THE LANGUAGE OF SCIENTISTS[1]

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HAVING been a student of language for many years and observant especially of the language of scientists, I thought that a paper on the subject might prove both appropriate and interesting. Scientific specialists are not always interested in papers on other specialties, but all are interested in interpreting the language of nature. The knowledge thus acquired must be passed on to others by means of the written or spoken word. All should therefore wish that such ideas should be expressed in language clear and accurate, and worthy of the great cause of science. Especially is this true when we reflect that many of us are teachers. Therefore I hope that you will be interested.

I was a little doubtful of the propriety of my choice of subject, until I found that in the program of the American Association for the Advancement of Science, to which doubtless many of us belong, Section L is devoted to "historical and philological sciences," and the proceedings of the last meeting of the association record what was done under the head of "the linguistic sciences part of Section L." Hence I hope my subject is a proper one for this body.

Lawrence W. Wallace, of Washington, D. C., secretary of the American Engineering Council, is quoted in SCIENCE[2] as saying: "Men of science . . . by supplementing with broad humanistic and scholarly interests the technical genius responsible for the Machine Age . . . are becoming a controlling force in culture and in politics no less than in commerce and industry, in finance, in education and in national defense." He mentions that the President of the United States, two members of his cabinet, many members of the two houses of Congress and ten governors of states, including our own governor of North Carolina, are men of science, or hold scientific degrees, or both. If they are to be leaders in culture, the responsibility of scientists to cultivate and use the best English would seem to be very great, in spite of the very natural temptation to regard language as something foreign to their own specialties. They need to acquire a linguistic conscience, a sensitive ear and a wise discrimination, as they hear or speak or write the English language. Then consider the great harm that may be done to vast numbers of the younger students of science if they carry from the classroom slovenly, or absolutely incorrect, modes of speech. Once a charming co-ed graduate student, after telling of the gross mistakes of her learned scientific professors, including mention of one "Ar chím edes," with mournful tones said to me, "I sometimes despair of the future of the English language." I am not so pessimistic as she, but I do think we need to be very careful.

Allow me first of all to call attention to some of the mistakes into which we are liable to fall when from carelessness or inadvertence we follow the vulgar crowd. There is a tendency in America to accent the first syllable of many words where true culture demands an accent on the second syllable. If we say, and even defend, "ré search," "ré sources" and the "U'nited States," we shall have plenty of support, but not from those who are most cultivated in their speech. Also, if we are consistent, we must say ád dress, dí rect, dís charge, éx cess, hó tel, mág azine, moús tache, úm brella, Dé troit, Sé attle, cí gar and cíg arette.

Another common tendency in America is to give a word two accents, where only one is proper. I once lived in a city where some of the streets were named after trees. Several of my friends lived on what they called "Sassy Frass Street." I never found its companion, "Polite Frass Street." The worst example is "Hoss Spittle." Of course none of you say this, but notice your friends carefully and you will find that most of them so pronounce it. It is a most uncomfortable word, and reminds me of my youthful experiences when driving against the wind in the old horse-and-buggy days. Millions of our boys, being familiar with speedometers and cyclometers, brought back from France the word *ki-lom'eter*. This has been taken up by some scientists. Soon we shall be hearing of cubic *centimeters*, and then of *kilogrums*, to agree with those perfectly horrid words, *progrum* and *telegrum*.

Many words are distinguished as nouns or verbs by taking an accent on the first syllable as nouns and on the second as verbs. Pronounced as verbs, some of them are as follows: ac-cent', af-fix', pre-fix', suf-fix', con-trast', con-tract', ex-tract', in-crease', con-test' and con-vict'. It may please you for me to confess that I had been teaching the intricacies of Greek ác-cent for many years before I learned that I must teach my pupils how to ac-cent'.

A lack of knowledge of the classic languages, or

[1] A paper read before the North Carolina Academy of Science at Duke University, May 9, 1930.

[2] "Engineers in American Life," SCIENCE, 71: 28, January 10, 1930.

carelessness in the use of what little knowledge one has retained, leads to many regrettable blunders. Words of the fourth declension in the Latin are sometimes used improperly, and the English plurals of words from Latin or Greek are used incorrectly. One can not preserve the *statu quo,* or keep things *in status quo.* One can say "many apparatus" or "many apparatuses," but not "many apparati." "Many alibi" is also indefensible. I have read the frenzied defense of "this data is"; but for one with a linguistic conscience it simply isn't done. If one can agree with that defense, it would seem fair to excuse even the Harvard professors whom I have heard say "a strata" and "a suitable media."

If one is going to use a phrase or word from a foreign language, it is quite necessary to know the meaning in that language. Otherwise many mortifying mistakes will be made. By most people *per* and *via* are thought of as simply meaning "by," with no distinction between *per,* "by means of a specified agent," and *via,* "by a specified route." But one sometimes reads of things sent *via* Mr. Smith.

Then the French word *née* is equivalent to the Latin *nata.* It is feminine and means "born." It is properly used in giving a woman's maiden name, which is the only one she has at birth and the one that frequently she is quite willing later to discard. In the description of a widow's second marriage I have heard of Mrs. John Jones, *née* Mrs. Samuel Smith, *née* Miss Mary Robinson. This seems to be carrying the idea of regeneration to a rather unwarranted extreme. And in the *Popular Radio Magazine,* a supposedly scientific periodical, I found this delicious bit: "Leningrad, *née* Petrograd, *née* Saint Petersburg." Of course these writers thought of *née* as simply meaning "formerly," and let it go at that.

With a friend of mine, who kindly allows me to use the occurrence as an illustration, I had a conversation which shows the necessity of a scientist's having at least sufficient knowledge of Greek to be able to look up words in a Greek dictionary. He asked me whether *Rhizopogon parasiticus* was correct. The former word looks like a common neuter form. Should *parasiticus* be masculine? Now many of the scientific Greek words for genera are not found in ordinary Greek literature. I could not answer the question offhand. There was a large room full of all kinds of books on botany, but no Greek dictionary. I asked him, "Do you say rhizó pogon or rhizopó gon?" He answered, "I say *rhizopó-gon,* but I don't know why." After consulting a Greek dictionary at home I was able to tell him that *rhizopogon* was masculine in Greek and that each of the last two "o's" was omega, or long "o," in Greek, and that therefore the penult took the accent. He was correct about both points, but could not be sure. He then showed how a little learning is sometimes a dangerous thing. He asked me the derivation of "pyrenomycete," saying that of course *pyr* meant fire. I said, "I am not sure of that. Where would you get the *eno?*" This time I only had to consult a big English dictionary, verifying the information by the Greek dictionary. So I told him that the chemical term "pyrene" was indeed from "pyr," but that the botanical term "pyrene" and the combining form "pyreno" were both from the Greek stem *pyreno,* meaning the stone of a fruit, as of a drupe or drupelet.

An example of ignorance or carelessness appeared in an important paper by an eminent scientist that was published in SCIENCE. Carnivora, herbivora and omnivora are neuter plurals, but they have the same ending as many feminine singular nouns of the first declension in Latin. This paper spoke of the carnivorae, herbivorae and carnivorae, and rubbed it in by using herbivorae again on the same page. When I asked the writer about it, he acknowledged his carelessness, but made the plea in extenuation that SCIENCE printed it that way. This was a pretty hard knock on SCIENCE.

An interesting point about homonyms, or words that are pronounced alike but differ in spelling and meaning, was brought out by a geological friend who said that to distinguish between syenite (or sienite) and cyanite he pronounced the latter with a hard "c," like "k." I said, "You can't do that. Before that vowel sound 'c' must be soft; but you can say 'kya-nite,' if you spell it so, that being a permissible form of the word."

Scientists are overwhelmed by the vast number of new facts discovered and the many new theories or explanations of these facts. In each such case a new word must be devised to express the new idea. These words are practically always derived from the Latin or the Greek, of which languages scientists are, as a rule, largely ignorant. The English dictionaries are often of no help, since the words are invented and come into general use long before the dictionaries can put them into print. There would seem to be immediate need for some central authority to determine correct terminology and the proper and exact meaning, spelling and pronunciation of new words. I mention certain obvious points.

Mongrel or hybrid words constitute a linguistic crime. Generally speaking, a word should be all Latin or all Greek. To be sure, some combining forms from the Greek have been so completely naturalized in Latin and English that they may be used indiscriminately. Such forms as *pro-* and *anti-* and

-ology are examples. We even say "Roentgenology." But there is no palliation for the linguistic crimes of "hypersensitive" and "hypertension" when we can say "supersensitive" and "supertension," or "television" when we might have invented something like "teleopsis."

Such a central authority could insure that every new word had a perfectly definite and exact meaning which would be recognized by all scientists. Attention has been called recently to two examples of unscientific confusion in the meaning of words. It is asserted that "micromicron" is used by physicists with one value and by biologists and chemists with another. One value is a thousand times greater than the other. Then some one has invented another word, the "bicron," all by himself. I have met no scientist who had heard of it. Yet it has crept into some dictionaries. Likewise the symbols for micron, millimicron and micromicron do not seem to be settled in a way universally accepted. The U. S. Bureau of Standards is definite and precise in this regard, but seems to lack the respect of some. The other example is the word "pedology." The soil men derive it from a Greek word meaning earth. Some one points out that this is a very recent use of the word, and that it has been used for over thirty years to mean child study, with a derivation from another Greek word meaning child, like "pediatrics" and "orthopedics," which are not derived, as many suppose, from the Latin word for foot. Next a soil man tells me that pedology was used by the Russians and other European scientists to mean soil science long before it was used for child study. Surely science should not allow such confusion.

Nomenclature is an exceedingly important subject. So important is it that in the account of creation in the second chapter of Genesis we are told of the first authority on nomenclature. The animals were brought to Adam "to see what he would call them. . . . And whatsoever Adam called every living creature, that was the name thereof." I am far from regarding this account as a literal record, but at least it shows an early recognition of the importance of correct names in science.

Not only should scientific names be definite; they should also be as simple as possible so as to be easy to remember and pronounce. In SCIENCE for January 10, Professor James G. Needham, of Cornell University, mentions a poor little innocent amphipod crustacean that is burdened with the name *brachyuropushkydermatogammarus grewinglii mnemonotus* Dybowski, and a very small fish named *microstomaticoichthyoborus bashford-deani* Nichols and Griscom. It sounds like a college cheer. He objects to having to manage such jawbreakers and claims that a name is a name to call a thing by, and not a definition or a memorial to a discoverer. Instead of the former of the two examples of sesquipedalianism he proposes *Gammarus mnemonotus,* and nothing more, as being definite, simple and quite sufficient. I am sure it would also be more pleasing to the dear little member of the Gammaridae not to be called hard names.

Finally I wish to say that I fully appreciate the difficulties under which scientists labor. Little help is given in scientific books as to derivation or pronunciation. It would be well if all scientific textbooks at least gave both the derivation and the accent of words derived from foreign languages. Scientists can not even trust each other. I am told that the same word may be pronounced in one meeting in one way and in quite a different way at another meeting held shortly after in another part of the country. My sympathy is the greater and more genuine since I am all the time discovering words that I have mispronounced for many years.

This is preeminently a scientific age. Scientists are leaders. I hope that I have helped to make clear the great opportunity presented to all scientists to be leaders in culture, as well as in the ascertainment of facts and the explanation of phenomena.

OBITUARY

MEMORIALS

WILLIAM BARTON ROGERS, first professor of natural philosophy at the University of Virginia, will be honored on December 7 by a ceremony at which the presidents of two institutions will speak. The Technology Club of Virginia, composed of alumni of the Massachusetts Institute of Technology, will unveil a bronze tablet in the Cobb Chemical Laboratory, commemorating Rogers's connection with the University of Virginia and with the Massachusetts Institute of Technology. Rogers, who was a member of the Virginia faculty from 1835 to 1853, went to Massachusetts where he founded the institute in 1859, to serve later as its first president, from 1865 to 1870, and again during the years 1878 to 1881. The dedication exercises will take place in the Cobb Laboratory on Sunday, December 7, the one hundred and twenty-sixth anniversary of Rogers's birth. The presentation will be made by Mr. J. Scott Parrish, Richmond, president of the Technology Club of Virginia. Acceptance for the university will follow by President Edwin A. Alderman. The services of Rogers to Virginia will be