table entomological text-books, the nymphs of four of these five families are shown to be herbivorous in their feeding habits, and those of only one (Perlidae) are carnivorous. All are lotic, living in moving water, either in streams or on wave-washed shores.

The illustrations in this third volume are particularly fine. These represent all the families and all but three of the genera of our fauna. It satisfactorily fills a big gap in the knowledge of our North American insects.

J. G. NEEDHAM

CORNELL UNIVERSITY

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

BIOLOGICAL SCIENCES AT ATLANTIC CITY

THE American Society of Zoologists, in cooperation with Section F of the association, will present a program similar in general plan to the programs of previous years. On Wednesday morning two sessions will be held simultaneously, one on physiology and the other on embryology. The physiology program will include papers on growth in relation to temperature and other factors, on the swimming activity of spermatozoa, on germ cell development as affected by aspirin and on the newly discovered third hormone of the anterior pituitary. This hormone has been named "prolactin" by Dr. Oscar Riddle, of the Carnegie Institution at Cold Spring Harbor, and has been identified with milk secretion. On the embryology program are papers on the tissue culture of rabbit embryos, on the rôle of cytoplasm and chromosomes in the early development of salamanders and on the growth of nerve cells from the rat transplanted to the allantois of the chick. A method for studying developmental factors by x-ray radiation will be described.

Wednesday afternoon will be devoted to sixteen demonstrations in various fields of zoology. Especially interesting to scientific men in general will be moving pictures of a developing sea-urchin egg by Robert Chambers, of New York University; a new glass electrode for measuring pH of minute amounts of body fluids by I. R. Taylor, of Brown University, and newly designed apparatus for determining the temperature, salinity, biological population and rate of flow simultaneously of sea water at different depths, by T. C. Nelson, of Rutgers University. At 4:30 P. M. on Wednesday, Carl C. Speidel, who was awarded the general A. A. A. S. prize in 1931, will give a lecture on the growth of living nerves, illustrated by thirty minutes of motion pictures.

Thursday morning three simultaneous sessions will be held dealing with physiology, cytology and ecology. Papers on the sexual hormones, on regeneration and transplantation of various kinds of tissues and on the depression of bioluminescence by narcotics are important on the physiology program. Among the cytological papers four are on the chromosomes of as many different animals, one on the reactions of marine blood corpuscles to vital dyes, and another on the remarkable mathematical precision with which epithelial cells arrange themselves into definite patterns. Four papers on ecology will be presented at the joint session with the Ecological Society of America. On Thursday afternoon the final sessions for reading of papers will be held. In the physiological section there will be a group of papers dealing with such varied subjects, as the use of the precipitin reaction in studying evolution, the rôle of neurohumoral secretions and other endocrines in controlling color changes, the responses of caterpillars to sounds illustrated by motion pictures, the sensitivity of animal eyes to different regions in the spectrum, the functioning of kidney tubules in tissue culture and the effects of x-rays and ultra-violet light on an insect and a protozoan. In the other session a few papers each in the fields of protozoology, parasitology and anatomy will be presented covering histological studies on protozoa, on the human mouth mucous membrane and on the blood of the duck, as well as on germ cell cycles in a salamander, reproduction of a Mexican killifish, a new mutation in Drosophila and life histories of two kinds of female rotifers. In the evening at the Zoologists' dinner Charles Zeleny, of the University of Illinois, will give the vice-presidential address of Section F on "Genetics and Embryology."

Friday morning will be given over to a symposium on "Embryonic Determination," at which papers by E. G. Conklin, Princeton University; D. H. Tennent, Bryn Mawr College; R. G. Harrison, Yale University; B. H. Willier, Chicago University, and Paul Weiss, of Germany, will be presented. A discussion is planned at the end of each paper. In the afternoon there will be held the usual joint symposium with the American Society of Naturalists, the Botanical Society of America and the Genetics Society of America.

On Saturday a field trip to visit the oyster industry of New Jersey will be led by T. C. Nelson, of Rutgers University, who is in charge of oyster investigation for the state of New Jersey.

The Entomological Society of America will hold sessions on Wednesday and Thursday. One session will be devoted to a symposium on "The Influence of Civilization on the Insect Fauna of North America."

The American Association of Economic Entomologists will hold sessions from Wednesday morning, December 28, to Saturday morning, December 31. Topics to be considered will include plant quarantine and inspection, agriculture, extension entomology and insect toxicology.

A short description of some phases of the program of the American Society of Parasitologists appeared in SCIENCE for November 25.

At a joint session of Section G with the associated botanical societies, Dr. E. D. Merrill, retiring vice-president for Section G, will discuss the interrelations between crops and civilizations. This session will also include a memorial program celebrating the centenary of Julius von Sachs (1832–1897). Sachs will be characterized by one of the speakers as the last of the epitomists; another address will deal with Sachs as the man and the teacher; a third will stress the influence of the Sachs text-book on botany in America.

The physiological programs will include a wide range of topics, of considerable interest and importance. Papers will deal with photosynthesis of normal leaves and of those treated with ether and chloroform; the effects of illuminating gas on oak trees and other plants; the influence of carbon monoxide in stimulating root production; effects of carbon dioxide storage on fruits and vegetables; soil aeration and plant metabolism; nitrogen fixation by Myxophyceae; hydrogen-ion concentration of plant sap, and the influence of hydrogen-ion concentration on oxidase activity and on plant distribution; toxicity of normal and pathological blood for seedlings; mechanism of dormancy in seeds and changes occurring during after-ripening; neophyosis, or rejuvenescence of nucellar bud seedlings in Citrus.

Papers on general botany will deal with many subjects, of which the following may be mentioned: thermal distribution of the Myxophyceae of the Yellowstone National Park; comparative resistance of a plant virus and of bacteria to monochromatic light; ontogeny of phloem in healthy sugar-beets and in those affected with curly-top; pathological anatomy of roots attacked by nematodes; responses of tobacco to topping; embryogeny of plants; differentiation of mesophyll tissue; flower variation; life history of *Coenogonium linkii;* symmetry and bending in Marsilea and Pilularia; polyploidy in Alliums; somatic chiasmotypy, and meiosis in Digitalis.

Systematic botany will be well represented with a symposium on objectives and methods in field work, including papers on the significance of compilers' data, objectives of plant exploration work of the U. S. Department of Agriculture, etc. One session will be devoted principally to recent progress in American agrostology, with papers on grasses of Yucatan, eastern Asia and eastern North America. An interesting field trip is planned to the pine barrens and coastal marshes of New Jersey.

Ecological phases of botany will be treated in a series of important papers, including the following topics: Heterogeneity of natural vegetation as an indicator of soil heterogeneity; new black porous-porcelain spheres for estimating the drying influence of sunshine; spherical *versus* horizontal plane surfaces for the atmometric integration of solar radiation; ecology of Alaskan forests; pollen analysis of a Kodiak bog, and epharmony in a New Zealand Rubus.

The American Phytopathological Society plans joint sessions as follows: (1) With Section G and Associated Societies, on Wednesday afternoon, (2) With the Mycological Society, on Thursday afternoon. In addition to the usual general program it is planned to arrange a series of discussion sections in which papers selected on the basis of a theme of common interest will be grouped. Business sessions will follow papers scheduled for Wednesday and Friday mornings. The annual dinner of the society will be held on Wednesday evening in the Madison Hotel.

The Genetics Society of America plans a joint session with the American Society of Naturalists, the American Society of Zoologists and the Botanical Society of America for a symposium on Friday afternoon. Tuesday morning will be devoted to a symposium on applied genetics, dealing with the evaluation of breeding individuals by means of progeny tests. Regular sessions for the reading of short papers will occupy the remaining forenoons. The afternoons will be kept free for informal discussion, demonstrations and exhibits. Wednesday noon there will be a Genetics Society luncheon followed by a business meeting.

Other societies related to the botanical or zoological sections or to both that will hold sessions in Atlantic City are the American Society of Plant Physiologists, the Phi Sigma Biological Society and the American Nature Study Society.

Section O of the association has arranged a joint session with the American Society of Agronomy for Wednesday, December 28, both morning and afternoon. The program will consist of invitation papers on the general symposium subject, "Nitrogen in Relation to Crop Growth and the Use of Nitrogen Fertilizers." Among the speakers will be Director J. G. Lipman, of New Jersey; Director B. E. Gilbert, of Rhode Island; Dr. A. B. Beaumont, of Massachusetts; Dr. S. A. Waksman, of New Jersey; Professor J. W. White, of Pennsylvania; Professor A. W. Blair, of New Jersey; Professor G. L. Schuster, of Delaware; Dr. R. P. Thomas, of Maryland, and others who have been invited to appear on the program. The address of the retiring chairman of Section O, Director C. G.

Williams, of the Ohio Agricultural Experiment Station, will be given at the joint dinner with the American Society of Agronomy on the evening of December 28 at the headquarters hotel.

The American Society for Horticultural Science will hold its meetings on December 28, 29 and 30. There will be sessions devoted to genetics and fruit breeding, small fruits, grapes, propagation of plants, tree fruits, growth and nutrition, vegetable crops, floriculture, ornamentals and economics. There will be a joint session with the American Society of Plant Physiologists on Thursday forenoon. The retiring president, Dr. H. A. Jones, of the University of California, will give an address at the annual banquet to be held Thursday evening. On Friday there will be a joint session with the section on agriculture, which will be addressed by Dr. C. G. Williams, director of the Ohio Experiment Station.

REGISTRATION AND RAILWAY RATES

GENERAL registration for the Atlantic City meeting of the American Association for the Advancement of Science and Associated Societies will be held in the ballroom of the Municipal Auditorium, which is centrally located on the boardwalk. This office will be open from Tuesday morning, December 27 at 9:00 o'clock to 12:00 o'clock Saturday noon, December 31. The registration fee for the Atlantic City meeting is $1.00. Every one interested in the advancement of science who expects to attend any of the meetings is urged to register.

General programs will be available at the registration offices from Tuesday morning to Saturday noon. Each registrant will be supplied with a free copy of the general program which will be a book of 300–400 pages. Non-registrants may purchase programs for $1.00 each.

Reduced railway rates by the standard certificate plan have been granted by almost all railroads in the United States and Canada. Persons attending the meeting should purchase a first-class, full-fare, one-way through ticket to Atlantic City, securing a certificate on the "Standard Certificate Form" reading "for the Atlantic City meeting of the American Association for the Advancement of Science and Associated Societies." Persons should leave their railway certificates at the validation desk to be called for later at the same place. Each person presenting an endorsed and validated certificate may purchase a continuous passage, one-way, return ticket for one half of the regular fare, by the same route as that followed on the trip to Atlantic City. The earliest dates at which tickets may be purchased range from December 20 for the most distant territory to December 23 for the nearest places. Certificates may be validated from December 27 to December 30. The last date on which return tickets may be purchased is January 4, 1933. There is a possibility that some of the railroads will offer excursion rates lower than the rates on the certificate plan. Members are urged, therefore, to consult their passenger agents before purchasing tickets.

CHARLES F. ROOS,
Permanent Secretary

THE NATIONAL ACADEMY OF SCIENCES

PAPERS PRESENTED AT THE ANN ARBOR MEETING. III

(*Continued from page 547*)

Diurnal variation in efficiency: NATHANIEL KLEITMAN (introduced by A. J. Carlson). Our diurnal sleep habit manifests itself in a certain degree of drowsiness which overtakes us every evening and gradually reaches an intensity that makes resistance to the onset of sleep well-nigh futile. Is this inclination toward sleep at the end of a day's activities dependent upon or independent of other periodic changes showing a 24-hour cycle? To answer this question a number of adult subjects were subjected to several simple tests at different times of the day, and variations in performance noted as regards the length of time required to carry out a certain task, or the number of errors made in a definite period of time, or both. The tests were made five times daily, for at least 20 days: A—immediately upon getting up in the morning; B—one hour later; C—just before lunch; D—just before supper; E—just before going to bed. The tasks chosen were such that they could be performed by the subject without outside help, and in the privacy of his own home. They were: *1*—copying a text; *2*—transcribing a text into code; *3*—sorting cards; *4*—dealing cards; *5*—multiplication of large numbers; *6*—mirror drawing; *7*—the ability to keep a stylus in a small hole without touching the edges; *8*—the ability to stand upright without swaying. The results obtained indicate a well-marked variation in performance during the day, efficiency of performance (reciprocal of time or errors), increasing up to noon or afternoon, then declining for the rest of the waking period. The body temperature varies in the same sense. There are indications that the temperature is dependent upon the tonus of the skeletal muscles, in that it falls upon lying down and rises upon getting up. If the variations in temperature can be used as a criterion of changes in tonicity of the body musculature, it would appear that the gradual decrease in efficiency toward the end of the day might be due to greater muscular relaxation, which leads to a decrease in the number of proprioceptive impulses reaching the cerebral cortex and makes it increasingly difficult to maintain the state of wakefulness, irrespective of