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REDUCTION OF *SPONGIOSYNDESMUS* GILLI TO *LADYGINIA* LIPSKY (UMBELLIFERAE)

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Comparative morphological and carpological investigation shows that *Ladyginia* and *Spongiosyndesmus* are congeneric. An emended generic description of *Ladyginia* is given and two new nomenclatural combinations *Ladyginia afghanica* and *L. gigantea* are made.

INTRODUCTION

Spongiosyndesmus Gilli is one of the genera of Umbelliferae endemic in the 'Flora Iranica' area. There are two known species, the type species *S. afghanicus* Gilli, described simultaneously with the genus (Gilli, 1959) and *S. giganteus* described by Leute during preliminary studies for the treatment of the Umbelliferae for *Flora Iranica* (Leute, 1972).

A detailed description was given of this genus particularly in regard to the carpology. The structure of the fruits of *S. afghanicus*, as described by Gilli, seems to be distinctive. The fruit is compressed dorsally and thus the taxon belongs to the tribe Peucedaneae. However, the mature fruit is devoid of vallecular and commissural secretory ducts, although it is probable that vittae do exist when the fruit is immature. The mericarps of *S. afghanicus* have a peculiar commissural surface, spongiose, rough, rugose or lacerate, from which Gilli derived the name for his new genus.

The peculiar structure of the mericarp secretory system described by Gilli is, we believe, the most interesting aspect of the genus. A lack of vallecular and commissural ducts is known for some Apioideae (e.g. *Aegopodium* L., *Conium* L., *Silaum* Miller) but it is rather rare and sporadic. It seems usual to regard this as a generic character indicative of considerable specialization; this character is especially rare in the so-called flat-fruited Umbelliferae. The absence of vallecular vittae is observed for instance in the genus *Johrenia* DC., but its species have very large costal ducts with a spongiose inflated pericarp. In his original description, Gilli compared *Spongiosyndesmus* with *Pastinacopsis* Golosk. While indeed the latter has dorsally compressed fruit without vittae in either the valleculae or on the commissure, it is a rather superfluous analogy because *P. glacialis* has a pericarp structure completely typical for members of the tribe Tordylieae. One of the marked differences between Tordylieae and the taxa closely related to *Ferula* (Peucedaneae) seems to be the presence in Tordylieae of vertically orientated fibres in the hypendocarp or sclerocarp (the inner part of the mesocarp made up of lignified prosenchyma of horizontally or vertically orientated cells with rounded or oval pores); they are absent in Peucedaneae.

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DISCUSSION

Authentic specimens of *Spongiosyndesmus* were not to be found in herbaria in the USSR. Therefore critical study of this genus only became possible when duplicates of the Umbelliferae collected in Afghanistan, in particular by I. Hedge and by J. Lamond, were received from RBG Edinburgh. Since then an opportunity has arisen to study these collections in situ at Edinburghthereby widening the amount of herbarium material studied of both species of *Spongiosyndesmus*. Amongst this material we found one specimen of *S. afghanicus* with quite mature fruit (Prov. Qataghan: lower Andarab valley, 14km E of the village, 1100m, serpentine slope, 'Fl. yellow. Plant up to 4-5 ft', 1 vii 1965, *J. Lamond* 2289). This specimen is not cited in *Flora Iranica* but matches the photograph of an authentic sheet (Rechinger 1987, t.422) and was in fact collected at the same time. Our examination of herbarium material and of the anatomical structure of the fruit confirms the attribution of the taxon to Peucedaneae. The fruit has a well-developed layer of hypendocarp which indicates that *Spongiosyndesmus* belongs to Drude's subtribe Ferulinae. The analysis of all the characters – both exomorphological (form of the umbels, leaves and stems) and carpological – bears witness to the great affinity between *Spongiosyndesmus* and the genus *Ladyginia*.

This genus was described by Lipsky (1904: 150), reduced to synonymy under *Ferula* by Koso-Poljansky (1916: 111), and restored again in *Flora URSS* (Schischkin, 1951: 143). Our investigation (Pimenov & Kirillina, 1980) showed, however, a great similarity of fruit structure between the only known species of this genus, *L. bucharica*, and *Ferula* species, although it must be admitted that we had overestimated the value of hypendocarp presence in the fruit of both taxa – *Ladyginia* and *Ferula*. This character does not seem to be an absolute criterion of generic limits in the Umbelliferae, though neither do any other characters! Moreover, species with rather reduced hypendocarp are known in various infrageneric taxa of *Ferula*, in particular in the subgenera *Peucedanoides* (Safina & Pimenov, 1983) and *Ferula* (Safina & Pimenov, 1990).

The genus *Ladyginia* is upheld in both *Flora of Tadzhikistan* (Korovin *et al.*, 1984: 196) and in *Flora Iranica* (Rechinger, 1987: 427). Now we also accept this genus with its type species *L. bucharica* as separate from *Ferula*, based on more than just carpological characters, and taking into account the result of the immunochemical investigation of storage proteins in the seeds of *Ladyginia* and *Ferula* (Shneyer *et al.*, 1991).

L. bucharica is a widely distributed species in South Uzbekistan and South Tadzhikistan (formerly 'the mountainous Bukhara') and it would be strange if it were not fairly common in the adjacent regions of Afghanistan. True, *Flora Iranica* indicates only two localities for the species in Afghanistan, although one of them may belong elsewhere to judge from a photograph (Rechinger, 1987, t. 385). However, another trustworthy specimen (Prov. Takhar: between Talicfan and Qeshm, steep slopes of gorge, 29 vi 1969. *I. Hedge & P. Wendelbo* 9262) has been received from E, but is not cited in *Flora Iranica*.

Obviously it was necessary to compare *Ladyginia* and *Spongiosyndesmus* on the basis of all essential taxonomic characters including the peculiarities of the pericarp, which seem to be significant for the taxonomy of this group of the Umbelliferae. This

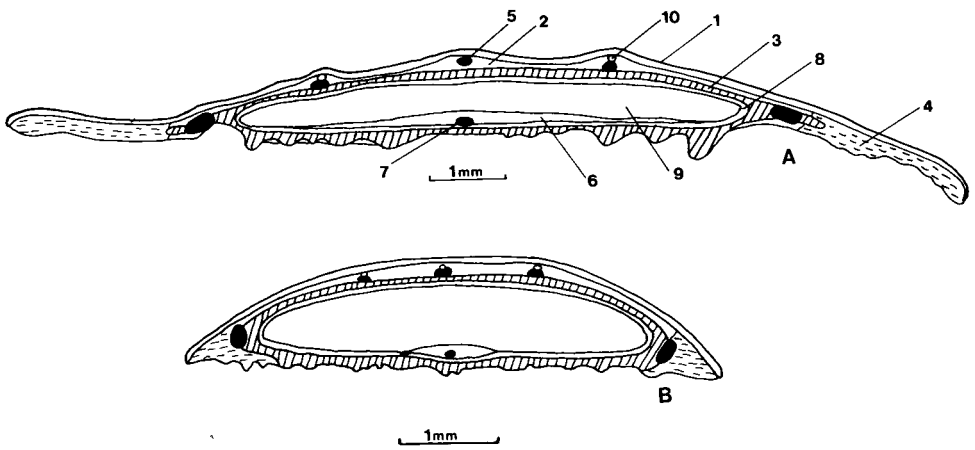

FIG. 1. TS of mericarps. A, *Ladyginia bucharica* (Karategin Mts, Obi-Garm, *Pimenov & Kljukov*, MHA); B, *Ladyginia gigantea* (Afghanistan, prov. Mazar-i-Sharif, *Ekberg* W-9061, E). 1, exocarp; 2, mesocarp; 3, hypendocarp; 4, aerenchyma; 5, costal vascular bundle; 6, funicle; 7, funicular vascular bundle; 8, spermoderma; 9, endosperm; 10, costal oil duct.

comparison has revealed an affinity in many important features: the fruits of both taxa investigated are very much compressed dorsally, and have a large commissure with rather distinctive spongiose surface (this character has been regarded as a key character for *Spongiosyndesmus* but passed unnoticed in *Ladyginia*), a well-developed hypendocarp (this feature on the contrary, has been described for *Ladyginia* but has not been noted for *Spongiosyndesmus*) – see Figs 1 & 2. Certainly, the fruits of *L. bucharica* (15–18 x 9–10mm) and *S. afghanicus* (5–6.5 x 3.5–4mm) differ considerably in size – but the size of fruit of the other species of *Spongiosyndesmus* – *S. giganteus* – occupies rather an intermediate position. Besides the carpology, the two genera are rather similar in their life-form (both are perennials), in the stem structure (the stems are rather thin, solid, virgate, without ribs), leaf sheaths (narrow, lanceolate), terminal leaf lobes (rather large, especially those of *L. bucharica* and *S. giganteus*), and the inflorescence structure (terminal umbels only, in contrast to most *Ferula* species which possess both terminal and lateral umbels).

Thus, we have not revealed any essential differences between these two genera. The specific differences detected are within the range of variation usual for rather small genera of the Umbelliferae (height of the plant, size of terminal leaf lobes, size of mericarps). As a result we propose to unite these genera under the earlier name *Ladyginia*; an enlarged more exact generic description as well as two new nomenclatural combinations for species of the former *Spongiosyndesmus* are necessary and a key to the species is given.

Ladyginia Lipsky, Acta Horti Petrop. 23: 150 (1904) – *Spongiosyndesmus* Gilli, Feddes Repert. 61: 199 (1959), **syn. nov.**

Plantae perennes, polycarpicae, radicibus palaribus incrassatis ramosis. Folia radicalia biternata lobis terminalibus latis, integris vel vix lobatis, margine crenatis vel dentatis vel plus minusve profunde dissectis. Folia caulina vaginis oblongo-lanceolatis longis

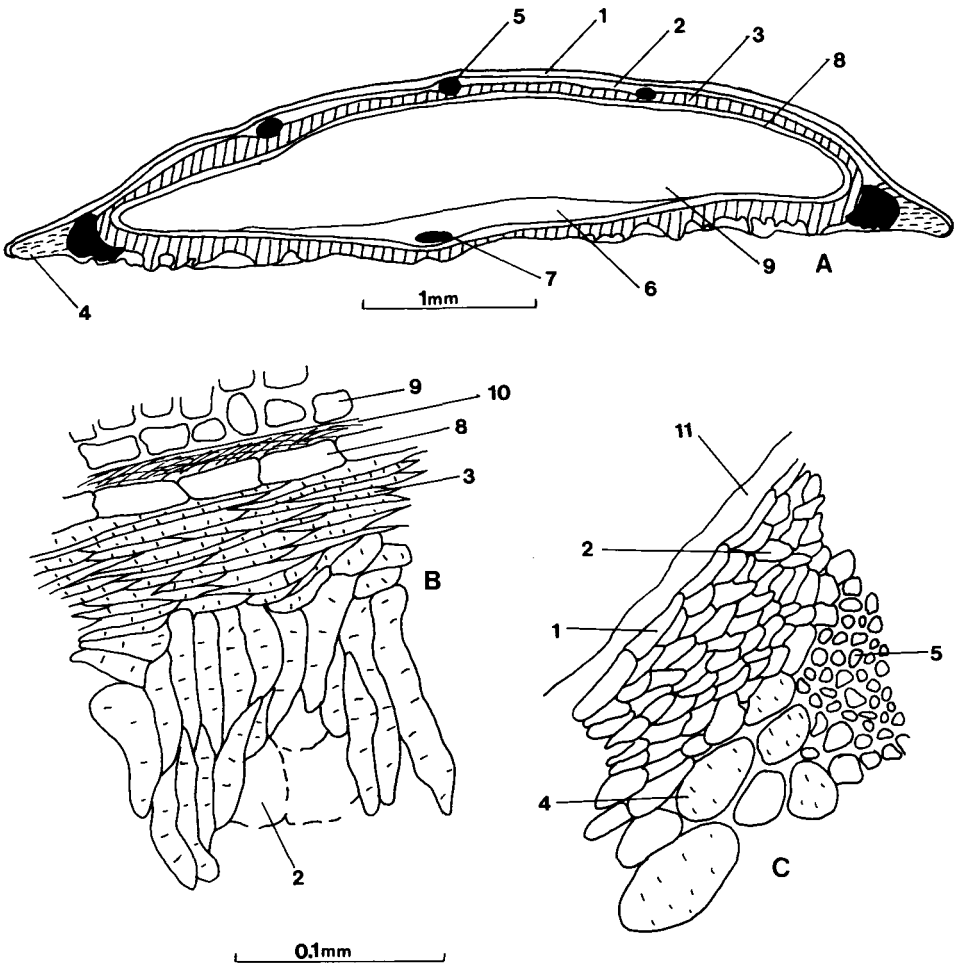

FIG. 2. *Ladyginia afghanica* (Afghanistan, prov. Qataghan, *Lamond* 2289, E). A, TS of mericarp; B, TS of pericarp through commissure; C, TS of pericarp through marginal rib. 1–9 – see Fig. 1; 10, compressed cells of nucellus and integument; 11, the outer part of the walls of exocarp cells.

angustis, laminis dissectis vel integris vel ad vaginam reductis. Caules solitarii. Umbellae solum terminales, 10–20-radiatae, involucris involucellisque nullis. Dentes calycini breves vel nulli. Petala fusco-flavida apicibus brevibus, dorso pubescentia vel glabra. Stylopodia breviter conica, marginibus lobatis elevatis. Fructus glabri, dorso compressi, obovati, elliptici, vel rotundato-elliptici, jugis marginalibus angusto - vel lato-alatis, dorsalibus filiformibus, teretibus vel fere inconspicuis. Commissura lata. Exocarpium unistratosum, ad extremitatem jugorum interruptum. Mesocarpium e cellulis parenchymaticis, in jugis marginalibus e cellulis aerenchymaticis, vix lignescentibus, membranis fissuratim porosis compositum. Hypendocarpium multistratosum e fibris sclerenchymaticis horizontalibus anguste tangentaliter elongatis, a latere commissurali fibris radialbus, excrescentias cristatas efficiens. Fasciculi vasculares jugis dorsalibus tenues,

jugis marginalibus aliquanto massivi. Vittae valleculares commissuralesque obsoletae, jugales solitariae vel nullae. Endospermium ventre planum.
Typus: *L. bucharica* Lipsky loc. cit.; Rechinger, Flora Iranica 162:427 (1987). **Fig. 1.**

L. afghanica (Gilli) M. Pimenov & Kljuykov, **comb. nov.** – *Spongiosyndesmus afghanicus* Gilli in Feddes Repert. 61: 199 (1959); Rechinger, Flora Iranica 162:462 (1987). **Fig. 2.**

L. gigantea (Leute) M. Pimenov & Kljuykov, **comb. nov.** - *Spongiosyndesmus giganteus* Leute in Oesterr. Bot. Zeitschr. 120: 299 (1972); Rechinger, Flora Iranica 162: 463 (1987).

KEY TO THE SPECIES OF *LADYGINIA*

1. Plants 50–60cm tall; petals hirsute; fruit 15-18mm long, 9–10mm broad *L. bucharica*
+ Plants 100–200cm tall; petals glabrous or hirsute; fruit up to 9mm long _____ 2

2. Plants up to 100cm tall; petals hirsute; fruit 5–6.5mm long, 3.5–4mm broad *L. afghanica*
+ Plants up to 200cm tall; petals glabrous; fruit 7.5–9mm long, 4.5–5.5mm broad *L. gigantea*

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