

SOME NOTES ON *GALEOPSIS LADANUM* L. AND *G. ANGUSTIFOLIA*
EHRH. EX HOFFM.

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ABSTRACT

Galeopsis angustifolia Ehrh. ex Hoffm. is formally typified. The characters normally used to separate the two species are reviewed, and that of leaf shape is shown to have only limited application. Attention is drawn to the structure of the hairs of the calyx in these two plants, which seems to be diagnostic as far as tested. The status of the varieties listed in the second edition of Druce's *British Plant List* is investigated; only one is believed to be worthy of recognition. There appears to be no reliable evidence of the hybridisation of the two species.

PREAMBLE

My interest in the British forms of *Galeopsis ladanum* and *G. angustifolia* arose when, as an amateur botanist, I found myself unable satisfactorily to place many gatherings on the basis of the account given by Warburg (1952). In conversation with other botanists, I found that I was not alone in this, and have found subsequently in some of the larger herbaria sheets annotated with such remarks as 'seems to have the upper indument of *angustifolia* and the leaves of *ladanum*.' It was hoped that an investigation into the varieties listed by Druce (1928) within the British flora would shed some light on these anomalous forms, but rather did this confuse the issue further. The present notes are written with two objects in view; firstly, to clear up the differences between these two species, and secondly to assess the value of the varieties listed by Druce.

HISTORICAL

The foundation of most modern work on *Galeopsis* has been the monumental monograph of Briquet (1893). The influence of this, with the inevitable changes of status and additions of infra-specific entities of varying worth, may be seen in all the Continental Floras. These range in their taxonomic concepts from the confusing treatment of Rouy & Foucaud (1909) to the ultra-conservative account by Fiori (1925-9); the most recent truly critical paper is that of Henrard (1919).

TYPIFICATION OF THE SPECIES

The typification of *G. ladanum* L. presents no difficulty. As has been widely noted, an excellent specimen exists in the Linnean Herbarium at Burlington House. But to the best of my knowledge *G. angustifolia* has never been formally typified.

The name *G. angustifolia* first appeared on exsiccatae which were distributed by Ehrhart in 1792 (No. 137, mis-cited by Briquet, 1893, as No. 132). He published no description, but the name was validated by Hoffmann (1804), who published a short but adequate diagnosis and cited Ehrhart's exsiccata number as the basis of the name. Williams (1910) suggested that in fact Hoffmann published *angustifolia* as a variety of *G. ladanum* and that Persoon (1807) was the first to accord it specific rank. However, it would seem that the 'unnumbered species' listed by Hoffmann (and other older botanists) were intended to take specific rank, though perhaps as species concerning whose status the writer was in some doubt. Mr. J. E. Dandy advises me (*in litt.*, 7 Feb. 1961) that such was his view in compiling the *List of British Vascular Plants*.

Williams makes the following remarks on this exsiccata :

'On p. 246 of the monograph, var. (or subsp.) *angustifolia* is mentioned as having first been described by Ehrhart, *Pl. exsicc.* no. 132 (1792) as a species. This merely refers to a series of specimens (and poor ones) from Ehrhart's garden, bearing Linnean or other names, several of them obviously cultivated examples, but without either descriptions or other references. There seem to have been 160 of them, divided into ten bundles. In Kew Herbarium Library there is a catalogue of the whole series of names, bound up with the first two bundles. But the name of *Galeopsis angustifolia* is not in the list at all. No. 132, which is the plant cited in the monograph, is *Rumex pulcher*; while No. 137, which is the plant cited by Hoffmann, is *Artemisia sieversiana*.'

It seemed to me that since the date of circulation of the exsiccata referred to by Williams differed from that cited by Briquet, and the numbers given by Briquet and Hoffmann did not correspond to specimens of *G. angustifolia* in the list which he mentions, it was very probable that there were other sheets distributed by Ehrhart of which Williams was unaware. This view has been vindicated by the discovery of at least two sheets of Ehrhart's *G. angustifolia* No. 137 still extant. These are at Halle (HAL) and Goettingen (GOET), and by courtesy of Profs. Meusel and Firbas I have been able to examine both. Both agree well with Hoffmann's description, but that from Halle is the more homogeneous, and I therefore formally designate this as the lectotype of *Galeopsis angustifolia* Ehrh. ex Hoffm. (Plate 7a). It has appressed hairs to the calyx and agrees well with specimens of *G. ladanum* subsp. *angustifolia* var. *kernerii* Briq. from Briquet's herbarium at Geneva (G) which I have had on loan through the kindness of Prof. Baehni.

DISTINCTION BETWEEN THE TWO SPECIES

The difficulties which have been experienced in distinguishing between *G. angustifolia* and *G. ladanum*, at any rate in British and the Continental material which I have seen, are the result of undue stress on the value of leaf characters. Indeed, Warburg stresses these in italics as the chief means of separating these perfectly distinct species. Yet it has long been realised that *G. angustifolia* frequently has broad-leaved forms. Briquet's variety *odontota* is described as having the leaf superficies with a length : breadth ratio of 3 : 1, which is quite as broad as in many gatherings of *G. ladanum* which I have seen. Rouy & Foucaud described a var. *latifolia* of 'Race *calcareae*' with 'feuilles ovales-lancéolées' and Henrard's *G. ladanum* ssp. *angustifolia* var. *calcareae* subvar. *platyphylla* (Plate 7b) is undoubted *G. angustifolia* with a superficies of 4.0 × 1.8 cm. In fact, after examining a large number of gatherings of both species, one is made aware that leaf shape in this species pair is as variable as in, for example, the genus *Mentha*; and as Graham (1954) has done good service in recommending the quashing of all varietal epithets based on leaf shape in *Mentha aquatica* L., so 'varieties' of, particularly, *G. angustifolia* based on leaf shape are scientifically worthless, as a complete range from broadly ovate to narrowly linear may be found, though lanceolate is probably the commonest shape. Likewise I have seen leaf serration quite as pronounced in *G. angustifolia* as in any *G. ladanum* material which has been examined. However, it may be said that *G. ladanum* does not seem to produce forms with linear or linear-lanceolate leaves, and to this extent leaf-shape would appear a reliable character; the real pitfall is in the broad-leaved *G. angustifolia* forms.

Thus we are left with the other commonly used separating character, that of calyx indument. After testing this on a great number of specimens I am satisfied that, correctly understood, it affords a means of accurate identification. Unfortunately the macroscopic difference is of a nature which is not readily expressed in words, and unquestionably the best means of apprehending it is to 'get one's eye in' by examining a quantity of authentic material. As is pointed out by Warburg the calyx of *G. ladanum* appears green, while that of *G. angustifolia* appears whitish or canescent. At first sight this appears due to the fact that the hairs on the calyx of *G. ladanum* are patent, thus rendering the tube visible; but if fresh or fairly recent herbarium material is viewed under a lens it is at once apparent that the hairs of *G. ladanum* have a peculiar transparent and glistening appearance while those of *G.*

angustifolia appear a dull harsh white. To ascertain the reason for this, the hairs were examined under the high power of the compound microscope ($\times 400$). It was found that the white colour of the hairs of *G. angustifolia* was due to the crowded, coarse papillae with which the hairs are furnished. In *G. ladanum*, on the other hand, the hairs are for the most part almost devoid of papillae and quite transparent—so much so that the inner walls of the cells of the hair are visible (Fig. 1). All the hairs in *G. ladanum* are not always as smooth as figured, but in material I have examined papillae of sufficient prominence to show any irregularity in the profile of the hair are very rare; it is difficult to determine whether such unevenness in the hair surface as does occur is in fact caused by a very low papilla or a very shallow punctum, and the inner cell walls remain visible. In old herbarium material the glistening appearance under the lens is lost due to the shrinkage of the cells, but is restored somewhat by boiling out. I cannot find any previous notice of this character, which is diagnostic as far as I have been able to test it. It may also be noted that when the indument of the calyx in *G. angustifolia* is so sparse as to render any appreciable area of the tube visible, the hairs are usually short and tightly appressed, glands are few, and there is often development of anthocyanin pigmentation which tints the tube purplish or brownish. In fresh material the glistening appearance of the glands in *G. ladanum* is very striking.

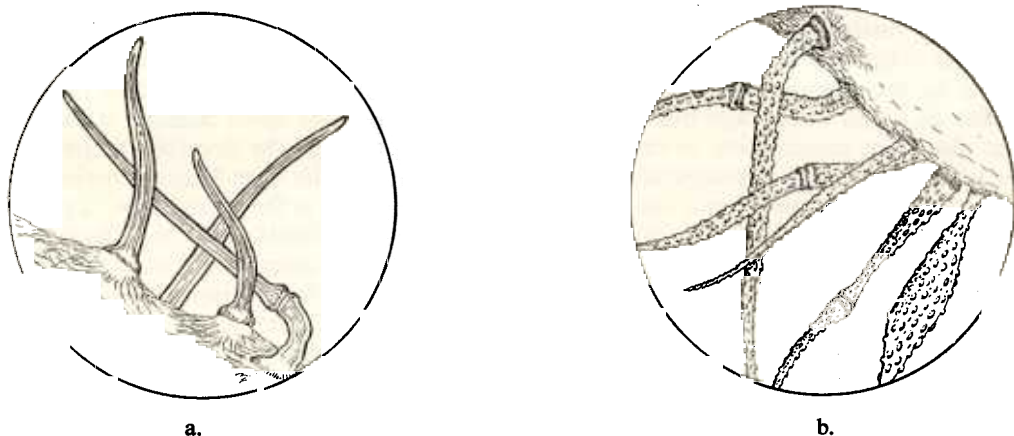


Fig. 1. Calyx hairs, $\times 400$, of
(a) *Galeopsis ladanum* L. (b) *Galeopsis angustifolia* Ehrh. ex Hoffm.

Hybrids between the two species have been reported from the Continent, but I have had no difficulty in assigning all the material which I have seen to either one species or the other. *G. ladanum* is clearly a plant of considerable rarity in this country, occurring in waste places, docks, railway tracks, vegetable gardens and other abodes of the casual alien, which is clearly its status in Britain. It is thus hardly to be expected that, in any event, hybrids would be of any but the rarest occurrence with us. According to Briquet, the hybrid recorded by Haussknecht (1884) is in fact typical *ladanum*. Briquet himself cites some intermediates between ssp. *intermedia* and ssp. *angustifolia*; but since these are for the most part said to approach ssp. *intermedia* in leaf shape probably broad-leaved *angustifolia* forms are involved.

ON THE VARIETIES LISTED IN DRUCE'S "BRITISH PLANT LIST," ED. 2 (1928)

In this list Druce notes only one species, 578/4 *G. ladanum* L., with eight varieties. These will be dealt with seriatim :—

b. *intermedia* (Vill.). *G. ladanum* L. was divided by Briquet into two subspecies, subsp. *intermedia* (Vill.) and subsp. *angustifolia*. It is as clear as can be ascertained in the absence of an authentic specimen in Villars' herbarium at Grenoble that Villars' *G. intermedia* was,

as has been long accepted, a form of *G. ladanum* L. *sensu stricto*. Villars' second and better description (1778), including the phrase 'toute la plante est visqueuse,' considered in conjunction with the plate, which shows a broad-leaved plant with patent glandular hairs on the calyx, can hardly apply to *G. angustifolia*. Villars appears to have regarded his plant as an intermediate between *G. ladanum* and *G. tetrahit* on the grounds of flower size—not a constant character in *G. ladanum*, or in most species of the genus.

c. *angustifolia* (Ehrh.). This becomes the second species, *G. angustifolia*.

d. *latifolia* (Hoffm.). With his original description Hoffmann (1804) cites t. 884 of Sowerby & Smith's *English Botany*. This plate is not only clearly *G. ladanum*, but in the accompanying description it is mentioned that the plant illustrated agrees well with the Linnaean specimen. Thus *G. latifolia* Hoffm., like *G. intermedia* Vill., falls into the synonymy of *G. ladanum* L. *sensu stricto*.

e. *kernerii* Briq. As has been pointed out above, specimens of var. *kernerii* from Briquet's herbarium match the lectotype of *G. angustifolia*. Thus, assuming that two or more varieties are recognised within *G. angustifolia*, 'var. *kernerii*' falls into the synonymy of var. *angustifolia*.

f. *campestris* Timb. This variety is placed by Briquet in the synonymy of his var. *orophila* (an earlier MS. name from an exsiccata distributed by Timbal-Lagrave which he takes up), which is distinguished from 'var. *kernerii*' by the length of the calyx teeth (5 mm. long as compared with 2-3 mm. for the latter variety). That the two names do in fact apply to the same form is clear not only from Timbal-Lagrave's description (1885) : 'lobes du calice aussi longs que le tube . . . terminés par une épine blanche et longue,' but also from examination of the exsiccata distributed through the Société Dauphinoise on which this was based compared with specimens of var. *orophila* from Briquet's herbarium. Since the epithet *campestris* is the earlier at varietal level, this is the correct one. I do not consider, however, that the variety is worth maintaining. The length of the calyx teeth in *G. angustifolia* varies tremendously, quite independently of other characters. I have seen quite a lot of British material that matches well 'var. *orophila*' from Briquet's herbarium — e.g., a gathering by E. F. Linton from Diddington Wood, Hunts. (v.c. 31), 29 July 1879, in Cambridge (CGE); and also others which provide a good match for the type of *G. ladanum* subsp. *angustifolia* var. *calcarea* subvar. *longidentata* Henrard. These apparently represent the greatest length reached by the calyx teeth in Great Britain. At the other end of the scale are specimens agreeing with the type of *G. ladanum* subsp. *angustifolia* var. *calcarea* subvar. *microdus* Henrard — e.g., a gathering from 'shingle bank between Southampton and Netley,' S. Hants. (v.c. 11), Sept. 1846, from Herb. Babington in Cambridge (CGE).

On the Continent greater variation even than this occurs, from var. *spinosa* Benth., with calyx teeth said to be over 8 mm. long, to var. *inermis* (Posp.) Fiori with mucicous calyx teeth. I have seen no material agreeing with the original descriptions of these, but they are clearly *angustifolia* forms.

g. *odontota* Briq. This variety is based on leaf shape, Briquet keying it out from 'var. *kernerii*' thus :—

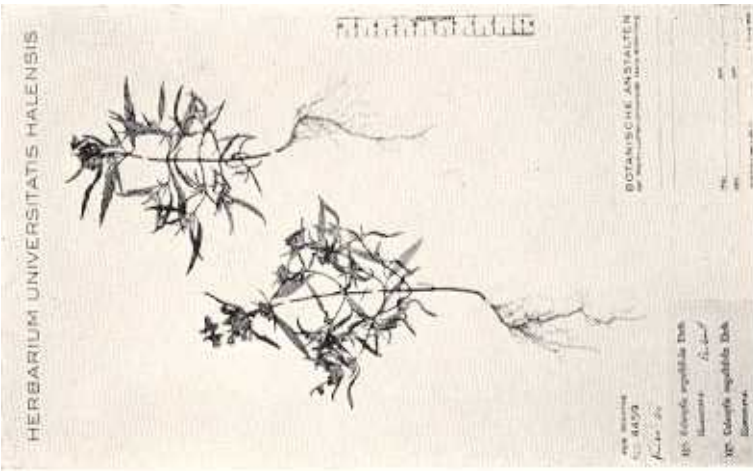
Leaf serration always of irregular, scarcely perceptible or almost non-existent, triangular teeth less than 1 mm. deep.

var. *kernerii*.'

Leaf serration of stronger, more regular teeth, triangular, 1-1.5 mm. deep.

var. *odontota* (& var. *berteti* Briq.).

Var. *odontota*, which Briquet himself cites from Miller's Dale, is also said to have broad leaves of which the bases are rounded and shortly attenuate into the petiole. As has been stated above, no useful purpose will be served by maintaining varieties of this species based on leaf shape, and var. *odontota* thus falls into the synonymy of var. *angustifolia*.



(a) eciotype of *Galeopsis angustifolia*



(b) Holotype of *Galeopsis ladanum* ssp. *angustifolia* (Ehrh. ex Hoffm.) Briq. var *(Schonh.)* Briq. subvar. *platyphylla*

h. *monticola* Lannes. In some areas, particularly on the chalk in eastern and south-eastern England, there occurs a form of *G. angustifolia* which in its extreme state appears very distinct. It is a rather short plant, branched almost from the base, canescent, and with the calyx densely villous with patent, long white hairs. This form was first described without ambiguity by Schönheit (1832), as a species, *G. calcarea*, attention being particularly called to the 'calycis patenti-villosuli.' It is the form often called 'var. *canescens*' by referees of British exchange clubs, but its correct place under *calcarea* was noted by Salmon (1931). Briquet reduced Schönheit's species to a variety of *G. ladanum* ssp. *angustifolia*. However, since according to the International Code a name has priority only within its own rank, consideration must be given to two varietal names of earlier date which Briquet cites in synonymy here. One of these is var. *monticola* Lannes, the name used by Druce. This, however, is a *nomen nudum* which appeared on a herbarium label, Magnier's *Flora selecta* No. 940. Neither on the sheet nor in the Scrinia which gave notes on Magnier's plants does any description appear. The only note which the label on the specimen bears is 'an *G. monticola* Jord ined.?' It is undoubtedly *G. calcarea*, but the epithet *monticola* must be discarded as never validly published.

The name *G. angustifolia* var. *arenaria* Gren. Godr. was indicated as the correct one for the form under consideration by Brenan (1956). But what does not appear clear is why Briquet should have placed this name within the synonymy of *calcarea* at all. The original description is very brief: 'Dents du calice plus courtes; plante blanchâtre et parfois glanduleuse dans le haut.' There is no mention of patent hairs on the calyx, and in fact Godron cites *G. canescens* Schultes, which Briquet maintains as a distinct variety, as a synonym. The only two specimens of *G. angustifolia* var. *arenaria* Godr., named by the author, which exist in his herbarium, were kindly sent to me on loan by the Director of the École Nationale Supérieure Agronomique de Nancy. Both bear collection dates later than 1850, the date of publication of Godron's varietal epithet. These two specimens represent diverse elements. Under Briquet's classification, interpreted in the light of specimens from his herbarium at Geneva, one specimen, which has the calyces almost or quite eglandular and totally appressed-hairy, would have been called '*G. ladanum* ssp. *angustifolia* var. *kernerii*' (i.e., *G. angustifolia* var. *angustifolia*); the other, which has the calyces considerably glandular and with some patent hairs, would have been called '*G. ladanum* ssp. *angustifolia* var. *calcarea*.' Indications are, therefore, that Godron would have applied his epithet to any reasonably canescent form of *G. angustifolia* irrespective of other characters. What is clear is that whatever was in Godron's mind, he was in fact reducing *Galeopsis canescens* Schultes to the rank of variety. The present writer's views on *G. canescens* are given later in this paper, and these views thus gain some additional support from the fact that Godron appears to have interpreted Schultes' species in the same manner. Thus *G. angustifolia* var. *arenaria* Godr. and *G. canescens* Schultes can now only be regarded as merely representing any \pm canescent forms of *Galeopsis angustifolia*. The correct name for the form of *G. angustifolia* with the patent-villous calyces remains *G. angustifolia* var. *calcarea* (Schönh.) C. E. Salmon, based on the beautifully circumscribed *G. calcarea* Schönheit. In addition to the patent calyx hairs, var. *calcarea* is usually considerably glandular around the inflorescence.

Intermediates between var. *calcarea* and var. *angustifolia* certainly occur not infrequently, and it is a matter of opinion as to whether the former should be maintained; in particular, forms with long appressed hairs on the calyx tube, and patent hairs in the region of the teeth and sinuses between them, are clear intermediates. Nevertheless, the appearance of the variety is so distinct in the field, and it is so predominant over large areas of arable chalkland, that it seems worthy of recognition. It may be noted that the hairs of the calyx tend to spread even further on drying and storing.

i. *canescens* (Schultes) (not Schultz, as in the *British Plant List*). This is certainly the most elusive of the varieties of *G. angustifolia*. In the synoptic table which forms chapter XXXI of the *Monograph*, Briquet separates it from vars. *odontota* and *kernerii*, which it is said to resemble in the appressed indumentum of the calyx, in the following manner:—

Plant with branches greenish, pilose or glabrous, but not with a hoary indumentum.

vars. *odontota*, *kernerii* (&c.).

Plant with branches densely and closely hairy, the stem, leaves, bracteoles and calyces likewise being thickly canescent.

var. *canescens*.

The difficulty in resolving precisely what Schultes's plant was is due principally to the fact that no authentic specimen appears to be extant at Munich, Berlin, or other Continental institutions. Fortunately, however, his description is a good and full one.

The plant pictured by Briquet's description on p. 254 of his monograph is one with so thick an indumentum that the whole plant appears ashy-white (though, as often, the specimens in his herbarium so named do not always bear this out). Likewise, the leaves are depicted as having their margins more or less revolute; and in all but one of Briquet's specimens (a specimen from the Somme, ex herb. Schmidely, coll. E. Gonse – this is densely white-canescens) the plants have linear, entire or slightly sinuose leaves. In his original description Schultes (1809) clearly states 'caule . . . subtomentoso . . . foliis lanceolatis subtomentosis subserratis.' Also, in *Oesterreichs Flora*, Schultes gives to his *G. canescens* the vernacular name 'Graugrüner Hohlzahn' and refers to the stems and leaves as 'etwas filzig.' For such a plant as Briquet describes, 'graugrüner' would hardly be appropriate; 'weisgraulich' or 'weisgrau' seem more applicable. It appears to me that *G. canescens* was merely one of the more canescent forms of *G. angustifolia* var. *angustifolia*, and that Godron was correct in using the epithet *arenaria* to cover the same range.

Briquet's plant is said to occur in dry or stony places by the sea, or by lakes. Under such xerophytic conditions many species take on an unusually tomentose appearance (as may be seen in many plants as they occur, for example, at Braunton Burrows); similarly, leaf margins may become revolute. Briquet's form is probably of this kind; but it must be confessed that in this country *G. angustifolia* grows on maritime shingle (as for example at Wolferton, Norfolk, at Dungeness and the Crumbles, Eastbourne) without developing such tomentum, and the variety may prove worth keeping up. If so, the name var. *littoralis* de Vicq & de Brutelette (1864) should be used, as the description of these authors ('velue blanchâtre') is far more applicable to Briquet's plant than that of Schultes. Mr. Brenan informs me (*in litt.*, 1 March 1957) that '... I have seen what appears to be *canescens* as a sand dune plant in southern France, and it looks very different from anything I have seen in Britain.' I have seen no British material which could be placed here with any confidence.

The confusion which has existed in the past between *canescens* and *calcareea* may well be due to Hegetschweiler (1840), who describes his *G. canescens* as 'die Kelch . . . mit . . . etwas abstehenden Härchen besetzt.' *G. canescens* Heg. is, of course, an illegitimate later homonym.

It is thus proposed that *Galeopsis ladanum* L. agg. in Great Britain be listed thus :
Galeopsis ladanum L.

Galeopsis angustifolia Ehrh. ex Hoffm.

Var. *angustifolia*

Var. *calcareea* (Schönh.) C. E. Salmon.

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REFERENCES

- BRENAN, J. P. M. (1956). Notes on the flora of Oxfordshire and Berkshire, II. *Proc. B.S.B.I.* **2**, 111.
- BRIQUET, J. (1893). *Monographie du genre Galeopsis*. Brussels.
- DANDY, J. E. (1958). *List of British Vascular Plants*. London.
- DRUCE, G. C. (1928). *British Plant List*, Ed. 2, 93.
- FIORI, A. (1925-9). *Nuova Flora analitica d'Italia*, **2**, 418 ff. Florence.
- GRAHAM, R. A. (1954). Mint Notes V. *Watsonia* **3**, 109.
- GODRON, D. A. (1850), in Grenier, J. C. M. & Godron, D. A. *Flore de France*, **2**, 684. Paris.
- HAUSSKNECHT, C. (1892). *Mitt. thuring. bot. Ver.* **8**.
- HEGETSCHWEILER, J. (1840). *Die Flora der Schweiz*, 570. Zurich.
- HENRARD, J. Th. (1919). *Galeopsis* : Een systematisch floristische-studie. *Nederl. Kruidk. Arch.*, 1918, 158 ff.
- HOFFMANN, G. F. (1804). *Deutschlands Flora*, Ed. 2, **2**, 8. Erlangen.
- PERSOON, C. H. (1807). *Synopsis Plantarum*, **2**, 122. Paris.
- ROUY, G. & FOUCAUD, J. (1909). *Flore de France*, **11**, 279 ff. Asnières & Rochefort.
- SALMON, C. E. (1931). *Flora of Surrey*, 530.
- SCHÖNHEIT, P. (1832). Phytographische Bemerkungen, in *Flora*, **15**, 593-4.
- SCHULTES, J. A. (1809). *Observationes Botanicae*, 108. Innsbruck.
- SCHULTES, J. A. (1814). *Oesterreichs Flora*, Ed. 2, **2**, 151. Vienna.
- SOWERBY, J. & SMITH, J. E. (1801). *English Botany*, **13**, 884. London.
- TIMBAL-LAGRAVE, E. P. M. (1885). *Bull. Soc. Dauphin., Étud. biol.* **12**, 575.
- DE VICQ, E. & DE BRUTELETTE, B. (1864). *Catalogue raisonné des plantes vasculaires de la Somme*, 487. Abbeville.
- VILLARS, D. (1779). *Prospectus de l'Histoire des plantes du Dauphiné*, 21. Grenoble.
- VILLARS, D. (1787). *Histoire des plantes du Dauphiné*, **2**, 387. Grenoble.
- WARBURG, E. F. (1952), in Clapham, A. R., Tutin, T. G. & Warburg, E. F., *Flora of the British Isles*. Cambridge.
- WILLIAMS, F. N. (1910). *Prodromus Florae Britannicae* Pt. **6**, 396 ff. Brentford.