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Towards a clarification in the taxonomy of Sino-Himalayan species of *Selinum* L. s. l. *(Umbelliferae).* The genus *Oreocome* Edgew.

Abstract

Pimenov, M. G., Kljuykov, E. V. & Ostroumova, T. A.: Towards a clarification in the taxonomy of Sino-Himalayan species of *Selinum* L. s. l. *(Umbelliferae).* The genus *Oreocome* Edgew. – Willdenowia 31: 101-124. 2001. – ISSN 0511-9618.

Oreocome, a genus of Himalayan *Umbelliferae,* which has not been accepted in the majority of regional floristic treatments and whose name was previously lectotypified with *O. candollei,* is re-defined with the help of carpological features. *Oreocome* is considered to comprise six species, distributed from Pakistan to SW China with a centre of diversity in the Himalayas, and it is delimited from both *Selinum* and *Ligusticopsis*. Three new species, viz. *O. involucellata* and *O. depauperata* from Nepal and *O. hindukushensis* from Pakistan, are described as new to science. Four new combinations, two in *Oreocome (O. limprichtii, O. striata)* and two in *Ligusticopsis (L. coniifolia, L. wallichiana)* are validated. Keys are provided to the accepted species of *Oreocome* and to the Himalayan species of *Ligusticopsis*.

Introduction

Selinum is a problematic genus in the flora of both the Himalaya and China. In Central and E Europe and W Siberia it is represented by a single species, *S. carvifolia* (L.) L., which provides the nomenclatural type of the conserved name *Selinum* L. (Greuter & al. 2000: 355). The genus *Selinum* in a broad sense may be considered to have 14 species (Leute 1970, Li & al. 1993, Mukherjee & Constance 1993) but its delimitation from related genera, e.g., *Ligusticum* L., *Ligusticopsis* Leute, *Cortia* DC., *Cortiella* C. Norman, *Conioselinum* Hoffm. and *Cnidium* Cusson ex Juss., is still unsatisfactory. This is illustrated well by the inclusion of no less than 284 species names under *Selinum* in the "Index kewensis" (1997).

During critical evaluation of *Umbelliferae* in the flora of Middle Asia (Pimenov 1975, 1983, Lavrova & al. 1987), three local species of *Selinum* from the W Tianshan Mts were transferred to two new genera. These are *Sphaenolobium* Pimenov and *Karatavia* Pimenov & Lavrova, the latter being probably neither closely related to European *Selinum* nor to the *Selinum-Ligusticum* group, the "Verwandtschaftskreis der Gattung *Ligusticum* L." of Leute (1969-70), as a whole. More recently, another Asiatic species from W Himalaya, *Selinum papyraceum* C. B. Clarke, has been transferred to *Conioselinum* (Pimenov & Kljuykov 1999). The majority of remaining spe-

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cies of *Selinum* are concentrated in the Himalaya and adjacent regions of China. Some of them are critical even at species level (see Mukherjee & Constance 1993, Watson 1998) but there is in particular considerable disagreement about the generic treatment of the Sino-Himalayan species of the *Selinum-Ligusticum* group (see Edgeworth 1845, 1846, Clarke 1879, Hiroe 1958, 1979, Leute 1969, 1970, Nasir 1972, Cannon 1979, Chang 1985, Hedge & Rechinger 1987, Mukherjee & Constance 1993). Today, only *Cortia* and *Cortiella,* but not *Oreocome,* are widely accepted as separate endemic Himalayan genera within the *Selinum-Ligusticum* group. This contribution focuses on the Sino-Himalayan species connected with the generic name *Oreocome* Edgew.

Taxonomic history of *Oreocome*

Oreocome was described in two subsequent publications by Edgeworth (1845, 1846). The publication dates of both papers had been disputed (1845, 1846 or 1849 for the first, 1846, 1849 or 1851 for the second) but were established (pers. comm. Prof. Dan H. Nicolson) by Raphael (1970). Accordingly, Edgeworth's short paper with the protologue of *Oreocome* was published in 1845, the enlarged one in 1846. The paper of 1845 contains a short description of *Oreocome* and of two new species, *O. elata* and *O. filicifolia. Selinum candollei* DC. [*"candollii"*], *Peucedanum wallichianum* DC. and *Pleurospermum cicutarium* Lindl. are explicitly referred to the new genus but their binomials in *Oreocome* are not validated. The paper of 1846 repeats the diagnoses of the new genus and of the two new species, and supplements it by enlarged descriptions, reference to specimens and addition of other species of the genus. These other species are the same as in the first publication: *S. candollei* (*Peucedanum wallichianum* and *S. tenuifolium* are regarded as synonyms) and *Pleurospermum cicutarium;* this time, however, the combinations *O. candollei* [incorrectly given as *"O. candollianum"* (Edgeworth 1846: 55)] and *O. cicutaria* (Edgeworth 1846: 56, footnote) are validated. Recently, Pimenov & Leonov (1993) selected *Selinum candollei* DC. (≡ *O. candollei* [*"candollianum"*] (DC.) Edgew.) in accordance with Art. 10.2 and 10.3 of the Code (Greuter & al. 2000) as the lectotype of the generic name *Oreocome*. This lectotypification was incorporated with corrected spelling in the autoritative ING database (Farr & Zijlstra 1996).

Currently, *Oreocome* is a little known generic name. Apart from the aforementioned references concerned with the typification of the generic name only Farille & al. (1985) maintained *Oreocome,* adding a new species, *O. stelliphora* Cauwet & Farille, which was later, however, transferred to the new genus *Oreocomopsis* Pimenov & Kljuykov (1996).

Already Clarke (1879) did not accept *Oreocome* as a separate genus. He included Edgeworth's four *Oreocome* species in *Selinum* and merged them all with *S. tenuifolium* Wall. ex C. B. Clarke, of which he recognized three varieties. Besides *S. tenuifolium* proper (with the synonyms "*S. candollii* Edgew. non DC." [i.e. actually *O. candollei* (DC.) Edgew.], *Peucedanum wallichianum* DC. and *Pleurospermum cicutarium* Lindl. [≡ *O. cicutaria* (Lindl.) Edgew.]), Clarke (1879) distinguished var. *filicifolia* (Edgew.) C. B. Clarke (≡ *Oreocome filicifolia* Edgew. = *Ligusticum coniifolium* DC.) and var. *elata* (Edgew.) C. B. Clarke (≡ *Oreocome elata* Edgew.). Altogether he maintained five (plus one doubtful) species of Indian *Selinum.* Clarke (1879: 699) emphasized the similarity in all accepted species of *Selinum* ("the Indian species are uniform in habit ...") and distinguished them from local *Ligusticum* species by the number of vittae in the mericarp furrows: "dorsal furrows 1-vittate (or rarely 1 large deep-seated and 2 small lateral superficial or 0), lateral furrows 1-4-vittate" in Indian *Selinum,* but "dorsal furrows at least 2-vittate, lateral at least 3-vittate" in *Ligusticum* (Clarke 1879: 699). It is clear that he had some difficulties distinguishing these two genera on Indian material. Clarke's sixth, doubtful species, *S. dissectum* (DC.) C. B. Clarke, first had appeared in Wallich's "Catalogue" as nomen nudum before it was validly described as *Peucedanum dissectum* DC. on the basis of the collection *Wallich 581* from Gossain Than (Nepal). Its identity has remained doubtful up to now (Mukherjee & Constance 1993, Watson 1998) and Watson (1998) pointed out that the problems of its identity start with the original material: Wallich's collections were not rarely distributed

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without numbers or, on the contrary, with the same number for different species, or with sheets containing more than one species. Moreover, *Peucedanum dissectum* DC. (1830), the basionym of *S. dissectum*, is an illegitimate later homonym of *P. dissectum* Ledeb. (1829), the basionym of *Ferula dissecta* (Ledeb.) Ledeb.

Leute (1969-70) accepted a rather broad concept of *Selinum,* including *Cnidium* Cusson ex Juss. The most essential, if not only difference between *Selinum* sensu Leute and *Ligusticum* is the number of vallecular vittae ("vittae valeculares singulae" versus "vittae valeculares numerosae"). As a result, *Selinum* in Leute's monograph consists of 10 accepted species while 11 other names are listed under "species incertae sedis" and three are transferred to the genus *Tilingia.* He transferred all Sino-Himalayan species of *Selinum* to *Cortia* DC. validating some new combinations in *Cortia,* viz. *C. candollei* (DC.) Leute, *C. wallichiana* (DC.) Leute, *C. papyracea* (C. B. Clarke) Leute and *C. striata* (DC.) Leute. *C. vaginata* Edgew. was accepted by Leute in this genus. Edgeworth's *Oreocome* species were again all merged in one species, *C. wallichiana* (DC.) Leute (= *Peucedanum wallichianum* DC.). Later, Hedge & Rechinger (1987) followed Leute in treating *Selinum wallichianum, S. vaginatum* and *S. papyraceum* as species of *Cortia*.

Nasir (1972) in his treatment of the *Umbelliferae* for Pakistan largely followed Clarke (1879) but regarded *Selinum candollei, S. wallichianum* and *S. filicifolium* (Edgew.) Nasir as separate species. He characterized *S. filicifolium* by broader marginal than dorsal mericarp ribs, thus being closer to *S. wallichianum* than to *S. candollei* in this character.

Cannon (1979: 189) on the contrary, expressed the view that *Selinum tenuifolium* var. *filicifolium* "does not merit recognition, except perhaps at the rank of forma". At the same time he included *Peucedanum wallichianum* into *S. candollei* and regarded *S. cortioides* C. Norman and *S. striatum* as separate species, the latter, however, suspecting to be perhaps conspecific with *S. tenuifolium.* A similar observation was made for *S. candollei,* and in general, according to Cannon, "a complete revision of the genus is needed for clarification".

Only three species of *Selinum* were reported for China by Chang (1985), viz. *S. cryptotaenium* H. Boissieu, *S. candollei* DC. and *S. cortioides; Peucedanum wallichianum* and *S. tenuifolium* were regarded as synonyms of *S. candollei*. Later, two further Chinese species, previously described as *Cnidium sinchianum* and *C. nullivittatum* (Fu 1981), were transferred to *Selinum* (Li & al. 1993), probably under the influence of Leute's concept. These two northerly species with a very peculiar morphology are distributed in the Chinese provinces of Shaanxi and Henan and are not subject of the present paper. At least, they are not closely related to *Oreocome*.

In the recent revision of Indian species of the *Selinum-Ligusticum* group by Mukherjee & Constance (1993), the authors correctly note that generic delimitation between Indian species of *Selinum* and *Ligusticum* is rather problematic and that both are distant from the nomenclatural types of their generic names. *Cnidium (C. monnieri)* is regarded as an independent genus. In other respects this revision is more or less conservative. Seven species are accepted in *Selinum* and five in *Ligusticum*. Of interest in our context is the treatment of *S. candollei, S. wallichianum* and *S. elatum:* the latter is accepted as a separate species, *O. filicifolia* is referred to the synonymy of *S. wallichianum* and *"O. candolliana"* to the synonymy of *S. candollei*. The majority of the aforementioned names are placed in the synonymy of *S. wallichianum.*

Watson's (1998, 1999) treatment of the *Umbelliferae* of Bhutan (E Himalaya) comprises discussions also on some species of *Selinum* and related genera. He, in particular, elaborated differences between *S. candollei* and *S. wallichianum,* the most essential and reliable among them being the degree of the development of the marginal mericarp ribs. Watson also lectotypified some of the names of local species.

Material and methods

Our study is based on the investigation of herbarium collections of *Ligusticum gyirongense* R. H. Shan & H. T. Chang, *Selinum candollei* Wall. ex DC., *S. carvifolia* (L.) L., *Oreocome elata* Edgew., *S. wallichianum* (DC.) Raizada & H. O. Saxena, *S. striatum* (DC.) Benth. and *S. cryptotaenium* Boissieu, including their nomenclatural types preserved at DD, E, G, G-DC, K, KATH,

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KUN, LE, NAS, P, PE (abbreviations according to Holmgren & al. 1990). Morphological investigation and ecological observation of Himalayan species of the *Selinum-Ligusticum* group were also made in their natural habitats during our excursions to Nepal and the W Himalaya in 1999 and 2000. Field studies proved to be especially important since the species are mostly big plants and sometimes grow together with similar taxa. Species are represented in herbaria therefore often by mixed or inadequate gatherings, e.g. only comprising the tops of such big plants, or lacking fruits, etc. A most valuable background for the study of the Himalayan taxa constituted our own herbarium collections of and field observations on Chinese species of the *Selinum-Ligusticum* group made in Sichuan and Yunnan between 1996 and 1998.

Due to their eminent taxonomic importance we focused our studies on morphological and anatomical features of the mericarps, employing standard techniques. Unfortunately, we had no reliable material of *Oreocome filicifolia*. For comparison the fruits of *Ligusticum gyirongense* were studied too. The following taxa and specimens were carpologically investigated:

Ligusticopsis brachyloba (Franch.) Leute: China, coteaux calcearais au pied du Yang-in-chan (Lankong), 15.9.1885, *Delavay 2027* (P, syntype).

L. dielsiana (H. Wolff) Pimenov & Kljuykov: China, Sichuan, between Yajiang and Litang, 29°59'N, 100°52'E, 23.9.1998, *Pimenov & Kljuykov* (MW).

Ligusticum gyirongense R. H. Shan & H. T. Chang: China, Xizang, Gyirong, 4.11.1967, *Jiang & Zhao 345* (PE, holotype).

Oreocome candollei (Wall. ex DC.) Edgew.: (1) In montibus Nepaliae, ad Kamaon [Napoliae montis], 1821, *Wallich [582]* (G-DC, lectotype); (2) E Himalaya, Central Nepal, south slopes of Annapurna mountain massif, valley of Modi Khola, right bank, between Doban (Dovan) and Himalaya Hotel, 28°28'N, 83°52'E, 2700 m, 22.10.1999, *Pimenov & Kljuykov 12* (MW).

O. elata Edgew.: (1) India, Punjab, Simla, 1884, *Drummond 1608* (LE, det. C. B. Clarke); (2) India, Himachal Pradesh, Kullu distr., Pir Punjal Range, S slope of Rohtang Pass, Kothi, 32°19'N, 77°10'E, 2740 m, 26.8.2000, *Pimenov & Kljuykov, 13 & 15* (MW).

O. hindukushensis Pimenov & Kljuykov: Pakistan, E-Hindukush, Sai Valley, *Picea smithiana* forest, 3100 m, 1.9.1993, *Schickhoff 2035* (GOET, holotype).

O. depauperata Pimenov & Kljuykov: Nepal, Wangang (Ronnz distr.), 1660 m, 17.10.1977, *Manandhar 421* (KATH, holotype).

O. involucellata Pimenov & Kljuykov: Nepal, Langtang National Park, basin of the Trisuli Khola, between Sing Gompa and Chalong Pati, margins of *Abies spectabilis-Tsuga dumosa* forest, 28°07'N, 85°20'E, 3400 m, 31.10.1999, *Pimenov & Kljuykov 39* (MW, holotype).

Selinum carvifolia (L.) L.: Russia, Moscow province, Serpukhov distr., Sharapova Okhota, 30.8.1977, *Kljuykov* (MW); ibid., Kolomna distr., Peski, 18.6.1984, *Pimenov* (MW).

S. coniifolium (DC.) Benth. (Syn.: *Oreocome cicutaria* (Lindl.) Edgew., *O. filicifolia* Edgew.): India, Himachal Pradesh, Kullu distr., Pir Panjal Range, southern slope, Rohtang Pass, 6 km below near Marrhi, 32°20'N, 77°13'E, 3300 m, 27.8.2000, *Pimenov & Kljuykov 21* (MW).

S. cryptotaenium Boissieu: China, prairies du Yo-ling-chan, 8.1893, *Delavay 6722* (P, holotype).

S. cryptotaenium sensu Chang (= *Oreocome limprichtii* (H. Wolff) Pimenov & Kljuykov): China, Yunnan, Tali Co., Diancang Shan Mts, eastern slope, above Yangbi, rich mixed forests, 25°42'N, 100°06'E, 3200 m, 4.10.1998, *Pimenov, Kljuykov, Hu & Liu 552* (MW).

S. striatum (DC.) Benth.: (1) Himalaya, Central Nepal, Langtang National Park, basin of Trisuli Khola, between Dhunche and Sing Gompa, 28°07'N, 85°20'E, 1900 m, 31.10.1999, *Pimenov & Kljuykov 27* (MW); (2) Nepal, ad argos alyzaceous convallis Nepaliae magnae, 1821, *Wallich [583]* (G-DC, lectotype).

S. wallichianum (DC.) Raizada & H. O. Saxena: (1) Nepal, in monto Emodo ad Kamaon & Gossain- Than [Emody ad Gossain Than], *Wallich 579* (G-DC, lectotype); (2) E Himalaya, Central Nepal, S slopes of Annapurna mountain massif, valley of Modi Khola, right bank, between Doban (Dovan) and Himalaya Hotel, 28°28'N, 83°52'E, 2700 m, 22.10.1999, *Pimenov & Kljuykov 19* (MW).

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Results

The results of our morphological and carpological studies in Sino-Himalayan species of the *Selinum-Ligusticum* group related to the generic name *Oreocome* are summarized in Table 1. The mericarp anatomy of the species investigated is illustrated in Fig. 1-18, the petiole anatomy in Fig. 19-23.

Selinum vaginatum Edgew. showed a quite different fruit structure (for instance, its fruits have no vallecular and commissural vittae). It was therefore excluded from this study and will be regarded later separately. *S. papyraceum* C. B. Clarke was already transferred to *Conioselinum* (Pimenov & Kljuykov 1999).

Results of the carpological studies

Selinum carvifolia (L.) L. and *Oreocome candollei* (Wall. ex DC.) Edgew.

The first challenge is the comparison of the Sino-Himalayan *Selinum* species with *S. carvifolia,* which provides the type of the generic name *Selinum*. Their similarity in leaf structure is obvious, having been a basis for the attribution of the Himalayan species to *Selinum*. Leaf characters are not, however, reliable in *Umbelliferae* taxonomy, especially for generic classification.

Althought the taxonomically more reliable carpo-anatomy was studied in *Selinum carvifolia* more than once (Thellung 1926, Klan 1947, Leute 1970, Lavrova & al. 1983, etc.), it needed some refining. Our studies of the mericarps of *S. carvifolia* (Fig. 1-2) revealed the following features: mericarps elliptic, slightly compressed dorsally, 3.2-4.5 mm long, 2.5-3.5 mm broad, 0.8 mm thick, mericarp cavity 1.1-1.3 mm broad; stylopodium conical, styles 1.2-1.7 mm long, reflexed on the dorsal side of the mericarp; calyx teeth absent; dorsal ribs winged, 0.2-0.4 mm wide, marginal ribs broadly winged, 1.0-1.1 mm wide; secretory ducts 1-3 per vallecula and 3-5 on the commissural face; exocarp c. 10 µm thick, unilayered, covering the ventral mericarp face up to the carpophore (commissure very narrow); vascular bundles sclerified, stretched radially, occupying most of the ribs; endocarp 8-15 µm thick; commissural face of endosperm flat or slightly convex.

Oreocome candollei is rather similar to *Selinum carvifolia* in mericarp morphology, its mericarp anatomy, in contrast, reveals some essential differences, particularly in the width of the commissure and the fibro-vascular structure of the ribs (Fig. 3-4): mericarps elliptic, strongly compressed dorsally, 5-6 mm long, 3.5-4.5 mm broad, 0.7-1.4 mm thick, mericarp cavity 2.1-2.2 mm broad; stylopodium short-conical, styles 0.5 mm long, reflexed on the dorsal side of the mericarp; calyx teeth acute, lanceolate-triangular or lanceolate-linear, shorter than stylopodia; dorsal ribs winged, 0.2-0.7 mm wide, marginal ribs broadly winged, 0.9-1.2 mm wide; secretory ducts 1-3 per vallecula and 3-5 on the commissural face; exocarp 8 µm thick, often compressed, interrupted near the commissural ducts (commissure rather narrow); vascular bundles situated at the bases of the ribs, distal part of marginal ribs composed of lignified parenchyma cells with pitted walls; endocarp compressed; commissural face of endosperm flat or slightly concave.

Apart from the carpo-anatomical differences, *Selinum carvifolia* and *Oreocome candollei* also differ in other features: the calyx teeth are long, lanceolate-triangular or linear-lanceolate in *O. candollei,* as it was first noted by Edgeworth, but are completely absent in *S. carvifolia*. Less significant but clear differences show the stem structure. The stems in *S. carvifolia* have numerous prominent, thinly winged ribs in their lower part whereas the stems of *O. candollei* do not have them.

Oreocome elata Edgew. (≡ *Selinum elatum* (Edgew.) M. Hiroe)

Mericarps (Fig. 5) elliptic, strongly compressed dorsally, 6.2-8.5 mm long, 4.5-6.0 mm broad, 1.2-1.5 mm thick; mericarp cavity 2.4-3.0 mm broad; stylopodium short-conical, styles c. 1 mm long, reflexed on dorsal side; calyx teeth lanceolate to lanceolate-linear, approximately equalling the stylopodia; dorsal ribs winged, 0.6-0.7 mm wide, marginal ribs broadly winged, 1.3-1.6 mm

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Table 1. Synopsis of the carpological data of the species of the Sino-Himalayan *Selinum-Ligusticum* group related to the generic name *Oreocome*. – Measurements are in millimetre unless otherwise stated.

	Selinum carvifolia (Fig. 1-2)	*Oreocome candollei* (Fig. 3-4)	*Oreocome elata* (Fig. 5)	*Selinum striatum* (Fig. 6-8)	*Ligusticum gyirongense* (Fig. 9)	*Selinum wallichianum* (Fig. 10)	*Selinum cryptotaenium* (Fig. 15)	*Oreocome hindukushensis* (Fig. 16)	*Oreocome involucelllata* (Fig. 17)	*Oreocome depauperate* (Fig. 18)	*Selinum coniifolium* (Fig. 13)
Mericarp											
shape	elliptic	elliptic	elliptic	elliptic	elliptic	elliptic	elliptic to ovate	elliptic	elliptic	elliptic	elliptic
dorsal compression	slight	strong	strong	slightly	slightly	strong	compressed	slightly	slightly	slightly	strong
size	3.2-4.5 × 2.5-3.5	5-8 × 3.5-5.5	6.2-8.5 × 4.5-6.0	2.9-4.0 × 1.4-2.0	3.2 × 1.9	4.0-4.6 × 3.3-3.8	4-5.6 × 2.3-4.6	4.5 × 2.7	4.6-5.0 × 2.8	—	5 × 3.5-4
thickness	0.8	0.7-1.4	1.2-1.5	0.8-1.0	1.0	0.6-0.9	0.9-1.1	1.0	1.2	—	1.0
cavity width	1.1-1.3	2.1-3.2	2.4-3.0	1.4	1.4	1.7-2.0	2.1	1.6	1.3	—	2.0
Stylopodium	conical	short-conical	short-conical	short-conical to conical	short-conical	short-conical	short-conical	short-conical	short-conical	short-conical	short-conical
Style											
length	1.2-1.7	0.7	c. 1	0.6	0.5	0.7	0.5-1	1.5	1.0	—	1.0-1.1
form	reflexed on the dorsal side	curved	reflexed	reflexed on the dorsal side	reflexed on the dorsal side	reflexed on the dorsal side	straigth	straigth, or reflexed on the dorsal side	reflexed on the dorsal side or straigth	reflexed on the dorsal side	straight, or reflexed on the dorsal side
Calyx teeth	absent	acute, shorter than stylopodia	lanceolate to lanceolate-linear, equalling stylopodia	lanceolate	lanceolate, acute, equal to stylopodium	linear, longer than stylopodia	linear to linear-lanceolate, shorter than stylopodia	filiform, at fruiting reflexed, longer than stylopodia	narrow-lanceolate	linear-lanceolate	linear, longer than stylopodia
Dorsal ribs											
shape	narrow-winged,	narrow winged,	winged,	keeled or slightly winged	keeled,	keeled,	slightly winged, unequal	narrow-winged, unequal,	winged,	Winged	keeled,
width	0.2-0.4	0.2-0.7	0.6-0.7	0.2-0.4	0.2-0.3	0.1-0.2	0.2-0.5	0.2-0.5	0.6-0.8	—	0.3-0.4
Marginal ribs											
shape	winged	winged	winged	equalling as dorsal ribs,	slightly winged,	winged	winged	winged	winged	winged broader than dorsal	winged
width	1.0-1.1	0.9-1.2	1.3-1.6	0.3-0.6	0.4	0.8-1.0	1.2-1.4	0.5-0.7	0.9-1.2	—	0.9-1

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Vittae per vallecula	1-3	1-3	1-2	1-2	1-2	1-3	1-2	1	2-3	2-3	1-3
Commissural vittae	3-5	3-5	2-4	2-4	3-4	2-6	1-2	4	4	4	6
Exocarp [µm]	c. 10, unilayered	8, often compressed	thin, often compressed	thin	thin	10-20	thin	thin, slightly lignified	thin		thin
Commissure width	very narrow (exocarp covering ventral face of mericarp up to carpophore)	rather narrow (exocarp interrupted near commissural ducts)	very narrow (exocarp interrupted near carpophore)	rather narrow (exocarp interrupted near commissural ducts)	rather narrow (exocarp interrupted near commissural ducts)	very broad (exocarp covering only edges of marginal ribs)	rather narrow (exocarp interrupted near commissural ducts)	very narrow (exocarp interrupted near carpophore)	rather narrow (exocarp interrupted near commissural ducts)	very narrow (exocarp covering ventral face of mericarp up to carpophore)	very broad (exocarp covering only edges of marginal ribs)
Vascular bundles	sclerified, streched radially, occupying the most of the ribs	at the rib bases, marginal ribs distally of lignified parenchyma cells with pitted walls	at the rib bases, mesocarp in ribs and valleculas mainly of lignified parenchyma cells with pitted walls	near the rib bases, mesocarp in distal parts of ribs sometimes of lignified parenchyma cells with pitted walls	at the rib bases, scanty lignified parenchyma with pitted walls	at the rib bases, marginal ribs distally of lignified parenchyma cells with pitted walls	at the rib bases, lignified parenchyma cells with pitted walls in distal parts of the ribs	at the rib bases, ribs without lignified parenchyma cells with pitted walls	at the rib bases, ribs distally of lignified parenchyma cells with pitted walls	at the rib bases	at the rib bases, marginal ribs distally of lignified parenchyma cells with pitted walls
Endocarp [µm]	8-15	compressed	thin	thin	thin	4-5	thin	thin	thin		thin
Endosperm commissural face	flat or slightly concave	flat or slightly concave	slightly concave	flat or slightly concave	slightly concave	flat or slightly concave	flat	slightly concave	flat or slightly concave	flat	flat

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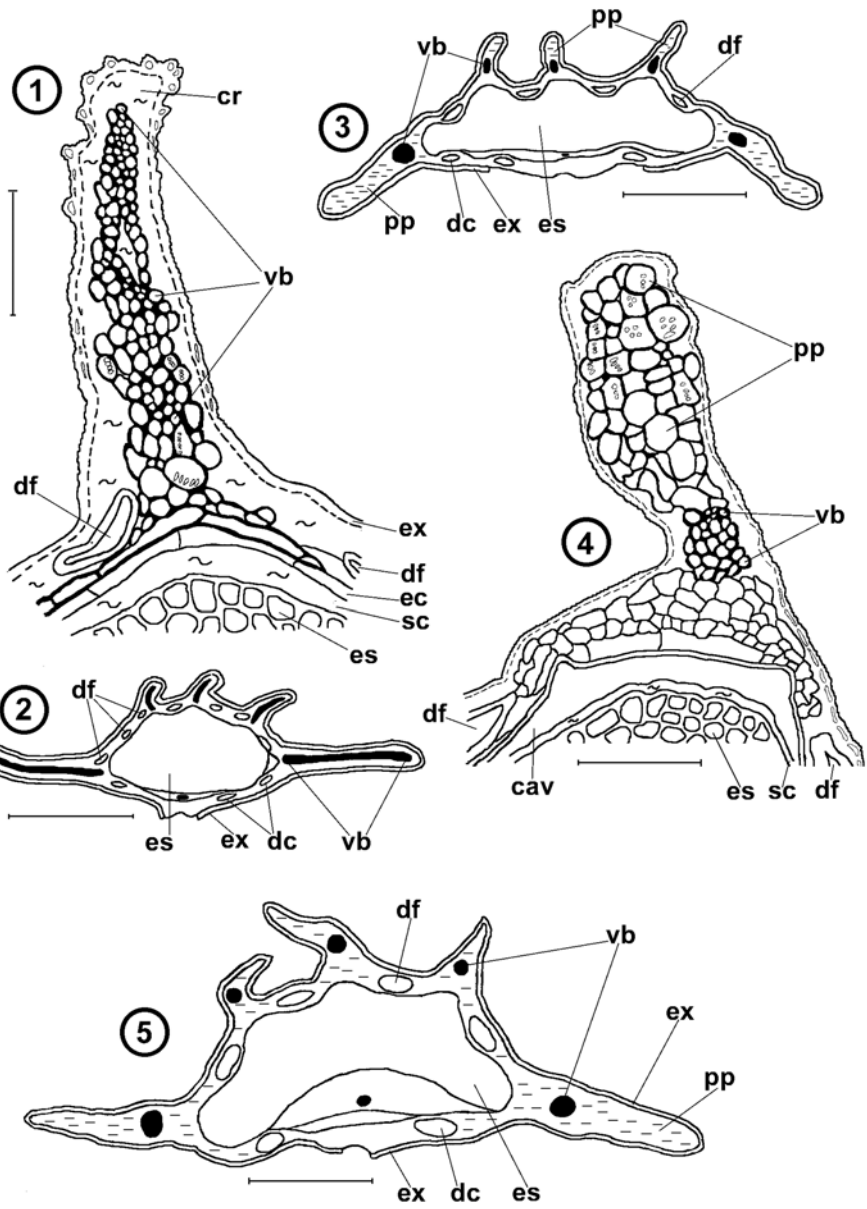


Fig. 1-5. Transects of mericarps – 1-2: *Selinum carvifolia, Kljuykov* (MW), dorsal rib (1); schematic transect (2); 3-4: *Oreocome candollei, Wallich 582* (G-DC), schematic transect (3), dorsal rib (4); 5: *Oreocome elata, Drummond 1608* (LE), schematic transect. – Scale bars: 1 + 4 = 0.1 mm; 2-3 + 5 = 1 mm; abbreviations: cav = cavity, cr = crushed cells, dc = commissural secretory ducts, df = secretory ducts in furrows, dr = small secretory duct in distal part of rib, ec = endocarp, es = endosperm, ex = exocarp, pp = parenchyma cells with lignified pitted walls, sc = seed coat, vb = vascular bundles.

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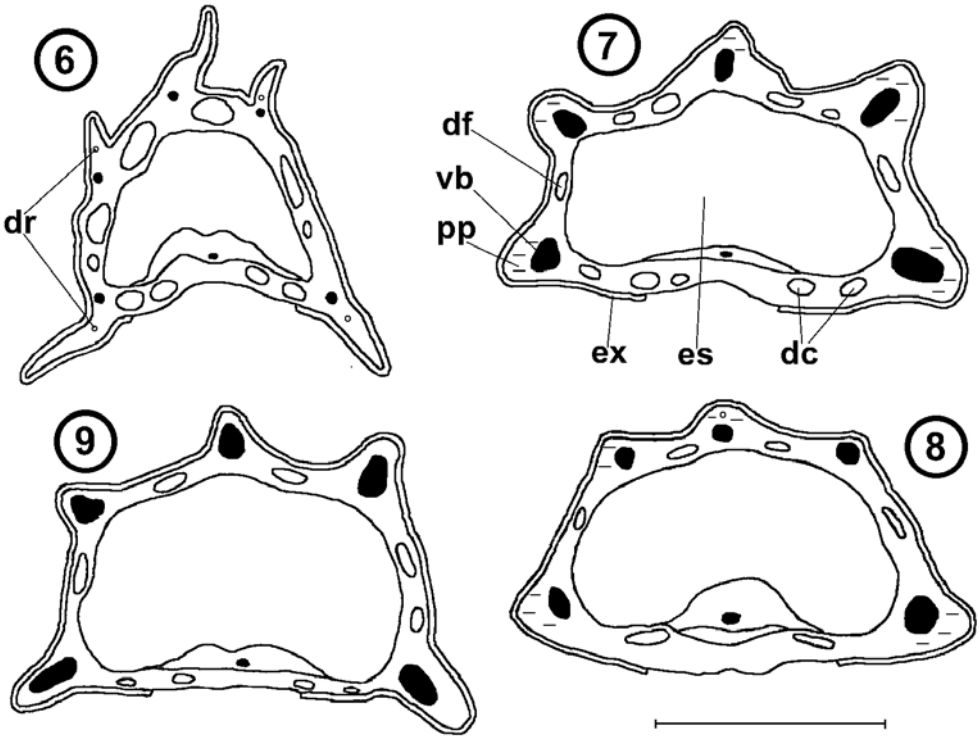


Fig. 6-9. Transect of mericarps – 6: *Oreocome striata, Wallich* (G); 7-8: *Oreocome striata,* variation of the mericarp structure in the same population, *Pimenov & Kljuykov 27* (MW); 9: *Ligusticum gyirongense, Jiang & Zhao 345* (PE). – Scale bar: 1 mm; for the abbreviations see caption of Fig. 1-5.

wide; secretory ducts 1-2 in the valleculas and 2-4 on the commissural face; exocarp thin, often compressed, interrupted near the carpophore (commissure very narrow); vascular bundles situated at the bases of the ribs, mesocarp in ribs and valleculas composed mainly of lignified parenchyma cells with pitted walls; endocarp thin; commissural face of the endosperm slightly concave.

In all essential characters the fruits of *Oreocome elata* are thus similar to those of *O. candollei.*

***Selinum striatum* (DC.) Benth**.

Mericarps (Fig. 6-8) elliptic, slightly compressed dorsally, 2.9-4.0 mm long, 1.4-2.0 mm broad, 0.8-1.0 mm thick, mericarp cavity 1.4 mm broad; stylopodium short-conical to conical, styles 0.6 mm, reflexed on the dorsal side of the mericarp; calyx teeth lanceolate, approximately equalling the stylopodia; dorsal and marginal ribs keeled or slightly winged, almost equal, dorsal ribs 0.2-0.4 mm wide, marginal ribs 0.3-0.6 mm wide; secretory ducts 1-2 per vallecula and 2-4 on the commissural face; small ducts present distally of the vascular bundles; exocarp thin, interrupted near the commissural ducts (commissure rather narrow); vascular bundles situated near the rib bases, mesocarp in distal parts of the ribs sometimes composed of lignified parenchyma cells with pitted walls; endocarp thin; commissural face of the endosperm flat or slightly concave.

Mericarp morphology and anatomy of *Selinum striatum* clearly correspond to *Oreocome candollei*.

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***Ligusticum gyirongense* R. H. Shan & H. T. Chang**

Ligusticum gyirongense was described from S Xizang, near to Nepalese border. The type locality (Gyirong) is situated in the valley of the Kyirong river, named Bhote Khosi on the Nepalese territory. Our collection of *Selinum striatum* from Nepal (near Dhunche) was made near the junction of this river with Trisuli Khola, aproximately 40 km from the locus classicus of *L. gyirongense*. Comparing the descriptions of *S. striatum* and *L. gyirongense* we did not find any essential difference. This was confirmed by the study of the type material of *L. gyirongense.*

Mericarps (Fig. 9) elliptic, slightly compressed dorsally, 3.2 mm long, 1.9 mm broad, 1.0 mm thick, mericarp cavity 1.4 mm broad; stylopodium short-conical, styles 0.5 mm, reflexed on the dorsal side of the mericarp; calyx teeth lanceolate, acute, equalling the stylopodium; dorsal ribs keeled, 0.2-0.3 mm wide, marginal ribs slightly winged, 0.4 mm wide; secretory ducts 1-2 per vallecula and 3-4 on the commissural face; exocarp thin, interrupted near the commissural ducts (commissure rather narrow); vascular bundles located at the rib bases, lignified parenchyma cells with pitted walls scanty; endocarp thin; commissural face of the endosperm slightly concave.

Also in mericarp features *Selinum striatum* and *Ligusticum gyirongense* are very similar if not completely identical. Their description and consequent treatment in different genera reflect the artificial taxonomic dichotomy between *Ligusticum* and *Selinum* in vallecular vittae number (actually this number varies in numerous species, including *S. striatum*). This character has been adopted by many *Umbelliferae* taxonomists, beginning probably with Clarke, althought he observed some variability in the mericarp secretory system of Himalayan *Selinum* species. Small differences between the two taxa may be treated as infraspecific, and so we regard *L. gyirongense* as a later synonym of *S. striatum*.

***Selinum wallichianum* (DC.) Raizada & H. O. Saxena**

Whereas the fruits of *Selinum elatum* and *S. striatum* (incl. *Ligusticum gyirongense*) correspond in all essential features with *S. candollei, S. wallichianum* shows clear differences.

Mericarps (Fig. 10) elliptic, strongly compressed dorsally, 4.0-4.6 mm long, 3.3-3.8 mm broad, 0.6-0.9 mm thick, mericarp cavity 1.7-2.0 mm broad; stylopodium short-conical, styles 0.7 mm long, reflexed on the dorsal side of the mericarp; calyx teeth linear, longer than stylopodia; dorsal ribs keeled, 0.1-0.2 mm wide, marginal ribs broadly winged, 0.8-1.0 mm wide; secretory ducts 1-3 per vallecula and 2-6 on the commissural face; exocarp 10-20 µm thick, covering only edges of marginal ribs (commissure very broad); vascular bundles located at the bases of ribs, distal part of marginal ribs composed of lignified parenchyma cells with pitted walls; endocarp 4-5 µm thick; commissural face of the endosperm flat or slightly concave.

As was noted repeatedly by many authors, starting with A. de Candolle, who described it under *Peucedanum,* to contemporary colleagues, *S. wallichianum* has dorsally strongly compressed fruits with distinctly unequal dorsal and marginal ribs, the latter being broadly winged and thickened near their distal ends. Our analysis adds relevant characters such as the commissure width: the exocarp of *S. wallichianum* is interrupted near the distal ends of the marginal ribs, in contrast to the narrower commissure in *S. candollei, S. striatum* and *S. elatum*. Moreover, the vittae in the mericarp valleculas are not usually solitary [(1) 2-3] and the calyx teeth are longer than the stylopodia.

This fruit type corresponds to that of *Ligusticopsis,* a genus previously treated as endemic to China, rather than to *Oreocome.* Later some species of *Ligusticopsis* were returned back to *Ligusticum* (Pu 1991) and the genus has been disputed. It has, however, to be emphasized that no essential differences exist between the *Ligusticopsis* species and *S. wallichianum,* neither in carpological nor in other features. The closest relatives of *S. wallichianum* are *L. brachyloba,* which is confirmed by strong similarity in fruit anatomy (Fig. 11), and *L. dielsiana* (H. Wolff) Pimenov & Kljuykov (= *Ligusticum rechingerana* Leute) (Fig. 12), which provides the type of the generic name *Ligusticopsis.*

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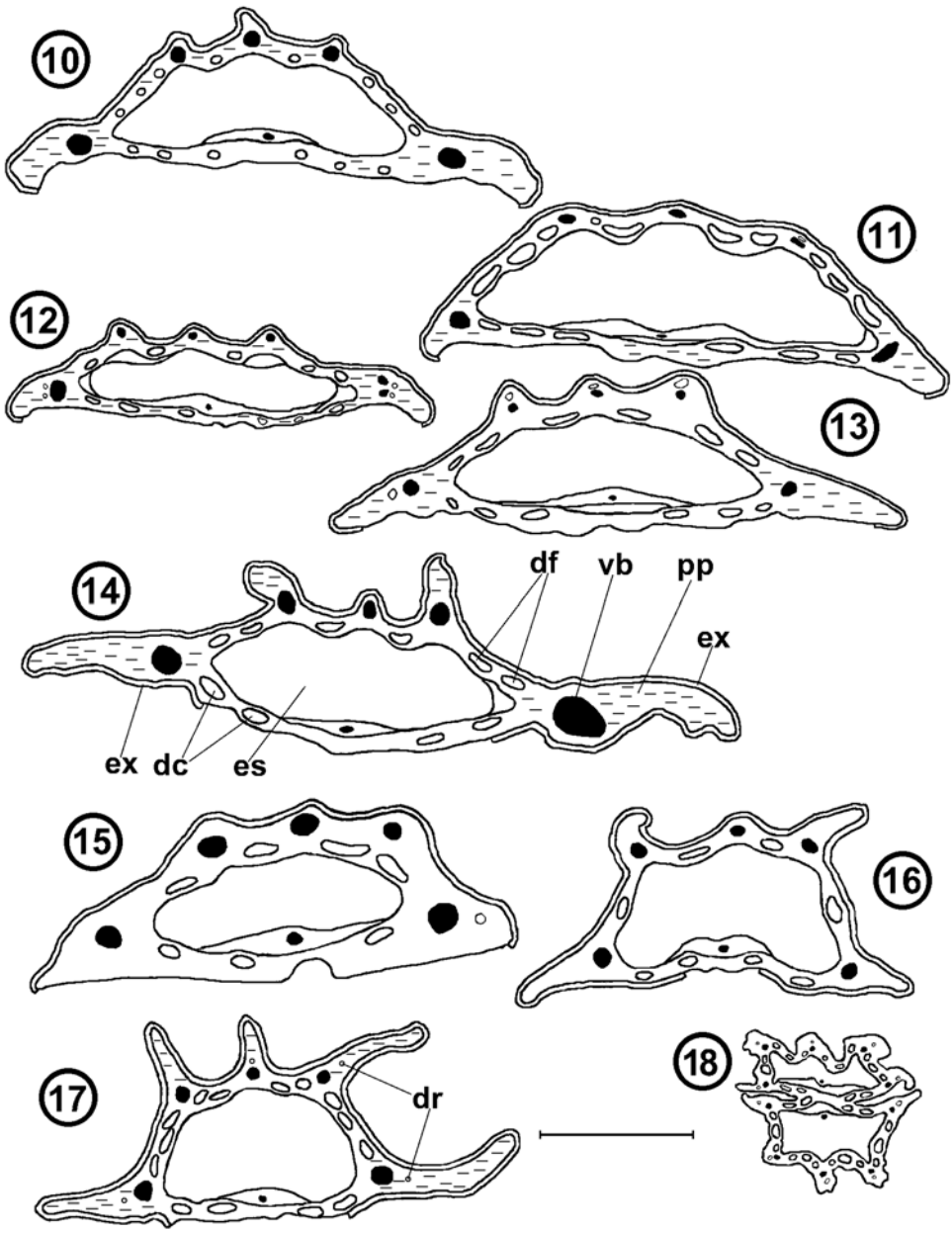


Fig. 10-18. Transect of mericarps – 10: *Selinum wallichianum, Pimenov & Kljuykov 19* (MW); 11: *Ligusticopsis brachyloba, Delavay 2027* (P); 12: *Ligusticopsis dielsiana, Pimenov & Kljuykov 329* (MW); 13: *Ligusticopsis coniifolia, Pimenov & Kljuykov 21* (MW); 14: *Oreocome limprichtii, Pimenov & Kljuykov 552* (MW); 15: *Selinum cryptotaenium, Delavay 6722* (P); 16: *Oreocome hindukushensis, Schickhoff 2035* (GOET); 17: *Oreocome involucellata, Pimenov & Kljuykov 39* (MW); 18: *Oreocome depauperata, Manandhar 421* (KATH). – Scale bar: 1 mm; for the abbreviations see caption of Fig. 1-5.

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***Selinum coniifolium* (DC.) Benth. (= *Oreocome cicutaria* (Lindl.) Edgew. , *O. filicifolia* Edgew.)**

The western vicariant of *Selinum wallichianum,* known in old taxonomic and floristic literature as *Oreocome cicutaria* (Lindl.) Edgew. or *O. filicifolia* Edgew., was frequently observed and collected by us in Himachal Pradesh and Uttar Pradesh during our trip in 2000.

Mericarps (Fig. 13) elliptic, strongly compressed dorsally, 5.0 mm long, 3.5-4 mm broad, 1.0 mm thick, mericarp cavity 2.0-2.0 mm broad, with distinctly unequal dorsal and marginal ribs, the latter broadly winged, 0.9-1.0 mm wide, but not thickened distally. Commissure very broad, exocarp interrupted near the distal ends of the marginal ribs. Secretory ducts in dorsal valleculas usually solitary, in lateral ones 2-3, and 6 on the commissural side. Calyx teeth longer than the stylopodia; stylopodium short-conical, styles 1.0-1.1 mm long, reflexed on the dorsal side of the mericarp.

The mericarp featurers correspond to *Selinum wallichianum* and are of the *Ligusticopsis* type. The correct name of this species under *Ligusticopsis* is *L. coniifolia* (see below).

***Selinum cryptotaenium* sensu Chang (1985) and sensu typi**

Selinum cryptotaenium, as illustrated in the "Flora RP Sinicae" (Chang 1985), is similar to *Oreocome candollei* in most characters. We collected material, concurring with this illustration, in Yunnan, near Lijiang in the Yulong Shan Mts and near Tali, in the Diancang Shan Mts. The species is apparently widespread in that province and, probably, in the adjacent parts of Sichuan and Guizhou. It is closely related to but not identical with Nepalese populations of *O. candollei,* differing from the latter in the absence of bracts and entirely smooth stems (the stem in *O. candollei* is slightly ribbed).

Mericarps (Fig. 14) elliptic to ovate, more or less compressed dorsally, 4.0-5.6 mm long, 2.3-4.6 mm broad, 0.9-1.1 mm thick, mericarp cavity 2.1 mm broad; stylopodium short-conical, styles 0.5-1 mm, straight; calyx teeth linear to linear-lanceolate, shorter than stylopodia; dorsal ribs slightly winged, unequal to each other, 0.2-0.5 mm wide, marginal ribs considerably broader, winged, 1.2-1.4 mm wide; secretory ducts 1-2 per vallecula and 4 on the commissural face; exocarp thin, interrupted near the commissural ducts (commissure rather narrow); vascular bundles located at the bases of the ribs, lignified parenchyma cells with pitted walls in distal parts of the ribs; endocarp thin; commissural face of the endosperm flat.

The fruit structure is thus clearly of the same type as in *Oreocome candollei* (though the marginal ribs in Chinese material are wider than the dorsal).

Selinum cryptotaenium sensu Chang (1985) differs, however, fundamentally from the holotype of this name kept in P. Fruit anatomy of *S. cryptotaenium* sensu typi (Fig. 15) is similar to that of *S. wallichianum* and of the *Ligusticopsis* type, althought there are some secondary differences in the lignification of mesocarp parenchyma (perhaps an artefact due to fruit damage). The combination in *Ligusticopsis* was already validated by Lavrova (1998). The species is, however, very closely related to *L. brachyloba* (Franch.) Leute and probably conspecific with it. *Selinum candollei* sensu Chang (1985) (including *S. wallichianum*) is also similar to *L. brachyloba* in leaf dissection and general fruit outline and differs from true *O. candollei* essentially in mericarp anatomy, the slightly developed dorsal ribs and some other features.

According to our investigation, *Selinum cryptotaenium* sensu Chang (1985), in contrast, is identical with *Ligusticum limprichtii* H. Wolff (1922), described on the basis of *Limpricht 1053* from Yunnan near Tali. The holotype deposited in Berlin was destroyed during World War II but the rather precise description matches very well the characters of our collection from the same place made in 1998. Also connected with this taxon is the binomial *Pleurospermum glaucescens* H. Wolff, recently transferred to *Ligusticopsis* by Kljuykov & Lavrova (1994). At that time, the mature fruits could not be studied since the type material comprises only fruits in an early stage of development. The comparison of the type of *P. glaucescens* with our collections from Lijiang and Tali (see above) showed their complete identity in all other characters. Thus the correct name for *S. cryptotaenium* sensu Chang (1985) from Yunnan is *L. limprichtii* with *P. glaucescens* as a later synonym.

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Further, hitherto undescribed species

Among rich Himalayan and Tibetian collections from German expeditions to High Asia made in the 1970-90s and kindly sent us by Prof. G. Miehe and Dr B. Dickore, we discovered a taxon from the E Hindukush similar to *Selinum candollei,* which differs, however, by the presence of unusually long, filiform, reflexed calyx teeth.

Mericarps (Fig. 16) elliptic, slightly compressed dorsally, 4.5 mm long, 2.7 mm broad, 1.0 mm thick, mericarp cavity 1.6 mm broad; stylopodium short-conical, styles 1.5 mm long, straight or reflexed on the dorsal side of mericarp; calyx teeth filiform, reflexed in fruit, longer than stylopodia; dorsal ribs narrow-winged, unequal, 0.2-0.5 mm wide, marginal ribs winged, 0.5-0.7 mm wide; secretory ducts in the valleculas solitary, 4 on the commissural face; exocarp thin, slightly lignified, interrupted near the carpophore (commissure very narrow); vascular bundles located at the bases of the ribs, distal part of the ribs composed of lignified parenchyma cells with pitted walls; endocarp thin; commissural face of the endosperm slightly concave.

The mericarp features clearly match the *Oreocome* type of the fruit. The species is described below as *O. hindukushensis*.

A second species not matching any of the known species we collected in Nepal. Is differs from the sympatric *Selinum candollei, S. striatum* and *S. wallichianum* in prominent oblanceolate, sometimes toothed bracteoles and in leaf dissection.

Mericarps (Fig. 17) elliptic, slightly compressed dorsally, 4.6-5.0 mm long, 2.8 mm broad, 1.2 mm thick, mericarp cavity 1.3 mm broad; stylopodium short-conical, styles 1.0 mm long, reflexed on the dorsal side of the mericarp or straight; calyx teeth lanceolate, narrow; dorsal ribs winged, 0.6-0.8 mm wide, marginal ribs broader, winged, 0.9-1.2 mm; secretory ducts 2-3 per vallecula and 4 on the commissural face; small ducts present distally of the vascular bundles; exocarp thin, interrupted near the commissural ducts (commissure rather narrow); vascular bundles located at the bases of the ribs, lignified parenchyma cells with pitted walls occupying the distal parts of the ribs; endocarp thin; commissural face of the endosperm flat or slightly concave.

The mericarp anatomy thus is of the *Oreocome* type too.

A third new species from W Nepal , closely related to latter and very similar to it in fruit anatomy (Fig. 18), was found among the herbarium collections kept in KATH. Its description is given below.

Results of studies of the petiole anatomy

Features of the petiole anatomy have some value in the *Umbelliferae* taxonomy. However, homoplasies are frequent within and among genera. The petioles of *Selinum carvifolia* have been described previously (Lavrova & al. 1982). For comparison we studied *Oreocome candollei, O. striata, O. involucellata, O. limprichtii* and *S. wallichianum* (Fig. 19-23). All these species, including *S. carvifolia,* have similar petioles: they are fistulose with peripherical vascular bundles and corresponding collenchyma columns. Differences were observed only in the relative size of the central cavity (comparatively narrow in *O. striata* and *O. involucellata,* comparatively large in the remaining species) and in the size of the adaxial side groove (*O. striata* and *O. involucellata* have larger and deeper grooves than other species). Petiole anatomy in *O. striata* matches completely with *Ligusticum gyirongense* (Pan & al. 1992).

As a result, we here treat *Oreocome* as an endemic Sino-Himalayan genus, into which *Selinum striatum* (with the synonym *Ligusticum gyirongense*) and *Ligusticum limprichtii* must be transferred, in addition to the species having been in it initially. Three new species are to be described in *Oreocome,* based on collections from Pakistan and Nepal. The differences of *Oreocome* from related genera can be summarized as follows:

* from *Cortia* DC. and *Cortiella* C. Norman by ternately pinnate leaves with petiolulate basal primary segments, well developed stems and entire bracteoles;
* from *Conioselinum* Hoffm. by developed calyx teeth and vascular bundles situated at the bases of mericarp ribs;

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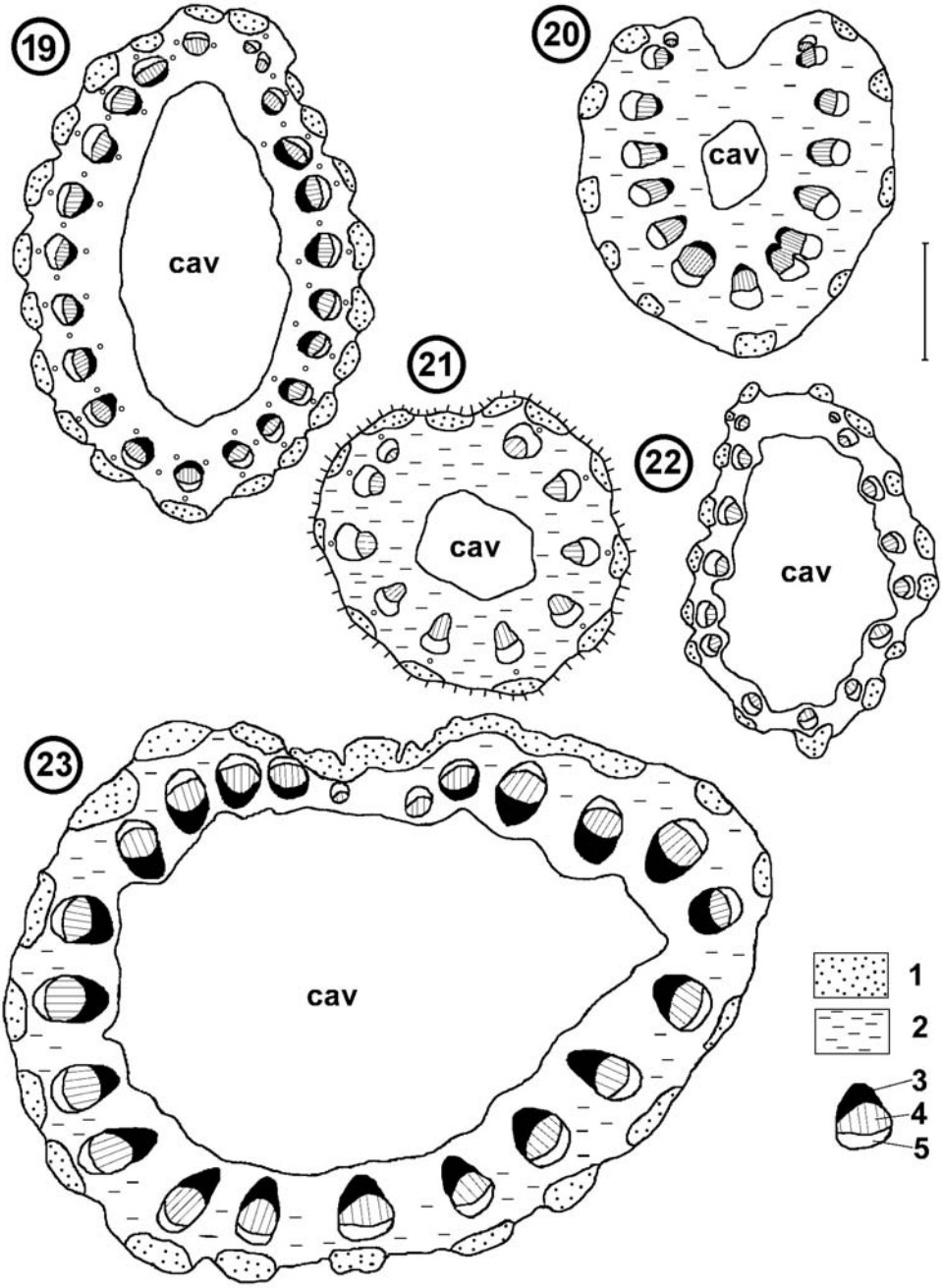


Fig. 19-23. Transects of petioles – 19: *Oreocome candollei, Pimenov & Kljuykov 12* (MW); 20: *Oreocome striata, Pimenov & Kljuykov 33* (MW); 21: *Oreocome involucellata, Pimenov & Kljuykov 39* (MW); 22: *Oreocome limprichtii, Pimenov & Kljuykov 538* (MW); 23: *Selinum wallichianum, Pimenov & Kljuykov 19* (MW). – Scale bar: 1 mm; 1= collenchyme; 2 = lignified parenchyma; 3 = sclerenchyma cap of vascular bundle; 4= xylem of vascular bundle; 5 = phloem of vascular bundle, cav = cavity.

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* from *Selinum* L. by round or furrowed umbella peduncles, developed calyx teeth and vascular bundles situated at the bases of the mericarp ribs;
* from *Ligusticopsis* Leute by narrow mericarp commissure and broadly winged (neither keeled nor filiform) dorsal mericarp ribs.

Taxonomy

Oreocome Edgew. in Proc. Linn. Soc. London 1: 252. 1845. – Lectotype (designated by Pimenov & Leonov, Gen. Umbellif.: 81. 1993): *Selinum candollei* DC. ≡ *Oreocome candollei* [*"candollianum"*] (DC.) Edgew.
Six species, distributed from SW China and Viet-Nam to Kashmir and Pakistan.

Key to the species of *Oreocome*

1. Bracts 4-10 2
– Bracts lacking 4
2. Umbels 8-16-rayed; mericarp ribs equal or almost equal, usually short-winged; fruits small, 2.9-4 mm long . . . . . 1. *O. striata*
– Umbels 20-45-rayed; marginal mericarp ribs winged, dorsal clearly narrower; fruits 4.5-8 mm long 3
3. Calyx teeth filiform, longer than stylopodia; styles up to 1.5 mm long; mesocarp cell walls without pits; stems thin, up to 6 mm in diam. . . . . 2. *O. hindukushensis*
– Calyx teeth lanceolate-triangular to lanceolate-linear, shorter than stylopodia; styles up to 0.7 mm long; mesocarp cell walls with pits; stems thick, 15-25 mm in diam . . . . . 3. *O. candollei*
4. Bracteoles lanceolate, longer than umbellets; terminal leaf lobes linear-lanceolate to linear; stems, petioles and petiolules pubescent . . . . . 4. *O. involucellata*
– Bracteoles linear-lanceolate to linear, shorter than umbellets; terminal leaf lobes broader, toothed; stems pubescent only below umbels or glabrous 5
5. Umbels 20-45-rayed; marginal ribs 3-4 times larger than dorsal; secretory ducts in valleculas 1-2 . . . . . 5. *O. limprichtii*
– Umbels 10-16-rayed; marginal and dorsal ribs almost equal; secretory ducts in valleculas 2-3 . . . . . *O. depauperata*

The species of *Oreocome*

1. *Oreocome striata* (DC.) Pimenov & Kljuykov, **comb. nova** ≡ *Ligusticum striatum* DC., Prodr. 4: 158. 1830 ≡ *Selinum striatum* (DC.) Benth. in Bentham & Hooker, Gen. Pl. 1: 914. 1867 ≡ *Ligusticum wallichii* Franch. in Bull. Soc. Philom. Paris, ser. 8, 6: 136. 1894, quiad nomen, excl. pl. ≡ *Cortia striata* (DC.) Leute in Ann. Naturhist. Mus. Wien 73: 85. 1969. – Lectotype: "Nepalia, ad argos oryzaceous convallis Nepaliae magnae", 1821, *Wallich [583]* (G-DC!; isolectotypes: CAL, BM, E, K-W, K, LE!).
= *Pimpinella bengalensis* H. Wolff in Feddes Repert. 17: 170. 1921. – Holotype: India, "Bengalia orientalis sine loco indic, *Griffith 2615/1*" (K?; isotypes: CAL, LE!).
= *Ligusticum gyirongense* R. H. Shan & H. T. Chang in Acta Phytotax. Sin. 24: 315. 1986. – Holotype: China, "Xizang, Gyirong", 4.11.1967, *Jiang & Zhao 345* (PE!), **syn. nov.**

Distribution. – China (Tibet: Xizang A.R.; SW China: Yunnan?), Viet-Nam, Thailand, Burma, Bhutan, Nepal, India (W Himalaya: Uttar Pradesh; N & NE India: Meghalaya, Assam).

Note. – In the Langtang Himal Mts we observed a clear ecological and altitudinal divergence between *Oreocome striata* (lower, mainly open situations) and *O. candollei.*

Ref. – Under *Ligusticum striatum:* Hiroe 1958: 108, 1979: 1071; Hedge & Lamond in Fl. Thailand 5, 4: 462. 1992. – Under *Selinum striatum:* Clarke 1879: 179; Hemsley & Pearson in J.

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Linn. Soc. Bot. 35: 178. 1902; Craib, Fl. Siam. Enum. 1: 790. 1931; Kanjilal & al., Fl. Assam 2: 342. 1938; Mukherjee in Rec. Bot. Surv. India 20,2: 110. 1973; Malla & al., Catalogue Nepal. Vasc. Pl.: 95. 1976; Cannon 1979: 189; Mukherjee & Constance 1993: 179; Watson 1998: 380. – Under *Ligusticum wallichii:* Wu, Index Fl. Yunnan. 1: 916. 1984; Pham-hoang Ho, Illustr. Fl. Vietnam 2,1: 607, t. 5359. 1992. – Under *Pimpinella bengalensis:* Wolff in Engler, Pflanzenr. 90: 305. 1927. – Under *Ligusticum gyirongense:* Pu in Acta Phytotax. Sin. 29: 528. 1991; Pu & al. in Fl. Reip. Pop. Sin. 55,3: 250, t. 110, fig. 1-6. 1992; Pu in Wang, Vasc. Pl. Hengduan Mts: 1339. 1993.

2. *Oreocome hindukushensis* Pimenov & Kljuykov, **sp. nova**
Holotype: Pakistan, E-Hindukush, Sai valley, 3100 m, *Picea smithiana*-forest, 1.9.1993, *Schickhoff 2035* (GOET!). – Fig. 25.

Ab *Oreocome candollei* caulibus tenuibus, ramis lateralibus umbellis centralis not superantibus, dentibus calycinis longis, filiformibus, fructificatione deflexis, stylodiis longioribus et cellulis mesocarpii elignescentibus dignoscitur.

Planta perennis monocarpica, ad 140 cm alt., radicis palaribus, incrassatis. *Collum* indivisum, residuis fibrosis petiolorum foliorum emortuorum dense tectum. *Caulis* rotundus, basi 6 mm in diam., in parte superiore sulculatus, glaber, tantum sub umbellis scabridulis, superne corymbosus, umbellis centralibus ramis lateralibus leviter superantibus. *Folia radicalia* longipetiolata, petiolis glabris, a latere adaxiali late emarginatis, laminis 12-15 cm lg., 8-11 cm lt., ambitu triangularibus, 3-4-pinnatisectis, segmentis basalibus petiolulatis, petiolulis 2-4 mm lg., lobis terminalibus ovatis vel rhomboideis, 7-10 mm lg., margine denticulatis. *Folia caulina* laminis minus dissectis, vaginis brevibus triangulatis, superiora laminis sessilibus, 2-3-pinnatis. Umbellae ad 9 cm in diam., involucri phyllis 9-10, anguste linearibus, breviter pubescentibus, integris, margine albomembranaceis, radiis 29-31, vix inaequalibus, teretibus, 4-6 cm lg., breviter pubescentibus, leviter costatis. *Umbellulae* 25-28-florae, bracteolis 12-14, anguste linearibus, integribus margine anguste albomembranaceis, nervis marginisque breviter pubescentibus, plus minusve umbellulis aequilongis, radiolis inaequalibus, 5-12 mm lg., scabridulis, teretibus. *Dentes calycini* filiformes vel lineari-filiformes, longi, fructificatione plerumque deflexi. Petala alba, 1.2-1.5 mm lg., obovata, basi cuneata, apice incurva et attenuata. *Fructus* ambitu ovales, glabri; stylopodia breve-conica vel clavata, styli tenues, ad 1.5 mm lg., uncinati. *Carpophorum* ad basin bifidum. *Mericarpia* dorso compressa, 4.3-4.6 mm lg., 2.4-2.6 mm lt., jugis marginalibus late alatis, dorsalibus alatis, vix angustioribus, interdum leviter inaequalibus; sectione transversali exocarpium e cellulis minutis leptodermaticis; interruptum prope carpophorum (commissura valde angusta). Mesocarpium in jugis e cellulis amplis, membranis tenuibus elignescentibus compositum. Vittae valleculares solitariae (interdum binae), commissurales 4. Endocarpium e cellulis minutis, membranis leviter lignescentibus. Spermoderma e cellulis minutis compositum. Endospermium a facie commissurali vix emarginatum.

Distribution. – Known only from the type locality.

3. *Oreocome candollei* (Wall. ex DC.) Edgew. in Trans. Linn. Soc. London 20(1): 55. 1846 [*"candollianum"*] ≡ *Selinum candollei* Wall. ex DC. in Prodr. 4: 165. 1830 ≡ *Cortia candollei* (Wall. ex DC.) Leute in Ann. Naturhist. Mus. Wien 73: 83. 1969. – Lectotype: India, "in montibus Nepaleae, ad Kamaon [Napoliae montis]", 1821, *Wallich 582* (G-DC!; isolectotype: E, K).
= *Oreocome elata* Edgew. in Proc. Linn. Soc. 1: 253. 1845 ≡ *Selinum elatum* (Edgew.) M. Hiroe, Umbell. Asia 1: 154. 1958 ≡ *Selinum wallichianum* var. *elata* (Edgew.) Raizada & H. O. Saxena, Fl. Mussoorie 1: 275. 1978. – Holotype: India, "Himala in sylvis, alt. ped. 8000-10000. Mahaseo, Chur.", 1844, *Edgeworth* (K!).

Distribution. – Bhutan, Nepal, India (W Himalaya: Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh), Pakistan.

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Fig. 25. *Oreocome hindukushensis* Pimenov & Kljuykov – holotype (GOET).

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Note. – After examination of the protologues, the herbarium material and, especially, after field observations in Indian and Nepalese Himalaya we have to conclude that there are no reliable diagnostic characters to distinguish *Oreocome candollei* and *O. elata* and that both taxa are conspecific.

Ref. – Under *Selinum candollei:* Edgeworth 1845: 253; Clarke 1879: 700; Kanai in Hara, Fl. E. Himal.: 231. 1966; Nasir 1972: 117, fig. 35, A-C; Mukherjee in Rec. Bot. Surv. India 20,2: 109. 1973; Cannon 1979: 189; Miehe in Bull. Brit. Mus. Nat. Hist. Bot. 16: 258. 1987; Mukherjee & Constance 1993: 180; Watson 1998: 378. – Under *Oreocome elata:* Edgeworth 1846: 54. – Under *Selinum elatum:* Hiroe 1979: 1307; Mukherjee & Constance 1993: 182; Aswal & Mehrotra, Fl. Lahaul-Spiti: 295. 1994.

4. *Oreocome involucellata* Pimenov & Kljuykov, **sp. nova**
Holotype: Nepal, E Himalaya, Langtang National Park, basin of the Trisuli Khola, between Sing Gompa and Shalang Pati, 28º07'N, 85º20'E, 3400 m, 31.10.1999, *Pimenov & Kljuykov 39* (MW!, isotype: KATH!). – Fig. 24.

Species nostra *Oreocome candollei* (Wall. ex DC.) Edgew. affinis, sed lobis terminalibus laminis foliorum linearibus vel lanceolato-linearibus et bracteolis prominentibus, oblanceolatis, umbellulis superantibus bene differt.

Planta perennis monocarpica, 80-100 cm alt., radicis palaribus, incrassatis, fusiformibus vel ramosis. *Collum* indivisum, residuis fibrosis petiolorum foliorum emortuorum dense tectum. *Caulis* plerumque violaceus, leviter geniculatus, fistulosus, rotundus, in parte superiore sulculatus, pilis brevibus patentibus tectus, inferne sparsae, superne dense, corymbosus, ramis lateralibus umbellis centralibus leviter superantibus. *Folia radicalia* longipetiolata, petiolis teretibus, breviter pubescentibus, laminis 8-15 cm lg., 5-9 cm lt., ambitu triangularibus, 3-4-pinnatisectis, segmentis basalibus petiolulatis, petiolulis breviter pubescentibus, ad 10-12 mm lg., lobis terminalibus lanceolatis vel lanceolato-linearibus, 5-7 mm lg., 1.5-2 mm lt., fere glabribus. *Folia caulina* laminis simplificatis, vaginis longis angustis, superiora laminis sessilibus, 2-3-pinnatis. *Umbellae* ad 8-12 cm in diametro, involucris nullis vel bracteis solitariis, radiis 25-32, valde inaequalibus, 2.5-4.5 cm lg., dense pubescentibus, costatis. *Umbellulae* bracteolis oblanceolatis, integribus vel breviter dentatis, nervis marginisque pubescentibus, apice anguste attenuatis, plerumque umbellulis superantibus, radiolis 25-30, inaequalibus, 2-7 mm lg., breviter pubescentibus, costatis. *Dentes calycini* angusti, lanceolato-lineares, margine scabri, stylopodiis aequalibus vel duplo superantibus. Petala alba, obovata, basi cuneata, apice incurva et attenuata. *Fructus* ambitu oblongi, plerumque glabri, rarius aculeolis brevibus; stylopodia breve-conica, styli at 1 mm lg., divergentes vel stricti. *Carpophorum* ad basin bifidum. *Mericarpia* dorso compressa, ambitu ovata vel oblonga, 4.6 mm lg., 2.8-3 mm lt., jugis angustis vel anguste alatis, marginalibus vulgo leviter latioribus; sectione transversali exocarpium e cellulis minutis leptodermaticis; interruptum prope basin jugorum marginalium. Mesocarpium in jugis e cellulis aerenchymis, plus minusve amplis, membranis vix lignescentibus, fissuratim porosis compositum. Vittae valleulares 2-3, commissurales 4-5, jugales tenues, solitariae. Endocarpium et spermoderma e cellulis minutis. Endospermium a facie commissurali fere planum.

Additional collections studied. – NEPAL: Bagmati Zone, Rasuwa District, between Syarpagaon & Langtang, on dry open slopes, 3000 m, 20.9.1966, *Nicolson 2552* (KATH, LE); Kyongchin Gomba, 28°13'-85°34', 3600 m, grasslands, 8.9.1971, *Dobremez 1037* (KATH); Langtang, 3400 m, 5.10.1977, *Manandhar 498* (KATH).

5. *Oreocome limprichtii* (H. Wolff) Pimenov & Kljuykov, **comb. nova** ≡ *Ligusticum limprichtii* H. Wolff in Feddes Repert. Beih. 12: 452. 1922. – Holotype: China, "Yunnan: Tali fu, Tsang shan, 3000 m", *Limpricht 1053* (B, destroyed). – Neotype (here designated): China, Yunnan, Tali Co., Diancang Shan Mts, eastern slope, above Yangbi, rich mixed forests, 25°42'N, 100°06'E,

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Fig. 24. *Oreocome involucellata* Pimenov & Kljuykov – holotype (MW).

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3000-3600 m, 4.10.1998, *Pimenov, Kljuykov, Hu & Liu 552* (MW! isoneotypes: MO! NAS!).
= *Pleurospermum glaucescens* H. Wolff in Feddes Repert. 27: 114. 1929 ≡ *Ligusticopsis glaucescens* (H. Wolff) Lavrova & Kljuykov in Bot. Žurn. 79(10): 105. 1994. – Lectotype (designated here): China, "Yunnan, Yangtze watershed, prefertural district of Likiang, eastern slopes of Likiang Snow Range, Lu Kago, alpine meadow, 12000 ft.", 16.6.1922, *Rock 4516* (US!); paralectotype: "Yunnan, Yangtze watershed, prefectural district of Likiang, eastern slopes of Likiang Snow Range", 1922, *Rock 4481* (E!).
– *Selinum cryptotaenium* auct., non H. Boissieu: Chang in Fl. Reip. Pop. Sin. 55,2: 226, t. 92, fig. 1-6. 1985.

Distribution. – China (SW China: Sichuan, Guizhou, Yunnan).

Ref. – Under *Pleurospermum glaucescens:* Wu, Index Fl. Yunnan. 1: 922. 1984.

6. *Oreocome depauperata* Pimenov & Kljuykov, **sp. nova**
Holotype: Nepal, Daha Kharka (Humla distr.), 3500 m, smelly herb on open subalpine pasture, 18.8.1985, *Shakya, Subedl & Uprety 8701* (KATH!). – Fig. 26.

Ab affini *Oreocome involucellata* lobis terminalibus laminis foliorum latioribus lanceolatis vel ovatis, caulibus glaberrimis, bracteolis angustioribus brevioribusque (umbellulae brevioribus), radiis subaequilongis, paucioribus (10-16 non 25-32) et radiolis paucioribus (12-19 non 25-30) differt.

Planta perennis polycarpica (?), 40-50 cm alt., radicibus palaribus, incrassatis, ramosis. *Collum* ramosum, residuis fibrosis petiolorum foliorum emortuorum tectum. *Caules* solitarii vel bini, rotundati, glabri, vix corymboso ramosi. *Folia radicalia* numerosa, longipetiolata, laminis 5-8 cm lg., 2.5-3.5 cm lt., ambitu triangularibus vel rhomboideis, 2-3-pinnatisectis; segmentis basalibus petiolulatis, petiolulis 10-15 mm lg., lobis terminalibus lanceolatis, 5-7 mm lg., dentatis. *Folia caulina* 2-3, laminis simplificatis, vaginis longis angustis. *Umbellae* 2.5-3.5 cm in diam., involucris nullis vel rarius bracteis solitariis, radiis 14-16, subaequilongis, subglabis vel breviter pubescentibus. *Umbellulae* bracteolis 8-12, lanceolatis vel linearis, apice anguste attenuatis, subglabris, radiolis brevioribus; radioli 12-19, 3.5-5.5 mm lg., subglabri. *Dentes calycini* lanceolato-lineares. Petala alba, obovata, basi cuneata, apice incurva et attenuata. *Fructus* immaturi ovales; stylopodia breve-conica, styli recurvi. *Mericarpia* sectione transversali leviter dorso compressa; jugis anguste alatis, marginalibus vulgo leviter latioribus, exocarpium e cellulis plus minusve magnis, interruptum prope carpophorum. Vittae valleculares 2-3, commissurales 4, jugales tenues, solitariae. Endospermium a facie commissurali fere planum.

Additional collections seen. – NEPAL: Wangang (Raouwa distr.), 1660 m, herb on open and rocky land, 17.10.1977, *Manandhar 421* (KATH).

Distribution. – Nepal (W).

Taxonomic position of *Selinum wallichianum*

Selinum wallichianum cannot be referred to *Oreocome* (see Results) and is even more distant from *Selinum* s.str. The species is actucally similar to *Ligusticopsis brachyloba* and therefore transferred to that genus here. Hence *Ligusticopsis* is here for the first time reported for territories outside of China.

Our herbarium and field investigations moreover showed that *Selinum wallichianum* as currently circumscribed is heterogenous, comprising two closely related species which are distributed in the S Himalaya. For the easterly species, the epithet *"wallichiana"* has priority, for the westerly species the epithet *coniifolia* has to be used. The two species differ from each other as follows:

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Fig. 26. *Oreocome depauperata* Pimenov & Kljuykov – holotype (KATH).

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1. Leaves 2-3-pinnatisect; terminal leaf lobes 7-14 mm long, 3-7 mm broad, rhombic to ovate-lanceolate, at the margin with several teeth or lobed; stylopodia at the margin not waved, slightly thickened; mericarp marginal ribs slightly tumid at the ends. . . . . 1. *L. wallichiana*
– Leaves 4-pinnatisect; terminal leaf lobes 2.5-3.5 mm long, 0.6-0.8 mm broad, lanceolate-linear to linear, entire or with 1-3 teeth; stylopodia at the margin waved, not thickened; mericarp marginal ribs thin. . . . . 2. *L. coniifolia*

1. *Ligusticopsis wallichiana* (DC.) Pimenov & Kljuykov, **comb. nova** ≡ *Peucedanum wallichianum* DC., Prodr. 4: 181. 1830 ≡ *Selinum tenuifolium* Wall. ex C. B. Clarke in Hooker, Fl. Brit. Ind. 2: 700. 1879, p.p. ≡ *Selinum wallichianum* (DC.) Raizada & H. O. Saxena in Indian Forest. 92: 323. 1966 ≡ *Cortia wallichiana* (DC.) Leute in Ann. Naturhist. Mus. Wien 73: 83, t. 6, fig. 2. 1969, p.p. – Lectotype (designated here): Nepal, "monte Emodo ad Gossain-Than", *Wallich [579]* (G-DC!; isolectotype: K!).

Distribution. – China (Tibet: Xizang A.R.), Bhutan, Nepal, India (E Himalaya: Sikkim; N and NE India: West Bengal).

Note. – In the southern, rather wet slope of Annapurna we found both *Oreocome candollei* and *Ligusticopsis wallichiana* in very close or even the same localities in high-herbaceous subalpine stony meadows. In spite of essential differences particularly in fruit characters (see Results, above), moreover in stem and root structure, both species appear very similar. The characters of stem and root structure can hardly be observed in herbarium material.

Ref. – Under *Selinum tenuifolium:* Banerji in Rec. Bot. Surv. India 19,2: 49. 1965; Kanai in Fl. E. Himal. 3: 88. 1975; Kaul in J. Bombay Nat. Hist. Soc. 72: 713. 1975; Malla & al., Catalogue Nepal. Vasc. Pl.: 95. 1976; Cannon 1979: 189; Polunin & Stainton, Concise Flowers Himal.: 59, t. 51. 1987, p.p.; Miehe in Bull. Brit. Mus. Nat. Hist. Bot. 16: 258. 1987. – Under *Selinum wallichianum:* Malla & al., Catalogue Nepal. Vasc. Pl.: 95. 1976; Mukherjee in Actes 2me Symp. Int. Umbell. Perpignan: 63. 1978, p.p.; Mukherjee & Constance 1993: 181, p.p.; Watson 1998: 380.

2. *Ligusticopsis coniifolia* (DC.) Pimenov & Kljuykov, **comb. nova** ≡ *Ligusticum coniifolium* DC., Prodr. 4: 158. 1830 ≡ *Selinum coniifolium* (DC.) Benth. in Bentham & Hooker, Gen. Pl. 1: 914. 1867. – Holotype: "In Nepaliae montibus altis [Nepalia, Kamaon]", 1821, *Blinkworth [584]* (G-DC!; isotypes: CAL, LE!).
= *Pleurospermum cicutarium* Lindl. in Royle, Ill. Bot. Himal. Mount.: 233. 1835 ≡ *Oreocome cicutaria* (Lindl.) Edgew. in Trans. Linn. Soc. London 20(1): 56. 1846. – Holotype: India, "Choor and Simla", *Royle* (LIV!).
= *Oreocome filicifolia* Edgew. in Proc. Linn. Soc. London 1: 253. 1845 ≡ *Selinum filicifolium* (Edgew.) Nasir in Fl. West Pakist. 20: 119. 1972 ≡ *Selinum coniifolium* var. *filicifolium* (Edgew.) Aswal, Fl. Lahaul-Spiti: 295. 1994. – Holotype: India, "Himalaya [Himala, in sylvis, alt. ped. 9000- 10000', Kamalori, Hattu & c.]", 1844, *Edgeworth 176* (K!).

Distribution. – India (W Himalaya: Jammu and Kashmir, Himachal Pradesh, Uttar Pradesh), Pakistan.

Ref. – Under *Selinum coniifolium:* Hiroe 1979: 1308; Aswal & Mehrotra, Fl. Lahaul-Spiti: 294. 1994. – Under *Oreocome filicifolia:* Edgeworth 1846: 54.

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examine collections: B, DD, E, G, GOET, K, KATH, KUN, LE, MW, NAS, P and PE. The authors are thankful to Mark F. Watson for valuable comments.

References

Candolle, A. P. de 1830: Prodromus regni vegetabilium **4.** – Paris.

Cannon, J. F. M. 1979: *Umbelliferae*. – Pp.184-190 in: Hara, H. & Williams, L. H. (ed.), An enumeration of the flowering plants of Nepal **2.** – London.

Chang, H. T. 1985: *Selinum*. – Pp. 225-228 in: Shan, R. H. & Sheh, M. L. (ed.), Flora reipublicae popularis sinicae **55(2).** – Beijing.

Clarke, C. B. 1879: *Umbelliferae*. – Pp. 665-720 in: Hooker, J. D. (ed.), Flora of British India **2.** – London.

Edgeworth, M. P. 1845: Descriptions of some unpublished species of plants from North-Western India. *Umbelliferae*. – Proc. Linn. Soc. London **1:** 252-253.

— 1846: Descriptions of some unpublished species of plants from North-Western India. – Trans. Linn. Soc. London **20(1):** 23-92.

Farille, M. A, Cauwet-Marc, A.-M. & Malla, S. B. 1985: *Apiaceae* himalayenses III. – Candollea **40:** 509-562.

Farr, E. & Zijlstra, G. 1996: Index nominum genericorum (ING) database, online version. – Retrieved March 2001 on the World Wide Web: http://www.nmnh.si.edu/ing/.

Fu, K. T. 1981: *Umbelliferae*. – Pp. 369-432 in: Flora tsinlingensis **1(3).** – Beijing.

Greuter, W., McNeill, J., Barrie, F. R., Burdet, H. M., Demoulin, V., Filgueiras, T. S., Nicolson, D. H., Silva, P. C., Skog, J. E., Trehane, P., Turland, N. J., Hawksworth, D. L. (editors & compilers) 2000: International Code of Botanical Nomenclature (Saint Louis Code) adopted by the Sixteenth International Botanical Congress St Louis, Missouri, July-August 1999. – Regnum Veg. **138.**

Hedge, I. C. & Rechinger, K. H. 1987: *Cortia*. – Pp. 362-364 in: Rechinger, K. H. (ed.), Flora iranica **162.** – Graz.

Hiroe, M. 1958: *Umbelliferae* of Asia (excluding Japan). – Kyoto.

— 1979: *Umbelliferae* of the World. – Tokyo.

Holmgren, P. K., Holmgren, N. H. Barnett, L. C. (ed.) 1990: Index herbariorum 1. The herbaria of the world, ed. 8. – Regnum Veg. **120.**

Index kewensis on CD-ROM, 1997, version 2.0. – Oxford.

Klan, Z. 1947: Srovnávací anatomie plodu rostlin okolicnatých oblasti Republiky Ceskoslovenské (anatomický klic). – Praha.

Kljuykov, E. V. & Lavrova, T. V. 1994: O sistematičeskom položenii nekotoryh vidov rodov *Pleurospermum* i *Trachydium (Umbelliferae)* [On systematic position of some species of the genera *Pleurospermum* and *Trachydium (Umbelliferae)*]. – Bot. Žurn. **79(10):** 102-108.

Lavrova, T. V. 1998: K sistematike roda *Ligusticopsis* Leute *(Umbelliferae)* [On taxonomy of the genus *Ligusticopsis* Leute (*Umbelliferae*)]. – In: II (X) Meeting Russ. Bot. Soc., Abstracts **2:** 167-168. – St Petersburg.

— , Pimenov, M. G. & Tikhomirov, V. N. 1982: Anatomija čereška kak istočnik taksonomičeskoj informacii v gruppe *Ligusticeae (Umbelliferae-Apioideae)* [Petiole anatomy as a source of taxonomical information in *Ligusticeae (Umbelliferae-Apioideae)*]. – Bjull. Moskovsk. Obšč. Isp. Prir., Otd. Biol. **87(1):** 99-111.

— , — , — 1983: Opisanie i analiz stroenija plodov zontičnyh triby *Ligusticeae* [Description and analysis of the *Umbelliferae* fruit structure in the tribe *Ligusticeae*]. – Bjull. Moskovsk. Obšč. Isp. Prir., Otd. Biol. **88(2):** 107-122.

— , — & Deviatkova G. N. 1987: Ispol'zovanie klaster-analiza dlja vyjasnenija taksonomičeskih otnošenij vidov podtriby *Foeniculinae (Umbelliferae)* flory SSSR [The usage of cluster analysis in the elucidation of the taxonomic relations of species of subtribe *Foeniculinae (Umbelliferae)* of the flora of the USSR]. – Bot. Žurn. **72(1):** 25-38.

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Ledebour, C. 1829: Flora altaica **1.** – Berolini.
Leute, G. H. 1969-70: Untersuchungen über den Verwandtschaftskreis der Gattung *Ligusticum*. I, II. – Ann. Naturhist. Mus. Wien **73:** 55-98, **74:** 457-519.
Li, L., Yuan, C., Ting, C. & Cheo, T. 1993: A taxonomic study on the genus *Cnidium* in China. – Acta Bot. Boreali-Occid. Sin. **13:** 63-69 (in Chinese).
Mukherjee, P. K. & Constance, L. 1993: *Umbelliferae (Apiaceae)* of India. – New Delhi.
Nasir, E. 1972: *Umbelliferae*. – Pp. 1-169 in: Nasir, E. & Ali, S. I. (ed.), Flora of West Pakistan **20.** – Rawalpindi.
Pan, Z. H., Wu, Z. J. & Pu, F. T. 1992: Anatomical studies of petiole in *Ligusticum* from China. – Acta Bot. Yunnan. **14:** 143-149 (in Chinese).
Pimenov, M. G. 1975: *Sphaenolobium* M. Pimen. Genus novum *Umbelliferarum* ex Asia Media. – Novit. Syst. Pl. Vasc. **12:** 238-245.
— 1983: *Umbelliferae*. – Pp. 167-322 in: Vvedensky, A. I. (ed.), Conspectus florae Asiae Mediae **7.** – Tashkent.
— & Kljuykov, E. V. 1996: Taxonomic and floristic novelties in Chinese *Umbelliferae* from Qomolangma regions (Xizang, the Himalayas). – Acta Phytotax. Sin. **34:** 1-11.
— , — 1999: Južnaja granica areala roda *Conioselinum (Umbelliferae)* prohodit v Gimalajah. [Southern area border of *Conioselinum (Umbelliferae)* gets through the Himalaya]. – Bot. Žurn. **84:** 87-92.
— & Leonov, M. V. 1993: The genera of the *Umbelliferae*. A nomenclator. – Kew.
Pu, F. T. 1991: A revision of the genus *Ligusticum (Umbelliferae)* in China. – Acta Phytotax. Sin. **29:** 385-393, 525-548 (in Chinese).
Raphael, S. 1970: The publication dates of the Transactions of the Linnean Society of London, Series I, 1791-1875. – Biol. J. Linn. Soc. **2:** 61-76.
Thellung, A. 1926: *Umbelliferae*. – Pp. 926-1537 in: Hegi, G. (ed.), Illustrierte Flora von Mittel-Europa **5(2).** – München.
Watson, M. F. 1998: Notes relating to the flora of Bhutan: XXXVI. *Umbelliferae,* II. – Edinburgh J. Bot. **55 (3):** 367-415.
— 1999: *Umbelliferae.* – Pp. 434-504 in: Grierson, A. J. C. & Long, D. G. (ed.), Flora of Bhutan **2(2).** – Edinburgh.
Wolff, H. 1922: *Umbelliferae*. – Pp. 447-453 in: Limpricht, W., Botanische Reisen in den Hochgebirgen Chinas und Ost-Tibets. – Repert. Spec. Nov. Regni Veg., Beih. **12.**

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