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A taxonomic revision of the genus *Gueldenstaedtia* Fisch.

by

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The genus *Gueldenstaedtia* Fisch., was established in 1823 by F. E. FISCHER in honour of the Russian naturalist, GUELLENSTAEDT. He originally based the genus only on two species. The total number of species that have been published in this genus amounts to twenty-five, but the author has been able to recognise only ten species (including one new species described here for the first time). The genus is mainly asiatic in distribution (Map, *f.* 47).

KITAGAWA (1936) pointed out the existence of an earlier homonym, *Gueldenstaedtia* Necker (1790) and he proposed *Amblyotropis* Kitagawa as a new name for the genus. ALI (1957) proposed the conservation of the generic name *Gueldenstaedtia* Fisch. in view of the uncertain nomenclatural status of the names of NECKER's *Species naturales*. But in view of the decision taken at the International Congress, Montreal, against the acceptance of Necker's names (RICKETT & STAFLEU 1959), conservation is not necessary and *Gueldenstaedtia* Fischer must be maintained as the correct name of the taxon concerned.

Subgeneric Classification

JACOT (1927) revised the entire genus in 1927. He recognises sixteen species. He has also discussed the phylogenetic relationship of the different species and has tried to show that any subgeneric division is not possible. Quite contrary to his inferences the present author has come to the conclusion that two definite groups are recognisable in the genus *Gueldenstaedtia* Fischer. The characters that have been found to be useful in this connection are given below. To facilitate easy reference in further discussion, each of these characters has been represented by a mathematical symbol and the variation of that character by further grades of the symbol concerned. Thus every species may be represented by a formula i.e. $\alpha_1\beta_2\gamma_2$.

α — *Stipule* α_1 — Stipules lateral, not leaf-opposed, free from each other (*f. 48, A*); α_2 — Stipules amplexicaul, leaf opposed, united, at least in the young condition (*f. 48, B*). β — *Style* β_1 — Style becoming curved on itself or circinate at least in fruit (*f. 48, C, C_1*); β_2 — Style remaining straight or at the most bending at right angles to the axis of the ovary but never more than that (*f. 48, D*). γ — *Seed* γ_1 — Seed glazed, pitted, uniformly coloured, never spotted (*f. 48, E*); γ_2 — Seed unglazed, never pitted, with irregular blackish spots (*f. 48, F*).

The analysis in terms of these characters of all the ten species recognised has been tabulated below. It is to be noted that the character of the seed

Taxa	α_1	α_2	β_1	β_2	γ_1	γ_2
Group A						
1. <i>G. monophylla</i> ...	+		+		+	
2. <i>G. maritima</i>	+		+		*	
3. <i>G. stenophylla</i> ...	+		+		+	
4. <i>G. verna</i>	+		+		+	
5. <i>G. henryi</i>	+		+		+	
Group B						
6. <i>G. coelestis</i>		+		+		*
7. <i>G. flava</i>		+		+		*
8. <i>G. forrestii</i>		+		+		*
9. <i>G. yunnanensis</i> ...		+		+		+
10. <i>G. himalaica</i>		+		+		+
+ indicates the presence of the character concerned.						
* indicates that the character concerned could not be confirmed.						

could not be confirmed in four species¹. However the six other species, where this character has been studied, may be represented in terms of these characters as follows:

	Frequency
$\alpha_1\beta_1\gamma_1$	4
$\alpha_2\beta_2\gamma_2$	2

¹ The author will be obliged if any botanist will kindly send the seeds to the author or inform him about the seed characters of these species.

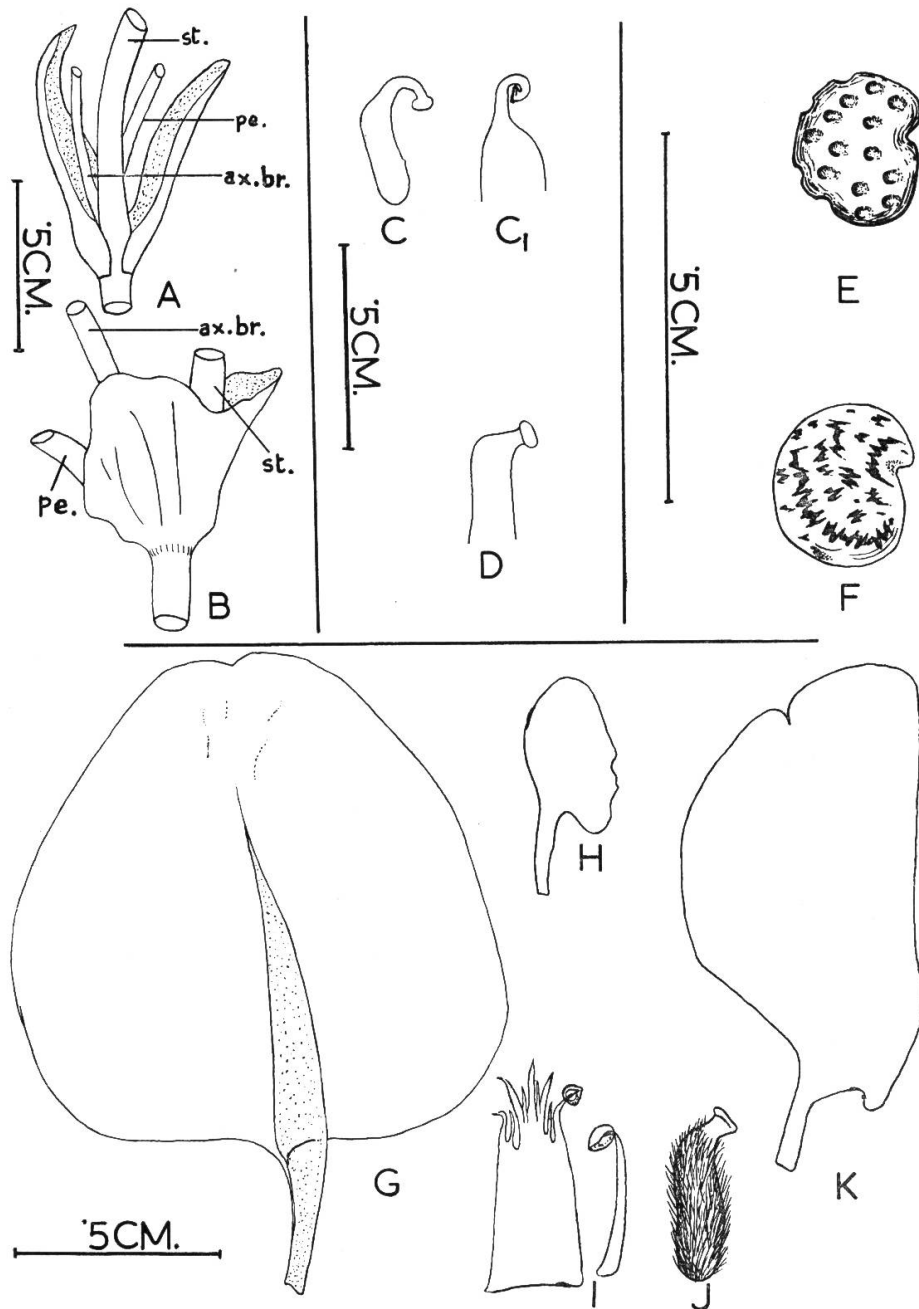


FIG. 47.

A: Stipule, *G. henryi* (Henry 1308, K); B: Stipule, *G. himalaica* (Badrinath, 1864, Falconer, K); st., stem; pe., petiole; ax. br., axillary branch; C: Style, *G. monophylla* (Altai, Ledebour, K); C₁: Style, *G. verna* (Peking plain, April 30. 1912, Purdom, K); D: Style, *G. coelestis* (Rock 3819, K); E: seed, *G. stenophylla*, (Clemens 6174a, E); F: seed, *G. himalaica* (Cooper 661, E). G-K: *G. forrestii*; G: vexillum; H: keel; I: stamens; J: ovary; K: wing (in A - D hairs have not been shown).

It is interesting to note that out of eight possible combinations only two are represented. The other six combinations are not represented at all. Thus it is possible to recognise two groups in the genus *Gueldenstaedtia*. The author has given the status of subgenera to these groups.

- (i) Subgenus **Gueldenstaedtia** ($\alpha_1\beta_1\gamma_1$).
- (ii) Subgenus **Tibetia** Ali subgenus nov. ($\alpha_2\beta_2\gamma_2$).

Hoc subgenus a *Gueldenstaedtiis* propriis in stipularum, styli seminumque characteribus differt; stipulae a rachide liberae, juniores connatae, folium oppositae, amplexicaules (f. 48, B); stylus vel erectus vel in angulo recto versus ovarii axin curvatus, nequaquam autem circinatus; semina laevia maculataque, nec lucida.

TYPE SPECIES: G. himalaica Baker.

Gueldenstaedtia Fisch. *Mém. Soc. Nat. Moscou* 6:170.1823.

Perennial herb. Root thick and woody. Stem almost absent to well developed cylindrical pilose. Leaf stipulate, stipule lateral, not leaf-opposed, free from each other or amplexicaul, leaf-opposed, united at least in the young condition; imparipinnate except in *G. monophylla*, where unifoliolate leaf is present. Inflorescence peduncled, many flowered umbel. Flower pedicellate, bracteate, bracteolate (bracteoles 2). Calyx bilipped, quinque denticulate. Corolla papilionaceous; vexillum almost twice the keel. Androecium diadelphous, 9+1. Ovary sessile, pilose or glabrous, style glabrous, small, in fruits at the most bent at right angles to the axis of the ovary, or comparatively longer, bent on itself or circinate in fruit. Legume, many seeded, dehiscent along both the sutures. Seed reniform, pitted and glazed or smooth and maculate.

TYPE SPECIES: G. pauciflora (Pallas) Fisch. (ALI, 1957).

Artificial key to the species of subgen. Gueldenstaedtia

Stipules lateral, not leaf opposed, free from each other; style becoming curved on itself or circinate, at least in fruit; seed glazed pitted, uniformly coloured, not spotted.

- | | |
|---|--------------------------|
| Leaf unifoliolate | 1. <i>G. monophylla</i> |
| Leaf multifoliolate | |
| Plant totally glabrous | 2. <i>G. maritima</i> |
| Plant hairy | |
| Leaflets oblong to lanceolate 3 or more than 3 times as long as broad | 3. <i>G. stenophylla</i> |
| Leaflets less than 3 times as long as broad | |
| Stem almost absent | 4. <i>G. verna</i> |
| Stem elongated | 5. <i>G. henryi</i> |

Artificial key to the species of subgenus Tibetia Ali

Stipules amplexicaul, leaf-opposed united at least in the young condition; style remaining straight or at the most bending at right angles to the axis of the ovary; seed unglazed, never pitted, with irregular blackish spots.

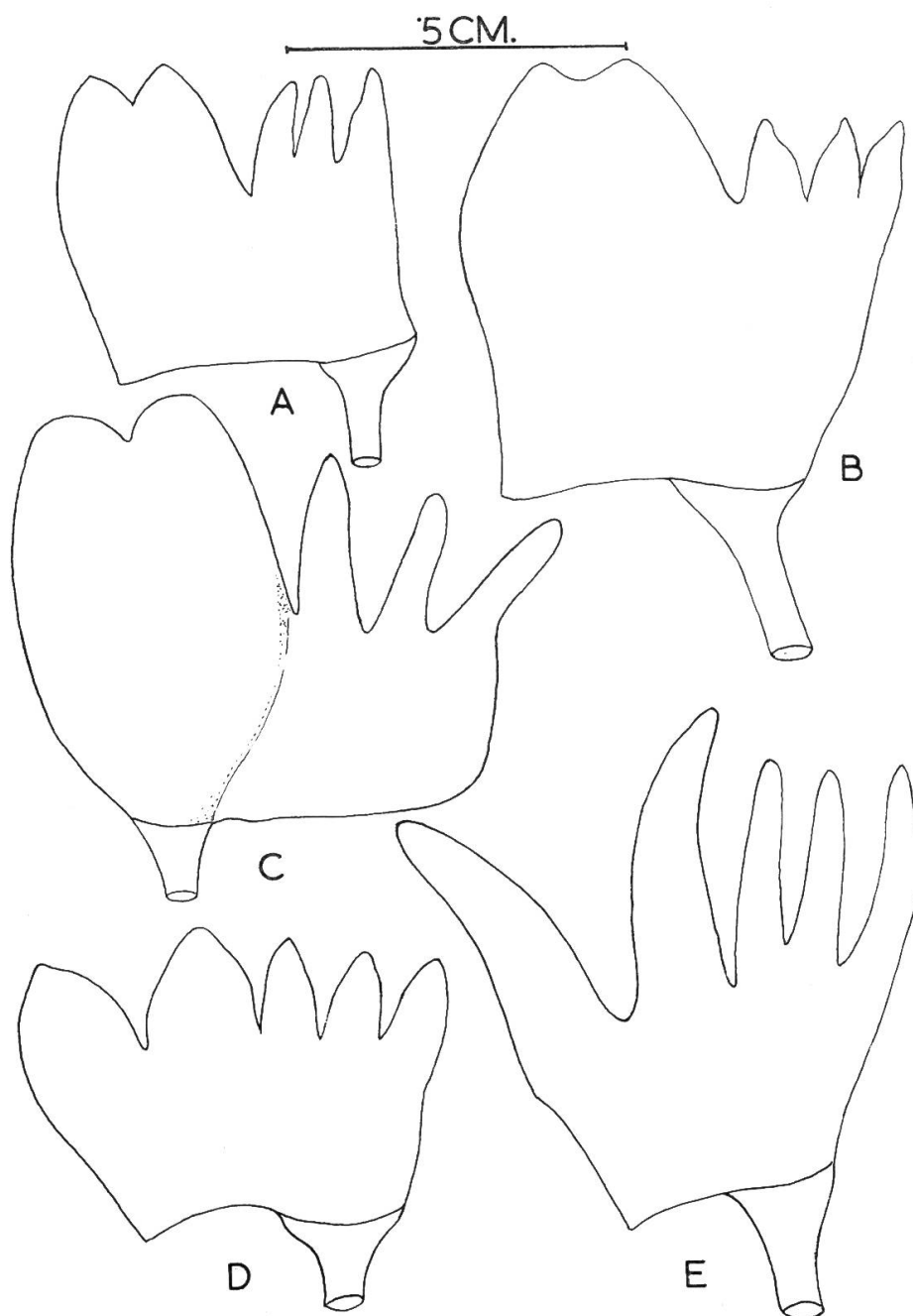


FIG. 48.

A: *G. flava* (Soulié 516A, K); B: *G. coelestis* (Rock 3742, K); C: *G. forrestii* (Forrest 13887, K); D: *G. himalaica* (Badrinath, 1864, Falconer, K); E: *G. henryi* (Henry 1308, K); (hairs not shown).

Ovary and stipules glabrous

Teeth of the upper lip of the calyx united up

to the tip, *f. 49, B* 6. *G. coelestis*

Teeth of the upper lip of the calyx free at
the tip, *f. 49, A*

Leaflets pilose on both sides 7a. *G. flava* var. *flava*

Leaflets glabrous adaxially 7b. *G. flava* var. *tongolensis*

Ovary and stipules hairy

Teeth of the upper lip of the calyx obtuse,

f. 49, C 8. *G. forrestii*

Teeth of the upper lip of the calyx not
obtuse

Leaflets generally 7 not more than 9, hairy

when young later becoming subglabrous 9. *G. yunnanensis*

Leaflets 9-13 rarely 17, uniformly pilose 10. *G. himalaica*

1. — **Gueldenstaedtia monophylla** Fisch. *Mém. Soc. Nat. Moscou* 6:171, *t. 19*. 1823; Delessert, *Ic. select. Pl.* 3:t. 73. 1837.

Tap root thick and woody. Stem much reduced almost absent. Leaves forming a rosette at the top. Leaf unifoliolate, stipule lateral, 5-7 mm long, margin entire, tip acute, pilose. Rhachis 1,5-6 cm long, pilose, leaflets 1,5-2,5 cm long, 1,7-4,3 cm broad, reniform to broadly cordate, uniformly pilose on both sides, hairs yellow, margin entire, tip obtuse, sometimes mucronate. Inflorescence 2-3 flowered umbel; peduncle 2,5-8,7 cm long; bract linear, 3-4 mm, hairy; pedicel, 1-2 mm long, pilose; bracteoles 2 at the base of calyx, linear, c. 2 mm long, pilose. Calyx bilabiate, 5-6 mm long, teeth 1-2 mm long, 2 teeth of the upper lip deltoid, 3 of the lower lip linear, pilose, hairs black and white. Corolla orange tipped with violet (in dry condition). Vexillum c. 1,3 cm long, 8-10 mm broad, tip retuse. Wing 9-10 mm long, 4-5 mm broad, claw c. 1-2 mm, auricle c. 1-1,5 mm. Keel 4-5 mm long, c. 2 mm broad, claw 1,5-2 mm. Stamens diadelphous, 9+1, filaments 3-4 mm long. Ovary 2-3 mm long, pilose, style small curved on itself, stigma capitate. Legume 1,4-2,5 cm long, pilose when young, becoming almost glabrous, dehiscent along both the sutures, each valve curling spirally. Seed c. 3 mm long, 2-3 mm broad, reniform, glaucous, pitted.

HOLOTYPE: Altai Mts., 1820, Fischer 47 (LE).

REPRESENTATIVE SPECIMENS: RUSSIA: Herb. Altaica, Fschiya, Politov (LE); Altai, Meyer (LE); Altai, Tschichatsch, on the right bank of river Katun, *Pschichatich* 206 (LE); Fschiya, on the bank of river Katun, 1837, Politov 12 (LE); Altai, Katunga, in rupestribus apricis ad fl., ex herb. Bunge (FI, G.K.P); Altai mounts, ex herb. Desfontaines, herb. Webb (FI); Altai, Bunge (E); Altai orient. ex herb. Cehihatchef (P); Altai 1835, Lindley (K); Prescott (K); Ledebour (K); Songaria, exped. Schrenk, ex herb. Drake (P).

DISTR.: RUSSIA, Altai, Angara-Sayan, Dauria (BORISSOVA 1945); MONGOLIA, Kotl oz (Khobdo r. Byyantu, GRUBOV 1955).

2. — **Gueldenstaedtia maritima** Maxim. *Bull. Soc. Nat. Moscou* **56** (1): 7. 1879.

Tap root thick, woody, c. 6 mm in girth. Entire plant glabrous. Stem much reduced, almost absent. Leaf imparipinnate; stipule, lateral, free, margin glandular, tip acute; petiole 1,5-3 cm long, rhachis 1,5-3,0 cm, slightly grooved adaxially; leaflets 7-19, petiolule < 1 mm, lamina 6-8 mm long, 2-3 mm broad, oblong-lanceolate, margin entire, tip apiculate to mucronate, emarginate. Inflorescence 2-4 flowered umbel; peduncle 1,3-4,5 cm long; bract c. 4 mm, acute, base of the calyx, 2-3 mm, acute. Calyx c. 8 mm long, 5 toothed, upper 2 teeth 4 mm long, 2 lateral c. 3,5 mm, 1 lower 2-2,5 mm. Corolla orange tipped with violet (in dry condition). Vexillum 1,3 cm long, 7-9 mm broad; wing c. 1 cm long, 2-3 mm broad, claw 2-3 mm, auricle c. 1 mm. Keel 6-7 mm long, 2-3 mm broad, claw 2-3 mm. Stamens diadelphous, 9+1, filaments c. 4 mm long. Ovary c. 2 mm, glabrous, style c. 2 mm, curved spirally, stigma capitate. Legume not seen.

HOLOTYPE: In litore prope Chefoo, 12 April 1875, *Hancock* (LE); phot. BM, isotype K.

REPRESENTATIVE SPECIMENS: CHINA: Prov. Shantung, *Fawel* (P).

DISTR.: CHINA: Province Shantung, Chefoo.

3. — **Gueldenstaedtia stenophylla** Bunge, *Enum. Pl. Chin.*: 18. 1833.

Tap root thick, woody, tapering gradually to a point. Stem prostrate, cylindrical, generally a few cm long, branched, pilose, hairs white; internodes c. 7 mm, generally smaller. Leaf imparipinnate, stipules lateral, acuminate, densely villous, 3-4 mm long, c. 2 mm broad at the base; petiole 2,2-6,4 cm long, rhachis 2,5-6,5 cm long; leaflets 7-15, occasionally up to 19, lateral leaflets opposite, rarely alternate, petiolule < 1 mm, lamina 6-18 mm, rarely 27 mm long, 2-4 mm broad, elongate-oval to elongate-oblong, covered with white appressed hairs, sometimes becoming almost glabrous adaxially; margin entire, tip obtuse-truncate to mucronate. Inflorescence 3-flowered umbel, peduncle 4 mm-11,6 cm; bract c. 2 mm, linear acute, pilose; pedicel c. 1 mm; bracteoles 2, situated at the base of the calyx c. 2 mm long, lanceolate, acute, pilose. Calyx 4-6 mm long, pilose, hairs black and white; teeth subequal, c. 2-3 mm, 2 upper teeth slightly longer than the other 3. Corolla yellow (in dry condition); vexillum 8-9 mm long, 4-5 mm broad, tip retuse; wing c. 7 mm long, 2 mm broad, claw c. 2 mm, auricle c. 1 mm; keel 4-5 mm long, 1-2 mm broad, claw c. 2 mm. Stamens diadelphous, 9+1, filaments 3-4 mm long. Ovary 2-3 mm long, densely covered with yellowish hairs, style incurved, glabrous; stigma capitate. Legume 1,1-1,9 cm long, 3-4 mm broad, pilose. Seed c. 2 mm long, c. 1,5 mm broad, reniform, glazed, pitted.

HOLOTYPE: « Ad vias in suburbiis pekinensibus », *Bunge* (LE, not seen).

REPRESENTATIVE SPECIMENS: CHINA, Hupeh: *Clemens* 6174b (E); *Licent* 50 (K); Tientsin, *Clemens* 1839, 6174, 6174a (E); *Bullock* 22037 (BM); *Hance* 2004 (BM); *Charles* 75 (E); Tchangkia-tchonang, *Licent* 50 (E); Fengtai, *Cowdry* 2141 (K); Kalgan, *Collector unknown* 1426 (K); Lun-tsichonsy, in the northern mountains, 30 miles off Peking, *collector unknown* (LE). Peking:

1870, *Bunge* (LE); Peking, in the northern mountains, close to the «Kumirni», Lun-tschuan-sy, 1856, *Tatarinow* (LE); Peking, Prince Park, *Liou* L1221 (E). Kiangsu: Peitaiho, *Cowdry* 62 (K). Shansi: Suitechow, *Purdum* 283 (K); Mau Choei, *Licent* 3669 (P). Shensi: Cun-jueu-fau, *Giraldi* 631 (FI); Sau-nagau-fu, *Giraldi* 4225 (FI). — MANCHURIA: Ichou, *Choch* (?) (E).

DISTR.: CHINA, Chihli, Hupeh, Kiangsu, Shansi, Shensi; MANCHURIA.

4. — *Gueldenstaedtia verna* (Georgi) Boriss. *List Herbarium Plants U.S.S.R.* 12:122, no. 3713.1953; Pallas, *Astrag.* t. 66. f. B.1800; A.P. de Candolle, *Astrag.* t. 49.1802; Gmelin, *Fl. Sibir.* 4, t. 26. f. 1. 1769 = *Astragalus vernus* Georgi, *Bemerk. Reise Russisch. Reich.* 1:226.1775 = *A. biflorus* Pallas, *Reise* 3:206.1773, non L. (1771) = *A. pauciflorus* Pallas, *Astrag.*: 81, t. 66. f. B.1800 = *A. brevicarnatus* DC. *Astrag.*: 241.1802 = *Gueldenstaedtia pauciflora* (Pallas) Fisch. *Mém. Soc. Nat. Moscou* 6:173.1823 = *G. pauciflora* var. *subglabrata* DC. *Prodr.* 2:307.1825 = *G. multiflora* Bunge, *Enum. Pl. Chin.*: 18. 1883 = *G. multiflora* var. *longiscapa* Franch. *Pl. David.*: 92.1884 = *G. longiscapa* (Franchet) Léveillé, *Cat. Pl. Yunnan.*: 155.1917 = *Astragalus mirpoureanus* Camb. in Jacquemont *Voy. Bot.*: 39, t. 46. 1844 = *Gueldenstaedtia mirpoureana* (Camb.) Benth. ex Baker in Hooker f. *Fl. Brit. Ind.* 2:118.1876 (sub *G. mirpourensis*) = *G. delavayi* Franch. *Bull. Soc. Bot. Fr.* 32:5.1885 = *G. giraldii* Harms in *Bot. Jahrb.* 29:413.1901 = *G. giraldii* f. *elongata* Pavol. *Nuovo Giorn. Bot. Ital.* 15:410.1908 = *G. giraldii* var. *longiscapa* (Franch.) Jacot in *J. N. China Br. Asiat. Soc.* 58:112.1927 = *G. harmsii* Ulbr. *Bot. Jahrb.* 36. Beibl. 82:58.1905 = *G. brachyptera* Pamp. *Nuovo Giorn. Bot. Ital.* 17:396.1910 = *G. brachyptera* var. *elongata* (Pavol.) Pamp. *l.c.*:396.1910 = *Amblyotropis multiflora* (Bunge) Kitagawa in Nakai, Honda, Satake & Kitagawa, *Rep. First Sc. Exped. Manch.* sect. 4, 4: 87.1936 (Index Fl. Jehol.) = *A. pauciflora* (Pallas) Kitagawa, *l.c.*

Tap root long, 3-10 mm in girth, woody, tapering gradually to a point. *Stem* much reduced, not more than a few cm, internodes 0-5 mm. Leaves and peduncles forming a rosette on the surface. *Leaf* imparipinnate, stipule lateral, free, 4-7 mm long, 1.5-4 mm broad at the base, lanceolate, acute, pilose on both sides. Petiole rarely 1 cm, generally 3.5-7 cm occasionally 15 cm long. Rhachis occasionally 2 cm, generally 4-10 cm rarely 22 cm long, minutely grooved adaxially, pilose. Leaflets 7-21, petiolule < 1 mm, lamina 6-17 mm, rarely 3.7 cm long, 3-6 mm rarely 11 mm broad, elliptical, oblong to oblong-lanceolate; margin entire, tip mucronate, obtuse, occasionally retuse, sometimes the two lobes unequal, densely pilose on both sides when young, becoming subglabrous to glabrous. *Inflorescence* 2-9 flowered umbel, peduncle rarely 15 mm, generally 5-17 cm, exceptionally as long as 29 cm; bract 2-5 mm long, 1-2 mm broad, lanceolate; pedicel 1-2 mm long; bracteoles 2, at the base of the calyx, 2-3 mm long, < 1 mm broad. *Calyx* 6-7 mm long, bilipped, teeth unequal, 2 teeth of the upper lip 3-4 mm long, 3 teeth of the lower lip c. 2 mm long. *Corolla* light violet to yellowish orange tipped with violet (in dry condition). Vexillum 9-14 mm long, 5-8 mm broad. Wing 8-10 mm long, 2-3 mm broad, claw 2-3 mm, auricle c. 1 mm long. Keel 5-7 mm long, 1-2 mm broad, claw 2-3 mm, auricle

c. 1 mm long. *Stamens* diadelphous, 9+1, filaments 4-5 mm long. *Ovary* c. 2-3 mm long, pilose, style glabrous, curved inwards. *Stigma* capitate. *Legume* 9-17 mm, rarely 22 mm long, 2-4 mm broad, many seeded. *Seed* c. 1-2 mm long c. 1-2 mm broad, reniform, one lobe smaller than the other, pitted glazed.

TYPE: Siberia, *Georgi* (LE, not seen).

A number of specific epithets have been associated with this widely distributed species. However a critical study of the material available has revealed that all these names must be regarded as synonymous since there are no reliable criteria for distinguishing them. The characters said to distinguish these « species » are discussed below. The statistical analysis of the length of the peduncle and the number of flowers per inflorescence are based on 837 observations out of 161 herbarium specimens including various types. From each specimen 10 or if less, as many inflorescences as available were taken into account. For a list of these specimens one may refer to ALI (1958).

OBS. 1: Number of flowers per inflorescence.

BAKER (1876) differentiated *G. mirpourea* (Camb.) Benth. ex Baker, apart from the number of leaflets, on the basis of the number of flowers. In *G. mirpourea*, according to BAKER, 1-3 flowers are present, whereas in *G. multiflora* Bunge 3-6 flowers are described. FRANCHET (1885) characterized his new species *G. delavayi* as having 4-6 flowers in contrast to *G. pauciflora* (Pallas) Fisch. where 1-3 flowers per inflorescence are said to be present. According to FRANCHET (1884) in *G. multiflora* 5-9 flowers are present. HANDEL-MAZZETTI (1936) has merged *G. delavayi* in *G. pauciflora* and recognises it as a species having as many as 6 flowers per inflorescence. *G. multiflora* however, he distinguishes as an 8-flowered plant.

The number of flowers per inflorescence is quite variable even in the same plant. The frequency distribution curve of the number of flowers per inflorescence has been plotted in f. 50. The position of the type specimens (A,B,C), wherever possible, has been indicated. The histogram is quite uniform and unimodal, hence it is not correct to give any taxonomic importance to this character.

OBS. 2: The length of the peduncle.

G. multiflora var. *longiscapa* Franchet, given specific status by LÉVEILLÉ (1917), later transferred to *G. giraldii* by JACOT (1927), which according to him is the same as *G. harmsii* Ulbr., is characterized by 10-12 cm long peduncle. PAVOLINI (1908) described a new form of *G. giraldii* i.e. *G. giraldi* f. *elongata* Pav., which was raised to the varietal rank and transferred to *G. brachyptera* by PAMPANINI (1910) thus creating a new combination *G. brachyptera* var. *elongata* (Pav.) Pamp. These workers have characterized it as a new taxon because the peduncle reaches 25 cm in length. *G. harmsii* Ulbr. has been stated (ULBRICH, 1905) to « stand near *G. giraldii* Harms but differs markedly by a much longer and more slender peduncle... ». The peduncle has been stated to vary from 10-20 cm, mostly 15 cm long. The frequency distribution curve

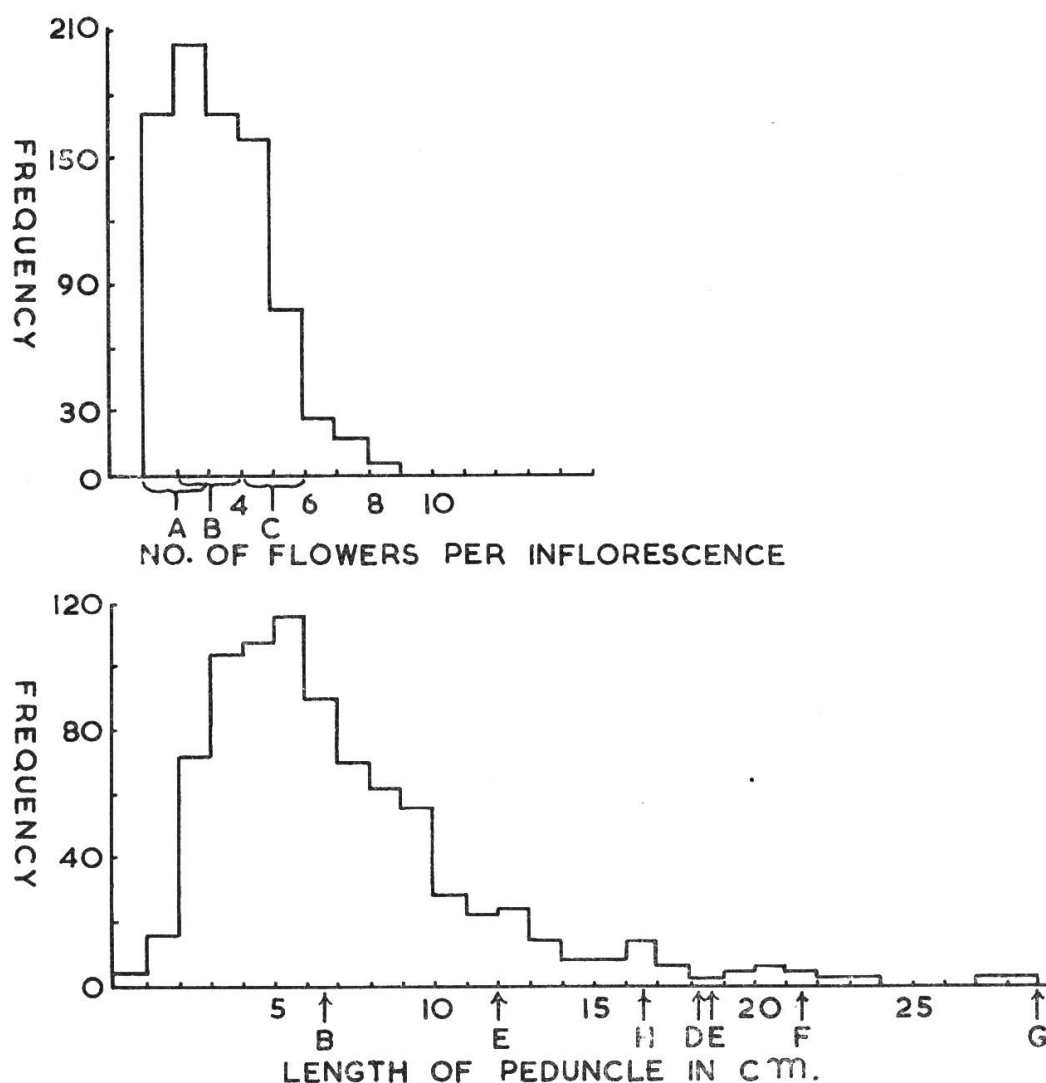


FIG. 49. — Frequency distribution curves of number of flowers per inflorescence and the length of the peduncle.

A: *G. mirpoureana* (holotype); B: *G. pauciflora* (holotype); C: *G. delavayi* (description); D: *G. giraldii* (lectotype); E: *G. longiscapa* (description); F: *G. brachyptera* (lectotype); G: *G. brachyptera* var. *elongata* (lectotype); H: *G. harmsii* (lectotype).

of the length of the peduncle is unimodal, hence this criterion is not useful in the segregation of more than one taxon.

OBS. 3: Correlation between the length of the peduncle and the number of flowers per inflorescence.

There seems to be a direct correlation between the two variables (*f. 51*). It seems quite likely that the same physiological conditions which favour a longer peduncle may also result in a larger number of flowers per inflores-

cence. However as the points are almost uniformly distributed, it is not possible to recognise more than one taxon on the basis of these characters.

No correlation between the geographical distribution and the variation of these structures was observed.

OBS. 4: Pubescence of rhachides and leaflets.

De CANDOLLE (1825) differentiated *G. pauciflora* var. *subglabrata* DC. on the basis of the subglabrous leaflets and rhachides. As a matter of fact the young leaflets and rhachides are always thickly pubescent, the older leaflets, however, become glabrescent, generally on the dorsal side, but they are rarely entirely glabrous on both sides. As the intermediate stages between these two extremes are met with, it is not possible to give this character any taxonomic significance. Hence the above variety has been reduced to synonymy.

OBS. 5: Presence of black hairs on calyx.

One of the characters stated by PAMPANINI (1910) to distinguish *G. brachyptera* from *G. multiflora* is the presence of black hairs on the calyx of the former species. A careful examination of the calyx of all the available spe-

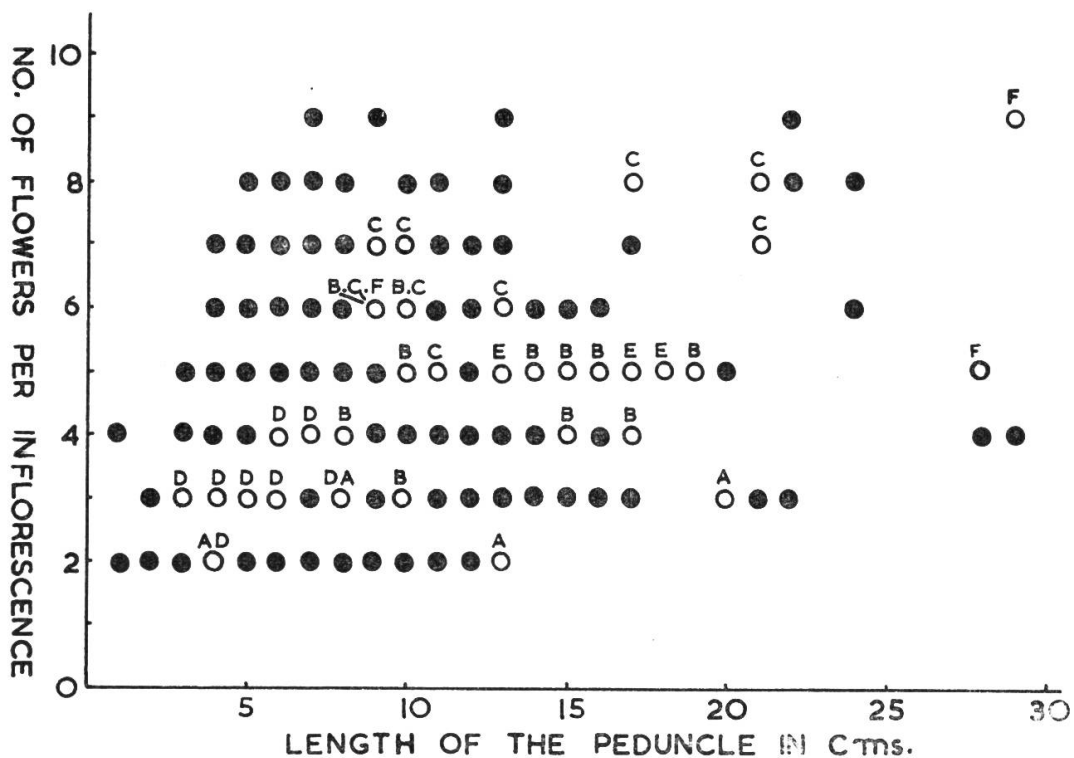


FIG. 50. — Correlation between the length of the peduncle and the number of flowers per inflorescence.

A: *G. mirpourea* (holotype); B: *G. giraldii* (lectotype); C: *G. brachyptera* (lectotype); D: *G. pauciflora* (holotype); E: *G. harmsii* (lectotype); F: *G. giraldii* var. *elongata* (lectotype).

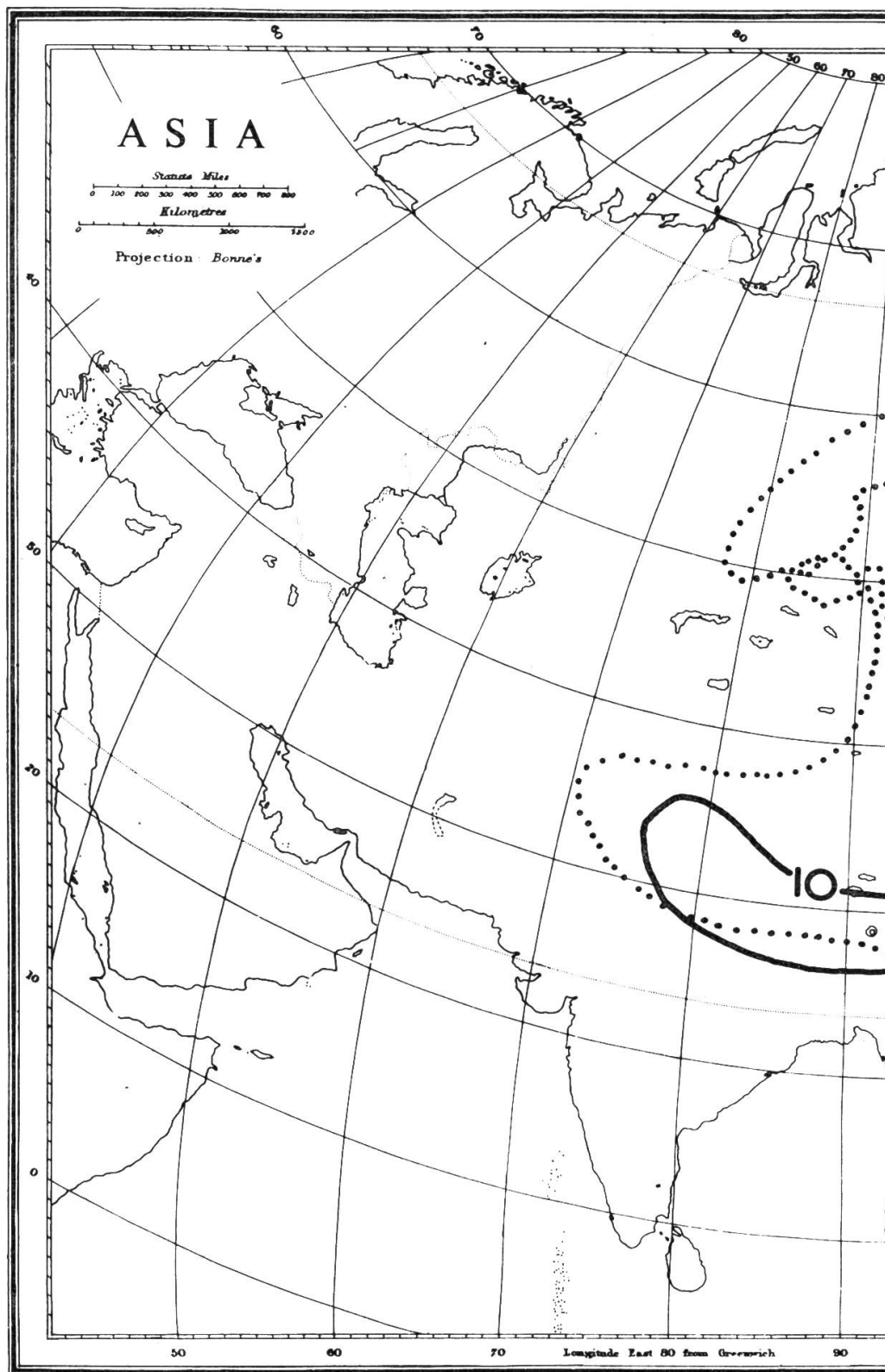
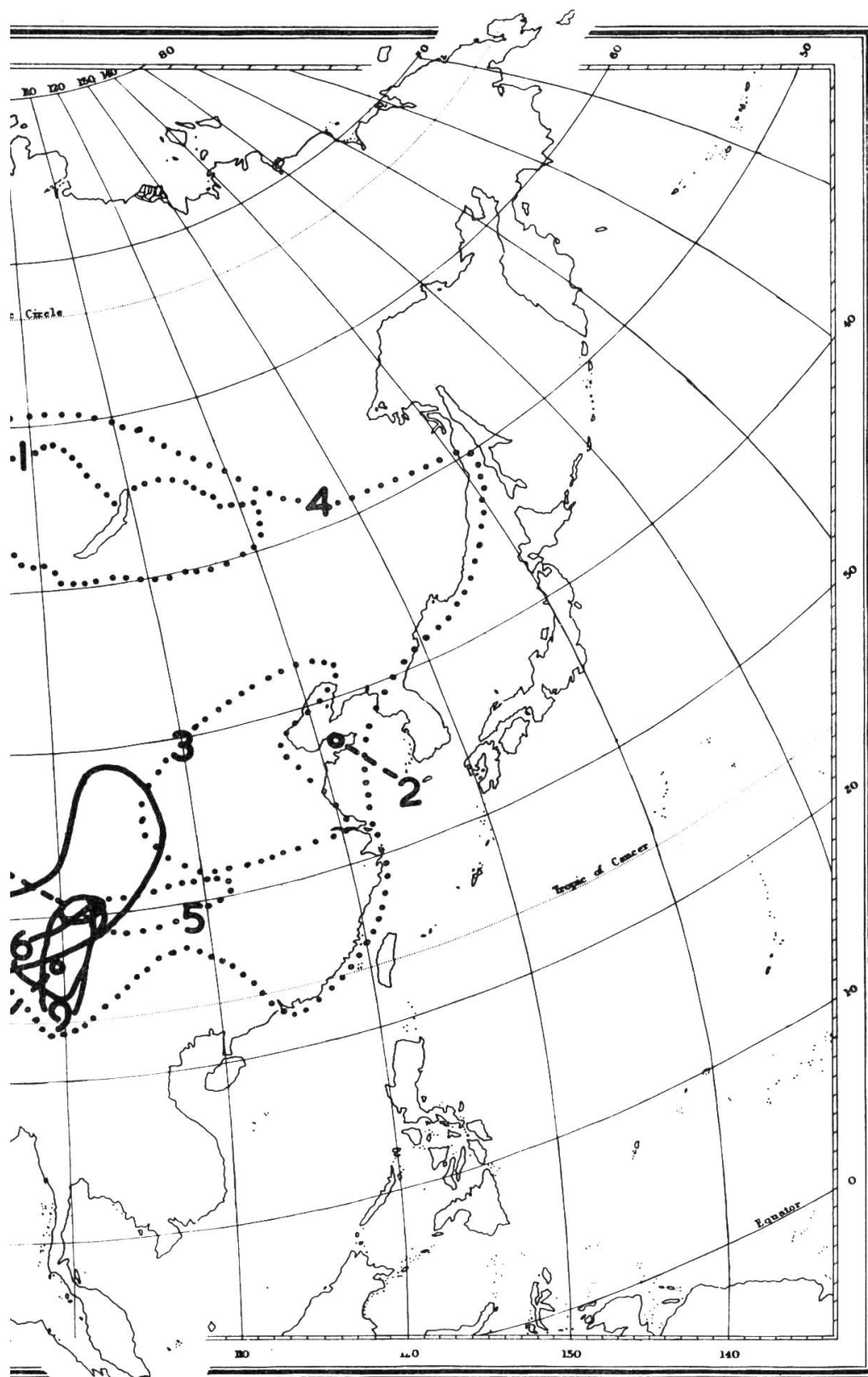


FIG. 51. — I

1. *Gueldenstaedtia monophylla*. 2. *G. maritima*. 3. *G. stenophylla*.
9. *G. yunnanensi*
Continuous line: subgenus *Tibetia*.



bution Map.

1. *G. verna*. 2. *G. henryi*. 3. *G. coelestis*. 4. *G. flava*. 5. *G. forrestii*.
 6. *G. himalaica*.
 Dashed line: subgenus *Gueldenstaedtia*.

cimens revealed that black hairs are universally present on the calyx though their number is quite variable. In some cases the black hairs are dominant (as in the type of *G. brachyptera*); in others the black hairs are present in the pubescence, but at times partly obscured by the white (or yellowish) hairs. Nevertheless all stages between the two extremes are met with, hence no taxonomic significance could be attached to this character.

REPRESENTATIVE SPECIMENS: PAKISTAN, N.W.F. Province: Hazara, below 700 m, *Stewart 118* (K); Abbottabad, 1300 m, *Stewart 9032* (RAW); Bagh, 1000-1300 m, *Stewart & Nasir 23692* (RAW). Punjab: Rawalpindi, *Suraj Prakash Malik 2* (RAW); Salt range, *Aitchison* (K). — BURMA, Shan Hills, 1500 m, *Collett 370* (K); Saga, 100 m, *Collett 979* (K). — CHINA, Hupeh: Kaghan, Ssirvan-tze, 1877, *Artselaer* (LE); Shanhaikwan, May 10, 1875, *Licent 983* (P); Kuyoh, *Clemens 6175a* (E); Tientsien, *Clemens 6175* (E); Hsinglungshan, May 29, 1931, *Liou* (K). Hong Kong: April 12, 1886, *Delavay 2349* (P). Peking, ex herb. *Fischer* (LE); *Kirilow* (LE); between Peking and Tungchow, on loess, 1884, *Potantin* (LE); Lun-tshuan-si, in the northern mountains, close to «Kumirni», 1856, *Tatarinow* (LE); Po hua shan, July 1877, *Bretschneider* (LE); Peking, western hill, *Liou L1237* (E); Tung-Fang, *Silvestri 4740* (FI); mountains west of Peking, *Bretschneider 1844* (BM). Kansu: *Potantin* (LE); Minchow, *Purdom* (K). Kiangsu: Mioc hen shan, June 1, 1908, *Wassilow* (LE); Nanking, *Tsu 434* (E); Peitaiho, *Cowdry 61* (K). Shansi: Taihang Shan, Tonkontwei, June 20, 1915, *Licent 1054* (P). Shensi: Kniu-liu shan, *Giraldi 1601* (FI); Lun-tum, *Giraldi 703* (FI); Ki-sau, *Giraldi 4277* (FI); Kan-y-huo (La o shan), *Giraldi 4081* (lectotype *G. harmsii*, FI), 4079 (syntype *G. harmsii*, FI); between Fang yu and Guiu yu, *Giraldi 1602* (syntype *G. giraldii*, FI); Fon Kian pu, *Giraldi 1604* (syntype), 1603 (lectotype *G. giraldii*, FI). Shantung: *Fauvel* (P); Chefoo beach, April 1875, collector unknown 19 (LE); Chefoo, *Fauvel* (P); *Perry* (K); Meng Shan, Fei hsien, *Cheo & Yen 229* (BM, P); Tsingtao, *Chiao 2482* (E); near Chingkiang, ex herb. *W. R. Carles 539* (E); Ching chou fu, Itu hsien, *Couling 108* (E). Sikang: Prov. Batang, Yargong, 1903, *Soulié 3116* (P); A-tun-tsu valley, 3600-4000 m, *Kingdon-Ward 344* (E). Szechuan: village Fushan, on clayey soil, 1893, *Potantin* (LE). Yunnan: La-kou, 2600-2700 m, *Maire 7132* (LE); plains of La Kou, 2600 m, *Maire* (E); Chin-chinang-kai, 1500 m, *Kingdon-Ward 3866* (E); north of Tsu Hsiong fu, sandy hill, pasture land, 2100, *Bulley 1122* (E); circa Lankong, *Delavay 514* (K). — MANCHURIA: Kvantunsk Distr., vicinity of town Dalnij, 1903, *Vasljew* (LE); Prov. Mukden, between Sun-bin-nu and Jun-lin, banks of the river Hunho, Sept. 27, 1897, *Komarov* (LE); Prov. Kirin, Ninguta, near experimental farm, Echo, May 19, 1923, *Tretiakoff* (LE); station Lamadjauzsy, in front of Nonni and Sungari, May 8, 1908, *Komarov* (LE); Pa-tao-ho, 1100 m, *Silvestri 1077* (lectotype *G. brachyptera*, FI); valle Ma-kia-keou, 765 m, *Silvestri 1079*, 1079a (syntypes *G. brachyptera*, FI); Ou-kia-ki, 328 m, April 1-15, 1905, *Silvestri 1080* (lectotype *G. giraldii f. elongata*, FI). — MONGOLIA: Gehol, April 1866, *Franchet 1781* (P); 1865, *David 21*

(P). — U.R.S.S., Siberia: ex. *herb. Maire* (P); ex. *herb. Labillardière* (FI); Nertschinsk, 1849, *Sirsioff* 179 (LE); 1889, *Karo* 17 (BM, E, FI, K, P); Dauria, ex *herb. Richard* (P); Dornna, May 12, 1865, ex *herb. Bunge* (P); Altai, *Pallas* (holotype *A. pauciflorus*, BM).

DISTR.: W. PAKISTAN, N. W. F. Province, Punjab; BURMA, Shan Hills; CHINA, Hong Kong, Hupeh, Kansu, Kiangsu, Shansi, Shensi, Shantung, Sikang, Szechuan, Yunnan; MANCHURIA; MONGOLIA; RUSSIA, Siberia, Dauria, Altai, Angara-Sayan, Ussuri (BORISSOVA, 1945).

5. — *Guelldenstaedtia henryi* Ulbr. *Bot. Jahrb.* 36. Beibl. 82: 59.1905 = *Guelldenstaedtia henryi* Palib. *Bull. Herb. Boissier*, ser. 2, 6: 18.1906.

Tap root thick and woody, thin adventitious roots also produced at the nodes of rhizome. Stem rhizome, rooting at nodes and producing aerial branches. Aerial stem creeping, cylindrical, minutely ribbed (in dry condition), pilose, internodes 3-20 mm long. Leaf imparipinnate, stipule 3-8 mm long, 2-4 mm broad at the base, lanceolate, acute, pilose (petiole c. 4.5 cm). Rhachis 4-10 cm long, sparsely pilose to subglabrous; leaflets 11-15, lateral ones opposite, petiolule < 1 mm, pilose; lamina 5-12 mm long, 2-6 mm broad, oval to obovate, margin entire, tip obtuse-subtruncate apiculate, finely pilose to subglabrous on both sides. Inflorescence 5-6-flowered umbel, peduncle 2-15.5 cm, almost cylindrical, minutely ribbed, pilose; bract 3-5 mm, lanceolate, acute, pilose; pedicel 2-5 mm, pilose becoming subglabrous in fruits; bracteoles 2, at the base of the calyx, 2-4 mm long, linear, acute, pilose. Calyx (cf. f. 49, E) 5-8 mm, bilipped, 2 teeth of the upper lip 4-5 mm, 3 teeth of the lower lip 2-3 mm, linear acute, pilose hairs black and yellow. Corolla yellowish orange sometimes tinged with violet (in dry condition), vexillum 9-13 mm long, 6-10 mm broad, wing 9-12 mm long 3-4 mm broad, claw 1.5-3 mm; keel 5-7 mm long, 1.5-2 mm broad, claw 2-2.5 mm long. Stamens diadelphous, 9+1, filaments 3-4 mm long. Ovary 2-3 mm long, hairy, style glabrous, curved on itself, stigma capitate. Legume 11-18 mm long, glabrous subglabrous, dehiscent, each valve curling spirally after dehiscing, seeds many. Seed c. 3 mm long, c. 2 mm broad, reniform, pitted glazed.

TYPE: China, Szechuan, Feb. 1890, *Henry* 8982, 1238 (B? not seen, holotype; K, P).

REPRESENTATIVE SPECIMENS: CHINA, Honan: near Shan chau, 1899, *Schockley* (BM). Hupeh: 1875, *Piasezky* (LE); W. Hupeh, *Wilson* 1775 (K); Ichang, *Henry* 1308 (E, K, P), 3384 (BM, K). Szechuan: Tachienlu, 3000-4500 m *Pratt* 389 (BM, K); between Fu-chan and San-chschuo-pin, on clayey soil, April 12, 1893, *Potanin* (LE); village Fushan, April 11, 1893, *Potanin* (LE). Yunnan: March 19, 1882, *Delavay* (P); Zong zhouan (?), 2450 m, ex *herb. Maire* 3762 (LE). Throughout Shensi and Kansu, *Farrer & Purdom* 2 (E).

DISTR.: CHINA, Honan, Hupeh, Szechuan, Yunnan, Shensi (?), Kansu (?)

The only record from Shensi and Kansu is the specimen of *Farrer & Purdom* cited above.

6. **Gueldenstaedtia coelestis** (Diels) Simpson, *Notes Roy. Bot. Gard. Edinb.* 8:263. 1915 = *Astragalus coelestis* Diels, *Notes Roy. Bot. Gard. Edinb.* 5:244. 1912.

Root system adventitious, rooting from the nodes of the rhizome. *Stem* rhizome, ribbed (in dry condition) internodes 4 mm-4 cm, aerial stem almost absent. *Leaf* imparipinnate, stipule 5-8 mm long, leaf-opposed, amplexicaul, sometimes joined together at the base, membranous, rotund, obovate, tip obtuse to subtruncate; petiole 2-10 cm, rhachis 1-3 cm, pilose, minutely grooved; leaflets 5-9, lateral ones opposite, conduplicate in bud, petiolule c. 1 mm pilose, lamina 7-20 mm long, 6-15 mm broad, oblong-obovate, margin entire, tip obtuse, subtruncate to retuse, covered with brown-black dots adaxially, pilose on both sides to glabrous adaxially. *Inflorescence* 1-4 flowered umbel, peduncle 4-16 cm, sparsely hairy; bract 3-6 mm, membranous, pilose; petiole 2-5 mm, covered with black hairs; bracteoles 2, c. 1 mm from the base of the calyx, pilose, hairs black. *Calyx* 6-7 mm, bilipped, 2 teeth of the upper lip almost united up to the tip (*f.* 51, *B*) 2,5-3 mm long, 3 teeth of the lower lip subequal c. 1,5-2 mm long, linear, acute. *Corolla* yellowish orange, sometimes tinged with violet (in dry condition), vexillum 11-12 mm long, 10-11 mm broad; wing c. 12 mm long, c. 7 mm broad, claw 1-2 mm long; keel 4-5 mm long, 1,5-2 mm broad, claw c. 1-2 mm long. *Stamens* diadelphous, 9+1, filaments c. 6 mm long. *Ovary* c. 4 mm long, glabrous, style very short, bent at right angles to the axis of the ovary, stigma capitate. *Legume* not seen.

HOLOTYPE: Yunnan, on the eastern flank of the Lichiang Range, dry mountain pasture land, 3000-3600 m, May 1906, *Forrest* 2221 (E, type No. BM, K).

REPRESENTATIVE SPECIMENS: CHINA, Sikang: Nam Tamai valley (Adung wang-Gamlang wang), form with some retuse leaflets, Sept. 30, 1937, *Kingdon-Ward* 13319 (BM). Szechuan: S. W. of Tatsienlu, north of Chiu-Lung-Hsien, in Minya country, *Rock* 17765 (E, K). Yunnan: Eastern flanks of Lichiang, 3660 m, *Forrest* 5770 (E, K); flowers lemon yellow, mountains west of Tengkon valley, 4000 m, *Forrest* 12486 (E); flowers blue, Yangtze, Dt. Likiang, eastern slopes of Likiang snow range, *Rock* 4708 (K, P); flowers blue, Yangtze, Dt. Likiang, eastern slopes of Likiang range, *Rock* 3742 (BM, K); Yangtze, western slopes of Likiang snow range, *Rock* 4594 A (K).

DISTR.: CHINA, Sikang, Szechuan, Yunnan.

7. — **Gueldenstaedtia flava** Adamson, *J. Bot.* 51:130. 1913, var. *flava*.

Tap *root* thick (sometimes 1 cm thick); adventitious roots produced from the nodes of the prostrate rhizome, finely branched. *Stem* underground rhizome as well as trailing on the surface of the soil, faintly ribbed (in dry condition), glabrous, internodes 2 mm-6,5 cm. *Leaf* imparipinnate stipule amplexicaul, leaf-opposed, 4-6 mm, oblong to rotund, margin entire, tip obtuse to truncate, membranous, glabrous, generally with reddish black dots; petiole 1,6-12 cm, rhachis 7-30 mm minutely hairy; leaflets 5-7, lateral ones opposite, petiolule c. 1 mm, pilose, lamina 6-17 mm long, 4-13 mm broad, obovate-elliptical, margin entire, tip obtuse, subtruncate to

emarginate, pilose on both sides, brown to black dots present on the upper surface. *Inflorescence* 2-3-flowered umbel, peduncle 4,5-21,5 cm long, sparsely hairy; bract 1-1,5 mm long pilose, hairs black; pedicel 4-6 mm long, pilose, hairs black; bracteoles 2, at the base of the calyx 1 mm or less long, pilose hairs black. *Calyx* 5-6 mm long, bilipped, upper lip c. 2 mm long, made up of 2 teeth, teeth free at the tip (*f.* 51, *A*) lower lip c. 1,5 mm, 3 toothed, teeth acute, linear. *Corolla* yellow occasionally tinged with violet (in dry condition), vexillum 8-10 mm long, claw 7-9 mm broad, emarginate; wing c. 8-9 mm long, 4-5 mm broad, claw 1-2 mm long; keel 3-4 mm long, c. 1,5 mm broad, claw c. 1-2 mm long. *Stamens* diadelphous, 9+1, filaments 3-4 mm long. *Ovary* 3-4 mm long, glabrous, style very small, bent at right angles to the axis of the ovary, stigma capitate. *Legume* not seen.

HOLOTYPE: West Szechuan, Tatsienlu, 3300 m, June 27, 1910, *Kingdon-Ward* (E).

REPRESENTATIVE SPECIMENS: CHINA, Szechuan: *Mc Laren* 168 (E); Tatsienlu, *Harry Smith* 10450 (BM); *Pratt* 259 (K); *Soulié* 516B (K).

DISTR.: CHINA, Szechuan.

— Var. **tongolensis** (Ulbr.) Ali, stat. nov. = *Gueldenstaedtia tongolensis* Ulbr. *Fedde Repert., Beih.* 12:425. 1922.

This variety differs from var. *flava* in having the leaflets glabrous adaxially.

TYPE: Szechuan, Tongolo, Khazi la tho, *Soulié* 2530 (BRSL, not seen; isotype P).

REPRESENTATIVE SPECIMENS: CHINA, Sikang: Litang river divide, 16 km, S-W of Muli, 4000 m, *Kingdon-Ward* 4320 (E); Yangtze, W of Yung-wing, *Kingdon-Ward* 5253 (E); Litang river divide, 4300-5000 m, *Kingdon-Ward* 4064 (E); Mt. Siga, W and overlooking the Yalung river, north of Karadi, *Rock* 23842 (BM, E). Szechuan: Tatsienlu, 3000-4500 m, *Pratt* 578 (BM, K); Kangting (Tatsienlu), distr. Yulingkong, Gomba La, *Harry Smith* 10665 (BM); Tatsienlu, *Soulié* 516A (K); northern valley, by the town Da-dsian, village Shin-djan-tzi, July 17, 1893, *Potanin* (LE); Pass Da-Co-shan, July 18, 1893, *Potanin* (LE).

DISTR.: CHINA, Sikang, Szechuan.

8. — **Gueldenstaedtia forrestii** Ali spec. nov.

Herba perennis. *Radix* haud visa. *Caulis* prostratus elongatus, internodiis 3 mm-3 cm longis, primo quadriangularis flavus vel brunneus, pilis flavis diffusis vestitus, in senectute denique longitudinaliter sulcatus, glaber. *Folia* imparipinnata, stipulae circumflexae ad apicem liberae, basi conjunctae, obovatae vel oblongae, supra glabrae, infra pilis flavis diffusis indentatae, apice obtusae vel subtruncatae. *Petiolus* 3,5-9 cm longus. *Rhachis* 2-5,5 cm longa, inferne et superne subtiliter sulcata, pilosa. *Folia* 7-9 foliolo terminali excepto opposita, juvenia conduplicata; *petiolulus* c. 1 mm longus, *lamina* 11-19 mm longa, 9-15 mm lata, obovata vel rotundata, margine integra, apice retusa, raro subtruncata vel obtusa, supra costa excepta omnino glabra,

subtus pilosa. *Inflorescentia* umbellata, 3-4-flora, pedunculo 13-14 cm longo; bracteae c. 4 mm longae, lanceolatae; pedicelli 3-4 mm longi. *Calyx* 8 mm longus, pilis flavis vestitus bilabiatus; labium superius c. 3 mm longus, apice retuso duobus dentibus apice excepto conjunctus; labium inferius dentibus subaequalibus c. 2-3 mm longis, linearibus, acutis provisus. *Corolla* in sicco flava; vexillum retusus, 16 mm longum, 12 mm latum. Alae 14 mm longae, c. 7 mm latae, ungui 2-3 mm longo. Carina c. 6 mm longa, c. 2 mm lata, ungui c. 2 mm longo; auriculae < 1 mm longae. *Stamina* diadelpheia, 9+1, filamentis 5-6 mm longis. *Ovarium* 3-4 mm longum, pilosum; stylo minuto (< 1 mm), stigmatе capitato. *Legumen* non vidi.

HOLOTYPE: Yunnan, *Forrest* 13887 (K; isotypes: BM, E, P). (*f.* 52).

DISTR.: CHINA, Yunnan.

This species is related to *G. coelestis* but can easily be distinguished by its emarginate upper lip of the calyx (*f.* 51, C).

9. — *Gueldenstaedtia yunnanensis* Franch., *Pl. Delav.*: 164. *t.* 40. 1890.

Tap root thick, woody, sometimes c. 1 cm in girth. *Stem* prostrate, faintly angular (in dry condition), internodes short in basal portion (few mm), elsewhere as long as 3 cm. *Leaf* imparipinnate, stipules leaf-opposed, amplexicaul, united except at the tip, older ones becoming more separated, 4-10 mm long, membranous, yellowish white, pilose; petiole 0.9-5.5 cm long, rhachis 1-4 cm long, slightly grooved, leaflets 3-9, lateral ones opposite, 4-15 mm long, 3-15 mm broad, margin entire tip retuse to emarginate minutely hairy to subglabrous. *Inflorescence* 1-4-flowered umbel, peduncle 2-11 cm, bract 1-2 mm long, pilose; pedicel 2-7 mm long; bracteoles 2, at the base of the calyx, 1-2 mm. *Calyx* 4-6 mm, bilabiate, 2-teeth of the upper lip free at the tip, each tooth acute, deltoid; 3 teeth of the lower lip 1-2 mm linear. *Corolla* orange, tinged with violet (in dry condition), vexillum 9-12 mm long, 8-10 mm broad; wing 8-11 mm long, 3-5 mm broad; claw 1.5-2 mm, auricle < 1 mm; keel 3-4 mm long, 1-2 mm broad, claw 1.5-2 mm long. *Stamens* diadelphous, 9+1, filaments 3-4 mm long. *Ovary* 2-3 mm long, pilose, hairs brown, style < 1 mm, bent at right angle to the axis of the ovary, stigma capitate. *Legume* 9-20 mm long 3-4 mm broad, dehiscent, the 2 valves twisting spirally, pilose, becoming almost glabrous at maturity, 6-8 seeded. *Seed* c. 2 mm long, 1.5-2 mm broad, reniform maculate, spots black irregular against yellowish to greyish background.

HOLOTYPE: Yunnan in pascuis montis Hee-chan-men supra Hokin, 2750-3300 m, Sept. 11, 1885, *Delavay* 1957 (P).

REPRESENTATIVE SPECIMENS: CHINA, Szechuan: Kulu, Muli (or Mili) *Rock* 18184 (E); neighbourhood of Tatsienlu, *Cunningham* 230 (E); Kangting (Tatsienlu), 3300 m, *H. Smith* 10446 (BM); Kangting, Yulingkong, *H. Smith* 10760 (BM); Tatsienlu, 3000-4500 m, *Pratt* 259 (BM); Urbs Tatsienlu, *Potanin* (LE). Yunnan: Che tcho tze, Ta pin tze, 2200 m, Aug. 16, 1888, *Delavay* (P); Yu kiang, Hoang Kia, 2700 m, July 3, 1888, *Delavay* (P); Lupao, 3300 m, *Maire* (P); eastern flanks of Lichiang range, *Forrest* 6166 (BM, E, FI, K), 14278 (K); Lichiang snow range, 3300 m, *Yu* (E); Meking-salwin, 4000 m, *Forrest* 14278 (BM, E); Atun-tse, 4000 m, *Kingdon-Ward* (E); in regione



FIG. 52. — *Gueldenstaedtia forrestii* Ali, spec. nov.,
holotype (Yunnan, *Forrest 13887*, K)

temperata supra vicum Nugulko ad urbem Lidjiang (Likiang), 3400-3700 m, *Handel-Mazzetti* 6688 (FI) ; Hee chan men, 2700-3300 m, *Delavay* 1907 (K) ; Yangtze, eastern slopes of Likiang snow range, *Rock* 5548 (K) ; dry situation amongst scrub on the eastern flank of the Lichiang snow range, 3300 m, May 1906, *Forrest* 216 (BM).

DISTR.: CHINA, Szechuan, Yunnan.

10. — ***Gueldenstaedtia himalaica*** Baker in Hooker f. *Fl. Brit. Ind.* 2:117. 1876 = *Gueldenstaedtia diversifolia* Maxim., *Bull. Acad. St. Petersb.* 27: 462. 1881 = *G. uniflora* Strachey ex Jacot, *J. N. China Br. Asiat. Soc.* 58: 113. 1927.

Tap root thickened, sometimes 15 mm in diameter. Stem trailing, minutely angular (in dry condition), alternately branched, densely pilose, internodes generally 10-15 mm, rarely 3 mm long. Leaf imparipinnate, stipule 3-10 mm long, leaf-opposed, amplexicaul, the two stipules connate for about half the length, ovate, elliptical, membranous, semitransparent, spotted, pilose, petiole 2-5 cm, rhachis 2-7 cm, densely pilose; leaflets occasionally 5-7, generally 9-13, rarely 17, petiolule < 1 mm, pilose; lamina 5-13 mm long, 5-10 mm broad, cuneate, suboblong to rotund, margin entire, tip obtuse, retuse to emarginate, densely pilose, hairs white to pale brown. Inflorescence 1-3 flowered umbel, peduncle generally 2.5-5.5 cm, occasionally 6 mm, rarely reaching 7.8 cm, densely pilose; bract 1-2 mm long, linear, pilose; pedicel 1-3 mm; bracteoles 2, 1-2 mm long, situated at the base of the calyx, membranous, pilose. Calyx (cf. f. 49, D) 3-5 mm, bilipped, 2 teeth of the upper lip 1-2 mm long connate except at the tip, 3 teeth of the lower lip 1-2 mm, subequal, linear. Corolla pale orange to violet (in dry condition); vexillum 7-8 mm, rarely 11 mm long, 6-10 mm broad, emarginate; wing 5-10 mm, rarely 11 mm long, 2-5 mm broad, claw 1-2 mm long auricle < 1 mm keel, rarely 2 mm, generally 3-5 mm long, 1-2 mm broad, claw 1-2 mm long. Stamens diadelphous, 9+1, filaments c. 3 mm long. Ovary 2-3 mm, profusely pilose, style very short, bent at right angle to the axis of the ovary. Stigma capitate. Legume 10-15 mm long, c. 3 mm broad, minutely pilose to glabrescent, brown, dehiscent, each valve sometimes curls spirally. Seed c. 2 mm long, 1-2 mm broad, maculate, spots irregular, black, against yellowish to greyish background.

LECTOTYPE: Sikkim, 3700-4300 m, *Hooker* (K).

REPRESENTATIVE SPECIMENS: INDIA, Kumaun et Garhwal: Bompras, 4800 m, *Strachey & Winterbottom* 2 (BM, P); Byans, Chalek in Kali valley, 3700-4000 m, *Duthie* 5457 (BM); Phulaldaru, 4000 m, *Duthie* 1008 (BM, FI, K); Milam glacier, Niti proper, 3700-5000 m, 1852, *Strachey & Winterbottom* (K); Badrinath, *Falconer* (R); Milam, Gori valley, *Duthie* 24337 (K). — NEPAL: Glacier valley, 4300 m, *Lowndes* L983 (BM). — BHUTAN: Kitiphu, 4500 m, *Gould* 436 (E). — SIKKIM: 3700-5000 m, *J. D. Hooker* (BM, P); Chumbi valley, near Kaju Gompa, 3700 m, *Lowndes* L753 (E); Chumbi valley, Chumbi-thang, 3850 m, *Lowndes* L751 (E); Chumbi, *Cooper* 661 (E). — TIBET: Reting, 96 km, N of Lhasa, *Ludlow & Sherrif* 9991 (BM, E); Dechen Dzong, 4300 m, *Ludlow & Sherrif*, 9627 (BM, E); Rongchu (Tumbatse), 4000-4300 m,

Kingdon-Ward 5797 (E, K); Shasi Dzong, Pasho Dt., Kham (E. Tibet) 4200 m' *Hanbury-Tracy* 68 (BM); between Ho-Kiu and O-lun-shi, Kham, 1893, *Potanin* (LE). — CHINA, Kansu: Regio Tangut, 1880, *Przewalski* (K, P). Szechuan: Tatsienlu, *Mussort* 81 (P); neighbourhood of Tatsienlu, *Cunningham* 180 (E); Sung pan, 3500 m, *H. Smith* 2674 (BM); Tatsienlu, Yulingkong 3300 m, *H. Smith* 10769 (BM); Tatsienlu, *Pratt* 203 (BM, K).

DISTR.: INDIA, Kumaun, Garhwal; NEPAL; BHUTAN; SIKKIM; TIBET; CHINA, Kansu, Szechuan.

Uncertain species

Gueldenstaedtia guillonii Franch., *Mém. Soc. Nat. Sci. Nat. Math. Cherbourg* 24:210. 1884.

FRANCHET (*l.c.*) also gives a key according to which *G. guillonii* Franch. differs from *G. maritima* Maxim. by virtue of the obtuse apices of the leaflets and the « glabrous » (not glandular) margins of the stipules. The type locality and the habitat of both species is the same i.e. « Chefoo, littoral ». The type specimen of *G. guillonii* which should have been at Paris (FRANCHET, *l.c.*; FOURNIER, 1932) is untraceable there. In *G. maritima* the tip of the leaflets is stated (MAXIMOVIZ, 1879; FRANCHET, *l.c.*) to be emarginate. An examination of the photograph of the holotype obtained from Leningrad and of the type number at Kew shows that all the leaflets are not emarginate; there is a transition from the obtuse apiculate to the emarginate type of leaflets. I have not seen any specimen with the stipules having « glabrous » (not glandular) margins. Under these circumstances it appears best to treat *G. guillonii* as an uncertain species.

Phytogeographic Discussion

If the genus *Gueldenstaedtia* Fisch. is accepted as being a monophyletic^c group, in view of the morphological differences demonstrated between the two sub-genera, it seems reasonable to assume that the ancestors of the two taxa must have segregated quite early in the geological history of the genus. The genus is most closely related to the prolific genus *Astragalus* L., from which it differs in the characters of the keel only and to some extent in those of the fruit.

From a study of the distributional pattern of the various species, in view of the concentration of the species at Sikang-Szechuan border (Map, *f.* 47), this region (c. 102°-30°) would appear to be the centre of distribution of the genus. All the species of the subgenus *Tibetia*, morphologically as well as geographically appear to be closely related to each other, however, in the subgenus *Gueldenstaedtia*, *G. verna* (Georgi) Borissova is the most widely distributed species. It exhibits a great range of variation (cf. p. 147), so much so that some of the earlier workers had segregated a number of extreme forms as distinct species. The rest of the four species of the sub-genus differ

only in minor characters (cf. p. 140). The distributional patterns of these species do not overlap but occupy smaller isolated areas. In this group the most varied and widely distributed species *G. verna* probably represents the ancestral syngameon from which the other taxonomic entities have evolved, or at least, what is now closest to it. Hitherto, only one species (*G. monophylla*, $n = 7$) has been studied cytologically (TSCHECHOW, 1935). Further cytological work will undoubtedly establish the relationship between different taxa on a more scientific footing.

Excluded Species

Gueldenstaedtia cuneata Benth. in Royle, *Illustr. Bot. Himal.*: 200. 1835 = *Chesneya cuneata* (Benth.) Ali.

G. oliveriana Fisch. ex Jaub. & Spach. *Illustr. Pl. Or.*: 94. 1842 (*nom. nud.*).

G. latifolia (Lam.) Fisch. ex D. Don, *Gen. Syst.* 2:273. 1832 = *Astragalus latifolius* Lam. (1783).

G. australis Lévillé, *Cat. Pl. Yunnan.*: 155. 1916. (*nom. nud.*).

SUMMARY

The genus *Gueldenstaedtia* Fisch. has been taxonomically revised. Only ten species have been recognised, including one new species, *G. forrestii* Ali. The subgeneric classification of the genus has been attempted, a new sub-genus *Tibetia* Ali has been described.

Biometric studies were carried out in the case of *G. verna* complex. The examination of the taxonomic features used in the past to separate the various species involved in this complex revealed that the characters display continuous variation, making them unsuitable for taxonomic discrimination. Hence all the names involved in this complex were reduced to synonymy.

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LITERATURE CITED

- ALI, S. I. 1957. Proposal for the conservation of the generic name *Gueldenstaedtia* Fischer. *Taxon* 6:59.
- 1958. Taxonomic study of *Leguminosae* from West Pakistan and North Western Himalayas. Ph. D. thesis, University of London (Unpublished).
- BAKER, J. G. 1876. *Leguminosae* in Hooker, J. D. *Flora of British India* 2:117.
- BORISSOVA, A. 1945. The genus *Gueldenstaedtia* in Komarov, *Flora U.R.S.S.* 11: 384.
- CANDOLLE, A. P. de. 1825. *Prodromus systematis naturalis regni vegetabilis* 2.
- FOURNIER, P. 1932. *Voyages et découvertes scientifiques des missionnaires naturalistes français*: 34.
- FRANCHET, M. A. 1884. *Plantae Davidianae*. *Nouv. Arch. Mus. Par.* ser. 2, 5:92.
- 1885. Plantes du Yun-nan recoltées par M. l'abbé Delavay. *Bull. Soc. Bot. Fr.* 32:5.
- GRUBOV, V. J. 1955. Konspekt flory mongolskoj narodnoj respubliki. Moskva.
- HANDEL-MAZZETTI, H. 1936. *Symbolae Sinicae* 7:1375.
- JACOT, A.P. 1927. The genus *Gueldenstaedtia* (Leg.). *J. N. China Branch Roy. Asc. Soc.* 58:85-125.
- KITAGAWA, M. 1936, in Nakai, T., Honda, M., Satake, Y. and Kitagawa, M. *Report of first scientific expedition to Manchouko (Index Florae Jeholensis)* sect. 4, 4:87.
- LÉVEILLÉ, H. 1917. *Catalogue des Plantes du Yun-nan*: 155.
- MAXIMOWICZ, C. J. 1879. Ad florae Asiae Orientalis cognitionem meliorem fragmenta. *Bull. Soc. Nat. Moscou* 54(1):7.
- PAMPANINI, R. 1910. Le Piante vascolari raccolte dal Rev. P. C. Silvestri nell' Hu-peh gli anni 1904-1907. *Nuov. Giorn. Bot. Ital.* 17:396.
- PAVOLINI, A. F. 1908. Contributo alla flora dell' Hu-pe. *Nuov. Giorn. Bot. Ital.* 15:410.
- RICKETT, H. W. & STAFLEU, F. A. 1959. Nomina generica conservanda et rejicienda. Spermatophyta III. *Taxon* 8:291, 293.
- TSCHÉCHOW, W. P. 1935. Karyosystematische Übersicht der Tribus *Galegeae* Bronn. *Trud. Biol. Nauchn. Issledov. Inst.* 1:143-196.
- ULBRICH, E. 1905. *Astragaleae* in Diels, L. Beiträge zur Flora des Tsin-ling-shan. *Bot. Jahrb.* 36. Beibl. 82:58.

