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1954

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1968

strongly inflexed plaits, lacking congregations of glands or invaginations directly below the stamen attachments; pollen symmetric, bearing the pores about the equator; style with or without a prolonged bilobed sterile tip; nutlets rough, usually all four developing, ventral keel prominent.

The corollas of species belonging to this section are more simply organized than those of the section *Margarospermum*. In the present section the walls of the corolla are only very slightly swollen beneath the five vertical bands of hairs and glands on its inner surface. Complementing these bands on the outside of the corolla are merely five shallow lineate grooves. Only an incipient tendency for invagination along the hairy vertical bands is accordingly present. In the section *Margarospermum* the invagination is very pronounced, and the hairs and glands clothe well-developed inflexed plaits that form the five intruding ridges on the inside of the corolla.

To be included in the section *Eubuglossoides* is *Lithospermum tenuiflorum* L., as well as *L. arvense* L. and the undetermined number of critical species all closely related to it.

Buglossoides tenuiflorum (L. f.) comb. nov.

Lithospermum tenuiflorum Linn. f. Suppl. 130 (1781).

A well-marked species which ranges from Greece east to Irak. The nutlets are distinctive. They have a very fragile pericarp. They are erect or slightly incurving and when *in situ* have their tips proximate and their ventral keels parallel. These nutlets are also smaller than those of *B. arvense* and its allies and are further differentiated by being distinctly constricted just above their smaller attachment surface. The cymes are short (even in maturity seldom more than 8 cm. long) and obviously geminate or ternate at the ends of the branches. The flowers (with a very small blue corolla) are always crowded and evidently biseriate on the cyme. The calyx does not develop a cupulate tube nor does it become enlarged abaxially as may be the case in *B. arvense* and its allies.

Buglossoides arvense (L.) comb. nov.

Lithospermum arvense L. Sp. Pl. 1: 132 (1753).

This species is either exceptionally variable or is a complex of minor species awaiting analysis by a monographer. The typical form is that with the largest flowers. Its white corollas are decidedly funnelliform and evidently longer than the calyx. It is the form prevalent in middle and northern Europe and thence extends across Asia. In southern Europe and north Africa there are a number of distinguishable closely related plants, some of which are certainly geographically correlated and deserve specific recognition. Among these only *B. incrassatum* can be mentioned in the present paper. Others seem to merit recognition. Useful in distinguishing them from true *B. arvense* are differences not merely in habit but also in size, form, and color of corolla, size and form of the calyx lobes, degree of de-

velopment of the sterile style tip, and the presence or absence of a band of scattered short ascending hairs on the inner surface of the corolla just below the attachment of the stamens.

The fruit of *B. arvense* and its allies presents a number of very interesting features. The bony, hard, rough nutlets are straight and have a broad basal attachment which tends to become oblique. In the Boraginaceae nutlets with oblique attachments ordinarily have the attachment surface sloping upward towards the center of the flower and hence transgressing on the ventral side of the nutlet body. In *B. arvense* and its allies the reverse condition is true. If the nutlets are held in a vertical position, it is to be seen that the scar slopes upward, not towards the ventral but towards the dorsal side, and that as a consequence the nutlets are shorter on the dorsal side than on the ventral. Nutlets with an oblique attachment surface of this sort, when affixed to a low-pyramidal or nearly flat gynobase, are not erect with paralleling ventral keels, but are necessarily strongly divergent. This strong divergence of the nutlets of *B. arvense* and its allies is a development late in ontogeny. When they are young the nutlets are erect and parallel. They become noticeably divergent only as they approach full maturity.

Buglossoides incrassatum (Guss.) comb. nov.

Lithospermum incrassatum Guss. Ind. Sem. Hort. Boccad. 6 (1826); Fl. Siculae Prodr. 1: 217 (1827); Fl. Siculae Synop. 1: 217 (1842).

A close ally of *B. arvense* notable chiefly because of its remarkable calyx. After the fall of the corolla, the calyx, as it increases in size and the ensheathed nutlets mature, gradually becomes greatly modified in form as a result of excessive abaxial prolongation. At first the calyx is very similar to that of *B. arvense* at the same stage of development. It is affixed centrally on its symmetric base to the pedicel. At this early stage the central axis of the flower (or for all practical purposes, the style) points away from the leaf axil and is hence divergent from the stem. In later development, because of excessive growth on the abaxial side of the calyx-base, the axis of the flower is gradually shifted in an arc as great as 90° and finally points, not away from, but actually towards the adjacent stem. In other words the calyx is shifted from a central basal attachment to one that is distinctly lateral. The central line up the pedicel, if projected outward, no longer passes up the style but rather across the low gynobase, where it meets the style at an angle of as much as 90°. The mature nutlets are accordingly borne on a low gynobase which is now adaxial and which actually faces the adjacent stem. Because of the dislocation, the distorted calyx-base faces outward and so becomes the most conspicuous part of the fruiting calyx. The condition is unusual but not unique among the Boraginaceae. A very similar development is found in the genus *Pectocarya*, cf. Jour. Arnold Arb. 20: 400 (1939).

Various authors have dismissed the remarkable fruiting calyces of this species as teretological. With this I cannot agree. In *B. arvense* and other

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