the disappearance of the compounds was chiefly due to biological causes.

From the bottles or pots three species of bacteria were isolated, one of which uses pyridine as a source of nitrogen, one vanillin as a source of carbon and one cumarin as a source of carbon. An organism acting on quinoline has not yet been found.

This would seem to show that the enormous increase in numbers of organisms noted in the treated pots and the disappearance of the four substances in the soil depend on the fact that they (the compounds) serve as food sources to definite species of bacteria.

The significance of these facts to the soil toxin theory of soil fertility is evident. The persistence of vanillin, for example, in some soils and not in others may be due to the fact that the vanillin organism is absent or to the fact that conditions are not suitable for its development or for the use of the vanillin. If we should be able to improve a soil containing vanillin by treating it with the vanillin organism the results should be a strong argument for the soil-toxin theory of soil fertility. This of course is a step into the future.

The results are also suggestive in explaining some of the phenomena accompanying "partial sterilization." They would suggest that in "partial sterilization" (at least that caused by these four compounds) we do not have a large increase in the numbers of microorganisms because the less resistant are killed and the resistant forms given opportunity to develop; or because voracious protozoa are eliminated; but because the sterilizing agent used serves directly[6] as a food source. In the case of steam, and perhaps carbon bisulphide, unavailable food supplies are probably made available.

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SOCIETIES AND ACADEMIES

THE AMERICAN PHYSICAL SOCIETY

THE eighty-fifth regular meeting of the American Physical Society was held in the Ryerson Laboratory of the University of Chicago on Saturday, December 2.

The following papers were presented:

"On the Velocity of Sound in Metal Tubes," by Karl K. Darrow, University of Chicago.

"Collapse of Thin Tubes Shorter than the Critical Length," by A. P. Carman, University of Illinois.

"An Acoustical Thermometer," by F. R. Watson and H. T. Booth, University of Illinois.

"A General Method of producing the Stroboscopic Effect, and its Application in the Tonodeik," by L. E. Dodd, State University of Iowa.

"The Intensity-factor in Binaural Localization and an Extension of Weber's Law," by G. W. Stewart and O. Hovda, State University of Iowa.

"An Apparatus for the Demonstration to an Audience of Simple Harmonic Motion," by Paul E. Klopsteg, University of Minnesota.

"Report of Progress on the Measurement of Earth Rigidity," by A. A. Michelson and Henry G. Gale, University of Chicago.

"The Accuracy with which Gravity may be predicted at any Point in the United States," by John F. Hayford, Northwestern University.

"A Proposed New Method for the Determination of the Acceleration due to Gravity," by Herbert Bell, University of Michigan.

"On Some Very Large Variations in the Adsorption of certain specimens of Charcoal," by Harvey B. Lemon, University of Chicago.

"The Principle of Similitude," by C. S. Frazel, University of Illinois.

"Preliminary Notes on the Torsional Elasticity of Drawn Tungsten Wires," by L. P. Sieg, State University of Iowa.

"A Precision Calorimeter for measuring Heats of Dilution," by D. A. MacInnes and J. M. Braham, University of Illinois.

"Note on the Amount of Error in applying to Non-Parallel Plates the Formula for Electrical Capacity of Parallel Plates," by L. E. Dodd, State University of Iowa.

"The Kinetic Theory of Non-Spherical Rigid Molecules," by Yoshio Ishida, University of Chicago.

"The Photo-electric Emission from Crystals of Selenium," by F. C. Brown, State University of Iowa.

"The Production of Light by Cathode Rays in Air," by Gordon S. Fulcher, University of Wisconsin.

"The Optical Constants of Liquid Alloys," by Carleton V. Kent, University of Michigan.

"The Single-lined and the Many-lined Spec-

[6] This has been suggested for pyridine. See Buddin, W., *Jour. Agr. Sci.*, 6, 416–451 (1914).

trum of Mercury,'' by T. C. Hebb, University of Chicago.

''Note on the Single-lined and the Many-lined Spectrum of Mercury,'' by R. A. Millikan, University of Chicago.

''The Structure of the Bismuth Line at Wavelength 4722,'' by Henry G. Gale and Lester Aronberg, University of Chicago.

''Visual Diffusivity,'' by Herbert E. Ives, United Gas Improvement Co., Philadelphia.

''Measurement of Wave-lengths with the X-ray Spectrometer,'' by Elmer Dershem, State University of Iowa.

''A Single Bar and Yoke Method for the Magnetic Testing of Iron Bars,'' by Arthur Whitmore Smith, University of Michigan.

''Some Effects of Cross-Magnetizing Fields on Hysteresis,'' by N. H. Williams, University of Michigan.

''A. C. and D. C. Corona in Hydrogen,'' by John W. Davis, University of Illinois.

''The Magnetic Properties of Fe, Ni and Co above the Curie Point, and Keesom's Theory of Magnetization,'' by Earle M. Terry, University of Wisconsin.

''A Simple Method for determining the Audibility Current of a Telephone Receiver,'' by Edward W. Washburn, University of Illinois.

''An Extension of the Mayer Experiments,'' by R. R. Ramsey, Indiana University.

''The Derivation of the Retarded Potentials,'' by Max Mason, University of Wisconsin.

''The Mass of the Electric Carrier in Copper, Silver and Aluminium,'' by Richard C. Tolman and T. Dale Stewart, University of Illinois.

''An Experimental and Theoretical Investigation of Binaural Beats,'' by G. W. Stewart, State University of Iowa.

''Contact Electro-motive Forces and the Energy of Emission of Electrons under the Influence of Monochromatic Light,'' by R. A. Millikan, University of Chicago.

''The Permanence of the Wave-length Sensibility Characteristics of Photo-electric Cells,'' by Herbert E. Ives, United Gas Improvement Co., Philadelphia.

''An Effect of Light on the Contact Potential of Selenium and Cuprous Oxide,'' by E. H. Kennard and E. O. Dieterich, University of Minnesota.

''A Peculiar Gas-Crystal Resistance Change in Selenium,'' by W. E. Tisdale, State University of Iowa.

''The Variation in the blackening of a Photographic Plate with Time of Exposure, Total Energy Remaining Constant,'' by P. S. Helmick, State University of Iowa.

''Note on the Ionizing Potential of Metallic Vapors,'' by H. J. van der Bijl, New York City.

A. D. Cole,
Secretary

THE BIOLOGICAL SOCIETY OF WASHINGTON

The 558th meeting of the society was held in the Assembly Hall of the Cosmos Club, Saturday, October 21, 1916, called to order at 8.10 by President Hay, with 50 persons in attendance.

The president announced the death of Professor F. E. L. Beal, a member of the society, distinguished for his work in economic ornithology.

On recommendation of the council Mrs. Ella M. Enlows was elected to active membership.

Under the heading brief notes, exhibition of specimens, the following informal communications were presented:

Mr. A. L. Quaintance called attention to a new peach pest (related to the coddling moth), lately found in the District of Columbia and immediate vicinity. These remarks were illustrated by lantern-slide views of the insect and its work.

Dr. C. W. Stiles commented on zoological nomenclature and gave notice that it was the intention to set aside the rules of strict priority with reference to *Holothuria* and *Physalia* and to use these terms for the animals to which they are currently applied in the usual text-books.

Dr. Stiles also commented on recent cases in which trichina had figured in certain lawsuits. He expressed the view that with the purchase of meat products went the requirement that the product should be properly cared for and that in the case of pork this care required cooking before consumption. It was somewhat unfair to hold the seller of trichinous meat entirely responsible.

Dr. L. O. Howard cited an instance in which a cockroach was figuring in a lawsuit. A man was suing a Texas railroad for damages on the ground that typhoid fever had been contracted through his drinking pop which had been contaminated by a cockroach, which had apparently been in the bottle before the man drank the pop purchased of the common carrier.

The regular program consisted of an illustrated lecture by Dr. Paul Bartsch: ''Mollusk Collecting in the Philippines.'' Dr. Bartsch reviewed the work of previous collectors, gave an account of his own collecting expedition, describing the methods and apparatus used; he spoke of mollusks as a source of food for the natives, their method of gathering

them; he called attention to the variations of these animals as found on different islands; showed the necessity of exact locality determinations on specimens; and discussed the geographic distribution of the Philippine molluscan fauna, pointing out its possible origin from other islands or land masses. The lecture covered not only the land mollusks, but the marine forms as well.

THE 559th meeting of the society was held in the Assembly Hall of the Cosmos Club, Saturday, November 4, 1916, called to order at 8 P.M. by President Hay, with sixty persons present.

On recommendation of the council the following persons were elected to active membership: Dr. Wm. B. Bell, Biological Survey; Francis Harper, Biological Survey; H. E. Anthony, American Museum of Natural History, and A. B. Howell, Covina, California.

The president announced the death of Dr. E. A. Mearns, a member of the council of the society and distinguished for his work in birds, mammals and other branches of natural history.

Under the heading of brief notes and exhibition of specimens, Dr. R. W. Shufeldt exhibited a specimen of the Japanese giant salamander and made some remarks on its habits and habitat.

The regular program consisted of four papers as follows:

A Review of Recent Work on the House-fly: R. H. HUTCHISON.

This paper was restricted to a discussion of recent studies on the preoviposition period, the range of flight and the question of the over-wintering of the house-fly. The remarks on the preoviposition period summarized a recent bulletin of the Department of Agriculture on this subject (Bulletin 345).

In discussing the range of flight, attention was directed to the fact that up to 1914 the longest recorded flight was 1,700 yards. During the season of 1915 experiments were carried out in a suburban locality near Washington by Max Kisliuk, Jr., under the direction of the writer. In these, several records of from 1,800 to 2,175 yards were obtained. These were compared with the records obtained by R. R. Parker during the same season at Miles City, Montana. His longest record was 3,500 yards.

The question of how the house-fly overwinters in this latitude was said to be still undecided. It was pointed out that flies were not killed by the first heavy frost, as has often been stated; in fact a large percentage revived after several nights' exposure to minimum temperatures of 25° F. They are killed by temperatures of 15° F. Flies were found emerging up to the first week in December, and these late forms were found in heated buildings until the end of January. None were again seen till April 27. Other observations were cited as indicating that flies do not overwinter in the adult state, but, on the other hand, a long series of experiments and observations failed to give any positive evidence that they overwinter in the larval or pupal state.

Recent Spread of the Cotton Boll Weevil: W. DWIGHT PIERCE.

A brief history of the movement of this pest through the United States suggests from a study of specimens collected in all parts of the infested regions of North America that there are three lines of dispersion. It seems probable that the boll weevil originated in Guatemala or some other portion of Central America and that the most typical strain migrated northward through the mountains of Mexico into Arizona, where it is now found as a native species on the wild cotton-like plant *Thurberia thespesioides*. The main migration was along the Gulf Coast through the cultivated cotton regions into the United States. The third line of dispersion was through Yucatan across the Gulf, to Cuba. Specimens collected at the three termini of these dispersions appear to be very distinct varieties. That variety which is found on cultivated cotton in the United States is the smallest found and the most variable. The movement of the weevil is controlled by the amount of food supply, which regulates the time and distance of natural movement by winds and floods; and by artificial agencies.

The most interesting development of the present year is the extension of the weevil to the northern limits of cotton growth in Oklahoma and Arkansas into Central Tennessee; eastward to the Atlantic Ocean south of Savannah; and the infestation of practically all the cotton region of Florida. The only Sea Island cotton section now not infested is that of South Carolina.

Remarks on Entomological Inspection and Disinfection of Products offered for Entry into the United States: E. R. SASSCER.

A brief review of the Plant Quarantine Act of 1912 was given, pointing out the principal features of the act relating to the control of stock entering the states and what is required of the broker, the nurseryman, or party importing plants or plant products. The quarantine relating to insects were referred to, and lantern slides of a number of these quarantined insects and others collected by inspectors were shown. Brief mention was made

of the method of examining nursery stock in the District of Columbia, and it was shown that such stock was naturally divided into commercial material, including plants and plant products received by florists, department stores and private individuals; and departmental material, including plants and plant products introduced by the various offices of the Department of Agriculture, more particularly the Office of Foreign Seed and Plant Introduction. Some time was devoted to discussing the new method of disinfecting cotton, and lantern slides were shown exhibiting the plants which are now operating in Boston, Mass., Brooklyn, N. Y., Newark, N. J. and Oakland, Calif.

An Outline of the Glow-worms of the American Family Phengodidæ: H. S. Barber.

M. W. Lyon, Jr.,
Recording Secretary

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS

On November 18, 1916, the American Association of Variable Star Observers held its fourth annual meeting at the Harvard College Observatory, Cambridge, Mass., at the invitation of the director, Dr. E. C. Pickering. The meeting was called to order in the library of the institution at three o'clock with twenty-two members present. The results of the previous year's work were carefully discussed and more definite plans adopted for the future course of the association. Numerous light curves and plottings pertaining to the work were on exhibition, illustrating the observations on variable stars, particularly those of long period.

Later, a tour of the observatory was made, at which time Professor Pickering and Miss Cannon explained in detail the work of the astro-photographic department, and Professor King explained the manipulation of the different photographic telescopes. This was followed by a lantern-slide exhibition of views of Arequipa, Peru, and the work of the Southern Station of the Harvard College Observatory by Mr. Campbell.

The meeting then adjourned to the commodious quarters of the 12-inch polar telescope, when nineteen experienced observers had the unique opportunity of observing the same variable star, *SS* Cygni, under like conditions, with an average deviation between observers of only 0.14 magnitude.

From seven until ten o'clock Professor Pickering acted as host at a dinner given to the members of the association. Following the dinner many of the members enjoyed the opportunity of observing with the historic 15-inch equatorial until the wee sma' hours of the morning.

The next day a small party availed themselves of the chance to visit the well-equipped students observatory at Wellesley College, by the courtesy of the director, Dr. J. C. Duncan.

In no period in the history of astronomy has an opportunity offered itself, as at the present time, whereby a group of amateur astronomers has been able to combine and organize themselves for such useful scientific work. In fact no other branch of science offers this possibility so completely, in which a two-fold purpose is so well accomplished, namely: service and contribution to science and personal pleasure to those taking part therein.

Not all the problems of astronomy are so easily adaptable or inviting to amateurs, as this study of variable stars. Nevertheless, in the past five years a most productive field of research has been developed, and one which has called together one of the most enthusiastic assemblages of men and women, some forty in number and from all the different walks of life.

The study of variable stars is one of the oldest branches of astrophysical astronomy, and it was not until twenty-five years ago that systematic work was undertaken. To this work the Harvard College Observatory has devoted, under the directorship of Dr. E. C. Pickering, the greater part of its time and resources. The methods and results in this study have proved so simple and attractive that it has lent itself admirably to non-technically trained astronomers, with the result that in 1911 there was formed this association of amateur observers, with Mr. Wm. Tyler Olcott as its secretary and prime mover. From the character of the work thus far performed, a number of its members have recently received recognition by election to membership in the American Astronomical Society. F. E. B.