

16. SCROPHULARIA [Bauhin] Linnaeus

Scrophularia L., Spec. Plant. 619, 1753; Gen. Plant. ed. V. 271, 1754. Genotype, *S. nodosa* L., of Europe; see Proc. Acad. Nat. Sci. Phila. 82: 21, 1930.

A genus of about 150 species, mainly Palaearctic, most numerous in the Mediterranean subregion from Spain to Persia; also Nearctic, and slightly entering the Neotropical and (as shown below) the Oriental Regions.

KEY TO SPECIES

- A. Sepals acute to attenuate, not scarious-margined; fertile filaments glabrous or nearly so; corolla green; leaf-blades ovate to ovate-lanceolate, dentate, not pinatifid at base.
 - B. Corolla externally glandular-pubescent; sterile filament subulate; fertile anthers all included; style 1-2 mm. long; sepals lance-attenuate, exceeding the corolla and mostly equaling the capsule; inflorescence a strict thyrus, the peduncles very short; petioles 0.5-2 cm. long, less than $\frac{1}{2}$ the length of the blades.1. *S. calycina*
 - BB. Corolla externally glabrous; sterile filament distally dilated, triangular-obovate, green; fertile anthers slightly exerted from lower lip of corolla; style 3-4 mm. long, exerted; sepals oblong, acute to attenuate-tipped, much shorter than the corolla and capsule; inflorescence a panicle, the peduncles about 2 cm. long; petioles 2-4 cm. long, at least $\frac{1}{2}$ the length of the blades.
 - 2. *S. edgeworthii*
- AA. Sepals rounded, scarious-margined, much shorter than the capsule; fertile filaments glandular-pubescent; corolla externally glabrous; inflorescence a thyrus or panicle.
 - B. Veins of leaf-blade freely anastomosing, so venation finely reticulate; leaf-blades serrate to lobed; corolla green throughout or externally brown-tinged; stems solitary or few, 6-15 dm. tall or more; probably short-lived perennials, some annual.
 - C. Fertile filaments longer than and conspicuously exerted from the corolla; style 4-8 mm. long; root perennial.
 - D. Leaf-blades cordate at base, dentate but not lobed, glabrate; inflorescence relatively wide, about 10 cm. wide; sepals obtuse-rounded, slightly scarious-margined; corolla becoming 4-5 mm. long; style 6-9 mm. long; seeds 0.5-0.6 mm. long; stem nearly terete.
 - 3. *S. kalawayensis*
 - DD. Leaf-blades truncate or truncately rounded at base, paler (especially beneath); inflorescence narrower; sepals circularly rounded; style 4-6 mm. long; stem 4-angled.
 - E. Leaf-blades ovate, serrate, not or only slightly pinnate-lobed at base, pubescent; inflorescence a panicle 5-8 cm. wide; sepals with conspicuous scarious margins, that cover over $\frac{1}{2}$ the surface; corolla 2-3 mm. long.4. *S. polyantha*
 - EE. Leaf-blades ovate-lanceolate, glabrate (except midrib beneath), coarsely dentate and proximally pinnately lobed; inflorescence a thyrus 3 cm. wide; sepals with narrower scarious margins covering less than $\frac{1}{2}$ the surface; corolla 4 mm. long.
 - 5. *S. exserta*
 - CC. Fertile filaments shorter than the corolla, included; style 2-3 mm. long; root apparently annual.
 - D. Corolla 8-10 mm. long, green throughout; sterile filament less than $\frac{1}{2}$ the width of the base of the upper lip of the corolla; inflorescence divaricately diffuse, the pedicels 10-20 mm. long; leaf-blades crenately dentate, and stem sharply angled, both finely pubescent or puberulent.6. *S. obtusa*

- DD. Corolla 5-7 mm. long, greenish and somewhat tinged with brown; sterile filament at least $\frac{1}{2}$ the width of the base of the upper lip of the corolla; inflorescence less laxly spreading, the pedicels all ascending and usually shorter; leaf-blades crenately serrate, and stem usually slightly wing-angled, both glabrous.....7. *S. robusta*
- BB. Veins of leaf-blade not or only slightly anastomosing; upper lip or half of corolla brown or purple-brown (paler in *S. petraea* and *S. scabiosaeifolia*); stems several or many, usually lower and more branching; root perennial, usually woody.
- C. Leaf-blades crenate, not lobed; sepals oblong-obovate, slightly scarious-margined; corolla 9-10 mm. long; sterile filament about as wide as the base of the upper lip of the corolla; stems 0.5-1 dm. tall...8. *S. petraea*
- CC. Leaf-blades dentate to pinnatifid, at least the lower blades proximally lobed; sepals circular, more strongly scarious-margined; corolla smaller; stems over 1 dm. tall.
- D. Sterile filament not or scarcely widening distally; corolla 3-5 mm. long, the lower lobes pale or white; leaf-blades dentate to dentate-lobed.
- E. Fertile filaments shorter than or equaling corolla; corolla 4-5 mm. long; sterile filament obtuse, linear or slightly clavate; inflorescence thyrsoïd, the peduncles few- to 1-flowered; bases of stems (rhizomes) woody.
- F. Plant (excepting densely glandular inflorescence) cinereous-puberulent to -canescent, the hairs blunt and perhaps slightly gland-tipped; upper half of corolla, especially the posterior lobes, "maroon-madder"; growth broom-like.....9. *S. dentata*
- FF. Plant (excepting sparsely glandular inflorescence) glabrous.
- G. Stems many, broom-like; leaves probably all cauline, the blades lanceolate, sessile; upper half of corolla pale brown or merely brownish-tinged.
10. *S. scoparia*
- GG. Stems few or several, simple or branched; leaves at or near base of plant, the blades oblong or elliptic-oblong, cuneately narrowed to petioles, upper cauline leaves scarcely developed; upper half of corolla dark violet-purple.11. *S. nudata*
- EE. Fertile filaments conspicuously exerted; corolla 3 mm. long; sterile filament oblong, acutish; inflorescence wider, the peduncles usually about 5-flowered; leaf-blades oblong-lanceolate or narrowly elliptic, all petiolate; stem tall, and base (not seen) presumably not woody.....12. *S. stewartii*
- DD. Sterile filament flabellate, much widened distally.
- E. Sterile filament narrower than the base of the upper lip of the corolla; upper lip of corolla pale to dark purple or violet-purple; scarious margin less than $\frac{1}{2}$ width of sepal; leaf-blades pale green, usually pinnately lobed at base.
- F. Plant glandular-pubescent or -puberulent throughout; inflorescence narrowly thyrsoïd, the cymes 1-3-flowered.
- G. Sepals 1.5-2 mm. long, thick, narrowly margined; corolla 5 mm. long; sterile filament about $\frac{1}{2}$ the width of the base of the upper lip of the corolla; seeds 2 mm. long; leaves of middle portion of stem largest, dentate to dentate-lobed, cuneate to sessile or slightly petioled bases; stems woody below, the plant apparently lacking differentiated lower leaves.
13. *S. suffruticosa*

GG. Sepals 3.5-4 mm. long, relatively thin, with wide scarious margin; corolla 7 mm. long; sterile filament over $\frac{1}{2}$ the width of the base of the upper lip of the corolla; seeds probably smaller (not seen); leaves of basal portion of stem largest, more coarsely and irregularly dentate-lobed and proximally pinnatifid, more truncate to petioles; stems herbaceous from base, with well-differentiated lower leaves.

14. *S. stenothyrsa*

FF. Plant glabrous below the inflorescence; inflorescence more open, a lax thyrsus or panicle, the cymes few- to several-flowered; seeds about 1 mm. long; lower leaves most ample, and stems herbaceous from base.

G. Capsule 5-6 mm. long; corolla 5-7 mm. long; anthers included or the anterior slightly exerted; inflorescence narrow, the flowers all pedicelled and the lateral branches not elongated with moniliform disposition of flowers; pedicels with relatively large dark glands.15. *S. koelzii*

GG. Capsule 3-4 mm. long; corolla 2-4 mm. long; anthers exerted; inflorescence wider and more diffuse, the cymes moniliform with the lateral flowers on very short pedicels.

H. Corolla 3-4 mm. long, pale, the upper lip purplish; stems 3-8 dm. tall, leafy on the lower portions.16. *S. scabiosaefolia*

HH. Corolla 2-2.5 mm. long, brownish, the upper lip dark violet-purple; stems 2-4 dm. tall, leafy at base, or with smaller leaves elsewhere on lower portions of plant....17. *S. moniliformis*

EE. Sterile filament as wide as the base of the upper lip of the corolla; upper lip of corolla dark violet-purple; scarious margin over $\frac{1}{2}$ width of sepal; leaf-blades coarsely or deeply lobed.

F. Corolla 6-9 mm. long; sterile filament about as wide as the base of the upper lip of the corolla; capsule 5-6 mm. long; thyrsus narrow; leaf-blades ovate in general outline, coarsely toothed to pinnatifid, dark green; stems sharply 4-angled, relatively few and little branched.

18. *S. decomposita*

FF. Corolla 3-5 mm. long; sterile filament about as wide as the expanded portion of the upper lip of the corolla; capsule smaller; panicle lax, the shortly pedicelled flowers moniliform on the extended cyme-branches; leaf-blades lanceolate in general outline, with a few relatively short and entire lobes light green; stems slightly ridge-angled (striate), many, much branched, broom-like...19. *S. striata*

1. *Scrophularia calycina* Bentham

Veronica? thyrsiflora Wall., Numer. List Spec. Ind. Mus, n. 6393, 1832, ined. "Himalaya kamounanensis R. B."

Scrophularia calycina Benth., Scroph. Indicae 18, 1835. "Hab. in Kamaon, Wallich, Kanaour, Royle." Type, collected by Wallich in 1812, seen in Herb. Kew Gardens.

Open waysides, borders of fields, and on alpine meadows, at altitudes of 2700 to 4000 meters, through the western Himalayas from Hazara to Kumaun. Flowering from early June to mid-August.

Hazara: Bagun, Kagan, *Inayat* (DD); Bala Bhurj, Kagan, *Inayat* (DD); Kuthyali, Kagan, *Inayat* 22054 (DD); Gali, Musalla, *Inayat*; Shefadyar, Rela, *Duthie* 24763; Shadal, Shinkiari, *Inayat* 20007 (DD). Kashmir: Gulmarg, *Stewart* 10482; Liddar Valley, *Duthie* 13158 (DD); Pahlgam, *Stewart* 5607, 5758, 7826 (NYBG); Sonamarg, *Stewart* 6370, 7290; Tragbol ("Tarakbal"), *Koelz* 9196. Chamba: Kukti Pass, *Koelz* 8618 (USNA); head of Sural Valley, *Harsukh* (DD). Lahul: Rotang Pass, *Brandis* 3154 (DD); Shipting Nullah, *Koelz* 935 (NYBG). Kangra: Dharmsala, *Stewart* 10316 (ANSP, GH); Kulu, *Koelz* 4655 (NYBG); Rotang La, *Koelz* 5053 (USNH). Bashahr: —, *Parmanand* 1141 (ANSP, USNA, USNH). Simla: Mt. Halta, *Drummond* 590 (DD). Tehri: Jumnotri, *Duthie* (DD). Garhwal: Bhowali, *Duthie* 4240 (DD); above Derali, *Duthie* 480 (DD); ridge above Shala, *Duthie* 160 (DD). Kumaun: Malaha Gadh, Darma, *Duthie* 5867 (DD); Palang Gadh, Byans, *Duthie* 5867 (DD); Pindari, *Strachey & Winterbottom* 6 (GH); Shafaudiyar, Ralam Valley, *Inayat* 24763 (DD).

2. *Scrophularia edgeworthii* Bentham

Scrophularia edgeworthii Benth., in DC., *Prod. Syst. Nat. Regn. Veg.* 10: 304, 1846. "In jugo Himalayano altit. 12000 ped. ad Musa Pani (*Edgeworth!*)."
Described as viscid-puberulent, and with leaf-blades coarsely doubly or incised-dentate, whereas the species now considered is essentially glabrous below the inflorescence and usually has leaf-blades less sharply dentate. Both these discrepancies are mentioned by J. D. Hooker in his *Flora of British India* (4: 255, 1883) where he associates with *Edgeworth's* plant from Garhwal one collected by *Strachey & Winterbottom* in Kumaun. He comments upon the nearly glabrous stem, while Bentham's description of the leaf-dentation has been changed to "coarsely crenate-toothed." The plant that Hooker added is clearly the species now considered, of which Kumaun specimens form the majority of those cited below. Geographical considerations lead me to think Hooker correct in placing the two plants together. (Perhaps the supposed puberulence of *Edgeworth's* specimen was due to faulty preservation.)

As stated both by Bentham and by Hooker this is nearly related to *Scrophularia elatior* Benth. of Nepal and Sikkim, but that has wider corollas from which the anthers and stigma are long-exserted, the style reaching 8-9 mm. long. The plant seemingly is taller, with more sharply angled stem and more attenuate leaf-blades.

Mountains, at altitudes of 2100 to 3400 meters, in the Himalayas of Almora and Kumaun. Flowering from late June to mid-August.

Almora: Tola, Gori R., *Champion* (DD). Kumaun: Ayar Pani, *Duthie* 3250 (DD); Gini, *Duthie* 3251 (DD); Munshiyari, *Inayat* 24762 (DD); Palong Gadh, Byans, *Duthie* 5868 (DD).

3. *Scrophularia himalayensis* Royle

Scrophularia himalayensis Royle, ex Benth., *Scroph. Indicae* 18, 1835. "Hab. in jugo Himalayano communis; *Royle*." Very likely gathered at Mussoorie or in its vicinity, where Dr. Royle collected.

Roadsides and waste places, at altitudes of 1500 to 4000 meters, through the western Himalayas from Chamba to Naini Tal. Flowering from early June to late August.

Chamba: Khajiar, *Koelz* 8862 (ANSP, USNA). Kangra: Kulu, *Koelz* 1486 (NYBG), 4796 (USNH); Mamkam, Parbatti Valley, *Koelz* 4818 (USNH); Pulga, P. V., *Nath* (ANSP, Gord). Simla section: Khanag, *Nath*; Konain, *Raizada* (DD); Simla Hills, *Drummond* 612 (DD). Dehra Dun: Landour, *Stewart* 11209 (GH), 14990 (ANSP, NYBG); Mussoorie, *Gammie* (DD). Tehri: Jangla, *Duthie* (DD); under Srikanta, *Duthie* 567 (DD); near Tehri, — (DD). Naini Tal: Naini Tal, *Strachey & Winterbottom* 4 (GH).

4. *Scrophularia polyantha* Royle

Scrophularia polyantha Royle, ex Benth., *Scroph. Indicae* 18, 1836. "Hab. in Mussooree, Royle."

Roadsides and waste places, at altitudes of 800 to 3000 meters, through the western Himalayas from Hazara to Tehri. Flowering from early June to early September.

Hazara: Changla Gali, *Stewart* 3947; Chuari & Chamba road,* *Harsukh* (DD); Ghora Dakka, *Inayat* 14665 (DD); Mastok, *Brandis* 1528 (DD); toward Panj Galli, Black Mt., *Duthie* 7556 (DD); Shinkhari, *Inayat* 20010 (DD); Bhonja Ka Kattha, Kagan, *Inayat* 20008 (DD); Nivu, Kagan, *Inayat*. Muzaffarabad: Domel, *Stewart* 10109 (ANSP, Gord). Kashmir: Badwan to Korakbal, *Stewart* 19248; Bandipur, *Koelz* 9057 (ANSP, GH, USNA, USNH); Chatru to Sinthan, *Stewart* 3066; Ganderbal, Sind Valley, *Duthie* 11437 (DD); Gurais, *Duthie* 14094 (DD); Kainmul, Liddar Valley, *Duthie* 13095 (DD); Kangan to Gund, *Stewart* 6236; Pahlgam, *Stewart* 5366, 5873; Rajaori, Tawi Valley, *Gammie* (DD); Shalimar Gardens, *Stewart* 3206 (ANSP, NYBG); Sonamarg, *Stewart* 6908, 9812 (GH, USNH); Srinagar, *Koelz* 8991 (NYBG, USNA), *Schlagintweit*; Tangmarg, *Stewart* 10544 (NYBG); Tragbal, *Stewart* 4757. Chamba: Alwas, *Stewart* 2475; Chamba, *Brandis* 4247 (DD); Dalhousie, *Stewart* 2150; Marrund to Kalel, *Stewart* 2310; Oli, upper Chenab valley, *Stewart* 3013 (Gord); Sao Valley, *Lace* 1706 (DD). Kangra,⁷: Baijnath, *Koelz* 4583 (USNH); Kulu, *Koelz* 4801 (USNH). Bashahr: Chhit Kul, *Parmanand* 1073. Simla: Koti, *Gamble* 24404 (DD); Simla, *Duthie* 7340 (DD). Dehra Dun: Konain, Jaunsar, *Parkinson* 7135 (DD); Tons, *Duthie* (DD). Tehri: Dakara, *Gamble* 24404 (DD).

5. *Scrophularia exserta* sp. nov.

Plate 1, B.

Root perennial. Stem glabrous, slightly 4-angled, at least 6 dm. tall. Leaf-blades ovate-lanceolate in general outline, 3-4 cm. long, 1.5-2.5 cm. wide, above glabrate, beneath glaucous and pubescent on midrib, acute to acuminate, distally irregularly dentate, proximally with several pairs of lobes, the incisions cutting to midrib; petiole 1 cm. long, narrowly winged. Inflorescence probably about $\frac{1}{2}$ the height of the plant, of at least 8 pairs of opposite or scattered peduncles, each cyme of 3 to 5 flowers; finely glandular-pubescent throughout. Sepals 2 mm. long, nearly circular, green, with scarious erose margin 0.3 mm. wide. Corolla 4 mm. long, green (presumably purplish-tinged since called "pink" by collector), the posterior lobes projecting slightly beyond others. Sterile filament ovoid-truncate, as wide as long, about $\frac{1}{2}$ the width of the base of the upper lip of the corolla. Fertile filaments glandular-puberulent, about twice length of corolla. Style 6 mm. long. Capsule not seen.

Perennis; caulis glaber, altus; foliorum laminae ovato-lanceolatae dentatae proxime lobatae 3-4 cm. longae, petiolis 1 cm. longis; inflorescentia elongata, minute glanduloso-pubescentia; sepala 2 mm. longa, circularia, marginibus scariosis; corolla 4 mm. longa; staminodium ovoideo-truncatum; filamenta fertilia glanduloso-pubescentia; antheribus exsertis; stylus 6 mm. longus; capsula non visa.

Type, Lowarai Pass, Chitral, at 9000 feet (2700-2800 meters) altitude, collected in flower June 15, 1895, by S. A. Harriss, no. 16456; in Dehra Dun Herbarium.

* Although clearly marked "Hazara," this must rather have come from Chamba.

⁷ At Mamkam in the Parbati Valley, a place at which *Scrophularia himalayensis* was also collected, grows an apparent hybrid between that species and *S. polyantha*, having the wide leaf-blades and slightly scarious calyx of *himalayensis*, but the blades truncate at base and pubescent with the inflorescence narrow as in *polyantha*.

This, the only collection seen, was mistakenly identified as *Scrophularia himalayensis* Royle, and so reported on page 165 of J. F. Duthie's "The Botany of the Chitral Relief Expedition", in Records of the Botanical Survey of India, vol. 1, no. 9, 1898.

6. *Scrophularia obtusa* Edgeworth

Scrophularia obtusa Edgew., ex Hook. f., Fl. Brit. Ind. 4: 254, 1883. "Kumaon at Almora, alt. 6-6,500 ft., Edgeworth, &c."

Mountains, at altitudes of 700 to 2300 meters, in the Himalayas from Dehra Dun to Kumaun. Flowering from July to September.

Dehra Dun: Dhanaulti, *Royle* or *Jamison* (DD). Almora: Almora, ——— (DD); Binsar, *Inayat* 24766 (DD). Kumaun: Dhauri Valley, *Duthie* 5865 (DD); Hawulbagh, *Davidson Re* (DD); Kali Valley, *Duthie* 3249 (DD); Sarna Valley, *Duthie* 3251 (DD).

7. *Scrophularia robusta* sp. nov.

Plate 2, A.

Root annual, sending up a single glabrous narrowly winged stem, 8-15 dm. tall. Leaf-blades oblong-ovate, 7-10 cm. long, 3-4 cm. wide, crenately serrate, glabrous, slightly glaucous beneath (veins anastomosing), acute at apex, rounded at base to glabrous petioles 1-2 (-3) cm. long, the narrow wings of the petiole decurrent into the winged angles of the stem. Inflorescence less than $\frac{1}{2}$ the height of the plant, when fully developed of about 12 pairs of opposite, approximate, or (upper) scattered peduncles, each cyme of 7 to 13 flowers; rachis and peduncles mostly glabrous, but pedicels glandular-puberulent. Sepals 2 mm. long, circular, green, with white scarious entire margin 0.3 mm. wide. Corolla 4-7 mm. long, green, tinged ("washed") with madder or "rose-purple", but apparently the projecting posterior no darker than the anterior lobes, of which the mid-anterior is somewhat deflexed-spreading. Sterile filament flabellate, wider than long, $\frac{1}{2}$ to $\frac{3}{4}$ the width of the neck of the upper lip of the corolla. Fertile filaments glandular-puberulent, the anthers included within corolla. Style 2-3 mm. long. Capsule globose-ovoid, acuminate, 5 mm. long and wide. Seeds 0.7-0.8 mm. long, blackish, longitudinally ridged and with minute cross-lines.

Annua; caulis unicus glaber anguste alatus 8-15 dm. altus; foliorum laminae oblongo-ovatae crenato-serratae glabrae 7-10 cm. longae, petiolis 1-2 cm. longis; inflorescentia ampla; sepala 2 mm. longa, circularia, marginibus scariosis; corolla 4-7 mm. longa, purpurascens; staminodium flabellatum, latius quam longum; filamenta fertilia glanduloso-puberulentia, antheris inclusis; stylus 2-3 mm. longus; capsula 5 mm. longa; semina 0.7-0.8 mm. longa.

Type, along stream, Mak, Afghanistan, at 8500 feet (2600 meters) altitude, collected in fruit October 3, 1939, by Walter Koelz, no. 14075; in Herb. Academy of Natural Sciences of Philadelphia.

Along streams, at altitudes of 1300 to 2800 meters, in mountains from the Caucasus region of southern Russia to Chitral (northwesternmost India).

PERSIA. Khorasan: ———, *Aitchison* 685 (DD).

AFGHANISTAN. Hazratsaid, *Koelz* 12846; Mak, *Koelz* 14075; Paghman, *Koelz* 12152; Terak, *Koelz* 13891 (ANSP, NYBG).

INDIA. Chitral: Drosh, *Major Hamilton* 17901 (DD), *Harriss*; Mirga, *Harriss* 16457 (DD); Zachanah Pass, *Gatacre* 17364 (DD); Ziarat, *Harriss* 16460 (DD).

Scrophularia robusta resembles in its stoutness *S. aquatica* L. of Europe and northern Asia, although it is hardly so large as that species becomes. This, which seems to be actually its nearest relative, has a narrower and usually more elongated inflorescence and the leaf-blades normally cordate at base. In Boissier's *Flora Orientalis* (4: 399, 1879) our plant was identified as *S. alata* Gilib., but the original description of that in Gilibert's *Flora Lithuanica* (1: 127, 1781) described the root as very long and the petioles as very short and foliose; it seems to be matched by certain collections from Austria in the Academy's herbarium, that differ also in looser inflorescence (pedicels longer and more spreading), bracts usually longer, petioles shorter and more winged, and leaf-blades acuminate. I lack, however, sufficient material for comparison.

8. *Scrophularia petraea* Aitchison & Hemsley

Scrophularia petraea Aitch. & Hemsl., in *Journ. Linn. Soc., Bot.* 19: 180, 1882. "Hariab district [Afghanistan], amongst rock debris, at an altitude of from 11,000 to 14,000 feet [Aitchison 919 (1879)]." Isotypes seen in Dehra Dun Herbarium and in Gray Herbarium of Harvard University. The former supplies the locality "Sikarám" and the month August. Sikaram is a mountain on the border between the Jalalab and Hariob districts of Afghanistan and the Kurram District of India.

Rock debris, at altitudes of 3300 to 4300 meters, alpine zone of Mount Sikaram, Afghan-Indian border. Known from a single collection made on the Afghan side.

9. *Scrophularia dentata* Royle

Scrophularia dentata Royle, ex Benth., *Scroph. Indicae* 19, 1835. "Hab. in Kanaour, Royle." Description fits the species now considered, although the leaf-blades are usually narrower and more regularly dentate. The fertile filaments are not exerted beyond the posterior lip.

Root perennial, the woody bases of the old stems persisting. Stems many, in early anthesis 1-2 dm. tall, with rounded angles, sparsely glandular-puberulent. Leaf-blades 1.5-2 cm. long, 3-5 mm. wide, elliptic-lanceolate, puberulent, dentate, acute, gradually narrowed at base to a hardly defined petiole. Inflorescence narrow and densely flowered, slightly or somewhat glandular-puberulent, the peduncles hardly longer than the calyces. Sepals 1.5-2 mm. long, green with conspicuous white scarious entire border. Corolla 4-5 mm. long, reddish-brown ("maroon-madder"), brightest on the projecting posterior lobes, the anterior lobes pale, the mid-anterior deflexed. Filaments glandular-puberulent; the anthers slightly exerted from the lower lip of the corolla. Sterile filament clavate, purplish or dull. Style about 3 mm. long. Capsule 4 mm. long, globose-ovoid, with stiff beak 1 mm. long. Seeds not seen.

Alpine slopes, at altitudes of 4000 to 5000 meters, western Himalayas from Zaskar to Spiti. Flowering in July.

Zaskar: Bok, Pensi La, *Koelz* 5880 (USNH); Kargia, *Koelz* 5465 (USNH), 5466 (USNH). Lahul: Bara Lacha La, *Koelz* 5318 (USNH). Rupshu: Puga, *Koelz* 2154 (DD, NYBG, USNH). Spiti: Takenak to Giam, *Schlagintweit*.

10. *Scrophularia scoparia* sp. nov.

Plate 2, B.

Root perennial, woody. Stems many in a clump, glabrous, obtusely angled or nearly terete, somewhat glaucous, much branched, suffrutescent below, reaching 3 to 6 dm. tall. Leaves all cauline, alternate or scattered (some opposite or subopposite), glabrous and somewhat glaucous: blades narrowly lanceolate, acute or acutish, scarcely petioled, reaching 2 cm. long and slightly lobed; the upper smaller and narrower; the bracts subulate; the stems appearing mostly bare and broom-like. Inflorescence over $\frac{1}{2}$ the height of the plant, sparsely puberulent with sessile glands, the bracts and peduncles alternating or scattered, the lower peduncles sometimes 3-flowered, or all 1-flowered. Sepals 1.5-2 mm. long, circular, green, with white scarious entire margin 0.2-0.3 mm. wide. Corolla 5 mm. long, apparently light purplish brown externally, pale within, and with the anterior lobes yellowish white, the mid-lobe apparently little or not deflexed. Sterile filament clavate, pale. Fertile filaments glandular-puberulent, the anthers of the longer pair eventually somewhat exerted. Style 3-4 mm. long. Capsule globose-ovoid, mucronately tipped with the persistent style-base, not seen mature.

Perennis, scoparia; caules multi glabri obtuse angulati 3-6 dm. alti, saepissime nudi; foliorum laminae anguste lanceolatae parum lobatae glabrae 2 cm. longae subsessiles; inflorescentia thyrsoida; sepala 1.5-2 mm. longa, circularia, marginibus scariosis; corolla 5 mm. longa, purpurascens; staminodium clavatum; filamenta fertilia glanduloso-puberulentia, antheris filamentorum longiorum exertis; stylus 3-4 mm. longus; capsula matura non visa.

Type, dry slope, 2700-2800 meters altitude, Sirotai, Afghanistan, collected in flower June 17, 1937, by Walter Koelz, no. 11922; in Herb. Academy of Natural Sciences of Philadelphia.

Arid upland, at altitudes of 2600 to 3100 meters, northeastern Afghanistan and northwesternmost India, west of the Indus gorge. Flowering in June.

AFGHANISTAN. Sirotai, Koelz 11922 (ANSP, Gord, GH, NYBG); Zebak, Badakshan, Giles 175 (DD).

INDIA. Chitral: Chitral, Harriss (DD).

This broom-like species resembles in aspect *Scrophularia striata* Boiss., but that differs in its dilated sterile filament, its smaller and darker corolla, its flowers lateral to the peduncles, and its angled stems. Also that species pertains to lower elevations.

I had hoped that this might be the mysterious *Scrophularia cabulica* Benth., also from northern and higher Afghanistan,⁸ described as like this in habit and with linear sterile filament, but the description of the leaves as obsoletely repand-dentate, the cymes as 5-7-flowered, and the flowers as sessile on the divaricate peduncles, seems to make such identification impossible. But I suspect that *S. cabulica* was based upon a mixture of this and *S. striata*, as is suggested by Bentham's contrast of the habit and flowers of his two specimens; if so, the name chosen might select as typical the

⁸ From Bamian, according to Boissier, Fl. Orient. 4: 420, 1879.

species now considered. However, as Bentham states that all the flowers he saw were imperfect, I think that the name may be safely dropped.

11. *Scrophularia nudata* spec. nov.

Plate 3, A.

Root and rhizome perennial, woody, relatively thick. Stems few or several in a clump, glabrous, obtusely angled, 3 to 7 dm. tall, simple or branched, sharply distinguished from woody rhizotomous base. Leaves in a basal rosette or a few somewhat higher-placed, glabrous; blades oblong or elliptic-oblong, rounded at apex, dentate or dentate-lobed with rounded teeth, sometimes pinnately lobed near base, 2-5 cm. long, 1-2 cm. wide, cuneately narrowed to petioles which may be as long; upper leaves (bracts) small or minute, the inflorescence appearing bare. Inflorescence over half the height of the plant, glabrate (sparsely puberulent with sessile glands), the peduncles opposite, subopposite, or mostly scattered, 1-5-flowered. Sepals 1.5-2 mm. long, circular, green, with white scarious nearly entire margin 0.1-0.2 mm. wide. Corolla 4-5 mm. long, posterior half dark, the slightly projecting posterior lobes dark violet-purple, anterior half pale, the mid-anterior lobe apparently not deflexed. Sterile filament linear-clavate. Fertile filaments glandular-puberulent, the anthers becoming slightly exerted. Style about 5 mm. long. Capsule 3-4 mm. long, globose-ovoid, caudately mucronate-tipped. Seeds 1 mm. long, flattened-cylindric, black, transversely pitted.

Perennis; caules pauci vel plures, obtuse angulati 3-7 dm. alti, saepissime nudi; folia radicalia et pauca caulina, glabra, laminis oblongis aut elliptico-oblongis, dentatis aut dentato-lobatis, petiolatis; inflorescentia thyrsoides; sepala 1.5-2 mm. longa, circularia, marginibus scariosis; corolla 4-5 mm. longa, latere posteriore atroviolaceo, anteriore pallido; staminodium lineari-clavatum; filamenta fertilia glanduloso-puberulenta, antheris paulum exertis; stylus 5 mm. longus; capsula 3-4 mm. longa; semina 1 mm. longa.

Type, arid bare slopes, 2500-2800 meters altitude, Chunagand to Kharbu, Ladakh, collected in late flower and in fruit August 27, 1940, by R. R. Stewart, no. 21086; in Herb. Academy of Natural Sciences of Philadelphia.

Arid high slopes, at altitudes of 2400 to 2900 meters, upper Indus Valley behind the Himalayas, from Astor to Ladakh.

Astor: above Rattu, *Stewart* 18782. Baltistan: Indus Valley, to Parkutta from Kiris, *Stewart* 20888 (ANSP, Gord). Ladakh: Chunagand, *Stewart* 21060 (ANSP, NYBG); C. to Kharbu, *Stewart* 21086; Kargil, *Koelz* 6114 (NYBG), 6134 (USNH).

12. *Scrophularia stewartii* spec. nov.

Plate 3, B.

Root perennial. Stems few to a clump or solitary, glabrous, obtusely angled or nearly terete, branched, herbaceous throughout, tall and lax. Leaves glabrous: blades oblong-lanceolate or narrowly elliptic, obtuse or mucronulate, the lower reaching 7-11 cm. long, irregularly dentate or slightly dentate-lobed, slightly runcinate at base; on petioles 2.5-4 cm. long; the upper smaller throughout. Inflorescence lax, less than half the height of the plant, obscurely glandular-puberulent when young, the minute triangular-subulate bracts and peduncles opposite, the upper subopposite or scattered, peduncles about 5-flowered, flowers all distinctly pedicelled. Sepals 1.5 mm. long, circular, green, with white scarious nearly entire margin 0.1-

0.2 mm. wide. Corolla 2-2.5 mm. long, posteriorly madder-brown ("crimson", according to collector), the two upper lobes projecting and most colored, anteriorly paler, the lobes white or nearly so, the mid-anterior slightly spreading. Sterile filament oblong-acutish, green, minute. Fertile filaments glandular-puberulent, the anthers all conspicuously exerted. Style 3 mm. long. Capsule globose-ovoid, about 3 mm. long, thin-walled.

Perennis; caules pauci vel solitarii, obtuse angulati, alti; foliorum laminae oblongo-lanceolatae aut anguste ellipticae, glabrae, dentatae aut paulum dentato-lobatae, inferioribus 7-11 cm. longis, petiolis 2.5-4 cm. longis; inflorescentia laxa; sepala 1.5 mm. longa, circularia, marginibus anguste scariosis; corolla 2-2.5 mm. longa, latere posteriore purpureo-brunneo, lobis anterioribus albidis; staminodium oblongo-acutiusculum minutum; filamenta fertilia glanduloso-puberulentia, antheris exsertis; stylus 3 mm. longus; capsula ca. 3 mm. longa, parietibus tenuibus.

Type, clay bank, Phullaren, Jhelum District, Punjab, collected in flower April 1934, by R. R. Stewart, no. 13784; in Herb. Academy of Natural Sciences of Philadelphia.

Clayey soil, at altitudes of 400 to 900 meters, low ranges of the Jhelum River valley, below the Himalayas, northwestern India, from Shahpur to Jhelum. Flowering in April.

Shahpur: Karaha (Mt. Saherar), *Drummond* 14632. Jhelum: Phullaren, *Stewart* 13784 (ANSP, NYBG); Salt Range, *Aitchison* 19 (DD); Mt. Tilla, *Stewart* 721.

13. *Scrophularia suffruticosa* spec. nov.

Plate 4, B.

Root perennial, woody. Stems many in a clump, woody below, most of length herbaceous, slightly angled or nearly terete, finely glandular-pubescent or -puberulent, much branched, 3-4.5 dm. tall, purplish below. Leaves finely glandular-pubescent or -puberulent, opposite or subopposite: blades oblong-elliptic in general outline, obtuse, dentate-lobed, largest 2.5-3 cm. long, 12-15 mm. wide, proximally cuneately narrowed to sessile or nearly sessile bases. Inflorescence usually less than half the height of the plant, glandular-pubescent, the bracts and pedicels opposite or the upper scattered, bracts acute, shorter than the several- to usually one-flowered peduncles. Sepals 1.5-2 mm. long, circular, green or brownish green and finely glandular-pubescent, somewhat indurated, with white scarious nearly entire margin about 0.2 mm. wide. Corolla⁹ 5 mm. long, the posterior lobes slightly the longest, and the mid-anterior probably not deflexed. Sterile filament greenish, flattened-circular, hardly $\frac{1}{3}$ the width of the neck of the upper corolla-lip. Fertile filaments glandular-puberulent, the anthers included or eventually those of the longer pair slightly exerted. Style 3-4 mm. long. Capsule 5 mm. long, globose-ovoid, acuminate. Seeds 2 mm. long, blackish, roughened by a reticulate-impressed pattern, about half as wide as long.

Perennis; caules multi, basi lignosi, fere teretes, 3-4.5 dm. alti; folia oblongo-elliptica dentato-lobata, glanduloso-pubescentia puberulentia, fere sessilia, maximis 2.5-3 cm. longis; inflorescentia fere thyrsoida; sepala 1.5-2 mm. longa, circularia, marginibus anguste scariosis; corolla 5 mm.

⁹ Blackened in poorly dried specimen that alone shows flowers.

longa; staminodium circulare; filamenta fertilia glanduloso-puberulentia, antheris inclusis vel paulum exsertis; stylus 2 mm. longus; capsula 5 mm. longa; semina 2 mm. longa.

Type, Mangla, Bashahr, collected in flower and fruit September 24, 1934, by Negi Parmanand, no. 1241; in Herb. Academy of Natural Sciences of Philadelphia.

Presumably in arid situations, in the Himalaya Mountains from Spiti to Bashahr. Only collections seen were gathered in September, when the plant was almost wholly past blossom.

Spiti: Kibor¹⁰, *Koelz* (USNH), 7127 (USNH), 7131 (USNH). Bashahr: Mangla, *Parmanand* 1241 (ANSP, Gord, GH, NYBG).

14. *Scrophularia stenothyrsa* spec. nov.

Plate 4, A.

Root perennial. Stems probably few to a clump, finely glandular-pubescent or glandless below, sharply 4-angled, simple or somewhat branched, 4-8 dm. tall. Leaves finely glandular-pubescent: blades ovate or lance-ovate, acute, the lower reaching 5-10 cm. long, irregularly dentate or dentate-lobed, proximally pinnately parted to base, on petioles 1.5-6 cm. long; the upper simpler and shorter-petioled. Inflorescence a narrow thyrsus, about $\frac{2}{3}$ the height of the plant, glandular-pubescent throughout, the bracts and bractlets lanceolate-attenuate, the former about equaling the peduncles; these short, 3-7 mm. long, ascending, 1-3-flowered, some pedicels as long. Sepals 3.5-4 mm. long, circular, green, with white scarious nearly entire margin 0.7-1 mm. wide. Corolla 7 mm. long, posteriorly brown, the two upper lobes longer than wide, strongly projecting and dark brown, anteriorly pale and the anterior lobes much wider than long, mid-anterior deflexed-spreading. Sterile filament yellowish green, flabellate, over half the width of the neck of the posterior lip of the corolla. Fertile filaments glandular-puberulent, the anthers included or barely exserted. Style 4 mm. long. Capsule 6-7 mm. long, globose-ovoid, acuminate. Seeds not seen.

Perennis; caulis argute quadrangulatus, 4-8 dm. altus; foliorum laminae ovatae aut lanceolato-ovatae, dentatae aut dentato-lobatae, glanduloso-pubescentes, inferioribus 5-10 cm. longis, petiolis 1.5-6 cm. longis; inflorescentia thyrsoida; sepala 3.5-4 mm. longa, circularia, marginibus late scariosis; corolla 7 mm. longa, latere posteriore atro, anteriore pallido; staminodium flabellatum; filamenta fertilia glanduloso-puberulentia, antheris inclusis vel fere exsertis; stylus 4 mm. longus; capsula 6-7 mm. longa; semina non visa.

Type, at 3000 to 3100 meters altitude, Aina Mela, Kurram Valley, Afghanistan, collected in flower July 8, 1894, by Harsukh; no. 15421 in Dehra Dun Herbarium.

Upper Kurram Valley, northeastern Afghanistan, at about 3000 meters altitude. Presumably also in adjacent India.

AFGHANISTAN. Aina Mela, *Harsukh* 15421 (ANSP, DD); Alez (Ali) Khel, *Aitchison* 461 (DD, GH).

¹⁰ Also there are two more specimens from this locality, spelled "Kyiber", by an unnamed collector, number "57" and "58" (ANSP, USNA).

15. *Scrophularia koelzii* new species

Plate 5, A.

Root perennial, woody, from its crown sending up a cluster of slender glabrous obscurely angled stems, 4-10 dm. tall. Leaves glabrous: blades ovate or oval in main outline, slightly glaucous beneath, the largest 2-9 cm. long, 1.5-4 cm. wide, dentate, dentate-lobed, or somewhat pinnatifid, acute to rounded at apex, basally narrowed to slender glabrous petioles 1-3 cm. long. Inflorescence less than half the height of the plant, of 4 to 8 pairs of opposite, approximate, or usually scattered peduncles, each cyme of 1 to 6 flowers; rachis, peduncles, and pedicels puberulent with relatively large dark glands. Sepals 1.5-2 mm. long, with white scarious entire margin 0.3-0.5 mm. wide. Corolla 5-7 mm. long, the posterior lobes projecting, purple-brown, as may be also the posterior half of the corolla-tube; anterior lobes pale or greenish yellow, the mid-anterior lobe somewhat recurved. Sterile filament flabellate, about half the width of the base of the posterior lip of the corolla. Fertile filaments glandular-puberulent, the anthers included or slightly exerted. Style 2-4 mm. long. Capsule 5-6 mm. long, shortly or moderately beaked. Seeds 1.2 mm. long, transversely pitted.

Perennis; caules plures glabri obscure quadrangulares, 4-10 dm. alti; foliorum laminae ovatae ovaliaeve, dentatae vel dentato-lobatae vel paulum pinnatifidae, inferioribus 2-9 cm. longis, petiolis 1-3 cm. longis; inflorescentia paniculata; sepala 1.5-2 mm. longa, circularia, marginibus late scariosis; corolla 5-7 mm. longa, latere posteriore atro, anteriore pallido; staminodium flabellatum; filamenta fertilia glanduloso-puberulentia, antheris inclusis vel paulum exertis; stylus 2-4 mm. longus; capsula 5-6 mm. longa; semina 1.2 mm. longa.

Type, dry hillside, altitude 3350 meters, near Kukti Pass, Lahul, collected in flower and fruit August 26, 1930, by Walter Koelz, no. 1229; in Herb. Academy of Natural Sciences of Philadelphia.

Bare exposed banks, at altitudes of 2600 to 5100 meters, through the western Himalayas from eastern Afghanistan to Bashahr. Flowering from July to September.

Dera Ismail Khan: Pirgal, *Williams* 7884 (DD); Tariak, near Tank, *Williams* (DD). Chitral: Janba tai, *Harriss* 16462 (DD). Hazara: Kuthizali, ——— 22058b (DD); Silan, Kagan, *Inayat* (DD). Muzaffarabad: Matayan, *Stewart* 7431. Kashmir: Banihol Pass, *Stewart* 10600 (GH), 12177; Pahlgam, *Stewart* 5386, 8030 (ANSP, USNH), 9265 (Gord, NYBG). Astor: Astor Valley (Shunkergadh, Kamrinula), *Inayat* 25730a. Udampur: Junga, Chenab, *Brandis* 3152 (DD). Baltistan: Chatpani Nullah, *Duthie* 13844 (DD); Lachit, Saltaro Valley, *Hunter-Weston* 10255¹¹ (DD); Marpu Nullah, *Duthie* (DD); Satpura Nullah, above Skardu, *Stewart* 20300 (ANSP, GH, NYBG, USNH); Thalle La, *Stewart* 20654 (ANSP, Gord, GH, NYBG, USNH). Purig: Dras, *Duthie* 11765 (DD); Dras-Pan Pass, *Stewart* 9996 (ANSP, NYBG, USNH); Tangola,

¹¹ This is the type collection of *Scrophularia variegata* f. *himalayensis* Gand., in Bull. Soc. Bot. France 46: 420, 1899. "Baltistan, alt. 9000 ped. (*Duthie*, n° 10255)." It was collected May 28, 1890 at Lachit, Saltaro Valley, and *Duthie* has written on the sheet "Coll. A. G. Hunter-Weston, R.E." I can only key this to *S. koelzii*, but it differs by more elongate and pinnatifid leaves restricted to the base of the stem, and long peduncles that give an unusually lax inflorescence. This correlation may denote a separate species, but all other collections from Baltistan seem normal enough *S. koelzii*. The stature of the plant makes me wonder if there may have been some confusing of data, as it is surprisingly large and lax for a district so far within the Himalayas.

Koelz 6087 (USNH). Chamba: Hodan Valley, *Harsukh* (DD); Kilar, Pangi, *Stewart* 2747; Kulail Forest, *Harsukh* (DD). Ladakh: Chortren Chen, *Koelz* 2669d (ANSP, NYBG); Gilgit Road, Deosai Plain (Kharbu to Dras), *Stewart* 21136 (ANSP, Gord); Tog, *Koelz* 2637 (NYBG). Zaskar: Abring, *Koelz* 2972a (NYBG); Mune, *Koelz* 5738 (USNH), 5740 (NYBG). Lahul: Kolung, *Koelz* 10066 (ANSP, NYBG, USNA); Kye-lang, *Koelz* 474 (NYBG); via Kukti Pass, *Koelz* 1229 (ANSP, NYBG); Sisu, *Koelz* 5094 (USNH), 8364 (ANSP, NYBG, USNA, USNH); Tsembak, *Chand* 153 (USNH), *Parmanand*. Spiti: Rangrik (Ki), *Koelz* 7150 (USNH). Bashahr: Mangla ("Hangla"). *Parmanand* 595 (ANSP, GH, NYBG); Tidong Nala, *Gorrie* 49227 (DD).¹²

In Hooker's Flora of British India (4: 256, 1883) this was identified as *Scrophularia variegata* Bieb., but the original description of Bieberstein's plant of the Caucasus (Besch. Casp. 177, App. n. 48, not seen, but quoted in Flora Taurico-Caucasica 2: 78, 1808) called for a plant woody at base, with bipinnatifid pubescent leaves, and pedicels hirsute with glochidiate hairs—evidently a different species from this of the Himalayas. It appears to be represented in the Academy's herbarium by a specimen marked in Schweinitz' hand "Caucas Ledeb *Scrophularia variegata*."

16. *Scrophularia scabiosaefolia* Bentham

Scrophularia scabiosaefolia Benth., in DC., Prod. Regn. Nat. Veg. Syst. 10: 311, 1846.

"In regno Cabulico (*Griffiths!* [*Griffith*] n. 614, 622) (v. in herb. Hook.)"

Description evidently composite, presumably of *S. stenothyrsa* and the species now considered. That would supply the alternative character of glandular canescence, but the account of the slender peduncles that are bifid and usually 5-7-flowered applies best to the glabrous-stemmed species now considered. Bentham described the flowers as pedicelled, whereas the lateral ones are usually very shortly so, but the pedicels are often evident, as in Inayat's collection from the Sind Valley cited below, a plant with pinnatifid leaf-blades and long lax panicles. Hooker, who may be presumed to have studied primarily Bentham's specimens, speaks of the ample cymes, with the "flowers very small often spicate," features especially descriptive of our plant. Accordingly, I restrict the name to what I judge was the element preferred by Hooker, to a plant with small capsules and flowers, lax inflorescences, glaucescent leaf-blades that are dentate to pinnatisect, the blade and segments with teeth from rounded to acute or acuminate.

Root perennial, woody. Stems several, slender, sharply quadrangular, glabrous, branched, 3-6 dm. tall. Leaves glabrous: blades lanceolate to elliptic in main outline, slightly glaucous beneath, the largest 3-5 cm. long, 1-2 cm. wide, dentate to pinnatifid, acute to acutish at apex, at base rounded or narrowed to slender glabrous petioles 0.5-3 cm. long. Inflorescence usually less than half the height of the plant, of 4 to 6 pairs of opposite or usually scattered peduncles, each cyme of 2 to 4 flowers; rachis, peduncles, and pedicels more or less glandular-puberulent. Sepals 1.5-2 mm. long, green, with white scarious entire margin 0.3 mm. wide. Corolla 3-4 mm. long, the upper lobes slightly longest, projecting, pink, the 3 lower lobes cream-colored, recurved. Sterile filament greenish yellow, flabellate, about $\frac{2}{3}$ width of base of upper lip of corolla. Style 3 mm. long. Capsule 3-4 mm. long, shortly beaked. Seeds 0.8-1 mm. long, dark brown or blackish, transversely pitted.

Banks and rocky places, at altitudes of 1200 to 3600 meters, through the western Himalayas from eastern Afghanistan to Lahul. Flowering from early May to mid-August.

¹² Perhaps *Gorrie* 49227 is not this species, as the leaf-blade seems too deeply cut, and the inflorescence has too fine glands, but the sterile filament is that of *S. koelzii*.

AFGHANISTAN. Lorinj, *Koelz* 13656 (ANSP, USNA).

INDIA. Chitral: Bundai, *Harriss* 16453 (DD); Jambatai, *Harriss* 16452 (DD), 16454 (DD); Mirga, *Harriss* 14355 (DD); Ziarat, *Harriss* 16461 (DD). Hazara: Dogah, Saran Valley, *Inayat* (DD); Mansera to Abbottabad, *Stewart* 3781; -Kagan: Kamalban, *Inayat* (ANSP, DD); Kawai, *Inayat* 22057 (DD); Malkandi, *Inayat* 20011 (DD), 20014 (ANSP, DD), 22056 (DD). Muzaffarabad: Bataki to Dhanni, *Stewart* 17347 (ANSP, Gord, GH); Dhanni to Titwal, *Stewart* 17382 (ANSP, Gord, GH, NYBG, USNH); near Garhi, *Stewart* 8582a (NYBG); Titwal, Kishanganga Valley, *Stewart* 17459 (ANSP, NYBG); Uri, *Stewart* 12010 (ANSP, GH, NYBG), 14017 (ANSP, GH). Kashmir: Bandipur: *Koelz* 9093 (NYBG, USNA); Baramulla, *Stewart* 6097, 6098; Ganganguir, Sind Valley, *Inayat* 25730b (DD); Gulmarg, *Stewart* 10482a (ANSP, NYBG); Kangan to Gund (near Sonamarg), *Stewart* 6235; Pahlgam, *Stewart* 8030. Gilgit: Niltar Valley, north of Gilgit, *Duthie* 12347 (DD). Astor: Rattu, *Inayat* 25730 (DD), *Stewart* 18782 (ANSP, GH). Baltistan: Skagarthang Valley, *Duthie* 12124 (DD). Ladakh: Chatpani Nullah, west of Dras, *Duthie* 13812 (DD). Lahul: Sisu, *Koelz* 815.

17. *Scrophularia moniliformis* spec. nov.

Plate 5, B.

Root perennial. Stems several, branched below, rather sharply quadrangular, glabrous (but glandular-punctate), 2-4 dm. tall. Leaves glabrous, glaucous, the lower forming a rosette, the blades 2 cm. long, 1.2 cm. wide, rhombic-oval, obtuse, doubly dentate with a few rounded teeth, cuneately narrowed to petioles about as long as the blades; cauline leaves much smaller, narrower, with few obtuse lobes or teeth, all the leaves near the base of the stem. Inflorescence over $\frac{3}{4}$ the height of the plant, of 6 to 9 pairs of widely spreading peduncles (these all scattered), each cyme of 6 to 12 short-pedicelled flowers, which are all or nearly all along one cyme-arm; rhachis (toward apex), peduncles, and pedicels sparsely glandular-puberulent or glabrate. Calyx-lobes 1.5 mm. long, circular, green, with somewhat erose white scarious margin 0.2 mm. wide. Corolla 2-2.5 mm. long, brownish, the posterior lobes projecting, dark violet-purple, somewhat exceeding the anterior lobes. Sterile filament yellowish, flabellate, about half width of base of posterior lip of corolla. Fertile filaments glandular-puberulent, the anthers exerted, purple-brown. Style 2 mm. long. Capsule 1.5-2 mm. long, depressed-globose, mucronate. Seeds 0.8-1 mm. long, black, transversely pitted (somewhat irregularly angulate).

Perennis; caules plurimi glabri quadrangulares, 2-4 dm. alti; folia rosulata vel cauli inferiora, laminis ovalibus duplicato-dentatis infimis 2 cm. longis, petiolis 2 cm. longis; inflorescentia paniculata ramis florum moniliformibus; sepala 1.5 mm. longa, circularia, marginibus scariosis; corolla 2-2.5 mm. longa, brunnea, lobis posterioribus atroviolaceis; staminodium flabellatum; filamenta fertilia glanduloso-puberulentia, antheris exsertis; stylus 2 mm. longus; capsula 1.5-2 mm. longa; semina 1 mm. longa.

Type, Kacha Garhi, near Peshawar, northwestern India, collected in flower May 25, 1928, by N. A. Qazilbash; in Herb. Academy of Natural Sciences of Philadelphia.

Gravelly soil, stream-beds, at altitudes of 300 meters, in Peshawar. Flowering in April and May.

Peshawar: Kacha Garhi, Peshawar (Islamia College), *Nath* 15834 (NYBG), *Qazilbash* (ANSP), *Stewart* 10176 (ANSP, DD, Gord, GH, NYBG, USNH).

18. *Scrophularia decomposita* Royle

In Hooker's Flora of British India (4: 254, 256, 1883) the plants that I am now associating under this specific name were sundered and placed under *Scrophularia scopolii* Hoppe and *S. lucida* L. From both of these the plants of the western Himalayas seem amply distinct; but, though at sight they appear yet more distinct from each other, there seems to be considerable intergradation where they are in geographical contact. Both have the same floral and fruiting characters, so that only leaf-cutting distinguishes the two subspecies. Apparent intergrades are marked by asterisks on the lists under each.

KEY TO SUBSPECIES

- A. Leaf-blades coarsely toothed or somewhat cleft into relatively wide (lanceolate) lobes. 18b. *S. d. latifolia*
 AA. Leaf-blades pinnatisect to pinnatifid, the segments linear-lanceolate to linear. 18a. *S. d. typica*

18a. *Scrophularia decomposita typica*

Scrophularia decomposita Royle, ex. Benth., Scroph. Indicae 18, 1835. "Hab. in Kanour, Royle." Type seen in Herb. Kew Gardens; isotype in Dehra Dun Herbarium.

*Scrophularia griffithii*¹³ Benth., in DC., Prod. Syst. Nat. Regn. Veg. 10: 312, 1846. "In regno Cabulico (*Griffith*, n. 616) (v. in herb. Hooker.)" I fail to discern any actual contrast between Bentham's description of this and the preceding, as they occur on opposite pages of the Prodromus.

Varies greatly in degree of leaf-cutting, the coarsest states passing to subsp. *latifolia*, the finest (toward the eastern part of the range) being delicately much-divided.

Upper lip deep madder-purple or blackish, the corolla elsewhere yellow-green. Flowering from May to September.

Forming clumps in open valleys, usually in alpine meadows, at altitudes of 2000 to 4000 meters, through the western Himalayas from Afghanistan to Kumaun.

Waziristan: Shekai, *Harsukh* 15646 (DD). Hazara (Kagan Valley): Rewri Manur, *Inayat* 20006 (DD); *Saifar Maluk, *Inayat* 20018a (DD). Kashmir: Baltal, *Stewart* (ANSP, NYBG); Banihal Pass, *Stewart* 10720 (NYBG), 12200 (USNH); Burzil, *Duthie* 13970 (DD), 14034 (DD), *Koelz* 9443; Gulmarg, *Duthie* 13048 (DD), *Stewart* 10335 (NYBG), 15514 (ANSP, Gord, NYBG), 10654a (GH); Har Nag, Mt. Kolahoi, *Stewart* 9372 (ANSP, Gord); above Kainmul, Liddar Valley, *Duthie* 13149 (DD); Kaji-nag Range, *Duthie* 11051 (DD); Kamri Valley, *Duthie* (DD); Killanmarg, *Stewart* 8761 (ANSP, GH, USNH); Kolahoi Valley, *Duthie* 13502; Pahlgam, *Stewart* 5386, 5921, 8016 (Gord), 8432 (NYBG); Pir Panjal, *Strachey & Winterbottom* 115 (DD); Rajdhingan Pass, *Stewart* 19515; Sinthan Pass, *Stewart* 6449; Sonamarg, *Stewart* 6321, 9708 (GH); Zogi La, *Gammie* (ANSP, DD). Gilgit: Kule Pam, *Giles* 176 (DD). Astor: Kalapani, Kamrinala, *Inayat* 25730c (DD). Baltistan: near Skardu (Escardoo), *Falconer's* collectors (DD); Thalle La, *Stewart* 20654a (ANSP, NYBG). Purig: Chatpani Nullah, west of Dras, *Duthie* 14174 (DD). Chamba: Alwas, *Stewart* 2429; Brahmour, *Koelz* 10141 (NYBG, USNA); Satrundi, *Lace* 1612 (DD); Sural Valley, *Harsukh* (DD). Kangra: above Dharmasala, *Stewart* 10317 (ANSP, Gord, GH); Rotang Pass, *Nath* (NYBG).

¹³ Bentham erroneously thought that the collector's name was "Griffiths", and so misspelled the name both in the reference to him and in the specific designation.

Zaskar: Pensi La, *Koelz* 5871 (USNH). Kulu: Tosnal, above Shari Jani Thach, *Parkinson* 4033 (DD). Bashahr: Pieri Pass, *Parmanand* 532 (ANSP, GH). Tehri: near Jamara camping ground in Damdar Valley, *Duthie* 235 (DD). Kumaun: "Kulti Yanati Valley", Byans, *Duthie* 5866 (DD); Milam¹⁴, Gori Valley, *Inayat* 24765 (DD); Par Chu, Gori Valley, *Inayat* 24761 (DD); Ralam Valley, *Inayat* 24764 (DD).

In his Flora of British India (4: 256, 1883) J. D. Hooker identified both *Scrophularia decomposita* and *S. griffithii* with *S. lucida* L. of southern Europe and southwestern Asia. As there considered, that species included several other entities, the plant of southern France (as illustrated by Coste in Flore de France 3: 4, 1906) having a sterile filament less than half the width of the base of the upper lip of the corolla, whereas that of Anatolia (as shown by *Bornmuller* 596 and 597, in the Academy's herbarium) has the sterile filament nearly as wide as the expanded portion of the upper corolla-lip. Both have more finely cut leaf-blades, that are usually more bipinnatifid. Whichever is real *S. lucida*, our Himalayan plant seems clearly different from it, or from any other specimens seen from west of Afghanistan.

18b. *Scrophularia decomposita latifolia* (Bentham) comb. nov.

Scrophularia griffithii latifolia Benth., in DC., Prod. Syst. Nat. Regn. Veg. 10: 312, 1846. Cum priore [in regno Cabulico] *Griffith*¹⁵! n. 619 specim. fructiferum in herb. Hooker." Distinguished from the species, which I identify above as subsp. *typica*, by the phrase: "foliis majoribus minus incisus," a clear characterization of the subspecies now considered.

Forming clumps of only a few stems (or even solitary), in forest, at altitudes of 2000 to 3400 meters, in the western Himalayas from Afghanistan to Kashmir. Flowering from May to August. (Specimens marked by asterisks intermediate with ssp. *typica*.)

AFGHANISTAN. Kurram Valley: Aina Mela, *Harsukh* 14719 (DD); in the Kuram and Hariab districts, *Aitchison* 77 (DD).

INDIA. Waziristan: Pirghal, *Harsukh* 15619 (DD). Astor: *Shunkergadh, Kamrinala, *Inayat* 25730a (DD). Hazara: Changla Gali, *Stewart* 10214 (ANSP, Gord, NYBG), 13900 (GH); Deoli, *Inayat* (ANSP, DD); Thandiani, Abbottabad Dist., *Inayat* 20009 (DD). Hazara (Kagan): Besri, *Inayat* 20017 (DD); Bhurj, *Inayat* 22055 (DD); Chapran, *Inayat* (DD); Jebri Manur, *Inayat* 20015 (DD); *Kunna Danna, *Inayat* 22058 (DD); Kuthyali, *Inayat* 22058 (DD); Makra, *Inayat* 22058 (ANSP, DD); Shinu Ka Katha, *Inayat* (DD); *Silan, *Inayat* (DD). Rawalpindi: Darya Gali, west of Murree, *Inayat* 14603 (DD); Gharial, Murree Hills, *Stewart* 3806, 7612 (ANSP, NYBG); Jhicca Gali, Murree Hills, *Stewart* 12359 (GH); Murree, *Stewart* 9625 (ANSP, Gord, NYBG), 15357 (ANSP, Gord, GH), 15888 (NYBG, USNH). Muzaffarabad: Kel, *Stewart* 17836; Musa, *Inayat* 14603 (DD); Thora, *Inayat* 22053 (DD). Punch: *Baramgala, *Strachey & Winterbottom* 82 (DD); Mandi, *Stewart* 12009 (ANSP, NYBG). Kashmir: *Chorwan, *Stewart* 19234 (ANSP, Gord); Gulmarg, **Duthie* 13041 (DD), *Stewart* 14755 (ANSP, NYBG); *Gurais, *Duthie* (DD); Pahlgam, *Stewart* 8016; Tangmarg, *Stewart* 10654 (ANSP, Gord).

J. D. Hooker in the Flora of British India (4: 254, 1883) identified this as *Scrophularia scopoli* Hoppe, a name dating from Bentham's description in DeCandolle's Prodrum (10: 308, 1846). It is certainly not the plant of eastern Europe and Asia Minor there described, as that was more pubes-

¹⁴ Finest leaf-cutting observed.

¹⁵ "Griffiths", error for Griffith.

cent, with leaf-blades crenately dentate and somewhat cordate at base, and, as shown by specimens in the Academy's herbarium, with sterile filament expanded $\frac{1}{2}$ to $\frac{2}{3}$ the width of the base of the upper lip of the corolla. Apparently also the upper lip, while dark, is much lighter than in *S. decomposita* and the present plant. In the latter the stem and foliage is glabrate or the stem somewhat glandular-puberulent above, the sepals have conspicuously wide scarious margins (0.5-1 mm. wide), the upper lip is dark purple-violet (almost blackish at times), and the sterile filament is about as wide as the base of the upper lip of the corolla.

Bentham placed *Scrophularia scopolii* among the species with leaf-blades showing a closed reticulation. *S. decomposita latifolia* shows gradations in its loss, while *S. d. typica* lacks it altogether.

19. *Scrophularia striata* Boissier

Scrophularia striata Boiss., Fl. Orient. 4: 413, 1879. "Hab. in montibus prope Jezd Persiae orientalis ad pagum Dehballo (*Buhse* 1339!)" Three other collections cited, and from the four the type must be selected. If the first is chosen, a topotype, *Bornmuller* 4997, is in Herb. Academy of Natural Sciences of Philadelphia.

Upper lip blackish crimson, corolla elsewhere pale, lower lobes white. Flowering from March to early June.

Forming very large clumps, stream-beds and rocky slopes, at altitudes below 1200 meters, in northwestern India. Ranging from the plateau of eastern Persia and Baluchistan to Rawalpindi, India.

PERSIA. Yesd: Yesd, *J. Bornmüller* 4997.

BALUCHISTAN. Fort Sandeman, ——— 20610 (DD); Kawas Tangi, *A. V. Monro* (DD); Mina Bazaar, ——— 18952 (DD).

AFGHANISTAN. Kurrum Valley: from Badishkhel to Shalizan, *Aitchison* 264 (DD, GH).

INDIA. Waziristan: Torkhan, ——— 18953 (DD); ———, *Harsukh* 15724 (ANSP, DD). Kurrum: Jiran, *Harsukh* 15420 (ANSP, DD); Parachinar, *Harsukh* 14673 (ANSP, DD); Shalizan, *Harsukh* 14794 (DD). Tirah: Khyber Pass, *Nath* 15451 (ANSP, NYBG). Peshawar: Peshawar, *Collett* (DD). Samana Range, N.W. Frontier, *Capt. Hare* (DD). Attock: Hasan Abdal, *Stewart* 7006, 7758 (ANSP, GH, NYBG), 9558 (Gord), 10136 (NYBG, USNH); Jhalar, *Nasir* 16309 (GH, NYBG); Chhoi, Kalachita Hills, *R. N. Parker* 3379 (GH). Hazara: Abbottabad, *Stewart* 14642 (ANSP, Gord, GH, NYBG); Havelian, *Stewart* 10780 (NYBG); Kaie, Kagan Valley, *Inayat* 20895 (DD). Rawalpindi ("Rawul Pindee"): Murree Hills, *Stewart* 7682 (Gord); Rawalpindi, *Aitchison* 489 (DD); Dharmyal, near R., *Nath* (NYBG); Morga, near R., *Stewart* 16626 (NYBG).

Tribe IV. CALCEOLARIEAE

Tribe mainly consisting of the following Neotropical genus.

17. CALCEOLARIA (Feuillee) Linnaeus

Calceolaria L., in Vetensk. Acad. Handl. 31: 288, 1770. Genotype, *C. integrifolia* L. of Chile, the one of the two original species that had been described in 1714 by Feuillee who first proposed the generic name.

A genus of some 500 species, all Neotropical.