

## NOTES ON THE SPECIES OF SELAGINELLA FROM GUIZHOU, CHINA

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Thirty species of *Selaginella* are currently known from Guizhou Province in south-central China. A key to these species is given. Following the key are notes on species that are newly discovered in the province, previously undescribed, or otherwise in need of discussion.

*Selaginella* Beauv. in China has not been studied thoroughly since Alston enumerated the Chinese species in 1934. In some provinces or regions, however, the vascular flora, including *Selaginella*, has been treated; currently about 50 species of this genus are estimated to occur in China, with 30 species known from Guizhou (Kweichow) Province in the south-central part of the country.

### KEY TO THE SPECIES OF SELAGINELLA IN GUIZHOU

1. Main stems erect, suberect, or scandent, or plants with densely tufted stems; plants usually rooting at base or in lower parts.
  2. Stems densely tufted or branched from base; plants xerophytic.
    3. Stems red, branched from base; lateral and median leaves directed forward. .... 1. *S. sanguinolenta*.
    3. Stems brown, densely tufted; only median leaves directed forward. .... 2. *S. pulvinata*.
  2. Stems not branched near base, or if branched from base plants not xerophytic.
    4. Plants at most 6 cm high; main stems more or less zigzag. .... 3. *S. kouycheensis*.
    4. Plants much larger; main stems not zigzag.
      5. Plants over 1 m long, scandent. .... 4. *S. helferi*.
      5. Plants generally less than 60 cm tall, not scandent.
        6. Branches pubescent.
          7. Stems terete; leaves wrinkled when dry; northern and north-eastern Guizhou. .... 5. *S. braunii*.
          7. Stems sulcate; leaves not wrinkled when dry; southern Guizhou. .... 6. *S. flagellifera*.
        6. Branches glabrous.
          8. Leaves below branches on main stems appressed and directed upward.
            9. Leaves near base of main stem overlapping; median leaves not white margined; lateral leaves with basiscopic margin entire. .... 7. *S. involvens*.
            9. Leaves near base of main stem distant; median leaves white margined; lateral leaves with basiscopic margin serrulate. .... 8. *S. moellendorffii*.

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8. Leaves below branches on main stems spreading.
  10. Median leaves entire; lateral leaves entire or subentire.
    11. Plants stout; lateral leaves entire; distal part of stems black when dry. .... 9. *S. picta*.<sup>2</sup>
    11. Plants delicate; lateral leaves slightly serrulate at apex; distal part of stems straw colored or brownish when dry. .... 10. *S. delicatula*.
  10. Median and lateral leaves serrulate or ciliate.
    12. Leaves white margined. .... 11. *S. sichuanica*.
    12. Leaves not white margined.
      13. Sporophylls dimorphic, those on upper (dorsal) side of strobilus different both in shape and size from those on lower (ventral) side.
        14. Plants up to 40 cm or more tall; stems including leaves up to 7 mm wide.
          15. Lateral leaves with long cilia at base; median leaves acuminate. .... 12. *S. bodinieri*.
          15. Lateral leaves short-ciliate or serrulate at base; median leaves aristate.
            16. Lateral leaves ovate to ovate-lanceolate; median leaves cordate at base; species of mid-montane forests (above 1400 m alt.). .... 13. *S. labordei*.
            16. Lateral leaves oblong-lanceolate; median leaves not cordate at base; species of low hills and valleys (below 700 m alt.). .... 14. *S. monospora*.
        14. Plants generally less than 20 cm tall; stems including leaves up to 5 mm wide.
          17. Median leaves cordate at base. .... 13. *S. labordei*.
          17. Median leaves not cordate at base.
            18. Median leaves strongly aristate; basiscopic margin of lateral leaves entire or subentire. .... 15. *S. effusa*.
            18. Median leaves acuminate; lateral leaves with margin distinctly serrulate throughout. .... 16. *S. heterostachys*.
    13. Sporophylls monomorphic.
      19. Median leaves long-aristate; lateral leaves scabrous adaxially. ... 17. *S. trachyphylla*.
      19. Median leaves acuminate to aristate; lateral leaves smooth.
        20. Leaves serrulate; median leaves keeled. .... 18. *S. doederleinii*.
        20. Leaves ciliate; median leaves not keeled.

<sup>2</sup>This species is found in the Guangxi Zhuang Autonomous Region near the border with Guizhou; it may also grow in Guizhou.



- 21. Lateral leaves symmetrical or sub-symmetric, with cilia only at base; valley species of southern border of province. . . . . 19. *S. repanda*.
- 21. Lateral leaves asymmetric, with cilia from base to near middle on acroscopic margin; species of limestone areas of province. . . . . 20. *S. omeiensis*.
- 1. Main stems creeping; rooting throughout.
  - 22. All leaves entire and with distinct white margin. . . . . 21. *S. uncinata*.
  - 22. Median and lateral leaves serrulate or ciliate, with or without white margin.
    - 23. Median and lateral leaves serrulate.
      - 24. Sporophylls similar to leaves in both shape and arrangement, not forming distinct strobili. . . . . 22. *S. nipponica*.
      - 24. Sporophylls different from leaves, forming strobili.
        - 25. Plants over 20 cm long; axillary leaves oblong to oblong-lanceolate, entire; strobili with 1 megasporangium; microsporangia not spherical. . . . . 23. *S. remotifolia*.
        - 25. Plants usually less than 10 cm long; axillary leaves spreading-ovate, serrulate; strobili with more than 1 megasporangium; microsporangia spherical. . . . . 24. *S. liboensis*.
    - 23. Median and lateral leaves ciliate.
      - 26. Lateral leaves white margined.
        - 27. Plants 5–10 cm long; leaves with long cilia around margin. . . . . 25. *S. albociliata*.
        - 27. Plants up to 30 cm or more; leaves ciliate at base, serrulate toward apex. . . . . 26. *S. gebaueriana*.
      - 26. Lateral leaves not white margined.
        - 28. Sporophylls on upper (dorsal) side of strobilus smaller than those on lower (ventral) side. . . . . 27. *S. prostrata*.
        - 28. Sporophylls on upper (dorsal) side of strobilus larger than or nearly equal to ones on lower (ventral) side.
          - 29. Lateral leaves with base symmetrical, cordate. . . . . 28. *S. chaetoloma*.
          - 29. Lateral leaves with base asymmetric, not cordate.
            - 30. Leaf margin ciliate at base, denticulate toward apex; lateral leaves ovate, acute to acuminate at apex.
              - 31. Median leaves ovate. . . . . 29. *S. xipholepis*.
              - 31. Median leaves lanceolate. . . . . 30. *S. compta*.
            - 30. Leaf margin densely ciliate throughout; lateral leaves falcate, acuminate at apex. . . . . 31. *S. drepanophylla*.

## NOTES

3. *Selaginella kouycheensis* A. Lévillé, Repert. Spec. Nov. Regni Veg. 9: 451. 1911; Alston, Bull. Fan Mem. Inst. Biol. 5: 290. 1934.

I have studied the type of this species *Esquirol 2158* (E) and have found Lévillé's description of it to be incorrect. Mainly, it is not a creeping species but an erect one. Individuals that I have seen are about 1–3 cm tall (Lévillé's original description indicates a height of 6 cm), and the strobili have only megaspores. The leaves and sporophylls are both serrulate, not entire.

Léveillé cited two collections in his original description of *Selaginella kouycheensis*, *Cavalerie* 1933 and *Esquirol* 2158. Alston's (1934) citation of *Esquirol* 2158 as the type can be construed as lectotypification, a designation that is accepted here. His other citation, *Cavalerie* 4156 (κ), as he had pointed out, is a mixed collection. There are two other species, *S. heterostachys* Baker and *S. delicatula* (Desv.) Alston (?) in addition to *S. kouycheensis*.

A specimen from Yunnan, *C. W. Wang* 78983 (Meng-pung, Jenn-yeh Hsien (A)) is also *Selaginella kouycheensis*, a new record for the province.

5. ***Selaginella braunii*** Baker, *Gard. Chron.* **1867**: 1120. 1867; Alston, *Bull. Fan Mem. Inst. Biol.* **5**: 281. 1934. *S. hieronymi* Alderw. *Bull. Jard. Bot. Buitenzorg*, ser. 2. **1**: 18. 1911.

This species is known to occur only from Zhejiang, Anhui, Hubei, Sichuan, and Guizhou provinces, all located in the Changjiang River basin. From Guizhou the following recent collections can be cited: Tongren, *East Guizhou Exped.* 75325 (HGAS, PE); Tongzi, *P. S. Wang* 77185, 77316 (both HGAS); Songtao, *East Guizhou Exped. s.n.*, June 1975 (HGAS). However, there is reason to believe that it also grows in Yunnan Province. While studying the materials in the Harvard University herbaria (A and GH), I found a specimen, *J. Delavay* 339 (Tsin-tan, Yunnan Province), that was cited by Alston (1934) as *Selaginella elephantopus* Hand.-Mazz. However, based on its pubescent stems and wrinkled leaves, it is *S. braunii*.

6. ***Selaginella flagellifera*** W. Bull, *Cat. no.* **225**: 9. 1886. *S. biformis* A. Br. ex Kuhn, *Filic. Afr.* 189. 1868, *nomen nudum*; A. Brown ex Kuhn, *Forschungs-r. Ges.* **4**(6): 19. 1889; Alston, *Bull. Fan Mem. Inst. Biol.* **5**: 282. 1934; Philip. *J. Sci.* **58**: 374. 1935; *Fl. Gén. Indo-Chine*, **7**(2): 570, 571. 1951; Ching, *Flora Hainanica* **1**: 10. 1964.

This is a tropical Asian species and is at the northern limit of its range in southern Guizhou. It is similar to *Selaginella involvens* (Sw.) Spring and *S. moellendorffii* Hieron. but is easily distinguished from them by its pubescent branches. Collections from Guizhou examined are: Congjiang Xian, *East Guizhou Exped.* 75228 (HGAS, PE); Anlong Xian, *Zhang & Zhang* 3304 (PE).

Although Bull indicated that the species came from Fiji, Alston (1934) placed the name in the synonymy of *Selaginella biformis* and gave the range as Burma to Sumatra and Celebes.

11. ***Selaginella sichuanica*** H. S. Kung, *Acta Bot. Yun.* **3**: 252. 1981.

Recent collections from Guizhou (Fanjingshan, Jiangkou Xian, *Sino-Brit. Bot. Exped.* F0673 (HGAS, PE); *Sino-Amer. Guizhou Bot. Exped.* 480 (A, CAS, HGAS, PE)) constitute a new record for the province. The species was previously known only from Sichuan.

19. ***Selaginella repanda*** (Desv. in Poiret) Spring in Gaudich. *Voy. Bonite, Bot.* **1**: 329. 1846; Alston, *Bull. Fan Mem. Inst. Biol.* **5**: 293. 1934. *Lycopodium repandum* Desv. in Poiret, *Encycl. suppl.* **3**: 558. 1814.



One collection of this species (Guizhou: Luodian, by Hongshui River bordering Guangxi, 280 m, *P. S. Wang 76321* (HGAS)) constitutes a new record for this province.

20. *Selaginella omeiensis* Ching in H. S. Kung, Acta Bot. Yun. 3: 253. 1981.

This is a common species in limestone areas of Guizhou. It is much like *Selaginella bodinieri* Hieron., only smaller in size and with uniform sporophylls. The sporophylls and size of *S. bodinieri* are variable. Possibly they are the same species, but further evidence is needed before a final decision can be made.

25. *Selaginella albociliata* P. S. Wang, sp. nov.

Habitu *S. chaetolomae* Alston, sed in foliis albo-marginatis, ciliis foliorum longioribus densioribus, differt.

Plant 5–10 cm long; stem prostrate, creeping, ca. 3 mm in diameter including leaves, sparingly branched, rooting throughout. Vegetative leaves dimorphous: lateral leaves patent, ovate-oblong, 1.5–2 mm long, 1–1.3 mm wide, round at base and blunt or acute at apex, the margin white, with numerous long cilia, these patent or ascending, up to 0.3 mm long; median leaves ovate, 1–1.3 mm long, 0.5–0.8 mm wide, round at base, aristate at apex, the margin white, with numerous long cilia. Strobili 6–10 mm long, 2–2.5 mm in diameter. Sporophylls dimorphous: larger ones on upper (dorsal) side of strobilus, oblong-lanceolate, 2–2.5 mm long, 0.7 mm wide, acuminate at apex, the margin white, ciliate; smaller ones oblong-ovate, 1.8–2 mm long, 0.7 mm wide, caudate at apex, the margin white, ciliate. Megaspores light gray; microspores tangerine colored, 30  $\mu$ m in diameter, verrucate.

TYPE: Guizhou, Libo Xian, on limestone surface along the Wujia River, 530 m, 20 May 1988, *P. S. Wang 77981* (holotype, HGAS).

ADDITIONAL SPECIMENS EXAMINED. GUIZHOU: Libo Xian, in soil on wet rock surface in forest, 660 m, *P. S. Wang 76801* (CDBI, HGAS).

26. *Selaginella gebaueriana* Hand.-Mazz. Symb. Sin. 6: 9. 1929; Alston, Bull. Fan Mem. Inst. Biol. 5: 274. 1934.

Alston (1934) listed this as a synonym of the earlier-published *Selaginella davidii* Franchet. Kung (1981) stated that the two taxa are distinct and that *S. gebaueriana* is mainly from southwestern China, while *S. davidii* is from northern China. In its larger shoots and ciliate leaves, *S. gebaueriana* may easily differ from the northern species; consequently, I agree with Kung.

28. *Selaginella chaetoloma* Alston, J. Bot. 70: 67. 1932; Bull. Fan Mem. Inst. Biol. 5: 292. 1934.

After studying types of *Selaginella chaetoloma* (*Cavalerie 731* (BM, E)) and additional specimens (*Cavalerie 285* (K), *517* (K), and *1469* (E)), I find that *S. prostrata* H. S. Kung (Kung, 1981) does not differ significantly, except in the

sporophylls, from *S. chaetoloma*. In *S. chaetoloma* the sporophylls on the lower (ventral) side of the strobilus are smaller than those on the upper (dorsal) side; in *S. prostrata* the opposite is true.

Alston (1932) cited specimens of *Cavalerie 731* at both BM and E as types in the original description but did not designate either as holotype. I hereby designate the specimen at BM, the more complete specimen of the two, as the lectotype.

31. *Selaginella drepanophylla* Alston, J. Bot. **70**: 66. 1932; Bull. Fan Mem. Inst. Biol. **5**: 292. 1934.

I record here a second report for the species in China (Guizhou: Fanjingshan, Jiangkou Xian, *Sino-Amer. Guizhou Bot. Exped.* 68, 116, 367 (all A, HGAS, PE)). The type locality is in Guangxi, south of Guizhou. Alston (1934) pointed out that *Selaginella xipholepis* Baker, *S. drepanophylla*, and *S. compta* Hand.-Mazz. may be different forms of a single species. Recently, Dahlen (1988) treated *S. drepanophylla* as a synonym of *S. xipholepis*. After comparing the type of *S. xipholepis* with *S. drepanophylla* from Guizhou, I believe that they are very similar but separable species. *Selaginella compta* is also very similar to *S. xipholepis*, but additional specimens—especially those from Yunnan—should be checked before a decision is made on the status of these two taxa.

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