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# REMARKS ON THE GENUS LINANTHUS

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In spite of his early dictum, which may be paraphrased as 'by their calyx shall ye know them,' Greene (1892) paid no attention to this in assigning taxa to the genus *Linanthus.* Grant (1959) included the calyx as one of the bases for dividing the genus into sections but did not go into its details. In the present note the taxa attributed to the genus are being considered from the viewpoint that evolution in sepal-characteristics takes place only by gradual stages, so that those which differ markedly in this respect are not to be regarded as closely related, whatever their corolla may be like. The non-committal term taxon is being used in the discussion in preference to dogmatic assignment to a definite category under any one genus.

The perennial taxon *nuttallii* is manifestly the ancestor of some of the annual members of the genus. Its sepal-body (a term here preferred over the pre-evolutionary "calyx-lobe") consists of a broad sheet of green tissue with barely developed midrib, but with thickened margins; correspondingly, the intersepalar membrane is of minimal width, and indeed occasionally obsolete. These features were illustrated in the paper proposing to place taxon *nuttallii* in an independent genus, *Linanthastrum* (Ewan, 1942); they are not well shown in the drawing in Abrams' Flora, copied by Grant (*op. cit.*) as fig 56 on p. 104 (the accompanying habit sketch, it may be noted, is of taxon *floribundus* rather than *nuttallii*)[1].

As classified by Grant, Section i, *Siphonella,* comprises a few taxa with the sort of calyx just described, and a funnelform corolla. Section ii, *Pacificus,* consists of the single taxon *grandiflorus,* with similar corolla but a "gilioid" calyx—the sepal-body with a distinct midrib and thin margins, about equalled in width by the membrane. This represents a considerable evolutionary change from the *Siphonella* group.

In defining Section iii, *Leptosiphon,* Grant stated it to have "calyx as in Section *Pacificus,*" but this is not the case throughout. Several of its members, notably taxa *androsaceus, bicolor* and *serrulatus,* actually agree in calyx with Section *Siphonella.* A beginning of evolutionary departure from this, slight narrowing of the sepal-body and broadening of the membrane, is shown by taxon *acicularis.* This trend continues through taxon *nudatus* and culminates in taxa *breviculus, ciliatus,* and *montanus,* in which the membrane may be broader than the sepal-body and even have a medial carina. Throughout this group the corolla is relatively constant in being salverform with slender tube, though varying in size.

Section iv, *Dactylophyllum,* has a more open inflorescence than the preceding three; its ancestor may well be represented in taxon *floribundum.* This is often considered unworthy of segregation from taxon *nuttallii,* but being more slender with fewer, narrower leaf segments and a better developed sepal-midrib, it is actually more distinct from that than is taxon *melingii.* Most significantly, its inflorescence is sparser with the pedicels showing a marked tendency to elongate. Accompanying the shift from perennial to annual duration, with reduction in size, a continuation of the same trends and slight broadening of membranes may well have given rise to taxa *ambiguus* and *bolanderi.* Then, as in the preceding section, further broadening would have resulted in the remainder of the group.

[1]EDITOR'S NOTE: It should be noted that Grant (*op. cit.*) treated *floribundus* and *nuttallii* as subspecies of one species, *L. nuttallii,* and also regarded this species as retaining phylogenetically primitive features.

In Section v, *Linanthus,* the eulinanthus group,[2] a markedly different calyx from that in any of the previous sections is present. The sepal-body consists of a midrib with a minimal laminar border, and the membrane is of maximal length and breadth; the free sepal-blade is short and subulate. No obvious evolutionary change could produce this eulinanthoid calyx from that of any of the taxa thus far treated.

There is, however, a perennial from which the eulinanthus group could have arisen directly, namely taxon *watsoni.* This has the same sort of calyx and, it may be noted, a similar funnelform corolla which opens and exhales an aromatic fragrance at night. Though currently classed as a *Leptodactylon,* it differs from all other members of that genus in its strictly opposite leaves. The plan of placing a perennial and its annual derivatives in the same genus, followed in Section i, is equally applicable here, yielding **Linanthus watsoni** (Gray) Wherry, comb. nov.: basionym—*Gilia watsoni* Gray (1870); synonym—*Leptodactylon watsoni* (Gray) Rydberg (1906).

As to the annuals of the eulinanthus Section, taxon *dichotomus* is to be regarded as most primitive, and as having given rise, through reduction in size of parts, successively to taxa *bigelovii* and *jonesii.* While Grant assigned taxon *concinnus* here also, its alternate pinnate leaves and carinate membrane suggest that it really belongs somewhere in the *Gilia* complex.

The tiny members of Section vi, *Dianthoides,* are said by Grant to be characterized by a convex-margined intersepalar membrane, but this is difficult to make out in herbarium specimens. Some of them seem scarcely to pertain to *Linanthus* at all; for example, taxon *arenicola* suggests a much reduced *Ipomopsis congesta.* They can not be profitably further discussed at this time.

The aim of this note has been to point out that, if calyx characters are given adequate consideration, the so-called genus *Linanthus* is polyphyletic. The small group of its members which includes the generitype, and so is here termed colloquially the eulinanthus section, seems to have arisen from the *Leptodactylon* complex. Most of them have on the other hand evolved from perennials which may be assigned to a genus *Linanthastrum,* and so could be classed as generically distinct from *Linanthus* Bentham (1833), *sens. strict.* Finally, a few may even be reduced descendents from *Gilia* and *Ipomopsis.* To bring these relationships out in the nomenclature would require the proposal of so many new combinations that it should not be undertaken until cytogenetic study of the taxa involved can be carried out.

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[2]The present section was early named *Eulinanthus* (Endlicher, 1840), and that unambiguous name continued in use for over 100 years. Recently, however, the promulgators of International Codes of Botanical Nomenclature have ruled that such names are "illegitimate" and require a type-including group to bear the name of the next higher category unchanged. To make clear what is meant in discussions like the present without complex circumlocution or double-talk, it is accordingly necessary to use names referring to type-including subdivisions in colloquial form.