

An Enumeration of *Saxifraga* Collected in NW Yunnan and SW Sichuan, China between 1984 and 1997

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Abstract NW Yunnan and W Sichuan are one of the centres of species diversification in the genus *Saxifraga*. We have collected 53 species for studies on chromosome evolution and morphological diversity between 1984 and 1997. All the specimens collected are listed principally according to Gornall (1987). Significant references and taxonomic notes are also given in each entry.

Key words: *Saxifraga*, NW Yunnan, SW Sichuan, Sino-Himalaya, alpine flora.

The species diversity of sections or subsections Ciliatae, Serpyllifoliae, Rosulares and Flagellares in the genus *Saxifraga* is one of the remarkable features of the Sino-Himalayan alpine flora. Franchet (1889–1890), Engler and Irmscher (1912), and Handel-Mazzetti (1931) described a great number of species from this region based on collections made by Delavay, Forrest, Kingdon-Ward, Handel-Mazzetti, Rock and other explorers and missionaries. Their taxonomic works resulted in an epoch-making monograph by Engler and Irmscher (1916 & 1919).

A considerable number of new species were later described from this region by W. W. Smith, Marcquand, and Harry Smith. Harry Smith (1924) especially studied Chinese *Saxifraga* using his own collections from W Sichuan. He also published two papers on *Saxifraga* from the Himalayan and Tibetan alpine zones mainly based on the collections made by Ludlow and Sherriff and their collaborators (Smith, 1958, 1960). More recently Pan (1991, 1992) revised on Chinese (including Tibet) *Saxifraga*.

The area from Dali to Deqin through Lijiang (Lichian), Weixi, Zhongdian (Chungtien), and around Daocheng (including Gongga Shan) on the border of Yunnan and Sichuan is regarded as one of the centres of species diversification in *Saxifraga* and a significant area for further research on the genus. To understand chromosome evolution and morphological diversity in *Saxifraga* in the Sino-Himalayan

alpine flora, the authors conducted field research in the Himalaya and SW China since 1983 (e.g. Wakabayashi & Ohba, 1988; Wakabayashi, 1997). This enumeration is the result of determinations of materials collected in SW China during their field research since 1987. In this enumeration the *Saxifraga* that were collected by Iwatsuki *et al.* in 1984 in Diancangshan (Cang Shan) near Dali were also studied. All specimens are deposited in KUN and TI, and duplicates are deposited in TNS and have been sent to A, BM, E, and MO from TI. The species were arranged principally according to Gornall (1987).

Members and itineraries are as follows:

1984: 21 to 31 August: Diancangshan (mainly Zhongshan in Yangbi and Huadianba in Dali).

Collectors: Kunio Iwatsuki, Hiroshi Hara, Sachiko Kurosawa, Hiroyoshi Ohashi, Shigeyuki Mitsuta, Mu Zang, Su-Kung Wu, Xiao Cheng, K.-Y. Guan, Y. Fei, and F.-G. Pan (for more details see Iwatsuki & Zang, 1986).

1987: 5 September to 8 October: Lijiang (mainly Yulong Xueshan and around Lijiang).

Collectors: Kunio Iwatsuki, Hideaki Ohba, Michio Wakabayashi, Sugong Wu (Su-Kung Wu), and Xiao Cheng (for more details see Iwatsuki *et al.*, 1988).

1988: 13 July to 1 September: Diancang Shan (Dali and Yangbi), Lijiang (Yulong Xueshan, around Lijiang, Shrgu, and Longpan), Xishuangbanna, and Kunming.

Collectors: Masahiro Kato, Sugong Wu, Xiao Cheng, Yoshikazu Shimizu, Noriaki Murakami, and Shinobu Akiyama (for more details see Shimizu, 1991).

1994: 17 September to 4 October: Zhongdian (mainly Bi Ta Hai, Shudu Hu, Da Xue Shan (including Sichuan side)), Deqin (mainly Baima Xue Shan), Dali (Cang Shan). Hideaki Ohba, Sugong Wu, Xiao Cheng, Shinobu Akiyama, and Hiroshi Ikeda (for more details see Ikeda & Ohba, 1994).

1996: 1 August to 3 September: Weixi (Sanchan He, Sibao, Pantien Ge, Dacao Chang), Lijiang (Ganhaizi, Yunshan Ping), Zhongdian (Tianchi, Napa Hai, Daxue Shan), Xiangcheng, Daocheng (Bowa Shan, Haizi, Gongga Shan), Dali (Cangshan).

Collectors: Hideaki Ohba, Sugong Wu, Shinobu Akiyama, Hiroshi Ikeda, Takao Kikuchi, Futoshi Miyamoto, Haruo Takayama, Hirokazu Tsukaya, Michio Wakabayashi, and Yongping Yan (for more details see Ikeda & Miyamoto, 1996).

1997: 23 July to 19 August: Xiangcheng, Daocheng (mainly Gongga Shan), Yangbi (western slope of Cang Shan).

Collectors: Sugong Wu, Hiroshi Ikeda, Shinobu Akiyama, Futoshi Miyamoto, and Weinyun Chen (for more details see Ikeda & Miyamoto in press).

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Saxifraga L.

Section **Ciliatae** Haw., Misc. Nat. 155, 160 (1803).

Subsection **Hirculoideae** Engl. & Irmsch. in Notes Roy. Bot. Gard. Edinburgh **5**(24): 135 (1912).

Series **Hirculoideae** (Engl. & Irmsch.) Gornall in Bot. J. Linn. Soc. **95**: 276 (1987).

1. **Saxifraga aristulata** Hook. f. & Thomson in J. Linn. Soc. **2**: 68 (1857). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 91 (1992).

[Specimens] Yunnan. Deqin: Baima Xue Shan, ca. 4000 m (Wu *et al.*, 1059, 22 Sept. 1994). Yunnan. Zhongdian: Da Xue Shan, 4120–4440 m (Wu *et al.*, 1144, 26 Sept. 1994); 4120–4440 m (Wu *et al.*, 1155, 26 Sept. 1994). Sichuan. Daocheng: Bowa Shan, 4460 m (Wu *et al.*, 693, 16 Aug. 1996); 4460 m (Wu *et al.*, 2243, 16 Aug. 1996). Yunnan. Deqin: around Daxue Shan, 4270 m (Wu *et al.*, 767, 27 Aug. 1996); 4270 m (Wu *et al.*, 771, 27 Aug. 1996). Sichuan. Daocheng: around Gongga Shan, Zhong Niuan, 4140 m (Wu *et al.*, 735, 21 Aug. 1996). Sichuan. Daocheng: around Gongga Shan, 4520 m (Wu *et al.*, 843, 4 Aug. 1997); 4520 m (Wu *et al.*, 844, 4 Aug. 1997); 4550 m (Wu *et al.*, 851, 4 Aug. 1997).

[Habit] On soil or stony bank in alpine meadow.

[Note] Our collections have slightly larger cauline leaves than those from east Himalaya.

2. **Saxifraga cardiophylla** Franch. in Nouv. Arch. Mus. Hist. Nat. sér. 2, **8**: 230 (1886). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 119 (1992).

[Specimens] Yunnan. Lijiang: Yulongshan, 3900 m (Ohba *et al.*, 863, 17–26 Sept. 1987). Yunnan. Deqin: Baima Xue Shan, ca. 4200 m (Wu *et al.*, 1067, 22 Sept. 1994). Yunnan. Zhongdian: Da Xue Shan, 4120–4440 m (Wu *et al.*, 1142, 26 Sept. 1994). Yunnan. Deqin: Tianchi, 3680 m (Wu *et al.*, 659, 12 Aug. 1996); 3680 m (Wu *et al.*, 660, 12 Aug. 1996).

[Habit] On stony slope or scree between huge rocks often under forest.

3. **Saxifraga dianxibeiensis** J.T.Pan in Acta Phytotax. Sin. **28**(1): 59 (1990); in Fl. Reipubl. Pop. Sin. **34**(2): 131 (1992).

[Specimens] Yunnan. Lijiang: Yulongshan, 3900 m (Ohba *et al.*, 856, 17–26 Sept. 1987); 3900 m (Ohba *et al.*, 858, 17–26 Sept. 1987).

[Habit] On stony slope under forest or on stony herbage by scree.

[Note] It seems to be an extreme representative of *S. diversifolia* which shows wide range of variations in the shape and size of leaves, the height of flowering stems, and the gradation of the morphological changes of leaves from the base to the upper nodes.

4. **Saxifraga diapensia** H.Sm. in Acta Horti Gothob. **1**: 10, f. 3 (1924). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 139 (1992).

[Specimen] Yunnan. Zhongdian: Da Xue Shan, 4120–4440 m (Wu *et al.*, 0022, 26 Sept. 1994).

[Note] This species is characterized by the gibbose base of sepals and known from W Sichuan and E Tibet. Differences between this and *S. caveana* W.W.Sm. described from east Himalaya are obscure. We collected this in Mt. Da Xue Shan in the border between Sichuan and Yunnan.

5. **Saxifraga diversifolia** Wall. [Numer. List: no. 452 (1828), nom. nud.] ex Ser. in DC., Prodr. **4**: 44 (1830). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 127 (1992).

[Specimens] Yunnan. Lijiang: Baishui, 3000–3150 m (Iwatsuki *et al.*, 1166, 2 Oct. 1987). Yunnan. Lijiang: Sandawan, 3000–3200 m (Iwatsuki *et al.*, 1855, 5 Oct. 1987). Yunnan. Lijiang: Yunshan Ping, 3200 m (Wu *et al.*, 655, 10 Aug. 1996). Sichuan. Xiangcheng: around Da Xue Shan, 3970–4420 m (Wu *et al.*, 1109, 25 Sept. 1994); 3970–4420 m (Wu *et al.*, 1120, 25

Sept. 1994); 3970–4420 m (Wu *et al.*, 1123, 25 Sept. 1994). Sichuan. Daocheng: Haizi, 4100 m (Wu *et al.*, 712, 17 Aug. 1996).

[Habit] On forest floor or stony ground.

[Note] This species shows wide ranges of variations in the shape and size of basal and cauline leaves and the size reduction of cauline leaves. Some specimens in which the shape and size of cauline leaves are inconspicuously different between on the basal part and the upper part of flowering stem are approaching to *S. dianxibeiensis* or *S. implicans*. The presence and density of blackish tipped glandular hairs on the margins and the adaxial surface of sepals are variable.

6. ***Saxifraga forrestii*** Engl. & Irmsch. in Notes Roy. Bot. Gard. Edinburgh **5**(24): 137, t. 96 (1912). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 113 (1992).

[Specimens] Yunnan. Lijiang: Lijiang–Ganhaizi, 2750–2800 m (Ohba *et al.*, 504, 15 Sept. 1987). Yunnan. Lijiang: Yulongshan, 3900 m (Ohba *et al.*, 537, 21 Sept. 1987); 3550 m (Ohba *et al.*, 547, 17–26 Sept. 1987). Yunnan. Lijiang: Ganhaizi, 3000–3550 m (Ohba *et al.*, 751, 12 & 13 Sept. 1987). Yunnan. Lijiang: Sandawan, 3000–3100 m (Iwatsuki *et al.*, 1609, 2 Oct. 1987). Yunnan. Lijiang: Yunshanping, 2850–3150 m (Iwatsuki *et al.*, 1617, 3 Oct. 1987); 2850–3150 m (Iwatsuki *et al.*, 1828, 3 Oct. 1987).

[Habit] On exposed huge rock.

[Note] This species is well characterized by the long sparsely branched inflorescences with slender peduncles and pedicels.

7. ***Saxifraga heleonastes*** H. Sm. in Acta Horti Gothob. **1**: 5 (1924). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 92 (1992).

[Specimens] Yunnan. Zhongdian: Tianchi, 3600–3700 m (Wu *et al.*, 1401, 30 Sept. 1994). Sichuan. Xiangcheng: around Da Xue Shan, 3970–4420 m (Wu *et al.*, 1127, 25 Sept. 1994). Sichuan. Daocheng: Bowa Shan, 4460 m (Wu *et al.*, 690, 16 Aug. 1996). Sichuan. Daocheng: around Gongga Shan, 4020 m (Wu *et al.*, 753, 23 Aug. 1996).

[Note] This species is known from Shaanxi, Sichuan and Tibet. Our collection from Tianchi is the first record from Yunnan.

8. ***Saxifraga implicans*** H. Sm. in Bull. Brit. Mus. (Nat. Hist.), Bot. **2**: 231 (1960). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 116 (1992).

[Specimens] Yunnan. Lijiang: Ganhaizi, 3000–3550 m (Ohba *et al.*, 452, 12 & 13 Sept. 1987); 3150 m (Ohba *et al.*, 477, 13 Sept. 1987). Yunnan. Lijiang: Yulongshan, 3650–4000 m (Ohba *et al.*, 522, 17–26 Sept. 1987); 3900 m (Ohba *et al.*, 578, 17–26 Sept. 1987); 3700 m (Ohba *et al.*, 1008, 17–26 Sept. 1987). Yunnan. Lijiang: Ganhebai, 3050 m (Iwatsuki *et al.*, 1601, 30 Sept. 1987). Yunnan. Zhongdian: Shu Du Hu, 3600 m (Wu *et al.*, 1096, 23 Sept. 1994). Yunnan. Zhongdian: Dongwang, 3630 m (Wu *et al.*, 1170, 27 Sept. 1994). Yunnan. Dali: Cang Shan, Zhonghe Peak, 3100–3700 m (Wu *et al.*, 1416, 3 Oct. 1994). Yunnan. Deq: Tianchi, 3680 m (Wu *et al.*, 664, 12 Aug. 1996); 3800 m (Wu *et al.*, 669, 12 Aug. 1996). Yunnan. Deq: around Daxue Shan, 4420 m (Wu *et al.*, 764, 27 Aug. 1996). Sichuan. Daocheng: Daocheng–Gongling, 4010 m (Wu *et al.*, 722, 19 Aug. 1996). Sichuan. Daocheng: around Gongga Shan, Zhong Niuan, 3920 m (Wu *et al.*, 727, 21 Aug. 1996). Sichuan. Daocheng: around Gongga Shan, 3920–4760 m (Wu *et al.*, 2304, 22 Aug. 1996); 4170 m (Wu *et al.*, 750, 23 Aug. 1996); 3920–4760 m (Wu *et al.*, 2336, 23 Aug. 1996).

[Habit] Beside *Abies* forest or mountain grassland.

[Note] This species is separated from *S. diversifolia* in having gradually decreasing ovate cauline leaves. It has also a tendency to have denser glandular hairs on pedicels.

9. ***Saxifraga montana*** H.Sm. in Acta Horti Gothob. **1**: 9 (1924). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 94 (1992).

[Specimens] Yunnan. Lijiang: Yulongshan, 4250 m (Ohba *et al.*, 574, 17–26 Sept. 1987). Yunnan. Deqin: Baima Xue Shan, ca. 4000 m (Wu *et al.*, 1066, 22 Sept. 1994). Yunnan. Zhongdian: Da Xue Shan, 3600–4200 m (Wu *et al.*, 1179, 28 Sept. 1994). Yunnan. Deqin: around Daxue Shan, 4330 m (Wu *et al.*, 779, 29 Aug. 1996). Sichuan. Daocheng: around Gongga Shan, 4630 m (Wu *et al.*, 740, 22 Aug. 1996); 4350 m (Wu *et al.*, 857, 8 Aug. 1997).

[Habit] In scrub, such as *Salix*, in alpine meadow.

10. ***Saxifraga montanella*** H.Sm. in Bull. Brit. Mus. (Nat. Hist.), Bot. **2**(9): 237, f. 6, t. 16B (1960). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 94 (1992).

[Specimens] Yunnan. Lijiang: Yulongshan, 4350 m (Ohba *et al.*, 916, 17–26 Sept. 1987). Sichuan. Daocheng: Haizi, 4550 m (Wu *et al.*, 718, 18 Aug. 1996).

[Habit] On soil ground.

11. ***Saxifraga nigroglandulosa*** Engl. & Irmsch. in Notes Roy. Bot. Gard. Edinburgh **5**(24): 135, t. 95 (1912). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 132 (1992).

[Specimen] Sichuan. Daocheng: Haizi, 4550 m (Wu *et al.*, 715, 18 Aug. 1996).

[Note] Sepals have sparse blackish-tipped glandular hairs on adaxial surface, but no hairs on margins.

12. ***Saxifraga parnassifolia*** D.Don in Trans. Linn. Soc. London **13**: 405 (1821). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 141 (1992).

[Specimens] Yunnan. Lijiang: Ganhaizi, 3000–3550 m (Ohba *et al.*, 164, 12 & 13 Sept. 1987); 3200–3500 m (Ohba *et al.*, 339, 12 & 13 Sept. 1987); 3000–3550 m (Ohba *et al.*, 749, 12 & 13 Sept. 1987). Yunnan. Lijiang: Ganhebai, 2950–3050 m (Iwatsuki *et al.*, 985, 30 Sept. 1987). Sichuan. Xiangcheng: Da Xue Shan Yakou, ca. 4000 m (Wu *et al.*, 1163, 27 Sept. 1994).

[Habit] At the edge of *Picea* forest, under *Picea* or *Abies* forest, or in herbage together with dwarf *Quercus*, *Corylus* and *Rhododendron*.

[Note] This species can well be distinguished from *S. diversifolia* in Himalayan region in having characteristic radical and basal cauline leaves with conspicuous lateral veinlets. This is also known from Tibet. Our collections from Yunnan and Sichuan are somewhat approaching to *S. diversifolia* in having basal cauline leaves in which the base being truncate or shallowly cordate and the lateral veins inconspicuously impressed on upper surface.

13. ***Saxifraga pratensis*** Engl. & Irmsch. in Bot. Jahrb. **50** (Beibl. 114): 42 (1914). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 114 (1992).

[Specimen] Yunnan. Lijiang: Baishui, 3000–3150 m (Iwatsuki *et al.*, 1169, 2 Oct. 1987).

[Habit] Under *Pinus densata* forest.

14. ***Saxifraga subomphalodifolia*** J.T.Pan in Acta Phytotax. Sin. **28**(1): 57 (1990); in Fl. Reipubl. Pop. Sin. **34**(2): 121 (1992).

[Specimen] Yunnan. Deqin: around Daxue Shan, 4240 m (Wu *et al.*, 762, 27 Aug. 1996).

[Note] This species is known only from Daocheng (Sichuan). We collected this species around Daxue Shan in the border between Sichuan and Yunnan.

15. ***Saxifraga tangutica*** Engl. in Bull. Acad. Imp. Sci. Saint-Petersbourg **29**: 114 (1883). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 201 (1992).

[Specimens] Sichuan. Daocheng: around Gongga Shan, 4630 m (Wu *et al.*, 745, 22 Aug. 1996). Sichuan. Xiangcheng-Daocheng: around Wuming Shan, 4580 m (Wu *et al.*, 807, 27 July 1997). Sichuan. Daocheng: around Gongga Shan, 4650 m (Wu *et al.*, 852, 6 Aug. 1997).

[Habit] On soil in *Rhododendron* scrub or in alpine meadow.

[Note] This species is related to *S. tibetica* and *S. przezoalskii* Maxim. These three are distributed in east to northeast margin of central Asiatic Highland, Sichuan to Qinghai and may form a natural group or complex in series Hirculoideae.

16. ***Saxifraga turfosa*** Engl. & Irmsch. in Notes Roy. Bot. Gard. Edinburgh **5**(24): 134 (1912).

Saxifraga glaucophylla Franch.: J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 113 (1992), p. p.

[Specimen] Yunnan. Zhongdian: Bi Ta Hai, 3470 m (Wu *et al.*, 1009, 19 Sept. 1994).

[Note] Though Pan (1992) failed *S. turfosa* in the synonymy of *S. glaucophylla* Franch., the former differs from the latter by the hairy narrowly ovate to lanceolate cauline leaves and the caducous radical and basal leaves.

Series **Lychnitidae** (Engl. & Irmsch.) Gornall in Bot. J. Linn. Soc. **95**: 276 (1987).

Series **Nutantes** (Engl. & Irmsch.) Gornall in Bot. J. Linn. Soc. **95**: 276 (1987), syn. nov.

17. ***Saxifraga nigroglandulifera*** Balakr. in J. Bombay Nat. Hist. Soc. **67**: 59 (1970). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 200 (1992).

S. nutans Hook.f. & Thomson in J. Linn. Soc. Bot. **2**: 69 (1857), non D. Don (1821).

[Specimens] Sichuan. Daocheng: Bowa Shan, 4460 m (Wu *et al.*, 688, 16 Aug. 1996).

Sichuan. Daocheng: Daocheng-Gongling, 3700 m (Wu *et al.*, 719, 19 Aug. 1996). Sichuan.

Daocheng: around Gongga Shan, 4430 m (Wu *et al.*, 847, 5 Aug. 1997).

[Habit] On soil slope in *Rhododendron* scrub or in alpine meadow.

[Note] Engler and Irmscher (1912) and Gornall (1987) classified *S. nutans* in a monotypic series Nutantes. However, *S. nutans* has peduncles and pedicels with dense glandular hairs and linear or linear-oblong yellow petals. These features indicate that this species is closely related to those in series Lychnitidae. Pan (1992) already classified this in series Lychnitidae.

18. ***Saxifraga oresbia*** J. Anthony in Notes Roy. Bot. Gard. Edinburgh **18**: 28 (1933). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 199 (1992).

[Specimens] Sichuan. Daocheng: Bowa Shan, 4460 m (Wu *et al.*, 686, 16 Aug. 1996).

Sichuan. Daocheng: Haizi, 4550 m (Wu *et al.*, 717, 18 Aug. 1996).

Densifoliata group

Saxifraga Hirculoideae gregis Densifoliata Engl. & Irmsch. in Bot. Jahrb. **48**: 569 (1912); Pflanzenr. Saxifr.: 91 (1916).

[Note] *Saxifraga densifoliata* and allied species differs from any other species in subsect. Hirculoideae Engl. & Irmsch. in having massive stem base and moderate cauline leaves arranged interruptedly throughout, and are considered to form a natural group taxonomically.

19. ***Saxifraga brachyphylla*** Franch., Pl. Delav.: 237 (1890). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 109 (1992).

[Specimen] Yunnan. Zhongdian: Tianchi, 3600–3700 m (Wu *et al.*, 1402, 30 Sept. 1994).

20. ***Saxifraga bulleyana*** Engl. & Irmsch. in Notes Roy. Bot. Gard. Edinburgh **5**: 130, t. 91 (1912); Pflanzenr. Saxifr.: 92, f. 20 A–D (1916). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 141

(1992).

[Specimens] Yunnan. Lijiang: Yulongshan, 3800 m (Ohba *et al.*, 531, 20 Sept. 1987); 4250 m (Ohba *et al.*, no. 570, 17–26 Sept. 1987); 4100 m (Ohba *et al.*, 571, 17–26 Sept. 1987); 4000 m (Ohba *et al.*, 576, 17–26 Sept. 1987); 3900 m (Ohba *et al.*, 859, 17–26 Sept. 1987); 3900 m (Ohba *et al.*, 1207, 17–26 Sept. 1987); 3900 m (Ohba *et al.*, 1221, 17–26 Sept. 1987); 3900 m (Ohba *et al.*, 1222, 17–26 Sept. 1987). Yunnan. Lijiang: Ganhebai, 2950–3050 m (Iwatsuki *et al.*, 982, 30 Sept. 1987); 2950–3050 m (Iwatsuki *et al.*, 1602, 30 Sept. 1987).

[Habit] On rock.

[Note] This species differs from all other species in the series in having conspicuous massive stem base, dense glandular hairs on flowering stem, leaves, and calyx, and pedicels with both glandular and crisp hairs.

21. ***Saxifraga densifoliata*** Engl. & Irmsch. in Bot. Jahrb. **48**: 570, f. 1 A–F (1912); in Engl., Pflanzenr. Saxifr.: 93 (1916). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 169 (1992).

[Specimens] Yunnan. Zhongdian: Da Xue Shan, 4120–4440 m (Wu *et al.*, 1143, 26 Sept. 1994). Yunnan. Deq: around Daxue Shan, 4270 m (Wu *et al.*, 765, 27 Aug. 1996); 4270 m (Wu *et al.*, 770, 27 Aug. 1996).

[Habit] On scree between rocks.

22. ***Saxifraga hypericoides*** Franch. in J. Bot. **10**: 261 (1896). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 101 (1992).

[Specimens] Yunnan. Lijiang: Yulongshan, 3800 m (Ohba *et al.*, 536, 17–26 Sept. 1987); 3650–4000 m (Ohba *et al.*, 566, 17–26 Sept. 1987); 4250 m (Ohba *et al.*, 572, 17–26 Sept. 1987). Sichuan. Xiangchen: around Da Xue Shan, 3970–4420 m (Wu *et al.*, 1110, 25 Sept. 1994); 3970–4420 m (Wu *et al.*, 1121, 25 Sept. 1994). Sichuan. Daocheng: Daocheng–Gongling, 4010 m (Wu *et al.*, 721, 19 Aug. 1996). Sichuan. Daocheng: around Gongga Shan, 4140 m (Wu *et al.*, 732, 21 Aug. 1996); 4240 m (Wu *et al.*, 756, 23 Aug. 1996); 4350 m (Wu *et al.*, 856, 8 Aug. 1997).

[Habit] In scrub, such as *Salix*, in alpine meadow.

23. ***Saxifraga peplidifolia*** Franch. Pl. Delav. 234 (1890). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 106 (1992).

[Specimens] Yunnan. Lijiang: Yulongshan, 3670 m (Ohba *et al.*, 510, 17–26 Sept. 1987); 3900 m (Ohba *et al.*, 538, 21 Sept. 1987); 3900 m (Ohba *et al.*, 540, 17–26 Sept. 1987); 4100 m (Ohba *et al.*, 575, 17–26 Sept. 1987); 3850 m (Ohba *et al.*, 1046, 17–26 Sept. 1987); 3900 m (Ohba *et al.*, 1222bis, 17–26 Sept. 1987). Yunnan. Lijiang: Qilanbiao, Yulong Xue-shan, 3500–3900 m (Kato *et al.*, 1852, 1 Aug. 1988). Sichuan. Daocheng: around Gongga Shan, 4600 m (Wu *et al.*, 741, 22 Aug. 1996); 3920–4580 m (Wu *et al.*, 2311, 22 Aug. 1996); 3920 m (Wu *et al.*, 829, 3 Aug. 1997); 4550 m (Wu *et al.*, 849, 5 Aug. 1997).

[Habit] On stony slope, on rock, or on gravelly slope.

24. ***Saxifraga rizhaoshanensis*** J.T.Pan in Acta Phytotax. Sin. **28**(5): 386 (1990); in Fl. Reipubl. Pop. Sin. **34**(2): 101 (1992).

[Specimen] Sichuan. Daocheng: Haizi, 4550 m (Wu *et al.*, 714, 18 Aug. 1996).

25. ***Saxifraga trinervia*** Franch. in Nouv. Arch. Mus. Hist. Nat. sér. 2, **8**: 232 (1886). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 100 (1992).

[Specimen] Sichuan. Daocheng: around Gongga Shan, 4630 m (Wu *et al.*, 744, 22 Aug. 1996).

Subsection **Gemmiparae** Engl. & Irmsch. in Notes Roy. Bot. Gard. Edinburgh **5**(24): 140 (1912).

Series **Gemmiparae** (Engl. & Irmsch.) Gornall in Bot. J. Linn. Soc. **95**: 277 (1987).

[Note] Our observation of chromosomes reveals that the basic chromosome number is 16 and the species are diversified in ploidy level: *S. strigosa* is $2n=16$ (2x) and 32 (4x), *S. hispidula* 16 (2x) and 24 (3x), *S. balfourii* 32 (4x) and 48 (6x), *S. filicaulis* 24 (3x) and 32 (4x) (Wakabayashi 1997). Further details will be presented in our forthcoming paper (Wakabayashi *et al.*, submitted).

26. **Saxifraga balfourii** Engl. & Irmsch. in Notes Roy. Bot. Gard. Edinburgh **5**(24): 141 (1912). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 150 (1992).

[Specimens] Yunnan. Lijiang: Ganhaizi, 3500 m (Ohba *et al.*, 478, 13 Sept. 1987). Yunnan. Lijiang: Yulongshan, 3670 m (Ohba *et al.*, 512, 17–26 Sept. 1987). Yunnan. Lijiang: Yulongshan, 3550 m (Ohba *et al.*, 549, 17–26 Sept. 1987). Yunnan. Lijiang: Tuagshang, 2350–2600 m (Ohba *et al.*, 1642, 6 Oct. 1987). Yunnan. Lijiang: Ganhaizi, 3100 m (Wu *et al.*, 644, 9 Aug. 1996).

27. **Saxifraga filicaulis** Wall. [Numer. List: no. 445 (1828), nom. nud.] ex Ser. in DC., Prodr. **4**: 46 (1830). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 153 (1992).

[Specimens] Yunnan. Yangbi: Zhongshan, 2300 m (Iwatsuki *et al.*, 577, 24 Aug. 1984). Yunnan. Lijiang: Lijiang–Ganhaizi, 2600 m (Ohba *et al.*, 384, 15 Sept. 1987). Yunnan. Lijiang: Ganhaizi, 3000–3550 m (Ohba *et al.*, 487, 12 & 13 Sept. 1987). Yunnan. Lijiang: Xuehaocum, Yuhu, 2600–2650 m (Ohba *et al.*, 494, 14 Sept. 1987). Yunnan. Lijiang: Lijiang–Ganhaizi, 2750–2800 m (Ohba *et al.*, 506, 15 Sept. 1987). Yunnan. Lijiang: Yulongshan, 3650–4000 m (Ohba *et al.*, 564, 17–26 Sept. 1987). Yunnan. Lijiang, Lijiang–Ganhaizi, 2750–2800 m (Ohba *et al.*, 827, 15 Sept. 1987). Yunnan. Lijiang: Ganhebai, 2950–3050 m (Iwatsuki *et al.*, 984, 30 Sept. 1987); 2950–3050 m (Iwatsuki *et al.*, 1605, 30 Sept. 1987). Yunnan. Zhongdian: Bi Ta Hai, 3470 m (Wu *et al.*, 1017, 19 Sept. 1994). Yunnan. Zhongdian: Shu Du Hu, 3600 m (Wu *et al.*, 1091, 23 Sept. 1994). Yunnan. Dali: Cangshan, 3430 m (Wu *et al.*, 785, 1 Sept. 1996). Sichuan. Xiangcheng: Da Xue Shan Yakou, ca. 4000 m (Wu *et al.*, 1164, 27 Sept. 1994).

[Habit] On rock (sometimes on dry rock in open forest), or on stony slope.

[Note] The size of leaves is variable.

28. **Saxifraga gemmipara** Franch. in J. Bot. **10**: 262 (1896). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 150 (1992).

[Specimens] Yunnan. Yangbi: Zhongshan (Iwatsuki *et al.*, 787, 23 Aug. 1984); 2500 m (Iwatsuki *et al.*, 275, 24 Aug. 1984); 2500 m (Iwatsuki *et al.*, 565, 24 Aug. 1984). Yunnan. Lijiang: Xiangshan, 2400–2650 m (Ohba *et al.*, 402, 6 Sept. 1987); 2400–2650 m (Ohba *et al.*, 404, 6 Sept. 1987). Yunnan. Lijiang: Yufeng Si, 2600–2800 m (Ohba *et al.*, 414, 7 & 8 Sept. 1987). Yunnan. Lijiang: Ganhaizi, 3000–3550 m (Ohba *et al.*, 485, 12 & 13 Sept. 1987); 2750–2800 m (Ohba *et al.*, 505, 15 Sept. 1987). Yunnan. Lijiang: Lijiang–Ganhaizi, 2750–2800 m (Ohba *et al.*, 508, 15 Sept. 1987). Yunnan. Lijiang: Tiejiashan, 2500 m (Ohba *et al.*, 585, 28 Sept. 1987); 2500 m (Ohba *et al.*, 590, 28 Sept. 1987). Yunnan. Lijiang: Tuagshang, 2350–2600 m (Ohba *et al.*, 1867, 6 Oct. 1987); 2350–2600 m (Ohba *et al.*, 1878, 6 Oct. 1987). Yunnan. Dali: Swangian stream on the eastern slope of Dianchang Shan, 2200–2800 m (Kato *et al.*, 1897, 7 Aug. 1988). Yunnan. Dali: Fongho stream on the eastern slope of Dianchang Shan, 2000–2400 m (Kato & Akiyama 1916, 9 Aug. 1988).

[Habit] On rock in *Schima* forest, on mossy rock, or on clayey soil in half shaded place.

29. ***Saxifraga hispidula*** D. Don in Trans. Linn. Soc. London **13**: 380 (1821). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 156 (1992).

[Specimens] Yunnan. Lijiang: Yulongshan, 3550 m (Ohba *et al.*, 550, 17–26 Sept. 1987); 3650–4000 m (Ohba *et al.*, 557, 17–26 Sept. 1987); 3650–4000 m (Ohba *et al.*, 567, 17–26 Sept. 1987); 3700 m (Ohba *et al.*, 1010, 17–26 Sept. 1987); 3950 m (Ohba *et al.*, 1206, 17–26 Sept. 1987). Yunnan. Lijiang: Qilanbiao, Yulong Xueshan, 3500–3900 m (Kato *et al.*, 1850, 1 Aug. 1988). Yunnan. Yangbi: around Cangshan (Yangbi side), 3710 m (Wu *et al.*, 868, 18 Aug. 1997).

[Habit] On steep rock in alpine meadow or on rock beside *Abies* forest.

30. ***Saxifraga oreophila*** Franch. in J. Bot. **10**: 260 (1896). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 152 (1992).

[Specimens] Yunnan. Lijiang: Xuehaocun, Yuhu, 2600–2650 m (Ohba *et al.*, 762, 14 Sept. 1987). Yunnan. Lijiang: Lijiang–Ganhaizi, 2600 m (Ohba *et al.*, 381, 15 Sept. 1987). Yunnan. Lijiang: Yulongshan, 3900 m (Ohba *et al.*, 541, 17–26 Sept. 1987). Yunnan. Dali: Cangshan, 3475 m (Wu *et al.*, 791, 1 Sept. 1996).

31. ***Saxifraga strigosa*** Wall. [Numer. List: no. 448 (1828), nom. nud.] ex Ser. in DC., Prodr. **4**: 41 (1830). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 153 (1992).

[Specimens] Yunnan. Dali: Huadiaba, 3000 m (Iwatsuki *et al.*, 1176, 28 Aug. 1984); 2900–3100 m (Iwatsuki *et al.*, 1258, 29 Aug. 1984); 2900–3100 m (Iwatsuki *et al.*, 1528, 29 Aug. 1984). Yunnan. Lijiang: Xuehaocun, Yuhu, 2600–2650 m (Ohba *et al.*, 493, 14 Sept. 1987). Yunnan. Lijiang: Baishui, 3000–3150 m (Iwatsuki *et al.*, 1155, 2 Oct. 1987). Lijiang: Sandawan, 3000–3200 m (Iwatsuki *et al.*, 1611, 2 Oct. 1987). Yunnan. Lijiang: Yunshanping, 2850–3150 m (Iwatsuki *et al.*, 1624, 3 Oct. 1987); 2850–3150 m (Iwatsuki *et al.*, 1827, 3 Oct. 1987). Yunnan. Lijiang: Sandawan, 3000–3200 m (Iwatsuki *et al.*, 1493, 5 Oct. 1987). Yunnan. Yunnan. Yanbi: Zhongshan on the western slope of Dianchang Shan, 2200–2350 m (Murakami & Cheng 1904, 8 Aug. 1988). Yunnan. Dali: Cang Shan, Zhonghe Peak, 3100–3700 m (Wu *et al.*, 1425, 3 Oct. 1994). Yunnan. Deq: Sibao, 2900 m (Ohba *et al.*, 608, 4 Aug. 1996). Yunnan. Lijiang: Yunshan Ping, 3200 m (Wu *et al.*, 654, 10 Aug. 1996). Yunnan. Lijiang: Yunshan Ping, 3200 m (Wu *et al.*, 657, 10 Aug. 1996). Yunnan. Dali: Cangshan, 3430 m (Wu *et al.*, 786, 1 Sept. 1996). Yunnan. Dali: Cangshan, 3260 m (Wu *et al.*, 788, 1 Sept. 1996).

[Habit] On mossy soil bank in *Picea* forest, on rock sometimes under *Picea* forest, on humus rich mountain slope in *Quercus* forest, on muddy slope near streamlet in shade, or in grassland.

Series ***Spinulosae*** (C. B. Clarke) Gornall in Bot. J. Linn. Soc. **95**: 277 (1987).

32. ***Saxifraga wallichiana*** Sternb., Rev. Saxifr. Suppl. **2**: 21, t. 22 (1831). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 147 (1992).

S. brachypoda D. Don var. *fimbriata* (Ser.) Engl. & Irmsch. in Bot. Jahrb. **48**: 591 (1912).

[Specimens] Yunnan. Lijiang: Yulongshan, 3650–4000 m (Ohba *et al.*, 517, 17–26 Sept. 1987); 3700 m (Ohba *et al.*, 1004, 17–26 Sept. 1987). Yunnan. Lijiang: Qilanbiao, Yulong Xueshan, 3500–3900 m (Kato *et al.*, 1849, 1 Aug. 1988). Yunnan. Deq: around Daxue Shan, 4050 m (Wu *et al.*, 781, 29 Aug. 1996). Sichuan. Xiangcheng: around Da Xue Shan, 3970–4420 m (Wu *et al.*, 1115, 25 Sept. 1994); 3970–4420 m (Wu *et al.*, 1122, 25 Sept. 1994).

Sichuan. Daocheng: Haizi, 4000 m (Wu *et al.*, 698, 17 Aug. 1996). Sichuan. Daocheng: around Gongga Shan, Zhong Niuan, 3960 m (Wu *et al.*, 728, 21 Aug. 1996). Sichuan. Daocheng: around Gongga Shan, 4170 m (Wu *et al.*, 754, 23 Aug. 1996); 3920–4910 m (Wu *et al.*, 2350, 24 Aug. 1996).

[Habit] On rock beside *Abies* forest or in rocky place.

[Note] *Saxifraga gouldii* C.E.C.Fisch. seems to be a synonym of this species.

Subsection **Cinerascetes** Engl. & Irmsch. in Notes Roy. Bot. Gard. Edinburgh **5**(24): 143 (1912).

33. ***Saxifraga cinerascens*** Engl. & Irmsch. in Notes Roy. Bot. Gard. Edinburgh **5**(24): 142 (1912). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 148 (1992).

[Specimens] Yunnan. Lijiang: Baishui, 3000–3150 m (Iwatsuki *et al.*, 1627, 4 Oct. 1987); 3000–3150 m (Iwatsuki *et al.*, 1835, 4 Oct. 1987).

Subsection **Rosulares** Gornall in Bot. J. Linn. Soc. **95**: 277 (1987).

34. ***Saxifraga finitima*** W.W.Sm. in Notes Roy. Bot. Gard. Edinburgh **8**: 133 (1913). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 185 (1992).

[Specimens] Yunnan. Zhongdian: Da Xue Shan, 4120–4440 m (Wu *et al.*, 1157, 26 Sept. 1994). Yunnan. Deq: around Daxue Shan, 4520 m (Wu *et al.*, 774, 28 Aug. 1996).

[Note] This species is related to *S. sediformis*, but differs by the widely elliptic petals with indistinctly clawed base, the short flowering stems with 2 or 3 cauline leaves. *Saxifraga sediformis* has narrowly ovate petals with shallowly cordate base and distinct claw, and flowering stems with numerous cauline leaves.

35. ***Saxifraga lhasana*** H.Sm. in Bull. Brit. Mus. (Nat. Hist.), Bot. **2**(9): 225 (1960).

Saxifraga obovatipetala T.C.Ku in Bull. Bot. Res., Harbin **9**(4): 16, f. 5 (1989).

Saxifraga umbellulata Hook.f. & Thomson var. *pectinata* (C. Marquand & Airy Shaw) J.T.Pan: J.T.Pan in Fl. Reipubl. Pop. Sin. **34**(2): 166 (1992), p. p.

[Specimen] Sichuan. Xiangcheng, around Wuming Shan, 4000 m (Wu *et al.*, 819, 29 July 1997).

[Habit] In rock crevice.

[Note] This is the first record from Sichuan. This species is easily distinguished the other species in subsect. Rosulares by the white suberect petals with yellow gradually narrowed base and without any spot nor dot on inside, and sometimes tinged red outside.

36. ***Saxifraga sediformis*** Engl. & Irmsch. in Notes Roy. Bot. Gard. Edinburgh **5**(24): 144 (1912). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 187 (1992).

[Specimens] Yunnan. Lijiang: Yulongshan, 3600 m (Ohba *et al.*, 546, 17–26 Sept. 1987); 3700 m (Ohba *et al.*, 886, 17–26 Sept. 1987); 3850 m (Ohba *et al.*, 1041, 17–26 Sept. 1987). Yunnan. Lijiang: Sandawan, 3000–3200 m (Iwatsuki *et al.*, 1634, 5 Oct. 1987). Yunnan. Lijiang: Qilanbiao, Yulong Xueshan, 3500–3900 m (Kato *et al.*, 1853, 1 Aug. 1988).

[Habit] On gravelly slope or on mossy huge rock.

37. ***Saxifraga signata*** Engl. & Irmsch. in Notes Roy. Bot. Gard. Edinburgh **5**(24): 143 (1912). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 188 (1992).

[Specimens] Sichuan. Daocheng: around Gongga Shan, 4020 m (Wu *et al.*, 749, 23 Aug. 1996). Sichuan. Daocheng: around Gongga Zhonggu, 3930 m (Wu *et al.*, 828, 3 Aug. 1997).

[Habit] In rock crevice.

[Note] This species is characterized by the creamy white (sometimes turned to dark red when dried) ovate petals with numerous reddish dots, like those of *S. sanguinea* Franch. These two are close but different in the shape of petals and cauline leaves.

Subsection **Serpyllifoliae** Gornall in Bot. J. Linn. Soc. **95**: 277 (1987).

[Note] Except for *S. drabiformis* and *S. vilmorinians*, all other species listed here are only distinguished by the combination of a limited number of characters of leaves and flowers. A critical study is much needed.

38. **Saxifraga baimashanensis** C.Y.Wu in Acta Phytotax. Sin. **28**(1): 62 (1990). J. T. Pan in Fl. Reipubl. Pop. Sin. **34** (2): 174 (1992).

[Specimens] Yunnan. Lijiang: Yulongshan, 3650–4000 m (Ohba *et al.*, 562, 17–26 Sept. 1987); 3900 m (Ohba *et al.*, 579, 17–26, Sept. 1987).

39. **Saxifraga drabiformis** Franch., Pl. Delav.: 235, t. 59b (1890). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 179 (1992).

[Specimens] Yunnan. Lijiang: Yulongshan, 3650–4000 m (Ohba *et al.*, 524, 17–26 Sept. 1987); 3900 m (Ohba *et al.*, 862, 17–26 Sept. 1987); 4000 m (Ohba *et al.*, 870, 17–26 Sept. 1987); 3800–3900 m (Ohba *et al.*, 1053, 17–26 Sept. 1987); 3900–3950 m (Ohba *et al.*, 1064, 17–26 Sept. 1987).

[Habit] On gravelly slope and among gravel on scree.

40. **Saxifraga draboides** C.Y.Wu in Acta Phytotax. Sin. **28**(1): 64 (1990). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 185 (1992).

[Specimens] Yunnan. Zhongdian: Da Xue Shan, 3600–4200 m (Wu *et al.*, 1178, 28 Sept. 1994). Yunnan. Deq: around Da Xue Shan, 4340 m (Wu *et al.*, 778, 29 Aug. 1996).

[Habit] In crevice of rock.

[Note] This species is similar to *S. drabiformis* but has small flowers (petals 5–6 mm long) and short flowering stems (2.5–6 cm long), and sometimes hangs in rock crevice. *Saxifraga drabiformis* collected in Yulongshan, Lijiang has 7–9 mm long petals and 5–10 cm long flowering stems, and grows on gravelly slope or scree.

41. **Saxifraga flexilis** W.W.Sm. in Notes Roy. Bot. Gard. Edinburgh **8**: 134 (1913). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 174 (1992).

[Specimen] Sichuan. Xiangcheng–Daocheng (Wu *et al.*, 683, 15 Aug. 1996).

42. **Saxifraga stella-aurea** Hook.f. & Thomson in J. Linn. Soc. Bot. **2**: 72 (1857). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 178 (1992).

[Specimens] Sichuan. Daocheng: Haizi, 4360 m (Wu *et al.*, 711, 17 Aug. 1996); 4550 m (Wu *et al.*, 716, 18 Aug. 1996). Sichuan. Daocheng: around Gongga Shan, 4630 m (Wu *et al.*, 746, 22 Aug. 1996).

43. **Saxifraga vilmoriniana** Engl. & Irmsch. in Bot. Jahrb. **48**: 600, f. 14 (1912). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 163 (1992).

[Specimens] Yunnan. Zhongdian: Da Xue Shan, 3600–4200 m (Wu *et al.*, 1183, 28 Sept. 1994). Yunnan. Deq: around Daxue Shan, 4320 m (Wu *et al.*, 780, 29 Aug. 1996).

[Note] By having a conspicuous rosette at flowering, this species approaches to those of the subsect. *Rosulares*. Particular *S. lhasana* seems to be close to this because the yellow petals without any dot and spot are not spreading at flowering. This species is known only from

Sichuan, and we collected this in and around Mt. Da Xue Shan (=Daxue Shan) in the border between Sichuan and Yunnan.

Subsection **Flagellares** (C.B.Clarke) Engl. & Irmsch. in Notes Roy. Bot. Gard. Edinburgh **5**(24): 146 (1912).

44. ***Saxifraga consanguinea*** W.W.Sm. in Notes Roy. Bot. Gard. Edinburgh **8**: 132 (1913). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 226 (1992).

[Specimens] Yunnan. Zhongdian: Da Xue Shan, 4120–4440 m (Wu *et al.*, 1152, 26 Sept. 1994). Yunnan. Deqe: around Daxue Shan, 4450 m (Wu *et al.*, 768, 27 Aug. 1996). Sichuan. Xiangcheng–Daocheng: around Wuming Shan, 4570 m (Wu *et al.*, 805, 27 July 1997).

[Habit] In alpine *Rhododendron* scrub.

45. ***Saxifraga deqenensis*** C.Y.Wu in Acta Phytotax. Sin. **28**(1): 66 (1990). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 227 (1992).

[Specimens] Yunnan. Zhongdian: Da Xue Shan, 3600–4200 m (Wu *et al.*, 1182, 28 Sept. 1994). Yunnan. Deqe: around Daxue Shan, 4330 m (Wu *et al.*, 782, 29 Aug. 1996).

46. ***Saxifraga microgyna*** Engl. & Irmsch. in Engl. Jahrb. **48**: 604 (1912). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 225 (1992).

[Specimens] Yunnan. Zhongdian: Da Xue Shan, 3600–4200 m (Wu *et al.*, 1182, 28 Sept. 1994). Sichuan. Daocheng: Haizi, 4380 m (Wu *et al.*, 702, 17 Aug. 1996). Sichuan. Xiangcheng: around Wuming Shan, 4180 m (Wu *et al.*, 811, 28 July 1997).

[Habit] On rocky wet soil sometimes under *Spirea*.

47. ***Saxifraga stenophylla*** Royle, Ill. Bot. Himal. 227, t. 50, f. 1 (1835). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 196 (1992).

[Specimens] Sichuan. Daocheng: around Gongga Shan, 4630 m (Wu *et al.*, 747, 22 Aug. 1996); 4650 m (Wu *et al.*, 854, 6 Aug. 1997).

[Habit] On soil in alpine meadow.

Section **Irregulares** Haw., Misc. Nat. 155, 158 (1803).

48. ***Saxifraga rufescens*** Balf. f. in Trans. Bot. Soc. Edinburgh **27**: 74 (1916). J. T. Pan in Fl. Reipubl. Pop. Sin. **34**(2): 68 (1992).

[Specimens] Yunnan. Lijiang: Yulongshan, 3650–4000 m (Ohba *et al.*, 521, 17–26 Sept. 1987); 3700 m (Ohba *et al.*, 855, 17–26 Sept. 1987); 3650–4000 m (Ohba *et al.*, 1049, 17–26 Sept. 1987). Yunnan. Lijiang: Sandawan, 3000–3200 m (Iwatsuki *et al.*, 1633, 5 Oct. 1987). Yunnan. Dali: eastern slope of Zhonghe Fong, Dianchang Shan, 2550–3150 m (Kato *et al.*, 221, 14 July 1988); 2550–3150 m (Kato *et al.*, 838-B, 14 July 1988). Yunnan. Lijiang: Mahuanba, Yulong Xueshan, 2700–3500 m (Kato *et al.*, 391, 28 July 1988). Yunnan. Lijiang: Sandawan, 3200 m (Kato *et al.*, 1804, 29 July 1988). Yunnan. Lijiang: Yunshanping, 3000–3100 m (Kato *et al.*, 1836, 31 July 1988). Yunnan. Zhongdian: Da Xue Shan, 3800 m (Wu *et al.*, 1284, 28 Sept. 1994). Yunnan. Lijiang: Ganhaizi, 3100 m (Wu *et al.*, 645, 9 Aug. 1996); 3100 m (Wu *et al.*, 646, 9 Aug. 1996). Yunnan. Deqe: Tianchi, 3680 m (Wu *et al.*, 671, 12 Aug. 1996). Yunnan. Deqe: Napa Hai, 3660 m (Wu *et al.*, 675, 13 Aug. 1996). Yunnan. Deqe: around Daxue Shan, 3880 m (Wu *et al.*, 776, 29 Aug. 1996). Yunnan. Yangbi: around Cangshan (Wu *et al.*, 871, 19 Aug. 1997). Sichuan. Daocheng: around Gongga Shan, Shinzhang, 3700 m (Wu *et al.*, 757, 24 Aug. 1996); 3700 m (Wu *et al.*, 758, 24 Aug. 1996).

[Habit] On mossy or steep slope, on rock near or along stream, on floor of *Abies* forest, or on rock in *Picea* forest.

Section **Mesogyne** Sternb., Revis. Saxifrag. Suppl. 2: 29 (1831).

49. **Saxifraga granulifera** H.Sm. in Bull. Brit. Mus. (Nat. Hist.), Bot. 2(9): 259, t. 21B (1960).

Saxifraga cernua L.: J. T. Pan in Fl. Reipubl. Pop. Sin. 34(2): 77 (1992), p. p.

[Specimens] Sichuan. Daocheng: Haizi, 4100 m (Wu *et al.*, 713, 17 Aug. 1996). Sichuan. Daocheng: Daocheng–Gongling, 3700 m (Wu *et al.*, 724, 19 Aug. 1996). Sichuan. Daocheng: around Gongga Shan, Zhong Niuan, 3960 m (Wu *et al.*, 731, 21 Aug. 1996).

[Habit] On rock.

Section **Porphyron** Tausch, Hort. Canal.: 1 (1823).

50. **Saxifraga pulchra** Engl. & Irmsch. in Notes Roy. Bot. Gard. Edinburgh 5(24): 146, t. 102 (1912). J. T. Pan in Fl. Reipubl. Pop. Sin. 34(2): 212 (1992).

[Specimens] Yunnan. Lijiang: Yulongshan, 3750 m (Ohba *et al.*, 882, 17–26 Sept. 1987). Yunnan. Zhongdian: Da Xue Shan, 3600–4200 m (Wu *et al.*, 1181, 28 Sept. 1994). Sichuan. Daocheng: around Gongga Shan, 4250 m (Wu *et al.*, 926, 23 Aug. 1996).

[Habit] On rock.

Section **Micranthes** (Haw.) D.Don in Tans. Linn. Soc. London 13: 345 (1822). Gornall in Bot. J. Linn. Soc. 95: 278 (1987).

Series **Melanocentrae** (Engl. & Irmsch.) Gornall in Bot. J. Linn. Soc. 95: 279 (1987).

51. **Saxifraga divaricata** Engl. & Irmsch. in Bot. Jahrb. 50 (Beibl. 114): 41 (1914). Engl., Pflanzent. Saxif. 50 (1916). J. T. Pan in Fl. Reipubl. Pop. Sin. 34(2): 82 (1992).

[Specimens] Sichuan. Daocheng: Bowa Shan, 4460 m (Wu *et al.*, 687, 16 Aug. 1996); 4460 m (Wu *et al.*, 692, 16 Aug. 1996). Sichuan. Daocheng: Haizi, 4360 m (Wu *et al.*, 708, 17 Aug. 1996).

52. **Saxifraga melanocentra** Franch. in J. Bot. 10: 263 (1896). J. T. Pan in Fl. Reipubl. Pop. Sin. 34(2): 83 (1992).

[Specimens] Yunnan. Deq: Tianchi, 3800 m (Wu *et al.*, 661, 12 Aug. 1996). Yunnan. Deq: around Daxue Shan, 4380 m (Wu *et al.*, 769, 27 Aug. 1996). Sichuan. Daocheng: around Gongga Shan, Zhong Niuan, 4140 m (Wu *et al.*, 730, 21 Aug. 1996). Sichuan. Daocheng: around Gongga Shan, Beiyu, 4600 m (Wu *et al.*, 742, 22 Aug. 1996); 3920–4580 m (Wu *et al.*, 2305, 22 Aug. 1996). Sichuan. Daocheng: around Gongga Shan, 4430 m (Wu *et al.*, 846, 4 Aug. 1997); 4650 m (Wu *et al.*, 853, 6 Aug. 1997); 4210 m (Wu *et al.*, 859, 8 Aug. 1997).

[Habit] In scrub, such as *Rhododendron*, or on exposed soil in alpine meadow.

[Note] Except *S. divaricata* plants with subulate or filiform filaments and deep purplish red ovaries are all tentatively classified under this species. Further details will be discussed in a forthcoming paper (Wakabayashi and Ohba, submitted).

var. **rubriflora** J. T. Pan in Fl. Hengduan Mts. 1: 701 (1993), nom. nud.

[Specimens] Yunnan: Deq: around Daxue Shan, 4270 m (Wu *et al.*, 766, 27 Aug. 1996). Sichuan. Xiangcheng–Daocheng, 4410 m (Wu *et al.*, 684, 15 Aug. 1996). Sichuan. Daocheng: Bowa Shan, 4460 m (Wu *et al.*, 689, 16 Aug. 1996). Sichuan. Xiangcheng–Daocheng, around

Wuming Shan, 4580 m (Wu *et al.*, 806, 27 July 1997). Sichuan. Daocheng: around Gongga Shan, 4550 m (Wu *et al.*, 850, 5 Aug. 1997).

[Note] Plants with dark red petals are distinguished as var. *rubiflora*, but the colour is variable from dark red to pale pink.

53. ***Saxifraga pallida*** Wall. [Numer. List: no. 450 (1828), nom. nud.] ex Ser. in DC., Prodr. 4: 38 (1830). J. T. Pan in Fl. Reipubl. Pop. Sin. 34(2): 65 (1992).

[Specimens] Yunnan. Lijiang: Ganhizi, 3000–3550 m (Ohba *et al.*, 803, 12 & 13 Sept. 1987).

Yunnan. Yanbi: Dashr Chan on the western slope of Dianchangshan, 3100–3900 m (Kato *et al.*, 354, 23 July 1988). Yunnan. Lijiang: Yunshanping, 3000–3100 m (Kato *et al.*, 1846, 31 July 1988).

Yunnan. Dali: the eastern slope of Dianchangshan, 3100–3900 m (Kato *et al.*, 1909, 8 Aug. 1988). Yunnan. Zhongdian: Tianchi, 3600–3700 m (Wu *et al.*, 1403, 30 Sept. 1994, TI).

Yunnan. Deq: Tianchi, 3800 m (Wu *et al.*, 665, 12 Aug. 1996); 3700 m (Wu *et al.*, 666, 12 Aug. 1996); 3800 m (Wu *et al.*, 667, 12 Aug. 1996); 3800 m (Wu *et al.*, 668, 12 Aug. 1996); 3800 m (Wu *et al.*, 886, 12 Aug. 1996).

Yunnan. Deq: around Daxue Shan, 4270 m (Wu *et al.*, 772, 27 Aug. 1996); 4260 m (Wu *et al.*, 783, 29 Aug. 1996); 4060 m (Wu *et al.*, 784, 29 Aug. 1996).

Yunnan. Yangbi: around Cangshan, 3820 m (Wu *et al.*, 865, 17 Aug. 1997); 3710 m (Wu *et al.*, 869, 18 Aug. 1997). Sichuan. Daocheng: around Gongga Shan, Beiyu, 4500 m (Wu *et al.*, 743, 22 Aug. 1996).

[Habit] On wet rock, in grassland, on clay bank in *Rhododendron* forest, or on wet soil in alpine meadow.

[Note] As like as the Himalayan representative (Wakabayashi, 1997), our collections from SW China are diploid and have $2n=22$ monomodal chromosomes.

