

Torrey Botanical Society

The Concept of the Genus: III. Genera from the Standpoint of Morphology

Author(s): J. M. Greenman

Source: *Bulletin of the Torrey Botanical Club*, Vol. 67, No. 5 (May, 1940), pp. 371-374

Published by: Torrey Botanical Society

Stable URL: <http://www.jstor.org/stable/2481070>

Accessed: 21/03/2010 10:45

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/page/info/about/policies/terms.jsp>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at <http://www.jstor.org/action/showPublisher?publisherCode=tbs>.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.



Torrey Botanical Society is collaborating with JSTOR to digitize, preserve and extend access to *Bulletin of the Torrey Botanical Club*.

<http://www.jstor.org>

III. Genera from the Standpoint of Morphology

J. M. GREENMAN

My concept of the genus has been formed through a practical experience in the field of taxonomy extending over a relatively long period of years. It has developed gradually, but it was first formulated when influences brought to bear were on the whole conservative. I learned from my teachers of biology, from my associates, and from my own observations, that a genus is a taxonomic category consisting of one or more related species, and that a group of allied genera constitute a family.

In simple terms then, but in degrees of diminishing importance, there is the family, the genus, the species, and the variety. Other categories may be interpolated if thereby clarity and convenience be enhanced.

Thus, classification is fundamentally a practical arrangement for convenience—a means to an end. In other words it furnishes a ready instrument for identifying any given plant and placing it in its proper pigeon-hole. Little thought was given to any underlying principle or philosophy concerning the classification. And I fancy that some botanists of today look upon classification, or taxonomy, as being only such a mechanical device. The basis of our present system of classification is quite another thing, and it is of fundamental importance. It is the result of the experience of many generations; and it rests primarily on comparative morphology. Moreover, there is a definite philosophical principle underlying the system, namely, the arrangement of the larger categories in such a manner as to indicate, through comparative morphology, their genetic relationships and to some extent their probable phylogeny.

No one now claims, no one has ever claimed, that the present system of classification, namely, the one elaborated by Engler and Prantl, is perfect and final; but, that on the whole it expresses better than any other system of classification previously or since proposed a relatively natural grouping of plants in accordance with our present knowledge of them.

Of the taxonomic categories mentioned above, namely, family, genus, species, and variety, each category may vary to a considerable extent in accordance with individual interpretation. That is the personal element which has always been a factor and probably always will be so long as the subject remains a dynamic one; but, even so there is almost always a universal understanding as to what is meant by a generic category.

However, it is important to bear in mind that the concept of the genus, as well as the species, may vary not only with the individual's interpretation, but it may vary more or less in accordance with the trend of the

times. This is perfectly natural, since we are all influenced to a greater or lesser degree by the opinions of our contemporaries.

At the present time taxonomists are working almost universally in accordance with the type-concept idea. That is, the species of a genus must conform in all essential morphological characters to those of the type-species of the genus under consideration, and similarly all members of a species must conform in the essential morphological characters to the type-specimen of the particular species concerned.

In the absence of a type-specimen, that is where there is no historical type extant, a standard-species may be substituted. Likewise in the absence of a historical type specimen of a given species a selected specimen may be taken as typifying the species. In accordance with this plan of operation, the generic concept centers around a concrete thing—the type-specimen. Whereas, formerly the generic and the specific concept centered around the complex which represents the genus or species in its general area of distribution, and more particularly the dominant form.

To show this change in concept, may I refer to an incident in my own experience (if you will pardon a personal reference). Some years ago, when I was a graduate student working under the direction of Professor Adolf Engler in Berlin, I recall very well one of the many discussions which took place during the lunch hour. The late Professor Ernest Gilg said to me, "Aber, Herr Greenman, was meinen Sie ueber das Wort Type oder Typus? Meinen Sie vielleicht das Original?"

At that time in many of the great botanical centers in Europe and elsewhere the type-concept centered around the most common representative of the genus, as well as the species, in its total area of distribution rather than on the historical type. Again may I say that it becomes necessary to bear in mind the time factor involved when we try to interpret the delimitations of a genus or of a species?

Many genera, as now delimited in literature, have been greatly altered from the original interpretation placed upon them. Some of the older and larger genera now include many generic synonyms. Take for example *Andropogon*, *Panicum*, *Crepis*, etc. It not infrequently happens that generic names, which have been reduced to synonymy, upon a more intensive restudy have to be revived and given coordinate generic rank. This was shown to be the case with *Astranthium*, a genus proposed by Nuttall and reduced to synonymy under *Bellis*, but upon restudy by Esther Larsen (1933) it was revived and reinstated as a valid generic entity.

Another instance is that of *Youngia* of Cassini, a genus which was regarded for many years as synonymous with *Crepis*, but upon an intensive restudy by Babcock and Stebbins (1937) it has been reinstated by them as a valid genus.

I mention these examples, because it is impossible to treat all genera in exactly the same way; not infrequently are they differently constituted, and must be treated accordingly.

Apropos of the lack of uniformity in genera, may I say that new genera have been proposed in the course of studies made on the flora of a limited region; and while it is true that such genera appear to be amply distinct when compared with other genera of the same region, yet when studied in relation to the entire representation of the genera concerned, the newly proposed entity is not infrequently found to be merely a variation. Hence, it is very important in formulating our concept of a genus, and of a species also, to take into consideration not only comparative morphology, but also geographical relationships. This principle, I think, has been well demonstrated by Dr. H. K. Svenson in his work on *Eleocharis*.

Much has been said about the segregation of genera. I am not opposed to segregation if it can be justified on the basis of comparative morphology, including characters not previously recorded, and the application of any supporting evidence obtained from anatomical studies, cyto-genetic investigations, or any other sources of information. We should recognize the desirability, however, of keeping the generic category as uniform as possible.

Unless some very definite object is attained by segregation of relatively homogeneous groups of plants, such for example as *Aster*, *Erigeron*, *Conyza*, *Baccharis*, *Senecio*, *Euphorbia*, and *Cassia*, I am personally inclined to think that it is more practical to retain these groups in their traditional sense. Certainly such a treatment is less disconcerting to botany in general than to make numerous possible changes. Generic segregation almost invariably means the introduction of new combinations and new names.

After all *Aster*, *Erigeron*, *Conyza*, and *Baccharis* are not entirely and mutually exclusive categories, any more than are *Cirsium* and *Carduus*; since, when one studies large series of specimens representing these genera, it is manifest that they grade imperceptibly one into another. But largely for the sake of convenience they are maintained as separate genera.

If one began to segregate the genus *Senecio*, as it is usually interpreted, it would be possible to recognize some twenty or more genera in which habit would play a prominent part. Difference in habit is due primarily to change of environmental conditions. And when one studies this genus throughout its entire geographical range, which is not exceeded by any other genus of flowering plants, it would be exceedingly difficult to maintain the possible generic segregates. Furthermore, the number of new names and new combinations would be excessive and confusing.

On the whole, therefore, my personal inclination is towards a conservative concept of the genus and the retention of well-established generic names in so far as consistent with the comparative morphological characters originally ascribed to them, especially when corroborated by additional knowledge gained by a more intensive study resulting from improved technique and new methods of attack.

Finally, may I say that while I am of the opinion that comparative morphology must remain as the fundamental basis of classification, yet I welcome the important contributions to taxonomy, which have been made through cyto-genetic studies and experimental investigations.

THE MISSOURI BOTANICAL GARDEN
ST. LOUIS, MISSOURI

Literature Cited

- Babcock, E. B. & Stebbins, G. L. 1937. The Genus *Youngia*. Carnegie Inst. Wash. Publ. 484, pp. 1-106, pls. 1-5, figs. 1-31.
- Larsen, Esther L. 1933. *Astranthium* and Related Genera. Ann. Mo. Bot. Gard. 20: 23-44, pls. 2-4.