

## THE GENERA *Calorhabdos* AND *Botryopleuron* (SCROPHULARIACEAE) IN CHINA

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The genera *Calorhabdos* and *Botryopleuron* are eastern Asiatic. The former was established first, and it included originally several species now segregated as *Botryopleuron*. Franchet, in Bull. Soc. Bot. France 47: 19. 1901, divided the genus into two sections; one, *Acrostachys*, includes *C. brunnoniana*, *C. sutchuensis*, and also *Scrofella chinensis* Maxim. (as *C. chinensis* (Maxim.) Franch.), the last of which should be retained as a distinct genus. The other section of Franchet, *Plagiostachys*, includes the other species of the genus which Hemsley later formed the genus *Botryopleuron*, as well as *C. cauloptera* Hance which should be more appropriately grouped with *Calorhabdos*.

The species of *Botryopleuron* differ from those of *Calorhabdos* in being twining or prostrate instead of erect, robust plants, and in having racemose, axillary, ament-like inflorescences. They also have unequally 4-lobed corolla tube and long-exserted stamens.

*Botryopleuron* has recently been reduced to the synonymy of *Veronicastrum* by Yamazaki (Yamazaki, T. in Journ. Fac. Sci. Univ. Tokyo Sec. 3 7: 91-162. 1957). As this has not yet been followed by other workers, the genus *Botryopleuron* is here maintained as distinct pending further study.

Among the species enumerated below, *B. axillare* Hemsl. also occurs in Japan. Two or three additional species also occur in Japan and the Ryukyus. Among the five species of *Calorhabdos*, only *C. brunnoniana* (Wallich) Benth. extends beyond China to the eastern Himalayas. One new species is here proposed in *Botryopleuron*.

Herbarium specimens from the following herbaria are cited: Academy of Natural Sciences of Philadelphia (PH), Arnold Arboretum (A), University of California (UC), University of California at Los Angeles (LA), New York Botanical Garden (NY), National Taiwan University, Formosa (TAI), and United States National Herbarium, Smithsonian Institution (US). Grateful acknowledgement is hereby made to the curators of these herbaria for their kind assistance.

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**Calorhabdos Benth**

*Calorhabdos* Benth., Scroph. Ind. 551. 1835.

Type species: *C. brunnoniana* Benth.

A genus of about 4-5 species, from eastern Himalaya to western China.

- A. Leaves sessile, decurrent or not; stems simple; inflorescences terminating the stems; flowers greenish to yellowish.
  - B. Leaves not decurrent at base, the margins subserrulate.
    - 1. *C. brunnoniana*
  - BB. Leaves decurrent at base, the margins distinctly serrulate.
    - C. Leaves strongly decurrent at base, sessile. 2. *C. sutchuenensis*
    - CC. Leaves slightly decurrent at base, sessile to subsessile.
      - 3. *C. formosana*
  - AA. Leaves distinctly petiolate; stems branching; inflorescences terminating the long or short, frequently spreading lateral branches; flowers purplish.
    - 4. *C. cauloptera*
    - 5. *C. robusta*

Uncertain species

1. *Calorhabdos brunnoniana* (Wallich) Benth

*Veronica brunnoniana* Wall., List n. 405. 1829.

*Calorhabdos brunnoniana* Benth., Scroph. Ind. 44. 1835, in DC. Prodr. 10: 456. 1846; Franch. in Bull. Soc. Bot. France 47: 17. 1900; Hemsl. in Hook. Icon. Pl. 27: t. 2669. 1900; 482. 1922; Hand.-Maz., Symb. Sin. 7: 842. 1938; Li in *Taiwania* 1:165. 1950. Based on the above.

*Calorhabdos sutchuenensis* sensu Pai in Contr. Inst. Bot. Nat. Acad. Peiping 2: 202. 1934, non Franch. Based on *Fang 2775* from Omei. *C. sutchuenensis* is found in the eastern part of Szechuan, but not in Omei.

Mountain slopes or ravines, at altitudes of 2100-4000 meters, from the eastern Himalayas to northwestern Yunnan and southwestern Szechuan. Flowers greenish to yellowish. Flowering in August and September.

Szechuan: Mount Omei, *W.P. Fang 2775* (A, US); *C.Y. Chiao and C.S. Fan 516* (A), *788* (A); *T.C. Peng 129* (A).

Yunnan: Lo-pin-chan, *Delavay s. n.* (LA, PH, US); Tsang-chan, *Delavay s. n.* (LA, PH, US); Moo-so-yn, *Delavay s. n.* (LA, PH); Ma-hong, *E.E. Maire 3146* (LA, PH); eastern slopes of Likiang Snow Range, *J.F. Rock 5697* (PH, US); Tsang-shan Range, west of Talifu, *J.F. Rock 6377* (PH, US); Lang-shan, La-mi, *H.T. Tsai 51236* (A); Tai-li District, *H.T. Tsai 53831* (A).

2. *Calorhabdos sutchuenensis* Franchet

*Calorhabdos sutchuenensis* Franch. in Bull. Soc. Bot. France 47: 18. 1900; Diels in Bot. Jahrb. 29: 568. 1900. The type was described from a collection from eastern Szechuan: "Hab. China occidentalis, prov. Su-tchuan, circa Tchen-keou-tin (Farges)". It has not been seen.

Wet places in eastern Szechuan and western Hupeh. Flowers yellowish. Flowering in September.

Hupeh: Fang District, *E. H. Wilson 2388* (NY, US).

This species is very close to *C. brunnoniana* differing only in the long decurrent leaves which are more distinctly and sharply serrulate. The range, however, is limited to northeastern Szechuan and Hupeh, much farther north than that of *C. brunnoniana*.

3. *Calorhabdos formosana* (Masamune) Ohwi

*Calorhabdos formosana* (Masamune) Ohwi in Rep. Sp. Nov. 36: 54. 1934; Mori in Masamune, Short Fl. Formos. 190. 1936; Li in Quart. Journ. Taiwan Mus. 7: 74. 1950.

*Veronica formosana* Masamune in Journ. Soc. Trop. Agr. 2: 241. 1930; Nemoto, Fl. Jap. Suppl. 669. 1936.

Endemic in Taiwan.

Taiwan: Taityu-syu, Kanko, *Suzuki-Tokio 13296* (TAI); Taityu, *Y. Yamamoto & E. Mori 101* (TAI); inter Pinan et Sikayo, *G. Masamune 1190* (TAI).

4. *Calorhabdos cauloptera* Hance

*Calorhabdos cauloptera* Hance in Journ. Bot. 15: 298. 1877; Forbes & Hemsl. in Journ. Linn. Soc. Bot. 26: 195. 1890; Diels in Bot. Jahrb. 29: 568. 1900; Hand.-Maz., Symb. Sin. 7: 842. 1936; Li in Quart. Journ. Taiwan Mus. 3: 74. 1950.

*Botryopleuron yunnanense* W. W. Smith in Notes Bot. Gard. Edinb. 10: 9. 1918. Smith cited two collections: "China: Taping-pu Valley, Yunnan, Lat. 25° 30'N. Alt. 7000-8000 ft. Scandent shrub of 4-8 ft. On scrub. May 1913, G. Forrest. N. 9898. Valley of the Mekong on the Tenyueh-Tali-fu route, Yunnan. 5000 ft. Procumbent plant, flowers deep rich blue. Aug. 1914, G. Forrest. No. 623". A specimen of *Forrest 623*, from the Edinburgh Herbarium, is available for study. It is a relatively young plant of *C. cauloptera*. In the description, Smith has indicated that the species differs from other species of *Botryopleuron* in having spikes terminating the short lateral branches.

*Calorhabdos kitamurae* Ohwi in Rep. Sp. Nov. 36: 54. 1934.

*Botryopleuron kitamurae* Ohwi in Act. Phytotax. Geob. 4: 128. 1935.

*Veronica kitamurae* Nemoto, Fl. Jap. Suppl. 670. 1936.

In ravines, to an altitude of 1500 meters from Yunnan to Hunan and Hupeh. Flowers purple. Flowering in July.

Hupeh: No precise localities, *A. Henry 4326* (NY), *4445* (US), *E. H. Wilson 1724* (NY).

Hunan: Hsinhwa, *Handel-Mazzetti 12692* (US)

Yunnan: Mengtze, *A. Henry 9076* (US), *9076A* (NY); Ping-pien District,

H.T. Tsai 61006 (A); no precise localities, F. Ducloux 706 (NY), H.T. Tsai 60958 (A).

Taiwan: Kwareenko, Y. Nakamura 3776 3776 (TAI); Arisan, Iriyama, Yoshimura s. n. (TAI).

This species can be readily distinguished from *C. brunnoniana* in having inflorescences terminating the short or long, frequently spreading branches. The flowers are purplish instead of yellowish or greenish and the leaves are petiolate instead of sessile. This species has, in Yunnan, a more southern range than *C. brunnoniana*, and inhabits lower elevations.

5. *Calorhabdos robusta* Diels

*Calorhabdos robusta* Diels in Notizb. Bot. Gart. Muz. Berl.-Dahl. 9: 1031. 1926. The type is from Kiangsi: "Prov. Kiang si: in valle prope Kui chi hsien, 860 m.a.m. Hor. 16. Jul. 1921 (Hun. 1274-Typus speciei!)." It has not been seen.

This species, described as with petiolate leaves, is clearly related to *C. cauloptera*. I suspect, judging from the description, that it is identical with the latter species. However, an actual reduction is not being made pending a chance to examine the type material.

***Botryopleuron* Hemsley**

*Botryopleuron* Hemsl. in Hook, Ic. Pl. 27: t. 2670. 1900.

Type species: *Calorhabdos venosa* Hemsl.

About six species in China and Japan.

- A. Leaves ovate-oblong to oblong-lanceolate, 2 or more times as long as broad, chartaceous.
  - B. Corolla short-cylindric; inflorescences 1-1½ rarely to 3-4 cm. long; leaves not conspicuously veined. 1. *B. axillare*
  - BB. Corolla long, cylindric; inflorescences 3-4 to 6-8 cm. long; leaves conspicuously veined.
    - C. Indumentum on inflorescences not capitate-glandular.
      - D. Flowers purple, in racemes to 3-5 cm. long; leaves more conspicuously veined, distinctly and sharply serrate. 2. *B. venosum*
      - DD. Flowers white, in racemes to 10 cm. long; leaves conspicuously veined, finely serrulate. 3. *B. stenostachyum*
    - CC. Indumentum on inflorescences capitate-glandular. 4. *B. longispicatum*
  - AA. Leaves broadly ovate, sometimes nearly orbicular, as long as broad to 1½ times as long as broad, membranaceous.
    - B. Leaves smaller, to 6 cm. long and 5.5 cm. wide, sparsely pubescent to glabrate; inflorescences long, 2-3 cm. or more in length. 5. *B. latifolium*

BB. Leaves larger, to 13 cm. long and 8 cm. wide, densely pubescent on both surfaces; inflorescences very short, to 1 cm. long.

6. *B. macrophyllum*

1. *Botryopleuron axillare* (Siebold & Zuccarini) Hemsley

*Paederota axillaris* Sieb. & Zucc., Fl. Jap. Fam. Nat. 2: 20. 1846; Miq. in Ann. Mus. Bot. Lugd.-Bat. 2: 118. 1865-66.

*Botryopleuron axillare* Hemsl. in Hook. Ic. Pl. 27: sub. *t.* 2670. 1900; Pai in Contr. Inst. Bot. Nat. Acad. Peiping 2: 202. 1934; Hand. Maz., Symb. Sin. 7: 842. 1936; Li in Quart. Journ. Taiwan Mus. 3: 74. 1950. Based on the above.

*Calorhabdos axillaris* Benth. & Hook. f., Gen. Pl. 2: 963. 1876; S. Moore in Journ. Bot. 13: 230. 1875; Hance in Journ. Bot. 15: 298. 1877; Forbes & Hemsl. in Journ. Linn. Soc. Bot. 26: 195. *t.* 4. *f.* 2. 1890; Diels in Bot. Jahrb. 29: 568. 1900, 36., Beibl. 82: 96. 1905; Chun in Sunyatsenia 1: 303. 1934.

*Botryopleuron formosanum* Masamune in Journ. Soc. Trop. Agr. 3: 114. 1931; Ohwi in Act. Phytotax. Geob. 4: 128. 1935; Mori in Masamune, Short Fl. Formos. 190. 1936.

*Calorhabdos l.c. imadai* Masamune in Trans. Nat. Hist. Soc. Formos. 32: 2. 1942. Shaded ravines, at altitudes of 360-1200 meters, in eastern China and Japan. Flowers reddish-purple. Flowering from July to September. Kiangsi: Lushan, A. N. Steward & H. C. Cheo 259 (NY); Fengcheng, Y. Tsiang 10312B (NY).

Chekiang: Sui-an District, Y. L. Keng 807 (UC); King Yuan, R. C. Ching 2380 (UC, US); no precise locality, Barchet 518 (US).

Fukien: Kuliang Hills, J. B. Norton 1528 (US); Hinghwa District, H. H. Chung 1045 (UC).

Kwangtung: Mei District, W. T. Tsang 21536 (NY).

Taiwan: Sintiku, Mt. Yura, Simada 2419 (TAI); Sintiku-syu, Suzuki-Tokio 4716 (TAI); Shoten-zen, Shinchiku-shu, Fukuyama & Suzuki s. n. (TAI).

2. *Botryopleuron venosum* (Hemsley) Hemsley

*Calorhabdos venosa* Hemsl. ex Forbes & Hemsl. in Journ. Linn. Soc. Bot. 26: 197. 1890; Diels in Bot. Jahrb. 29: 568. 1900. The types were from: "Chekiang: Ningpo mountains (*Faber.*); Hupeh: Ichang, Nanto and mountains to the northward (A. Henry, 55, 2187, 4638!). Herb. Kew". Specimens of *Henry 55* in the United States National Herbarium and 4638 in the herbarium of the New York Botanical Garden have been seen.

*Botryopleuron venosum* Hemsl. in Hook. Ic. Pl. 27: *t.* 2670. 1900; Pai in Contr. Inst. Bot. Nat. Acad. Peiping 2: 209. 1934; Li in Taiwania 1: 166. 1950.

*Calorhabdos fargesii* Franch. in Bull. Soc. Bot. France 27: 16. 1900. The type: "China occidentalis: Su-tchuen, circa Tchen-keou-tin (Farges)", has not been seen. Hemsley (in Hook. Ic. Pl. 27: unpagged notes accompanying *t.* 2668-2670. 1900) stated that "He (Franchet) also described a *C. Fargesii*, which is a *Botryopleuron* and very near *B. stenostachyum*, Hemsley." In the purple flowers and sharply serrate leaves, I think this species is rather referable to *B. venosum*. It is here tentatively placed in the synonymy of the latter. An examination of the type is necessary to ascertain its exact status.

Hillsides and shaded ravines, in western and central China. Flowers purple. Flowering from July to September.

Hupei: No precise localities, A. Henry 55 (US), 4638 (NY), 6673 (NY), E. H. Wilson 2481 (NY, US).

Szechuan: Mount Omei, W. P. Fang 2396 (PH), 2469 (PH), 3109 (PH), 5610 (PH, NY), 5798 (A, PH), 12520 (A), C. Y. Chiao & C. S. Fan 6 (A), Y. S. Liu 1537 (A), 1546 (A), K. N. Yin 190 (A), T. C. Peng 27 (A), W. K. Hu 8519, 8945, 9104 (TAI).

Kweichow: Chang-ko, Tungtze, Y. Tsiang 4804 (NY); Fang Ching Shan, Y. Tsiang 7825 (NY).

*Botryopleuron venosum* and *B. stenostachyum* are closely related and they resemble each other in general appearance. Their leaves are mostly long and narrow but vary, in both species, to oblong-ovate. Their inflorescences are both long and slender, with the flowers sometimes loosely arranged. *B. venosum* has more conspicuously veined leaves with more distinct and sharp serrations. Its inflorescences are relatively shorter and its flowers are purplish. The flowers of *B. stenostachyum* are white.

### 3. *Botryopleuron stenostachyum* (Hemsley) Hemsley

*Botryopleuron stenostachyum* Hemsl. in Hook. Ic. Pl. 27: sub. *t.* 2670. 1900; Pai in Contr. Inst. Bot. Nat. Acad. Peiping 2: 203. 1934; Hand-Maz., Symb. Sin. 7: 842. 1936; Li in Taiwania 1: 166. 1950. Based on the following:

*Calorhabdos stenostachya* Hemsl. ex Forbes & Hemsl. in Journ. Linn. Soc. Bot. 26: 196. 1890; Diels in Bot. Jahrb. 29: 568. 1900. The types were from: "Hupei: Nanto and mountains to the northward (A. Henry, 3044!); Szechuan: Mount Omei at 3000 to 4000 feet (Faber!) Herb. Kew". A specimen of *Faber 589*, evidently of one of the type collections, is in the Herbarium of the New York Botanical Garden.

Shaded slopes at altitudes of 1100-1300 meters, in Sikang, Szechuan, western Hupei, Kiangsi, and Hunan. Flowers white. Flowering in July and August.

Hupei: Chien-shih District, H. C. Chow 1508 (NY).

Szechuan: Mount Omei, *Faber 589* (NY), *C. Y. Chiao & C. S. Fan 101, 637* (A).

Sikang: Ya-an, Montin Shan, *C. Y. Chiao 1789* (A).

4. *Botryopleuron longispicatum* Merrill

*Botryopleuron longispicatum* Merr. in Philipp. Journ. Sci. 21: 509. 1922.

The type, "Kwangtung Province, Maan Chi Shan, *C. C. C. 8728*, collected by *Wai Tak*, September 25, 1921. In ravines." has not been seen. Kwangtung. No specimen seen.

A species allied to *B. venosum* Hemsl. and *B. stenostachyum* Hemsl. From both it is at once distinguished by its conspicuously castaneous-capitate-glandular pubescent inflorescences, the indumentum being of the same type on the rachis, bracts, calyces, and corollas. It is the first representative of the genus to be found in Kwangtung Province.

5. *Botryopleuron latifolium* (Hemsley) Hemsley

*Botryopleuron latifolium* Hemsley in Hook. Ic. Pl. 27: sub. t. 2670. 1900.

Based on the following:

*Calorhabdos latifolia* Hemsl. ex Forbes & Hemsl. in Journ. Linn. Soc. Bot. 26: 196. t. 4. 1890; Diels in Bot. Jahrb. 29: 568. 1900. The type was from "Hupeh: Antelope glen, near Ichang (*A. Henry!*) Herb.

Kew". A specimen of the type collection, *Henry 4368*, is in the Herbarium of the New York Botanical Garden.

Shaded mountain slopes, at altitudes of 500-680 meters, in western China. Flowers white. Flowering from July to September.

Hupeh: Ichang, *A. Henry 4368* (NY); no precise locality, *E. H. Wilson 1616* (NY).

Sikang: Ya-an, *C. Y. Chiao 1148* (A), *1190* (A).

Kweichow: Tehkiang, *Steward, Chiao, & Cheo 916* (NY, US).

This species is readily distinguished from other species of the genus in the broad, membranaceous leaves. They are either sparsely pubescent to glabrate or glabrous.

6. *Botryopleuron macrophyllum* sp. nov.

Herba perennis, prostrata vel vagans, omnino molliter pubescens; caulibus gracilibus elongatis, ad 1 1/3 m. altis, simplicibus; foliis alternis, brevissime petiolatis (petiolis ad 6-7 mm. longis) membranaceis, late ovatis, 9-13 cm. longis, 5-8 cm. latis, apice longe acuminatis, basi rotundatis vel subcordatis, margine aculeato-serratis, utrinque nitidis concoloribus, plus minusve molliter pubescentibus, grosse reticulato-venosis, venis primariis paucis inter se arcuatim anastomosantibus supra subconspicuis, subtus leviter elavatis; floribus purpureis, subsessilibus, dense racemoso-spicatis, racemis circiter 1 cm. longis, brevissime pedunculatis; bracteis angustis acuminatis; calyx unaequaliter 5-lobatus, glaber, lobis

longe lanceolatis, acuminatis, margine longe ciliatis; corollae tubo subcylindrico, circiter 5 mm. longo, intus barbato, limbo subaequaliter 4-lobato; staminibus 2, posticis longe exsertis, filamentis ad medium hirsutis, 8-9 mm. longis; capsulis ignotis.

Type, under woods at an altitude of about 550 meters, in Huang Shan, Anhwei Province, collected July 5, 1925, by R. C. Ching, No. 4128 (University of Nanking Herbarium No. 8819); holotype in the Herbarium of the University of California; isotype in the Herbarium of the New York Botanical Garden. Flowers purplish blue. Only collection seen.

This species is a very distinct one and is readily distinguished from all other species of the genus by the large, broad, pubescent leaves, and the very short, dense inflorescences. In the shape of the leaves, it resembles *B. latifolium*, but the leaves are much larger and are pubescent on both surfaces.

## 中國之玄參科 *Calorhabdos* 及 *Botryopleuron* 二屬植物

李 惠 林

本文爲中國玄參科 *Calorhabdos* 及 *Botryopleuron* 二屬植物分類之訂正。二屬主產於中國。前者本文定爲五種，內存疑者一種。五種皆產於中國，其中僅 *C. brunnoniana* 分佈西至希馬拉雅山之東部。後者本文定爲六種，內 *B. macrophyllum* 爲新發表種。此屬中國六種中，*B. axillare* 亦分佈於日本。此外另有二三種專產於日本及琉球。(摘要)