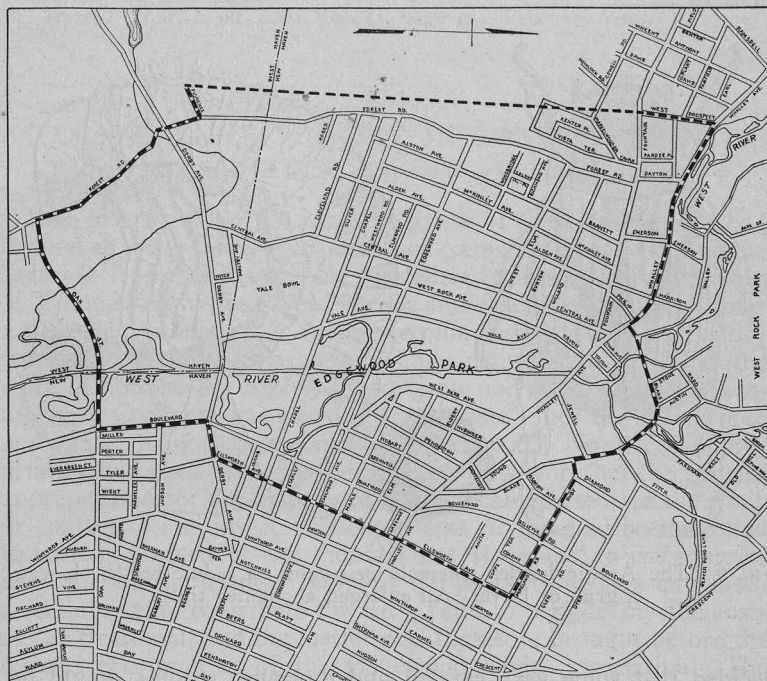


FIG. 7. Map of the Westville section of the City of New Haven. The area enclosed by the heavy dotted line is now quarantined on account of the Asiatic beetle.

are fastened together but can be readily separated for moving elsewhere at the expiration of the lease. The lower portion of the entire frame is sheathed with an artificial sheathing material and painted. The upper portion of the frame is covered with wire netting. There is a screen door in each end and another in the partition separating the two sections. The smaller section is insect tight, being covered with copper wire with a fine mesh. The larger section is covered with chicken wire with an inch mesh. A view of this insectary and a front view of the premises are shown on plate VII. This property has served very well as a place for headquarters and for insectary work. The lease has been

extended for the coming season. Good progress has been made in the investigations, but another season is necessary to complete them.

The money expended in 1926 on the Asiatic beetle project is shown, with the amount from each source, in the following table:

Source of Funds	Amount Expended
Edgewood Civic Association .....	\$4,086.71
City of New Haven .....	2,471.83
Federal Bureau of Entomology .....	5,000.00
State of Connecticut .....	5,530.58
Total .....	\$17,089.12

Of the \$17,089.12, \$7,884.59 was expended for labor, and \$4,244.21 for emulsion. An additional charge of \$1,500 for emulsion used, and not included in the figures given above, had to be paid later, chiefly from State funds.

A more detailed report on the soil treatment work has been prepared by Mr. Johnson and will be found on page 262.

The quarantine was revised in November to include additional territory, some of which was found infested by adult beetles during the summer. This present quarantined area is shown in figure 7.

Quarantine Order No. 10 became effective November 10, 1926, and is as follows:

STATE OF CONNECTICUT  
AGRICULTURAL EXPERIMENT STATION  
NEW HAVEN, CONN.

QUARANTINE ORDER No. 10

Concerning Asiatic Beetle

The fact has been determined that the Asiatic Beetle, *Anomala orientalis* Waterhouse, now occurs outside the area regulated under Quarantine Order No. 8, and it seems advisable to revise and extend the regulations to include the additional area.

Now therefore, I, Director of the Connecticut Agricultural Experiment Station, pursuant to the provisions of Chapter 107, Public Acts of 1925, do hereby declare and order that the area bounded by Whalley Avenue from West Prospect Street eastward to Blake Street, to Ruby Street, to Moreland Road, to Ellsworth Avenue, southward to Derby Avenue, to Boulevard, to Oak Street, westward to Forest Road, northward to Florence Avenue, westward to the end of Florence Avenue (a point about 400 feet west of Forest Road), thence on a straight line northward to West Prospect Street, to Whalley Avenue, and all territory within these boundaries being partly in New Haven and partly in West Haven, shall be a regulated area out from which, until further notice, the movement of certain articles and materials will not be permitted except where inspection or treatment is prac-

licable and permits are issued by some person or persons authorized by me to issue such permits. The restricted articles and materials are as follows:

1. Soil of any kind, including sand and loam.
2. All out-door plants with or without soil; potted plants which have been set on or in the ground out of doors between June 1 and September 30.
3. Turf or sod trimmings.
4. Lawn clippings during the period between June 15 and September 15.
5. Ground litter, weeds, manure, and compost which has lain upon the ground.
6. All cut flowers during the period between June 15 and September 15.

This order does not affect such materials originating outside of and passing through the regulated area.

This order shall take effect November 10, 1926.

W. L. SLATE, JR.,

Director, Connecticut Agricultural  
Experiment Station.

Approved:

JOHN H. TRUMBULL,  
Governor.

#### PENALTY

Chapter 107, Public Acts of 1925, contains the following provision: "Any person interfering with the performance of such duty or violating the quarantine regulations established under this act shall be fined not less than ten nor more than fifty dollars."

The foregoing regulations do not constitute an embargo, and the movement of these materials will be prohibited *only* where there is great danger of carrying the pest into uninfested territory and where inspection or treatment is considered impracticable. Permits may be issued for the movement of such materials which are not in danger of carrying the insects or which may be rendered safe by inspection or treatment.

#### WHERE TO OBTAIN INFORMATION

Mr. J. P. Johnson has been placed in charge of enforcing this quarantine, and any one desiring to move plants and soil should make application to him. Headquarters have been established at 132 West Elm Street, telephone Colony 7215, where he may be reached during the summer months. From December 1 to April 1, the headquarters office will be closed and Mr. Johnson may be reached at the Agricultural Experiment Station, 153 Huntington Street, or by telephone, Pioneer 6450, or Liberty 1253.

#### LITERATURE

- Britton, W. E., Brief note on the occurrence of *Anomala orientalis* in Connecticut. Jour. Econ. Ent., Vol. 15, page 311, August 1922.
- An Asiatic Beetle in Connecticut. Conn. Agr. Expt. Station, Report for 1922, page 345 (Illus.).
- The Asiatic Beetle, Conn. Agr. Expt. Station, Report for 1923, page 291 (Illus.).
- An Asiatic Beetle (*Anomala orientalis*) in Connecticut. Jour. Econ. Ent., Vol. 17, page 309, April 1924.
- A New Pest of Lawns. Conn. Agr. Expt. Station, Bull. of Immediate Information No. 52, December 1925 (Illus.).
- Three Injurious Insects Recently Introduced into Connecticut. A Beetle from the Orient. Jour. Econ. Ent., Vol. 19, page 540, June 1926.
- The Asiatic Beetle Quarantine, Conn. Agr. Expt. Station, Bull. of Immediate Information No. 54, November 1926 (Illus.).
- The Asiatic Beetle Quarantine (Revision of preceding), Conn. Agr. Expt. Station, Bull. of Immediate Information No. 54, November 1926 (Illus.).
- Britton, W. E., and Zappe, M. P., Further Notes on the Asiatic Beetle. Conn. Agr. Expt. Station, Report for 1925, page 309 (Illus.).
- Zappe, M. P., and Garman, Philip, Tests of Insecticides for the Control of the Asiatic Beetle, Conn. Agr. Expt. Station, Report for 1924, page 294 (Illus.).

#### REPORT OF QUARANTINE AND CONTROL WORK FOR THE ASIATIC BEETLE DURING 1926

J. PETER JOHNSON

##### Organization:

The organization was employed mainly for the control work, as very little assistance was needed in enforcing the quarantine. In addition to the man in charge, one assistant, Mr. Charles E. Brown, supervised the treatment, diggings, and scouting in the field. A crew of eight men was employed to make the spring diggings, and this number was increased to 25 for the treatment work. On June 30 the force was reduced to 15 men to carry on the summer scouting. In September the force was increased, numbering 25 at the peak of the fall treatment and digging work.

##### Quarantine:

On April 15, 1926, a quarantine was established on account of the Asiatic beetle and the quarantined area included approximately 400 acres of land in the Westville section of New Haven. Shortly afterward copies of the Bulletins of Immediate Information No. 52 and No. 53 were left at each home within the infested area. This was done to inform the inhabitants of the quarantine and to make it immediately effective.

From time to time requests were made for the inspection of plants, soil, etc., to be shipped out from the area. In all, 28 cer-



tificates were issued certifying 2 shipments of cut flowers, 12 shrubs and evergreens, 229 plants, 963 bulbs and roots, and three excavations. The form of certificate used is as follows:

## STATE OF CONNECTICUT

AGRICULTURAL EXPERIMENT STATION

New Haven, Conn.

## CERTIFICATE OF INSPECTION FOR THE ASIATIC BEETLE

(Plants, Soil, Garden Litter, etc.)

This is to certify that I have examined or caused to be examined under Quarantine Order No. 8, as authorized by Chapter 107, Public Acts of 1925, the contents of this shipment and found it to be free from the Asiatic Beetle. It is hereby permitted to be moved, in accordance with the provisions of Quarantine Order No. 8.

Issued to .....

Address .....

Consignee ..... Via.....

Street and Number .....

City ..... State.....

Date .....

Shipment consists of .....

.....

.....

AGRICULTURAL EXPERIMENT STATION

Wm. L. Slate, Jr., *Director*W. E. Britton, *State Entomologist*

New Haven, Conn.

J. P. JOHNSON,

In Charge of Quarantine.

Per.....

Void after.....No. ....

The soil about the roots of twelve trees was treated with carbon disulphide emulsion for possible grub infestation, allowing their certification.

The quarantine was revised in the fall and included about 1,000 acres of new territory. In this area there is located a large sand bank from which shipments are made daily and this necessitated a new certificate for bulk shipments. A total of 28 of these certificates was issued, certifying 632 cubic yards of sand.

During the year 12 excavations were under observation as to the disposal of the soil, and three refuse collectors were approached and their co-operation secured in enforcing the quarantine.

## STATE OF CONNECTICUT

AGRICULTURAL EXPERIMENT STATION

New Haven, Conn.

No. ....

## CERTIFICATE OF INSPECTION ON ACCOUNT OF THE ASIATIC BEETLE

Date .....192..

This is to certify that I have examined or caused to be examined, according to Quarantine Order No. 11, as authorized by Chapter 107, Public Acts of 1925, and found to be free from the Asiatic beetle, the following products:

Shipped by .....  
(Name and address)Consigned to .....  
(Name and address)

Shipment consists of .....

.....

via .....Car Number.....

This certificate is void after .....

J. P. JOHNSON,

In Charge of Quarantine.

Per .....

AGRICULTURAL EXPERIMENT STATION

Wm. L. Slate, Jr., *Director*W. E. Britton, *State Entomologist*

New Haven, Conn.

### Diggings:

In the spring it was thought necessary to make diggings throughout the quarantined area to determine the nature and extent of the infestation, and 1,800 diggings were made, approximately 50 feet apart. The infestation was found to be spotted, and in places there were as many as 1,000 grubs in a square yard.

Diggings were resumed in the fall, as the summer scouting work did not give all the information needed for intensive control work. The spring work was duplicated in addition to all areas in which adult beetles were found, and altogether 2,776 diggings were made.

During the season 50 or more complaints of possible grub infestations were received from outside of the area. All such complaints were investigated, and on May 17, 1926, an infestation was found at 437 Savin Avenue, West Haven, and on October 4, 1926, another infestation, one city block in extent, was found on Washington Manor Avenue, West Haven.

Because of the nature of the territory infested by the beetle, and also because of its habits, it was necessary to make nearly all the diggings in lawns. In the spring the people as a whole co-operated exceedingly well, and in the majority of cases where objections were made, the work was explained and co-operation secured. The work in the fall was to a great extent a repetition of the spring work, and very little opposition was encountered.

### Emulsion:

The insecticide used in the control work was emulsified carbon disulphide. This emulsion is identical with that used to control the Japanese beetle, *Popillia japonica* Newman, and was recommended by the Japanese Beetle Laboratory. The formula is as follows:

#### Soap:

50 grams of lump rosin (grind), dissolve in sodium hydroxide (heat)  
50 cc. of oleic acid.  
135 cc. of a 7% sodium hydroxide solution.  
450 cc. of water.

The soap is used at the rate of 3 parts to 7 parts of commercial carbon disulphide and this mixture is agitated until it emulsifies.

All of the emulsion was purchased from the I. P. Thomas & Son Company, Philadelphia, Pa., at a cost of \$300 per ton. The majority of it was sent by freight, and the average delivery was made in eight or nine days. However, there were a few deliveries made by express, arriving in three days from Philadelphia. The emulsion arrived in perfect condition and was used immediately excepting one ton which was stored in the headquarters during the summer months. This emulsion stood up very well and was used for fall treatment.

### Hose:

The standard hose used in applying the liquid was one inch in diameter. As it was known that the carbon disulphide emulsion had a deteriorating effect upon rubber hose, three grades of rubber hose were purchased in the spring in order to test their value. These were nine-ply and six-ply high-pressure hose and three-ply water hose. The nine-ply hose proved to be the poorest hose, while the three-ply water hose was the best. However, not one of the three grades was very satisfactory, as the inner lining either crumbled or separated from the hose proper, causing it to bulge and preventing the free passage of the liquid through it.

The Japanese Beetle Laboratory lent some equipment to carry on the control work, and a cheap grade of hose was included. This hose was used with great success and lasted throughout the season without any ill effects. As a result, this type of hose was purchased for the fall work and served satisfactorily.

In the spring of the year the house sill-cocks were considered as the logical source of water supply as determined by past experience with the machines. This source, however, proved to be inefficient because of the low pressure encountered, causing very much trouble in diluting the insecticide properly and permitting but a small amount of area to be treated in a day. Whenever possible, fire hydrants were used, and this enabled the machines to work at a maximum until a one-inch hose line 200 feet or more in length was needed. The friction of the water passing through the small-caliber hose would then increase to a point causing trouble identical with that encountered in the use of the sill-cocks.

During the summer, standard single-jacket, canvas-covered, rubber-lined, 2½-inch, 2-inch, and 1½-inch hose were purchased and tested. The 2½-inch hose gave the greatest flow of water and the desired results. This hose was adopted for hydrant use in the fall and enabled double the area to be treated, as compared with the spring work, in less time.

It was necessary to secure a written permit from the New Haven Water Company and the fire chiefs of New Haven and West Haven to use the fire-hydrants.

### Machines:

In the latter part of April four proportioning machines were ordered from the I. P. Thomas & Son Company, Philadelphia, Pa. These machines are sold for about \$70 each, with the understanding that they can be used only in applying I. P. Thomas carbon disulphide emulsion. Three machines, with the necessary equipment, were borrowed from the Japanese Beetle Laboratory for the spring work, and one for the fall work. Each machine has a capacity of 600 gallons an hour. However, because of the large area to be treated, it was thought that these machines were not



large enough to treat the area efficiently. Therefore, during the summer a larger machine was ordered and one with a capacity of 1,200 gallons an hour was made by the I. P. Thomas & Son Company and sent to us for testing. It proved to be a decided improvement and was in use during the fall.

The machines can be used in treating lawns, terraces, gardens, and ornamental plantings when proper precautions are observed. One-inch hose is used on all the machines, and a six- and a nine-inch special nozzle is used on the 600-gallon and 1,200-gallon machines respectively.

#### *Treatment:*

The insecticide used in the soil treatment for the Asiatic beetle grub is carbon disulphide emulsion, as recommended by the Japanese Beetle Laboratory. This was diluted at the rate of one quart of the emulsion in 50 gallons of water and three pints of this liquid applied to one surface square foot by the proportioning machine. This dose is effective to a depth of nearly three inches, obtaining a grub kill as high as 98% when applied properly.

During the spring season as much of the infested territory was treated as the time permitted. Every square foot in this area, including lawns, gardens, and ornamental plantings, received the treatment. Because of the nature of the surface to be treated, three men were needed to operate a machine and handle the hose, in order to minimize the possibility of damage to plants and shrubbery. In the fall, however, only lawns were treated, and two men were sufficient to operate a machine.

Seven machines, each with a capacity of 600 gallons an hour, were used during the spring treatment, and four similar ones and one of 1,200 gallons' capacity for the fall work.

Some promising results were obtained with a dose of one quart of emulsion diluted in 100 gallons of water and applied at the rate of one gallon to a square foot. Grubs were killed to a depth of eight inches, and in some instances 100% control was obtained. However, more work is necessary before any recommendation can be made.

Westville is primarily a residential section having progressive citizens who take pride in their homes, lawns and ornamental plantings. The plant world is well represented with annuals, perennials, shrubs, evergreens and deciduous stock. In the course of treatment everything received the required amount of insecticide, and very little injury resulted. Very few complaints were made concerning annuals and perennials and the injury to them was negligible. Japanese barberry proved to be somewhat susceptible to the treatment, and extreme care was exercised to prevent possible injury.

However, in considering the great number of shrubs and ever-

greens treated, the injury was practically negligible and largely due to flooding or weakening by insect attack.

Lawn injury was noted in low areas where flooding took place and in new or poor turf. As the treatment was continued into early July, it was evident that the turf became more susceptible at the approach of hot weather. The total lawn injury did not exceed 1½%, while the actual surface treated was 43.5 acres.\*

Gardens were treated after the seeds had been planted and the crops were noted to grow normally. Annual plants received the treatment just after transplanting into the garden with excellent results. The perennials withstood the treatment very well and not one case of injury was reported.

The policy for controlling the Asiatic beetle during the past year was to treat every square foot possible in the infested area. Surprising co-operation was given by the residents, and only three people objected to the treatment being made during the year. However, when the object of the work was recognized by these people, they also gave their co-operation.

The infestation at 437 Savin Avenue and the area surrounding it were treated in the spring and again in the fall. A much heavier dose was applied to the area actually known to be infested. This was possible due to permission from the property owner, who was willing to sacrifice his lawn in securing a complete control. Only one beetle was found during the summer, and not one grub was discovered during the fall diggings. It is evident that very good results were obtained and the insect may have been exterminated at this place.

Treatment was made late in the fall at the Washington Manor Avenue infestation, and it is certain that favorable results were obtained considering the lateness of the season. This infestation will be treated again in the spring with extermination in view.

#### *Scouting:*

The adult beetle is more readily seen when resting than when flying. It is a rapid flyer and may skim along a few feet above the ground or high in the air. Beetles were found at night, resting on telegraph poles, on the ground, and as many as 18 were caught in a half hour flying against the glass and on the sill of a brightly illuminated store window. The territory surrounding the known infested area was thoroughly scouted, and beetles were found north, south, and east of the quarantined area. The last beetle in the field was found on August 28. There was an average of twelve men scouting daily during the entire season. The Elm City Nursery in Woodmont was scouted repeatedly during the summer and no infestations found.

\* The total area including houses, garages and sidewalks would be approximately 100 acres.





with finely reticulated white markings, and two narrow broken subdorsal lines between which is a row of large spots or blotches which range from square to dumb-bell-like in shape. The tubercles are reddish-brown and bear yellowish-brown hairs.

The pupa is nearly black, covered with long white or yellowish hairs, and is from three-fourths to an inch in length.

Male and female moths, caterpillars and hibernating cases are shown on plate XII, a and b.

#### HABITS AND LIFE HISTORY

The moths appear in July, and each female usually lays about 550 eggs, though these may not all be laid in one place; particularly if disturbed, the female moth will continue egg-laying elsewhere and frequently lays more than one egg-cluster. The eggs hatch in about fifteen days.

When the larvae have reached the third stage and are about one-fourth of an inch long, they make pockets or hibernating shelters in crevices in the bark or other favorable situations. Occasionally two or three larvae are found in one shelter, but usually each has its own individual pocket. A silk case is then made, in which the larva spends the winter. Externally this case resembles the bark of the tree so closely that it is very inconspicuous and so difficult of detection that the ordinary methods of inspection fail to reveal it. Hence inspection is not attempted in the enforcement of the quarantine; all shipments out of the area are prohibited.

In spring the larvae emerge from their winter cases and feed upon the newly expanding foliage. They reach larval maturity about July 1, and spin loose cocoons, sometimes by drawing together the edges of the leaves, sometimes in crevices of the rough bark, and again in rubbish or on the sides of buildings. In about nine days the moths emerge. There is one annual generation.

#### CONTROL MEASURES

The egg-clusters may be saturated with creosote to kill the eggs, as is done with the gipsy moth, but only a portion of them can be so treated because they are not all accessible. Some of them are laid on the small twigs, out of reach, and climbing for them is particularly hazardous on poplars and willows on account of the weak and brittle nature of the wood.

Spraying heavily with lead arsenate as soon as the trees are in full leaf seems to be the best remedy. Burgess recommends as high as ten pounds of the poison to one hundred gallons of water, with some kind of "sticker" added. In severe infestations it may be necessary to spray again about the middle of June.

#### LITERATURE

- Bailey, H. L., Satin Moth (*Stilpnotia salicis*). Vermont Commissioner of Agriculture, 13th Biennial Report, page 52, 1927.  
 Burgess, A. F., A European Pest Found in Massachusetts. Jour. Econ. Ent., Vol. 13, page 370, August 1920.  
 The Satin Moth, An Introduced Enemy of Poplars and Willows. U. S. Dept. of Agr., Dept. Circ. 167, May 1921 (Illus.).  
 Burgess, A. F., and Crossman, S. S., The Satin Moth, A Recently Introduced Pest. U. S. Dept. of Agr., Dept. Bull. 1469 (In press).

#### ABUNDANCE OF *ORMENIS PRUINOSA* SAY ON IBOTA PRIVET

B. H. WALDEN

On August 5 the writer visited Bridgeport to examine the Ibota privet hedges around the houses owned by the Bridgeport Hous-

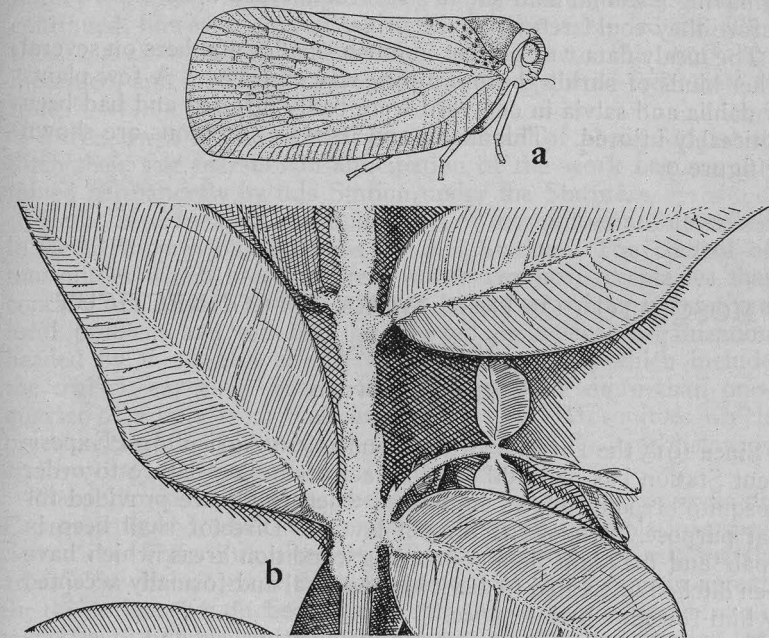


FIG. 9. The mealy flata, *Ormenis pruinosa* Say. a, adult, enlarged about seven times. b, privet twig showing wax secretion, twice natural size.

ing Company which were reported to be infested with insects. This Company owns over 700 houses, the grounds of which have

been planted with shrubbery and cared for by the Company at considerable expense. The hedges were about ten miles in extent and were found to be badly infested with the mealy flata, *Ormenis pruinosus* Say. Many of the inside branches were white with the wax-covered, last-stage nymphs, and adults were emerging on the hedges situated in sunny exposures. While the insects were very abundant there was no indication of injury to the privet, but the owners, expecting serious injury, had tried a number of contact insecticides with very little success.

The insects were so well protected by the dense foliage that it was very difficult to reach them with a spray of sufficient force to penetrate the waxy secretion with which they were covered.

In front of one of the houses a man was driving the insects out of the hedge onto the concrete walk with a strong stream of water from a garden hose. This did not drown the insects, and after the water had drained away many of them returned to the plants. It was suggested that a large number of the insects could be killed by having a second man with a stiff broom crush them on the walk before they could return to the privet.

The mealy flata was present in much smaller numbers on several other kinds of shrubs, but no injury was observed. A few plants of dahlia and salvia in one yard were badly infested and had been noticeably injured. This insect and its wax secretions are shown in figure 9.

## MOSQUITO CONTROL WORK IN CONNECTICUT

Season of 1926

R. C. BOTSFORD

Since 1915 the Director of the Connecticut Agricultural Experiment Station has had authority by act of the legislature to order mosquito breeding places eliminated when funds are provided for that purpose. Under the present law the Director shall keep in repair and maintain in non-breeding condition areas which have been ditched or treated to merit his approval and formally accepted by him for state maintenance.

Funds for maintenance and for making surveys and investigations are appropriated by the State as a special budget item of the Experiment Station. Formerly the law required that each town where work was done should be assessed for three-quarters the cost of both maintenance and new work. The Legislature of 1923 changed the law so that towns are no longer assessed, but the expense of maintenance is borne by the State. As the increased

appropriations to cover this work, as requested by the Station, have not in all cases been granted, it will be impossible for the State to assume the maintenance on any more ditched areas unless increased appropriations are granted by the General Assembly. Funds may be contributed for this work by towns, associations or individuals, and this has been done in many instances when state funds have been insufficient to produce satisfactory results in a particular locality.

In 1917 the State appropriated \$5,000 to pay for one-fourth the cost of extending the work, but so little money was contributed to make up the remaining three-fourths that most of the \$5,000 was unexpended. Since then the State has made no appropriation for new work.

About one-third of the total salt marsh area of Connecticut is patrolled by this Station and kept free from mosquito breeding as far as possible. The remaining two-thirds are probably breeding mosquitoes which tend to migrate to treated areas and seem to nullify the work. The maintenance of the treated areas should be continued, however, so that when the work is extended the older treated areas will be non-breeding. The cost of this work has increased, and increased appropriations are required from time to time.

Three towns have recently invested a total of about \$20,000 to ditch their salt marshes in anticipation of the work being maintained permanently by this Station under the Statute.

Methods of treating breeding places of mosquitoes are described in detail in previous bulletins of this Station. The control of mosquitoes which breed in fresh water swamps, receptacles that contain rain water, and in polluted bodies of water is purely a local problem and can best be effected by a local organization headed by the health officer. These mosquitoes, which include the malaria-carrying species, are seldom found more than one-quarter of a mile from their breeding places. Mosquitoes which breed in the brackish water of the salt marshes fly long distances and may be troublesome several miles inland.

The following table gives the status of the salt marsh areas of Connecticut, and while not complete, gives all available information. The first column names towns which contain salt marsh areas; the second gives the total amount of salt marsh in acres; the third, the acres ditched; the fourth, the number of acres maintained by the State; the fifth, the amount previously expended for ditching; the sixth, the cost of labor expended in maintenance work in accepted areas of each town in 1926; and the last column is an estimate of what it would cost to complete the ditching. In most cases this estimate is high and must not be accepted as a final estimate. Figures given under each column represent a total for the State.



## STATUS OF CONNECTICUT SALT MARSH AREAS, 1926

Town	Salt Marsh Areas	Salt Marsh Ditched	Main- tained by State	Total Cost of Ditching	Labor, Cost of Maintenance, 1926	Labor, Cost to Complete Ditching
Greenwich	200	200	None	.....	.....	.....
Stamford	300	300	200	\$3,245.80	\$175.00	.....
Darien	300	300	None	3,800.00	.....	.....
Norwalk	600	600	None	7,500.00	.....	.....
Westport	400	300	None	2,514.29	.....	\$1,500.00
Fairfield	1,200	1,200	1,200	8,400.00	857.00	.....
Bridgeport	173	.....	.....	.....	.....	3,000.00
Stratford	1,315	.....	.....	.....	.....	20,000.00
Milford	630	.....	.....	.....	.....	9,500.00
West Haven	463	222	222	Ditched with New Haven	255.25	3,500.00
New Haven	750	750	675		12,000.00	573.94
Hamden	2,042	.....	.....	.....	.....	750.00
No. Haven		.....	.....	.....	.....	30,000.00
East Haven	482	150	50	Ditched with New Haven	59.00	6,500.00
Branford	895	578	578		878.76	4,800.00
Guilford	1,085	1,085	1,085	20,000.00	1,961.35	.....
Madison	1,005	1,005	1,005	.....	1,743.41	.....
Clinton	785	677	None	10,000.00	.....	2,000.00
Westbrook	500	220	None	3,354.62	.....	3,500.00
Old Saybrook	1,373	100	None	.....	.....	20,000.00
Lyme	493	.....	.....	.....	.....	7,500.00
Old Lyme	1,393	.....	.....	.....	.....	21,000.00
East Lyme	424	.....	.....	.....	.....	6,500.00
Waterford	204	.....	.....	.....	.....	3,500.00
New London	34	.....	.....	.....	.....	500.00
Groton	304	50	50	1,000.00	40.07	4,000.00
Stonington	555	.....	.....	.....	.....	8,500.00
	18,005	7,737	5,065	\$71,814.71	\$6,553.78	\$156,550.00

## THE WORK BY TOWNS

## NEW HAVEN

The areas under State maintenance in the towns of New Haven, East Haven, Branford, and Guilford were treated as one unit this season. Two men, with Mr. C. F. Johnson as foreman, patrolled these areas and recut and deepened thousands of feet of 10" x 24" ditches. This crew also covered the Groton area and did some work in Madison and West Haven.

At the request of the Chamber of Commerce of New Haven, a report of mosquito breeding conditions in and around New Haven was furnished by this Station, as follows:

## REPORT ON ELIMINATION OF MOSQUITOES IN THE NEW HAVEN DISTRICT, JULY 20, 1926

## A—Salt Marsh Mosquitoes.

The Salt Marsh or Migratory Mosquito breeds in stagnant, brackish water, bites both day and night, and flies several miles

from breeding places. The control is simple and effective—draining the salt marshes.

Some years ago, as a result of local interest, funds were raised sufficient to drain most of the marshes in New Haven and West Haven, some areas in East Haven, and the eastern part of Branford.

The areas in and near New Haven remaining undrained and probably furnishing New Haven with mosquitoes are as follows:

New Haven	75 acres
North Haven	310 "
Hamden	571 "
East Haven	495 "
Branford	317 "
	1,768 "

## The Estimated Costs:

## New Haven

Ditching	\$ 750
Tide gate at Middletown Avenue	2,000
Dredging Morris Creek	3,000
	\$5,750

## North Haven

Ditching	\$3,100
----------	---------

## Hamden

Ditching	\$5,700
----------	---------

## East Haven

Ditching	\$5,000
----------	---------

## Branford

Ditching	\$3,200
----------	---------

For the relief of New Haven, three projects should be undertaken at once (see figure 10).

Project No. 1.	Ditching in Hamden	571 acres, cost \$5,700.
	Ditching in New Haven	75 acres, cost 750.
	Ditching in North Haven	310 acres, cost 3,100.

Tide gates on Little River at Middletown Avenue will make effective the ditching of 252 acres in New Haven and North Haven.

Project No. 2.	Ditching in East Haven	495 acres, cost \$5,000.
----------------	------------------------	--------------------------

Dredging of Morris Creek will make effective the ditching of 75 acres in New Haven and about the same amount in East Haven.

Project No. 3.	Ditching in Branford	317 acres, cost \$3,200.
----------------	----------------------	--------------------------

## B—Fresh Water Mosquitoes.

This is a problem that can only be attacked by local agencies. In the towns of Fairfield and Stamford the Health Officer employs

a deputy who spends a day or two a week on mosquito work. This man inspects the whole town and either removes or causes to be removed standing water that may breed mosquitoes. There is nothing that will so quickly raise the sanitary standards of a town as an efficient, permanent policy of mosquito elimination.

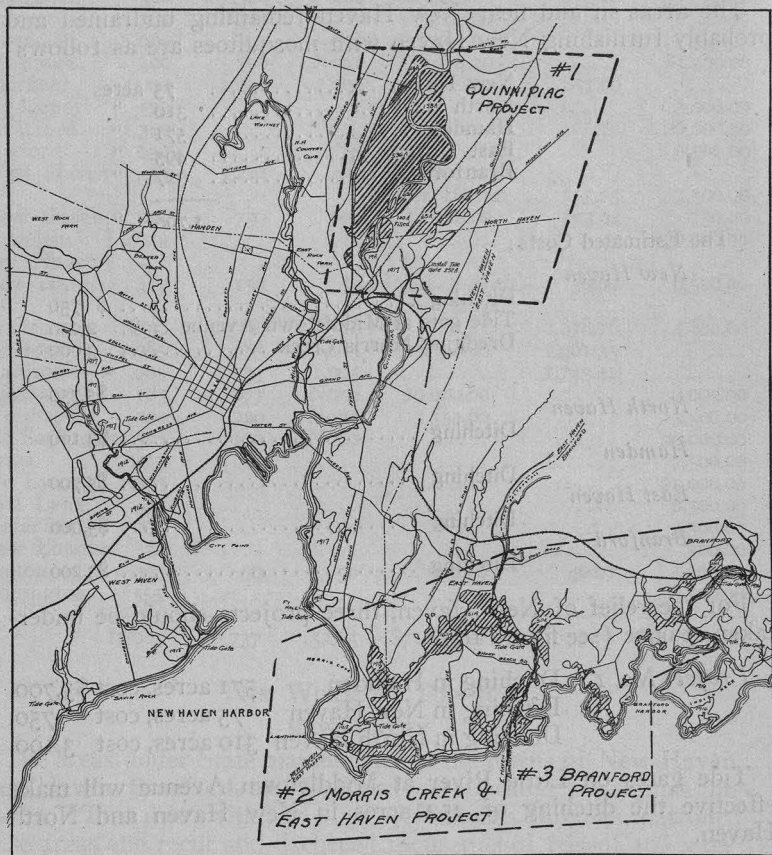


FIG. 10. Map of New Haven and vicinity; marsh areas enclosed by dotted lines need further ditching to eliminate mosquito breeding.

#### WEST HAVEN

The maintenance work was carried on under the same plan as in 1925, with Dr. Phelps in entire charge of the work. The town of West Haven furnished \$1,000 and this Station added \$220, which is the maximum amount available for the town under the present State appropriation. Not only were the areas under State care at Old Field Creek and West River kept from breeding,

but all other salt marsh breeding areas and some fresh water breeding places were eliminated by ditching. State funds alone are inadequate to properly maintain some of the West Haven areas in their present condition. The results of this season's work were reported to be highly satisfactory, and the amount actually expended was \$787.75.

#### EAST HAVEN

About one-tenth of the salt marsh area of East Haven is under State care. This comprises two small areas, one extending from Morris Creek eastward to the road to Shell Beach, and the other the area from Momauguin westward to Caroline Creek. Ditches on these areas were cleaned and recut where necessary and mosquito breeding eliminated on these areas. The remaining salt marsh areas of the town have never been adequately ditched for mosquito elimination to be acceptable for State maintenance and are the source of the greatest mosquito nuisance.

Mosquitoes which breed in rain barrels and fresh-water swamps were much in evidence.

The new tide gates installed by the town on the East Haven River tend to restrict mosquito breeding on the large marsh east of Hemingway Avenue.

#### BRANFORD

The dike at Stony Creek was repaired satisfactorily but the marsh above, being flooded for several years, requires re-ditching. Tide gates at Hubbard's Bridge on the Branford River were patched and coaxed to last through the season, but must be rebuilt this year. No funds are available for this work. The salt marshes west of the Branford River do not come under State care.

#### GUILFORD

A campaign of recutting and grading ditches, which was begun in September, 1925, was continued this season, with the result that now more than three-fourths of the total footage of ditches is in perfect condition. It has been brought to the attention of this Station that some of the recut ditches have been filled for crossings and left so. This is contrary to law and we urge that this practice be discontinued immediately. The dike at Great Harbor was damaged by storms this winter.

#### MADISON

Patrolling of beach outlets, marshes, and recutting of ditches was continued as usual this season, with the result that little mosquito breeding occurred in this town.



The State Park and Forest Commission voted \$1,000 for anti-mosquito work in the State parks. This was used at Hammonasset for re-ditching a large breeding area near the Hammonasset River which was formerly flooding the park with mosquitoes periodically, and also for overhauling the ditches west of the pavilion toward Webster Point.

## CLINTON

On June 1, 1926, the town of Clinton entered into contract with Mr. Edwin M. Skinner of Bloomfield, N. J., to ditch five-sixths of the salt marshes of the town under State supervision. Funds were not sufficient to complete the whole area at this time.

Legal notices were sent to all record marsh owners and every effort was made to cause as little inconvenience as possible to the marsh owners and yet obtain the desired results. Ditches were placed on boundaries wherever possible and intermediate ditches placed where necessary. The work of ditching will be completed before the next mosquito breeding season, and the maintenance work will start just as soon as the funds, which have been requested, are received.

## WESTBROOK

The town of Westbrook appropriated \$3,500 to complete the ditching of the salt marshes of the town. This work is being done under State supervision and will be completed next season. Funds for maintenance during the following biennium have been requested according to statute.

## GROTON

Some new ditches were installed in this area to improve drainage, and the old ditches were cleaned and graded where necessary to prevent possible mosquito breeding.

## FAIRFIELD

Where possible, salt marshes were burned over to facilitate the patrol work and cleaning. Altogether, 17,832 feet of new 10" x 24" ditches were cut to improve drainage, and 35,942 feet of old ditches recut and graded. The town of Fairfield continued its fresh water work and installed nearly 800 feet of pipe drains. Swamps which could not be drained were oiled every ten days and 100 gallons of crank case oil at four cents a gallon were used.

The funds available for work in Fairfield this season were as follows:

## MOSQUITO CONTROL WORK

Appropriations, Town .....	\$3,301.15
State .....	857.00
Fairfield Improvement Association, Inc. ....	146.05
DuPont Fabricoid Company .....	250.00
Mr. and Mrs. M. Neary .....	125.00
Total .....	\$4,679.20

Mosquito control work was reported very successful this season, and at the town meeting on October 5 it was unanimously voted to appropriate \$3,000 for the season of 1927.

## WESTPORT

Funds sufficient to ditch all salt marshes in the town of Westport were made available, and the Connecticut Agricultural Experiment Station was requested to supervise the work. Ditching was started on October 15, 1926, and continued until about December 1, when a heavy fall of snow prevented further work. The work will be completed next season, and State maintenance will start when funds are made available. This ditching job so far has progressed very satisfactorily, due to the co-operation of the property owners.

## STAMFORD

The salt marshes were burned over early in the spring wherever possible. About 9,873 feet of new 10" x 24" ditches were cut and 21,636 feet of old ditches recut and graded. About fifty feet of drain pipes were installed and 450 gallons of oil used to spray mosquito breeding pools which could not be drained.

This work was done by experienced men from Fairfield, and funds were furnished as follows:

Appropriation, City of Stamford .....	\$210.35
State .....	175.00
Shippan Point Association .....	550.00
Scofield Estate .....	48.50
	<hr/>
	\$983.85

Treatment of fresh water swamps was continued as usual by the City of Stamford.

## MISCELLANEOUS INSECT NOTES

**Leaf Roller on Hickory:** Leaf rollers on hickory were collected near the Station and brought to the laboratory June 16. On June 23, an adult moth emerged and proved to be *Archips rosana* Linn. In 1913, this insect was rather abundant on certain privet hedges in New Haven, rolling the leaves of the terminal shoots. It was also observed in 1915.

**Dingy Cutworm Injuring Apple Trees:** On May 14, 1926, Mr. Zappe collected at Wallingford some cutworms which had eaten the buds from grafts in small apple trees which had been planted in the orchard two or three years. The owner top-worked these trees and in most cases the injured grafts were not more than three feet from the ground. In September, some adults emerged and were identified as the moths of the dingy cutworm, *Feltia subgothica* Haworth.

**Spruce Scale:** Specimens of the spruce scale, *Physokermes piceae* Schrank, were received from Woodlawn, N. Y., February 9, 1926. These insects are globular and are usually clustered in groups surrounding the bases of the twigs and resembling buds. They are rigid, from 1.5-3 mm. in diameter, and chestnut-brown in color. This species has been recorded from Connecticut.

**Beets Attacked by Greenhouse Leaf-Tyer:** On September 23, 1925, Mr. E. M. Stoddard of the Botany Department brought to the laboratory some Lepidopterous larvae which he found feeding upon the leaves of beets in his garden in Hamden. On March 1, 1926, one adult emerged, and proved to be the greenhouse leaf-tyer, *Phlyctaenia ferrugalis* Hubn. This insect has often caused injury to various plants under glass and outside. Spraying with lead arsenate may be practiced with success where the foliage is not to be used for human food.

**European Grain Beetle in Connecticut:** The European grain beetle, *Cathartus advena* Walth. occurs in Connecticut and two specimens are now in the Station collection. One of them was collected in Fairfield, May 10, 1921, by M. P. Zappe, and the other in Cornwall, November 29, 1922, by K. F. Chamberlain. The former specimen was identified by Mr. H. C. Fall. This species often attacks stored grain and other plant products, especially where decay has set in. It is also found under the bark of dead trees. It belongs to the family Cucujidae.

**Japanese Scale Insect:** In the Report of this Station for 1915, page 139, is a record of the occurrence in Connecticut of a Japanese scale, *Leucaspis japonica* Cockerell, which had been collected on silver and Norway maple and privet in Greenwich. On December 14, this insect was again received from Greenwich on

silver and Norway maples; it is said to have caused considerable injury in that section of the town known as Belle Haven. Some of the infested trees have been sprayed each year for the past two years with a miscible oil (1-15) which considerably reduced the infestation, but it was not completely effective because in late fall there was a moderate number of living scales on the trees. Further field tests must be made for the control of this insect before we shall be in a position to make recommendations concerning treatment.

**Flight of Cotton Moth:** For a period of two or three weeks in late September and early October, there were moderate numbers of the cotton moth, *Alabama argillacea* Hubn. resting on the store windows along Chapel Street in New Haven, and Mr. J. L. Rogers observed similar conditions in Bridgeport. On October 8, eight specimens of this moth were received from Waterbury. The invasion seems to have been rather general. Similar flights of moths varying in abundance have been recorded in the Reports of this Station for 1911, page 339; 1912, page 217; 1919, page 202; and 1923, page 313. The larvae of this moth are known to feed only on cotton, and the moths must have migrated from the southern states where cotton is grown. It is believed that the species does not winter anywhere in the United States, but comes in each year from the West Indies, Mexico, or other southern countries.

**Persimmon Psyllid in Connecticut:** On July 17, some insects were received from Dr. Robert T. Morris, Stamford, on persimmon twigs. The leaves were curled at the edges, and the immature psyllids lived under the curled margins. One adult developed and proved to be the persimmon psyllid, *Trioza diospyri* Ashm., a species common on persimmon trees in the South, though not before recorded as occurring in Connecticut. Dr. Morris regards this insect as a destructive pest of cultivated Japanese, American, and hybrid persimmons, and states that the native persimmon is not often attacked. He further states that either the adults or young attack and destroy the terminal buds. Though his cultivated varieties have received several sprayings with tobacco and the infestation has been reduced somewhat, the insect is still sufficiently destructive to halt the growth on many branches. Probably the best chance of control lies in an application of nicotine sulphate solution and soap soon after the eggs hatch and before the leaves are curled.

**European Pine Shoot Moth:** The presence of this insect at Ridgefield was recorded in the Report of this Station for 1923, page 311, and for a longer period the pest has been known to be present on Long Island and in Westchester County, New York, adjoining Connecticut. This insect has been cited in literature



under the name of *Evetria buoliana*, but is now known as *Rhyacionia buoliana* Schiff. In 1925, Messrs. Filley and Zappe observed the characteristic crooked growth or "bayonet shoots" on red or Norway pines growing in Greenwich and also in the plantations of the Bridgeport Hydraulic Company along the highway between Bridgeport and Danbury, probably in the town of Easton. The entomologist visited these areas in company with Mr. Filley, on July 26. Although they saw some of the crooked growth, caused by the larvae killing the buds of the leaders, they were pleasantly surprised to see how readily the red pine adapts itself and recovers from such injuries. In several cases where all buds in a cluster had been killed, adventitious buds had formed, and one of these, if not injured, would replace the leader with almost no deformation. Further observations will be made regarding the injuries caused by this insect.

**Silky Robber Fly:** In making a small vegetable garden on an open hillside at Mount Carmel during May, the writer observed dozens of white larvae in the soil. These were evidently Dip-

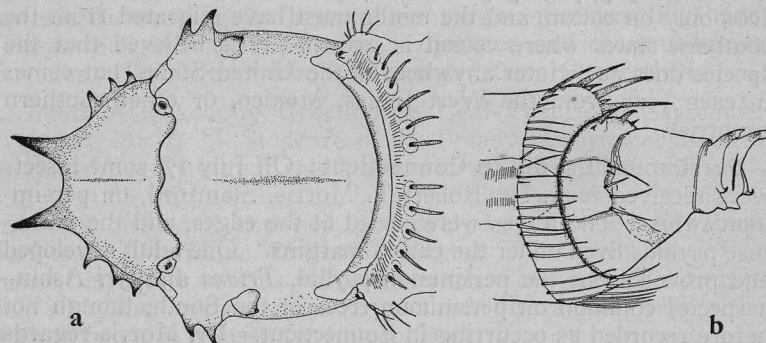


FIG. 11. Pupa of the silky robber fly, *Asilus sericeus* Say. a, dorsal view of head and thorax; enlarged about eight times. b, lateral view of posterior extremity; enlarged about fifteen times.

terous larvae and were nearly an inch in length and of nearly uniform thickness, though tapering slightly, and bluntly pointed at both ends. A row of stiff bristles or spines pointed backward on the dorsum of each segment. Material was gathered and placed in the insectary. In a day or two some of these larvae transformed to golden brown pupae which were much smaller than the larvae. Though the larvae were nearly an inch in length, the pupae were between half and five-eighths of an inch. On the head are borne two rather prominent teeth with a three-toothed lateral projection and the front and lateral margins of the thorax

are peculiarly toothed and scalloped, as shown in figure 11. The pupa has been described in detail by Malloch.<sup>1</sup> On May 29, four adults emerged and proved to be the silky robber fly, *Asilus sericeus* Say, a species with head, thorax, and body together totaling about an inch in length. The general color is golden brown, with darker brown eyes, median stripe on thorax and bases of abdominal segments. The wings are of the same color, with darker marginal cells. The legs are golden brown with darker femora; under surface, legs golden brown with dark brown thorax and abdomen. Larva, pupa and adult are shown on plate XVI. Apparently little is known regarding the larval habits of the silky robber fly. Malloch states that "the habits of the larvae are unknown to me."<sup>2</sup> He also states that "*Asilus notatus* and *Leptogaster flavipes* I have found only in or near woods, and especially in or under decaying wood, and it is very probable that they confine themselves to attacks upon species that are found in such situations—Tenebrionidae and Cerambycidae particularly."<sup>3</sup>

All Asilid larvae are supposedly predaceous, feeding upon other insect larvae. Williston states that "young larvae sometimes bore their way completely within the bodies of other larvae, remaining there till their food is wholly consumed. Often the larvae are found free in the earth, however, where their transformations occur. The eggs are laid about grass stems, or in crevices of decaying logs and trees infested by the larvae of other insects."<sup>4</sup>

Mr. E. L. Bell has recorded his observations on the adult of this fly as a captor of butterflies on the wing. In one case the common pearl crescent, *Phyciodes tharos* Drury, was captured.<sup>5</sup> In another instance the victim was the silver-spotted skipper, *Epargyreus tityrus* Fabr.<sup>6</sup>

<sup>1</sup> Bull. Ill. State Lab. Nat. Hist., Vol. xii, page 386, 1917.

<sup>2</sup> *Ibid.*, page 387.

<sup>3</sup> *Ibid.*, page 374.

<sup>4</sup> Manual of N. A. Diptera (3d ed.), page 106, 1908.

<sup>5</sup> Bull. Brook. Ent. Soc., Vol. xvi, page 96, 1921.

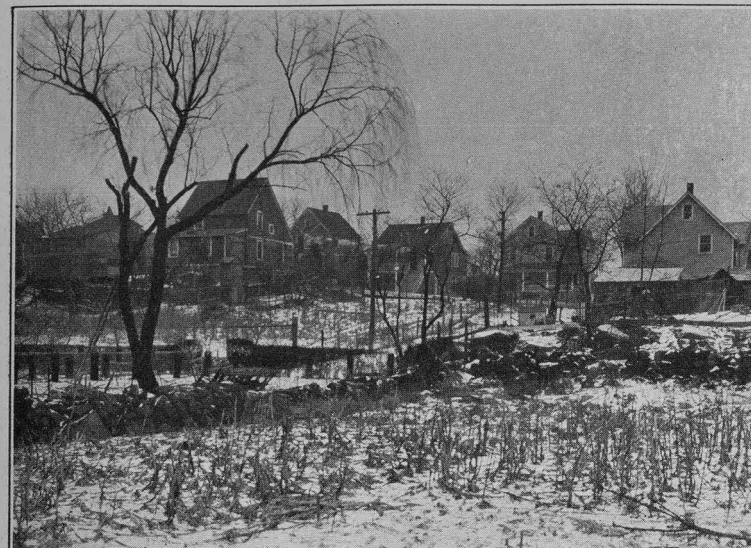
<sup>6</sup> Jour. N. Y. Ent. Soc., Vol. xxxii, page 219, 1924.

# INDEX

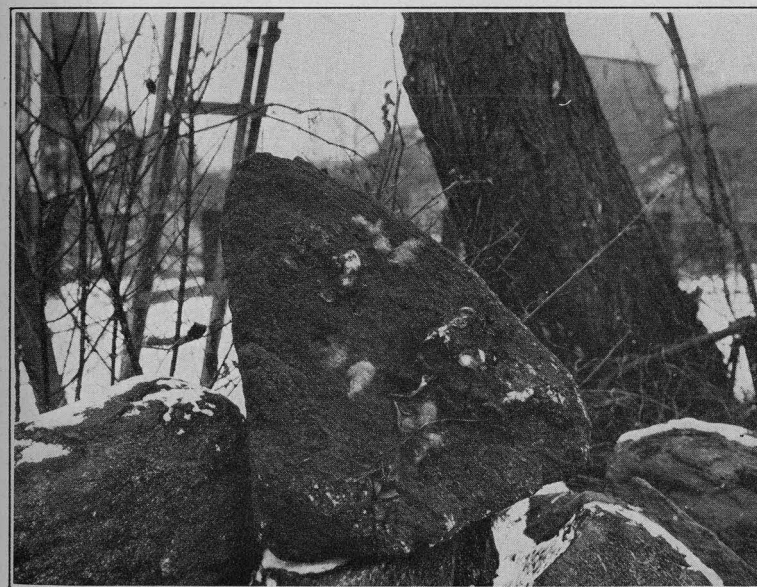
- Acronycta rumicis*, 191  
sp., 191
- Adelges abietis*, 174, 223-228
- Agrilus sinuatus*, 168
- Alabama argillacea*, 277
- Alsophila pometaria*, 169
- Anasa tristis*, 171
- Anastatus bifasciatus*, 215
- Anomala orientalis*, 178, 252-264
- Anuraphis roseus*, 167
- Aphis pomi*, 167
- Apiary inspection, 192-198
- Apple and thorn skeletonizer, 169
- aphid, green, 167
- rosy, 167
- woolly, 167
- leaf-crumpler, 169
- maggot, 169
- red bug, 167
- Archips rosana*, 276
- Ash midrib gall, 176
- Asiatic beetle, 178, 252-264
- quarantine, 255-256
- Asilus notatus*, 279
- sericeus*, 278-279
- Asparagus beetle, 172-173
- spotted, 172-173
- Aspidiotus perniciosus*, 168-169
- Attagenus piceus*, 177
- Aulacaspis pentagona*, 176
- Autographa brassicae*, 171
- Bacillus larvae*, 194
- pluton, 193
- Birch leaf miner, 173
- Blister beetle, black, 173
- margined, 173
- Brevicoryne brassicae*, 171
- Bud moth, 169
- Bulb mite, 177
- Cabbage aphid, 171
- looper, 171
- maggot, 171
- worm, imported, 170
- Calendra oryzae*, 177
- Canker worm, fall, 169
- Carpet beetle, black, 177
- Carpocapsa pomonella*, 170
- Catalpa bungei*, 182
- Cathartus advena*, 276
- Cecidomyia ocellaris*, 176
- poculum, 176
- verrucicola, 176
- Centeter cinerea*, 246
- Chalepus (Odontota) dorsalis*, 175
- Chermes abietis*, 182, 223
- cooleyi, 182
- Chionaspis euonymi*, 176
- furfura, 169
- pinifoliae, 174
- Cockroach, American, 179
- Codling moth, 170
- Colopha ulmicola*, 175
- Conotrachelus nenuphar*, 168
- Contarinia canadensis*, 176
- pyrivora, 168
- Convention of Entomological Workers, 179-181
- Corn borer, European, 177
- Clean-up work, 239-243
- Quarantine, 242-243
- ear worm, 173
- Cotton moth, 277
- Crepidodera helxines*, 182
- Crickets, tree, 169
- Crioceris asparagi*, 172-173
- 12-punctata, 172-173
- Ctenocephalus canis*, 177
- Cucumber beetle, striped, 171
- Cutworms, 170
- climbing, 169
- dingy, 276
- Cyclamen mite, 177
- Datana integerrima*, 174
- Diabrotica vittata*, 171
- Diamond back moth, 171
- Dichomeris marginellus*, 176
- Diprion simile*, 174, 182
- Dog flea, 177
- Elm leaf beetle, 176
- sawfly leaf miner, 174
- Emphytus cinctus*, 191
- Empoa rosae*, 167
- Epargyreus tityrus*, 279
- Epicauda marginata*, 173
- pennsylvanica, 173
- Epilachna borealis*, 172
- Epitrix cucumeris*, 172
- Eriophyes pyri*, 168
- Eriosoma lanigerum*, 167
- Eulia pinatubana*, 174
- velutinana, 169
- Euonymus scale, 176
- Euproctis chrysorrhoea*, 191
- Evetria buoliana*, 278
- Feltia subgothica*, 169, 276
- Fenusa pumila*, 173



- Field crop insects, 177-179  
 Flea beetle, horse-radish, 173  
   potato, 172  
 Foul brood, American, 194, 198  
   European, 193, 198  
 Fruit insects, 167-170  
*Galerucella xanthomelaena* (*luteola*), 176  
 Garden millipede, 176  
   slug, 179  
*Gillettea cooleyi*, 175, 224  
   var. *coweni*, 175, 224  
 Gipsy moth, parasites, 215  
   quarantine, 216-222  
   work, 199-222  
*Glycobi* (*Plagionotus*) *speciosus*, 175  
 Grain beetle, European, 276  
   saw-toothed, 177  
 Grape phylloxera, 167  
   -vine beetle, spotted, 170  
*Hamamelistes spinosus*, 175  
*Harmaloga fumiferana*, 174  
*Heliothis obsoleta*, 173  
*Hemerocampa leucostigma*, 174  
*Hemerophila pariana*, 169  
 Horse-radish flea beetle, 173  
 Household insects, 177  
*Hylemyia brassicae*, 171  
*Hylobius pales*, 175  
*Hypermallus villosus*, 175  
*Hyphantria cunea*, 174  
*Illinoia pisi*, 170  
 Insect collection, 166  
 Inspection, Apiary, 192-198  
   Imported nursery stock, 189-191  
   Nursery, 181-189  
   Raspberry plantations, 188-189  
 Iris borer, 176  
*Janus abbreviatus*, 182  
 Japanese beetle, 178, 244-252, 260  
   Quarantines, 246-250  
   scale, 175, 276-277  
*Julus hortensis*, 176  
 Juniper webworm, 176  
*Kaliofenusa ulmi*, 174  
*Kermes pubescens*, 175  
 Lady beetle, squash, 172  
*Laemophloeus pusillus*, 177  
*Laspeyresia molesta*, 169, 234-239  
 Leafhoppers, 167-168  
 Leaf miner, birch, 173  
   elm sawfly, 174  
   locust, 175  
   oak blotch, 174  
   roller on hickory, 276  
   red-banded, 169  
   -tyer, greenhouse, 276  
*Lecanium corni*, 169  
 Leopard moth, 170  
*Lepidosaphes ulmi*, 175  
*Leptinotarsa decemlineata*, 179  
*Leptobrysa rhododendri*, 176  
*Leptogaster flavipes*, 279  
*Leucaspis japonica*, 175, 276-277  
*Limax maximus*, 179  
*Limonus agonus*, 177  
*Lina scripta*, 182  
 Linden wart gall, 176  
*Listronotus latiusculus*, 173  
*Lithocolletis hamadryadella*, 174  
 Locust leaf miner, 175  
*Lygidea mendax*, 167  
*Macroductylus subspinosus*, 170  
*Macronoctua onusta*, 176  
*Malacosoma americana*, 168  
 Maple aphid, woolly, 175  
   borer, 175  
   bladder gall, 176  
   leaf spot gall, 176  
   scale, cottony, 175  
 Mealy flata, 176, 267-268  
*Melittia satyrimiformis*, 172  
*Mineola indiginella*, 169  
 Mosquito control work, 268-275  
*Neodiprion lecontei*, 174  
*Neoprociphilus aceris*, 175  
*Noctua unicolor*, 169  
*Notolophus antiqua*, 191  
 Nursery firms in Connecticut, 184-188  
   inspection, 181-189  
   pests, 182-183  
   stock, imported, inspection, 189-191  
   pests, 191  
 Oak blotch leaf miner, 174  
   -gall scale, 175  
   spangles, 176  
   twig pruner, 175  
*Oecanthus nigricornis*, 169  
 Oriental peach moth, 169, 234-239  
*Ormenis pruinosa*, 176, 267-268  
   *septentrionalis*, 176  
 Ornamentals, insects attacking, 176-177  
 Oyster-shell scale, 175  
 Pales weevil, 175  
*Papaipema nitela*, 173  
*Paratetranychus pilosus*, 167  
 Parsley stalk-weevil, 173  
 Pea aphid, 170  
 Peach moth, Oriental, 169, 234-239  
   scale, white, 176  
 Pear borer, sinuate, 168  
   leaf blister mite, 168  
   midge, 168  
   psylla, 168  
 Pearl crescent, 279  
*Pelidnota punctata*, 170  
*Periplaneta americana*, 179  
 Persimmon psyllid, 277  
*Phlyctenia ferrugalis*, 276  
*Phyciodes tharos*, 279  
*Phyllocoptes quadripes*, 176  
*Phyllophaga* sp., 179  
*Phyllotreta armoraciae*, 173  
*Phylloxera vitifoliae*, 167  
*Physokermes piceae*, 276  
*Picea canadensis*, 224  
   *excelsa*, 224  
*Pieris rapae*, 170  
 Pine leaf scale, 174  
   sawfly, imported, 174  
   shoot moth, European, 174, 277-278  
   tube moth, 174  
*Plagioderia versicolora*, 182  
 Plum curculio, 168  
*Plutella maculipennis*, 171  
*Popillia japonica*, 178, 244-252, 260  
 Potato beetle, Colorado, 179  
   flea beetle, 172  
*Psylla pyricola*, 168  
 Publications of Department, 162  
*Pulemaria vitis*, 175  
*Pyrausta nubilalis*, 177, 239-243  
 Raspberry inspections, 188-189  
 Receipts and Expenditures, Gipsy  
   moth, 199-200  
   Insect pest, 163  
 Red mite, European, 167  
*Rhabdophaga salicis*, 191  
*Rhagoletis pomonella*, 169  
*Rhizoglyphus hyacinthi*, 177  
 Rhododendron lace bug, 176  
*Rhyacionia buoliana*, 174, 278  
 Rice weevil, 177  
 Robber fly, silky, 278-279  
 Rose chafer, 170  
 Sachbrood, 194-195, 198  
 San José scale, 168-169  
 Satin moth, 173, 264-267  
*Schizotetranychus schizopus*, 176  
 Scurfy scale, 169  
*Silvanus surinamensis*, 177  
 Silver fish, spotted, 177  
 Skipper, silver-spotted, 279  
 Spiny aphid gall, 175  
 Spraying and dusting apples, 228-234  
 Spruce bud worm, 174  
   gall aphid, 174, 223-228  
   blue, 175  
   scale, 276  
 Squash borer, 172  
   bug, 171-172  
   lady beetle, 172  
 Stalk borer, 173  
*Stilpnotia salicis*, 173, 264-267  
*Symphoricarpos*, 183  
*Tarsonemus pallidus*, 177  
 Tent caterpillar, Eastern, 168  
*Thecodiplosis liriiodendri*, 182  
*Thermobia domestica*, 177  
*Tmetocera ocellana*, 169  
*Toumeyella liriiodendri*, 175  
 Tree insects, shade and forest, 173-176  
*Trichogramma minuta*, 236  
*Trioza diospyri*, 277  
 Tulip tree scale, 175  
 Tussock moth, white-marked, 174  
 Vegetable insects, 170-173  
 Walnut caterpillar, 174  
 Webworm, fall, 174  
 White grubs, 179  
 Wireworms, 170  
   Eastern field, 177  
*Zeusera pyrina*, 170



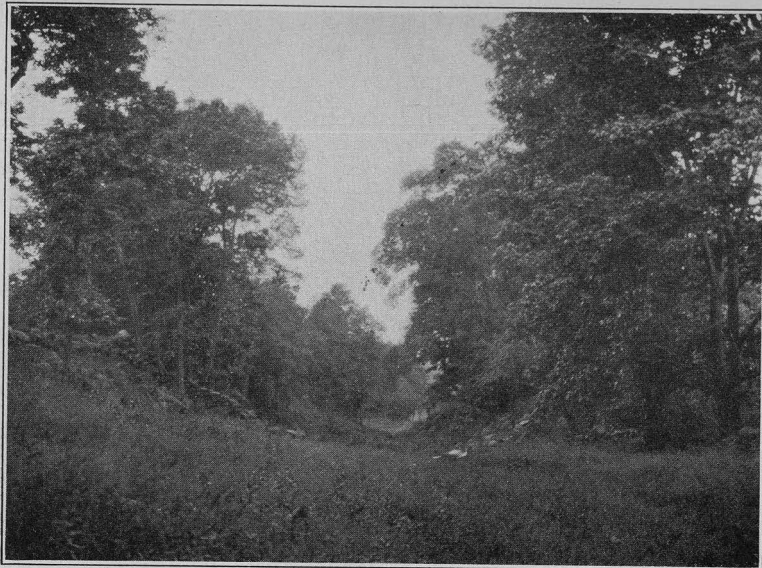
a. General view of gipsy moth infestation discovered in East Port Chester, Greenwich.



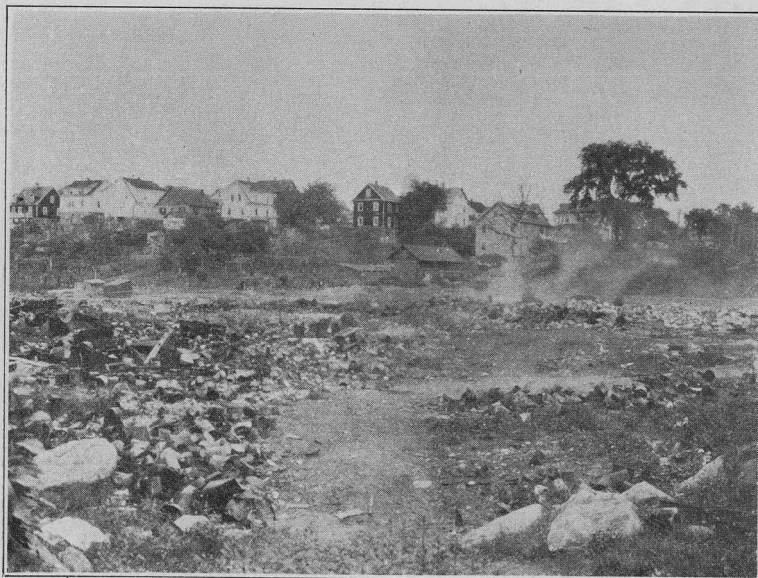
b. Close-up view of tree shown above, with stone of wall upturned to show egg-clusters.

**GIPSY MOTH.**





a. View showing sprayed trees in Greenwich infestation.

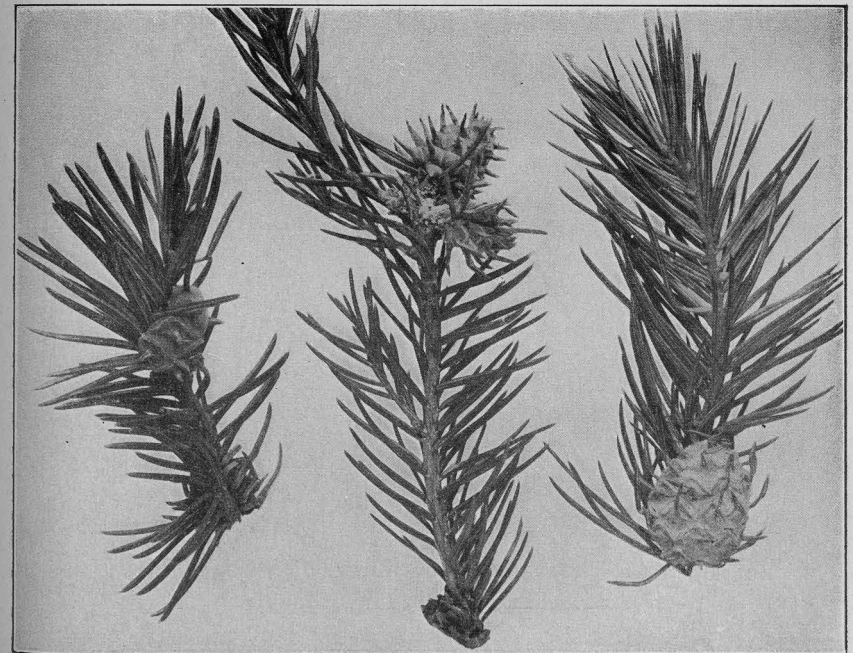


b. View of "dump" near Greenwich infestation.

GIPSY MOTH.



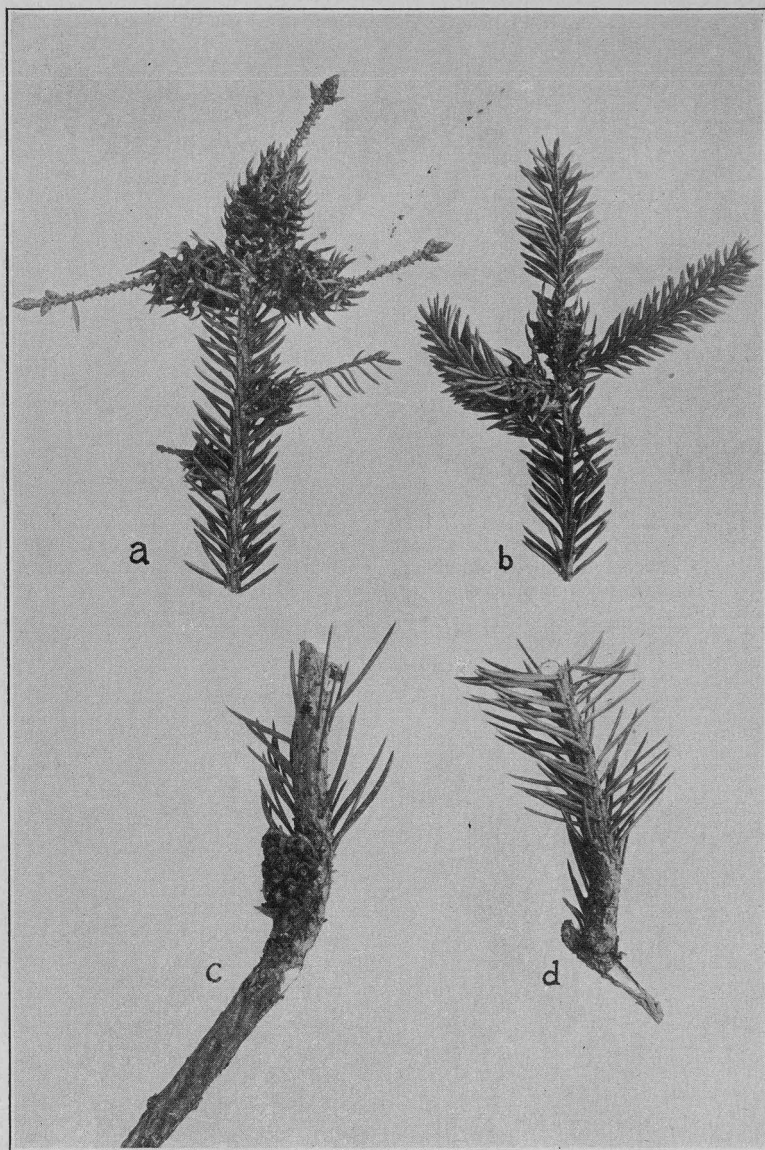
a. Overwintering females of *Adelges abietis* Linn.; left, appearance of females during winter, enlarged ten times; right, appearance of females at time of oviposition, enlarged four times; center, waxy threads removed to show eggs, enlarged four times.



b. Partially developed galls of *Adelges abietis* Linn., on Norway spruce, natural size.

SPRUCE GALL APHIDS.





Galls of *Adelges abietis* Linn. on twigs of Norway spruce,  
natural size.

SPRUCE GALL APHIDS.



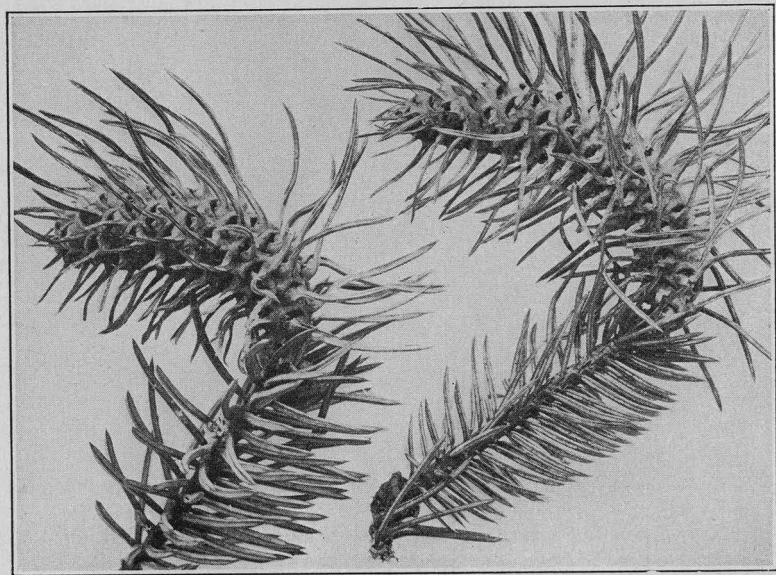
Young Norway spruce covered with galls of *Adelges abietis* Linn.

SPRUCE GALL APHIDS.





a. *Gillettea cooleyi* var. *coweni* Gillette, on Douglas fir, twice enlarged.



b. Galls of *Gillettea cooleyi* Gillette, on blue spruce, natural size.

SPRUCE GALL APHIDS.



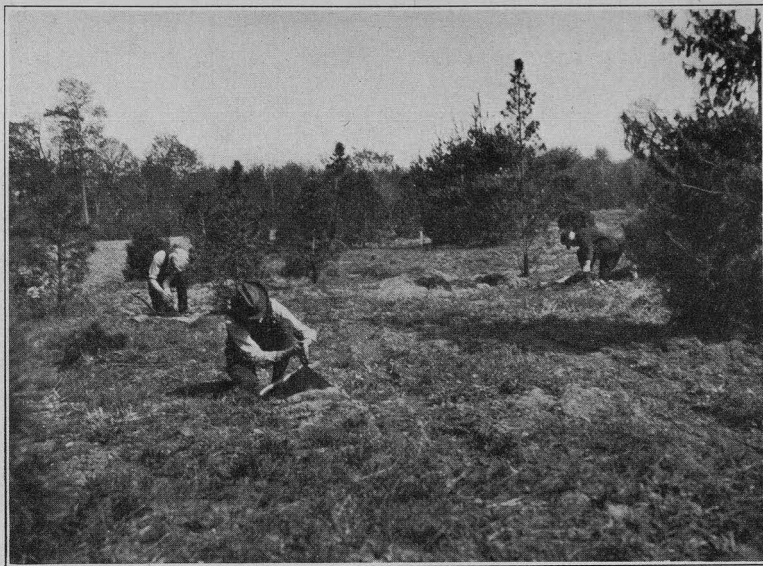
a. View of barn rented as headquarters, 132 West Elm Street; end of insectary may be seen in the rear at left.



b. Insectary built for life history studies, at 132 West Elm Street.

ASIATIC BEETLE WORK.





a. View in nursery where men are making diggings in search for grubs; none were found here.



b. Making a digging in a lawn.  
**ASIATIC BEETLE WORK.**

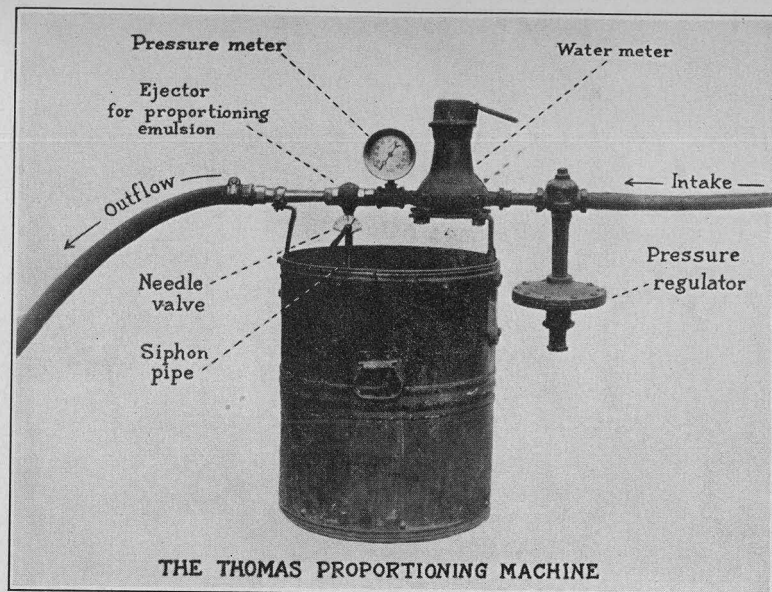


a. Lawn on McKinley Avenue, showing injury by grubs.



b. Lawn on Edgewood Avenue showing spots injured by grubs.  
**ASIATIC BEETLE WORK.**





a. View of Thomas Proportioning Machine.



b. Nozzle discharging emulsion upon a lawn.

ASIATIC BEETLE WORK.



a. Method of applying emulsion to lawns.



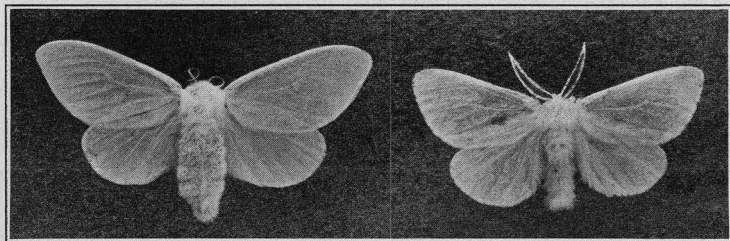
b. Method of treating flower beds.

ASIATIC BEETLE WORK.

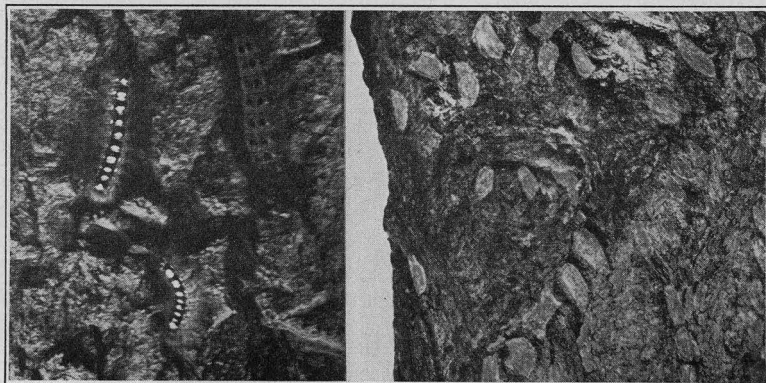




a. Method of treating soil around roots of trees to kill grubs of Asiatic beetle.

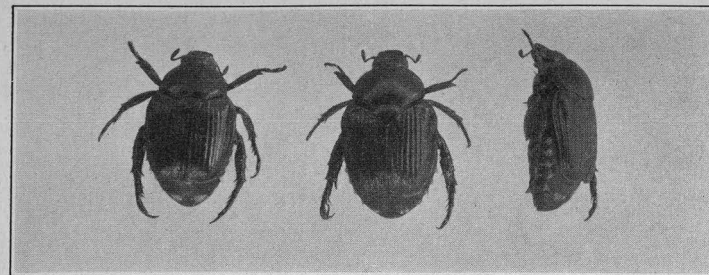


b. Female and male satin moths, natural size (After Burgess and Crossman, Dept. Bull. 1469 U. S. Dept. of Agriculture).

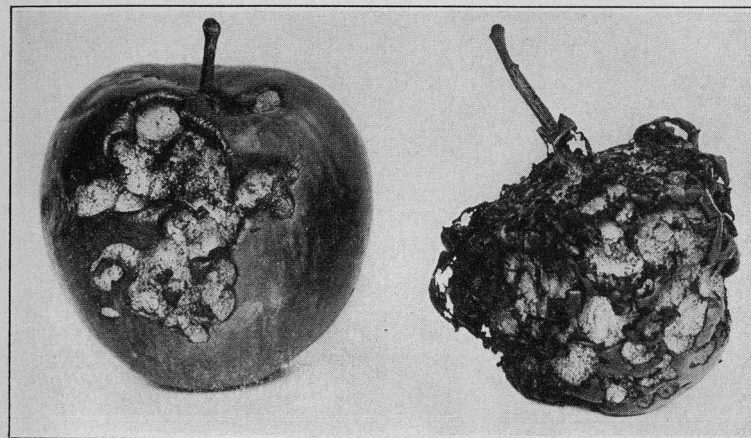


c. (Left) Caterpillars, and (right) winter cases of satin moth (After Burgess and Crossman, Dept. Bull. 1469, U. S. Dept. of Agriculture).

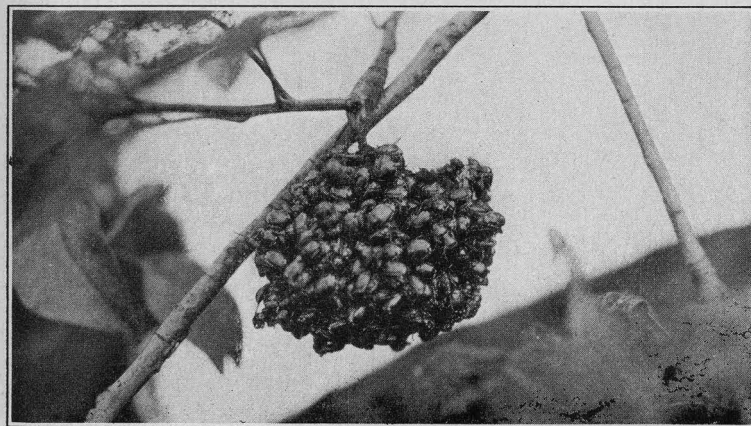
ASIATIC BEETLE WORK AND SATIN MOTH.



a. Japanese beetle, *Popillia japonica* Newm.; adults twice enlarged.



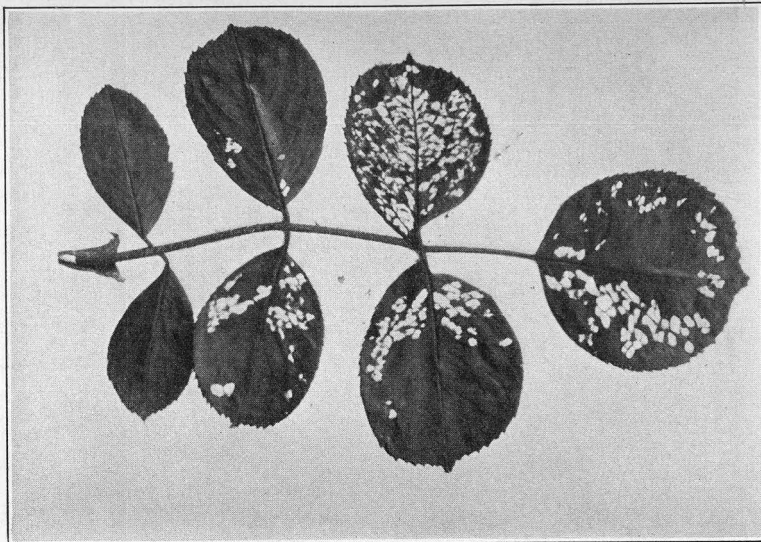
b. Apples injured by Japanese beetles (After Jap. Beetle Lab. U. S. Dept. of Agriculture).



c. Japanese beetles clustered on fruit (After Jap. Beetle Lab., U. S. Dept. of Agriculture).

JAPANESE BEETLE.



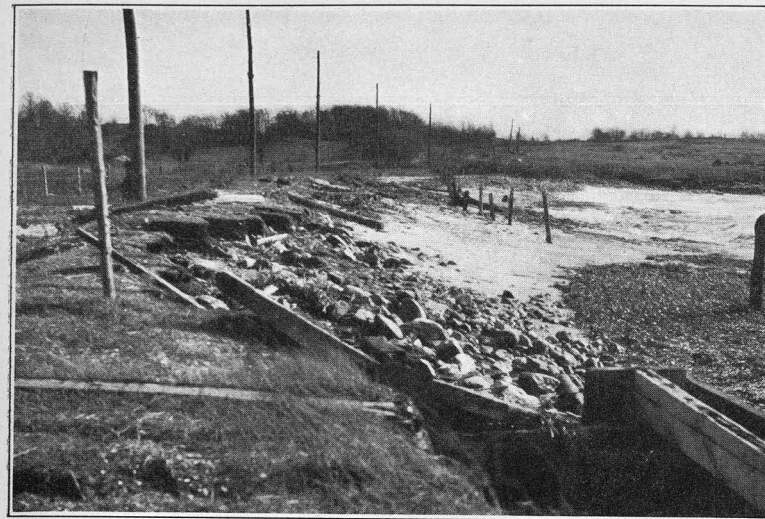


a. Rose leaves eaten by Japanese beetles, natural size.

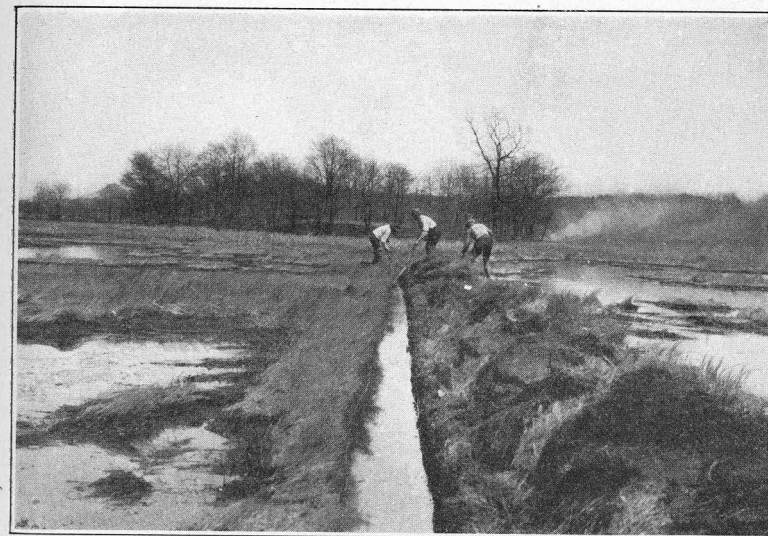


b. View in a Stamford back yard where Japanese beetles were found.

JAPANESE BEETLE.

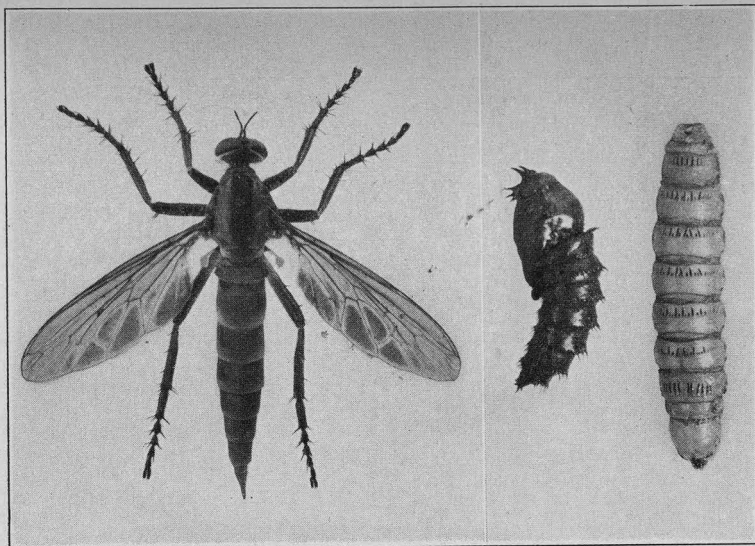


a. Dike at Leetes Island, Guilford, damaged by storms.

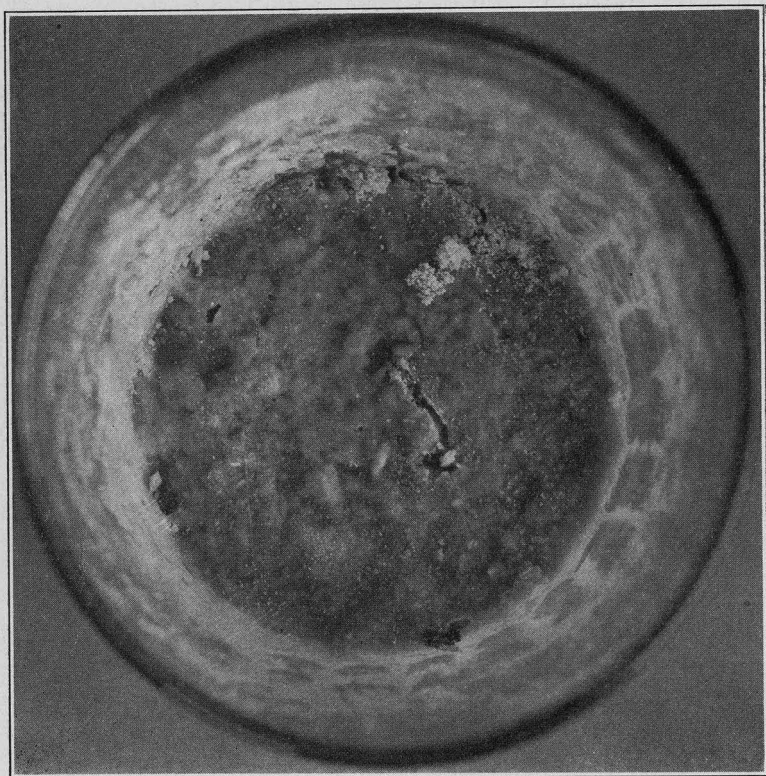


b. Cleaning ditches, New Haven.

MOSQUITO CONTROL WORK.



a. Silky robber fly, *Asilus sericeus* Say. Adult at left, larva at right, pupa case in center, all twice enlarged.



b. Artificial mixture showing tunnel just beneath the surface, and piles of frass like those found on fruits, where larvae of Oriental peach moth have entered.

**SILKY ROBBER FLY AND ORIENTAL PEACH MOTH.**

## Connecticut Agricultural Experiment Station

New Haven, Connecticut

## Connecticut Agricultural Experiment Station

Bulletin 286

### (Tables of composition of Common Foods and Special Foods)

#### ERRATA.

Page 308, item Beans, Lima, read calories 97.

Page 309, item Tangelo juice, read carbohydrate 9.0.

Page 311, item Pine nuts, Sabine, read carbohydrate 8.4, fat 53.7, calories 629.

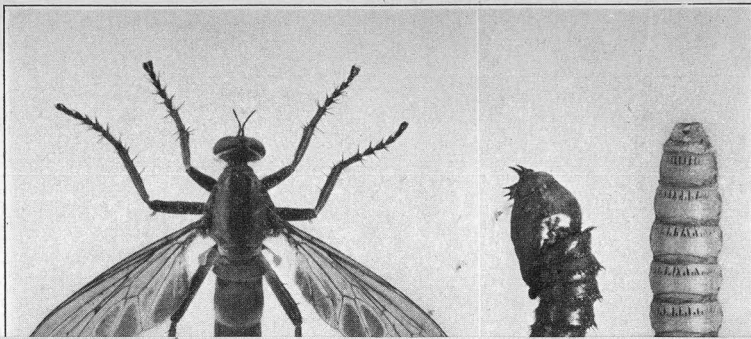
Page 340, item 1919 Diabetic Almond Macaroons, read calories 583.

Page 355, item Pears, Bartlett, read calories 23.

Page 356, item 1924 Alp Rose Royal Ann Cherries, read calories 54.

The Bulletins of this Station are mailed free to citizens of Connecticut who apply for them, and to other applicants as far as the editions permit.





Connecticut Agricultural Experiment Station  
New Haven, Connecticut

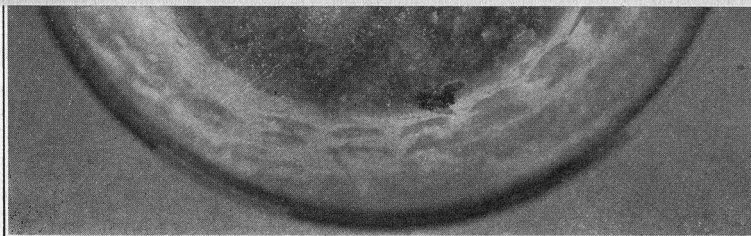
The Thirty-First Report on  
FOOD PRODUCTS  
and the Nineteenth Report on  
DRUG PRODUCTS

1926

Part I

Tables of Analyses of Foods

By  
E. M. BAILEY



b. Artificial mixture showing tunnel just beneath the surface, and piles of frass like those found on fruits, where larvae of Oriental peach moth have entered.

SILKY ROBBER FLY AND ORIENTAL PEACH MOTH.

The Bulletins of this Station are mailed free to citizens of Connecticut who apply for them, and to other applicants as far as the editions permit.

# CONNECTICUT AGRICULTURAL EXPERIMENT STATION

## OFFICERS AND STAFF

as of

April, 1927

### BOARD OF CONTROL

His Excellency, Governor John H. Trumbull, <i>ex-officio</i> , President	
Charles R. Treat, <i>Vice-President</i> .....	Orange
George A. Hopson, <i>Secretary</i> .....	Mount Carmel
Wm. L. Slate, <i>Treasurer</i> .....	New Haven
Joseph W. Alsop .....	Avon
Elijah Rogers .....	Southington
Edward C. Schneider .....	Middletown
Francis F. Lincoln .....	Cheshire

### STAFF.

	E. H. JENKINS, PH.D., <i>Director Emeritus</i> .
Administration.	WM. L. SLATE, B.Sc., <i>Director and Treasurer</i> . MISS L. M. BRAUTLECHT, <i>Bookkeeper and Librarian</i> . MISS J. V. BERGER, <i>Stenographer and Bookkeeper</i> . MISS MARY E. BRADLEY, <i>Secretary</i> . G. E. GRAHAM, <i>In charge of Buildings and Grounds</i> .
Chemistry:	E. M. BAILEY, PH.D., <i>Chemist in Charge</i> .
Analytical	C. E. SHEPARD
Laboratory.	OWEN L. NOAN } <i>Assistant Chemists</i> . HARRY J. FISHER, A.B. } W. T. MATHIS } FRANK C. SHELDON, <i>Laboratory Assistant</i> . V. L. CHURCHILL, <i>Sampling Agent</i> . MISS MABEL BACON, <i>Stenographer</i> .
Biochemical	T. B. OSBORNE, PH.D., <i>Chemist in Charge</i> .
Laboratory.	H. B. VICKERY, PH.D., <i>Biochemist</i> . MISS HELEN C. CANNON, B.S., <i>Dietitian</i> .
Botany.	G. P. CLINTON, Sc.D., <i>Botanist in Charge</i> . E. M. STODDARD, B.S., <i>Pomologist</i> . MISS FLORENCE A. McCORMICK, PH.D., <i>Pathologist</i> . WILLIS R. HUNT, PH.D., <i>Assistant in Botany</i> . A. D. McDONNELL, <i>General Assistant</i> . MRS. W. W. KELSEY, <i>Secretary</i> .
Entomology.	W. E. BRITTON, PH.D., <i>Entomologist in Charge</i> ; also <i>State Entomologist</i> . B. H. WALDEN, B.AGR. } <i>Assistant Entomologists</i> . M. P. ZAPPE, B.S. } PHILIP GARMAN, PH.D. } ROGER B. FRIEND, B.Sc., <i>Graduate Assistant</i> . JOHN T. ASHWORTH, <i>Deputy in Charge of Gipsy Moth Work</i> . R. C. BOTSFORD, <i>Deputy in Charge of Mosquito Elimination</i> . MISS GRACE A. FOOTE, B.A., <i>Secretary</i> .
Forestry.	WALTER O. FILLEY, <i>Forester in Charge</i> . H. W. HICOCK, M.F., <i>Assistant Forester</i> . J. E. RILEY, JR., M.F., <i>In charge of Blister Rust Control</i> . MISS PAULINE A. MERCHANT, <i>Stenographer</i> .
Plant Breeding.	DONALD F. JONES, S.D., <i>Geneticist in Charge</i> . W. R. SINGLETON, S.M., <i>Graduate Assistant</i> . H. R. MURRAY, B.S., <i>Graduate Assistant</i> .
Soil Research.	M. F. MORGAN, M.S., <i>Investigator</i> . H. G. M. JACOBSON, M.S., <i>Assistant</i> .
Tobacco Sub-station at Windsor.	PAUL J. ANDERSON, PH.D., <i>Pathologist in Charge</i> . N. T. NELSON, PH.D., <i>Plant Physiologist</i> .

### CONTENTS

	PAGE
Introduction .....	289
Definition of "Diabetic" food revoked .....	290
Rôle of the Nutrients .....	290
Analyses of common foods .....	293
Analyses of special foods, etc. ....	312



## The Thirty-First Report on Food Products and the Nineteenth Report on Drug Products

### PART I

#### Analyses of Common Foods and Special Foods

E. M. BAILEY

For many years the Station has given considerable attention to the analysis of special foods offered for use in the dietary of the diabetic patient. From time to time such analyses have been summarized in special bulletins,<sup>1</sup> the first in 1906 and others in 1913 and 1919. The purpose of such work is solely to furnish reliable information as to the composition of these foods for the guidance of physicians, dietitians and others interested in diabetes and in diabetic treatment. No particular foods are recommended; no advice is given in bulletins or otherwise as to the formulation of dietaries; and the inclusion of products in these compilations does not necessarily mean that such products are adapted to the purpose for which they are offered.

In all methods of treatment of diabetes careful regulation of diet is of paramount importance. The discovery of insulin has revolutionized treatment of this disease; it permits the patient to take more food, but proper choice of food and regulation of its quantity are still necessary.

Successful diets for diabetics may be formulated by proper selection of common foods quite as well as by the use of special foods although there can be no objection to such special foods when offered without misrepresentation. Many of them, no doubt, serve useful purposes. Such special products are expensive in most cases, however, and many physicians hesitate to encourage their use for that reason. Because of this, and also because of the increased tolerance which the use of insulin affords, the utilization of common foods is of increasing interest to the physician and to the patient. It seems desirable, therefore, also to include in the present bulletin analyses of some of these foods. For the most part such analyses are taken from well-known sources and they are already widely quoted.

---

<sup>1</sup> Conn. Agr. Exp. Sta., 11th Report on Food Products, pp. 153-165, 1906.  
" " " " 18th " " " " 1913.  
" " " " 24th " " " " Part II, 1919.

## OFFICIAL DEFINITION OF "DIABETIC" FOOD REVOKED

There is no longer any Federal definition of a "diabetic" food.<sup>2</sup> Since such products are offered as dietetic aids in the control or mitigation of disease they are regarded by food control officials as therapeutic agents rather than as foods and more properly regulated under the provisions of the Food and Drugs Act which refer to drugs.

The term "diabetic" as applied to this type of foods has been much abused in the past; many foods which differ but little from common foods of the same class have been designated by that term. Moreover it may be true that some patients have been led to believe that foods bearing the qualification "diabetic" are curative or mitigative in themselves rather than merely dietetic adjuncts. For these reasons regulatory officials are inclined to discourage the use of the term "diabetic" as a part of the name of these special foods and in explanatory literature concerning them.

## RÔLE OF THE NUTRIENTS AND THE SIGNIFICANCE OF TERMS USED IN ANALYSES.

The conventional analysis of foods shows their composition in terms of the proximate constituent groups, viz., moisture, ash, protein, carbohydrate and fat. Nearly all foods contain some water, the proportion varying from ten per cent or less in air-dry cereals for example, up to ninety per cent or more in fresh fruits and vegetables. Ash represents iron, calcium, phosphorus, and other mineral elements. Protein represents nitrogenous materials. Protein is not determined as such, but is always estimated from the nitrogen in the food. For this estimation nitrogen is generally multiplied by the factor 6.25, the assumption being that protein contains 16 per cent of nitrogen. But proteins vary in their nitrogen content and other factors are more accurate in certain cases; for example 6.38 is more nearly correct for casein and 5.70 for gluten. Food analyses do not take into account the differences in quality of various proteins; and, moreover, nitrogenous material of a non-protein character may be reckoned as protein.

In the process of digestion protein is broken down ultimately into a large number of simpler substances called amino-acids. The nitrogenous part of these protein derivatives is eliminated chiefly as urea; the non-nitrogenous part is either burned as fuel or converted into carbohydrate and, directly or indirectly, into fat.

<sup>2</sup> Revoked by U. S. Dept. Agr., Food Inspection Decision 199.

In diabetes this protein-derived carbohydrate may be excreted just as in the case of carbohydrate ingested as such.

Carbohydrate includes sugar, starch, dextrin and related nitrogen-free substances. Fiber also belongs to the carbohydrate group but it is not regarded as a nutrient in human digestion although it may be a mechanical aid to the digestive process. The carbohydrate group, sometimes called nitrogen-free extract, is generally, and a part of it almost always, estimated by calculation; the difference between 100 per cent and the sum of the percentages of determined items is taken as the percentage of this nutrient group.

The dietitian frequently wishes to know how much of the carbohydrate is "available" in digestion. This question cannot be answered without reservations. That portion which is composed of starch, sucrose and other sugars and dextrin is assimilable; the remainder, consisting of hemicellulose complexes, is of doubtful or undetermined availability. Joslin<sup>1</sup> has discussed some of the commoner carbohydrates from the standpoint of their influence upon the metabolism in diabetes. Among the hemicelluloses pentosans and galactans are conspicuous. Pentosans are the principal constituents of vegetable gums, the fibrous tissues of vegetables and the outer coats of cereal grains. Galactans occur in small quantities in many plants and in larger amounts in leguminous seeds. The digestibility of some of these substances as they occur in lichens and certain algae has been investigated by Schwartz<sup>2</sup> who observed that pentosans may very largely disappear from the alimentary tract, probably through the agency of bacterial activity; but that galactans exhibit a high degree of resistance to bacterial decomposition. Whether pentosans serve as true nutrients however was not determined. In general, hemicelluloses do not appear to be important sources of energy in nutrition.

Fat includes besides true fat and oil other substances soluble in ether. Mineral oil, which is used to a considerable extent in the preparation of low calorie products, is included as fat although, of course, it is unassimilable.

Under normal conditions fats are oxidized in the body to carbon dioxide and water, but in this change carbohydrate plays an important part. In the treatment of diabetes limitation of carbohydrate is a necessary expedient, but it is a common observation that on a carbohydrate-free diet, or one in which fat has been increased to compensate for the withdrawal of carbohydrate, there may be an incomplete oxidation of fat as indicated by the elimination of  $\beta$ -oxybutyric acid, acetoacetic acid and acetone; in other words, a condition of acidosis or ketosis results. Investiga-

<sup>1</sup> Treatment of Diabetes Mellitus, 3d edition, p. 427.

<sup>2</sup> Conn. Acad. Arts and Sci., 16, pp. 247-382, 1911.



tion has shown that certain nutrients interfere with the complete oxidation of fats while others favor that process, and this observation has resulted in a classification of the nutrients on this basis. Fats favor the production of acetone bodies and hence are regarded as ketogenic in their action; carbohydrates tend to inhibit the formation of acetone bodies and are therefore antiketogenic nutrients. Proteins to the extent in which they contain sugar-yielding amino-acids are antiketogenic; but with respect to other amino-acids present they are ketogenic.

This relation between ketogenic and antiketogenic nutrients is called the ketogenic ratio (K/A) and is of practical usefulness in dietary studies. Ladd and Palmer<sup>1</sup> have suggested a convenient formula for calculating this ratio when only the composition of the diet is known:

$$\frac{K}{A} = \frac{\text{gram Fat}}{(0.58 \times \text{gram Protein} + \text{gram Carbohydrate})}$$

When this ratio exceeds 4:1 ketosis is likely to occur according to these investigators.

In calculating calories the entire carbohydrate group (other than fiber) has been included. It is clear that our information is not complete enough to justify an attempt to include only that part of the carbohydrate which may be called "available." In certain products in which the fat was found, or known, to be largely mineral oil, and in a few other instances where the carbohydrate probably consists largely of hemicellulose complexes, calorie values have been omitted.

#### TABLES OF ANALYSES.

The analyses given in Table I are of some common foods and are taken largely from the classic work of Atwater and Bryant.<sup>2</sup> Many, however, are taken from various bulletins of this Station and some are from other sources.

The analyses in Table II are taken from a previous bulletin of this Station issued in 1919 with such additions as have been made since that time up to and including 1926.

Acknowledgment is due to Dr. E. P. Joslin who has called our attention to new or unusual products and has frequently obtained samples; also to Professor Lafayette B. Mendel for similar courtesies and for counsel and suggestions from time to time; to the chemists of the department staff for analyses, chiefly to Mr. Shepard who is responsible for the examination of so-called diabetic and special foods; and to Miss Bacon who has assisted largely in the work of compilation.

<sup>1</sup> Am. Jour. Med. Sci., 166, 157, 1923.

<sup>2</sup> U. S. Dept. Agr., Office of Experiment Stations, Bull. 28.

TABLE I. ANALYSES OF COMMON FOODS.  
(Analyses are of edible portion unless otherwise stated)

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
<b>Meat and Meat Products.</b>							
Beef, fresh:	%	%	%	%	%	%	
Brisket, medium fat .....	54.6	0.9	15.8	....	....	28.5	319
Chuck rib .....	66.8	1.0	19.0	....	....	13.4	197
Flank .....	59.3	0.9	19.6	....	....	21.1	268
Loin .....	61.3	1.0	19.0	....	....	19.1	247
Neck .....	66.3	1.0	20.7	....	....	12.7	197
Plate .....	56.3	0.8	16.8	....	....	26.9	309
Ribs .....	57.0	0.9	17.8	....	....	24.6	293
Round .....	67.8	1.1	20.9	....	....	10.6	179
Rump, lean .....	65.7	1.0	20.9	....	....	13.7	207
Shank, fore .....	70.3	0.9	21.4	....	....	8.1	158
hind .....	69.6	1.0	21.7	....	....	8.7	165
Shoulder and clod .....	68.9	1.1	20.0	....	....	10.3	173
Soup Stock .....	89.1	3.6	5.8	....	....	1.5	36
Miscellaneous cuts, free from visible fat .....	73.8	1.2	22.4	....	....	2.9	116
Beef organs, fresh:							
Brain .....	80.6	1.1	8.8	....	....	9.3	119
Heart .....	62.6	1.0	16.0	....	....	20.4	248
Kidney, as purchased .....	63.1	1.0	13.7	....	0.4	1.9	73
Liver, as purchased .....	65.6	1.3	20.2	....	2.5 <sup>1</sup>	3.1	119
Lungs, as purchased .....	79.7	1.0	16.4	....	....	3.2	94
Marrow, as purchased .....	3.3	1.3	2.2	....	....	92.8	844
Sweet breads, as purchased ....	70.9	1.6	16.8	....	....	12.1	176
Suet, as purchased .....	13.7	0.3	4.7	....	....	81.8	755
Tongue .....	70.8	1.0	18.9	....	....	9.2	158
Beef, cooked:							
Roast .....	....	....	22.3	....	....	28.6	347
Steak, round, fat partly removed	63.0	1.8	27.6	....	....	7.7	180
sirloin .....	63.7	1.4	23.9	....	....	10.2	187
tenderloin .....	54.8	1.2	23.5	....	....	20.4	278
Beef, canned:							
Corned .....	56.4	4.7 <sup>2</sup>	26.6	....	....	11.4	200
Dried and smoked .....	47.4	12.5 <sup>3</sup>	32.6	....	....	7.5	198
Kidney, stewed .....	71.9	2.5	18.4	....	2.1	5.1	128
Luncheon .....	52.9	4.8	27.6	....	....	15.9	254
Roast .....	58.9	1.3	25.9	....	....	14.8	237
Sweetbreads .....	69.0	2.0	20.2	....	....	9.5	166
Tongue, ground .....	49.9	4.0	21.4	....	....	25.1	312
whole .....	51.3	4.0	19.5	....	....	23.2	287
Tripe .....	74.6	0.5	16.8	....	....	8.5	144

<sup>1</sup> Largely, or in part, glycogen.

<sup>2</sup> Average 3.4 per cent salt (sodium chloride).

<sup>3</sup> Average 9.7 per cent salt (sodium chloride).

TABLE I. ANALYSES OF COMMON FOODS—Continued.

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
<b>Meat and Meat Products—Continued.</b>							
Beef, corned and pickled:	%	%	%	%	%	%	
Corned beef, all analyses	53.6	4.9	15.6	....	....	26.2	298
Spiced, rolled	30.0	6.8	12.0	....	....	51.4	511
Tongue, pickled	62.3	4.7	12.8	....	....	20.5	236
Tripe	86.5	0.3	11.7	....	0.2	1.2	58
Beef, dried, salted and smoked	54.3	9.1	30.0	....	....	6.5	179
Veal, fresh:							
Breast	68.2	1.0	20.3	....	....	11.0	180
Chuck	73.8	1.0	19.7	....	....	5.8	131
Flank, as purchased	66.9	1.0	20.1	....	....	12.7	195
Leg	71.7	1.1	20.7	....	....	6.7	143
Leg cutlets	70.7	1.1	20.3	....	....	7.7	151
Loin	69.5	1.1	19.9	....	....	10.0	170
Rib	69.8	1.1	20.2	....	....	9.4	165
Rump	62.6	1.1	19.8	....	....	16.2	225
Shoulder	73.4	1.3	20.7	....	....	4.6	124
Veal organs, fresh:							
Heart, as purchased	73.2	1.0	16.8	....	....	9.6	154
Kidney, as purchased	75.8	1.3	16.9	....	....	6.4	125
Liver, as purchased	73.0	1.3	19.0	....	....	5.3	124
Lungs, as purchased	76.8	1.1	17.1	....	....	5.0	113
Mutton, fresh:							
Chuck	48.2	0.8	14.6	....	....	36.8	390
Leg, hind, medium fat	62.8	1.0	18.5	....	....	18.0	236
Loin	50.2	0.8	16.0	....	....	33.1	362
Shoulder, medium fat	61.9	0.9	17.7	....	....	19.9	250
Mutton organs, fresh:							
Heart, as purchased	69.5	0.9	16.9	....	....	12.6	181
Kidney, as purchased	78.7	1.3	16.5	....	....	3.2	95
Liver, as purchased	61.2	1.7	23.1	....	5.0 <sup>1</sup>	9.0	193
Lungs, as purchased	75.9	1.2	20.2	....	....	2.8	106
Mutton, cooked:							
Leg roast	50.9	1.2	25.0	....	....	22.6	303
Mutton, canned:							
Corned	45.8	4.2	28.8	....	....	22.8	320
Tongue	47.6	4.8	24.4	....	....	24.0	314
Lamb, fresh:							
Breast	56.2	1.0	19.1	....	....	23.6	280
Leg, hind, medium fat	63.9	1.1	19.2	....	....	16.5	225
Loin	53.1	1.0	18.7	....	....	28.3	330
Shoulder	51.8	1.0	18.1	....	....	29.7	340
Lamb, cooked:							
Chops, broiled	47.6	1.3	21.7	....	....	29.9	356
Leg, roast	67.1	0.8	19.7	....	....	12.7	193

<sup>1</sup> Largely, or in part, glycogen.

TABLE I. ANALYSES OF COMMON FOODS—Continued.

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
<b>Meat and Meat Products—Concluded.</b>							
Lamb, canned:							
Tongue, spiced, cooked	67.4	0.5	13.9	....	....	17.8	216
Pork, fresh:							
Ham, lean	60.0	1.3	25.0	....	....	14.4	230
Ham, medium fat	53.9	0.8	15.3	....	....	28.9	321
Head cheese	43.3	3.3	19.5	....	....	33.8	382
Loin (chops), lean	60.3	1.0	20.3	....	....	19.0	252
Loin (chops), medium fat	52.0	1.0	16.6	....	....	30.1	337
Shoulder	51.2	0.8	13.3	....	....	34.2	361
Side, fat	29.4	0.4	9.4	....	....	61.7	593
Side, lean	34.4	0.5	9.1	....	....	55.3	534
Pork organs, fresh:							
Brains, as purchased	75.8	1.6	11.7	....	....	10.3	140
Heart, as purchased	75.6	1.0	17.1	....	....	6.3	125
Kidney, as purchased	77.8	1.2	15.5	....	0.7	4.8	108
Liver, as purchased	71.4	1.4	21.3	....	1.4 <sup>1</sup>	4.5	131
Lungs, as purchased	83.3	0.9	11.9	....	....	4.0	84
Pork, pickled, salted or smoked: <sup>2</sup>							
Ham, lean, smoked	53.5	5.5	19.8	....	....	20.8	266
Ham, medium fat, smoked	40.3	4.8	16.3	....	....	38.8	414
Ham, luncheon, cooked	49.2	5.8	22.5	....	....	21.0	279
Shoulder, medium fat, smoked	45.0	6.7	15.9	....	....	32.5	356
Pig's tongue, pickled	58.6	3.6	17.7	....	....	19.8	249
Pig's feet, pickled	68.2	0.9	16.3	....	....	14.8	198
Salt pork, clear fat	7.9	3.9	1.9	....	....	86.2	783
Bacon, smoked	20.2	5.1	10.5	....	....	64.8	625
Ham, deviled	44.1	3.3	19.0	....	....	34.1	383
Sausage:							
Arles	17.2	7.3	26.8	....	....	50.6	563
Bologna	60.0	3.7	18.7	....	0.3 <sup>3</sup>	17.6	234
Frankfurt	57.2	3.4	19.6	....	1.1 <sup>4</sup>	18.6	250
Pork, as purchased	39.8	2.2	13.0	....	1.1 <sup>5</sup>	44.2	454
Pork and beef, as purchased	55.4	1.0	19.4	....	....	24.1	295
Poultry, fresh:							
Chicken, broilers	74.8	1.1	21.5	....	....	2.5	109
Chicken heart, as purchased	72.0	1.4	20.7	....	....	5.5	132
Chicken gizzard, as purchased	72.5	1.4	24.7	....	....	1.4	111
Chicken liver, as purchased	69.3	1.7	22.4	....	2.4 <sup>1</sup>	4.2	137
Fowls	63.7	1.0	19.3	....	....	16.3	224
Goose	46.7	0.8	16.3	....	....	36.2	391
Goose liver, as purchased	62.6	1.2	16.6	....	3.7 <sup>1</sup>	15.9	224
Turkey	55.5	1.0	21.1	....	....	22.9	291

<sup>1</sup> Largely, or in part, glycogen.<sup>2</sup> The range of salt content for cured pork products may be taken as 3 to 5 per cent.<sup>3</sup> Carbohydrate range 0.2 to 3.1 per cent.<sup>4</sup> Carbohydrate range 0.0 to 6.6 per cent.<sup>5</sup> Carbohydrate range 0.0 to 8.6 per cent.



TABLE I. ANALYSES OF COMMON FOODS—Continued.

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
<b>Fish and Fish Products.</b>							
Fish, fresh:	%	%	%	%	%	%	
Alewife .....	74.4	1.5	19.4	....	....	4.9	122
Bass, black .....	76.7	1.2	20.6	....	....	1.7	98
Bass, red .....	81.6	1.2	16.9	....	....	0.5	72
Bass, sea .....	79.3	1.4	19.8	....	....	0.5	84
Bass, striped .....	77.7	1.2	18.6	....	....	2.8	100
Blackfish .....	79.1	1.1	18.7	....	....	1.3	87
Bluefish .....	78.5	1.3	19.4	....	....	1.2	88
Butterfish .....	70.0	1.2	18.0	....	....	11.0	171
Cod .....	82.5	0.9	16.7	....	....	0.3	70
Cod, steak .....	79.7	1.2	18.7	....	....	0.5	79
Eels, salt water .....	71.6	1.0	18.6	....	....	9.1	156
Flounder .....	84.2	1.3	14.2	....	....	0.6	62
Haddock .....	81.7	1.2	17.2	....	....	0.3	72
Halibut .....	75.4	1.0	18.6	....	....	5.2	121
Herring .....	72.5	1.5	19.5	....	....	7.1	142
Mackerel .....	73.4	1.2	18.7	....	....	7.1	139
Perch .....	77.5	1.2	19.0	....	....	2.4	98
Pickering .....	79.8	1.1	18.7	....	....	0.5	79
Porgy .....	75.0	1.4	18.6	....	....	5.1	120
Salmon .....	64.6	1.4	22.0	....	....	12.8	203
Shad .....	70.6	1.3	18.8	....	....	9.5	161
Shad roe .....	71.2	1.5	20.9	....	2.6	3.8	128
Smelt .....	79.2	1.7	17.6	....	....	1.8	87
Trout, brook .....	77.8	1.2	19.2	....	....	2.1	96
Trout, lake .....	70.8	1.2	17.8	....	....	10.3	164
Whitefish .....	69.8	1.6	22.9	....	....	6.5	150
Fish, preserved or canned:							
Cod, boneless .....	55.0	19.0 <sup>1</sup>	27.3	....	....	0.3	114
Haddock, smoked .....	72.5	3.6	23.3	....	....	0.2	95
Halibut, smoked .....	49.4	15.0 <sup>2</sup>	20.7	....	....	15.0	218
Herring, smoked .....	34.6	13.2 <sup>3</sup>	36.9	....	....	15.8	290
Mackerel, salt, dressed .....	43.4	12.9 <sup>4</sup>	17.3	....	....	26.4	307
Mackerel, salt, canned, as pur- chased .....	68.2	3.2	19.6	....	....	8.7	157
Mackerel, salt, canned in oil ..	58.3	4.1	25.4	....	....	14.1	220
Salmon, canned .....	63.5	2.6	21.8	....	....	12.1	196
Sardines, canned .....	52.3	5.6	23.0	....	....	19.7	269
Sturgeon, caviare, Russian .....	38.1	4.6	30.0	....	7.6	19.7	328
Tunney (Tuna), canned in oil ..	51.3	4.3	23.8	....	0.6	20.0	278
Shellfish, etc., fresh:							
Clams, long .....	85.8	2.6	8.6	....	2.0 <sup>5</sup>	1.0	51
Clams, round .....	86.2	2.7	6.5	....	4.2 <sup>5</sup>	0.4	46
Crabs, hard shell .....	77.1	3.1	16.6	....	1.2 <sup>5</sup>	2.0	89
Crayfish .....	81.2	1.3	16.0	....	1.0 <sup>5</sup>	0.5	73

<sup>1</sup> Largely salt.<sup>2</sup> Salt content 11.7 per cent.<sup>3</sup> Largely, or in part, glycogen.<sup>4</sup> One sample contained 12.1 per cent salt.<sup>5</sup> Salt content 10.4 per cent.

TABLE I. ANALYSES OF COMMON FOODS—Continued.

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
<b>Fish and Fish Products—Concluded.</b>							
Shellfish, etc., fresh—Concluded:	%	%	%	%	%	%	
Lobster .....	79.2	2.2	16.4	....	0.4 <sup>1</sup>	1.8	83
Mussels .....	84.2	1.9	8.7	....	4.1 <sup>1</sup>	1.1	61
Oysters .....	86.9	2.0	6.2	....	3.7 <sup>1</sup>	1.2	50
Scallops, as purchased .....	80.3	1.4	14.8	....	3.4 <sup>1</sup>	0.1	74
Terrapin .....	74.5	1.0	21.2	....	....	3.5	116
Turtle, green .....	79.8	1.2	19.8	....	....	0.5	84
Shellfish, etc., canned:							
Clams, long, as purchased .....	85.8	2.2	8.3	....	2.7 <sup>1</sup>	0.4	48
Clams, round, as purchased .....	87.0	2.1	8.9	....	0.9 <sup>1</sup>	0.8	46
Crabs, as purchased .....	80.0	2.0	15.8	....	0.7 <sup>1</sup>	1.5	80
Lobster, as purchased .....	77.8	2.5	18.1	....	0.5 <sup>1</sup>	1.1	84
Oysters, as purchased .....	83.4	1.5	8.8	....	3.9 <sup>1</sup>	2.4	72
Shrimp, as purchased .....	70.8	2.6	25.4	....	0.2	1.0	111
Turtle meat .....	75.0	0.9	23.4	....	....	0.7	100
<b>Amphibia.</b>							
Frog's legs .....	83.7	1.0	15.5	....	....	0.2	64
<b>Miscellaneous.</b>							
Gelatin .....	15.0	1.7	84.2 <sup>2</sup>	....	....	0.1	338
<b>Eggs.<sup>3</sup></b>							
Eggs, fresh (exclusive of shell):							
Duck, whole egg .....	70.5	1.0	13.3	....	....	14.5	184
white .....	87.0	0.8	11.1	....	....	trace	44
yolk .....	45.8	1.2	16.8	....	....	36.2	393
Goose, whole egg .....	69.5	1.0	13.8	....	....	14.4	185
white .....	86.3	0.8	11.6	....	....	trace	46
yolk .....	44.1	1.3	17.3	....	....	36.2	395
Guinea fowl, whole egg .....	72.8	0.9	13.5	....	....	12.0	162
white .....	86.6	0.8	11.6	....	....	trace	46
yolk .....	49.7	1.2	16.7	....	....	31.8	353
Hen, whole egg .....	73.7	1.0	13.4	....	....	10.5	148
white .....	86.2	0.6	12.3	....	....	0.2	51
yolk .....	49.5	1.1	15.7	....	....	33.3	363
Plover, whole egg .....	74.4	1.0	10.7	....	....	11.7	148
Turkey, whole egg .....	73.7	0.9	13.4	....	....	11.2	154
white .....	86.7	0.8	11.5	....	....	trace	46
yolk .....	48.3	1.2	17.4	....	....	32.9	366
Turtle, fresh water .....	65.0	2.9	18.1	....	....	11.1	172
sea .....	76.4	0.4	18.8	....	....	9.8	163
Eggs, cooked:							
Hen, whole, boiled .....	73.2	0.8	13.2	....	....	12.0	161
white, boiled .....	86.2	0.6	12.3	....	....	0.2	51
yolk, boiled .....	49.5	1.1	15.7	....	....	33.3	363
Eggs, dehydrated .....	4.8	4.0	40.0	....	....	43.7	556

<sup>1</sup> Largely, or in part, glycogen.<sup>2</sup> Nitrogen x 5.55.<sup>3</sup> In eggs, as purchased, the shell comprises from 10 to 17 per cent of the weight of the whole egg.

TABLE I. ANALYSES OF COMMON FOODS—Continued.

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
<b>Dairy Products, etc.</b>							
Milk and Milk Products:	%	%	%	%	%	%	
Milk, whole .....	87.2	0.7	3.3	....	4.8	4.0	68
condensed (evaporated) ..	73.4	1.6	6.9	....	9.9	8.2	141
condensed (evaporated), sweetened .....	26.8	1.7	7.9	....	54.6 <sup>1</sup>	9.0	331
skimmed .....	90.5	0.7	3.4	....	5.1	0.3	37
skimmed, condensed, sweet- ened .....	28.7	2.1	9.1	....	59.1 <sup>2</sup>	1.0	282
Buttermilk <sup>3</sup> .....	90.4	0.8	3.6	....	4.1	0.5	35
Kephir .....	....	....	3.1	....	1.6	2.0	37
Kumiss <sup>4</sup> .....	89.3	0.4	2.8	....	5.4	2.1	51
Cream, "heavy" (approx. 40 per cent) .....	54.9	0.5	2.1	....	1.5	41.0	383
Cream, "light" (approx. 20 per cent) .....	71.9	0.6	2.8	....	2.7	22.0	220
Whey .....	93.0	0.7	1.0	....	5.0	0.3	27
Milk powder:							
From whole milk .....	5.9	6.0	25.3	....	37.5	25.3	479
From partly skimmed milk (Mammala type) .....	4.0	5.8	25.8	....	49.9	14.5	433
From skimmed milk .....	4.5	8.1	34.6	....	50.9	1.9	359
Malted milk .....	4.0	3.5	13.8	....	71.9	6.8	404
Cheese:							
American, pale .....	31.6	3.4	28.8	....	0.3	35.9	440
red .....	28.6	3.5	29.6	....	....	38.3	463
Camembert .....	....	....	21.0	....	....	21.7	279
Cheddar .....	34.3	3.6	26.4	....	3.0	32.7	412
Cheshire .....	32.6	4.3	32.5	....	4.5	26.1	383
Cottage .....	72.0	1.8	20.9	....	4.3	1.0	110
Cottage, Jewish <sup>5</sup> .....	....	....	27.9	....	....	9.2	194
Dutch .....	35.2	10.0	37.1	....	....	17.7	308
Edam .....	36.1	4.9	24.1	....	4.6	30.3	388
Full Cream .....	38.2	4.1	25.4	....	2.0	30.3	382
Limberger .....	42.1	5.1	23.0	....	0.4	29.4	358
Neufchatel .....	50.0	2.4	18.7	....	1.5	27.4	327
Pineapple .....	23.0	5.6	29.9	....	2.6	38.9	480
Roquefort .....	39.3	6.8	22.6	....	1.8	29.5	363
Skimmed milk .....	45.7	4.2	31.5	....	2.2	16.4	282
Swiss .....	31.4	4.8	27.6	....	1.3	34.9	430
Ice Cream, typical .....	63.3	0.7	3.8	....	19.6	12.6	207

<sup>1</sup> Cane sugar 40.6 per cent; milk sugar 14.0 per cent.<sup>2</sup> Cane sugar 40.9 per cent; milk sugar 18.2 per cent.<sup>3</sup> Contains 0.8 per cent lactic acid.<sup>4</sup> Contains about 0.8 per cent alcohol.<sup>5</sup> One sample.

TABLE I. ANALYSES OF COMMON FOODS—Continued.

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
<b>Fats and Oils.</b>							
Butter, etc.:	%	%	%	%	%	%	
Butter average .....	12.3	1.6 <sup>1</sup>	1.5	....	none	84.6	767
Oleomargarine, average .....	5.4	1.4 <sup>2</sup>	0.8	....	none	92.4	835
Vegetable oil margarine (nut margarine), average .....	10.9	2.9 <sup>3</sup>	1.4	....	none	84.8	769
Salad oils and cooking fats (olive oil, Wesson oil, Mazola, lard, cottonseed, crisco, etc.), typical ..	trace	trace	0.2	....	none	99.7	897
<b>Soups and Broths.</b>							
Soups, homemade:							
Bean .....	84.3	1.7	3.2	....	9.4	1.4	63
Beef .....	92.9	1.2	4.4	....	1.1	0.4	26
Chicken .....	84.3	2.0	10.5	....	2.4	0.8	59
Clam chowder .....	88.7	2.0	1.8	....	6.7	0.8	41
Meat stew .....	84.5	1.1	4.6	....	5.5	4.3	79
Soups, broths, etc., canned:							
Asparagus, cream of .....	87.4	1.4	2.5	....	5.5	3.2	61
Bouillon, beef .....	96.6	0.9	2.2	....	0.2	0.1	11
clam .....	95.2	3.1 <sup>4</sup>	1.0	....	0.6	0.1	7
Celery, cream of .....	88.6	1.5	2.1	....	5.0	2.8	54
Chicken gumbo .....	89.2	1.4	3.8	....	4.7	0.9	42
soup .....	93.8	1.0	3.6	....	1.5	0.1	21
Consomme .....	95.9	2.2	1.4	....	0.4	0.1	8
Corn, cream of .....	86.8	1.0	2.5	....	7.8	1.9	58
Julienne .....	95.9	0.5	2.7	....	0.5	....	13
Mock turtle .....	87.9	2.4	3.0	....	5.7	1.0	44
Mulligatawny .....	89.3	1.2	3.7	....	5.7	0.1	39
Oxtail, edible portion .....	85.4	2.5	3.7	....	7.1	1.3	55
Pea soup .....	86.9	1.2	3.6	....	7.6	0.7	51
Pea, cream of green .....	87.7	1.3	2.6	....	5.7	2.7	58
Tomato soup .....	90.0	1.5	1.8	....	5.6	1.1	40
Turtle, green .....	86.6	1.5	6.1	....	3.9	1.9	57
Vegetable .....	95.7	0.9	2.9	....	0.5	....	14
Bouillon cubes:							
as purchased .....	7.4	73.6 <sup>5</sup>	11.4	....	5.8	1.8	85
prepared as directed .....	98.6	1.1	0.2	....	0.1	trace	1
Clam extract:							
as purchased .....	35.8	29.0 <sup>6</sup>	23.2	....	11.8	0.2	142
prepared as directed .....	98.6	0.6	0.5	....	0.3	trace	3
Yeast extract (Vegex), as purchased	32.5	23.5 <sup>7</sup>	31.3	....	12.5 <sup>8</sup>	0.2	177

<sup>1</sup> Average salt content. Range 0.2 to 4.1 per cent.<sup>2</sup> Average ash content. Range 0.4 to 3.1 per cent, largely salt.<sup>3</sup> Average ash content. Range 1.1 to 6.1 per cent, largely salt.<sup>4</sup> Salt content 2.7 per cent.<sup>5</sup> Salt content 70.2 per cent.<sup>6</sup> Salt content 20.8 per cent.<sup>7</sup> Salt content about 13 per cent.<sup>8</sup> Undetermined nitrogen-free extract.



TABLE I. ANALYSES OF COMMON FOODS—*Continued.*

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
<b>Cereal Products, etc.</b>							
Alimentary Pastes:	%	%	%	%	%	%	
Macaroni (average) .....	10.3	1.3	13.4	....	74.1 <sup>1</sup>	0.9	358
Macaroni, cooked .....	78.4	1.3	3.0	....	15.8 <sup>1</sup>	1.5	89
Noodles .....	10.7	1.0	11.7	0.4	75.2	1.0	357
Spaghetti .....	10.6	0.6	12.1	0.4	75.9	0.4	356
Vermicelli .....	11.0	4.1	10.9	....	72.0 <sup>1</sup>	2.0	350
Bread, soft:							
Bread, alfalfa .....	20.5	2.7	10.6	0.9	64.0	1.3	310
brown .....	43.6	2.1	5.4	....	47.1 <sup>1</sup>	1.8	226
corn (johnny cake) .....	38.9	2.2	7.9	....	46.3 <sup>1</sup>	4.7	259
Graham .....	35.7	1.5	8.9	1.1	51.0	1.8	256
peanut .....	24.6	3.8	33.6	5.5	19.7	12.8	328
rye .....	35.7	1.5	9.0	0.5	52.7	0.6	252
rye, Jewish .....	35.0	2.2	9.1	0.6	52.0	1.1	254
rye, whole .....	50.7	0.9	11.9	1.2	34.7	0.6	192
rye and wheat .....	35.3	1.0	11.9	....	51.5 <sup>1</sup>	0.3	256
wheat (average) .....	35.3	1.1	9.2	0.5	52.6	1.3	259
wheat, whole .....	38.4	1.3	9.7	1.2	48.5	0.9	241
Buns, hot cross .....	36.7	0.9	7.9	....	49.7 <sup>1</sup>	4.8	274
Biscuit, homemade .....	32.9	0.5	8.7	0.7	54.6	2.6	277
Maryland .....	24.6	1.3	8.4	1.3	58.8	5.6	309
soda .....	22.9	1.5	9.3	....	52.6 <sup>1</sup>	13.7	371
Rolls, all analyses .....	29.2	1.1	8.9	0.6	56.1	4.1	297
Bread, hard, and crackers:							
Bread, toasted .....	24.0	1.7	11.5	....	61.2 <sup>1</sup>	1.6	305
Zwieback .....	5.8	1.0	9.8	....	73.5 <sup>1</sup>	9.9	422
Crackers, Boston .....	7.5	1.9	11.0	0.8	70.3	8.5	402
butter .....	7.2	1.5	9.6	0.4	71.2	10.1	414
cream .....	6.8	1.7	9.7	0.6	69.1	12.1	424
egg .....	5.8	1.0	12.6	0.4	66.2	14.0	441
flatbread .....	9.8	1.2	14.9	....	73.6 <sup>1</sup>	0.5	359
Graham .....	5.4	1.4	10.0	1.5	72.3	9.4	414
oatmeal .....	6.3	1.8	11.8	1.9	67.1	11.1	416
oyster .....	4.8	2.9	11.3	0.2	70.3	10.5	421
pilot .....	8.7	1.0	11.1	0.3	73.9	5.0	385
pretzels .....	9.6	4.0	9.7	0.5	72.3	3.9	363
saltines .....	5.6	2.6	10.6	0.5	68.0	12.7	420
soda .....	5.9	2.1	9.8	0.3	72.8	9.1	412
water .....	6.4	1.2	11.7	0.4	75.3	5.0	393
Pastry, etc.:							
Cake, coffee .....	21.3	0.9	7.1	0.4	62.8	7.5	347
cup .....	15.6	1.0	5.9	0.3	68.2	9.0	377
frosted .....	18.2	2.1	5.9	....	64.8 <sup>1</sup>	9.0	364
gingerbread .....	18.8	2.9	5.8	0.9	62.6	9.0	354
sponge .....	15.3	1.8	6.3	....	65.9 <sup>1</sup>	10.7	385

<sup>1</sup> Includes fiber.TABLE I. ANALYSES OF COMMON FOODS—*Continued.*

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
<b>Cereal Products, etc.—Continued.</b>							
Pastry, etc.— <i>Concluded:</i>	%	%	%	%	%	%	
Cookies .....	8.1	1.5	7.0	0.5	73.2	9.7	408
Doughnuts .....	18.3	0.9	6.7	0.7	52.4	21.0	425
Fig bars .....	17.9	1.1	4.6	1.7	68.1	6.6	350
Ginger snaps .....	6.3	2.6	6.5	0.7	75.3	8.6	405
Lady fingers .....	15.0	0.6	8.8	0.2	70.4	5.0	362
Macaroons .....	12.3	0.8	6.5	1.1	64.1	15.2	419
Pie, apple .....	42.5	1.8	3.1	....	42.8 <sup>1</sup>	9.8	272
cream .....	32.0	1.0	4.4	....	51.2 <sup>1</sup>	11.4	325
custard .....	62.4	1.0	4.2	....	26.1 <sup>1</sup>	6.3	178
lemon .....	47.4	1.5	3.6	....	37.4 <sup>1</sup>	10.1	255
mince .....	41.3	2.5	5.8	....	38.1 <sup>1</sup>	12.3	286
raisin .....	37.0	1.5	3.0	....	47.2 <sup>1</sup>	11.3	303
squash .....	64.2	1.3	4.4	....	21.7 <sup>1</sup>	8.4	180
Pudding, Indian meal .....	60.7	1.5	5.5	....	27.5 <sup>1</sup>	4.8	175
rice .....	59.4	0.6	4.0	....	31.4 <sup>1</sup>	4.6	183
tapioca .....	64.5	0.8	3.3	....	28.2 <sup>1</sup>	3.2	155
Wafers, miscellaneous .....	6.6	1.6	8.7	0.4	74.1	8.6	409
vanilla .....	6.7	1.1	6.6	0.3	71.3	14.0	438
Breakfast foods:							
Barley preparations:							
Cream of Barley .....	9.2	1.4	11.1	0.6	76.1	1.6	363
Farwell & Rhines' Barley Crystals .....	9.9	1.2	11.5	0.9	75.2	1.3	359
Quaker Scotch Brand Pearled Barley .....	12.1	1.0	9.5	0.3	76.2	0.9	351
Corn (maize) preparations:							
Cerealine .....	11.2	1.5	6.9	0.1	79.9	0.4	351
E-C Corn Flakes, Toasted ...	12.1	2.2	6.6	0.2	78.6	0.3	344
F. S. Granulated Hominy ...	13.3	0.4	8.0	0.2	77.1	1.0	349
Hecker's Cream Hominy ...	11.7	0.3	9.8	0.5	77.3	0.4	352
H-O New Process Hominy ..	11.3	0.4	8.0	0.2	79.8	0.3	354
Jackson's Roman Meal .....	8.5	3.7	13.3	5.0	66.1	3.4	348
Jersey Corn Flakes .....	7.7	0.9	8.5	0.3	82.3	0.3	366
Kellogg's Toasted Corn Flakes	11.7	2.7	6.4	0.2	78.8	0.2	343
Korn Kinks .....	12.0	2.2	7.4	0.1	77.9	0.4	345
Nichols' Snow White Samp ..	13.4	0.3	7.8	0.5	77.7	0.3	345
Post Tosties .....	11.7	1.8	6.6	0.2	79.4	0.3	347
Quaker Best Yellow Corn Meal	12.3	0.5	7.5	0.2	78.7	0.8	352
Quaker Corn Puffs .....	12.0	0.4	8.7	0.1	78.5	0.3	352
Quaker Toasted Corn Flakes..	11.6	1.3	6.8	0.0	79.9	0.4	350
Ralston Hominy Grits .....	11.3	1.0	9.0	0.4	75.4	2.9	364
Street's Perfection Hominy ..	12.4	0.4	7.9	0.1	77.9	1.3	355
Sunbeam Pearl Hominy .....	14.3	0.4	9.4	0.3	75.0	0.6	343
Sunseal Sunny Corn .....	12.3	0.4	8.3	0.4	78.2	0.4	350
Sunseal Cream Corn Meal ...	12.0	0.5	8.9	0.4	77.2	1.0	353

<sup>1</sup> Includes fiber.

TABLE I. ANALYSES OF COMMON FOODS—Continued.

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
Cereal Products, etc.—Continued.							
Breakfast foods—Continued:							
Corn (maize) preparations—Concl.	%	%	%	%	%	%	
Sunseal Hominy Grits .....	11.6	0.5	8.5	0.4	77.8	1.2	356
Washington Corn Crisps .....	12.1	2.9	7.8	0.2	76.8	0.2	340
Quaker Hominy Grits .....	13.2	0.5	7.9	0.2	77.7	0.5	347
Oat preparations:							
Bestovotes .....	11.0	2.1	16.2	1.0	63.1	6.6	377
Bufceco Rolled Oats .....	11.1	2.0	15.1	1.0	64.0	6.8	378
Fruited Oats .....	9.7	3.3	13.1	1.3	68.2	4.9	369
Grandmother's Crushed Oats ..	10.7	1.9	14.0	0.6	65.4	6.5	380
Health Brand White Oats ....	10.9	2.0	13.8	1.0	64.5	7.8	383
Hecker's Cream Oat Meal ....	11.5	1.8	15.6	0.9	64.6	5.6	371
Hornby's Steam Cooked Oat Meal .....	10.6	1.7	16.1	0.8	64.1	6.7	381
Keen & Robinson's Granulated Scotch Oatmeal .....	10.4	1.9	13.7	0.8	64.1	9.1	393
Leggett's Premier 15 Minute Oat Flakes .....	11.3	1.8	17.2	0.6	63.7	5.4	372
McCann's Irish Oat Meal ....	9.2	1.8	15.1	0.3	64.9	8.7	398
Mother's Crushed Oats .....	10.9	1.6	15.6	0.9	64.9	6.1	377
Paw-Nee Rolled Oats .....	10.8	1.9	15.8	0.8	64.0	6.7	380
Purity Rolled Oats .....	13.5	2.0	16.3	1.0	61.1	6.1	365
Quaker Oats .....	10.8	1.9	15.9	0.9	64.5	6.0	376
Robinson's Patent Groats ....	8.4	1.8	12.8	0.7	67.7	8.6	399
Scotch Porage Oats .....	10.1	1.7	13.3	0.4	64.9	9.6	399
Sovereign 15 Minute Oat Flakes .....	10.8	2.0	16.5	0.9	64.0	5.8	374
White Rose Rolled Oats ....	10.3	1.9	14.3	0.7	64.8	8.0	388
Rice preparations:							
Comet Cereal .....	11.3	0.3	7.2	0.2	80.7	0.3	354
Cook's Flaked Rice .....	12.6	0.4	7.8	0.2	78.9	0.1	348
Cook's Malto Rice .....	11.3	0.6	7.6	0.1	80.2	0.2	353
Kellogg's Toasted Rice Biscuit	5.0	3.7	10.1	0.2	80.7	0.3	366
Kellogg's Toasted Rice Flakes	4.7	3.4	10.0	0.2	81.3	0.4	360
Milk Rice .....	12.3	3.2	6.9	0.2	77.2	0.2	338
Quaker Puffed Rice .....	12.2	0.4	7.6	0.1	79.5	0.2	350
Rye preparations:							
Cream of Rye .....	11.5	1.7	12.0	1.4	71.8	1.6	350
Kellogg's Toasted Rye Flakes	8.1	2.2	11.4	0.6	76.2	1.5	364
Ry-Krisp .....	5.8	2.8	14.0	1.3	74.4	1.7	369
Wheat preparations:							
Alber's Wheat Flakes Mush..	11.5	1.6	11.1	0.3	73.4	2.1	357
Cero-Vita .....	4.6	3.5	8.9	0.3	82.0	0.7	370
Cinnamon Rusks .....	9.9	0.7	10.3	0.2	71.7	7.2	393
Cream of Wheat .....	13.1	0.6	11.5	0.2	73.7	0.9	340
Cresco Grits .....	11.1	0.6	17.8	0.5	68.6	1.4	358

TABLE I. ANALYSES OF COMMON FOODS—Continued.

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
Cereal Products, etc.—Continued.							
Breakfast foods—Continued:							
Wheat preparations—Concluded:	%	%	%	%	%	%	
Crystal Wheat .....	9.5	1.9	11.3	1.7	73.6	2.0	358
Dieto Rusks .....	6.4	1.5	15.9	1.0	66.1	9.1	410
Force .....	10.7	2.8	10.6	1.1	73.7	1.1	347
F S. Farina (Quaker Farina)	13.7	0.4	10.2	0.2	74.6	0.9	347
Fruited Wheat .....	9.9	3.6	15.6	2.4	66.2	2.3	348
Grandmother's A. & P. Farina	12.9	0.6	10.8	0.1	75.0	0.6	349
Granola .....	6.1	2.3	13.9	0.6	76.3	0.8	368
Granose Biscuit .....	11.3	3.9	10.3	1.8	71.1	1.6	340
Granose Flakes .....	6.0	3.9	10.3	0.5	75.4	3.9	378
Grape Nuts .....	10.3	1.9	11.5	1.5	74.2	0.6	348
Hecker's Farina .....	12.7	0.6	10.0	0.1	75.9	0.7	350
Holland Rusk .....	11.0	1.3	12.1	0.1	70.4	5.1	376
Jireh Frumenty .....	6.2	1.4	12.3	1.1	77.3	1.7	374
Jireh Whole Wheat Farina ..	6.2	1.8	12.9	2.2	74.6	2.3	371
Kellogg's Breakfast Toast ...	7.7	1.6	13.6	0.3	74.9	1.9	371
Kellogg's Krumbles .....	10.0	2.6	12.0	1.9	72.3	1.2	348
Kellogg's Toasted Wheat Bis- cuit .....	5.8	2.4	14.2	1.5	74.7	1.4	368
Kellogg's Toasted Wheat Flakes	5.2	2.7	9.3	1.2	80.5	1.1	369
Kellogg's Zwieback .....	6.2	1.6	14.3	0.2	76.1	1.6	376
Leggett's Premier Farina ....	14.1	0.5	11.1	0.1	73.3	0.9	346
Malt Breakfast Food .....	9.6	1.4	13.8	1.0	72.7	1.5	360
Manana Gluten Breakfast Food	7.6	2.5	42.6	1.7	43.6	2.0	363
Mapl-Flake .....	10.8	2.8	9.3	1.2	74.7	1.2	347
Mother's Wheat Hearts .....	13.5	0.4	10.7	0.2	74.1	1.1	349
Pettijohn's Breakfast Food ..	10.3	1.7	9.1	2.0	74.9	2.0	354
Pillsbury's Best Cereal .....	11.3	0.5	11.5	0.1	75.9	0.7	356
Quaker Cracked Wheat .....	11.7	1.7	9.3	1.7	73.3	2.3	351
Quaker Puffed Wheat .....	11.5	1.8	13.1	1.6	70.2	1.8	349
Quaker Wheat Berries .....	9.8	1.4	14.0	1.2	71.6	2.0	360
Ralston Health Food .....	12.4	1.4	11.9	1.1	71.5	1.7	349
Ralston Wheat Food .....	11.9	1.1	11.3	0.8	73.1	1.8	354
Sanitas Granuto .....	4.9	1.3	10.1	0.4	81.6	1.7	382
Saxon Wheat Food .....	9.8	0.8	12.8	0.5	74.4	1.7	364
Shredded Wheat Biscuit .....	8.5	1.5	11.0	2.6	75.0	1.4	357
Street's Perfection Farina ...	13.1	0.5	10.3	0.1	74.9	1.1	351
Triscuit .....	10.3	1.7	11.0	1.7	73.9	1.4	352
Vitos .....	11.6	0.5	11.1	0.2	75.6	1.0	356
Wheatena .....	10.4	0.7	11.3	0.6	74.2	2.8	367
Wheatlet .....	12.2	0.8	12.8	0.3	72.3	1.6	355
Whole Grain Wheat (prepared)	66.2	1.5	6.6	1.2	23.7	0.8	128
Zest .....	10.7	2.6	9.0	1.2	75.3	1.2	348
Wheat bran:							
Ballard's Obelisk Sanitary Edible Bran .....	11.5	4.5	17.3	5.6	55.7	5.4	301
Culp's Capitol Health Bran ..	11.2	5.3	13.4	8.2	57.6	4.3	323



TABLE I. ANALYSES OF COMMON FOODS—Continued.

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
<b>Cereal Products, etc.—Continued.</b>							
<b>Breakfast Foods—Concluded:</b>							
<b>Wheat Bran—Concluded:</b>							
Health Food Co.'s Wheat Bran	11.6	5.6	14.3	8.2	56.2	4.1	319
Jireh Wheat Bran	11.1	4.3	16.8	6.3	56.7	4.8	337
Johnson's Educator Wheat Bran	11.6	6.1	15.4	7.8	54.4	4.7	322
Kellogg's Sterilized Wheat Bran	9.6	6.0	16.3	8.5	54.4	5.2	330
<b>Wheat bran biscuit and other laxative preparations:</b>							
Bran Biskue	8.5	3.1	12.1	2.2	61.0	13.1	410
Bran-eata Biscuit	9.8	4.4	9.1	3.6	72.2	0.9	333
Bran Zos	11.9	3.0	13.2	3.8	65.6	2.5	338
Brose Good Health Breakfast Food	10.1	2.6	14.4	3.1	65.5	4.3	358
Cerag	9.2	3.6	11.3	2.0	73.0	0.9	345
Cerena	7.2	4.9	27.8	2.4	46.3	11.4	399
Christian's Laxative Bread	9.9	2.8	10.0	1.3	74.6	1.4	351
<b>Christian's Laxative Cereal Flakes</b>							
Flakes	13.0	1.7	10.4	1.0	72.5	1.4	344
Colax	13.1	2.1	1.1	0.1	82.8	0.8	343
Dietetic Bran Biscuit	9.3	5.0	9.9	1.7	69.1	5.0	361
Educator Bran Cookies	7.1	3.3	8.9	1.5	64.7	14.5	425
Educator Bran Meal	11.8	2.9	12.3	3.8	66.4	2.8	340
<b>F. B. A. Laxative Health Biscuit</b>							
Biscuit	11.1	3.1	6.1	0.7	77.3	1.7	349
Fruit Nut Cereal	7.3	3.2	13.5	2.4	72.4	1.2	354
Good Health Biscuit (Kellogg)	10.9	4.2	7.7	1.5	74.5	1.2	340
Health Food Wafers	9.7	5.3	10.0	1.4	65.7	7.9	374
India (Digestive) Biscuit	8.7	5.0	12.8	5.2	66.1	2.2	335
Laxa	6.6	5.0	12.4	6.6	66.6	2.8	341
Laxative Biscuit (Kellogg)	9.4	3.0	16.7	2.4	57.7	10.8	395
Mansfield's Agar Agar Wafers	7.9	2.3	7.1	0.8	69.9	12.0	416
Oval Digestive Biscuit (H.&P.)	8.8	2.1	7.8	0.5	64.5	16.3	436
Uncle Sam Health Food	6.3	3.1	21.3	4.0	40.9	24.4	468
Zim	13.2	2.0	7.4	1.5	74.2	1.7	342
<b>Miscellaneous preparations:</b>							
Dieto Nut Cereal	5.0	2.0	21.6	1.2	51.8	18.4	459
Dieto Wheat and Barley Cereal	6.8	1.7	11.6	2.0	75.7	2.2	369
Jireh Wheat Nuts	7.6	2.3	19.0	1.0	54.5	15.6	434
Malabar Manoca	13.3	1.3	0.6	0.6	84.1	0.1	340
Post Tavern Porridge	12.7	1.5	10.3	0.2	74.5	0.8	346
Post Tavern Special	9.9	0.9	10.9	0.3	76.9	1.1	361
Sea Moss Farina	15.6	13.6	9.1	1.5	59.9	0.3	279
Sunbeam Tapioca	13.5	0.2	0.6	0.1	85.5	0.1	345
Trix	6.2	1.5	14.5	0.3	77.3	0.2	369
Trufood (Trufood Co.)	5.7	1.4	11.5	1.8	77.1	2.5	377
Zep (Battle Creek Food Co.)	5.0	2.9	14.0	1.3	74.6	2.2	374

TABLE I. ANALYSES OF COMMON FOODS—Continued.

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
<b>Cereal Products, etc.—Concluded.</b>							
<b>Flours, meals, etc:</b>							
Barley flour	11.4	1.6	12.3	1.0	71.3	2.4	356
Buckwheat flour	13.6	0.9	6.4	0.4	77.5	1.2	346
Corn flour	12.3	0.9	8.4	0.4	76.2	1.8	355
Corn meal	12.5	1.0	9.2	1.0	74.4	1.9	362
Oat flour	10.3	1.8	15.1	0.7	65.7	6.4	381
Potato flour	16.0	0.4	0.5	....	83.0 <sup>1</sup>	0.1	335
Rice flour	11.9	0.8	7.3	0.1	79.3	0.6	352
Rye flour	12.9	0.7	6.8	0.4	78.3	0.9	349
Rye meal	11.4	1.5	13.6	1.8	69.7	2.0	351
Soy bean flour	5.1	4.5	42.5	3.7	24.3	19.9	446
Soy bean meal	10.1	5.5	38.3	4.6	26.6 <sup>2</sup>	14.9	394
Wheat flour, entire	11.4	1.0	13.8	0.9	71.0	1.9	356
Wheat flour, Graham	11.3	1.8	13.3	1.9	69.5	2.2	351
Wheat flour, patent, average	12.0	0.5	11.4	0.3	74.8	1.0	354
<b>Vegetables.</b>							
<b>Vegetables, fresh (unless otherwise stated):</b>							
Aralia Cordata (Udo)	95.2	0.5	1.0	0.5	2.6 <sup>3</sup>	0.2	16
Artichokes	79.5	1.0	2.6	0.8	15.0 <sup>4</sup>	0.2	76
Jerusalem, fresh, whole	77.8	2.0	2.9	0.8	16.4 <sup>4</sup>	0.1	78
Jerusalem, cooked, edible portion	78.8	1.4	2.4	0.8	16.5 <sup>4</sup>	0.1	77
Asparagus	93.6	0.7	2.1	0.7	2.7	0.2	21
Basella	....	....	2.5	....	1.7	0.5	21
Beans, butter	58.9	2.0	9.4	....	29.1 <sup>1</sup>	0.6	159
cranberry, young pods	....	....	0.4	....	0.6	none	4
medium	....	....	1.3	....	1.7	0.6	17
fancy	....	....	1.0	....	2.1	0.1	13
Lima	68.5	1.7	7.1	1.7	20.3	0.7	116
refugee, young pods	....	....	0.5	....	0.8	none	5
medium	....	....	1.3	....	3.0	0.1	18
fancy	....	....	1.1	....	1.4	0.1	11
string	89.2	0.8	2.3	1.9	5.5 <sup>5</sup>	0.3	34
string, cooked	95.3	0.9	0.8	....	1.9 <sup>1</sup>	1.1	21
Beets	87.5	1.1	1.6	0.9	8.8 <sup>6</sup>	0.1	43
cooked	88.6	1.6	2.3	....	7.4 <sup>1</sup>	0.1	40
Borage (salad plant)	....	....	3.0	....	0.4	0.4	17
Brussels sprouts	....	....	1.5	....	3.4	0.1	21
Burdock	....	....	4.5	....	7.4	0.1	49
Cabbage	91.5	1.0	1.6	1.1	4.5 <sup>7</sup>	0.3	27
Carrots	88.2	1.0	1.1	1.1	8.2	0.4	41
Cassava, root	....	....	1.6	....	27.1	0.2	117

<sup>1</sup> Includes fiber.<sup>2</sup> Includes 1.1 per cent starch and sugar.<sup>3</sup> Carbohydrate range 3.9 to 10 per cent.<sup>4</sup> Carbohydrate range 3.0 to 6.5 per cent.<sup>5</sup> About 1/4 available.<sup>6</sup> Chiefly inulin.<sup>7</sup> Carbohydrate range 6.0 to 10 per cent.

TABLE I. ANALYSES OF COMMON FOODS—Continued.

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
Vegetables—Continued.							
Vegetables, fresh—Continued.	%	%	%	%	%	%	
Cauliflower .....	92.3	1.0	1.8	1.0	3.7	0.5	27
Celeriac .....	.....	.....	1.8	.....	6.0	0.2	33
Celery .....	94.5	1.0	1.1	.....	3.3 <sup>1</sup>	0.1	19
Celery root .....	.....	.....	2.0	.....	6.3	0.4	37
Chard .....	89.6	1.6	3.2	.....	5.0 <sup>1</sup>	0.6	38
Chayote (tayote) .....	91.9	0.4	0.9	0.8	5.9	0.1	28
Chenopodium .....	.....	.....	8.5	.....	2.7	1.1	55
Chicory, root .....	.....	.....	.....	.....	15.0	.....	.....
leaves, Italian .....	.....	.....	1.9	.....	0.8	0.4	14
Chinese vegetables:							
Kai Tsoi .....	94.5	1.1	1.7	0.7	1.8	0.2	16
Bak Toy .....	95.9	1.1	1.2	0.6	1.1	0.1	10
Collards .....	87.1	1.5	4.5	.....	6.3 <sup>1</sup>	0.6	49
Corn, green .....	75.4	0.7	3.1	0.5	19.2	1.1	99
Cucumbers .....	95.4	0.5	0.8	0.7	2.4	0.2	14
Egg plant .....	92.9	0.5	1.2	0.8	4.3	0.3	25
Endive .....	.....	.....	1.0	.....	2.6	none	14
Finnocchio .....	.....	.....	1.5	.....	1.6	0.1	13
Greens, beet, cooked .....	89.5	1.7	2.2	.....	3.2 <sup>1</sup>	3.4	52
dandelion .....	81.4	4.6	2.4	.....	10.6 <sup>1</sup>	1.0	61
turnip salad .....	86.7	2.2	4.2	.....	6.3 <sup>1</sup>	0.6	47
Kale .....	.....	.....	3.0	.....	2.1	0.4	24
Kale, sea .....	.....	.....	1.4	.....	3.8	none	21
Kohl-rabi .....	91.1	1.3	2.0	1.3	4.2	0.1	26
Lamb's quarters .....	.....	.....	3.8	.....	1.7	0.6	27
Leeks .....	.....	.....	2.9	.....	4.0 <sup>2</sup>	0.1	29
Lettuce .....	94.7	0.9	1.2	0.7	2.2	0.3	16
Mushrooms .....	88.1	1.2	3.5 <sup>3</sup>	0.8	6.0 <sup>3</sup>	0.4	42
Mustard .....	.....	.....	2.4	.....	0.3 <sup>2</sup>	0.3	14
Okra .....	90.2	0.6	1.6	3.4	4.0	0.2	24
Onions .....	87.6	0.6	1.6	0.8	9.1	0.3	46
cooked .....	91.2	0.9	1.2	.....	4.9 <sup>1</sup>	1.8	41
Orach .....	.....	.....	4.6	.....	0.2 <sup>2</sup>	0.4	23
Oyster plant .....	.....	.....	1.2	.....	7.0	0.1	34
Palmetto cabbage .....	87.4	1.7	3.3	0.9	6.1	0.6	43
cooked .....	88.9	1.2	2.9	0.9	5.6	0.5	39
Parsnips .....	83.0	1.4	1.6	2.5	11.0 <sup>4</sup>	0.5	55
Peas, green .....	74.6	1.0	7.0	1.7	15.2	0.5	93
cooked .....	73.8	1.5	6.7	.....	14.6 <sup>1</sup>	3.4	116
Peppers, Neapolitan .....	.....	.....	1.1	.....	5.7	0.3	30
sweet, green .....	.....	.....	0.8	.....	4.1	0.1	21
Potatoes .....	78.3	1.0	2.2	0.4	18.0	0.1	82
air (tropical Asia) .....	.....	.....	1.9	.....	16.3	0.4	76
boiled .....	75.5	1.0	2.5	0.6	20.3	0.1	92

<sup>1</sup> Includes fiber.<sup>2</sup> Largely unassimilable.<sup>3</sup> Largely salt.<sup>4</sup> Starch and sugar.<sup>5</sup> Carbohydrate range 6 to 14 per cent.

TABLE I. ANALYSES OF COMMON FOODS—Continued.

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
Vegetables—Continued.							
Vegetables, fresh—Concluded.	%	%	%	%	%	%	
Potatoes, cooked, chips .....	2.2	4.5	6.8	.....	46.7 <sup>1</sup>	39.8	572
cooked, mashed and creamed .....	75.1	1.5	2.6	.....	17.8 <sup>1</sup>	3.0	109
sweet .....	69.0	1.1	1.8	1.3	26.1	0.7	118
cooked .....	51.9	0.9	3.0	.....	42.1 <sup>1</sup>	2.1	199
Pumpkins .....	93.1	0.6	1.0	1.2	4.0	0.1	21
Radishes .....	91.8	1.0	1.3	0.7	5.1	0.1	27
Rhubarb .....	94.4	0.7	0.6	1.1	2.5	0.7	19
Roquette (rocket salad) .....	.....	.....	0.7	.....	0.3 <sup>2</sup>	0.4	8
Rutabagas .....	88.9	1.1	1.3	1.2	7.3	0.2	36
Sauerkraut .....	88.8	5.2 <sup>3</sup>	1.7	.....	3.8 <sup>1</sup>	0.5	27
Sorrel .....	.....	.....	2.1	.....	0.1 <sup>2</sup>	0.2	11
Spinach .....	92.3	2.1	2.1	0.9	2.3	0.3	20
cooked .....	89.8	1.4	2.1	.....	2.6 <sup>1</sup>	4.1	56
Squash .....	88.3	0.8	1.4	0.8	8.2	0.5	43
Tomatoes, green .....	94.8	0.6	1.2	0.4	2.8	0.2	18
ripe .....	94.3	0.5	0.9	0.6	3.3	0.4	20
Truffles .....	.....	.....	9.1	.....	7.0	0.5	69
Turnips .....	89.6	0.8	1.3	1.3	6.8	0.2	34
Vegetable marrow .....	93.1	1.1	0.5	1.2	4.0 <sup>4</sup>	0.1	19
cooked .....	93.0	1.0	0.4	1.4	4.1 <sup>5</sup>	0.1	19
Watercress .....	.....	.....	0.7	.....	3.7	0.5	22
Yams .....	.....	.....	1.6	.....	23.6	0.2	103
Yautia (Janier) .....	.....	.....	4.2	.....	53.0	0.4	232
Vegetables, dried:							
Beans .....	12.6	3.5	22.5	4.4	55.2	1.8	327
carob .....	4.0	2.7	6.3	5.7	80.7	0.6	353
frijoles (New Mexico) .....	7.5	4.2	21.9	.....	65.1 <sup>1</sup>	1.3	360
Lima .....	10.4	4.1	18.1	.....	65.9 <sup>1</sup>	1.5	350
mesquite .....	4.8	3.4	12.2	.....	77.1 <sup>1</sup>	2.5	380
soy .....	10.1	5.5	38.3	4.6	26.6	14.9	394
Carrots, evaporated .....	3.5	4.9	7.7	.....	80.3 <sup>1</sup>	3.6	384
Lentils .....	8.4	5.7	25.7	.....	59.2 <sup>1</sup>	1.0	349
Peas .....	9.5	2.9	24.6	4.5	57.5	1.0	337
cow .....	13.0	3.4	21.4	4.1	56.7	1.4	325
Peppers, green .....	.....	.....	15.5	.....	63.0 <sup>1</sup>	8.5	391
red .....	.....	.....	9.4	.....	70.0 <sup>1</sup>	7.7	387
Potatoes, evaporated .....	7.1	3.1	8.5	.....	80.9 <sup>1</sup>	0.4	361
Tomatoes .....	7.3	9.4	12.9	.....	62.3 <sup>1</sup>	8.1	374
Vegetables, canned:							
Artichokes .....	92.5	1.7	0.8	0.6	4.4	.....	21
Asparagus .....	94.4	1.2	1.5	0.5	2.3	0.1	16

<sup>1</sup> Includes fiber.<sup>2</sup> Largely salt.<sup>3</sup> 2.0 per cent starch and sugar.<sup>4</sup> Starch and sugar.<sup>5</sup> 1.8 per cent starch and sugar.



TABLE I. ANALYSES OF COMMON FOODS—*Continued.*

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
<b>Vegetables—Concluded.</b>							
Vegetables, canned— <i>Concluded:</i>							
Beans, baked	68.9	2.1	6.9	2.5	17.1	2.5	119
haricots vers	95.2	1.1	1.1	0.5	2.0	0.1	13
flageolets	81.6	1.2	4.6	1.0	11.5	0.1	65
Lima	79.5	1.6	4.0	1.2	13.4	3.0	72
little green	93.8	1.5	1.2	0.6	2.8	0.1	17
red kidney	72.7	1.6	7.0	1.2	17.3	0.2	99
string	93.7	1.3	1.1	0.5	3.3	0.1	19
wax	94.6	1.2	1.0	0.6	2.5	0.1	15
Brussels sprouts	93.7	1.3	1.5	0.5	2.0	0.1	19
Corn, green	76.1	0.9 <sup>1</sup>	2.8	0.8	18.2	1.2	95
Corn and tomatoes	87.6	0.8	1.6	0.5	9.1	0.4	46
Macedoine (mixed vegetables)	93.1	1.0	1.4	0.6	3.9	....	21
Okra	94.4	1.2 <sup>2</sup>	0.7	0.7	2.9	0.1	15
Peas, green	85.3	1.1 <sup>3</sup>	3.6	1.2	8.6	0.2	51
Potatoes, sweet	55.2	1.1	1.9	0.8	40.6	0.4	174
Pumpkins	91.6	0.7	0.8	1.1	5.6	0.2	27
Squash	87.6	0.5	0.9	0.7	9.8	0.5	47
Succotash	75.9	0.9	3.6	0.9	17.7	1.0	94
Tomatoes	94.0	0.6	1.2	0.5	3.5	0.2	21
<b>Pickles, Condiments, etc.</b>							
Pickles, condiments, etc.:							
Capers	....	....	3.2	....	5.0	0.5	37
Catsup, tomato	....	....	1.8	....	10.0 <sup>4</sup>	0.2	49
Chili sauce	....	....	....	....	20.0 <sup>5</sup>	....	....
Horseradish	86.4	1.5	1.4	....	10.5 <sup>6</sup>	0.2	49
Olives, green	76.4	6.6 <sup>7</sup>	1.3	1.1	2.5	21.1	124
ripe	75.0	2.7 <sup>8</sup>	1.4	0.9	2.0	18.0	176
Mustard, prepared	....	....	4.7	....	5.0	4.1	76
prepared, with cereal	....	....	....	....	....	....	....
added	....	....	3.5	....	7.0	1.9	59
Pickles, cucumber	92.0	3.6	0.5	....	2.7 <sup>9</sup>	0.3	16
mixed	93.8	0.7	1.1	....	4.0 <sup>6</sup>	0.4	24
spiced	....	....	0.4	....	21.0	0.1	87
Vinegar, cider	....	....	none	....	0.3 <sup>9</sup>	none	1
distilled	....	....	none	....	none	none	....
malt	....	....	none	....	0.5 <sup>10</sup>	....	....
spiced salad	....	....	....	....	10.0	....	....
Tarragon	....	....	....	....	0.2 <sup>10</sup>	....	....
wine	....	....	....	....	0.4	....	....

<sup>1</sup> Includes about 0.4 per cent salt.<sup>3</sup> Includes about 0.7 per cent salt.<sup>5</sup> Carbohydrate range 14 to 28 per cent.<sup>7</sup> Includes 5.9 per cent salt.<sup>9</sup> Carbohydrate range 0.3 to 1.5 per cent.<sup>2</sup> Includes about 1.1 per cent salt.<sup>4</sup> Carbohydrate range 3 to 26 per cent.<sup>6</sup> Includes fiber.<sup>8</sup> Includes 2.1 per cent salt.<sup>10</sup> Manufacturers' analysis.TABLE I. ANALYSES OF COMMON FOODS—*Continued.*

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
<b>Fruits, Berries, etc.</b>							
Fruits, berries, etc., fresh:	%	%	%	%	%	%	
Apples	84.6	0.3	0.4	1.2	13.0	0.5	58
Apricots	85.0	0.5	1.0	....	13.4 <sup>1</sup>	....	58
Avocados (alligator pears)	77.3	0.8	1.1	....	7.1 <sup>1</sup>	13.7	156
Bananas	75.3	0.8	1.3	1.0	21.0	0.6	95
Blackberries	86.3	0.5	1.3	2.5	8.4	1.0	48
Cherries	80.9	0.6	1.0	0.2	16.5	0.8	77
Citrag juice	....	....	1.3	....	6.9	....	33
Cranberries	88.9	0.2	0.4	1.5	8.4	0.6	41
Currants	85.0	0.7	1.4	....	12.8 <sup>1</sup>	....	....
Egg fruit	51.3	1.1	3.4	1.3	41.0	1.9	195
Figs	79.1	0.6	1.5	....	18.8 <sup>1</sup>	....	....
Gooseberries	....	....	0.4	....	12.0	....	....
Grapes	77.4	0.5	1.3	4.3	14.9	1.6	79
Grape juice	....	....	....	....	15.0 <sup>2</sup>	....	....
Grape fruit	89.7	0.5	0.8	0.4	8.6 <sup>3</sup>	trace	36
Huckleberries	81.9	0.3	0.6	....	16.6 <sup>1</sup>	0.6	74
Lemons	89.3	0.5	1.0	1.1	7.4	0.7	40
Lemon juice	....	....	....	....	9.8 <sup>1</sup>	....	....
Loganberries	....	....	4.6	....	7.2 <sup>4</sup>	0.6	53
Loganberry juice	....	....	0.6	....	6.8 <sup>4</sup>	....	....
Loquat	74.9	1.2	0.3	0.7	23.0	....	....
Mangoes	....	....	....	....	13.0	....	....
Mulberries	....	....	0.3	....	12.0	....	....
Muskmelons	89.5	0.6	0.6	2.1	7.2	0.3	34
Nectarines	82.9	0.6	0.6	....	15.9 <sup>1</sup>	....	....
Oranges	86.9	0.5	0.8	....	11.6 <sup>1</sup>	0.2	51
Papaya (papaw)	90.8	0.9	0.8	1.1	6.3	0.1	29
Peaches	89.4	0.4	0.7	3.6	5.8	0.1	27
Pears	84.4	0.4	0.6	2.7	11.4	0.5	53
Persimmons	66.1	0.9	0.8	1.8	29.7	0.7	128
Pineapple	89.3	0.3	0.4	0.4	9.3	0.3	42
Plums	78.4	0.5	1.0	....	20.1 <sup>1</sup>	....	....
Pomegranates	76.8	0.6	1.5	2.7	16.8	1.6	88
Prunes	79.6	0.6	0.9	....	18.9 <sup>1</sup>	....	....
Quince	84.2	0.4	0.3	1.8	13.2	0.1	55
Raspberries, black	84.1	0.6	1.7	....	12.6 <sup>1</sup>	1.0	66
red	85.8	0.6	1.0	2.9	9.7	....	....
Sapodilla	77.0	0.5	0.6	1.1	19.4	1.4	93
Sour sop	80.8	1.1	0.8	....	17.2	0.1	73
Strawberries	90.4	0.6	1.0	1.4	6.0	0.6	33
Tangelo juice	....	....	0.7	....	0.9	....	....
Watermelons	92.4	0.3	0.4	....	6.7 <sup>1</sup>	0.2	30
Whortleberries	....	....	0.7	....	10.0	0.3	46

<sup>1</sup> Includes fiber.<sup>2</sup> Carbohydrate range 11 to 20 per cent.<sup>3</sup> Includes 7.6 per cent sugar.<sup>4</sup> Invert sugar.

TABLE I. ANALYSES OF COMMON FOODS—*Continued.*

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
<b>Fruits, Berries, etc.—Concluded.</b>							
Fruits, berries, etc., dried:	%	%	%	%	%	%	
Apples .....	28.1	2.0	1.6	....	66.1 <sup>1</sup>	2.2	291
Apricots .....	29.4	2.4	4.7	....	62.5 <sup>1</sup>	1.0	278
Citron .....	19.0	0.9	1.5	....	78.1 <sup>1</sup>	1.5	332
Currants .....	17.2	4.5	2.4	....	74.2 <sup>1</sup>	1.7	322
Dates .....	15.4	1.3	2.1	....	78.4 <sup>1</sup>	2.8	347
Figs .....	18.8	2.4	4.3	....	74.2 <sup>1</sup>	0.3	317
Prunes .....	22.3	2.3	2.1	....	73.3 <sup>1</sup>	....	....
Raisins .....	14.6	3.4	2.6	....	76.1 <sup>1</sup>	3.3	345
Raspberries .....	8.1	2.6	7.3	....	80.2 <sup>1</sup>	1.8	366
Fruits, berries, etc., canned:							
Apples, crab .....	42.4	0.5	0.3	....	54.4 <sup>1</sup>	2.4	240
Apple sauce .....	61.6	0.7	0.2	....	37.2 <sup>1</sup>	0.8	157
Apricots .....	81.4	0.4	0.9	....	17.3 <sup>1</sup>	....	....
Apricot sauce .....	45.2	2.8	1.9	....	48.8 <sup>1</sup>	1.3	215
Blackberries .....	40.0	0.7	0.8	....	56.4 <sup>1</sup>	2.1	248
Blueberries, canned .....	85.6	0.4	0.6	....	12.8 <sup>1</sup>	0.6	59
Cherries .....	77.2	0.5	1.1	....	21.1 <sup>1</sup>	0.1	90
Cherry jelly .....	21.0	0.7	1.1	....	77.2 <sup>1</sup>	....	....
Figs, stewed .....	56.5	1.1	1.2	....	40.9 <sup>1</sup>	0.3	171
Grape butter .....	36.7	3.5	1.2	....	58.5 <sup>1</sup>	0.1	240
Grape fruit, canned .....	90.5	0.4	0.5	0.2	8.3	0.1	36
Marmalade, orange .....	14.5	0.3	0.6	....	84.5 <sup>1</sup>	0.1	341
Peaches .....	88.1	0.3	0.7	....	10.8 <sup>1</sup>	0.1	47
Pears .....	81.1	0.3	0.3	....	18.0 <sup>1</sup>	0.3	76
Pineapples .....	61.8	0.7	0.4	....	36.4 <sup>1</sup>	0.7	154
Prune sauce .....	76.6	0.5	0.5	....	22.3 <sup>1</sup>	0.1	92
Strawberries, stewed .....	74.8	0.5	0.7	....	24.0 <sup>1</sup>	....	....
Tomato preserves .....	40.9	0.7	0.7	....	57.6 <sup>1</sup>	0.1	234
<b>Nuts.</b>							
Almonds .....	4.8	2.0	21.0	2.0	15.3	54.9	639
Almond butter .....	1.6	3.0	22.1	3.9	7.9	61.5	674
Beechnuts .....	4.0	3.5	21.9	....	13.2 <sup>1</sup>	57.4	657
Brazil nuts .....	3.3	3.4	16.8	2.1	5.0 <sup>2</sup>	69.4	712
Butternuts .....	4.4	2.9	27.9	....	3.5 <sup>1</sup>	61.2	676
Cashew nuts .....	4.5	2.5	10.1	0.6	26.2 <sup>3</sup>	47.1	605
Chestnuts .....	45.0	1.3	6.2	1.8	40.3	5.4	235
Coconut .....	14.1	1.7	5.7	....	27.9 <sup>1</sup>	50.6	590
Coconut milk .....	92.7	0.8	0.4	....	4.6	1.5	34
Coconut, prepared .....	3.5	1.3	6.3	....	31.5 <sup>1</sup>	57.4	668
Filberts .....	3.7	2.4	15.6	....	13.0 <sup>1</sup>	65.3	702
Hickory nuts .....	3.7	2.1	15.4	....	11.4 <sup>1</sup>	67.4	714
Lichi nuts .....	17.9	1.5	2.9	....	77.5 <sup>1</sup>	0.2	323

<sup>1</sup> Includes fiber.<sup>2</sup> Includes 1.3 per cent water-soluble carbohydrate. No starch present.<sup>3</sup> Includes 13.4 per cent starch and 6.8 per cent water-soluble carbohydrate.TABLE I. ANALYSES OF COMMON FOODS—*Concluded.*

Description of food	Water	Ash	Protein	Fiber	Carbohydrate (other than fiber)	Fat	Calories per 100 gms.
<b>Nuts—Concluded.</b>							
Nuts—Concluded:	%	%	%	%	%	%	
Peanuts .....	9.2	2.0	25.8	2.5	21.9	38.6	538
Peanut butter .....	2.1	5.0	29.3	....	17.1 <sup>1</sup>	46.5	604
Pecans .....	2.7	1.9	9.6	....	15.3 <sup>1</sup>	70.5	734
Pine nuts:							
Pignolias .....	5.8	4.2	36.5	0.8	4.8 <sup>2</sup>	47.9	596
Piniones .....	3.8	2.8	6.5	....	26.2 <sup>1</sup>	60.7	677
Pinon .....	3.4	2.8	14.6	....	17.3 <sup>1</sup>	61.9	685
Sabine .....	5.1	4.7	28.1	....	17.4 <sup>1</sup>	61.9	685
Pistache nuts .....	5.7	2.8	24.3	1.8	14.3 <sup>3</sup>	51.1	614
Walnuts, California .....	2.5	1.7	18.4	1.4	11.6	64.4	700
California, black .....	2.5	1.9	27.6	1.7	10.0	56.3	657
California, soft shell..	2.5	1.4	16.6	2.6	13.5	63.4	691
<b>Alcoholic Beverages.</b>							
Distilled liquors <sup>4</sup> (whiskey, gin, rum, brandy) .....	....	....	....	....	{ none or tr. }	....	....
Wines, <sup>5</sup> dry .....	....	....	....	....	0.3	....	....
sweet .....	....	....	....	....	8.0	....	....
Cordials <sup>6</sup> (creme de menthe, kum- mel, benedictine, anisette, char- treuse) .....	....	....	....	....	30.0	....	....
Beer, <sup>7</sup> near .....	....	....	....	....	5.0	....	....
Ale <sup>8</sup> .....	....	....	....	....	5.1	....	....
Malt extract, commercial .....	....	....	....	....	10.6	....	....
true (concentrated) .....	....	....	....	....	71.3	....	....
Cider <sup>9</sup> .....	....	....	....	....	4.5	....	....
<b>Other Beverages or Beverage Materials.</b>							
Tea (0.5 oz. to 1 pt. water) .....	....	....	....	....	0.6	....	....
Coffee (1 oz. to 1 pt. water) .....	....	....	....	....	0.7	....	....
Cocoa, as purchased .....	6.2	5.5	18.3 <sup>9</sup>	4.5	37.5 <sup>10</sup>	26.7	464
Cocoa (0.5 oz. to 1 pt. water) ..	....	....	....	....	1.1	....	....
(0.5 oz. to 1 pt. milk) ...	....	....	....	....	6.0	....	....
Chocolate, as purchased .....	3.8	3.1	12.4 <sup>11</sup>	2.8	24.8 <sup>12</sup>	52.2	619
Carbonated drinks (bottled soda, sarsaparilla, birch beer, root beer, ginger ale) .....	....	....	....	....	8.0	....	....

<sup>1</sup> Includes fiber.<sup>2</sup> Includes 4.3 per cent water-soluble carbohydrate. No starch present.<sup>3</sup> Includes 6.1 per cent water-soluble carbohydrate. No starch present.<sup>4</sup> Sugar is sometimes added to brandy. One sample examined contained 33.5 per cent of sugar. Range of alcohol content 35 to 50 per cent by volume.<sup>5</sup> Natural wines contain from 6 to 12 per cent alcohol; "fortified" wines, 15 to 20 per cent. Dry wines contain from a trace to 3.6 per cent of sugar; sweet wines from 0.1 to 40.7 per cent.<sup>6</sup> Range of alcohol content 35 to 50 per cent.<sup>7</sup> Range of alcohol content formerly 3 to 5 per cent, now not over 0.5 per cent.<sup>8</sup> Range of alcohol content 2.5 to 6 per cent. Carbohydrate range 0 to 13.5 per cent.<sup>9</sup> Theobromine and caffeine (1.3 per cent), not included.<sup>10</sup> Includes about 14 per cent of starch and soluble carbohydrate; balance of carbohydrate of doubtful or undetermined availability.<sup>11</sup> Theobromine and caffeine (0.9 per cent), not included.<sup>12</sup> Includes about 10 per cent of starch and soluble carbohydrate; balance of carbohydrate of doubtful or undetermined availability.



TABLE II. ANALYSES OF SPECIAL FOODS.

Date of analysis	Manufacturer and Brand	Water	Ash	Nitrogen	Protein	Fiber	Carbohydrate (other than fiber)		Fat	Calories per 100 gms.
							Starch	Undeter- mined carbohydrate		
	<b>Flours and Meals.</b>									
	<i>Acme Mills Co., Portland, Ore.</i>	%	%	%	%	%	%	%	%	
1910	Acme Diabetic Flour .....	9.40	1.10	1.50	9.40	0.80	71.40	6.00	1.90	364
	<i>Amthor &amp; Co., Halle.</i>									
1904	Weizen-Protein .....	8.60	1.10	13.46	76.70	....	12.20		1.40	368
	<i>Herman Barker, Somerville, Mass.</i>									
1906	Barker's Gluten Food "A" .....	10.10	0.20	13.66	77.90	0.00	4.50 <sup>1</sup>	6.70	0.60	362
1912	Barker's Gluten Food "A" .....	7.40	0.40	13.90	79.20	0.20	trace	12.30	0.50	370
1919	Barker's Gluten Food "A" .....	9.86	0.29	13.50	76.95	0.06	2.56	9.84	0.44	361
1906	Barker's Gluten Food "B" .....	10.10	0.20	13.50	77.00	0.00	6.00 <sup>1</sup>	6.10	0.60	362
1913	Barker's Gluten Food "B" .....	6.30	0.40	13.62	75.20	0.40	3.70	13.40	0.60	375
1919	Barker's Gluten Food "B" .....	9.72	0.33	12.98	73.99	0.08	5.23	10.14	0.51	362
1906	Barker's Gluten Food "C" .....	9.70	0.20	13.20	75.20	0.00	8.30 <sup>1</sup>	5.80	0.80	364
1913	Barker's Gluten Food "C" .....	5.70	0.40	13.46	76.70	0.60	3.40	12.60	0.60	377
1919	Barker's Gluten Food "C" .....	10.00	0.42	12.79	72.90	0.09	6.39	9.80	0.40	360
	<i>Battle Creek Sanitarium Co., Battle Creek, Mich.</i>									
1916	Gluten Meal .....	7.55	1.35	4.61	26.28	0.12	55.03	8.65	1.02	369
1916	Gluten Meal .....	7.35	1.20	6.90	39.33	....	41.12	10.08	0.92	370
1914	Gluten Meal 80% .....	6.83	....	13.44	76.61	....	5.77	....	....	...
	<i>Battle Creek Food Co., Battle Creek, Mich.</i>									
1925	Gluten Flour .....	8.08	0.93	7.57	43.15	0.34	39.33 <sup>2</sup>	6.35	1.82	372
	<i>Bischof &amp; Co., London.</i>									
1907	Gluten Flour .....	10.10	1.30	12.77	72.80	0.20	12.00		3.60	372

<i>Callard, Stewart &amp; Watt, London.</i>										
1906	Casoid Flour .....	10.00	2.50	13.70	85.60	....	none	1.40 <sup>3</sup>	0.50	353
1909	Casoid Flour .....	10.30	2.50	13.20	82.50	....	none	3.10 <sup>3</sup>	1.60	357
1916	Gluten Flour .....	9.70	....	12.88	73.40	....	none	....	....	...
<i>Canada Cereal &amp; Flour Co.</i>										
1919	Gluten Flour .....	12.02	2.61	3.26	18.58	1.50	43.87	16.94	4.48	358
<i>Cereal Meal Corporation, St. Louis, Mo.</i>										
1923	Cereal Meal .....	6.39	4.60	3.07	19.19	5.13	34.77 <sup>4</sup>	23.35	6.57	368
<i>Cereo Co., Tappan, N. Y.</i>										
1912	Soy Bean Gruel Flour .....	4.90	4.40	7.31	45.70	1.90	0.60	22.00	20.50	458
1913	Soy Bean Gruel Flour .....	4.20	4.20	6.90	43.10	2.20	trace	24.90	21.40	465
1919	Soy Bean Gruel Flour .....	6.12	3.98	7.38	46.13	2.38	0.90	21.86	18.63	443
<i>Cheltine Food Co., Cheltenham, England.</i>										
1923	Cheltine Diabetic Food .....	4.66	6.89	9.26	57.88	0.78	16.40 <sup>5</sup>	3.34	10.05	401
<i>Curdolac Food Co., Waukesha, Wis.</i>										
1924	Curdolac Flour .....	4.98	7.78	6.58	41.13	6.53	4.60 <sup>6</sup>	22.54	12.44	385
<i>The Dieto Food Co., New York City.</i>										
1914	Flour, Pure Whole Wheat .....	7.85	1.15	2.36	13.45	1.01	62.44	11.99	2.11	371
<i>Efficiency Products Co., Somerville, N. J.</i>										
1926	Hoffman's Casein Flour .....	15.55	7.23	11.44	72.99	0.03	0.68 <sup>7</sup>	2.48	1.04	314
<i>Empire Flour Mills.</i>										
1919	Gluten Flour .....	10.46	0.48	2.30	13.11	0.25	59.08	15.48	1.14	361
<i>Farwell &amp; Rhines, Watertown, N. Y.</i>										
1906	Cresco Flour .....	12.70	0.50	1.78	11.10	....	....	74.80	0.90	352
1913	Cresco Flour .....	12.70	0.40	2.90	18.10	0.40	57.20	10.20	1.00	351
1913	Cresco Flour .....	....	....	3.22	20.10	....	....	....	....	...
1904	Gluten Flour .....	....	....	1.50	8.55	....	much	....	....	...

<sup>1</sup> Includes water-soluble carbohydrates.<sup>2</sup> Includes 2.88 per cent water-soluble carbohydrates.<sup>3</sup> Includes fiber.<sup>4</sup> Includes 7.68 per cent water-soluble carbohydrates.<sup>5</sup> Includes 7.76 per cent water-soluble carbohydrates.<sup>6</sup> Includes 3.76 per cent water-soluble carbohydrates.<sup>7</sup> All water-soluble carbohydrates.

TABLE II. ANALYSES OF SPECIAL FOODS—Continued.

Date of analysis	Manufacturer and Brand	Water	Ash	Nitrogen	Protein	Fiber	Carbohydrate (other than fiber)			Calories per 100 gms.
							Starch	Undeter- mined carbohydrate	Fat	
	<b>Flours and Meals—Continued.</b>									
	<i>Farwell &amp; Rhines, Watertown, N. Y.—Concluded.</i>	%	%	%	%	%	%	%	%	
1906	Gluten Flour .....	12.70	0.40	1.82	10.40	0.30	71.50 <sup>1</sup>	3.80	0.90	351
1906	Gluten Flour .....	13.30	0.50	1.73	9.90	0.10	72.00 <sup>1</sup>	3.20	1.00	349
1909	Gluten Flour .....	10.70	0.50	1.92	10.90	....	77.40 <sup>2</sup>		0.50	358
1913	Gluten Flour .....	8.30	0.60	6.90	39.30	0.20	38.10	12.30	1.20	370
1913	Gluten Flour .....	8.60	0.50	7.41	42.20	0.60	32.80	14.20	1.10	367
1916	Gluten Flour .....	10.65	0.45	3.06	17.44	0.04	63.39	7.05	0.98	360
1916	Gluten Flour .....	7.05	0.35	7.04	40.13	....	41.35	10.12	1.00	366
1919	Gluten Flour .....	10.93	0.34	3.64	20.75	trace	54.09 <sup>3</sup>	12.55	1.34	362
1919	Gluten Flour .....	11.14	0.57	3.84	21.89	trace	55.71	9.41	1.28	360
1919	Gluten Flour .....	9.34	0.52	7.16	40.82	trace	32.17	15.75	1.40	368
1919	Gluten Flour 40% .....	9.09	0.55	6.90	39.32	trace	37.75	12.03	1.26	368
1919	Gluten Flour 40% .....	10.65	0.75	7.10	40.47	0.23	37.01	9.42	1.47	361
1923	Gluten Flour .....	8.81	0.65	7.10	40.47	0.34	43.24 <sup>3</sup>	5.12	1.37	368
1925	Gluten Flour .....	8.23	0.72	7.38	42.07	0.29	40.99 <sup>4</sup>	6.30	1.40	370
1904	Special Diabetic Food .....	....	....	2.16	13.50	....	much	....	....	....
1906	Special Diabetic Food .....	12.00	1.90	2.29	14.30	1.40	58.30 <sup>1</sup>	9.10	3.00	354
1906	Special Diabetic Food .....	10.30	1.60	2.27	14.20	1.10	62.10 <sup>1</sup>	7.90	2.80	362
1906	Special Diabetic Food .....	12.40	1.30	2.05	12.80	0.60	70.30		2.60	358
1913	Special Diabetic Food .....	9.60	1.80	4.40	27.50	1.70	40.00	16.60	2.80	362
	<i>Federal Mill &amp; Elevator Co., Lockport, N. Y.</i>									
1923	Gluten Flour .....	9.20	0.90	6.76	38.53	0.41	42.30 <sup>5</sup>	6.88	1.78	367
	<i>Gericke, Potsdam.</i>									
1910	Aleuronat .....	9.30	0.90	13.34	76.04	....	10.46 <sup>2</sup>		3.30	376

<i>Golden Rod Milling Co., Portland, Ore.</i>										
1913	Acme Special Flour	10.00	0.70	2.53	15.80	0.70	57.00	13.50	1.40	361
1919	Acme Special Flour	11.73	1.02	2.42	15.13	0.33	61.48	8.56	1.75	356
1916	Gluten Flour	12.12	....	2.47	14.08	....	66.97	....	1.25	...
<i>O. B. Gilman, Boston, Mass.</i>										
1913	Gluten Flour	8.70	1.00	7.57	43.20	0.60	31.40	13.10	2.00	369
<i>Karl Goldscheider, Carlsbad.</i>										
1909	Conalbin-Mehl No. 1	9.40	0.50	1.74	10.90	....	78.80 <sup>2</sup>	0.40	362	
<i>Gumpert, Berlin.</i>										
1910	Ultramehl	6.60	2.90	5.84	36.50	....	9.40 <sup>2</sup>	44.60	585	
1908	Wheat Protein, Hazard's	7.00	0.60	6.69	38.10	0.30	52.80	1.20	374	
<i>The Health Food Co., New York City.</i>										
1906	Almond Meal	8.50	6.40	8.10	50.60	2.90	7.20 <sup>1</sup>	8.80	15.60	407
1913	Almond Meal	7.90	6.30	8.05	50.30	2.80	trace	17.90	14.80	406
1914	Almond Meal	7.16	5.48	7.86	49.13	0.48	none	15.91	21.84	457
1919	Almond Meal	7.90	6.01	8.04	50.25	2.40	none	18.00	15.44	412
1919	Bran Biskue, Gluten Bran	9.19	3.38	4.85	27.65	1.51	33.84	13.90	10.53	396
1911	C. B. X. Cold Blast Flour, 25% Protein	8.70	0.50	1.62	10.10	0.20	68.90	10.70	0.90	367
1919	Diabetic Casein Flour (self-raising)	11.93	9.16	11.56	72.25	0.14	none	5.73	0.79	319
1914	Gluten Flour No. 1	7.65	2.78	12.11	69.03	0.21	7.09	12.36	0.88	362
1916	Gluten Flour	7.70	....	7.28	41.50	....	35.00	....	....	....
1919	Gluten Flour 40%	8.48	0.65	6.88	39.21	0.35	37.27	12.99	1.05	371
1906	Glutosac Gluten Flour	10.10	1.10	5.45	31.10	1.00	49.30 <sup>1</sup>	5.80	1.60	359
1909	Glutosac Gluten Flour	8.00	1.10	5.65	32.20	....	58.10 <sup>2</sup>	0.60	367	
1911	Glutosac Gluten Flour	8.70	....	5.86	33.40	....	....	....	....	....
1913	Glutosac Gluten Flour	8.20	1.40	6.38	36.40	0.70	36.90	14.10	2.30	370
1914	Glutosac Gluten Flour	8.18	1.20	6.08	34.65	0.48	41.96	11.84	1.69	369
1919	Glutosac Gluten Flour	10.53	0.75	7.28	41.50	0.29	36.20	9.05	1.68	362
1913	Pronireu (Gluten Griddle Cake Flour)	8.80	4.90	5.97	34.00	0.50	37.70	12.90	1.20	349
1919	Pronireu (Gluten Griddle Cake Flour)	10.81	4.26	6.64	37.85	0.20	36.56	9.14	1.18	345

<sup>1</sup> Includes water-soluble carbohydrates.<sup>2</sup> Includes fiber.<sup>3</sup> Includes 4.34 per cent water-soluble carbohydrates.<sup>4</sup> Includes 3.08 per cent water-soluble carbohydrates.<sup>5</sup> Includes 2.70 per cent water-soluble carbohydrates.



TABLE II. ANALYSES OF SPECIAL FOODS—Continued.

Date of analysis	Manufacturer and Brand	Water	Ash	Nitrogen	Protein	Fiber	Carbohydrate (other than fiber)		Fat	Calories per 100 gms.
							Starch	Undeter- mined carbohydrate		
Flours and Meals—Continued.										
The Health Food Co., New York City—Concluded.										
1906	Protosac Gluten Flour .....	10.60	0.70	5.86	33.40	0.30	50.00 <sup>1</sup>	4.10	0.90	358
1913	Protosac Gluten Flour .....	8.00	0.90	6.83	38.90	0.30	36.30	13.90	1.70	372
1914	Protosac Gluten Flour .....	8.16	1.30	7.35	41.90	0.38	31.50	14.80	1.96	370
1913	Protosoy Soy Flour .....	3.00	5.00	6.77	42.30	5.40	trace	24.50	19.80	446
1914	Protosoy Soy Flour .....	3.86	5.30	6.86	42.88	2.75	1.86	24.17	19.18	448
1919	Protosoy Soy Flour .....	6.32	4.43	6.30	39.38	4.33	1.86	25.10	18.58	433
1906	Pure Washed Gluten Flour .....	6.20	0.80	9.98	56.90	0.20	27.50 <sup>1</sup>	7.50	0.90	376
1913	Pure Washed Gluten Flour .....	6.10	0.50	12.85	73.20	0.40	7.00 <sup>1</sup>	11.20	1.60	380
1914	Pure Washed Gluten Flour .....	7.03	0.58	13.70	78.09	0.40	2.81	10.08	1.01	373
1919	Pure Washed Gluten Flour .....	8.31	0.71	13.14	74.90	0.30	3.77	10.04	1.97	373
1922	Pure Washed Gluten Flour .....	7.10	....	14.05	80.09	....	3.36 <sup>2</sup>	....	....	....
1919	Snow Flake Diabetic Casein Flour .....	10.41	6.07	12.67	79.19	....	none	3.18	1.15	340
R. Hundhausen, Hamm.										
1892	Aleuronat (pure) .....	8.50	0.90	13.78	78.55	....	11.55	....	0.50	365
1892	Aleuronat (less pure) .....	9.10	1.20	12.43	70.85	0.20	17.45	....	1.20	364
Hudson Hebert (furn'r).										
1919	Gluten Flour .....	11.84	1.24	2.52	14.36	1.30	52.20	16.84	2.22	354
Jireh Diabetic Food Co., New York City.										
1906	Diabetic Flour .....	9.30	1.30	2.29	14.30	1.00	66.60 <sup>1</sup>	5.30	2.20	365
1906	Diabetic Flour .....	11.00	1.30	1.94	12.10	1.10	72.70	....	1.80	355
1919	Diabetic Flour .....	10.36	1.04	2.60	14.82	1.00	50.13	20.69	1.96	360
1919	Diabetic Flour .....	12.03	1.01	2.49	14.22	1.05	50.62	18.55	2.52	356
1913	Flour .....	7.60	1.40	2.30	14.40	1.40	60.90	12.00	2.30	370

1919	Gluten Flour .....	9.10	1.40	2.52	14.36	1.20	50.00	21.86	2.08	371
1919	Gluten Flour .....	11.34	1.34	2.50	14.25	1.60	48.66	20.41	2.40	355
1913	Patent Barley .....	5.00	1.10	1.82	11.40	0.70	67.80	12.40	1.60	381
1913	Patent Cotton Seed Flour .....	7.40	5.50	7.86	49.10	4.00	6.00	15.30	12.70	396
1913	Patent Lentils Flour .....	5.90	2.50	4.37	27.30	3.30	42.60	17.20	1.20	359
1913	Protein Flour .....	7.30	1.70	5.02	31.40	0.90	48.50	8.20	2.00	370
1913	Soja Bean Flour .....	4.40	4.60	6.77	42.30	4.70	0.00	25.80	18.20	435
1906	Wheat and Barley Flour .....	9.70	1.50	1.89	11.80	1.60	66.20 <sup>1</sup>	7.30	1.90	358
1906	Wheat and Barley Flour .....	9.50	1.60	1.81	11.30	1.40	74.40	....	1.80	359
1924	Soycasein Flour .....	9.16	5.81	12.13	75.81	0.30	1.36 <sup>3</sup>	4.58	2.98	354
Jireh Food Co., Inc., Morris Plains, N. J.										
1925	"Starch-Treated" Flour .....	8.08	1.36	2.14	13.38	1.29	65.95 <sup>4</sup>	7.89	2.05	367
Johnson Educator Food Co., Boston, Mass.										
1906	Educator Standard Gluten Flour .....	11.30	1.00	4.22	24.10	0.40	56.80 <sup>1</sup>	4.70	1.70	358
1911	Educator Standard Gluten Flour .....	7.30	0.80	6.42	36.60	0.20	40.90	12.80	1.40	374
1911	Educator Standard Gluten Flour .....	8.80	....	6.42	36.60	....	....	....	....	....
The Kellogg Food Co., Battle Creek, Mich.										
1904	20% Gluten Meal .....	10.50	1.00	2.53	14.40	0.40	57.40	15.70	0.60	355
1909	20% Gluten Meal .....	8.90	1.10	3.36	19.20	....	70.00 <sup>5</sup>	....	0.80	364
1912	20% Gluten Meal .....	9.80	1.40	4.40	25.10	0.10	49.60	13.50	0.50	357
1916	20% Gluten Meal .....	7.65	1.22	4.33	24.68	0.12	51.24	14.17	0.92	369
1906	40% Gluten Flour .....	10.50	0.50	6.45	36.80	0.20	46.90 <sup>1</sup>	3.90	1.20	361
1906	40% Gluten Flour .....	8.50	1.40	6.14	35.00	0.10	50.00 <sup>1</sup>	3.80	1.20	366
1909	40% Gluten Flour .....	7.90	1.20	6.24	35.60	....	53.50 <sup>5</sup>	....	1.80	373
1912	40% Gluten Flour .....	9.70	1.40	7.52	42.90	0.20	31.90	13.00	0.90	359
1913	40% Gluten Flour .....	8.00	1.20	6.99	39.80	0.20	40.50	9.40	0.90	367
1916	40% Gluten Flour .....	8.62	0.89	5.90	33.63	0.08	48.04	7.31	1.43	369
1919	40% Gluten Flour .....	10.10	0.63	8.28	47.20	0.26	30.66	10.17	0.98	261
1909	40% Gluten Flour, Self-Raising .....	8.80	1.30	6.19	35.30	....	53.60 <sup>5</sup>	....	1.00	365
1916	Gluten Meal .....	7.30	1.36	7.29	41.55	0.10	36.59	11.99	1.11	371
1919	40% Gluten Meal, Thoroughly Cooked .....	8.50	1.38	7.54	42.98	0.31	33.38	12.00	1.45	380
1909	80% Gluten .....	7.20	0.60	12.61	71.90	....	19.40 <sup>5</sup>	....	0.90	373

<sup>1</sup> Includes water-soluble carbohydrates.<sup>2</sup> Includes 0.55 per cent water-soluble carbohydrates.<sup>3</sup> All water-soluble carbohydrates.<sup>4</sup> Includes 5.48 per cent water-soluble carbohydrates.<sup>5</sup> Includes fiber.

TABLE II. ANALYSES OF SPECIAL FOODS—Continued.

Date of analysis	Manufacturer and Brand	Water	Ash	Nitrogen	Protein	Fiber	Carbohydrate (other than fiber)		Fat	Calories per 100 gms.
							Starch	Undeter- mined carbohydrate		
	<b>Flours and Meals—Continued.</b>									
	<i>The Kellogg Food Co., Battle Creek, Mich.—Concl.</i>	%	%	%	%	%	%	%	%	
1912	80% Gluten .....	9.10	0.60	13.01	74.20	0.20	6.20	8.80	0.90	365
1916	Gluten Meal .....	5.10	0.45	12.90	73.53	0.18	3.10	15.88	1.76	386
1916	Pure Gluten Meal .....	4.60	0.96	13.47	76.78	0.08	6.77	10.00	0.81	374
1919	Pure Gluten Meal .....	7.73	0.92	13.88	79.12	0.19	2.56	8.74	0.74	368
	<i>Lister Bros., New York City.</i>									
1917	Lister's Diabetic Flour, Self-rising .....	11.62	2.77	10.78	67.38	0.17	none	17.20	0.86	346
1919	Lister's Diabetic Flour, Self-rising .....	11.53	9.44	10.93	68.31	0.05	none	9.72	0.95	321
	<i>Lyster Bros., Whitefield, N. H.</i>									
1915	Casein Flour .....	5.70	5.78	13.52	84.50	0.05	none	0.37	3.60	381
1916	Diabetic Flour .....	6.58	7.90	12.68	79.25	....	none	....	3.00	...
	<i>Eugene Loeb, New York City.</i>									
1913	Gluten Cracker Meal .....	9.70	1.00	4.45	25.40	0.30	40.20	15.70	7.70	394
1913	Imported Gluten Flour .....	9.20	1.40	12.21	69.60	0.40	4.40	14.10	0.90	361
1913	Pure Gluten Flour .....	10.10	0.60	6.45	36.80	0.30	39.60	10.20	2.40	368
1913	Whole Wheat Flour .....	11.10	1.10	2.34	13.30	0.50	54.60	17.20	2.20	360
	<i>E. Loeb &amp; Co., New York City.</i>									
1913	Gluten Flour .....	9.80	0.50	7.02	40.00	0.30	39.80	8.50	1.10	363
1919	Gluten Flour .....	9.72	0.48	6.12	34.86	0.20	39.87	14.11	0.76	362
	<i>Loeb's Diabetic Food Bakery, New York City.</i>									
1916	Gluten Cracker Meal .....	8.22	1.07	6.82	38.87	0.19	31.59	11.14	8.92	407
1919	Gluten Cracker Meal .....	8.40	1.59	6.44	36.71	0.28	30.66	11.48	10.88	417

1919	Gluten Cracker Meal .....	7.94	1.39	6.46	36.82	0.30	32.17	12.43	8.95	406
1916	Pure Gluten Flour .....	8.85	0.51	7.65	43.61	0.13	35.78	10.11	1.01	333
1919	Pure Gluten Flour .....	10.48	0.89	6.80	38.76	0.15	38.22	10.30	1.20	360
1923	Pure Gluten Flour .....	8.22	0.83	7.28	41.50	0.15	39.72 <sup>1</sup>	7.39	2.19	374
1923	Special Gluten Flour .....	5.76	0.77	12.84	73.19	0.19	9.42 <sup>2</sup>	8.70	1.97	383
<i>McDowell Bros., Ogdensburg, N. Y.</i>										
1925	Diaban Flour .....	6.78	6.46	4.48	28.00	2.15	32.06 <sup>3</sup>	6.48	18.07	429
1925	Diaban Flour .....	5.95	6.15	4.17	26.06	1.35	33.17 <sup>4</sup>	9.97	17.35	431
<i>Thomas Martindale &amp; Co., Philadelphia, Pa.</i>										
1913	Special Gluten Flour .....	8.20	0.60	6.45	36.80	0.30	41.40	11.20	1.50	371
<i>Maple Leaf Milling Co.</i>										
1919	Gluten Flour .....	12.52	0.38	2.22	12.66	0.25	61.51	11.52	1.16	353
<i>Mayflower Mills, Fort Wayne, Ind.</i>										
1913	Bond's Diabetic Flour .....	9.40	0.60	6.43	40.20	0.20	40.60	7.70	1.30	366
1919	Gluten Flour .....	10.35	0.85	8.42	47.99	0.30	28.63	10.23	1.65	365
<i>A. McFarlane Co.</i>										
1919	Gluten Flour .....	11.09	0.47	2.16	12.14	0.30	60.34	14.28	1.38	358
<i>P. McIntosh Co.</i>										
1919	Gluten Flour .....	10.65	0.45	2.64	15.05	0.25	63.28	9.32	1.00	360
<i>Theo. Metcalf Co., Boston, Mass.</i>										
1906	Soja Bean Meal, 5.5% Starch .....	7.80	4.40	6.38	39.90	3.90	9.00 <sup>3</sup>	15.90	19.10	431
1906	Soja Bean Meal, 7.6% Starch .....	....	....	5.89	36.80	....	....	....	....	...
1913	Soja Bean Meal, 18.0% Starch .....	6.50	4.10	6.56	41.00	3.40	25.00	....	20.00	444
1906	Vegetable Gluten, 20.0% Starch .....	7.90	0.70	9.82	56.00	0.30	26.80 <sup>3</sup>	6.70	1.60	372
1913	Vegetable Gluten, 8.1% Starch .....	7.60	0.50	12.86	73.30	0.20	5.90	11.00	1.50	374
<i>H. Niemöller, Gütersloh.</i>										
1901	Roborat .....	9.50	1.40	13.17	82.30	0.20	2.90	....	3.70	374

<sup>1</sup> Includes 3.04 per cent water-soluble carbohydrates.<sup>2</sup> Includes 0.76 per cent water-soluble carbohydrates.<sup>3</sup> Includes water-soluble carbohydrates.<sup>4</sup> Includes 5.04 per cent water-soluble carbohydrates.



TABLE II. ANALYSES OF SPECIAL FOODS—Continued.

Date of analysis	Manufacturer and Brand	Water	Ash	Nitrogen	Protein	Fiber	Carbohydrate (other than fiber)		Fat	Calories per 100 gms.
							Starch	Undeter- mined carbohydrate		
	<b>Flours and Meals—Continued.</b>									
	<i>Northwestern Cereal Co., London, Ont.</i>	%	%	%	%	%	%	%	%	
1916	Gluten Flour .....	8.50	....	2.07	11.80	....	60.60	....	....	...
1916	Gluten Flour .....	11.10	....	2.42	13.79	....	54.68	....	....	...
1916	Gluten Flour .....	9.30	....	2.03	11.57	....	53.20	....	....	...
1919	Gluten Flour .....	10.21	2.10	2.99	17.07	1.58	42.10	21.95	4.99	369
1916	Gluten Flour .....	12.77	....	1.78	10.14	....	64.80	....	2.02	...
1919	Gluten Flour, 40% .....	11.66	2.27	2.49	14.20	2.40	38.65 <sup>1</sup>	25.56	5.26	361
	<i>Norton-Truax, Chicago, Ill.</i>									
1919	Diaprotein .....	11.72	6.35	12.44	77.75	....	none	2.72	1.46	335
	<i>Phospho Food Co., Los Angeles, Calif.</i>									
1914	Phospho D. & D. Special .....	8.74	1.22	2.19	13.69	1.24	58.57	14.35	2.19	366
	<i>Pieser-Livingston Co., Chicago, Ill.</i>									
1913	Gluten Flour .....	8.50	0.60	6.93	39.50	0.10	38.40	11.60	1.30	370
1913	Gluten Flour .....	8.70	0.60	6.69	38.10	0.20	36.50	14.50	1.40	369
1919	Genuine Gluten Flour .....	10.16	0.81	7.26	41.38	0.20	36.31	9.79	1.35	362
1925	Gluten Flour .....	8.78	0.89	7.37	42.01	0.30	39.39 <sup>1</sup>	6.96	1.69	369
	<i>Plasmon, Ltd., London.</i>									
1923	Plasmon Arrowroot .....	12.98	2.20	3.17	19.81	0.11	62.24 <sup>2</sup>	2.53	0.13	340
	<i>Potter &amp; Wrightington, Boston, Mass.</i>									
1919	Diet-Ease Gluten Flour .....	12.50	0.98	4.64	26.45	0.73	46.89	10.29	2.16	354
1919	Diet-Ease Gluten Flour .....	8.76	0.96	6.94	39.56	0.42	36.20	11.78	2.32	371
1925	Diet-Ease Gluten Flour .....	7.93	1.18	7.12	40.58	0.44	38.38 <sup>3</sup>	8.89	2.60	375
1925	Diet-Ease Gluten Flour .....	7.74	1.76	7.03	40.07	0.46	40.60 <sup>4</sup>	6.54	2.83	374

<i>The Pure Gluten Food Co., New York City.</i>										
1904	Gum Gluten Flour .....	....	....	8.69	49.53	....	....	....	....	...
1911	Gum Gluten Flour .....	8.10	1.00	6.13	34.90	0.20	42.40	11.80	1.60	371
1902	Gum Gluten Ground .....	11.90	0.90	4.29	24.50	....	61.30 <sup>5</sup>	....	1.40	356
1904	Gum Gluten Ground .....	10.60	0.80	7.05	40.20	0.40	30.00	16.70	1.30	359
1906	Gum Gluten Ground .....	6.90	1.00	8.02	45.70	0.50	38.60 <sup>6</sup>	5.40	1.90	376
1902	Gum Gluten Self Raising .....	9.80	3.80	5.04	28.70	0.30	56.00	....	1.40	351
1906	Gum Gluten Self Raising .....	10.80	4.50	6.06	34.50	0.50	42.90 <sup>6</sup>	5.80	1.00	342
1906	Hoyt's Gum Gluten .....	11.20	1.00	5.09	29.00	0.30	52.00 <sup>8</sup>	4.90	1.60	358
1914	Hoyt's Gum Gluten Flour, 50% .....	6.61	0.70	7.95	45.32	0.33	37.07	8.82	1.15	375
1914	Hoyt's Gum Gluten Flour, Ground .....	8.21	0.60	6.71	38.24	0.18	42.61	9.23	0.93	369
1914	Hoyt's Gum Gluten Self Raising Flour .....	7.30	3.88	6.83	38.93	0.40	38.98	9.76	0.75	357
1914	Hoyt's Gum Gluten Special Flour .....	5.63	0.93	14.51	82.70	0.35	2.17	7.50	0.72	376
1923	Hoyt's Gluten Flour .....	7.40	0.99	9.32	53.12	0.42	31.38 <sup>7</sup>	3.43	3.26	381
1925	Hoyt's Gluten Flour .....	8.23	0.94	7.56	43.09	0.28	40.41 <sup>8</sup>	5.20	1.85	371
1901	Plain Gluten Flour .....	9.90	0.60	8.58	48.90	0.20	34.50	....	5.90	363
1911	Pure Gluten Flour .....	....	....	6.06	34.54	....	....	....	....	...
1911	Pure Gluten Flour .....	9.10	....	6.29	35.54	....	....	....	....	...
<i>The Pure Gluten Food Co., Columbus, Ohio.</i>										
1919	Hoyt's Gluten Flour over 40% protein .....	10.68	0.82	7.34	41.84	0.27	33.19	12.07	1.13	359
1919	Hoyt's Gluten Self-raising Flour over 40% protein .....	10.18	3.85	7.28	41.50	0.50	33.38	9.72	0.87	346
1919	Hoyt's Gluten Special Flour 80% protein .....	6.82	1.10	13.54	77.18	0.27	2.81	10.63	1.19	373
<i>Rademann's Nährmittelfabrik, Frankfurt.</i>										
1913	Diabetiker Mehl .....	9.60	0.80	6.06	37.90	0.20	46.80	3.90	0.80	362
<i>Ralston Health Food Co.</i>										
1895	Gluten Flour .....	12.80	0.60	2.40	13.70	0.60	70.30	....	2.00	354
1902	Gluten Flour .....	11.90	0.90	2.53	14.40	....	72.30 <sup>5</sup>	....	0.50	351

<sup>1</sup> Includes 4.04 per cent water-soluble carbohydrates.<sup>2</sup> Includes 0.65 per cent water-soluble carbohydrates.<sup>3</sup> Includes 4.80 per cent water-soluble carbohydrates.<sup>4</sup> Includes 5.72 per cent water-soluble carbohydrates.<sup>5</sup> Includes fiber.<sup>6</sup> Includes water-soluble carbohydrates.<sup>7</sup> Includes 2.24 per cent water-soluble carbohydrates.<sup>8</sup> Includes 5.76 per cent water-soluble carbohydrates.

TABLE II. ANALYSES OF SPECIAL FOODS—Continued.

Date of analysis	Manufacturer and Brand	Water	Ash	Nitrogen	Protein	Fiber	Carbohydrate (other than fiber)		Fat	Calories per 100 gms.
							Starch	Undeter- mined carbohydrate		
	<b>Flours and Meals—Concluded.</b>									
	<i>Schulenburg Oil Mill, Schulenburg, Texas.</i>	%	%	%	%	%	%	%	%	
1915	Allison's Cotton Seed Flour .....	9.38	5.95	8.06	50.38	2.70	1.07	19.28	11.24	384
1921	Allison's Flour (Cotton Seed) .....	6.65	6.20	8.07	50.44	4.83	8.81 <sup>1</sup>	15.18	7.89	369
1919	Baumgarten Process Allison Flour .....	8.08	5.67	8.00	50.00	3.47	1.13	21.61	10.04	381
	<i>La Societe L'Aliment "Essentiel," Nanterre, France.</i>									
1921	"Essential" Flour .....	7.89	1.58	3.14	19.63	0.27	58.43 <sup>2</sup>	9.24	2.96	376
1921	Heudebert, Surazotized Gluten Flour .....	7.79	3.36	10.75	61.28	0.30	14.03 <sup>3</sup>	10.94	2.30	366
1921	Heudebert, Gluten Flour with Cacao .....	7.46	3.63	9.40	53.58	1.00	13.76 <sup>4</sup>	14.73	5.84	381
1921	Lacteous Flour .....	4.80	2.02	1.38	8.63	0.32	72.18 <sup>5</sup>	8.48	3.57	389
	<i>Soy Bean Products Co., San Francisco, Calif.</i>									
1919	Soy Bean Flour A .....	7.65	4.71	6.69	41.81	1.98	0.34	24.07	19.44	440
1919	Soy Bean Flour B .....	7.91	5.08	7.04	44.00	2.07	0.76	25.98	14.20	411
	<i>Sprague, Warner &amp; Co., Chicago, Ill.</i>									
1913	Richelieu Gluten Flour .....	8.70	0.50	7.95	45.30	0.20	31.60	12.50	1.20	368
	<i>Still Rock Spa, Waukesha, Wis.</i>									
1919	Curdolac Flour .....	10.25	3.99	9.06	56.63	3.79	5.09	17.89	2.36	335
	<i>G. Van Abbott &amp; Sons, London.</i>									
1913	Almond Flour .....	4.00	3.00	3.94	24.60	1.90	none	7.90	58.60	657
1913	Gluten Flour .....	10.20	0.80	12.02	68.50	0.40	12.40	6.80	0.90	359
1913	Gluten Semola .....	10.10	2.80	8.22	46.90	0.40	28.20	8.70	2.90	361
	<i>Vitae Health Food Co., Seattle, Wash.</i>									
1924	Soya Manna .....	8.88	4.35	6.58	41.13	1.50	10.68 <sup>6</sup>	14.45	19.01	436

<i>Waukesha Health Products Co., Waukesha, Wis.</i>										
1917	Ayos, the Improved Soja Bean Flour .....	8.75	4.13	6.63	41.44	3.82	0.56	24.43	16.87	458
1914	Hepco Flour .....	6.96	5.05	6.72	42.00	5.05	9.02 <sup>6</sup>	14.80	17.12	417
1919	Hepco Flour .....	8.09	4.31	7.04	44.00	2.15	0.90	21.41	19.14	438
<i>White Swan Spice Co., Toronto.</i>										
1916	Diet Flour .....	10.20	....	2.06	12.90	....	60.75	....	....	...
1916	Diet Flour .....	11.25	0.90	1.65	10.30	0.10	67.84	7.95	1.66	359
1919	Diet Flour .....	11.47	0.70	1.52	8.66	0.55	61.29	16.05	1.28	356
1919	Gluten Flour .....	9.21	0.77	1.72	9.80	0.44	62.30	16.00	1.48	370
1919	Gluten Flour .....	10.50	0.75	1.56	8.89	0.46	62.00	15.95	1.45	360
1919	Gluten Flour .....	10.84	0.87	1.61	9.18	0.44	61.60	15.47	1.60	359
<i>Wilson Bros., Rochester, N. Y.</i>										
1919	Genteel Brand Flour .....	11.60	0.98	4.70	29.38	0.26	49.16	6.23	2.39	361
1911	Gluten Flour, 4/7 Standard .....	11.10	....	3.18	18.10	....	....	....	....	...
1911	Gluten Flour, 4/7 Standard .....	9.70	....	3.12	17.80	....	....	....	....	...
1913	Gluten Flour, 4/7 Standard .....	11.00	1.20	3.33	19.00	0.30	54.60	11.80	2.10	361
1913	Gluten Flour, Self-Raising, 4/7 Standard ....	12.20	4.60	2.78	15.80	0.30	51.80	13.30	2.00	342
1919	Gluten Flour .....	10.52	0.74	8.04	45.83	0.36	28.63	11.91	2.01	364
<b>"Non-Nutritive" Flours, Fillers, etc.</b>										
<i>Dietetic Cellulose Co., Chicago.</i>										
1920	Cellu Flour .....	5.52	0.30	none	none	57.25	none	36.93 <sup>7</sup>	trace	...
<i>Efficiency Products Co., Somerville, N. J.</i>										
1924	Ecmo (cellulose) Flour .....	9.05	1.00	0.66	4.13	4.75	3.44 <sup>8</sup>	77.00 <sup>7</sup>	0.63	...
<i>Lister Bros., Inc., New York City.</i>										
1924	Low Caloric Flour .....	7.55	6.10	0.63	3.94	5.24	1.76 <sup>6</sup>	74.84 <sup>7</sup>	0.57	...
<i>Nutrivoid Diabetic Flour Co., Brooklyn, N. Y.</i>										
1924	Nutrivoid Flour .....	8.23	1.17	0.69	4.31	7.18	6.08 <sup>6</sup>	72.11 <sup>7</sup>	0.92	...
<i>Vitae Health Food Co., Seattle, Wash.</i>										
1925	Cellulose Flour .....	9.95	4.18	1.85	11.56	32.33	3.76 <sup>6</sup>	35.42 <sup>7</sup>	2.80	...

<sup>1</sup> Includes 8.25 per cent water-soluble carbohydrates.<sup>2</sup> Includes 9.30 per cent water-soluble carbohydrates.<sup>3</sup> Includes 1.32 per cent water-soluble carbohydrates.<sup>4</sup> Includes 1.46 per cent water-soluble carbohydrates.<sup>5</sup> Includes 40.96 per cent water-soluble carbohydrates.<sup>6</sup> All water-soluble carbohydrates.<sup>7</sup> Modified celluloses.



TABLE II. ANALYSES OF SPECIAL FOODS—Continued.

Date of analysis	Manufacturer and Brand	Water	Ash	Nitrogen	Protein	Fiber	Carbohydrate (other than fiber)		Fat	Calories per 100 gms.
							Starch	Undeter- mined carbohydrate		
	<b>"Non-Nutritive" Flours, Fillers, etc.—Concl.</b>									
	<i>Miscellaneous.</i>	%	%	%	%	%	%	%	%	...
1923	Cellulose Flour from Corn Cobs .....	5.00	0.82	0.16	1.00	63.80	0.34	28.50	0.54	...
	<b>Bran, etc.</b>									
	<i>The Battle Creek Food Co., Battle Creek, Mich.</i>									
1924	Cooked Bran .....	4.15	7.46	2.45	15.31	9.19	59.20		4.69	340
	<i>Callard &amp; Co., London.</i>									
1925	Washed Bran .....	8.60	4.37	1.66	10.38	21.48	2.31 <sup>1</sup>	46.41	6.45	294
	<i>Lister Bros., New York City.</i>									
1924	Lister's Starch-free Bran .....	8.16	4.30	2.62	16.38	21.14	1.63 <sup>2</sup>	44.37	4.02	286
	<i>The Spa, Waukesha, Wis.</i>									
1924	Malted Bran .....	3.24	2.94	1.56	9.75	17.91	2.01 <sup>2</sup>	58.60	5.55	331
	<i>Vitae Health Food Co., Seattle, Wash.</i>									
1925	Vitae Special Starch-free Bran .....	9.75	4.39	3.58	22.38	20.98	5.80 <sup>1</sup>	27.77	8.93	304
	<i>Woman's Baking Co., Boston, Mass.</i>									
1921	Washed Bran .....	9.13	....	1.79	11.19	....	4.59 <sup>2</sup>	....	7.39	130
	<i>Experimental.</i>									
1921	Bran, unwashed .....	6.05	6.31	2.62	16.38	6.05	12.21 <sup>3</sup>	46.86	6.14	357
1921	Bran, washed .....	....	....	....	....	....	2.29 <sup>4</sup>	....	....	...
	<i>Efficiency Products Co., Somerville, N. J.</i>									
1926	Starch-free Bran .....	12.33	3.65	2.67	16.69	19.71	2.41 <sup>2</sup>	40.81	4.40	279

	<b>Protein Preparations.</b>									
	<i>The Bauer Chemical Co., Berlin.</i>									
1912	Sanatogen .....	10.00	5.60	12.82	80.10	....	4.20 <sup>5</sup>		0.10	338
	<i>Cheltine Food Co., Cheltenham, Eng.</i>									
1923	Cheltine Milk Protein .....	9.05	3.08	13.24	84.47	none	0.19 <sup>5</sup>	2.24	0.97	356
1923	Cheltine Milk Protein .....	....	....	13.38	85.36	....	....	....	....	...
	<i>Eiweiss Extrakt Co., Altona, Germany.</i>									
1900	Soson .....	6.40	1.00	14.59	91.20	....	1.10 <sup>5</sup>		0.30	372
	<i>Glogau &amp; Co., Chicago. (Sole Agents.)</i>									
1923	Aleuronat .....	8.11	0.76	12.46	71.02	0.26	10.68 <sup>7</sup>	3.59	5.58	391
1923	Aleuronat .....	....	....	12.46	71.02	....	....	....	....	...
	<i>Krecke &amp; Co., Salzuflen.</i>									
1902	Energin .....	9.10	1.00	13.41	83.80	0.30	1.30		4.50	381
	<i>Menley &amp; James, New York City.</i>									
1913	Glidine .....	5.70	0.90	14.62	83.30	0.20	none	9.10	0.80	377
	<i>John Norton Co., Columbus, Ohio.</i>									
1922	Diaprotein No. 2 .....	11.23	6.75	12.43	79.30	....	0.88 <sup>6</sup>	....	1.55	335
	<i>Plasmon Co., London.</i>									
1899	Plasmon (average 9 analyses) .....	11.90	7.50	11.23	64.00	....	15.90 <sup>5</sup>		0.70	326
1901	Plasmon .....	8.50	7.40	12.00	68.40	....	15.50 <sup>5</sup>		0.20	337
1908	Plasmon .....	12.40	7.70	11.25	64.10	....	15.40 <sup>5</sup>		0.40	322
1909	Plasmon .....	10.90	7.60	12.59	70.10	....	8.70 <sup>5</sup>		2.70	339
1923	Plasmon Milk Proteid .....	12.13	7.92	11.90	75.92	none	1.44 <sup>6</sup>	1.87	0.72	323
	<i>Tropenwerke, Mülheim.</i>									
1898	Tropon (average of many analyses) .....	9.30	1.20	13.86	86.60	....	2.70 <sup>5</sup>		0.20	359
1901	Tropon .....	9.20	0.80	14.16	88.50	....	1.20 <sup>5</sup>		0.30	362

<sup>1</sup> All water-soluble carbohydrates; no starch.<sup>2</sup> Includes water-soluble carbohydrates.<sup>3</sup> Includes 3.19 per cent water-soluble carbohydrates.<sup>4</sup> Includes 0.86 per cent water-soluble carbohydrates.<sup>5</sup> Includes fiber.<sup>6</sup> Lactose.<sup>7</sup> Includes 3.54 per cent water-soluble carbohydrates.

TABLE II. ANALYSES OF SPECIAL FOODS—Continued.

Date of analysis	Manufacturer and Brand	Water	Ash	Nitrogen	Protein	Fiber	Carbohydrate (other than fiber)		Fat	Calories per 100 gms.
							Starch	Undeter- mined carbohydrate		
	<b>Soft Breads.</b>									
	<i>American System of Bakeries, Hartford, Conn.</i>	%	%	%	%	%	%	%	%	
1921	Gluten Bread .....	35.29	1.65	6.52	26.16	0.30	23.70 <sup>1</sup>	6.84	5.97	281
1921	Gluten Bread A .....	30.43	1.79	6.60	27.75	0.41	27.58 <sup>2</sup>	6.12	5.92	299
1921	Gluten Bread B .....	30.85	1.60	6.81	28.54	0.43	27.49 <sup>3</sup>	5.65	5.44	296
	<i>Barker System of Bakeries, Hartford, Conn.</i>									
1925	Gluten Bread .....	38.71	1.91	2.93	16.68	0.40	32.30 <sup>4</sup>	6.45	3.55	254
	<i>Beroth Bread Shop, Hartford, Conn.</i>									
1925	Gluten Bread .....	33.28	2.65	5.02	28.60	0.42	23.32 <sup>5</sup>	7.13	4.60	278
	<i>Bibeau, Meriden, Conn.</i>									
1925	Gluten Bread .....	38.87	2.31	1.51	8.58	0.92	41.81 <sup>6</sup>	6.13	1.38	239
	<i>Canada Bread Co., Toronto, Canada.</i>									
1919	Gluten Bread .....	35.00	2.34	1.73	9.87	0.34	34.82	16.52	1.11	255
	<i>Community Bake Shop, Norwich, Conn.</i>									
1925	Gluten Bread .....	33.37	2.37	5.42	30.88	0.51	22.32 <sup>7</sup>	5.76	4.79	279
	<i>The Dieto Food Co., New York City.</i>									
1914	Dieto Bread, Pure Whole Wheat .....	40.42	1.69	1.55	8.84	0.71	36.57	11.41	0.36	231
	<i>Ferguson Bakery, Boston, Mass.</i>									
1913	Gluten Bread .....	37.20	1.70	3.87	22.10	0.20	25.20	10.50	3.10	259
	<i>Frank &amp; Co., Bockenheim.</i>									
1892	Protein-Roggenbrot .....	32.00	2.80	3.79	21.60	2.30	35.10		6.20	283
1892	Protein-Weizenbrot .....	31.90	2.70	3.74	21.30	2.20	45.60		6.30	284

	<i>Fritz, Vienna.</i>									
....	Aleuronatbrot .....	35.50	1.30	2.50	14.30	0.20	47.90		0.80	256
1910	Kleberbrot, Schwarz .....	....	....	3.44	19.60	....	50.50		....	...
1910	Litonbrot .....	....	....	6.18	38.60	....	15.40		....	...
	<i>Fromm &amp; Co., Dresden.</i>									
1910	Conglutinbrot .....	....	....	2.93	18.30	....	47.30		....	...
1910	Litonbrot .....	....	....	5.73	35.80	....	14.30		....	...
	<i>Gericke, Potsdam.</i>									
1910	Doppel-Porterbrot .....	38.60	....	4.30	26.90	....	35.10		....	...
1910	Doppel-Porterbrot .....	38.90	1.10	3.50	21.90	....	36.60 <sup>8</sup>		1.50	248
1910	Dreifach-Porterbrot .....	35.10	1.30	4.91	30.70	0.40	19.80	6.20	6.50	285
1910	Einfach-Porterbrot .....	30.50	1.60	2.85	17.80	....	48.30 <sup>8</sup>		1.80	280
1910	Sifarbrot .....	39.60	2.20	5.97	37.30	0.60	12.30	2.70	5.30	257
	<i>Karl Goldscheider, Carlsbad.</i>									
1910	Sinamylbrot .....	39.10	3.50	4.51	28.20	4.40	17.30	2.90	4.60	235
	<i>Gumpert, Berlin.</i>									
1910	Diabetiker-Doppel-Schwarzbröt .....	27.90	1.60	2.54	15.90	0.50	39.40	2.60	11.80	348
1910	Diabetiker-Doppel-Schwarzbröt .....	25.60	1.60	2.96	18.50	....	41.90 <sup>8</sup>		12.70	346
1910	Diabetiker-Doppel-Weissbröt .....	23.70	2.30	3.01	18.80	0.40	36.80	2.60	15.40	371
1910	Einfach-Schwarzbröt .....	30.10	1.40	2.50	15.60	....	49.50 <sup>8</sup>		3.40	291
1910	Einfach-Weissbröt .....	29.40	1.50	2.59	16.20	....	46.40 <sup>8</sup>		6.50	309
1910	Ultrabrot .....	27.90	3.10	4.51	28.20	0.80	6.80	1.00	32.20	434
	<i>F. Günther, Frankfurt.</i>									
1892	Kleberbrot .....	33.70	2.40	2.75	15.68	0.70	47.02		0.50	255
	<i>Hallinan's Bakery, New Britain.</i>									
1925	Gluten Bread .....	33.40	1.97	4.83	27.54	0.46	23.38 <sup>9</sup>	7.50	5.75	287
	<i>H. and R. Diabetic Foods, Bronx, N. Y.</i>									
1924	Bread of Low Food Value .....	24.80	3.43	1.51	9.45	9.37	1.74 <sup>10</sup>	27.92	23.29	...

<sup>1</sup> Includes 1.01 per cent water-soluble carbohydrates.<sup>2</sup> Includes 2.33 per cent water-soluble carbohydrates.<sup>3</sup> Includes 1.93 per cent water-soluble carbohydrates.<sup>4</sup> Includes 5.92 per cent water-soluble carbohydrates.<sup>5</sup> Includes 4.28 per cent water-soluble carbohydrates.<sup>6</sup> Includes 7.79 per cent water-soluble carbohydrates.<sup>7</sup> Includes 3.99 per cent water-soluble carbohydrates.<sup>8</sup> Includes fiber.<sup>9</sup> Includes 4.08 per cent water-soluble carbohydrates.<sup>10</sup> Includes 0.75 per cent water-soluble carbohydrates.



TABLE II. ANALYSES OF SPECIAL FOODS—Continued.

328

CONNECTICUT EXPERIMENT STATION

BULLETIN 286

ANALYSES OF SPECIAL FOODS

329

Date of analysis	Manufacturer and Brand	Water	Ash	Nitrogen	Protein	Fiber	Carbohydrate (other than fiber)		Fat	Calories per 100 gms.
							Starch	Undeter- mined carbohydrate		
Soft Breads—Continued.										
Health Food Co., New York City.										
		%	%	%	%	%	%	%	%	
1906	Glutosac Bread .....	31.50	1.90	4.38	24.40	0.40	29.90 <sup>1</sup>	9.20	2.70	278
1914	Glutosac Bread .....	37.20	1.64	4.34	24.74	0.82	22.17	11.33	2.10	252
1919	Glutosac Bread .....	28.28	1.72	4.86	27.70	1.49	26.78	10.33	3.70	293
1919	Glutosac Bread .....	23.10	1.95	5.22	29.75	0.84	29.53	12.26	2.57	309
1906	Protosac Bread .....	27.30	1.40	5.20	29.60	0.20	33.10 <sup>1</sup>	6.80	1.60	292
1914	Protosac Bread .....	30.70	2.11	4.77	27.19	0.38	27.66	10.16	1.80	276
1919	Protosac Bread, No. 1 .....	28.85	2.42	6.31	35.97	0.84	20.53	7.39	4.00	292
1919	Protosac Bread, No. 2 .....	28.49	1.83	4.73	26.96	0.30	30.47	8.43	3.52	302
J. Heinbockel & Co., Baltimore, Md.										
1914	Diabeto Bread for Diabetes .....	33.47	3.22	1.37	8.55	1.15	40.39	11.73	1.49	256
Howland Co., Bridgeport, Conn.										
1921	Gluten Bread .....	31.74	2.25	5.80	23.51	0.41	34.16 <sup>2</sup>	7.01	0.92	257
R. Hundhausen, Hamm.										
1892	Aleuronatbrot, low gluten .....	39.60	1.60	2.77	15.80	0.60	42.10		0.30	234
Jireh Diabetic Food Co., New York City.										
1906	Whole Wheat Bread .....	39.20	1.80	1.50	8.60	0.60	43.80 <sup>1</sup>	5.60	0.40	236
1913	Whole Wheat Bread (not fresh) .....	21.80	2.50	1.98	11.30	0.60	44.90	18.20	0.70	304
Keney Tower Bakery, Hartford, Conn.										
1925	Gluten Bread .....	37.79	3.19	3.61	20.57	0.34	29.80 <sup>3</sup>	3.29	5.02	260
Levine Bros., New Haven, Conn.										
1923	Gluten Bread .....	39.17	1.87	3.07	17.52	0.29	25.72 <sup>4</sup>	11.68	3.75	253
Eugene Loeb, New York City.										
1913	P. & L. Genuine Gluten Bread .....	31.40	1.60	1.66	9.50	0.30	44.20	10.40	2.60	280
Loeb's Diabetic Food Bakery, New York City.										
1919	Casein Bread .....	40.42	4.47	6.53	40.84	0.08	none	3.35	10.84	274
1919	Casein Bread .....	39.73	4.35	6.57	41.05	0.09	trace	3.71	11.07	323
1923	Genuine Gluten Bread .....	30.21	1.83	5.71	32.57	0.24	27.16 <sup>5</sup>	4.40	3.59	289
1919	Casein Muffins .....	30.82	4.89	7.32	45.74	0.15	none	7.03	11.37	313
1916	Genuine Gluten Bread .....	27.72	1.51	5.66	32.26	0.21	26.37	11.76	0.17	282
1919	Genuine Gluten Bread .....	32.01	1.80	4.98	28.39	0.28	28.56	6.86	2.10	273
1914	P. & L. Genuine Glubetic Bread .....	30.07	1.06	6.20	35.34	0.36	19.15	9.97	4.05	294
Lyster Bros., Whitefield, N H.										
1915	Casein Bread .....	38.27	4.24	5.85	36.57	0.05	none	2.49	18.38	322
Mory's Bakery, New Haven, Conn. ....										
1925	Gluten Bread .....	38.30	1.30	4.92	28.06	0.18	23.99 <sup>6</sup>	4.30	3.87	260
Rademann's Nahrungsmittelfabrik, Frankfurt.										
1910	Diabetiker-Grahambrot .....	31.70	1.80	1.57	9.80	2.10	45.60	3.90	5.10	283
1910	Diabetiker-Schwarzbrot (dry) .....	....	....	6.05	37.80	....	33.30	....	....	....
1910	Diabetiker-Schwarzbrot .....	29.10	1.96	2.32	14.50	1.40	45.80	4.80	2.50	283
1910	Diabetiker-Schwarzbrot .....	33.60	1.90	2.38	14.90	....	47.70 <sup>7</sup>	....	1.90	267
1910	Diabetiker-Weissbrot (dry) .....	....	....	6.94	43.40	....	28.10	....	....	....
1910	Diabetiker-Weissbrot .....	33.80	1.90	3.73	23.30	0.40	37.00	3.10	0.50	258
1910	"D-K." Brot (dry) .....	....	....	1.97	12.30	....	58.90	....	....	....
1892	Erdnuss-Brot .....	24.60	3.80	5.38	33.60	5.50	19.70	....	12.80	328
1910	Litonbrot .....	42.60	2.40	4.83	30.20	0.70	17.50	4.10	2.50	230
Mrs. Root's Food Shop, New Haven, Conn.										
1925	Gluten Bread .....	35.91	1.00	5.06	28.85	0.20	23.91 <sup>8</sup>	5.05	5.08	277
Schaeffer Bros., Inc., Middletown, Conn.										
1925	Gluten Bread .....	34.22	2.69	4.87	27.75	0.43	25.06 <sup>9</sup>	5.32	4.53	273

<sup>1</sup> Includes water-soluble carbohydrates.<sup>2</sup> Includes 1.88 per cent water-soluble carbohydrates.<sup>3</sup> Includes 2.55 per cent water-soluble carbohydrates.<sup>4</sup> Includes 1.89 per cent water-soluble carbohydrates.<sup>5</sup> Includes 1.79 per cent water-soluble carbohydrates.<sup>6</sup> Includes 2.91 per cent water-soluble carbohydrates.<sup>7</sup> Includes fiber.<sup>8</sup> Includes 4.08 per cent water-soluble carbohydrates.<sup>9</sup> Includes 4.87 per cent water-soluble carbohydrates.

TABLE II. ANALYSES OF SPECIAL FOODS—Continued.

Date of analysis	Manufacturer and Brand	Water	Ash	Nitrogen	Protein	Fiber	Carbohydrate (other than fiber)		Fat	Calories per 100 gms.
							Starch	Undeter- mined carbohydrate		
	<b>Soft Breads—Concluded.</b>									
	<i>Schelte, Münster.</i>	%	%	%	%	%	%	%	%	
1894	Aleuronatbrot .....	38.80	1.30	2.93	16.70	0.90	41.70		0.60	239
	<i>Seidl, München.</i>									
1910	Aleuronatbrot .....	28.00	....	3.50	20.00	....	49.20		0.30	280
1910	Kleberbrot .....	24.20	....	2.98	17.00	....	56.00		0.70	298
	<i>Slinn-Shouldis Co.</i>									
1919	Gluten Bread .....	35.00	0.69	1.62	9.20	0.17	39.00 <sup>a</sup>	13.36	2.58	269
	<i>Troponwerke, Mülheim.</i>									
1899	Tropon-Brot .....	42.10	....	3.12	19.50	....	....	....	....	...
	<i>Washburn-Crosby Co. Minneapolis, Minn.</i>									
1925	Gluten Bread .....	27.23	3.71	4.13	23.56	2.26	10.24 <sup>1</sup>	13.49	19.51	365
	<i>Weston Bakery, Boston, Mass.</i>									
1915	Gluten Bread .....	....	....	3.34	19.04	....	28.16	....	....	...
	<i>Miscellaneous.</i>									
1921	Almond Gluten Bread .....	25.58	6.70	5.81	27.98	0.92	13.17 <sup>2</sup>	8.26	17.39	354
1923	Cestus Bread, Gluten .....	34.26	1.15	1.97	11.23	0.14	48.38 <sup>3</sup>	3.38	1.46	265
1921	Cottonseed-Wheat Bread .....	42.22	2.23	3.10	11.63	0.95	33.26 <sup>4</sup>	8.08	1.63	227
1923	Gluten Bread .....	....	....	3.18	18.13	....	40.71 <sup>5</sup>	....	....	...
1921	Soybean Bread .....	37.70	5.88	5.38	21.75	0.88	6.22 <sup>6</sup>	9.53	18.04	312
	<b>Hard Breads and Bakery Products.</b>									
	<i>James Aird.</i>									
1916	Gluten Bread .....	8.10	2.05	2.25	13.13	0.70	59.75	15.91	0.72	360

330

CONNECTICUT EXPERIMENT STATION

BULLETIN 286

<i>Arnaud, Inc., New York City.</i>										
1921	Cassava Cakes .....	10.42	2.16	0.28	1.75	4.83	69.53 <sup>7</sup>	11.08	0.23	332
<i>Bischof &amp; Co., London.</i>										
1907	Diabetic Gluten Bread .....	7.40	4.70	11.70	66.70	0.00	20.70	0.50	354	
1907	Essentiel Bread for Super Alimentation .....	7.30	4.80	4.26	20.60	0.10	59.60	1.60	359	
<i>Brusson Jeune, Villemur, France.</i>										
1910	Gluten Bread .....	7.80	1.10	5.14	29.30	0.20	49.80	10.00	1.80	373
1912	Gluten Bread .....	12.70	0.80	5.97	34.00	0.30	40.10	10.30	1.80	354
1921	Gluten Bread .....	10.31	0.71	5.93	33.80	0.15	44.95 <sup>8</sup>	0.38	3.77	350
<i>Callard, Stewart &amp; Watt, London.</i>										
1909	Almond Biscuit, Plain .....	3.70	3.20	4.53	28.30	....	36.80 <sup>9</sup>	28.00	512	
1909	Almond Shortbreads .....	4.20	3.50	3.12	19.50	....	20.70 <sup>9</sup>	52.10	630	
1916	Casoid Biscuits .....	7.52	....	8.99	56.18	....	trace	....	27.10	...
1906	Casoid Biscuits, No. 1 .....	7.80	3.90	10.08	63.00	....	8.10 <sup>5</sup>	....	17.30	440
1909	Casoid Biscuits, No. 1 .....	7.20	2.50	10.37	64.80	....	8.70 <sup>9</sup>	16.80	445	
1913	Casoid Biscuits, No. 1 .....	4.80	3.40	10.69	66.80	0.40	4.00	1.80	18.80	460
1908	Casoid Biscuits, No. 2 .....	....	....	9.30	58.10	....	0.00	....	....	...
1909	Casoid Biscuits, No. 2 .....	7.50	3.60	9.25	57.80	....	5.60 <sup>9</sup>	25.50	483	
1908	Casoid Biscuits, No. 3 .....	....	....	8.75	54.70	....	trace	....	....	...
1909	Casoid Biscuits, No. 3 .....	7.90	5.00	8.69	54.30	....	7.80 <sup>9</sup>	25.00	473	
1908	Casoid Dinner Rolls .....	....	....	12.93	80.80	....	3.30 <sup>9</sup>	....	....	...
1909	Casoid Dinner Rolls .....	7.00	1.80	12.48	78.00	....	2.10 <sup>9</sup>	11.10	420	
1909	Casoid Lunch Biscuit .....	4.20	3.80	4.08	25.50	....	21.60 <sup>9</sup>	44.90	593	
1909	Casoid Rusk .....	5.40	4.50	5.92	37.00	....	20.80 <sup>9</sup>	32.30	522	
1909	Cocoonut Biscuit + Saccharin .....	2.60	3.10	2.66	16.60	....	16.40 <sup>9</sup>	61.30	684	
1909	Ginger Biscuit + Saccharin .....	2.50	3.70	2.74	17.10	....	18.10 <sup>9</sup>	58.60	668	
1909	Kalari Batons .....	8.10	4.40	8.46	52.90	....	0.90 <sup>9</sup>	33.70	519	
1913	Kalari Batons .....	4.50	5.20	6.91	43.20	0.70	none	7.40	39.00	553
1909	Kalari Biscuits .....	6.30	3.70	9.10	56.90	....	1.70 <sup>9</sup>	31.40	517	
1909	Prolactic Biscuits .....	6.30	4.00	6.86	42.90	....	19.30 <sup>9</sup>	27.50	496	

<sup>1</sup> Includes 1.58 per cent water-soluble carbohydrates.<sup>2</sup> Includes 1.74 per cent water-soluble carbohydrates.<sup>3</sup> Includes 4.29 per cent water-soluble carbohydrates.<sup>4</sup> Includes 1.74 per cent water-soluble carbohydrates.<sup>5</sup> Includes water-soluble carbohydrates.<sup>6</sup> Includes 2.52 per cent water-soluble carbohydrates.<sup>7</sup> Includes 2.76 per cent water-soluble carbohydrates.<sup>8</sup> Includes 9.32 per cent water-soluble carbohydrates.<sup>9</sup> Includes fiber.

ANALYSES OF SPECIAL FOODS

331



TABLE II. ANALYSES OF SPECIAL FOODS—Continued.

Date of analysis	Manufacturer and Brand	Water	Ash	Nitrogen	Protein	Fiber	Carbohydrate (other than fiber)			Calories per 100 gms.
							Starch	Undeter- mined carbohydrate	Fat	
	<b>Hard Breads and Bakery Products—Cont.</b> <i>Callard &amp; Co., London—Concluded.</i>	%	%	%	%	%	%	%	%	
1923	Almond Biscuits, No. 15 .....	4.08	5.30	5.46	34.13	1.66	3.49 <sup>1</sup>	2.79	48.55	599
1925	Bran and Agar Biscuits, "Cellulon" .....	10.15	4.51	1.75	10.94	15.93	10.90 <sup>2</sup>	40.57	7.00	313
1923	Bran and Almond Biscuits .....	3.34	4.03	3.90	24.38	4.14	2.81 <sup>3</sup>	3.81	57.49	641
1923	Casoid Biscuits, No. 17 A .....	6.04	8.95	9.32	58.25	0.13	0.32 <sup>4</sup>	1.71	24.60	463
1923	Casoid Biscuits, No. 8 .....	5.98	7.70	8.68	54.25	0.09	0.49 <sup>4</sup>	4.91	26.58	478
1923	Chocolate Biscuits .....	3.74	4.11	4.18	26.13	1.50	5.57 <sup>5</sup>	9.18	49.77	611
1925	Chocolate Biscuits (Casoid) .....	4.30	4.25	3.68	23.00	2.00	5.44 <sup>4</sup>	9.43	51.58	616
1923	Gluten and Almond Biscuits, No. 11 .....	5.42	2.58	10.46	65.38	0.29	3.08 <sup>6</sup>	0.00	23.25	483
1923	Gluten Biscuits, No. 9 .....	5.50	2.54	10.59	60.36	0.40	3.40 <sup>7</sup>	3.90	23.90	486
1923	Gluten Cracknells, No. 7 .....	6.18	2.12	12.06	68.74	0.24	3.36 <sup>8</sup>	4.68	14.68	439
1923	Gluten Dinner Rolls, No. 6 .....	6.89	1.52	12.94	73.76	0.18	5.16 <sup>9</sup>	5.40	7.09	401
1923	Kalari Batons, No. 5 .....	4.92	6.68	7.07	44.19	0.38	1.16 <sup>2</sup>	0.13	42.54	565
1923	Parmesan Cheese Straws, No. 17 .....	3.43	5.79	5.00	31.25	0.50	3.48 <sup>4</sup>	6.61	48.04	606
1923	Ponos Biscuits, No. 14 .....	7.55	8.44	9.69	60.56	0.33	1.25 <sup>4</sup>	2.64	19.23	421
1923	Prolacto Biscuits, No. 12 .....	5.76	8.82	9.56	59.75	0.22	0.26 <sup>4</sup>	4.74	20.45	443
1923	Soup Sippets .....	1.89	7.70	8.66	54.13	0.03	0.52 <sup>4</sup>	6.99	28.74	505
1925	Starchless Ginger Biscuits .....	3.83	3.41	4.38	27.38	1.28	2.68 <sup>2</sup>	4.49	56.93	651
	<i>Canada Bread Co., Toronto, Canada.</i>									
1916	Gluten Health Bread .....	7.45	1.95	2.70	15.39	0.78	57.88	13.19	3.36	376
	<i>Cheltine Food Co., Cheltenham, Eng.</i>									
1923	Cheltine Assorted Biscuits .....	6.02	2.44	2.92	18.25	0.55	51.46 <sup>10</sup>	5.28	16.00	444
1923	Cheltine Brown Rusks .....	8.02	2.14	2.91	18.19	0.22	50.97 <sup>11</sup>	10.75	9.71	407
1923	Cheltine White Rusks .....	7.39	2.35	3.63	22.69	0.20	47.97 <sup>12</sup>	4.61	14.79	434
1923	Manhu Diabetic Biscuits .....	5.97	1.07	2.07	12.94	0.80	61.71 <sup>13</sup>	5.55	11.96	424

<i>Chicago Dietetic Supply House, Chicago.</i>										
1925	Bran-Agar Agar Wafers .....	5.85	7.32	1.91	11.94	13.10	8.24 <sup>2</sup>	47.86	5.69	...
1925	Cellu Bran Wafers .....	4.28	4.17	0.66	4.13	21.50	3.05 <sup>2</sup>	38.63	24.24	...
1925	Cellu Cheese Wafers .....	3.48	3.21	1.24	7.75	21.15	2.31 <sup>2</sup>	31.46	30.64	...
1925	Cellu Chocolate Wafers .....	4.08	3.43	1.04	6.50	19.18	3.55 <sup>14</sup>	34.93	28.33	...
<i>The Dieto Food Co., New York City.</i>										
1914	Dieto Crackers .....	6.59	1.75	1.98	13.38	0.98	54.84	13.92	9.24	409
1914	Dieto Rusks .....	6.43	1.50	2.55	15.94	0.98	52.09	13.95	9.11	410
<i>Fougeron, Paris.</i>										
1925	Pain Anti-diabetique .....	6.75	2.95	3.34	20.88	0.48	43.38 <sup>15</sup>	5.51	20.05	460
<i>Frank &amp; Co., Bockenheim.</i>										
1892	Erdnuss-Kakes .....	6.40	2.70	5.15	32.20	3.10	36.50	19.10	447	
<i>Fritz, Vienna.</i>										
1910	Braunes Luftbrot "B" .....	....	....	6.82	42.60	....	19.80	....	....	...
1910	Mandelbrot .....	....	....	2.46	15.40	....	23.10	....	....	...
<i>Fromm &amp; Co., Dresden.</i>										
1913	Almond-form Wafers with Chocolate .....	2.60	1.00	0.77	4.80	0.30	14.00	48.30	29.00	529
1913	Butterbrezeln .....	6.30	2.00	1.97	12.30	0.20	43.10	19.60	16.50	449
1914	Conglutin Drops .....	6.40	5.23	8.13	50.81	0.23	29.19	6.94	1.11	358
1914	Conglutin-Zwieback .....	4.48	2.00	2.28	14.25	0.40	29.70	27.92	21.25	479
1913	Crackers .....	7.40	3.40	2.06	12.90	0.20	58.20	10.20	7.70	395
1913	Eierbiscuit .....	7.70	1.30	3.01	18.80	0.20	37.50	23.10	11.40	420
1910	Eiweissbrot .....	....	....	7.28	45.50	....	37.50	....	....	...
1913	Hazelnuss-Stangen .....	5.20	2.90	2.14	13.40	1.70	none	60.80	16.00	441
1913	Luft Bread .....	8.30	8.90	8.14	50.90	0.20	23.40	7.30	1.00	335
1913	Makronen .....	6.00	3.00	2.26	14.10	1.30	none	56.20	19.40	456
1913	Salz-Stangen .....	6.20	3.60	2.08	13.00	0.40	39.10	22.10	15.60	437

<sup>1</sup> Includes 3.10 per cent water-soluble carbohydrates.<sup>2</sup> All water-soluble carbohydrates.<sup>3</sup> Includes 2.32 per cent water-soluble carbohydrates.<sup>4</sup> Includes water-soluble carbohydrates.<sup>5</sup> Includes 3.74 per cent water-soluble carbohydrates.<sup>6</sup> Includes 0.93 per cent water-soluble carbohydrates.<sup>7</sup> Includes 0.98 per cent water-soluble carbohydrates.<sup>8</sup> Includes 0.18 per cent water-soluble carbohydrates.<sup>9</sup> Includes 0.60 per cent water-soluble carbohydrates.<sup>10</sup> Includes 5.28 per cent water-soluble carbohydrates.<sup>11</sup> Includes 5.55 per cent water-soluble carbohydrates.<sup>12</sup> Includes 7.53 per cent water-soluble carbohydrates.<sup>13</sup> Includes 9.12 per cent water-soluble carbohydrates.<sup>14</sup> Includes 1.44 per cent water-soluble carbohydrates.<sup>15</sup> Includes 9.04 per cent water-soluble carbohydrates.

TABLE II. ANALYSES OF SPECIAL FOODS—Continued.

Date of analysis	Manufacturer and Brand	Water	Ash	Nitrogen	Protein	Fiber	Carbohydrate (other than fiber)			Calories per 100 gms.
							Starch	Undeter- mined carbohydrate	Fat	
	<b>Hard Breads and Bakery Products—Cont.</b> <i>Fromm &amp; Co., Dresden—Concluded.</i>	%	%	%	%	%	%	%	%	
1913	Stangenin .....	6.60	1.60	2.24	14.00	0.40	51.60	12.80	13.00	431
1910	Uni Bread .....	.....	.....	11.41	71.30	.....	.....	8.60	.....	...
1913	Uni Bread .....	8.10	5.60	11.47	71.70	3.50	2.90	6.50	1.70	340
	<i>Gericke, Potsdam.</i>									
1910	Doppel-Porterzwieback .....	.....	.....	3.06	19.10	.....	41.00	.....	.....	...
1910	Doppel-Porterzwieback .....	4.90	1.70	5.47	34.20	.....	39.70 <sup>1</sup>	.....	19.50	471
1910	Mandelbrot .....	.....	.....	2.59	16.20	.....	43.30	.....	.....	...
1910	Porterbiskuits .....	.....	.....	2.58	16.10	.....	63.00	.....	.....	...
1910	Porterzwieback .....	.....	.....	4.22	26.40	.....	72.00	.....	.....	...
1910	Sifabiskuits .....	.....	.....	3.23	20.20	.....	35.30	.....	.....	...
	<i>Karl Goldscheider, Carlsbad.</i>									
1914	Aleuronat-Conglutin Cakes .....	5.17	1.25	4.26	26.63	0.08	31.67	19.63	15.57	452
1914	Butter-Brezeln .....	5.16	1.83	1.68	10.50	0.08	43.93	23.64	14.86	446
1914	Feinste Cocanuss-Biskuits für Diabetiker "3.6% carbohydrates" .....	2.71	2.73	5.50	34.44	0.88	0.00	13.86	45.38	602
1914	Feinste Vanille-Biskuits für Diabetiker, "3.6% carbohydrates" .....	3.14	2.85	7.42	46.38	0.55	none	16.75	30.33	525
1914	Honigküchen für Diabetiker, "3.6% carbohy- drates" .....	2.98	3.05	6.45	40.31	1.00	none	13.91	38.75	566
1914	Saccharin-Oblaten ohne Zucker .....	5.42	2.43	2.64	16.50	1.95	33.47	17.63	22.60	474
1914	Tee-Gebäck .....	3.44	1.28	1.12	7.00	0.23	18.00	42.79	27.26	517
1914	Zwieback .....	6.85	2.70	3.41	21.31	0.23	51.69	13.61	3.61	379

<i>Groetzsch, Frankfurt.</i>										
1910	Diabetiker-Salzbrezch .....	14.00	3.30	5.81	36.30	.....	17.10 <sup>1</sup>	.....	29.30	477
1910	Diabetiker-Salzbrezch .....	5.30	1.60	5.52	34.50	0.30	22.90	.....	35.40	548
1910	Pfeffernüsse .....	25.20	2.80	6.19	38.70	.....	9.30 <sup>1</sup>	.....	24.00	408
1910	Pfeffernüsse .....	15.20	2.60	6.27	39.20	0.70	10.30	.....	32.00	486
<i>Gumpert, Berlin.</i>										
1910	Diabetiker-Stangen .....	5.50	2.90	4.98	31.10	.....	11.00 <sup>1</sup>	.....	49.50	614
1910	Doppel-Diabetiker-Zwieback .....	4.60	2.50	5.20	32.50	0.80	27.10	0.40	32.10	529
<i>F. Gunther, Frankfurt.</i>										
1892	Aleuronat-Kakes .....	5.10	0.80	2.38	13.60	0.40	70.80	.....	9.30	421
1892	Aleuronat-Kakes .....	4.50	1.60	2.85	16.30	0.90	68.80	.....	7.90	412
1897	Aleuronat-Kakes .....	4.50	1.50	2.45	14.00	.....	71.30 <sup>1</sup>	.....	8.70	420
<i>H. and R. Diabetic Foods, Bronx, N. Y.</i>										
1924	Bran Biscuits .....	11.47	4.04	1.06	6.62	6.26	2.16 <sup>2</sup>	56.95	12.50	375
1924	Bran Biscuits, spiced and sweetened .....	4.80	3.81	1.22	7.63	7.60	2.20 <sup>3</sup>	55.57	18.39	427
1924	Cellu Lemon Cookies .....	4.33	2.63	1.25	7.81	8.65	3.98 <sup>4</sup>	45.12	27.48	475
<i>Health Food Co., New York City.</i>										
1919	Alpha .....	9.48	5.76	10.97	68.56	0.35	1.01	6.40	8.44	380
1913	Alpha Best Diabetic Wafer .....	4.90	3.60	10.58	66.10	0.50	trace	11.30	13.60	432
1914	Alpha Best Diabetic Wafer .....	7.61	5.03	10.73	67.06	0.16	1.26	10.47	8.41	391
1919	Alpha No. 1 Best Diabetic Wafer, Casein.....	6.81	6.23	7.74	48.38	0.17	none	4.89	33.52	515
1919	Alpha No. 2 Best Diabetic Wafer .....	12.88	5.09	11.28	70.50	0.13	1.13	6.25	4.02	348
1906	Diabetic Biscuit .....	4.70	3.10	4.50	28.10	0.30	51.10 <sup>5</sup>	13.70	9.00	413
1913	Diabetic Biscuit .....	8.90	2.50	4.00	25.00	0.20	46.50	7.70	9.20	400
1914	Diabetic Biscuit .....	5.80	2.55	5.75	35.94	0.35	39.77	6.76	8.83	409
1919	Gluten Cracker Dust .....	8.58	2.42	7.81	44.52	0.71	23.18	11.83	8.76	398
1913	Gluten Nuggets .....	5.70	2.80	4.83	27.50	0.20	38.60	12.40	12.80	429
1914	Gluten Nuggets .....	5.32	2.75	5.07	28.90	0.27	34.93	13.53	14.30	438
1919	Gluten Nuggets .....	8.59	2.35	5.06	28.84	0.33	32.18	15.38	12.33	417
1906	Glutona .....	4.80	2.50	3.38	19.30	0.30	54.90 <sup>5</sup>	6.40	11.80	429
1919	Glutona Bread Sticks .....	8.21	2.29	5.86	33.40	0.29	30.60	14.10	11.11	412

<sup>1</sup> Includes fiber.<sup>2</sup> Includes 0.92 per cent water-soluble carbohydrates.<sup>3</sup> Includes 0.68 per cent water-soluble carbohydrates.<sup>4</sup> Includes 2.04 per cent water-soluble carbohydrates.<sup>5</sup> Includes water-soluble carbohydrates.



TABLE II. ANALYSES OF SPECIAL FOODS—Continued.

Date of analysis	Manufacturer and Brand	Water	Ash	Nitrogen	Protein	Fiber	Carbohydrate (other than fiber)		Fat	Calories per 100 gms.
							Starch	Undeter- mined carbohydrate		
	<b>Hard Breads and Bakery Products—Cont.</b> <i>Health Food Co., New York City—Concluded.</i>	%	%	%	%	%	%	%	%	
1906	Glutosac Butter Wafers .....	4.70	3.80	4.42	25.20	1.60	41.20 <sup>1</sup>	10.60	12.90	424
1914	Glutosac Butter Wafers .....	5.44	2.10	4.98	28.39	0.38	38.93	10.82	13.94	438
1919	Glutosac Butter Wafers .....	10.30	1.89	5.46	31.12	0.36	40.42	7.92	7.99	390
1906	Glutosac Rusks .....	4.50	2.70	5.84	33.30	0.90	42.50 <sup>1</sup>	12.30	3.80	387
1914	Glutosac Rusks .....	6.66	2.50	6.29	35.85	1.13	33.64	16.78	3.44	376
1919	Glutosac Rusks .....	9.91	2.20	6.08	34.65	0.83	34.26	12.53	5.62	376
1906	Glutosac Wafers, Plain .....	6.10	3.50	4.70	26.80	1.50	41.60 <sup>1</sup>	10.90	9.60	404
1914	Glutosac Wafers, Plain .....	7.24	2.55	6.82	38.87	1.58	29.55	18.47	1.74	363
1919	Glutosac Wafers, Plain .....	10.47	2.55	7.20	41.04	1.19	25.12	12.09	7.54	342
1906	Glutosac Zwieback .....	7.60	2.50	5.20	29.60	1.20	40.90 <sup>1</sup>	11.30	6.90	389
1914	Glutosac Zwieback .....	5.92	2.50	5.82	33.17	0.85	32.46	17.39	7.71	401
1919	Glutosac Zwieback .....	9.18	2.04	5.06	28.84	0.83	33.34	15.24	10.53	405
1906	No. 1 Proto Puffs .....	8.60	1.30	12.14	69.20	0.10	9.90 <sup>1</sup>	9.90	1.00	365
1913	No. 1 Proto Puffs .....	7.20	2.70	12.21	69.60	0.20	4.30	13.10	2.90	374
1914	No. 1 Proto Puffs .....	8.71	2.80	11.56	65.89	0.40	9.23	10.15	2.82	366
1919	No. 1 Proto Puffs .....	9.32	2.73	12.12	69.08	0.20	3.26	10.74	4.67	371
1911	No. 2 Proto Puffs .....	8.20	1.80	8.38	47.80	0.20	27.20	13.30	1.50	367
1913	No. 2 Proto Puffs .....	7.90	2.50	9.06	51.60	0.20	19.00	16.70	2.10	368
1914	No. 2 Proto Puffs .....	9.16	2.60	9.40	53.58	0.40	20.70	11.47	2.09	362
1906	Protosac Rusk .....	5.90	2.00	6.54	37.30	0.50	43.90 <sup>1</sup>	8.40	2.00	376
1914	Protosac Rusk .....	7.21	2.93	6.35	36.19	0.48	35.89	14.30	3.00	373
1919	Protosac Rusk .....	11.00	2.22	5.74	32.71	1.95	39.26	7.84	5.02	364
1913	Protosoy Diabetic Wafer .....	3.90	5.00	6.90	43.10	1.90	4.70	16.50	24.90	481
1914	Protosoy Diabetic Wafer .....	4.76	3.50	5.93	37.07	1.80	14.40	14.94	23.53	477
1919	Protosoy Diabetic Wafer .....	7.35	4.03	7.44	46.50	1.80	10.58	14.23	15.51	421

1906	Salvia Almond Sticks .....	6.60	7.50	6.27	39.20	1.90	18.70 <sup>1</sup>	5.30	20.80	440
1914	Salvia Almond Sticks .....	2.63	3.38	3.57	22.31	0.70	28.29	12.75	29.94	523
1919	Salvia Almond Sticks .....	7.11	3.28	5.14	32.13	0.85	21.40	9.10	26.13	486
<i>Heintz Food Co., Chicago, Ill.</i>										
1912	Gluten Biscuits .....	....	....	2.10	11.97	....	....	....	....	...
1913	Gluten Biscuits .....	6.40	3.50	2.05	11.70	1.30	21.40	37.40	18.30	447
1913	Gluten Biscuits .....	7.30	3.00	2.32	13.20	1.00	45.50	22.80	7.20	391
<i>Ch. Heudebert, Paris.</i>										
1914	Pain d'Aleurone pour Diabétiques, "5% carbo- hydrates" .....	8.18	4.43	12.17	69.21	0.71	4.22	11.80	1.45	354
1914	Pain "Essentiel" en Biscottes .....	7.67	2.33	4.22	26.38	0.20	49.89	12.33	1.20	365
1914	Pain de Gluten pour Diabétiques .....	7.85	3.96	12.90	73.53	0.16	3.38	10.28	0.84	356
<i>R. Hundhausen, Hamm.</i>										
1892	Aleuronatzwieback, high gluten .....	8.50	2.60	10.59	60.40	....	23.50 <sup>2</sup>	....	5.00	381
1892	Aleuronatzwieback, low gluten .....	6.50	1.60	3.66	20.90	0.80	61.60	....	8.60	407
1894	Aleuronat-Biskuits .....	6.60	4.70	3.97	22.60	0.50	54.40	....	11.20	409
1891	Aleuronat-Kakes .....	3.40	1.10	3.22	18.40	1.20	66.50	....	9.40	424
<i>Huntley &amp; Palmer, London.</i>										
1912	Akoll Biscuits .....	9.30	3.90	8.51	53.20	0.40	trace	6.30	26.90	480
1913	Akoll Biscuits .....	7.20	3.40	8.72	54.50	0.70	trace	6.80	27.40	492
1916	Akoll Biscuits .....	7.97	3.43	8.57	53.56	0.49	trace	6.22	28.33	493
<i>Hygienic Food Co., New York City, Dist'b's. (Laboratoire E. Storage, Marseilles, France.)</i>										
1924	Madeleines Lucillus .....	5.20	1.13	1.40	8.75	0.38	46.90 <sup>3</sup>	14.21	23.43	490
1924	Vichy Gaufrettes .....	3.35	2.37	2.36	14.75	2.33	13.38 <sup>4</sup>	12.89	50.93	622
1924	Gaufrettes Vanilles .....	7.63	0.80	1.40	8.75	0.30	81.30	....	1.22	371
1924	Nougatines de Vichy .....	2.15	2.23	1.60	10.00	1.20	41.00 <sup>5</sup>	15.07	28.35	519

<sup>1</sup> Includes water-soluble carbohydrates.<sup>2</sup> Includes fiber.<sup>3</sup> Includes 15.32 per cent water-soluble carbohydrates.<sup>4</sup> Includes 5.84 per cent water-soluble carbohydrates.<sup>5</sup> Includes 37.40 per cent water-soluble carbohydrates.

TABLE II. ANALYSES OF SPECIAL FOODS—Continued.

Date of analysis	Manufacturer and Brand	Water	Ash	Nitrogen	Protein	Fiber	Carbohydrate (other than fiber)		Fat	Calories per 100 gms.
							Starch	Undeter- mined carbohydrate		
Hard Breads and Bakery Products—Cont. <i>Jacob &amp; Co., Ltd., Dublin, Ireland.</i>										
1923	Plasmon Oat Biscuit .....	5.86	2.43	2.46	15.38	0.26	49.25 <sup>1</sup>	6.09	20.73	469
1923	Plasmon Plain Biscuit .....	6.40	2.54	2.98	18.63	0.19	52.53 <sup>2</sup>	3.89	15.82	443
1923	Plasmon Sweet Biscuit .....	6.19	2.42	2.85	17.81	0.18	53.58 <sup>3</sup>	4.64	15.18	441
1923	Plasmon Wholemeal Biscuit .....	5.88	2.85	3.20	20.00	0.71	47.19 <sup>4</sup>	6.57	16.80	446
<i>Jireh Diabetic Food Co., New York City.</i>										
1906	Diabetic Biscuits .....	6.30	2.00	2.37	14.80	0.90	65.40 <sup>5</sup>	6.90	3.70	382
1906	Diabetic Biscuits .....	8.90	2.30	2.10	13.10	1.20	70.60		3.90	370
1913	Diabetic Biscuits .....	5.40	2.00	2.11	13.20	1.20	49.60	21.20	7.40	403
1906	Diabetic Rusks .....	8.70	3.10	2.34	14.60	0.90	67.70		5.00	374
1913	Diabetic Rusks .....	5.40	1.90	2.38	14.90	1.10	47.00	21.00	8.70	410
1906	Wheat Nuts .....	7.60	2.30	3.04	19.00	1.00	50.10 <sup>5</sup>	4.40	15.60	434
1906	Wheat Nuts .....	6.00	3.20	3.36	21.00	1.20	46.30		22.30	470
<i>Johnson Educator Food Co., Boston, Mass.</i>										
1906	Almond Biscuits .....	5.30	2.10	4.64	29.00	0.50	50.00 <sup>5</sup>	4.30	8.80	412
1906	Diabetic Biscuits .....	5.90	1.90	4.05	25.30	0.40	54.90 <sup>5</sup>	4.10	7.50	405
1906	Educator Crackers, Greseni Gluten .....	6.20	2.90	3.68	21.00	0.20	57.90 <sup>5</sup>	7.20	4.60	386
1913	Educator Gluten Bread Sticks .....	8.40	2.40	5.74	32.70	0.30	37.50	11.50	7.20	392
1911	Gluten Cookies .....	4.80	2.70	4.22	24.10	0.30	37.80	14.30	16.00	449
1919	Gluten Cookies .....	5.94	3.16	5.08	28.96	0.40	36.49	13.45	11.60	422
1906	Gluten Rusk, Greseni Gluten .....	6.20	3.00	3.54	20.20	0.30	63.30 <sup>5</sup>	6.70	0.30	364
1906	Gluten Wafers .....	6.90	0.90	4.85	27.60	0.30	57.00 <sup>5</sup>	6.90	0.40	370
1906	Glutine, Greseni Gluten .....	6.40	2.60	3.50	20.00	0.40	63.10 <sup>5</sup>	6.50	0.80	366
1899	Glutine, Greseni Gluten .....	10.20	1.10	2.21	12.60	....	75.20 <sup>6</sup>		0.90	359

<i>The Kellogg Food Co., Battle Creek, Mich.</i>										
1912	Avena-Gluten Biscuit .....	7.90	2.10	3.42	19.50	0.40	41.10	16.30	12.70	422
1906	Potato Gluten Biscuit .....	8.20	0.80	12.80	73.00	0.00	9.80 <sup>5</sup>	7.80	0.40	366
1909	Potato Gluten Biscuit .....	7.60	0.90	12.10	69.00	....	19.90 <sup>5</sup>		2.60	379
1913	Potato Gluten Biscuit .....	8.80	0.80	6.64	37.90	0.40	39.50	12.10	0.50	363
1906	Pure Gluten Biscuit .....	7.50	1.00	12.85	73.20	0.20	9.10 <sup>5</sup>	8.20	0.80	369
1909	Pure Gluten Biscuit .....	8.20	1.10	7.73	44.10	....	43.30 <sup>6</sup>		3.30	379
1916	Pure Gluten Biscuit .....	8.30	2.04	12.96	73.87	0.12	4.02	10.82	0.83	362
1919	Pure Gluten Biscuit .....	8.33	2.04	13.75	78.38	0.35	2.87	6.53	1.50	365
1913	Taro-Gluten Biscuits .....	9.40	0.70	5.01	28.60	0.40	48.20	12.20	0.50	361
1906	40% Gluten Biscuit .....	7.50	1.60	5.73	32.70	0.10	52.60 <sup>5</sup>	4.50	1.00	368
1909	40% Gluten Biscuit .....	7.50	1.40	5.82	33.20	....	55.10 <sup>6</sup>		2.80	378
1911	40% Gluten Biscuit .....	8.00	1.60	6.93	40.40	0.20	35.30	13.30	1.20	367
1912	40% Gluten Biscuit .....	10.20	0.50	7.60	43.30	0.20	35.00	10.30	0.50	359
1913	40% Gluten Biscuit .....	7.20	1.30	5.95	31.90	0.30	45.00	13.50	0.80	369
1916	40% Gluten Biscuit .....	8.50	1.48	7.22	41.15	0.08	36.98	10.83	0.98	365
1919	40% Gluten Biscuit .....	9.55	1.24	7.18	40.92	0.23	35.55	10.89	1.62	364
1912	80% Gluten Biscuit .....	10.10	2.10	13.18	75.10	0.10	4.70	7.00	0.90	355
<i>Kirche, Düsseldorf.</i>										
1895	Aleuronat-Kakes .....	5.00	0.90	2.72	15.50	1.60	63.30		13.70	439
<i>Klopfer Chemische Fabrik, Dresden.</i>										
1910	Glidinebrot .....	12.70	2.30	7.62	43.40	0.30	32.80	6.30	2.20	350
<i>Laporte &amp; Gauthier, Somerset, Manitoba.</i>										
1921	Croustils, Dechloridized .....	7.55	1.25	2.66	16.63	0.44	64.75 <sup>7</sup>	3.32	6.06	393
1921	Croustils, Simple .....	7.62	1.67	2.74	17.13	0.38	66.04 <sup>8</sup>	3.75	3.41	378
1921	Croustils, Glutenized .....	7.88	1.50	4.84	30.25	0.46	49.91 <sup>9</sup>	3.29	6.71	394
<i>Eugene Loeb, New York City.</i>										
1913	Gluten Luft Bread .....	7.30	1.00	4.46	25.40	0.40	44.10	12.60	9.20	411

<sup>1</sup> Includes 11.34 per cent water-soluble carbohydrates.<sup>2</sup> Includes 6.54 per cent water-soluble carbohydrates.<sup>3</sup> Includes 9.70 per cent water-soluble carbohydrates.<sup>4</sup> Includes 7.98 per cent water-soluble carbohydrates.<sup>5</sup> Includes water-soluble carbohydrates.<sup>6</sup> Includes fiber.<sup>7</sup> Includes 10.30 per cent water-soluble carbohydrates.<sup>8</sup> Includes 5.68 per cent water-soluble carbohydrates.<sup>9</sup> Includes 5.36 per cent water-soluble carbohydrates.