should be persons with teaching experience and at least a year of graduate work. Inquiries should be addressed to Professor E. L. Palmer, Cornell University, Ithaca, N. Y. Appointments may be made by July 1.

ORGANIZATION of the Lalor Foundation for the advancement of natural scientific research and encouragement of the arts was effected at Wilmington, Del., on May 11, and the announcement made that in the fall five professorship and fellowship grants of $2,500 each will be available. The foundation was organized as a Delaware corporation following receipt of a bequest of $400,000 from the estate of Willard A. Lalor, a former official of the Chicago, Burlington and Quincy Railway. The bequest is a testimonial to his sister, Mrs. Anna Burdick, of the U. S. Department of Education, and to his brother, John C. Lalor, who was prominently identified with the early development of the mining and metallurgical industries in Montana. It is stated that the foundation considers the encouragement of outstanding young men to continue work in purely scientific research after they have completed their graduate training to be a desirable object. Consequently, current awards will be for the support of purely scientific research and for fellowships in specified fields. They will be given to mature scholars of demonstrated ability and will afford recipients the "freest possible conditions for study."

SIR HERBERT AUSTIN, British motor manufacturer, has given £250,000 to the Cavendish Laboratory of Experimental Physics at the University of Cambridge. Prime Minister Stanley Baldwin, as chancellor of the university, in a letter to Sir Herbert acknowledging the gift, wrote as follows: "There can be no greater encouragement to the men who devote themselves to scientific research than to feel that their work is appreciated by those engaged in industry, the progress and development of whose businesses depend so much on the laboratories of our country. Your noble gift will be invaluable at this time to Cambridge and the benefits arising from its applications will be available for the civilized world."

THE Louisiana State University Zoological Field Laboratory will hold its sixth season from June 8 to August 5 at Grand Isle, La., for the first time with a building and land of its own. A survey of the local fauna, as well as formal course work, is planned. Dr. Ellinor H. Behre will be in charge of the work.

THE New York State Experiment Station at Geneva, cooperating with the New York Botanic Garden, announces the development of a new seedless grape which has been named "Bronx Seedless." The new variety represents sixteen years of effort to obtain a seedless grape that at the same time is hardy to New York conditions.

THE *British Medical Journal* notes that the *Nederlandsch Tijdschrift voor Geneeskunde* contains illustrations of eighteen postage stamps showing figures of physicians, including Imhotep, Boerhaave, Haller, Schiller, Semmelweis, Calmette and Ramon y Cajal.

DISCUSSION

SILVER SPRINGS AND THE FLORIDA SHIP CANAL

DURING recent weeks newspapers have referred frequently to the bitter controversy concerning probable effects of the projected Florida Ship Canal upon the ground-water supply of central and southern Florida. Occasional reference has been made to famous Silver Springs and Blue Spring in Marion County, and conflicting statements have been made as to their chances of surviving the digging of a sea-level canal. Scientists and lovers of the beautiful and marvelous in nature have reason to inquire whether these two natural wonders are to be sacrificed for a canal, the benefits of which may still be regarded as problematical. The writer has followed discussions of the proposed canal for some time, and it appears that the question of its probable effects upon these springs can be isolated from the larger problem of possible wholesale injury to Florida's ground-water resources and that possibly the effects upon the springs can be predicted with some degree of assurance. For that reason the following notes have been compiled, and a tentative interpretation is offered. It is believed that with the facts and maps available others may enjoy drawing their own conclusions, which, of course, may or may not agree with those of the writer. All the facts offered herein have been gleaned from the maps and reports of the Florida and United States Geological Surveys, or from various reports prepared in connection with the study of the selected route.

Silver Springs and Blue Spring occur within the outcrop area of the Ocala limestone. The Ocala, a formation of Eocene age, is believed to reach a thickness in excess of five hundred feet. It underlies all Florida in a gentle and elongate dome conforming roughly in shape and orientation to the form of the peninsula. This limestone is extremely porous and cavernous and is the foremost aquifer in Florida. It may be described as honeycombed with underground channels, and its outcrop areas are characterized by springs, lakes and sinkholes. There are probably few

limestones through which water will pass more readily, and for that reason the water table tends to be rather even and lacking in marked slopes.

Silver Springs, about five miles northeast of the city of Ocala, is shown on the Ocala sheet of the Topographic Atlas of the United States, to which the reader may wish to refer. It is the largest spring in Florida and is said to be the largest spring in limestone in the United States. According to the United States Geological Survey, about 500,000,000 gallons of water, approximately the amount of water used by New York City, flows from Silver Springs each day. The water is discharged into a basin about 35 feet deep and flows by way of Silver Springs Run, a stream having a maximum depth of eleven feet, to the Oklawaha River four miles to the east. The water surface of the springs is stated to be 40 feet above sea level, a figure closely approximating the average elevation of the water table for a considerable area of the surrounding country.

According to the map prepared for the Report of the Board of Review, June 28, 1934, the selected route for the proposed canal bears north 40 degrees east from the hamlet of Santos, south of Ocala. If this course is plotted upon the Ocala sheet, the route is seen to pass off the eastern edge of the map, east of Ocala, and almost exactly three and one half miles southeast of Silver Springs. Here it passes through the extensive Dead River Swamp, the surface of which lies 30 to 40 feet above sea level. The present difference in elevation between the water table at Silver Springs and at the indicated line is thus less, possibly several feet less, than ten feet in three and one half miles.

The proposed canal is to be a cut excavated to a minimum depth of 30 feet below sea level. While possibly no one may predict the exact effects, the following is suggested as perhaps a reasonable interpretation. Along the line of the canal the water table can with confidence be expected to drop to water level, which will be practically sea level. In the course of time, possibly rather rapidly because of the extremely cavernous nature of the Ocala limestone, and because water will escape readily into the cut not only above sea level, but also below as submarine springs, a new upper level of ground water will be established. Dead River Swamp will probably be drained. If the difference in elevation between the water table surface at the springs and at the canal becomes the same as the present difference between the surface at the springs and at Dead River Swamp along the selected route, it is clear that the water table will have an elevation of about ten feet at the Springs—in which case the springs would become a sink with a pond in the bottom, and the run an abandoned channel. It is possible that there would be a greater difference between the elevation of the water table at the two points, and if so, the springs would not be so seriously affected. The general effect, however, might still be the same.

It appears futile to suggest, as has been done by some without geological training, that a dam across the run will save the springs, for, if the described effect occurs, the water will be drawn off underground. It is interesting to note that the canal map mentioned earlier shows a hydro-electric plant with a reservoir on Silver Springs Run as one of the subsidiary projects in connection with the canal.

Conditions at Blue Spring differ only in degree from those at Silver Springs. For the best appreciation of local conditions reference should be made to the Dunnellon sheet, which shows a characteristic area of limestone sinks developed upon the Ocala formation. In volume of flow Blue Spring is comparable to and second only in Florida to Silver Springs. According to the United States Geological Survey its surface is also 40 feet above sea level. It is situated about four miles northeast of the village of Dunnellon and is drained southward to the Withlacoochee River at Dunnellon by Wekiwa Creek, a stream about five miles long. The 20-foot contour line crosses the Withlacoochee River just west of the railroad bridge at Dunnellon, so that the water level of the river four to five miles south of the spring is slightly, possibly two or three feet, over 20 feet. The difference in elevation of the water table at the spring and at the river is thus about 20 feet, and ground water in the area of the spring may be assumed to drain toward the river.

Reference to the map prepared for the Board of Review indicates that the selected route crosses this area on a line running directly from east to west through Dunnellon. It passes almost exactly four miles south of Blue Spring. Again it seems fair to assume that in the course of time the water table along a canal dug to 30 feet below sea level would drop to sea level, 20 feet lower than at present. The present water table would certainly be thrown out of equilibrium, and the rapidity with which the adjustment would be made would depend largely upon the perfection of the system of underground channels. If the water table at the spring should maintain the same relationship to that in the canal, as it now does to the water of the Withlacoochee, it would be about twenty feet lower than at present. These effects might not immediately become apparent, but in due course of time the water table would surely be lowered into a position of greater equilibrium. It is interesting to note that a hydro-electric plant is also proposed for the outlet of Blue Spring.

The writer is not prepared positively to assert that these springs will be destroyed or seriously damaged,

but the opinion that the available facts point toward that conclusion is advanced with some assurance.

HENRY S. SHARP
COLUMBIA UNIVERSITY

THE TOXICOGENIC AND TOXINIFEROUS INSECT[1]

THE increasing recognition of purely toxic effects of insect feeding as contrasted with those wherein a virus is concerned suggests the desirability of terms to describe those insects whose feeding results in pathological effects not ascribable to mere mechanical injury and not fulfilling the criteria necessary to establish the presence of a virus.

Possibly the simplest cases of such effects are to be found in the leaf spotting caused by the feeding of scale insects and leafhoppers. The leafhopper burns are more complicated, since the symptoms are not localized at the insects' feeding points and there is evidence of some diffusion of the toxic principle.

Systemic toxic effects are more rare, but psyllid yellows of potatoes and mealybug wilt of pineapples are cases in point.

Although these several types vary greatly in complexity, one characteristic is common, *i.e.*, all are specific toxic effects and the capacity to produce them is inherent in the insects concerned. These insects may therefore be described as "toxicogenic" species. A toxicogenic insect may, however, not always be capable of secreting toxins, since such toxins may only arise as a result of specific or limited nutritional conditions. To describe the active toxin-secreting condition of a toxicogenic insect the term "toxiniferous" is proposed.

This latter term was first used, without amplification, in a recent paper, "Mass Action Phenomena in Mealybug Wilt,"[2] to describe the mealybug species, *Pseudococcus brevipes* (Ckl.). The more restricted use of the word "toxiniferous" and the introduction of the term "toxicogenic" will serve a useful purpose in the clarification of these concepts.

WALTER CARTER
PINEAPPLE EXPERIMENT STATION
HONOLULU, HAWAII

VAGAL AND SYMPATHETIC ENDINGS IN THE RABBIT INTESTINE[1]

WE have previously reported[2] that section of the vagi and the splanchnic nerves below the diaphragm does not alter the response of excised segments of the small intestine to epinephrine, physostigmine, acetylcholine, nicotine or barium or to electrical stimulation of the mesenteric nerves. These observations afforded evidence for the preganglionic nature of the splanchnic and vagus fibers to the intestinal muscle. Further experiments have now shown that cutting the mesenteric nerves, with subsequent degeneration of the fibers, sensitizes the longitudinal muscle coat to the inhibitory action of epinephrine. Responses of the muscle to nicotine, physostigmine, acetylcholine and barium were unchanged. Thus has been obtained pharmacological confirmation, approaching proof, of the anatomical studies of Johnson[3] indicating that the vagus nerves end on the ganglion cells of the Auerbach system; the axones of these ganglion cells therefore constitute the postganglionic fibers of the vagus pathway to the gut muscle. The sensitization of the muscle to epinephrine as a result of sympathetic fiber degeneration indicates that the sympathetic fibers in the mesentery end directly on the muscle and are not relayed through the Auerbach ganglia. It is a well-known fact that smooth muscles are sensitized to epinephrine by degeneration of their postganglionic sympathetic nerve supply. Conversely, physostigmine response of the iris disappears, following degeneration of the postganglionic fibers, but not of the preganglionic fibers of the ciliary ganglion.

These experiments firmly establish the vagal nature of the cells of Auerbach's ganglia of the rabbit but do not rule out their possible secondary rôle for local reflexes in the intestine.

F. S. MODERN
C. H. THIENES
SCHOOL OF MEDICINE
UNIVERSITY OF SOUTHERN CALIFORNIA

LATRODECTUS GEOMETRICUS KOCH IN SOUTHERN FLORIDA

THE presence of the black-widow spider, *Latrodectus mactans* Fab. in Florida has long been recognized. It has not been particularly abundant in southern Florida, but specimens are taken with regularity, and occasionally word is received from some physician that a patient suffering from the bite of this spider has been treated by him.

Early in September, 1935, several spiders with cocoons were collected in their nests on one of the university buildings by certain students engaged in making repairs. A study of these specimens by the writer indicated that they belonged to the genus *Latrodectus,* but variations in markings, the presence of a variable amount of buff or brown in the general coloration of the specimens and the larger, tuberculated egg

[1] Published with the approval of the director as Miscellaneous Paper No. 17 of the Experiment Station of the Pineapple Producers Cooperative Association, University of Hawaii.

[2] *Ann. Ent. Soc. of America,* 28 (3): 396–403, September, 1935.

[1] Supported in part by grants 194 and 236, Committee on Scientific Research, American Medical Association.

[2] F. S. Modern and C. H. Thienes, *Jour. Pharm. Exper. Ther.,* 51: 128 (Proc.).

[3] S. E. Johnson, *Jour. Comp. Neur.,* 38: 299.