A. C. Foster, B.S. (Alabama Polytechnic), botany.
Franklin O. Church, B.S. (Rutgers), hydraulic engineering.
F. P. Schlatter, B.S. (Pennsylvania State), cranberry investigations.

DR. FRANCIS ARTHUR BAINBRIDGE, of the University of Durham, has been appointed to the University of London chair of physiology tenable at St. Bartholomew's Hospital Medical School.

DISCUSSION AND CORRESPONDENCE

LOSING THE ADVANTAGES OF THE BINOMIAL SYSTEM OF NOMENCLATURE

THE communication from Dr. F. B. Sumner which appeared in SCIENCE for June 18 last on the subject of saving the genus as a category of zoological classification, is certainly a timely one, and expresses views that are by no means confined to its author. It will require but little examination of the facts to lead to the conclusion that not the enforcement of the law of priority, but unrestricted splitting of genera, is responsible for most of the confusion and instability which characterize zoological nomenclature to-day, and makes it a source of inconvenience and uncertainty, demanding from scientific men much profitless labor, and expenditure of mental energy sufficient to bring about important advances in science if it could be turned into some useful channel.

Few zoologists ever stop to think how far we are getting away from a real binomial system of nomenclature. It is true that scientific names of animals still consist of two words, but only in a minority of cases does the first term of the binomial have any real meaning to us, or suggest ideas of a much broader and more comprehensive character than the second one. The genus name has become little more than a mere prefix to, or part of, the species name. The addition of a few more letters or syllables to the latter (to prevent confusion of organisms which have chanced to receive the same specific designation) would serve the same purpose. We learn generic names, if we learn them at all, by mere acts of memory, and we use them because we find them in the latest monographs and might be thought not up to date if we did otherwise, but what the distinctions are between these multitudes of closely allied genera we rarely stop to inquire. Indeed, if we do have interest enough to look up such points, the slight importance and complexity of the distinctions are apt to surprise and discourage us, and convince us that we had better take the specialist's word for them, and spend our time and labor in some more useful way. In short, though our classification is binomial in form, it is only very imperfectly so in effect.

Even within the memory of some scientific men living to-day, the system in use did still afford the practical advantages which secured the universal adoption of the system of Linnæus. The recognized genera, though even then being multiplied to an inconvenient extent, were still in a majority of cases separated by sufficiently well-marked characters and not as yet too numerous to enable the professional zoologist and even the more serious amateur students of the science to recognize by name and classify a large proportion of the genera, and to recall some of their more important characters. A genus name had in those days a real meaning to some others besides the specialists in the class of animals to which the genus happened to belong.

It would be a mistake to maintain that zoological classification has suffered through the recognition of these minor subdivisions. They exist in nature, and should have a recognition commensurate with their importance. The older and more comprehensive genera are now in many cases treated as subfamilies or families. Classification has gained in exactness and truthful representation of the facts, but through our neglect to keep the first term of our scientific names comprehensive in its application, and easily distinguished and remembered in its meaning, we have allowed our nomenclature to lose most of the practical advantages and conveniences of the Linnæan system.

Unfortunately, specialists, as Dr. Sumner has hinted, are only too apt to study their specimens till they see only differences and lose sight of much more important resemblances,

and hence to commit in their own works the offenses that they find fault with in the works of other authors. They should sometimes endeavor to look upon their subject from the point of view of the general zoologist, and get a more correct perspective of the relative importance of characters than can be obtained if their ideas run too much within the narrow limits to which the study of restricted groups tends to confine them. If specialists will take the lead in reducing to subgenera or sections many of the genera now recognized, other zoologists will be only too glad to follow them. Such a course would not for a moment require the abandonment of those genera as divisions of classification, nor necessarily indicate the admission of any change of view as to their intrinsic importance; it would be merely a question to be decided on the basis of obtaining a nomenclature practical for zoologists in general. As it is now, our nomenclature is adapted for specialists only, and for each specialist only for his own particular field of study. As far as the rest of the animal kingdom is concerned, he is in the same position as a general student of zoology, and finds the existing nomenclature as inconvenient as every one else does.

One common practise seems to be especially illogical. That is the attempt to break up well-defined genera simply because they contain a large number of species. Such genera exist in nature, as well as many genera with a few or with but one species, and this must be the case in our classification also if it is to be true to nature. It is claimed that large genera are "inconvenient," but in such cases the inconvenience is not in the classification, but in nature itself, which has evolved a large assemblage of closely allied forms, and it is often made worse rather than better by the attempt to distinguish genera which have no real dividing limits.

The writer is inclined to question whether Dr. Sumner has gone quite far enough in recommending subgenera as substitutes for many of our present genera. Some of the latter hardly deserve even that low rank. A subgenus receives a scientific name of the same form as a genus name, and affords a standing temptation for the next specialist who makes a more minute division, to treat it as a genus, thereby changing the scientific names of all the species involved. Even if this never happens, scientific literature is burdened with a new technical name which adds its weight to the already excessively large proportion of zoological subject-matter which consists of mere names of things, in distinction to real knowledge about animals. Names and technical words we must have, but whether we do it consciously or not, we use mental energy in learning and remembering and using them, or in looking them up in books. If neither necessity nor frequent and general usefulness justifies their existence they should be done away with, or, better still, never coined. The best carpenter or machinist neither needs nor desires the largest possible set of tools, and hesitates to encumber himself with extra ones which he has no real need of, and science would probably be as well off with fewer technical words.

A method that has often been used and proved a satisfactory one for naming unimportant groups is that of designating them by their best known or first described species. Such a system has been applied to the minor divisions of large genera, as *Unio*, by Simpson in his well-known synopsis of the Naiades, where he speaks of the "group of *Unio gibbosus*," "the group of *Unio littoralis*," etc. Not only are no new words coined, but to those with some familiarity with the genera in question the groups are better understood than if they were called by some arbitrarily formed and no less arbitrarily applied combinations of Greek or Latin roots and suffixes. Simpson used this method only for assemblages of very nearly allied species, but it might well be extended to many groups now treated as genera or subgenera.

If instead of coining new technical words, simple and logically formed combinations of more or less familiar ones were more generally employed, we would be saved the necessity of learning and remembering, looking up and explaining hundreds if not thousands of needless words and names, and have a correspond-

ingly greater part of our time left for acquiring and employing really useful knowledge, and the purposes and results of scientific investigation would be understood and appreciated by a larger part of the public than is now the case.

WILLARD G. VAN NAME
NEW YORK STATE MUSEUM

AMERICAN SANITATION

TO THE EDITOR OF SCIENCE: The writer has just finished reading Dr. Ford's most interesting article on "American Sanitation," in your issue of July 2, and wishes to endorse heartily the plea therein contained for more extensive and better training in public health. The writer feels, however, that he must differ with Dr. Ford as to the wisdom of excluding all but physicians from participation in health work. Dr. Ford evidently assumes that there is no essential difference between community hygiene and personal hygiene, and that a thorough medical training, with its time-consuming studies of anatomy, histology, obstetrics, materia medica, etc., is essential before undertaking special work along the lines of sanitation, or the protection of the community from disease.

The present writer holds no brief for the ordinary engineer in positions of high responsibility in general health work, but he can not help feeling that a well-trained sanitary engineer would distinguish his incumbency of the health officership of a town, about as well as an eye and ear specialist would do. In fact, the chances are that neither would be conspicuously successful.

The ideal health officer should be neither an M.D. nor a C.E. but should be an expert in community hygiene, such expertness combining a knowledge of both branches (and some others). It should be possible for a young man desirous of entering the field of public health to secure training for that service without being compelled to undertake the study of a great many medical subjects which have to do with curative rather than with preventive medicine; and also without having to learn about highways, railways and framed structures. He should, upon completion of such a course of training, be thoroughly conversant with the causation and transmission of disease; and have enough engineering training to enable him to look upon problems in municipal sanitation with that sense of perspective which is found more highly developed among civil engineers than among physicians.

An amusing story illustrating that lack of quantitative appreciation, or perspective is vouched for by one of the writer's professional friends. A practising physician in one of our large cities sent a communication to the health commissioner in which he recommended the addition of some mild laxative to the city water to counteract the baleful effects of the coagulants applied previous to filtration. Of course, it is to be understood that this is recognized as an extreme case, but in the course of ten years' experience as a sanitary engineer, the writer has heard many decidedly puerile things said by physicians who pretended to some knowledge of sanitation.

WM. T. CARPENTER
BROOKLYN SEWAGE DISPOSAL
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ANIMAL MALFORMATIONS

TO THE EDITOR OF SCIENCE: Referring to the communication on "a chicken with four legs" in SCIENCE, page 90, I would say, lest the malformation should be considered rare, that we have in this museum quite a number, fourteen from the chicken alone, showing various degrees of the malformation; also from the duck and turkey, and from some higher animals as the dog, pig and kitten. Technically the malformation is known as dipygus or preferably as dipygus parasiticus.

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THE LONG COST OF WAR

TO THE EDITOR OF SCIENCE: The writer is interested in gathering material bearing on the eugenics of war and militarism. It is obvious that these influences tend to weaken a nation through the destruction of those physically the best and through the debarring of