

The fact to which I wish to call attention is the close resemblance between this term *age* or *aje* and the terms applied to all kinds of "potatoes" by many of our southern tribes. The Creek and Alabama word is *aha*, but that of the Choctaw and the Hitchiti, the ancient inhabitants of southern Georgia, *ahe*. Along with some qualifying words this is used for the Irish potato, sweet potato, and yam, but it is also applied to a wild root which it is natural to suppose was the original plant so designated. The root to which the Alabama Indians apply the term, plus a qualifying adjective meaning "rough," *tcagawa*, has been identified for me by Mr. Paul C. Standley, of the National Herbarium, as *Apios apios* (L.) MacM. Presumably this is the same as the Creek *aha aktiwahi*, "mud potato," and the Choctaw *ahe kamassa* or *ahe ahkamassa*, "hard potato."

We have here the perplexing problem of a very similar name applied originally, to all appearances, to entirely unrelated plants and by derivation to the very same plants. The resemblance may be purely accidental, but I think it more likely that the word was borrowed from the West Indies by the southern tribes, or vice versa, as the name of several roots not perfectly discriminated from each other. Precisely the same thing has happened in the case of the name *kunti*. This was originally applied by the Creek Indians to the roots of several species of *Smilax*; but after those Creeks who came to be known as Seminole had invaded Florida, they found a *Zamia* in use there to which they gave the very same term. At first the older *kunti* was distinguished as the "red *kunti*" and the new plant as the "white *kunti*;" but later, or at least where only one of them was to be had, the qualifying adjective was dropped. It thus came about that the same word had a totally different application in different sections of the territory occupied by the same people.

TAXONOMY.—*Determining types of genera.* O. F. COOK,
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Biological taxonomy is being rebuilt on a new foundation. The older method of naming by concepts is giving place to naming by types. Names are no longer thought of as relating pri-

marily to the definitions of the natural groups, but as attached to the groups themselves, through the medium of types. Each species has its type specimen, each genus its type species.

The method of naming the concepts was used by Linnaeus and his followers for over a century, but had to be abandoned on account of the confusion caused by names slipping away from their original application. Types not being recognized, the applications of the names varied with interpretations of the definitions. Two or more names often became current for the same genus, or the same name for two or more genera. How to place the older names on a type basis is still a problem.

Priority governs the acceptance of names and should also determine the application of names. Priority of application means that a name should remain with its original type. Certainly no practical purpose is served by accepting a name unless the application is determined. Names without applications are worse than useless.

Generic names that have been misapplied need to be restored to their original applications and fixed by the recognition of types. But by using wrong methods in the work of restoration it is possible to damage the taxonomic structure still more. Historical continuity is sacrificed when names are carried away from their original applications. This objection lies against all of the arbitrary methods of fixing types, whether we take as types the last species by elimination, the first species named, or the first species to be designated as type by a later author. The method of elimination is most defective, because it does not give the same results in the hands of different students and because it often leads away from the true type. Obscure names are brought out for prominent genera, and prominent names transferred to obscure species. The confusion is worse than if the transferred names had been discarded altogether.

The need of more care in determining the original applications of names may be illustrated by an example from millipeds. The generic name *Spirobolus* has been used for a very large group of tropical species with their chief center in South America. The genus was established by Brandt in 1833, with two species

named, *S. olfersii* from Brazil and *S. bungii* from northern China. The generic description relates entirely to the characters of the antennae and refers to a drawing of *S. olfersii*, the only species figured. The characters as stated and illustrated are applicable only to *S. olfersii*, so that a strict interpretation would exclude *S. bungii*. It seems plain that *Spirobolus* was based wholly on *S. olfersii*, and that this species must be considered as the true historical type of the genus.

Nevertheless, *Spirobolus bungii* has been designated as the type of the genus, on the ground that the establishment of *Rhinocricus* in 1881 had the effect of removing *olfersii*, so that only *bungii* was left. But now it appears that *olfersii* was not really removed, since *Rhinocricus* needs to be maintained as a distinct genus, with the Porto Rican *Rhinocricus parvus* as type. Even if *olfersii* and *parvus* were congeneric, there would still be no adequate reason why the publication of *Rhinocricus* should be supposed to take away the historical type of *Spirobolus* and change the application of the name. Obviously, any later name based on *olfersii*, or on any species truly congeneric with *olfersii*, should be treated simply as a synonym of *Spirobolus*.

Under the law of priority a name has to be replaced if another is older, but elimination often has the effect of replacing an older name by a later one. Changing the type makes it possible for a later synonym to supplant an old, well-known generic name, which is then slipped along to a different application. To assume that the naming of *Rhinocricus* could have the retroactive effect of transferring the name *Spirobolus* from a Brazilian genus represented by *olfersii* to a Chinese genus represented by *bungii*, is neither consistent with priority nor in the interest of stability.

Transferring *Spirobolus* to China has the effect of giving the same name to a second genus. Altering the application of the name subverts the law against homonyms. Future writers and readers must guard themselves against confusing the two genera to which the name *Spirobolus* has been applied.

Some taxonomists hold that the first formal designation of a type species, however arbitrary or erroneous, must be main-

tained; but such a rule leads, in cases like the present, to a mere shuffling of names, without historical warrant or practical advantage. It seems more reasonable to hold that in using *olfersii* exclusively as the basis of his genus Brandt himself designated the type of *Spirobolus*. The original application of the name should not be subject to change by any later author, either by proposing a new genus in the place of *Spirobolus* or by designating a different type for *Spirobolus*. Instead of being taken as the type of *Spirobolus*, *bungii* should be associated with *Arctobolus*, the genus of Spirobolidae that is dominant in the temperate regions of North America.

The case is one of many where types are not to be determined from considerations of nomenclature alone. It would be useless to ask a nomenclatorial expert or commission to rule upon *Spirobolus* without the pertinent facts. Instead of premature regulations and decisions, the need is for more facts and more thorough study of taxonomic problems. Adequate investigation might lead to simple and practical solutions that could be applied by any careful student.¹

Complications have been increased unnecessarily in the effort to force a general adoption of an imperfect system. Priority has been pushed to extremes in the acceptance of names, only to be disregarded in determining the applications of names. Abortive names and synonyms that might well have remained in oblivion have replaced many well-known names, and others are being misapplied as a result of the practice of elimination. That botanists and zoologists are using different methods of typifying genera also shows how casual the study of taxonomic problems has been. Such divergence of views can only mean that the subject is not adequately understood, for the need of a stable taxonomy is the same in both branches of biological science.

¹ Other phases of the question have been treated in previous papers. See, *Terms relating to generic types*, *The American Naturalist*, **48**: 308; and *Fiat nomenclature*, *Science*, N.S., **40**: 272.