medicine and head of the department of medicine in the University of Minnesota Medical School. He succeeds Dr. S. Marx White, who has resigned to devote his full time to private practice.

DR. BURTON CLARK has been appointed associate professor in the department of geology at the University of South Carolina.

JOHN GIESEN, assistant professor of zoology in Marquette University, Milwaukee, has resigned to become head of the department of zoology in Holy Cross College, Worcester, Massachusetts.

DR. FREDERICK H. ALLEN, director of the All-Philadelphia Child Guidance Clinic, has been appointed associate in psychiatry, and Dr. Richard H. Paynter and Dr. Phyllis Blanchard, psychologists of the clinic, instructors in psychology in the graduate school of medicine at the University of Pennsylvania. They will have charge of the instruction in psychiatric and psychological methods in child guidance work of the neuro-psychiatric fellows of the Commonwealth Fund of New York City.

AT the New York Homeopathic Medical College and Flower Hospital the following appointments are announced: Dr. J. George Brody, professor of physiology and pharmacology; Dr. Laura Florence, assistant professor of histology and embryology; Dr. Hans Anderson, assistant professor of pathology; Dr. C. Saul Danzer, assistant professor of experimental medicine; Dr. Gregory Schwartzman has been promoted to be professor of bacteriology.

DR. WINFRED OVERHOLSER, a member of the Massachusetts Commission on Mental Diseases, has been appointed professor of psychiatry in the faculty of the Boston University School of Medicine to succeed Dr. N. Emmons Paine.

NORMAN C. MILLER, head of the engineering extension department of Pennsylvania State College, has resigned to become director of extension teaching at Rutgers University.

PROFESSOR H. V. A. BRISCOE has been made director of the department of chemistry at Armstrong College, Durham, in succession to Professor W. N. Haworth, now professor of chemistry in the University of Birmingham. Professor Briscoe has been for several years professor of inorganic and physical chemistry in Armstrong College. Dr. G. R. Clemo, of the British Dyestuffs Corporation, has been appointed professor of organic chemistry in the college.

PROFESSOR HANS CLOOS, of the University of Breslau, has been appointed professor of geology and paleontology at the University of Bonn, to take the place of Professor G. Steinman, who has been made professor emeritus.

DISCUSSION AND CORRESPONDENCE

BOTANICAL CRITICISM

ARE American botanists excessively polite?[1] Certainly they do not indulge in mutual criticism as a major activity. Most of us will agree that without discussion knowledge can not prosper. It is coming to be pretty generally admitted that the badly crowded programs at botanical meetings stifle even the most necessary discussion. On the whole, however, botanical criticism is not a matter of machinery, but of atmosphere. The columns of many journals are open, and publication is easy—too easy, the mathematicians and chemists tell us.

One may as well grant that our civilization is one which makes a specialty of avoiding friction. It has even been eliminated as bargaining from the age-old business of retail selling. "Knocking," as a source of friction, is a capital social offense and in the mind of the average man comprehends criticism in all its phases. But may we not also grant that science rises above such considerations?

The cause of inadequate criticism is not so patent. To put it bluntly one can not have criticism without having the critical attitude of mind. And the only truly critical mind is the educated mind.

As a matter of course science must attract large numbers of youths who are fascinated, not by the ideas involved, but by the manipulations to be performed. Any botanist who knows his field can name instances where the ideas of one man are at present engaging the hands of anywhere from five to fifteen other men.

Skill is a noble thing, but it does not guarantee an intellectual atmosphere. It is essential to know a good preparation from a bad one, or to distinguish a correlation from a coincidence, but that is not enough. In reality science consists not of things nor of events, but of ideas. So far as the scientist is concerned ideas have relative values. It is the task of criticism to assign these values. The great strategists in science have been great selectors in the field of ideas.

Naturally the business of criticism is no child's play. It is work for good minds that have been severely trained. One recalls a well-known teacher of botany who took actual pride in his "discovery" that it required no especial ability to become a botanist! If this opinion were very widely shared one would not have to look far for an explanation of the dearth of botanical criticism.

In addition to the need for ability there is the question of adequate training. The writer has been

[1] Rose, D. H., and Stevens, N. E., "The excessive politeness of American botanists," SCIENCE, 61: 656–657, 1925.

repeatedly struck, during his teaching experience, by the sound discrimination *in dealing with scientific ideas* displayed by students trained in the humanities. As a rule they have shown a better sense of values than students whose experience has been primarily scientific. Is it not possible that the drive against the humanities has been too successful? These subjects concern themselves with the task of evaluating ideas. Does the science student, busy with the acquisition of descriptive details and technique, have any proper substitute for them?

The choice seems fairly clear. On the one hand we may rigorously select those whom we permit to go ahead as botanists and see to it that they are soundly educated. Even so there will be many useful workers interested primarily in manipulation, but their interest should not be a blind one. On the other hand we may encourage students of mediocre intelligence and narrow training to fill the ranks. If we choose the latter course we commit ourselves to a policy of helotism in the realm of ideas. In such case it will be a cause for thankfulness rather than chagrin if those who perform the routine have nothing to say concerning the significance of their work.

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FUNCTIONAL DIVISIONS OF THE NERVOUS SYSTEM OF INSECTS

FROM time to time attempts have been made to homologize structures in widely separated groups of organisms. This is interesting but apt to be rather unsafe. The functional divisions determined in the nervous system of vertebrates have aided greatly in the determination of the nature of the various parts of this complex system.

In insects there is a similar complexity of function and structure. An analysis of the parts of the nervous system of arthropods in terms of function has been going on for some time. In no other group, with the exception of the vertebrates, has so much been done. However, somewhat different methods must be used and our knowledge is far from complete. Regeneration methods, for instance, are not very successful, nor are degeneration tracts easily traced. The chief method, then, for determining peripheral and central parts is by the use of the intravitam methylene blue stain followed by dissection. In a few cases serial sections may be used, but the tough body-wall often hinders the preparation of perfect slides.

Two years ago I found an exceedingly valuable source of material for this study in the flat, transparent larva of the beetle Dendroides. In this insect it was possible to trace practically all parts of the nervous system in abdominal segments. In a successful preparation there was a bewildering abundance of nerve structures shown with a clearness and completeness of detail that was remarkable. This often included both the central and peripheral systems at the same time. There were details in the central ganglia, the nerves of the intestine, of the heart, the nerves of the spiracles, nerves to all the muscles of the segment including both afferent and efferent terminations and the extensive receptor system of the body-wall. It was from the results of such a study that it was determined, for instance, that muscle cells had both afferent and efferent terminations, the former by means of bipolar cells located on the muscle fibers, the latter by extensive complex end-plates supplied by nerve cells from the ventral ganglia by a special motor branch. It was also determined that at least ten nerve cells supplied each muscle fiber of larger size. It was determined that the so-called median nerve was composed of two parts and that the lateral nerves from these strands had components, from both above and below, from cells in the two nearest ganglia. The lateral nerves were traced to spiracles. It was determined that the so-called heart was supplied by strands from the motor branch of each ganglion; the fibers from these nerves were not all confined to the segment from which they spring. It was determined that the intestine was supplied by visceral ganglia which give rise to a superficial and a deep plexus with motor fibers from the central ganglia and sensory fibers from the intrinsic nerve cells of the plexus. It was found that the superficial nerve plexus contributed to the afferent and efferent supply of the Malpighian tubules.

Other recent studies have added much to our knowledge of the nervous system of insects, notably Zwarzin (*Zeit. f. wiss. Zool.*, 1924) and Orlof in the same publication. As a result of their work and mine the following seems to be true:

(1) The visceral system of insects consists of the so-called visceral ganglia in the head region with nerve extensions along the digestive tube. Receptor cells in the wall of the intestine of a bipolar or tripolar nature may in part be from muscles. The effector cells seem to be located in the visceral ganglia.

(2) The somatic system consists of bipolar cells ending in hollow hairs of the body-wall. Similar cells and some of a tripolar nature end in the body-wall without hairs. These also seem to be receptors. The effectors are located in the ventral ganglia of each segment and supply nerve endings to the body muscles.

(3) Fibers or cells or both often form a peripheral