homogeneous parent cultures, transplants of such colonies are frequently considered as separate 'strains,'" because its major premise is that the parent cultures are apparently homogeneous. Most bacteriologists use the term "strain" for any independent culture, although various of these cultures or strains might prove to be apparently identical and belong in one "type" or "variety."

When dissociation occurs it may be of two kinds, "phenotypic" or temporary and "genotypic" or permanent. Still another occurrence is that of loss of virulence by pathogenic species in which the cultural and physiological characteristics may remain essentially unchanged. This poses the question: Is there a reliable method for accurately determining when a bacterial culture becomes genetically unrelated to its parent or sister cultures to enable one to designate the progeny as cultures or strains? The reservation of the designation of "strain" for the "offspring of a single 'pure' culture or better still, of a single cell" is a restricted form of definition because it leaves out of account the fact that all cultures are the progeny of single colonies or cells, pure or mixed, even though they are not designated and known as such. Several years ago the writer[2] discussed the pure culture concept in relation to microorganisms, pointing out the range in its interpretation by different investigators. The suggestion that strains "should only be considered as such when it is known that they are genetically unrelated" is an order quite out of reach and keeping with present methods and knowledge.

It is probable that most bacteriologists would be confused by the genetic appellation being considered as basic to the use of the term "strain" in bacteriology. After all is said and done, the terminology all scientists should be striving for is one that describes but does not confuse the scientist or layman of this or some related science. Just as the social sciences are jargon-ridden to their serious detriment, so also are some of the biological sciences cultivating confusion rather than understanding as fads come and go or grow.

E. M. HILDEBRAND

DUNEDIN, FLA.

EXPERIMENTAL TUMORS IN AN INSECT

AMONG the conditions which bring about the development of tumors such factors as hormones, nutrition, carcinogenic substances and others are currently studied by many workers in vertebrates, particularly in mammals. This preliminary note concerns an experimental animal not commonly used in tumor research, namely an insect (*Leucophaea maderae*, Orthoptera), and a factor, not usually considered as playing a role in tumorous growth, *i.e.*, innervation.

[2] E. M. Hildebrand, *Bot. Rev.*, 4: 627–664, 1938.

Innervation as a factor in the origin of tumors was studied by cutting the recurrent nerve at various levels. As in other insects this nerve, together with several sympathetic ganglia, represents the stomatogastric nervous system. The branches of the recurrent, which innervate the anterior portion of the alimentary canal as well as the salivary glands and their reservoir, were demonstrated in methylene blue preparations. When the recurrent nerve was cut tumors developed within ten days to several months after the operation in organs innervated by the recurrent nerve, *i.e.*, in the salivary glands, the salivary reservoir and the anterior gut. To date about 250 specimens with experimental tumors were obtained in this way. The tumors which may attain considerable sizes were verified by dissection of the animals, and many of them were cut for histological study.

Histologically the tumors consist of layers of cells which show various degrees of abnormality. In advanced stages the cells near the lumen of the organ, for instance, of the mid-gut, frequently break down into a brownish debris. The anterior portion of the mid-gut is a common site of these tumors. They are also frequently found in the wall of the salivary reservoir where they are particularly conspicuous because normally the wall is a very thin and transparent membrane. In the fore-gut and in the salivary glands well-developed tumors are relatively rare.

Several hundred animals were operated upon in various other ways (allatectomy, castration, etc.), care being taken not to disturb the recurrent nerve. These control operations did not cause the development of tumors. A more detailed report, to be published elsewhere, is in preparation.

BERTA SCHARRER

SCHOOL OF MEDICINE,
WESTERN RESERVE UNIVERSITY

THE SHORTAGE OF SCIENTIFIC PERSONNEL

I HAVE read with great interest the series of discussions and articles in SCIENCE relating to the shortage of trained scientists in this country. As a professional scientist (zoology, general physiology) the matter is of personal concern to me.

However, I have noticed that all the writers, who bewail the future results of the shortage, fail to consider one factor: the large number of highly trained scientists (Ph.D.'s) who are temporarily in the Armed Forces. The vast majority of these are anxious to return to a normal civilian position as soon as possible. They should be carefully considered whenever one discusses the dearth of scientists.

As a first-hand example, may I take my present occupation in aviation physiology with the Army Air Forces? There are well over a hundred aviation

physiologists in the service. All of us have the degree of doctor of philosophy in one of the biological (broad sense) sciences. We teach and do research in connection with problems of respiration, anoxia, air sickness, body temperature, and the like. With only one or two exceptions we are all anxious to return to academic life. We are an available pool of young scientists who will need positions when the war is over. In the Army Sanitary Corps, in the Quartermaster Corps and in the Navy you will find similar men.

However, we feel rather ignored, since practically none of us has been offered a civilian position to become effective upon discharge from the service. If the shortage of scientists is so critical and if the various university and commercial representatives are sincere, why have not the scientists, who are now temporarily in uniform, been approached in regard to post-war appointments?

Personally, the outlook is not too bright. Most university men with whom I have spoken recently maintain that they are making no postwar plans to take on additional faculty members. Where, then, does the shortage exist?

We have noticed that the National Research Council is planning to grant fellowships to aid young scientists in studying for the doctorate. We have not heard of any plan whereby trained scientists (now in the service) can get a six-month period of rehabilitation and "refreshing" between the time of discharge and the time they enter into new civilian duties.

CHARLES G. WILBER

SCIENTIFIC BOOKS

CHARLES DAVIES SHERBORN

Squire: Memoirs of Charles Davies Sherborn. By J. R. NORMAN. 202 pages. 2 figs., 8 plates. London: George G. Harrap and Co. 1944. 15 shillings.

"SQUIRE" was a unique character among British scientists, and this biography by one of the most intimate friends of his later years is in many respects a unique book. By means of personal recollections, excerpts from Sherborn's letters and autobiographical notes and various anecdotes and reminiscences supplied by friends and colleagues, it re-creates the spirit of the man and reveals an aspect of the scientific life that is seldom seen in any country. It moreover gives an extraordinary insight into the working relationships of the group of famous scientists who brought honor to the British Museum and other official organizations and learned societies of England, as well as to themselves, in the last quarter of the nineteenth century and the first quarter of the twentieth century. Many an American zoologist, geologist and student of the history of science will gain much pleasure as well as profit by reading it.

Dr. Sherborn was a "born collector" and even before he left school in 1875, at the age of fourteen, he "had amassed quite useful series of shells, fossils, minerals, stamps, coins, books, autograph letters, historical and other documents, and even a few prints." Despite his lack of any advanced formal schooling, his entire life was spent in close association with research scientists and he not only helped many of them achieve success, but he made many contributions to knowledge on his own account, notably in stratigraphic geology, paleontology and zoology. His *magnum opus* was of course the *Index Animalium,* with its 440,000 references, the last part of which was issued in 1933. This monumental work involved the indexing of nearly 28,000 publications and was completed only after forty-three years of unremitting toil in the face of difficulties that required almost superhuman persistence to surmount. Would that all the thousands of scientists the world around who blithely consult it from time to time could be required to read Mr. Norman's account of the way this self-assigned task was accomplished! Surely they would all applaud the action of Oxford University in conferring upon "Squire" Sherborn the honorary degree of doctor of science, the only academic reward and almost the only official recognition he ever received throughout his long life of unselfish, quiet service in the cause of science.

KIRTLEY F. MATHER
HARVARD UNIVERSITY

THE BIRDS OF CALIFORNIA

The Distribution of the Birds of California. By JOSEPH GRINNELL and ALDEN H. MILLER. Cooper Ornithological Club, Pacific Coast Avifauna No. 27. 608 pp., 1 color plate, 57 maps. Berkeley, Calif., 1944.

THE physiography of California and its effect upon meteorological phenomena have produced a notably large number of ecological niches. These are characterized not only by climates that can be quantitatively defined, but also by special associations of plants and animals. In extreme examples, such as that of the yellow-billed magpie, the correlation is one of thoroughgoing endemism. This bird (*Pica nuttallii*) occurs nowhere outside its limited range within the State of California.

Aside from climate of the proper kind, a further probably essential factor in habitable environment is presence of accessible water in dry seasons, needed not only to drink but in certain phases of nest-building; another is