a structure, that is, with "ether dipoles." By such a concept, we would obtain an explanation of "electric forces acting at a distance," something that has been very vague, or lacking, since the discard of the Maxwell ether displacement theory of electric charges and electric forces. The discovery of the electron disproved the ether displacement theory of electric charges, but it did not remove (for many physicists) the need of the ether concept in explaining electric waves, whether luminous or non-luminous. The actual structure of the ether will be a speculative problem until experiments have given us more facts in ether physics; but in view of the above, we can think of the ether as having an indefinitely large number of infinitesimal "ether dipoles." It is possible to think of these ether dipoles as ether concentration points, or some other hypothesis of their constitution may be assumed. Further, it may well be a question whether the ether is a continuous or a discontinuous medium. Indeed the quantum theory suggests the possibility of a discontinuous ether.

The "dipole ether hypothesis," while thus suggested by dielectric phenomena, should explain other phenomena if it is to gain acceptance. It seems to give a plausible explanation of the puzzle of how the electron can be at the same time a particle and a wave. A free electron, due to its electrical field, is surrounded by directed ether dipoles, an envelop of ether dipoles. The waves can be thought of as due to vibrations in this envelop of ether dipoles. The vibrations in the dipole envelop would arise from motions and changes of motions of the electron, these vibrations being transmitted to the surrounding ether atmosphere as waves. A free proton in motion, and possibly a moving atom, would also show wave characteristics for similar reasons.

We should also expect every material body to be surrounded by an atmosphere of ether dipoles, an atmosphere characteristic of the particular kind of matter. This follows of course from the fact that each kind of matter has its distinctive numbers of electrons and protons, and hence its field. We may find in these distinctive ether enveloping atmospheres possible explanations of various boundary electrical phenomena, such as electromotive forces of contact, electrosmosis, etc.

From the above, it is natural to ask about the possibilities of detecting ether structure by methods using X-rays or other short waves. The "grain" of ether structure may be too fine for ordinary X-ray methods, but there is always a possibility of some method giving results, and positive results would be important indeed for ether physics.

ALBERT P. CARMAN

JANUARY 8, 1930

AUDITORY NERVE IMPULSES

BY placing an electrode on the cat's auditory nerve near the medulla, with a grounded electrode elsewhere on the body, and leading the action currents through an amplifier to a telephone receiver, the writers have found that sound stimuli applied to the ear of the animal are reproduced in the receiver with great fidelity. Speech is easily understandable. Simple tones, as from tuning forks, are received at frequencies which, so far as the observer can determine by ear, are identical with the original. Frequencies as high as 3,300 cycles per second are audible.

Numerous checks have been used to guard against the possibility of artifact. No response was obtained when the active electrode was placed on any other tissue. After destruction by pithing of the cochlea on the electrode side, the intensity of the response was diminished; after destruction of the cochlea on the other side as well, the response ceased. However, the possibility is still conceivable that these results are due to purely mechanical action of the nerve, which is brought about by mechanical vibrations transmitted from the cochlear structure acting as a special receptor and transmitter.

Further experiments are in progress.

ERNEST GLEN WEVER
CHARLES W. BRAY

PSYCHOLOGICAL LABORATORY,
PRINCETON UNIVERSITY

SCIENTIFIC NAMES

THE problem of scientific names, and it is no small one, has been brought to attention once more by Professor James G. Needham, of Cornell University,[1] some twenty years after an earlier presentation along similar lines. He certainly can not be accused of being precipitate or of lacking patience. His main plea in both cases is for something more workable. This latter communication was evidently stimulated by an extremely long and to our mind presumably distinctive generic combination, namely, *Brachyuropushkydermatogammarus,* and another nearly equally long name. The author of this generic term evidently failed to live up to possibilities or it might have been prefixed by any one of several very popular combinations such as *eu-, pseud-* or *acanth-*, the last permitting thirty-six letters in the name, and this could be increased considerably by combinations of two or three prefixes. In other words, there is no limit to this sort of multiplication, and if our little crayfish had several related genera, it would easily be possible to bring together an unrivaled assemblage of generic names which under present conditions would be handed down and presumably used by countless generations, provided writer's cramp did not incapacitate

[1] SCIENCE, 71: 26–28, 1930.

the scientists of the entire human race. The trouble with these extremely long generic terms is that they tell too much or take too long to tell it, just whichever way one pleases to regard it. If we could only take the *push* out of the generic name given above and devote the energy expressed by this four-lettered expressive combination to working out a more usable and really a more scientific nomenclature, the effort would not be in vain.

There are something over 160,000 zoological genera, and they are increasing at the rate of 1500 names a year, and most zoologists are firmly possessed of the idea that they are building up a permanent nomenclature. It is reasonable to believe that this manufacturing of generic names will continue for another series of years, possibly a hundred or more, and with this expected great increase in generic names having twenty-six to thirty or even more letters each, one may reasonably ask the question as to whether zoological nomenclature is likely to be the permanent structure so many desire. It requires no great mentality to believe that an exceedingly complex and increasingly cumbrous system is bound to break by its own weight and the pity of it all is that this is entirely unnecessary if we will but face the realities and carefully study the possibilities of systematic terms. The chemist discovered this years ago. Zoologists are certainly headed in that direction. There is no need of following the present nomenclatural highway until it disappears in a limitless morass.

Professor Needham suggests a backward step in the use of many of the older generic names in the earlier and broader interpretation. That may be preferable in some respects to the enormously multiplied genera we find in some groups to-day. It is, however, only a palliative, and we cannot expect to stem the taxonomic tide which would define more closely the systematic relations of the multitudinous forms grouped under zoology, to say nothing of those coming within the domain of botany. It is very desirable that the names in these two great groups should not be duplicated and that their formulation and application should be governed by the same general principles. Professor Needham also suggests enlisting the services of a psychologist in solving this problem. It is more than probable that the knowledge of an expert librarian would assist greatly. It certainly looks as though aid would be really needed from some source, and the writer is by no means certain that a very considerable service might not be obtained from the psychiatrist, since our system of zoological nomenclature, as it stands to-day, with all due respect to the unselfishness and conscientiousness of earlier workers, cannot by any stretch of the imagination be considered on the whole especially creditable to the intelligence and the acumen of scientists. One only needs to scrutinize a considerable list of generic names, 50,000 are better than 10,000, to arrive at the conclusion that there is much in formation and the assignment of these names which could be greatly bettered and the change would mean an immense increase in the efficiency of all subsequent scientific workers. Just a moment's consideration is sufficient to show that the use of thousands of several popular prefixes to differentiate between generic names can hardly be sustained on the basis that the prefix selected is really definitive. The present-day tendency is so strongly toward differentiation, partly forced by an indefensibly illogical, unwieldy system, that many generic names have little really definitive, and in many cases are to all intents and purposes meaningless combinations of letters, except as they arbitrarily express a taxonomic concept.

The system of Linnaeus was admirable for his day and generation and served its purpose for a long series of years. It does not follow, however, that a system devised then is equally satisfactory now any more than we would be willing to revert to sail, the canal-boat, and the ox-cart for transportation.

The scientific nomenclature of both animals and plants is, in our opinion, a matter of very great importance and one worthy of extended study not necessarily by men who have distinguished themselves as taxonomists, since the ability to interpret generic and specific differences does not necessarily imply an equal grasp of the complex problems involved in building up a workable or permanent or nearly permanent nomenclature. There should be some way devised, possibly through the good offices of the National Research Council, of bringing together a representative group of scientists for an exhaustive study of the problems of nomenclature. It is doubtful if the International Commission on Zoological Nomenclature would prove the best agency to handle such a general problem, though it has done much toward stabilizing nomenclatural practices. The project should be on a broad basis, biological in scope. The writer has in mind a fundamental study of the possibilities of using generic terms, letter combinations, or something of the kind in the development of a nearly automatic classifying system. There are great possibilities in some such arrangement. Anyone of several would greatly improve the heterogeneous combinations produced by the thousands to meet supposedly scientific necessities. Zoologists and botanists, biologists, if one prefers, are faced with a tremendous problem in classification and one destined to increase enormously as various groups are studied more closely. It is inescapable. The problem is akin to that of the librarian in charge of

one of the largest libraries in the world. Experience has shown the latter that thirty-letter or thirty-numeral combinations are not necessary to the precise location of the million or more volumes in their charge. The same is true in regard to our hosts of generic names.

Primarily nomenclature is an aid to differentiation, the placing or locating of species. Generic names are not intellectual memorials of their originators. They are really tools for the correct placing of the multitude of interesting forms inhabiting the earth. The rule of priority was invoked in the interest of stability. Developments show gross carelessness in creating new names. We must face the facts and rise to the opportunity, not wait until overwhelmed by insurmountable obstacles. Does man exist for science or is science an aid to human understanding? It should be possible to secure a dispassionate, constructive survey of the entire nomenclatural situation by a body, not only capable of interpretation but one with sufficient influence eventually to bring into effect measures which will at least better existing conditions

The studies of the writer (he has been dealing with great numbers of generic names in the past thirty years) have shown that four-letter combinations are sufficient to throw every generic name in zoology into its family, or at least into a group of small families. They are not euphonious. The possibilities of prefix and numeral combinations may well be studied and while it may not be feasible to displace some of the lovely, descriptive generic names which have been foisted upon practically defenseless workers, there might be devised a placing system which would make possible arrangement either alphabetically or by numerical series and the placing of all biological genera in family or near family groups. This alone would mean a tremendous saving in bibliographic and taxonomic work and under such conditions we might be able to view with calmness the proposal of a new generic name with 30 or 40 or more letters.

E. PORTER FELT

BARTLETT TREE RESEARCH LABORATORIES,
STAMFORD, CONNECTICUT

WITH reference to Dr. Needham's discussion,[1] I venture to offer a few comments on particular points. He must be well aware that the Dybowski polysyllabics, one of which he quotes, have been declared invalid by the International Commission. But the Lake Baikal gammarids have valid generic names, and if Dr. Needham had seen them, as I have, he would no more want to refer them all to *Gammarus* than he would wish to return to a Linnaean or Fabrician nomenclature for the genera of dragon-flies. The five names of bumblebees, as he is also well aware, are not the names of five species, as such, but are the designations of certain mutations of subspecies of those species. The generic names quoted are names of subgenera or sections of *Bombus,* which a few authors have employed in a generic sense. This practice is not likely to become general. In the Palearctic region, the species of *Bombus* present various races or subspecies, which are designated by trinomials. These races include various mutants, for which quadrinomials are employed. The nomenclature simply follows the complexity of nature. Now here is the dilemma. If we use only binomials we are either obliged greatly to increase the number of specific names, and lose sight of the grouping of the races under aggregate species; or we must simply ignore the races in our system, as in fact Dr. Needham does in his book on dragon-flies. Similarly, if we use only trinomials, and give races and mutations equal standing in nomenclature, we again introduce confusion and obscure the facts of nature. But the system of trinomials and quadrinomials actually serves to conserve the binomial system of Linnaeus, leaving the names of the aggregate species as they were, and ready to be employed by all those who are not interested in the refinements of modern taxonomy.

There is a valid objection to the excessive multiplication of generic names, but the several cases must be considered by experts, and not decided offhand by those who have not studied the animals concerned.

There is a serious objection to excessively long generic names. Long ago it was proposed that no generic name should contain more than six syllables. I have in my own practice treated this as a rule and it ought to be made one, permitting of no exceptions.

Much trouble has resulted from the practice of "emending" names in the past, but the rules permit the correction of a name if a slip of the pen or a misprint can be declared to have occurred. In recent years, particularly, the ignorance of some authors has led to the publication of misspelled or ungrammatical names, and it should be permissible to correct these, at least if the change is made without undue delay.

But after all, the troubles due to vagaries of nomenclature are nothing compared with those due to careless and inaccurate scientific work, or even to the inevitable fallibility of human powers of perception and judgment.

T. D. A. COCKERELL

UNIVERSITY OF COLORADO

WE are interested in the discussion of scientific names by Professor Needham.[1] It is inevitable that

[1] SCIENCE, 71: 26, January 10, 1930.

[1] SCIENCE, 71: 26, January 10, 1930.

the little crustacean, laboriously designated *Brachyuropushkydermatogammarus,* is destined to be unhonored and unsung, unless by chance it be given a convenient and satisfactory nickname. It is unfortunate to launch a species upon the scientific sea with the handicap of a "bad name" which can never be lived down or in any way altered.

There is a well-known law of evolution which operates toward the extinction of gigantic and cumbersome forms: the dinosaurs are already gone, the elephants and redwoods are much reduced in distribution, the whales are doomed, and likewise, we hope, battleships! Nature acts as though she appreciated the unwarranted expense involved in producing a huge beast, the difficulty of its establishing, the extravagance of its maintenance and finally its susceptibility to a single fatal accident which results in the destruction of tons of material.

A natural selection working in taxonomy should and doubtless will eliminate the long technical names which we frequently see, because they are not only useless to most of us but they impede the work of those who are expected to profit from their existence.

EDWARD L. TROXELL

TRINITY COLLEGE,
HARTFORD, CONNECTICUT

SOIL SCIENCE

IN his note in the January 17, 1930, issue of SCIENCE relative to the term "pedology" as name for soil science, Dr. W. A. Hamor called attention to its use since 1896 as the name for another science, as recognized by lexicographers.

Webster gives this: "pedology; paedology . . . 1: Med. Pediatrics; 2. Child study." In contrast Webster gives this for geology, for example, which is recognized by lexicographers as a science: "The science which treats of the history of the earth and its life. . . ." The Encyclopaedia Britannica (fourteenth edition, 1929) gives this: "Children, diseases of. The study of this subject, known also as pediatrics, is comparatively modern."

Probably most soils scientists know that in 1862 Fallou (German) published a 488-page book on pedology. Fallou defined natural soil science or pedology as the description of the nature of soils, no matter what their relation to vegetation or industry might be.

W. W. WEIR

NEW YORK CITY

DR. HAMOR'S objection to the adoption of "pedology" as a name for soil science[1] seems to be sound and his suggestion of "humology" for that use is excellent.

As a worker in the field of soil science I enter my protest against such a monstrosity as "chthonology," in which, I think, the public would join. Scientific nomenclature is cluttered up too much with useless letters; why not apply the principles of simplified spelling? If we must have Greek, write it "thonology," even at the risk of its being interpreted "wolf science" by some Greek scholar. But *humology* seems better.

A. M. PETER

EXPERIMENT STATION,
LEXINGTON, KY.

PRESS NOTICE OF THE DES MOINES MEETING IN IOWA

MR. T. J. EDMONDS, who had charge of the local publicity for the Des Moines meeting, has prepared a statement showing the amount of space given the meeting by the press of Iowa.

In advance of the meeting there were published 1,710 articles (including 30 editorials and 36 photographs) totaling 10,998 column inches. In addition, advance notice of the meeting was given from 15 radio stations.

During the meeting there were published 7,436 articles (including 33 editorials and 88 photographs) totaling 74,781 column inches.

The press of the State of Iowa alone therefore published in connection with the meeting 9,146 articles (including 63 editorials and 124 photographs) totaling 85,779 column inches.

In the Des Moines papers the meeting was noticed by 15 eight-column headlines.

AUSTIN H. CLARK,
Director, Press Service

REPORTS

AWARDS OF THE AMERICAN SOCIETY OF PLANT PHYSIOLOGISTS

THE CHARLES REID BARNES LIFE MEMBERSHIP

AT the recent Des Moines meeting of the American Society of Plant Physiologists, the fourth and fifth awards of the Charles Reid Barnes life membership were made. The two recipients of the honor were Professor George J. Peirce and Professor Charles A. Shull. Accounts of the establishment of this honorary life membership and of the first two awards are found in previous issues of SCIENCE[1] Each year the

[1] SCIENCE, 71: 70.
[1] SCIENCE, 65: 175–176, 1927; 67: 264–265, 1928.