JOURNAL OF AGRICULTURAL RESEARCH

VOLUME XIII

APRIL 1—JUNE 24, 1918

PUBLISHED BY AUTHORITY OF THE SECRETARY OF AGRICULTURE
WITH THE COOPERATION OF THE ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS

WASHINGTON, D. C.
EDITORIAL COMMITTEE OF THE
UNITED STATES DEPARTMENT OF AGRICULTURE AND
THE ASSOCIATION OF AMERICAN AGRICULTURAL
COLLEGES AND EXPERIMENT STATIONS

FOR THE DEPARTMENT

KARL F. KELLERMAN, CHAIRMAN
Physiologist and Associate Chief, Bureau of Plant Industry

EDWIN W. ALLEN
Chief, Office of Experiment Stations

CHARLES L. MARLATT
Entomologist and Assistant Chief, Bureau of Entomology

FOR THE ASSOCIATION

H. P. ARMSBY
Director, Institute of Animal Nutrition, The Pennsylvania State College

E. M. FREEMAN
Botanist, Plant Pathologist and Assistant Dean, Agricultural Experiment Station of the University of Minnesota

All correspondence regarding articles from the Department of Agriculture should be addressed to Karl F. Kellerman, Journal of Agricultural Research, Washington, D. C.

All correspondence regarding articles from State Experiment Stations should be addressed to H. P. Armsby, Institute of Animal Nutrition, State College, Pa.
CONTENTS.

Studies on Capacities of Soils for Irrigation Water, and on a New Method of Determining Volume Weight. O. W. Israelson............................... 1

Some Stoneflies Injurious to Vegetation. E. J. Newcomer......................... 37

Basal Katabolism of Cattle and Other Species. Henry Prentiss Armsby, J. August Fries, and Winfred Waite Braman............................ 43

Further Notes on the Oriental Peach Moth, Laspeyresia molesta.

W. B. Wood and E. R. Selkregg............................................. 59

Soil Fungi in Relation to Diseases of the Irish Potato in Southern Idaho. O. A. Pratt................................................................. 73

Investigations Concerning the Sources and Channels of Infection in Hog Cholera. M. Dorset, C. N. McBryde, W. B. Niles, and J. H. Rietz.............................. 101

Effect of Temperature and Other Meteorological Factors on the Growth of Sorghums. H. N. Vinall and H. R. Reed......................... 133

Overwintering of the House Fly. R. H. Hutchison.............................. 149

Soil Acidity as Influenced by Green Manures. J. W. White................. 171

A Leafblight of Kalmia latifolia. Ella M. A. Enlows.......................... 199

Relation between Biological Activities in the Presence of Various Salts and the Concentration of the Soil Solution in Different Classes of Soil. C. E. Millar............................................. 213

Bacterial Flora of Roquefort Cheese. Alice C. Evans........................ 225

A Study of the Streptococci Concerned in Cheese Ripening.

Alice C. Evans................................................................. 235

Intumescences, with a Note on Mechanical Injury as a Cause of Their Development. Frederick A. Wolf................................. 253

Anthracnose of Lettuce Caused by Marssonina panattoniana.

E. W. Brandes................................................................. 261

The Calcium Arsenates. R. H. Robinson.................................... 281

Stemphylium Leafspot of Cucumbers. George A. Osner......................... 295

Yellow-Leafblotch of Alfalfa Caused by the Fungus Pyrenocephiza medicaginis. Fred Reuel Jones........................................... 307

An Undescribed Canker of Poplars and Willows Caused by Cytopora chrysosperma. W. H. Long................................................. 331

Chemistry of the Cotton Plant, with Special Reference to Upland Cotton. Arno Viehöver, Lewis H. Chernoff, and Carl O. Johns......................... 345

Stability of Olive Oil. E. B. Holland, J. C. Reed, and J. P. Buckley, jr................................. 353

Some Bacterial Diseases of Lettuce. Nellie A. Brown.......................... 367

Hydration Capacity of Gluten from “Strong” and “Weak” Flours. R. A. Gortner and E. H. Doherty......................... 389
Chemistry and Histology of the Glands of the Cotton Plant, with Notes on the Occurrence of Similar Glands in Related Plants. 
**ERNEST E. STANFORD and ARNO VIEHOEVER** 419

Pox or Pit (Soilrot) of the Sweet Potato.  **J. J. TAUBENHAUS** 437.

Boron: Its Effect on Crops and Its Distribution in Plants and Soil in Different Parts of the United States.  **F. C. COOK and J. B. WILSON** 451

Destruction of Tetanus Antitoxin by Chemical Agents.  **W. N. BERG and R. A. KELSER** 471

Relation of the Density of Cell Sap to Winter Hardiness in Small Grains.  **S. C. SALMON and F. L. FLEMING** 497

Influence of Temperature and Precipitation on the Blackleg of Potato.  **J. ROSENBAUM and G. B. RAMSEY** 507

A New Bacterial Disease of Gipsy-Moth Caterpillars.  **R. W. GLASER** 515

Physical Properties Governing the Efficacy of Contact Insecticides.  **WILLIAM MOORE and S. A. GRAHAM** 523

Inoculation Experiments with Species of Coccomyces from Stone Fruits.  **G. W. KEITT** 539

Nysius ericae, the False Chinch Bug.  **F. B. MILLIKEN** 571

Comparative Transpiration of Corn and the Sorghums.  **EDWIN C. MILLER and W. B. COFFMAN** 579

Inorganic Composition of a Peat and of the Plant from Which It was Formed.  **C. E. MILLER** 605

Digestibility of Corn Silage, Velvet-Bean Meal, and Alfalfa Hay When Fed Singly and in Combinations.  **P. V. EWING and F. H. SMITH** 611

Effects of Various Salts, Acids, Germicides, etc., Upon the Infectivity of the Virus Causing the Mosaic Disease of Tobacco.  **H. A. ALLARD** 619

A Study of the Physical Changes in Feed Residues Which Take Place in Cattle During Digestion.  **P. V. EWING and L. H. WRIGHT** 639

Sunscald of Beans.  **H. G. MACMILLAN** 647

A Third Biologic Form of Puccinia graminis on Wheat.  **M. N. LEVINE and E. C. STAKMAN** 651

---

**ERRATA AND AUTHORS' EMENDATIONS**

Page 44, line 3, "simple apparatus" should read "simple digestive apparatus."
Page 231, Table V, 7th column, line 1 under "Per cent." should read "0.300." Last column, line 1, under "Atmospheres" should read "4.459."
Page 265, line 14, "not noticeably sunken" should read "noticeably sunken."
Page 271, line 11 from bottom, "Hedivigia" should read "Hedwigia."
Page 497, line 3, "Table II" should read "Table V."
Page 577, footnote under Table III, line 3 after "ninth day" omit "the."
Page 4, omit "the" before "two."
Page 652, line 20, "P. graminis tritici compacti under greenhouse conditions." should read "P. graminis tritici."
ILLUSTRATIONS

PLATES

STUDIES ON CAPACITIES OF SOILS FOR IRRIGATION WATER, AND ON A NEW METHOD OF DETERMINING VOLUME WEIGHT

PLATE 1. A.—Apparatus used for the determination of the volume weight of soils in place by the rubber-tube method. B.—Apparatus used for the determination of the volume weight of soils in place by the paraffin-immersion method................................................................. 36

SOME STONEFLIES INJURIOUS TO VEGETATION

PLATE 2. Taniopteryx pacifica: A.—Young peach leaves and blossoms injured by stonefly. B, C.—Adult stoneflies feeding on peach buds................. 42

PLATE 3. Taniopteryx pacifica: A.—Cherry foliage injured by stoneflies. B.—Partly grown peaches, showing injuries caused by stoneflies. C.—Nymph, cast nymphal skin, and adult stonefly.......................... 42


FURTHER NOTES ON LASPEYRESIA MOLESTA

PLATE 5. Laspeyresia molesta: A.—Peach twig showing summer injury. B.—Peach twig with mass of gum, leaves, and frass; a type of injury found in fall and winter................................................................. 72

PLATE 6. Laspeyresia molesta: A.—A green peach attacked by the caterpillar, illustrating a common type of injury. B.—A quince severely injured..... 72

PLATE 7. Laspeyresia molesta. A.—Typical injury by larva on apple, resembling that caused by Laspeyresia prunivora. B.—Injury to the interior of the fruit ................................................................. 72


PLATE 10. Laspeyresia molesta: A.—Adult. B.—Metathoracic leg. C.—Head and mouth parts.......................... 72
SOIL FUNGI IN RELATION TO DISEASES OF THE IRISH POTATO IN SOUTHERN IDAHO

PLATE A. 1-4.—Fusarium nigrum, n. sp.: 1, Culture 32 days old on steamed Irish potato plug. 2, Culture 40 days old on string-bean agar. 3, Culture 21 days old on steamed rice. 4, Culture 31 days old on Irish potato agar, plus 10 per cent of glucose. 5-6.—Fusarium elegantum, n. sp.: 5, Culture 25 days old on steamed rice. 6, Culture 18 days old on steamed-potato plug. 7-8.—Fusarium lanceolatum, n. sp.: 7, Culture 20 days old on steamed-potato plug. 8, Culture 18 days old on steamed rice.

PLATE B. 1-3.—Fusarium aridum, n. sp.: 1, Culture 40 days old on string-bean agar. 2, Culture 31 days old on steamed-potato plug. 3, Culture 17 days old on steamed rice. 4-6.—Fusarium idahoanum, n. sp.: 4, Culture 41 days old on Irish potato agar with 10 per cent of glucose added. 5, Culture 20 days old on steamed-potato plug. 6, Culture 21 days old on steamed rice.

EFFECT OF TEMPERATURE AND OTHER METEOROLOGICAL FACTORS ON THE GROWTH OF SORGHUMS.

PLATE II. A typical plant of Black hull kafir grown at Chillicothe, Tex.

PLATE 12. A typical plant of Dwarf milo grown at Chillicothe, Tex.

OVERWINTERING OF THE HOUSE FLY


LEAFBLIGHT OF KALMIA LATIFOLIA

PLATE 14. A.—Twig of Kalmia latifolia showing late stage of infection with Phomopsis kalmiae. B.—A leaf of K. latifolia in an incipient stage of infection. C.—Plant of K. latifolia showing the intermediate stage of the disease.

PLATE 15. A.—A leaf of Kalmia latifolia enlarged 13 times to show the character of the pycnidia of the fungus on its host. B.—A stem of Kalmia latifolia 40 days after inoculation in leaves only. C.—Photomicrograph showing both kinds of spores of Phomopsis kalmiae, from culture on corn meal. D.—Section through a pycnidium of Phomopsis kalmiae on leaf of K. latifolia. E.—The ordinary type of spore of Phomopsis kalmiae more highly magnified.

PLATE 16. Phomopsis kalmiae: A.—An 18-day-old culture on steamed corn meal enlarged about 5 times. B.—A 15-day-old culture on same medium. C.—Portion of corn-meal agar plate on which were sown three bisected sterile pycnidia. D.—Section through a pycnidium, showing the sporophores and the nucleated hyphae just below them. E.—A portion of same section shown in figure A more highly magnified.

PLATE 17. Phomopsis kalmiae: A.—Section through a sterile pycnidium, showing an area containing nucleated hyphae. B.—Central portion of figure 1 more highly magnified. C.—Section through a sterile pycnidium, showing growth beginning at the margins after it had been transferred to a more suitable medium.

INTUMESCENCES, WITH A NOTE ON MECHANICAL INJURY AS A CAUSE OF THEIR DEVELOPMENT

PLATE 18. A.—Intumescence on cabbage formed as a result of injury from wind-blown sand. B.—Intumescences produced following injury from sand artificially projected against the leaves of cabbage.
Illustrations

PLATE 19. A.—Photomicrograph of a small columnar intumescence on cabbage, following artificial injury. B.—Photomicrograph of a large cushion-like intumescence developed after artificial injury

ANTHRACNOSE OF LETTUCE CAUSED BY MARSSONINA PANATTONIANA

PLATE C. Leaf of lettuce with lesions of Marssonina panattoniana

PLATE 20. Marssonina panattoniana: A.—Lettuce leaves of Grand Rapids Forcing variety, showing lesions on midrib and blade. B.—Lesions on midrib. C.—Lesions on leaves of Black-Seeded Tennis Ball variety produced by artificial inoculation

STEMPHYLIUM LEAFSPOT OF CUCUMBERS

PLATE 21. Stemphylium cucurbitacearum: A.—Small spots on upper surface of leaf with a few larger spots formed by coalescence of small spots. B.—Same leaf as shown in A, but lower surface view.

PLATE 22. Stemphylium cucurbitacearum: A.—Large and small spots on upper surface of cucumber leaf. B.—Large spots on cucumber leaf showing brown centers surrounded by lighter area.

PLATE 23. A.—Early stage of the Stemphylium leafspot on cucumber from artificial inoculation, showing the formation of the large mottled spots. B.—Early stage of the Stemphylium leafspot on gourd from artificial inoculation, showing very fine spots in groups.


YELLOW-LEAFBLOTCH OF ALFALFA CAUSED BY THE FUNGUS PYRENOPEZIZA MEDICAGINIS

PLATE D. Alfalfa showing the yellow-leafblotch

PLATE 25. Pyrenopeziza medicaginis: Conidial (Sporonema) stage on a leaflet of alfalfa.


AN UNDESCRIBED CANKER OF POPLARS AND WILLOWS CAUSED BY CYTOSPORA CHRYSOSPERMA

PLATE 27. A.—A small canker caused by Cytospora chrysosperma on the trunk of a tree of Populus italica, with the bark cut from around canker. B.—A tree of Populus wislizeni on the streets of Albuquerque, N. Mex., dying from the attacks of C. chrysosperma. C.—Main stem of a young tree of Populus italica killed by C. chrysosperma, showing young sprouts at the base of the tree. D.—A branch of Populus wislizeni attacked by C. chrysosperma, showing the spore horns of the fungus.

PLATE 28. A.—Pycnidia of Cytospora chrysosperma on Populus alba after the spore horns have been washed away by rains. B.—A young plant of Populus italica, showing the upper portion of the stem killed by inoculation with C. chrysosperma. C.—Two tubes of pure cultures of C. chrysosperma on malt agar, showing pycnidia and spore droplets. D.—A propagation cutting of Populus deltoides from Hays, Kans., killed by C. chrysosperma.
SOME BACTERIAL DISEASES OF LETTUCE

PLATE E. 1.—Bacterium viridilividum, second organism isolated from Virginia lettuce: Appearance of the growth on potato at the end of 2 days. 2.—Bacterium viridilividum, original organism from Louisiana: Appearance of the growth on potato at the end of 2 days. 3.—Bacterium vitians, first organism isolated from Virginia lettuce: Appearance of the growth on potato at the end of 2 days. 4.—Bacterium vitians, isolated from South Carolina lettuce: Appearance of the growth on potato at the end of 3 days. 5.—Bacterium marginale, isolated from Kansas lettuce: Appearance of the growth on potato at the end of 2 days. 6.—Bacterium marginale, isolated from Kansas lettuce: Appearance of the growth on potato at the end of 13 days.

PLATE 29. Bacterium vitians: A.—Lettuce from Beaufort, S. C., showing stems blackened by the disease. B.—Lettuce leaves from South Carolina, showing spotted-leaf type of the disease.


PLATE 31. Two badly diseased leaves of Virginia lettuce, from which both Bacterium viridilividum and the South Carolina yellow organism Bact. vitians were isolated.


PLATE 33. Bacterium marginale, the cause of the Kansas lettuce disease: A.—A head of diseased lettuce from Manhattan, Kans. B.—Single leaves of Manhattan lettuce, showing the effect of the marginal disease.

PLATE 34. Bacterium marginale: A diseased leaf of lettuce received from Hutchinson, Kans.

PLATE 35. A.—Louisiana lettuce disease: Surface colonies on agar-poured plates of Bacterium viridilividum, showing the mottled type of colonies, and also one buried colony. B.—Bact. viridilividum: Nonmottled type 3 days after pouring. C.—Bact. vitians, cause of the South Carolina lettuce disease: Agar-poured plate showing surface, buried, and bottom colonies. D.—Bact. viridilividum, cause of a Virginia lettuce disease: Mottled colonies on agar-poured plates. E.—Bact. marginale, cause of the Kansas lettuce disease: Colonies on surface of agar-poured plates.

PLATE 36. Bacterium vitians the cause of the South Carolina lettuce disease: A.—Cross-sections of a lettuce stem at two levels 35 days after inoculation with the South Carolina yellow organism. B.—A longitudinal section of another plant inoculated at the same time as A. C.—A longitudinal section of a healthy stem for comparison. D.—Longitudinal sections at the crown of a lettuce plant one month after inoculation, showing browning of the tissues. E.—A cross section at the crown of a lettuce plant one month after inoculation, showing browning of the tissues.

PLATE 37. A.—Two leaves of a lettuce plant inoculated by spraying with Bacterium viridilividum isolated from Virginia lettuce. B.—Cross sections of stems of lettuce plants inoculated with the Virginia yellow organism (Bact. vitians), which is the same as the South Carolina lettuce organism.

PLATE 38. Bacterium vitians: A.—A lettuce plant inoculated by spraying with the Virginia yellow organism, which is the same as the South Carolina yellow organism. B.—Part of a healthy plant for comparison.
Illustrations

Plate 39. *Bacterium marginale*: A.—Part of a leaf from one of the original plants as received, showing the brown veins in the infected and shriveled margins. B.—Part of a lettuce leaf, showing the shriveling and the marginal brown venation produced by spraying with *Bact. marginale* on March 2, 1917.

Plate 40. *Bacterium marginale*: A.—A head of lettuce showing the marginal infection on tender leaves in center. Inoculated by spraying on March 2, 1917. B.—Four lettuce leaves inoculated by spraying February 21, 1917.


Plate 42. A.—Longitudinal section of a cotton seed, showing the internal glands in the cotyledons and the radicle. B.—Longitudinal section of seed of *Ingenhousia triflora*, showing the internal glands as in *Gossypium* spp. C.—Internal gland of a cotton seed, with secretion...

Plate 43. A.—Cross section of the hypocotyl of a cotton seedling, showing internal glands. B.—Gland of same.

Plate 44. A.—Longitudinal section of the hypocotyl of a cotton seedling, showing internal glands. B.—Gland of same.

Plate 45. A. Cross section of a primary root of a cotton seedling, showing internal glands. B.—Gland of same, the secretion having been removed by alcohol.

Plate 46. A.—Cross section of a cotton bud, showing internal glands in (a) calyx, (b) petal, (c) anther, (d) staminal column. B.—Cross section of a young cotton boll, showing internal glands.

Plate 47. A.—Cross section of a woody cotton stem, showing internal glands in the primary cortex (X), but none in the secondary cortex. B.—Cross section of a phloem ray of a cotton root, showing two internal glands.

Plate 48. A—C.—Cross sections of the internal gland of cotton from the ovary in the bud, showing three stages of its development.

Plate 49. A.—Portion of a cotton leaf, showing internal glands, punctured by aphids (surrounded by light area); also uninjured glands. B.—Cross section of the midvein of a cotton cotyledon, showing rudimentary nectary.

Plate 50. A.—Cross section of the midvein of young true leaf of a cotton seedling, showing the nectary and internal gland. B.—Nectary and internal gland of same.

POX, OR PIT (SOIL ROT), OF THE SWEET POTATO

Plate 51. A.—Young sweet-potato roots affected with pox spots. B.—Sweet-potato sprouts, the lower rootlets of which have been totally destroyed by pox. C.—Typical pox spots on tubers of the Irish potato. D.—Pox spots of the Irish potato (after Ramsey). E.—Pox on Irish potato showing lenticel infection.
Plate 52. A.—Sweet potatoes showing the typical pox spots and cracking previous to the falling out of affected tissue. B.—Top row: Sweet potatoes showing the large pits formed as a result of a heavy infection, and later by the falling out of the pox spots. Bottom row: Sweet potatoes showing the constricted effect and uneven growth of the root as a result of early infection.

Relation of the Density of Cell Sap to Winter Hardiness in Small Grains

Plate 53. Effect of wilting on ability of small grains to survive low temperatures: Flask 1.—Exposed to air for 2.5 hours previous to freezing. Flask 2.—Exposed to air for 1.5 hours previous to freezing. Flask 3.—Exposed to air for 1 hour previous to freezing. Flask 4.—Exposed to air for 0.5 hour previous to freezing. Flask 5.—Not exposed to the air previous to freezing. Flask 6.—Exposed to the air for 2.5 hours, but not frozen.

A New Bacterial Disease of Gipsy-Moth Caterpillars

Plate 54. A.—Photomicrograph of normal and early pathological gipsy-moth muscle tissue. B.—Photomicrograph of late pathological gipsy-moth muscle tissue showing separation of fibrillae. C.—Photomicrograph of last stage in pathology of gipsy-moth muscle tissue, showing complete disintegration.

Inoculation Experiments with Species of Coccomyces from Stone Fruits

Plate 55. Prunus leaves from inoculation experiments, illustrating various degrees of infection, as recorded in Tables I to IX: A.—P. mahaleb, infected by a strain of Coccomyces from P. serotina. B.—P. serotina, infected by a strain from P. avium. C.—P. serasus, infected by a strain from P. avium. D.—P. pennsylvanica, infected by a strain from P. pennsylvanica.

Plate 56. Prunus leaves from inoculation series 104 (Table II), infected by strains of Coccomyces from P. cerasus: A.—P. cerasifera, infected after prolonged incubation in the greenhouse. B.—P. insititia, infected after prolonged incubation in the greenhouse. C.—P. mahaleb. D.—P. munsoniana, inoculated with naturally discharged ascospores on June 2; the infection appeared after prolonged incubation in the greenhouse. E.—P. domestica. Spots developed after prolonged incubation in the greenhouse, but the fungus failed to fructify.


Illustrations

NYSIUS ERICAEE, THE FALSE CHINCH BUG

PLATE 60. Nysius ericae: Adult.......................... Page 578


COMPARATIVE TRANSPERSION OF CORN AND THE SORGHUMS


PLATE 63. A.—Blackhull kafir, 4 feet high, heading. B.—Pride of Saline corn at period of full leaf development. C.—Dwarf milo heading. D.—Dwarf milo, Pride of Saline corn, and Dwarf Blackhull kafir...................... 604

SUNSCALD OF BEANS

PLATE 64. A.—Six pods of the Green Bountiful variety of beans which showed natural sunscald on September 1. B.—Reverse side of the six pods shown in A.............................. 650

PLATE 65. A.—Two pods of beans, the one at the left injured by sunscald, the one at the right having been protected from the rays of the sun. The pod at the left was exposed to the sun in the position shown. The pod at the right was covered by slipping it through a slit on the back edge of the muslin sack. B.—Four groups of bean pods exposed tied in muslin sacks. The two at the left were slightly spotted as shown when the experiment began.............................. 650

PLATE 66. A.—Refugee wax beans. The pod at the right was exposed for one-half its length. The image in the mirror shows the freedom from spotting of the underside of the exposed pods. B.—Hardy wax beans, showing sunscald on the stems, branches, and pods........................................ 650

TEXT FIGURES

STUDIES ON CAPACITIES OF SOILS FOR IRRIGATION WATER AND ON A NEW METHOD OF DETERMINING VOLUME WEIGHT

FIG. 1. Diagram for determining the depth of irrigation water, in inches, necessary to add a given percentage of moisture to 1 foot of soil....... 3

2. Graphs of the water content before and after irrigation, moisture equivalent, and pore space of silt-loam soils having fine sandy-loam subsoils 9

3. Graphs of the water content before and after irrigation, moisture equivalent, and pore space of silt-loam soils........................................ 11

4. Graphs of the water content before and after irrigation, moisture equivalent, and pore space of clay-loam soils............................ 12

5. Graphs of the water content before and after irrigation, moisture equivalent, and pore space of clay soils............................. 13

6. Graphs of the water content before and after irrigation, moisture equivalent, and pore space of clay soils............................ 16

7. Graphs showing the comparison of water content before and after irrigation, moisture equivalent, and pore space of soils of plots B and D, Davis, Cal........................................ 20

8. Graphs showing the comparison of water content before and after irrigation, moisture equivalent, and pore space of soils of plots C and D, Davis, Cal.............................. 21
FIG. 9. Graphs showing the comparison of water content before and after irrigation, moisture equivalent, and pore space of soils of plots E and G, Davis, Cal.

FIG. 10. Graphs showing the comparison of water content before and after irrigation, moisture equivalent, and pore space of soils of plots F and G, Davis, Cal.

FIG. 11. Graphs of water content before and after irrigation, moisture equivalent, and pore space of soils.

FIG. 12. Graphs of water content before and after irrigation, moisture equivalent, and pore space of soils.

FIG. 13. Diagram showing plan of excavation for the determination of the volume weight of soil by means of the paraffin-immersion method.

FIG. 14. Diagram showing method used for the determination of the volume weight of soil by the use of an iron cylinder: A, column of soil ready for determination; B, cylinder being placed over the column of soil.

BASAL KATABOLISM OF CATTLE AND OTHER SPECIES

FIG. 1. Graph of the basal katabolism of cattle per 24 hours' lying.

FIG. 2. Graph of the basal katabolism of cattle per 12 hours' lying and 12 hours' standing.

FIG. 3. Graph of the basal katabolism of cattle per 24 hours' standing.

FIG. 4. Graph of the frequency distribution of the basal katabolism of cattle per square meter of body surface lying 24 hours.

FIG. 5. Graph of the frequency distribution of the basal katabolism of cattle per square meter of body surface lying 12 hours and standing 12 hours.

FIG. 6. Graph of the frequency distribution of the basal katabolism of cattle per square meter of body surface standing 24 hours.

FIG. 7. Graph of the frequency distribution of the basal katabolism of cattle per square meter of body surface.

FIG. 8. Graph of the frequency distribution of the basal katabolism of men per square meter of body surface. Complete muscular rest.

SOIL FUNGI IN RELATION TO DISEASES OF THE IRISH POTATO IN SOUTHERN IDAHO


3. Penicillium soil series (strain 89): Colonies pale green, velvety at border, but more or less floccose in center, with under side of mycelium rose to dark red, conidia becoming globose, 2 to 3 μ in diameter.

4. Penicillium soil series (strain 2490): Colonies differing very little in structure from strain 89, but with reverse colors slowly yellow to orange.

INVESTIGATIONS CONCERNING THE SOURCES AND CHANNELS OF INFECTION IN HOG CHOLERA

FIG. 1. Diagram showing the arrangement of pens for pigeon experiments.

A LEAFBLIGHT OF KALMIA LATIFOLIA

FIG. 1. Phomopsis kalmiae: A, Germinating pycnospores; B, types of spores produced by the fungus.

2. Phomopsis kalmiae: A, Scolecospores and basidia; B, the ordinary pycnospore and basidia.
INTUMESCENCES, WITH A NOTE ON MECHANICAL INJURY AS A CAUSE OF THEIR DEVELOPMENT

Page 256

ANTHRACNOSE OF LETTUCE CAUSED BY _MARSSONINA PANATTONIANA_

267

2. Diagrams representing results (plot 1) of watering with the hose and (plot 2) by subirrigation.

270

3. _Marssonina panattoniana_: A, Germination of spores; B, the same spores two hours later; C, after four hours; D, after six hours; E, after eight hours.

270

STEMPHYLIUM LEAFSPOT OF CUCUMBERS

302

3. _Stemphylium cucurbitacearum_: Mycelium, conidiophores, and conidia produced on prune-juice agar 40 hours after the spores were sown.

304

YELLOW-LEAFBLOTCH OF ALFALFA CAUSED BY THE FUNGUS _PYRENOPESIZA MEDICAGINIS_

313

5. _Pyrenopeziza medicaginis_: Semidiagrammatic section of an apothecium. The tissue of the leaf has been largely replaced by the fungus hyphae and stroma.

317

6. _Pyrenopeziza medicaginis_: Germinating ascospores.

321

STABILITY OF OLIVE OIL

356

HYDRATION CAPACITY OF GLUTEN FROM “STRONG” AND “WEAK” FLOURS

394

4. Graph showing the imbibition curves for the various glutens in different concentrations of oxalic acid.

396
INOCULATION EXPERIMENTS WITH SPECIES OF Coccomyces FROM STONE FRUITS

Fig. 1. Moist chamber used in the outdoor inoculation experiments of 1917: 547
2. Moist chamber used in the greenhouse inoculation experiments: 548
3. Device used for inoculation by means of natural ejection of ascospores: 549

NYSIUS ERICAE, THE FALSE CHINCH BUG

Fig. 1. Nysius ericae: Eggs: 572

COMPARATIVE TRANSPIRATION OF CORN AND THE SORGHUMS

Fig. 1. Graphs showing the amount of water transpired by Pride of Saline corn, Dwarf Blackhull kafr, and Dwarf milo during July 6, 7, and 8, 1916, and the evaporation during the corresponding period: 588
2. Graphs showing the amount of water transpired by Pride of Saline corn, Blackbull kafr, and Dwarf milo during July 11, 12, and 13, 1916, and the evaporation during the corresponding period: 589
3. Graphs showing the amount of water transpired by Pride of Saline corn, Dwarf Blackhull kafr, and Dwarf milo during July 17 and 18, 1916, and the evaporation during the corresponding period: 590
4. Graphs showing the amount of water transpired by Pride of Saline corn, Blackhull kafr, and Dwarf milo during July 26 and 27, 1916, and the evaporation during the corresponding period: 591
5. Graphs showing the amount of water transpired by Pride of Saline corn, Dwarf Blackhull kafr, and Dwarf milo during July 31 and August 1 and 2, 1916, and the evaporation during the corresponding period: 592
6. Graphs showing the amount of water transpired by Freed’s White Dent corn, Dwarf milo, feterita, and Freed’s sorgo during July 10, 11, and 12, 1917, and the evaporation during the corresponding period: 593
7. Graphs showing the amount of water transpired by Pride of Saline corn, Sherrod’s White Dent corn, Dwarf Blackhull kafr, and Freed’s sorgo during July 13, 14, and 15, 1917, and the evaporation during the corresponding period: 594
8. Graphs showing the amount of water transpired by Freed’s White Dent corn, Dwarf milo, Dwarf Blackhull kafr, and feterita during July 17, 18, and 19, 1917, and the evaporation during the corresponding period: 595
9. Graphs showing the amount of water transpired by Pride of Saline corn, Dwarf milo, Red Amber sorgo, and Freed’s sorgo during July 20, 21, and 22, 1917, and the evaporation during the corresponding period: 596
10. Graphs showing the amount of water transpired by Sherrod’s White Dent corn, Dwarf milo, feterita, and Freed’s sorgo during July 23, 24, and 25, 1917, and the evaporation during the corresponding period: 597
11. Graphs showing the amount of water transpired by Pride of Saline corn, Dwarf Blackhull kafr, Red Amber sorgo, and Freed’s sorgo during July 26 and 27, 1917, and the evaporation during the corresponding period: 598
12. Graphs showing the amount of water transpired by Freed’s White Dent corn, Dwarf Blackhull kafr, Red Amber sorgo, and feterita during July 30 and 31, 1917, and the evaporation during the corresponding period: 599
FIG. 5. Graph showing the imbibition curves for the various glutens in different concentrations of hydrochloric acid. .......................... 396
6. Graph showing the imbibition curves for P gluten in lactic acid and in lactic acid plus certain salts. .......................... 400
7. Graph showing the imbibition curves for C gluten in lactic acid and in lactic acid plus certain salts. .......................... 401
8. Graph showing the imbibition curves for W3 gluten in lactic acid and in lactic acid plus certain salts. .......................... 402
9. Graph showing the imbibition curves for P gluten in acetic acid and in acetic acid plus certain salts. .......................... 403
10. Graph showing the imbibition curves for C gluten in acetic acid and in acetic acid plus certain salts. .......................... 404
11. Graph showing the imbibition curves for W3 gluten in acetic acid and in acetic acid plus certain salts. .......................... 405
12. Graph showing the imbibition curves for P gluten in oxalic acid and in oxalic acid plus certain salts. .......................... 406
13. Graph showing the imbibition curves for C gluten in oxalic acid and in oxalic acid plus certain salts. .......................... 407
14. Graph showing the imbibition curves for W3 gluten in oxalic acid and in oxalic acid plus certain salts. .......................... 408
15. Graph showing the imbibition curves for P gluten in hydrochloric acid and in hydrochloric acid plus certain salts. .......................... 409
16. Graph showing the imbibition curves for C gluten in hydrochloric acid and in hydrochloric acid plus certain salts. .......................... 410
17. Graph showing the imbibition curves for W3 gluten in hydrochloric acid and in hydrochloric acid plus certain salts. .......................... 411

DESTRUCTION OF TETANUS ANTITOXIN BY CHEMICAL AGENTS

FIG. 1. The destruction of tetanus antitoxin (— X —) in 0.5 per cent sodium-carbonate solution without any change in total coagulable protein ( — O —) or amino nitrogen ( — + —). Mixture B, experiments 4-5.1. .......................... 490
2. The destruction of tetanus antitoxin ( — X —) by tryps in solution amphoteric to litmus strips; the digestion of coagulable protein past the coagulable stage ( — O —); the liberation of free amino nitrogen ( — + —). Mixture C, experiments 4-5.1. .......................... 491
3. The destruction of tetanus antitoxin ( — X —) by 0.2 per cent hydrochloric acid without any significant change in the amounts of total coagulable protein ( — O —) or free amino nitrogen ( — + —). Mixture B, experiment 22. .......................... 492
4. The destruction of tetanus antitoxin ( — X —) by pepsin-hydrochloric acid; the digestion of coagulable protein past the coagulable stage ( — O —), and the liberation of free amino nitrogen ( — + —). Mixture D, experiment 22. .......................... 493

INFLUENCE OF TEMPERATURE AND PRECIPITATION ON THE BLACKLEG OF POTATO

FIG. 1. Soil-thermograph record showing the range in temperature for the month of August, 1915 and 1916 at Presque Isle, Me. .......................... 512

PHYSICAL PROPERTIES GOVERNING THE EFFICACY OF CONTACT INSECTICIDES

FIG. 1. Sketch of a trachea of the cockroach divided into sections A, B, C, etc., to indicate the distance the various oils penetrated. .......................... 526
FIG. 13. Graphs showing the amount of water transpired by Freed's White Dent corn, Sherrod's White Dent corn, Red Amber sorgo, and feterita during August 2 and 3, 1917, with the evaporation during the corresponding period.

A THIRD BIOLOGIC FORM OF PUCCINIA GRAMINIS ON WHEAT

DIAGRAM 1. Results of inoculations with urediniospores of the new biologic form of *Puccinia graminis* Pers.
Carbonic acid. See Acid, carbonic.

Caterpillar, gypsy-moth. See *Porthetria dispar*.

Cattle—
basal katabolism. 43-50
physical changes in feed residues during digestion. 619-640
feedstuffs, digestibility. 611-618

Cauliflower. See *Brassica oleracea botrytis*.

Cell sap density, relation to winter hardiness in grain. 407-505

Cerambycidae. sp., parasite of *Macrocentrus* sp. 71

Chaetomelis spp., isolation from soil. 81

Cheese—
Cheddar—
factors in ripening. 246-249
streptococci in cream. 239-249

Roquefort—
bacterial flora of. 229-233
influence of slime on the ripening process. 230-231
ripening factors. 227-231
streptococci in. 225-233, 239-243

Chemistry of the Cotton Plant, with Special Reference to Upland Cotton (paper). 347-352

Cherry. See *Prunus*.

Chinch bug, false. See *Nysius ericae*.

Chloral hydrate, effect on infectivity of mosaic virus. 624-625

Chorera, hog—
contagiousness. 115-130
sources of infection. 101-113

Cienfuegosia spp., presence of internal glands in. 432-433

Citrin acid. See Acid, citric.

*Cladina effusum*—
composition. 605-606
description. 605-606

Coccomyces spp., inoculation experiments with *Prunus* spp. 539-549

Cooling moth. See *Laspeyresia pomonella*.

Coffman, W. B., and Miller, E. C. (paper): Comparative Transpiration of Corn and the Sorghums. 579-604

Colemanite, effect on plants. 451-470

Comparative Transpiration of Corn and the Sorghums (paper). 579-604


Copper sulphate, effect on infectivity of mosaic virus. 624

Corn. See *Zea mays*.

Cotton. See *Gossypium* spp.

Creolin, solutions of, effect on infectivity of mosaic virus. 624-625

Cresol, solutions of, effect on infectivity of mosaic virus. 625

Cucumber. See *Cucumis sativus*.

*Cucumis sativus*, Stempphylium leafspot of. 295-306

Cystoboria—
*balata*—
causal organism of pox of *Ipomoea batatas*. 440-443
causal organism of pox of *Solanum tuberosum*. 443-444
Cystospora—Continued.

batata—Continued. Page
control .................................. 447-448
life history .......................... 445
morphology ........................ 445
pathogenicity ........................ 446-447
chrysosperma—
causal organism of disease of poplars and willows .......................... 333
control .................................. 341-344
distribution .......................... 339-341
injury by ................................ 337-339
inoculations .................................. 333-334
morphological characters .......................... 335
physiological characters .......................... 335-336

Destruction of Tetanus Antitoxin by Chemical Agents (paper) .................. 477-494

Dibrackys boucheanus, parasite of Macrocen-tris sp. .................. 71

Digestibility of Corn Silage, Velvet-Bean Meal, and Alfalfa Hay When Fed Singly and in Combinations (paper) .................. 611-618

Didymaria, perforans, syn. Massomina pan-atomiana.

Digestion—
coefficients of, for cattle rations ................. 611-618
physical changes in feed residues in cattle during .................. 659-656

Dichelococcus lymantriae, comparison of .................. 319


Effect of Temperature and Other Meteorological Factors on the Growth of Sorghum (paper) .................. 133-148

effect of Various Salts, Acids, Germicides, etc., upon the Infectivity of the Virus Causing the Mosaic Disease of Tobacco (paper) .................. 619-637

Elen. See Ulmus americana.

Emmer. See Triticum dicoccum.


Erixyylon spp., presence of internal glands in . ................. 432-433

Errata and author's emendations .......................... 1V

Evans, A. C. (paper)—
Bacterial Flora of Roquefort Cheese .................. 215-233
A Study of the Streptococci Concerned in Cheese Ripening .................. 235-253
Everglade peat. See Peat, in Everglades.

Ewing, P. V. and Smith, F. H. (paper):
Digestibility of Corn Silage, Velvet-Bean Meal, and Alfalfa Hay When Fed Singly and in Combinations .................. 611-618

Ewing, P. V., and Wright, L. H. (paper): A study of the Physical Changes in Feed Residues Which Take Place in Cattle During Digestion .................. 619-646

Fusarium—Continued.

elegantum, n. sp. .................. 84-86
idahoanum, n. sp. .................. 86-87
lanoculatum, n. sp. .................. 83
niprum, n. sp. .................. 90-91
radiocola, isolation from soil .................. 91-92
sanguineum, isolation from soil .................. 84
spp. .................. 81
subulatum, isolation from soil .................. 89
trichothecioideus, isolation from soil .................. 88

Feed—
cattle, digestibility .......................... 611-618
physical changes in cattle .................. 659-666

Fertilizer-burn, syn. Pox. of Ipomea batatas.

Fertilizer-burnt, effect on plants .................. 457-470

Flavone—
presence outside glands of Gossypium spp. .................. 479
relation to anthocyanins .................. 430


Fleur—
analyses .......................... 400-401, 414-415
baking tests .......................... 400-401, 414-415
hydration capacity of gluten from .................. 389-418

Fly—
house. See Musca domestica.
salmon. See Teneiopteryx.
stone. See Teneiopteryx.

Fomoraldehyde, effect on infectivity of mosaic virus .................. 634

Freezing point, determination in gram sap .................. 497-503

Fries, J. A., et al. (paper): Basal Katabolism of Cattle and Other Species .................. 43-57

Fumigant, penetration in insects .................. 534-535

Fungus—
cause of anthracnose of Lactuca sativa .................. 261-280
cause of canker of Populus spp. and Salix spp. .................. 337-344
cause of leafblight of Kalmia latifolia .................. 199-212
cause of Stemphylium leafspot of Cucumis sativus .................. 295-306
cause of yellow-leafblotch of Medicago sativa .................. 307-310
soil, relation to potato diseases .................. 72-100

Further Notes on Laspeyresia melista (paper) .................. 59-72

Germicide, effect on infectivity of mosaic virus .................. 679-697

Gipsy moth. See Porthetria dispar.

Gipsy-moth disease, Japanese—
characteristics .................. 515-516
pathology .................. 516-519
resemblance to wilt .................. 516-519
symptoms .................. 515-516


Gloeosporium morianum, syn. Pyrenopeziza medicaginis.

Gluten—
hydration capacity .................. 309-318
rate of hydration .................. 409
relation between quality and degree of hydration .................. 409-408

Glycin, effect on infectivity of mosaic virus .................. 634-635

Glypta vulparis, parasite of Laspeyresia melista .................. 70
Investigations Concerning the Sources and Channels of Infection in Hog Cholera (paper).......................... 101-131

Ips pectinatus, pest of—
association of Actinomycoses spp. with........ 445-557
control ........................................ 447-448
dissemination ................................... 449-453
economic importance ............................. 439
pox of, geographic distribution ............... 438
nomenclature ................................... 438
relation to storage .............................. 443
symptoms ........................................ 439-440

Irrigation water, capacities of soils for ......... 13-36

Israelens, O. W. (paper): Studies on Capaci-
ities for Irrigation Water, and on a New Method of Determining Volume
Weight ............................................ 13-36

Isoquercitrin, isolation from Gossypium spp. ................. 346-358

Japanese gipsy-moth disease. See Gipsy-
moth disease, Japanese.
Jones, F. R. (paper): Yellow-Leafhight of
Allalia Caused by the Fungus Pyrenopezia
medicaginis ....................................... 307-330

Kalo, See Brassica oleracea acephala.
Kalmia latifolia, leafblight of .................. 349-352
Kansas, lettuce disease ............................. 372-373, 380-387

Kaolin, effect on infectivity of mosaic virus
control ........................................... 535-536

Katabolism, basal—
of cattle .......................................... 43-50
of hog ............................................. 55-54
of horse .......................................... 55-54
of man ............................................. 59-63

Keitt, G. W. (paper): Inoculation Experi-
ments with Species of Coccomyces from
Stone Fruits (paper) ......................... 539-560
Keeler, R. A. and Berg, W. N. (paper): De-
struction of Tetanus Antitoxin by Chem-
ical Agents ....................................... 471-494

Lactic acid. See Acid, lactic.

Lactuca sativa—
anthrax-mote of—
control ........................................... 277-279
distribution ....................................... 254
economic importance ............................ 264
etiology .......................................... 265-266
symptoms ........................................ 264-265

host plant of—
Bacterium marginale ................................ 386-387
Bacterium viridilividum ......................... 371
Bacterium vibrio .................................. 379
Laspeyresia—
moles—
control ........................................... 71
distribution ....................................... 59-60
enemies .......................................... 70-71
food plants of ................................... 60
habits ............................................. 65-69
hibernation ..................................... 70
injury by ........................................ 60-64
life history ...................................... 65-69
parasites ........................................ 70-71
resemblence to Anarsia lineatella ............. 64-65
resemblence to Laspeyresia pomonella ....... 64
Laspeyresia—Continued
Moelesta—Continued
resemblance to Laspeyresia prunivora... 64-65
resemblance to Laspeyresia pyricola... 64-65
pomonele, resemblance to Laspeyresia
molesta... 64
prunivora, resemblance to Laspeyresia
molesta... 64-65
pyricola, resemblance to Laspeyresia
molesta... 64-65

Laurel, mountain. See Kalmia latifolia.
Lead nitrate, effect on infectivity of mosaic
virus... 463
Leaf blight of Kalmia latifolia (Kalmia)... 209-213
Leaf blight, yellow, of Medicago sativa—
causal organism... 310-316
description... 308-310
distribution... 307-308
economic importance... 308
Leaves, of Macrosporium commune, isolation from soil... 92
Macrocentrus sp.—
McBryde, C. N., et al. (paper); Investigations
doucissi. A cherry. See H. MacMillan, Lycopersicon esculentum, susceptibility to
Marssonina panattoniana—
sylvestris, Malus Laspeyresia
Long, W. H. (paper); An Undescribed
371
Louisiana lettuce disease... 371
Lycopersicon esculentum, susceptibility to
pox... 444
McBryde, C. N., et al. (paper); Investigations
Concerning the Sources and Channels of
Infection in Hog cholera... 107-131
MacMillan, H. G. (paper); Suncal of
Beans... 647-650
Macrocenficus sp.—
parasite of Laspeyresia molesta... 70-71
Macrosporium commune, isolation from soil... 92
Magnesium sulphate, ammonification of dried
blood in soils with... 216-217, 221
Molus syrrostris, food plant of Laspeyresia
molesta... 60
Man, basal katabolism of... 50-52
Manganese sulphate, effect on infectivity of
mosaic virus... 622
Manure—
boron-treated, effect on plants... 451-457
green, soil acidity as influenced by... 171-173
limestone requirement of... 174-178
Maple. See Acer douglasii.
Marssonina panattoniana—
causal organism of anthracose of Lactuca
sativa... 264-280
Marssonina panattoniana—Continued
Page
distribution... 264
morphology... 271-273
physiological relations... 273-277
synonym... 271
Marssonina panattoniana, syn. Marsionina
panattoniana
Marssonia performer, syn. Marssonina panattoniana
Medicago sativa—
digestibility... 611-613
yellow leaf blight of—
causal organism... 310-316
description... 308-310
distribution... 307-308
economic importance... 308
Mercuric chloride, effect on infectivity of
mosaic virus... 623
Mexestus sp., parasite of Laspeyresia
molesta... 70
Miller, C. E. (paper); Relation between Bio-
logical Activities in the Presence of Various
Salts and the Concentration of the Soil
Solution in Different Classes of Soil... 213-215
Miller, C. F. (paper); Inorganic Composition
of a Pest and of the Plant from Which It
Was Formed... 605-609
Miller, E. C, and Coffman, W. B. (paper);
Comparative Transpiration of Corn and
the Sorghums... 579-584
Milliken, P. B. (paper); Nysius ericae, the
False Chinch Bug... 571-578
Moisture—
effect on olive oil... 356-364
relation to growth of Stipembiyum cu-
cutiacarcum... 301
See also Water.
Monascus spp., isolation from soil... 92
Moore, W., and Graham, S. A. (paper); Physi-
cal Properties Governing the Efficacy of
Contact Insecticides... 523-538
Mosaic virus of Nicotiana spp., effect of chem-
icals on infectivity... 619-631
Moth-coding. See Laspeyresia pomonella.
gypsy. See Porthetria dispar.
oriental peach. See Laspeyresia molesta.
Mucor spp., isolation from soil... 92-93
Musca domestica, relation of temperature to
activity... 161-164
Naphthaline crystals, effect on infectivity of
mosaic virus... 634
Newcomer, E. J. (paper); Some Stoneflies
Injurious to Vegetation... 371-374
Nicotiana spp., mosaic virus of, effect of
chemicals on infectivity... 619-637
Nitril acid. See Acid, nitric.
Nysius ericae, the False Chinch Bug (paper) 571-578
Nysius ericae—
description... 571-572
effect of temperature on development... 577-578
life history... 572-576
reproduction... 576-577
A New Bacterial Disease of Gypsy-Moth
Caterpillars (paper)... 515-522
Niles, W. B. et al., (paper); Concerning the
Sources and Channels of Infection in Hog
Cholera... 701-712
Nitrogen, nitric, changes in manured soil. 180-187
Os. See Avena sativa.
Oidium lactis, relation to cheese ripening. 230-232
Oil—ethereal, isolation from Gossypium hirsutum. 349-351

Olive—
character of decomposition. 350-353
effect of air on. 353-354
effect of moisture on. 354-356
organoleptic changes in. 356-358
production of aldehyde in. 358-360
stability. 360-366

See Oil, olive.
Onion. See Allium cepa.
Os. See Avena sativa.

Overwintering of the House Fly (paper). 149-170
Pean ut, or Pit (Soil Rot), of the Sweet Potato—

Physical Properties Governing the Efficacy of Contact Insecticides (paper). 523-528

Nitrogen, nitric, changes in manured soil. 180-187
Oats. See Avena sativa.
Oidium lactis, relation to cheese ripening. 230-232
Oil—ethereal, isolation from Gossypium hirsutum. 349-351

Olive—
character of decomposition. 350-353
effect of air on. 353-354
effect of moisture on. 354-356
organoleptic changes in. 356-358
production of aldehyde in. 358-360
stability. 360-366

See Oil, olive.
Onion. See Allium cepa.
Os. See Avena sativa.

Overwintering of the House Fly (paper). 149-170
Pean ut, or Pit (Soil Rot), of the Sweet Potato—

Physical Properties Governing the Efficacy of Contact Insecticides (paper). 523-528
Index

Page

Quercetin, and its glucosides, relationship to 
gossypol .................................. 419-430
Quince. See *Sidonia* spp. 
Quinine bisulphate, effect on infectivity of 
mosaic virus .................................. 633

Page

*Sidonia* spp., food plants of *Laspeyresia mo-
lesta* .................................. 60
Silver nitrate, effect on infectivity of mosaic 

Page

virus .................................. 633
Smith, F. H., and Ewing, P. V. (paper); Di-
gestibility of Corn Silage, Velvet-Bean 

Page

Meal, and Alfalfa Hay when Fed Singly 

Page

and in Combinations .................................. 617-618
Sodium—
benzoate, effect on infectivity of mosaic 

Page

virus .................................. 633
carbonate, effect on infectivity of mosaic 

Page

virus .................................. 633
clorid, effect on infectivity of mosaic virus 

Page

622
hydroxid, effect on infectivity of mosaic 

Page

virus .................................. 622
nitrate, effect on infectivity of mosaic virus 

Page

623
tauracholate, effect on infectivity of mosaic 

Page

virus .................................. 623
Soil Acidity as Influenced by Green Manures 

Page

(paper) .................................. 577-597
Soil Fungi in Relation to Diseases of the Irish 

Page

Potato in Southern Idaho (paper) .................................. 71-100
Soil, ammonia production in by green ma-
nures .................................. 179-180
capacity for irrigation water .................................. 1-36
capillary capacity of .................................. 30-38
effect of boron on .................................. 457-570
effect on infectivity of mosaic virus .................................. 615-636
fungi of, relation to potato diseases .................................. 71-100
manured, organic matter of .................................. 187
solution, biological activities, relation to 
capacity for irrigation water .................................. 1-36
capillary capacity of .................................. 30-38
concentration of .................................. 213-243
See also sand.

Page

Sap, cell, relation of density to winter hardi-
ness in .................................. 497-505
Saponin, effect on infectivity of mosaic virus 

Page

654
Saw grass. See *Cidadium effusum*.

Page

*Secale* cereale, density of cell sap in relation to 
winter hardness .................................. 500-505
Selkregg, E. R., and Wood, W. B. (paper);

Page

Further Notes on *Laspeyresia* Molesta .................................. 59-72
Serum, anthrax, inoculation experiments .......................... 497-494
Serviceberry. See *Amelanchier* sp. 
Shothole of *Lactuca sativa*, syn. Anthracose 
of *Lactuca* sativa.
Steer—
rations of, digestibility 619-618
See also Cattle.

Stem rust, occurrence on *Triticum* spp. 631-634

*Stemphylium* cucurbitacearum—
control 305-306
cultural characters 305-306
description 299-300
inoculations 299-300
isolation 296-297
life history 304
n. sp. 299-300
spore formation 301
spore germination 302-305
taxonomy 299-300

*Stemphylium* spp., isolation from soil 96, 295-306

*Stemphylium* leafspot of *Cucumis* sativus—
causal organism 296-297, 299-300
symptoms 295-296

*Stizolobium* deeringianum, digestibility 611-618

Stempleylium spp., isolation from soil 96, 295-306—
*Stempkylium cucurbitacearum*—
sweet-potato. See *Ipomoea batatas*.

Sunscald of beans—
causal organism of disease of *Portulaca dispar* 515-522
n. sp. 520-521
pathogenicity 520-521
kefir—
factor in Cheddar cheese ripening 246-249
in cheese, characteristics 243-245
lacticus, factor in cheese ripening 233-234, 238-241
X—
factor in Cheddar cheese ripening 246-249
in cheese, characteristics 241-242, 244

Studies on Capacities of Soils for Irrigation
Water, and on a New Method of Determining Volume Weight (paper) 1-16
Study of the Physical Changes in Feed Residues Which Take Place in Cattle During Digestion, A (paper) 609-620
Study of the Streptococci Concerned in Cheese Ripening, A (paper) 235-253

Sunsced of Beans (paper) 647-650

Sunsced of beans—
cause 649
description 647-648
economic importance 649
resemblance to bacterial-blight 649

Sweet-potato. See *Ipomoea batatas*.

Swine. See Hog; Pig.

*Taenioptreryx* spp.—
control 39
description 40-41
habits 38-39
life history 39-40

Taka-diastase, effect on infectivity of mosaic virus 634

tale, effect on infectivity of mosaic virus 635-636

Tannin acid. See Acid, tannic.
Wilt, gipsy-moth caterpillar, resemblance of Japanese gipsy-moth disease to. 515-516
Wolf, F. A. (paper): Intumescences, with a Note on Mechanical Injury as a Cause of Their Development. 253-260
Wormhole of Ipomoeabatatas, syn. Pox of Ipomoea batatas.

Wright, L. H. and Ewing, P. V. (paper): A Study of the Physical Changes in Feed Residues Which Take Place in Cattle during Digestion. 619-646
Yeast, in cheese. 228-229
Yellow-Leafblotch of Allalla Caused by the Fungus Pyrenopeziza medicaginis (paper). 307-330
Zea mays—
effect of boron-treated manure on. 458
transpiration. 579-604
Zinc chlorid, effect on infectivity of mosaic virus. 624