A SYNOPSIS OF ACONITUM SUBGENUS PARACONITUM: I

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ABSTRACT. A review of the history of the classification of *Aconitum* subgen. *Paraconitum* (Ranunculaceae) is presented, followed by a new classification. Keys to the sections and series are given. There follows an account of sect. *Galeatum*, *Fletcherum* and *Alatospermum* and sect. *Lycoctonum* ser. *Scaposa* and *Crassiflora*. There are no new species but one new series, *Crassiflora* Tamura & Lauener, is described, and one new combination is made.

Both authors have an interest in the family Ranunculaceae and their co-operation over the last few years has led to joint work on *Aconitum*.

The present paper is the first of two, revising the subgenus *Paraconitum* in Europe, Asia and America. It is devoted to a review of the various classifications of the subgenus followed by an account of sect. *Galeatum*, *Fletcherum* and *Alatospermum*, and sect. *Lycoctonum* ser. *Scaposa* and *Crassiflora*.

CLASSIFICATION

There are three subgenera in the genus *Aconitum*. The monotypic subgen. *Gymnaconitum* (Stapf) Rapcs. (in *Növényt. Közlem.* 6:143, 1907) contains the only annual species of the genus, *A. gymnandrum*. Subgenera *Aconitum* and *Paraconitum* are distinguished by characters of the underground organs: in the former there are biennial paired tuberous roots, whereas the latter has perennial rhizomes. The three subgenera are discussed by Tamura in "Morphology, Ecology and Phylogeny of the Ranunculaceae, VI" (*Sci. Rep. Osaka Univ.* 15:29–32, 1966).

There have been various classifications of the group of species to be treated in this synopsis. De Candolle first proposed sect. *Lycoctonum*, containing 8 species, in 1817 (*Syst. Nat.* 1:365, 367) and in 1824 retained it with 3 species (*Prodr.* 1:57). In 1905 in "A Monograph of the Aconites of India" (*Ann. Roy. Bot. Gard. Calc.* 10:115–197) Stapf also maintained sect. *Lycoctonum*. Previously Fournier (*Ann. Soc. Linn. Lyon* n.s. 16:326, 1868) had recognized *Lycoctonum* as a separate genus.

In 1907 Rapaics (*Növényt. Közlem.* 6:136–176) proposed the first subgeneric division of *Aconitum* and divided subgen. *Paraconitum* Rapcs. into sect. *Galeata* Rapcs. and sect. *Lycoctonum* DC. Sect. *Galeata* included the single Indian species *A. moschatum* (Brühl) Stapf, and sect. *Lycoctonum* was composed of 14 species.

Handel-Mazzetti, in his "Enumeration of the Chinese Species" of *Aconitum* (*Acta Hort. Gotob.* 13:77, 1939) followed Rapaics, and eleven species were included in sect. *Lycoctonum*.

In the following summary of subsequent classifications many of the names were never validly published and these are shown in square brackets.

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In 1937 in the *Flora URSS* (7:192–210) Steinberg used the following classification.

Sect. *Lycoctonum*
- [Ser. *Volubilia* Steinb.]
- [Ser. *Pubescentia* Steinb.]
- [Ser. *Ranunculoidea* Steinb.]
- [Ser. *Longibracteolata* Steinb.]
- [Ser. *Umbrosa* Steinb.]
- [Ser. *Micrantha* Steinb.]
- [Ser. *Longicassidata* Steinb.]

In 1945 Voroshilov (Notes on the Systematics of Aconite Species of the Flora of URSS. *Journ. Bot. URSS* 30:125–143) proposed another classification as follows:

Sect. *Lycoctonum*
- [Subsect. *Eulycoctonum* Vorosh.]
  - [Ser. *Kryloviana* Vorosh.]
  - [Ser. *Micrantha?* Steinb.]
  - [Ser. *Ampelifolia* Vorosh. *nom. nov.*] (=*Volubilia* Steinb.)
- [Subsect. *Barbatum* Vorosh.]
  - [Ser. *Pedatifolia* Vorosh.]
- [Subsect. *Vulparia* Vorosh.]
  - [Ser. *Moldavica* Vorosh.]
  - [Ser. *Pallida* Vorosh.]

As pointed out by Czerepanov (*Nov. Syst. Pl. Vasc.* 9:304–305, 1972) Voroshilov's names were all invalid as they were described in Russian only. Steinberg's series names in *Flora URSS* were also invalid for the same reason.

Nakai (A New Classification of Lycoctonum and Aconitum in Korea, Japan and their surrounding Areas. *Bull. Nat. Sci. Mus. Tokyo* no. 32:1–53, 1953) followed Fournier (*Ann. Soc. Linn. Lyon* n.s. 16:326, 1868) in recognizing *Lycoctonum* as a separate genus, and divided it into 4 sections, validated by Latin descriptions, as follows:
- Sect. *Volubilia* [Steinb. ex] Nakai
- Sect. *Curvicassidata* Nakai
- Sect. *Longicassidata* [Steinb. ex] Nakai
- Sect. *Umbrosa* [Steinb. ex] Nakai

The next major classification of the genus *Aconitum* was by Wang in 1965 (*Acta Phytotax. Sin.* 12, Addit. 1:58–103). He classified subgen. *Paraconitum* as follows:

Subgen. *Paraconitum* Rapcs.
- Sect. 1. *Paraconitum* (Sect. *Lycoctonum* DC.)
  - [Ser. 1 *Micrantha* Steinb.]
  - Ser. 2 *Scaposa* W. T. Wang, *ser. nov.*
  - [Ser. 3 *Ampelifolia* Vorosh.]
  - [Ser. 4 *Longicassidata* Steinb.]
- Sect. 2. *Galeata* Rapcs.

Of these series, *Micrantha*, *Ampelifolia* and *Longicassidata* are still not validly published. As previously mentioned, *Micrantha* and *Ampelifolia* are invalid since they were never published in Latin. *Longicassidata* was validly published by Nakai as a section but Wang's later use of the name in the rank of series, following Steinberg, is still not valid as the basionym was not cited.

Tamura considered that Nakai's sections carried too high a taxonomic rank because the diagnostic characters are not absolutely constant and the groups are closely related. He therefore, in "Morphology, Ecology and Phylogeny of the Ranunculaceae VI" (*Sci. Rep. Osaka Univ.* 15:29–31, 1966) re-classified sect. *Lycoctonum* into subsections and proposed the following classification of subgen. *Paraconitum*.

Subgen. *Paraconitum*
Sect. *Galeatum* Rapcs. (*A. moschatum*)
Sect. *Fletcherum* Tamura (*A. fletcheranum*)
Sect. *Alatospermum* Tamura (*A. novoluridum*)
Sect. *Lycoctonum* DC. (all other species)
[Subsect. *Volubilia* (Nakai) Tamura]
Subsect. *Lycoctonum*
[Subsect. *Longicassidata* (Nakai) Tamura]
[Subsect. *Micrantha* Tamura]
[Subsect. *Scaposa* (W. T. Wang) Tamura]

As a result of our studies the classification of sect. *Lycoctonum* adopted in the present synopsis is very different from all previous treatments.

Lectotypification of the genus

Two species have been proposed as lectotype of *Aconitum*: *A. lycoctonum* L. by Britton & Brown (*Ill. Fl. N.U.S.* ed. 2, 2:96, 1913) and *A. napellus* L. by Hitchcock & Green [*International Botanical Congress, Cambridge (England)*, 162, 1929].

Although Britton & Brown's choice has priority, it accords ill with historical treatment of the genus where *A. napellus* has generally been given a central and *A. lycoctonum* a more peripheral position. For instance, Reichenbach (*Ill. Spec. Acon. Gen.* 1823–27) included *A. napellus* in his *Aconita genuina* whereas *A. lycoctonum* was placed in *Aconita delphinastrina*. Rapaics placed *A. napellus* in his sect. *Euaconitum* while Nakai split off sect. *Lycoctonum* as a genus distinct from *Aconitum*. Wang retained subgen. *Paraconitum* Rapcs. to include the *Lycoctonum* group and replaced subgen. *Tuberconitum* Rapcs. by subgen. *Aconitum* which included sect. *Aconitum* (sect. *Napellus* DC.).

We support the opinions of these authors which in effect means accepting Hitchcock and Green's choice of *A. napellus* as generic lectotype. This has the added advantage that it evades the problem caused by rejection of *A. lycoctonum* L. as a *nomen ambiguum* by Tutin (*Fl. Eur.* 1:211, 1964).

Subgenus **Paraconitum** Rapcs. in Növényt. Közlem. 6:139, 140, 167 (1907).

Rhizome perennial, separating into several strands, anastomosing or free, and often producing several aerial stems from the collar. Helmet mostly conical, sometimes navicular or galeate. Petal spurs various but mostly thin and longer than the lamina. Carpels mostly 3, sometimes more.

Type species: *A. lycoctonum* L. sensu DC. (*A. vulparia* Reichb.).

A. lycoctonum L. sensu DC. is the yellow-flowered species (now generally known as *A. vulparia* Reichb. sensu Tutin in *Fl. Europ.*) and not the northern

European blue-flowered species (at present known as *A. septentrionale* Koelle).

We have some doubts about the validity of *A. vulparia* and *A. septentrionale* but the problem of deciding whether or not *A. lycoctonum* should be rejected and whether true *A. lycoctonum* is the blue- or yellow-flowered taxon, is beyond the scope and intention of this present study.

The brief specific descriptions are intended only to focus attention on the more important diagnostic characters and as these vary in the different groups of species, we have not attempted to make all descriptions strictly comparable.

Throughout the synopsis we use the terms 'paniculate' or 'racemose' according to common usage but in many cases the inflorescence does have a terminal flower and is a kind of cyme.

Key to Sections

1. Seeds alate, not lamellate. Helmet hemielliptic . . . Sect. *Alatospermum* (p. 117)
+ Seeds lamellate, not alate. Helmet galeate, navicular or conical-cylindrical 2
2. Helmet galeate or navicular, broader than long . . . 3
+ Helmet conical-cylindrical, longer than broad . Sect. *Lycoctonum* (p. 118)
3. Plants short, scapose, 1-flowered . . Sect. *Fletcherum* (p. 117)
+ Plants not scapose, more than 1-flowered . . Sect. *Galeatum*

Sect. **Galeatum** Rapcs. in Növényt. Közlem. 6:140 (1907).

Inflorescence racemose. Helmet galeate. Spur of petal very obtuse, capitate, not opposite the lamina but a continuation of the claw. Carpels 3. Seeds lamellate. Monotypic.

1. A. moschatum (Brühl ex Duthie) Stapf in Ann. Roy. Bot. Gard. Calc. 10: 139, t. 94 (1905).

Syn.: *A. ferox* [Wall. ex] Ser. var. *moschatum* [Brühl ex] Duthie in Rec. Bot. Surv. Ind. 1, no. 3:37 (1894) *nom. nud.*; Brühl in Ann. Roy. Bot. Gard. Calc. 5:109, t. 111, fig. A, 1, 20, 26 (1896).

Type. Kashmir, Liddar valley, Sonsal nala, 13–14,000 ft, 31 vii 1893, *Duthie* 14120 (syntype BM, DD, E, K); Musjid valley, 12–13,000 ft, *Duthie* 13191 (syntype DD).

Kashmir.

Leaves orbicular-cordate, divided nearly to the middle with broad obovate segments, sparsely spreading-hairy above and on the veins below; petioles sparsely spreading-hairy towards the top. Few radical leaves at flowering time. Inflorescence and outside of sepals covered with yellow spreading hairs at the base. Stamens glabrous, carpels densely spreading-hairy.

A. moschatum is a very distinct species found only in Kashmir. It is easily separated from all other species of subgen. *Paraconitum* by the shape of the helmet and petal.

Sect. **Fletcherum** Tamura in Sci. Rep. Osaka Univ. 15:30 (1966).

Plant scapose, 1-flowered. Helmet navicular. Spur of petal obtuse, curving strongly at the apex of the claw, on the same side as the very short entire lamina. Carpels 6–8. Seeds unknown. Monotypic.

2. A. fletcheranum G. Tayl. in Journ. Roy. Hort. Soc. London 77:242 (1952). Type. Bhutan, Tsampa, Pangotang, 14,500 ft, on cliff ledges and steep grassy open slopes. Perianth a very bright violet, a beautiful colour, with a striking white outer edging to the inner segments, 12 ix 1949, *Ludlow, Sherriff & Hicks* 19734 (holo. BM; iso. E).

Bhutan, SE Tibet, Assam.

Plant dwarf. Basal leaves several, rounded, almost glabrous, divided nearly to the base; petioles glabrous. Scape one-flowered, bearing a pair of reduced, usually 3-partite and shortly sheathed-petiolate, cauline leaves. Flowers violet, edged white on lateral sepals; sepals glabrous or curled-hairy towards the base.

The specimens of *A. fletcheranum* in the Edinburgh herbarium are all similar in general facies but an examination of the petals, stamens and carpels reveals the following differences.

	Petals	*Stamens*	*Carpels*
L.S.H. 19734 (type)	glabrous	hairy	slightly hairy
,, 16846	glabrous	hairy	slightly hairy
,, 17198	glabrous	hairy	slightly hairy
,, 21328	hairy	hairy	hairy
,, 19771	glabrous or sparsely hairy	glabrous or sparsely hairy	glabrous
Cooper 4288	sparsely hairy	hairy	hairy

Sect. **Alatospermum** Tamura in Sci. Rep. Osaka Univ. 15:30 (1966).

Syn.: Ser. *Micrantha* Steinb.; Wang in Acta Phytotax. Sin. 12, Addit. 1:59 (1965) *p.p.*

Inflorescence racemose, many-flowered. Helmet hemielliptic with long broad beak. Spur of petal opposite the lamina, hammer-shaped, produced at right angles to the short erect, thick, claw. Carpels 3. Seeds alate, hardly lamellate. Monotypic.

3. A. novoluridum Munz in Gentes Herb. 6:472 (1945); Mukerjee in Bull. Bot. Surv. Ind. 3:101 (1961); Tamura in Acta Phytotax. Geobot. 19:74 (1962); Lauener in Notes R.B.G. Edinb. 25:29 (1963); Wang in Acta Phytotax. Sin. 12, Addit. 1:59 (1965).

Syn.: *A. luridum* Hook. f. & Thoms., Fl. Ind. 1:55 (1855) & Fl. Brit. Ind. 1:28 (1872)—non Salisb. (1796); Stapf in Ann. Roy. Bot. Gard. Calc. 10:138, t. 93 (1905).

Type. Sikkim, Tankra Pass, 14,000 ft, 22 viii 1849, *J. D. Hooker* s.n. (syntype K); Chola Pass (27° 30′ N, 88° 54′ E), 7 xi 1849, *J. D. Hooker* s.n. (syntype K).

S Tibet, Tibet/Bhutan, Nepal, W Bengal, Sikkim, Assam.

Leaves reniform-cordate, partite to or beyond the middle, segments broadly cuneate with a wide sinus, curled-hairy above, spreading-hairy or with semi-curled hairs below; petioles usually curled- sometimes spreading-hairy. Hairs on stem curled and sparser lower down; stem becoming glabrate below. Basal leaves few, often withered at flowering time. Flowers usually aggregated near the top of the inflorescence but sometimes more distant. Inflorescence and outside of sepals covered with yellowish spreading hairs, some of which are swollen at the base. Flower colour varying from "dull brownish wine red" to "blue purple", sometimes "almost white at the base". Stamens usually glabrous, sometimes very sparsely hairy. Carpels spreading-hairy or glabrous, sometimes with a few hairs at the base.

A. novoluridum is an easily recognisable species because of the shape of the helmet and petals and the presence of winged seeds. The variation in indumentum of the carpels apparently shows no correlation with geographical distribution.

Sect. **Lycoctonum** DC., Syst. Nat. 1:365, 367 (1817).

Inflorescence racemose or paniculate. Helmet, excluding the beak, conical cylindrical, usually taller than broad. Spur of petal elongate, sometimes capitate; claw thin, longer than limb (i.e. spur and lamina). Carpels 3. Seeds lamellate.

Type species: *A. lycoctonum* L. sensu DC.

KEY TO SERIES OF SECT. LYCOCTONUM

1.	Stem with many leaves	2
+	Stem with few leaves or subscapose	3
2.	Inflorescence dense. Branches and pedicels ascending	[Ser. *Laevia*]
+	Inflorescence lax. Branches and pedicels divaricate	[Ser. *Reclinata*]
3.	Stem subscapose	4
+	Stem with few leaves	6
4.	Flowers yellow. Inflorescence lax	[Ser. *Ranunculoidea*]
+	Flowers dull violet or purple. Inflorescence dense	5
5.	Pedicels 2·5–3 cm	Ser. *Scaposa*
+	Pedicels 0·5–1·2 cm	Ser. *Crassiflora*
6.	Helmet up to 10 mm high	[Ser. *Micrantha*]
+	Helmet more than 10 mm high	7
7.	Pedicels short, 2–5 mm	8
+	Pedicels longer, 4–40 mm or more	9
8.	Flowers purple	[Ser. *Brevicalcarata*]
+	Flowers yellowish green	[Ser. *Longibracteolata*]
9.	Flowers dilute purple. Leaf-teeth ovate or obovate, obtuse	(Ser. *Volubilia*)
+	Flowers yellow or if purple or blue then leaf-teeth lanceolate, acute or acuminate	10
10.	Spur shorter than or ± the same length as the lamina	(Ser. *Longicassidata*)
+	Spur elongate, usually coiled, distinctly longer than lamina, (shorter in *A. gigas* var. *gigas*)	(Ser. *Lycoctonia*)

The series in brackets will appear in Part II; those in square brackets have not yet been described.

Ser. **Scaposa** W. T. Wang in Acta Phytotax. Sin. 12, Addit. 1:60 (1965), *p.p.*

Syn.: Subsect. *Scaposa* (W. T. Wang) Tamura in Sci. Rep. Osaka Univ. 15: 31 (1960).

Plant scapose or subscapose. Leaves partite to near or often beyond the middle but not to the base; segments widely-cuneate rhomboid, or rhomboid, or obovate. Inflorescence racemose, many-flowered, elongate, flowers not aggregated at the top; lax; pedicels 2·5–3 cm long in flower, obliquely ascending; bracteoles near the base of pedicels, ovate or elliptic, sometimes linear-lanceolate. Flowers purplish, rarely yellowish; helmet 17–20 mm high, 3–5 mm broad; spur of petal coiled, usually longer than lamina. 3 species.
Type species. *A. scaposum* Franch.

4. A. scaposum Franch. in Journ. de Bot. 8:277 (1894); Hand.-Mazz. in Acta Hort. Gotob. 13:78 (1939); Wang in Acta Phytotax. Sin. 12, Addit. 1:60 (1965).

var. **scaposum**

Syn.: *A. vaginatum* Pritz. in Bot. Jahrb. 29:328 (1900); Hand.-Mazz. in Acta Hort. Gotob. 13:77 (1939); Wang in Acta Phytotax. Sin. 12, Addit. 1:60 (1965), **syn. nov.**

A. lycoctonum auct. non L.; Finet & Gagnep. in Bull. Soc. Bot. Fr. 51:501 (1904), *p.p.*

A. lycoctonum L. var. *ranunculoides* (Turcz.) Fin. & Gagnep. in Bull. Soc. Bot. Fr. 51:502 (1904), *p.p.*

A. scaposum Franch. var. *efoliatum* Rapcs., var. *hupehanum* Rapcs. & var. *pseudovaginatum* Rapcs. in Növényt. Közlem. 6:168 (1907).

A. scaposum Franch. var. *vaginatum* (Pritz.) Rapcs., *l.c.*

A. jucundum Diels in Notes R.B.G. Edinb. 5:266 (1912); Hand.-Mazz. in Acta Hort. Gotob. 13:78 (1939); Fletcher & Lauener in Notes R.B.G. Edinb. 20:192, t. 266, fig. 8 (1949); Lauener & Green *l.c.* 23:576 (1961); Wang in Acta Phytotax. Sin. 12, Addit. 1:60 (1965); Hara in Journ. Jap. Bot. 47:269 (1972), **syn. nov.**

Lycoctonum scaposum (Franch.) Nakai in Journ. Jap. Bot. 13:406 (1937).

Type. China, Szechuan, District de Tchen-Kéou-Tin, 2400 m, juillet, *Farges* 116 (holo. *A. scaposum* P; iso. K).

E Nepal, Bhutan, N Burma, China (Yunnan, Szechuan, Kweichow, Hupeh, Shensi).

Plant 25–120 cm tall; scapose in small plants, stem often more leafy in taller plants. Leaves cordate, underside curled-hairy. Inflorescence usually spreading-hairy, rarely curled-hairy; outside of petals and carpels spreading-hairy, with hairs swollen at the base. Flowers blue or purple.

The holotype specimens of *A. scaposum*, *A. vaginatum* and *A. jucundum* have all been examined together with many other collections of these taxa, hitherto regarded as three distinct species. Certainly the three type specimens are distinguishable from each other in the shape of the leaves, i.e. with the

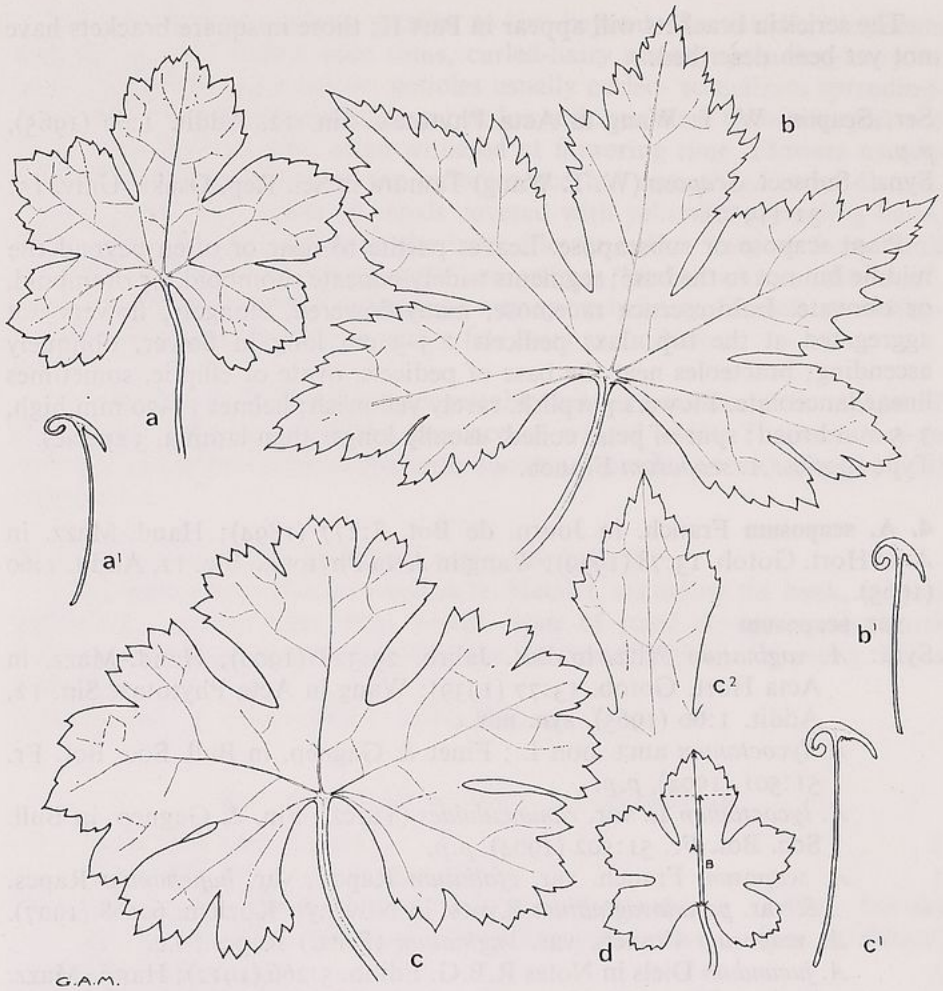

FIG. 1. Leaves and nectaries of *Aconitum* species: a, *A. scaposum*; b, *A. jucundum*; c, *A. vaginatum* (c^2 shows a lobe of different shape from c). d, diagram to show the axes used for determining leaf shape ratio (see text). a, b, c × c. ½; a^1, b^1, c^1 & c^2 × c. 1½.

central segment tapering to a point in *A. jucundum*, or obovate-cuneate in *A. scaposum* and *A. vaginatum*, but much larger in the latter (see fig. 1). The leaf character, however, is far from constant in other collections, some of which are even found with both leaf shapes on the same plant (fig. 1). An attempt was made to distinguish the three leaf shapes and sizes by plotting the length from the base of the lamina to the broadest part of the terminal leaf segment (fig. 1d, B) against total leaf length (fig. 1d, A). No clear division, however, was possible from the measurements and the results showed a continuous linear relationship.

Although Handel-Mazzetti retained the three species on the basis of leaf shape, and horizontal versus vertical flowers (a character we have found of no value), he expressed doubts that *A. jucundum* could be sharply differentiated from *A. scaposum*. Over a whole range of collections it becomes difficult to relate some specimens to one of the three 'species', or to separate the three 'species' satisfactorily on leaf character, flowers or indumentum.

Nectaries are sometimes a valuable diagnostic character and those of many collections have been examined; there is little difference in those of the type specimens of the three species (see fig. 1), although some variation is found between different collections, and the spurs of the nectaries of *Forrest* 18481, *Wilson* 566 and *Henry* 6547 represent a condition where there is less coiling of the spur. Taking these factors into account it seems better to reduce *A. vaginatum* and *A. jucundum* to synonymy.

In the original description of *A. scaposum*, Franchet designated *Farges* 116 as the type of *A. scaposum*, but did not designate a type for his var. *pyramidalis*. However, another specimen of *Farges* 116 is determined as var. *pyramidalis* by Franchet and this must be regarded as the type of the variety.

When describing *A. vaginatum*, Pritzel cited *Bock & von Rosthorn* nos. 42, 123, 1082 & 905 and these numbers are therefore all syntypes. Numbers 123, 1082 & 905 from Oslo have been examined; the two former numbers are entirely vegetative but 905 has inflorescences on the left and right hand sides of the sheet. The specimen is fragmentary but the right hand inflorescence certainly belongs to *A. vaginatum* and this collection is chosen as the lectotype of the species.

The map (fig. 2) shows the distribution of *A. scaposum* and the type localities of *A. scaposum*, *A. vaginatum* and *A. jucundum*.

4a. A. scaposum Franch. var. **chloranthum** (Hand.-Mazz.) Lauener & Tamura, **comb. nov.**

Syn.: *A. chloranthum* Hand.-Mazz. in Sitzgsanz. Akad. Wiss. Wien Math.-Nat. Kl. 60:134 (1923).

A. jucundum Diels var. *chloranthum* (Hand.-Mazz.) Hand.-Mazz., Symb. Sin. 7:282 (1931); Fletcher & Lauener in Notes R.B.G. Edinb. 20:193 (1949).

A. vaginatum Pritz. var. *xanthanthum* Hand.-Mazz. in Acta Hort. Gotob. 13:77 (1939).

Type. China, Yunnan, inter fluvios Djinscha-djiang (Yangtze) et Landsang-djiang (Mekong) ad viam Djitsung-Kakatang, 30 viii 1915, *Handel-Mazzetti* 7909 (holo. *A. chloranthum* WU; iso. E, P).

China (Yunnan, Szechuan).

A variety with greenish, sulphur- or pale-yellow flowers.

4b. A. scaposum Franch. var. **patentipilum** W. T. Wang in Acta Phytotax. Sin. 12, Addit. 1:60 (1965).

Type. China, Shensi, Yang-hsien, *H. W. Kung* 3563 (holo. PE—*n.v.*).

China (Shensi).

A variety with stem and rachis covered with spreading hairs. We have seen no specimens of it.

5. A. cavaleriei Lévl. & Van. in Bull. Soc. Agric. Sci. Arts Sarthe 40:78 (1905); Fletcher & Lauener in Notes R.B.G. Edinb. 20:192, t. 266, f. 7 (1949); Lauener & Green *l.c.* 23:575 (1961); W. T. Wang in Acta Phytotax. Sin. 12, Addit. 1:60 (1965).

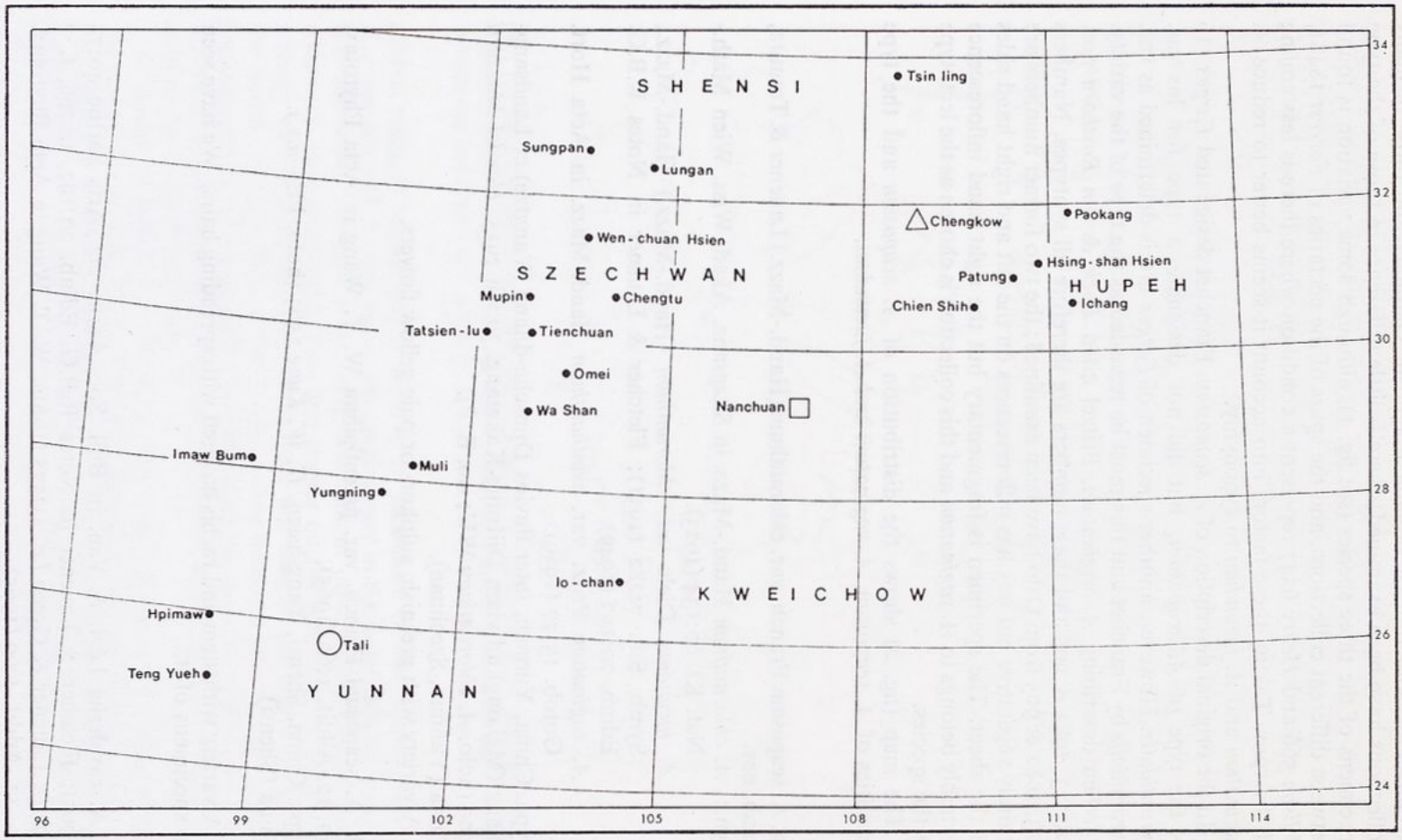

FIG. 2. Chinese distribution of ● *Aconitum scaposum*. Type localities of ○ *A. jucundum*, △ *A. scaposum*, □ *A. vaginatum*.

Syn.: *A. lycoctonum* L. var. *ranunculoides* (Turcz.) Fin. & Gagnep. in Bull. Soc. Bot. Fr. 51:502 (1904), *p.p.*
Type. China, Kweichow, Pin-fa, ruiss., fl. viol., v 1903, *Cavalerie* 708 (holo. E; iso. K, P).
China (Kweichow, Szechuan).

Leaves more or less truncate at the base, segments mostly narrowly cuneate, underside minutely curled-hairy or glabrate. Axis of inflorescence and lower part of pedicels curled-hairy, upper part of pedicels and carpels spreading-hairy.

This species is distinguishable from *A. scaposum* by the shape and division of the leaves. The petals show no difference from those of *A. scaposum*.

6. **A. aggregatifolium** [Chang ex] W. T. Wang in Acta Phytotax. Sin. 12, Addit. 1:60 (1965).
Type. China, Szechuan, Ching-chuan, Mo-tien-ling, 2200 m, *F. T. Wang* 22468 (holo. PE—*n.v.*).
China (Szechuan).

We have not seen any material of this species except a photograph at Edinburgh of the type specimen. Wang gives a full description of *A. aggregatifolium* and relates it to *A. scaposum* but the former differs from the latter in its more deeply partite leaves with more acuminate segments.

Ser. **Crassiflora** Tamura & Lauener, **ser. nov.**
Syn.: Ser. Scaposa W. T. Wang in Acta Phytotax. Sin. 12, Addit. 1:60 (1965), *p.p. quoad A. crassiflorum.*

Planta subscaposa. Folia ad vel ultra medium 5–7 partita, segmentibus late cuneato-obovatis. Inflorescentia racemosa, multiflora, elongata, pedicellis 0·5–1·2 cm longis, erectis, circa basem bi-bracteolata, bracteolis linearibus. Flores sordide-violacei, casside 16–20 mm alta 3–9 mm lata. Calcaria petalorum circinata lamina fere aequilonga. Monotypic.

Although *A. crassiflorum* was placed in ser. *Scaposa* by Wang we consider that it cannot be included there mainly because of the erect pedicels which are about 3–5 times shorter than the obliquely-ascending pedicels characteristic of that series.

7. **A. crassiflorum** Hand.-Mazz., Symb. Sin. 7:283, t. 6, f. 7 (1931) & in Acta Hort. Gotob. 13:82 (1939); Fletcher & Lauener in Notes R.B.G. Edinb. 20:200 (1949); W. T. Wang in Acta Phytotax. Sin. 12, Addit. 1:60 (1965).
Type. China, Yunnan, auf dem Berge Schusutsu ober Bödö, 5 viii 1914, *Handel-Mazzetti* 4487 (holo. WU).
China (Yunnan).

Plant 50–120 cm tall; scapose habit less obvious in tall plants; leaves orbicular with short appressed hairs on both surfaces; petioles with sparse spreading hairs. Inflorescence densely covered with yellow spreading hairs, some of which are swollen at the base. Sepals sparsely hairy. Carpels densely spreading-hairy to glabrate.

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