

## An Enumeration of the Flowering Plants Collected in NW Yunnan and E & C Tibet between 1999 and 2001 — Crassulaceae, Asteraceae, Juncaceae, Eriocaulaceae, and Orchidaceae

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**Abstract** This is a record of plant collecting in the Hengduan Mountains Hotspot, one of the hotspots (earth's biologically richest and most endangered terrestrial ecoregions) by the Chinese-Japanese-American joint expedition team and the Chinese-Japanese joint expedition teams in 1999, 2000 and 2001. Among the collections were 27 species in four genera of Crassulaceae, 67 species in 26 genera of Asteraceae, 13 species in two genera of Juncaceae, one species in one genus of Eriocaulaceae, and 14 species in 11 genera of Orchidaceae. Three species, *Artemisia speciosa* (Pamp.) Ling & Y. R. Ling (Asteraceae), *Saussurea leucoma* Diels (Asteraceae) and *Eriocaulon atrum* Nakai (Eriocaulaceae), are new to Tibet.

**Key words:** alpine flora, Asteraceae, Crassulaceae, Eriocaulaceae, Juncaceae, Orchidaceae, Tibet, Yunnan.

Myers (1988) proposed the term 'hotspot', for the earth's biologically richest and most endangered terrestrial ecoregions, and designated the 'Eastern Himalayas' as one of the top ten hotspots. Myers defined the Eastern Himalayas hotspot as including both tropical and temperate forest elements. Mittermeier *et al.* (1999) modified the hotspot concept and established two new hotspots; the Indo-Burma Hotspot to include the tropical portion of Myers's original Eastern Hi-

malayas region and the Hengduan Mountains Hotspot (or Mountains of South-Central China Hotspot) comprising the temperate vegetation of the Hengduan Mountains. The Hengduan Mountains Hotspot covers the temperate montane to alpine regions of the eastern part of the Qinghai-Tibetan Plateau, and is bounded to the northwest by the dry Qinghai-Tibetan Plateau, to the north by the Tao River of extreme southern Gansu, to the east by the Sichuan Basin and the plateau of

eastern Yunnan, and to the south by the Indo-Burma Hotspot.

We focused our botanical research on this hotspot because of the following:

First, as pointed out by Mittermeier *et al.* (1999) the Hengduan Mountains Hotspot is botanically the richest temperate region in the world. The hotspot is estimated to contain a little less than half (ca. 12000) of the all the species of vascular plants known from China, although the flora is still poorly known to the outside world.

Second, the floristic relationships between this hotspot (the Hengduan Mountains Hotspot) and the Himalayas are also still not clear, as Mittermeier *et al.* (1999) did not mention the west boundary of the hotspot.

Third, the alpine floras of both regions (the Hengduan Mountains Hotspot and the Himalayas) are similar, with a great number of shared species and many corresponding species especially in greatly diversified genera, such as *Saxifraga*, *Pedicularis*, *Primula*, *Gentiana*, and *Potentilla*, in both regions.

Besides using previously collected herbarium specimens, we also collected new materials for the studies. This is the second report of the results of the determinations of materials collected in NW Yunnan and E & C Tibet, China by the Chinese-Japanese-American joint expedition team in 2000 and the Chinese-Japanese joint expedition teams in 1999 and 2001 (Akiyama *et al.*, 2002). The Crassulaceae were determined by Ohba and Akiyama, Asteraceae by Ikeda, Juncaceae and Eriocaulaceae by Miyamoto, and Orchidaceae by Tsukaya. All specimens collected by Wu *et al.* and Akiyama *et al.* are deposited in KUN and TI (duplicates in A and TNS), those by Boufford *et al.* in KUN and A (duplicates in TI). Additional duplicates from TI or A are at BM, CAS, E, MO and PE. For members and itineraries of the field research see Miyamoto (2000), Akiyama *et al.* (2001), Miyamoto and Ikeda (2001), and Akiyama and Ikeda (2002).

We prepare a list of collected plants to provide for regional species diversity in the Hengduan Mountains Hotspot. The list shows species col-

lected during our field surveys in NW Yunnan and E Tibet in systematic order.

The list shows species diversity of flowering plants in the Hengduan Mountains Hotspot. The following species are new to Tibet: *Artemisia speciosa* (Pamp.) Ling & Y. R. Ling (Asteraceae), *Saussurea leucoma* Diels (Asteraceae) and *Eriocaulon atrum* Nakai (Eriocaulaceae).

The hotspot consists of a considerable number of species endemic to the hotspot and also species sharing the hotspot and Himalayan region. Recently phylogeographical significance of Sino-Himalaya has been pointed by Wu (1998) and other botanists. Genera greatly diversified in this hotspot are also greatly diversified in the Himalayan region. Our collections and studies show similarity in species diversity in both regions in *Rhodiola*, *Aster*, *Cremanthodium*, *Saussurea*, *Senecio*, *Juncus*, and many other genera.

Taxonomy of greatly diversified genera is still insufficient and to make further comparative studies with the corresponding Himalayan representatives is needed. In conjunction with the research, we began various comparative taxonomic studies of corresponding taxa found in both the Eastern Himalayas and the Hengduan Mountains in some greatly diversified genera in both regions including *Saxifraga*, *Pedicularis*, *Rhodiola*, *Impatiens*, *Juncus*, *Potentilla* and *Bistorta* in 1983. The comparisons of the Himalayan species with the common and corresponding species of the Hengduan Mountains are necessary for taxonomic definition. It is also important to define the west boundary of the Hengduan Mountains Hotspot, and the origin and development of the diversity in the hotspot.

For example, in *Rhodiola* and other genera of Crassulaceae we have acquired some new evidence on morphology and distribution.

Variations especially of the shape and size, serration, arrangement of leaves are remarkably wide in *Rhodiola chrysanthemifolia* (H. Lévl.) Fu. Considerable number of taxa ascribable to this was described by Raymond Hamet and others. Ohba (1980) recognized only two subspecies in the species, subsp. *chrysanthemifolia* and *sacra*

(Raym.-Hamet) H. Ohba. Subspecies *sacra* differs from subsp. *chrysanthemifolia* by the leaves scattered throughout the flowering stems, calyx lobes oblong to oblong-ovate, 3.5–5 mm long, and the usually oblanceolate petals 5–7 mm long.

*Rhodiola tsuiana* Fu has a subterranean cluster of stout roots, rather densely papillate flowerings stems up to 20 cm long from axils of blackish scaly leaves on rhizomes, and translucent white petals with pink shade. Ohba (1980) treated this as a synonym of *Rhodiola chrysanthemifolia* (H. Lév.) Fu subsp. *sacra* (Raym.-Hamet) H. Ohba. Our collections of *R. tsuiana* make clear that the species apparently differs from subsp. *sacra* in having constantly papillate flowering stems and villous narrowly oblong or widely lanceolate leaves with isolated serrated margins. *Rhodiola tsuiana* approaches to *R. nepalica* (H. Ohba) H. Ohba described from Nepal by sharing papillate flowering stems and serrate leaves. Moreover the localities of *R. tsuiana* and *R. nepalica* are close. Fu and Ohba (2001) treated *R. tsuiana* as a subspecies of *R. sacra* and recorded from SE Qinghai and E and S Xizang (Lhasa Shi, Qamdo Xian). We have examined a specimen of *Rhodiola tsuiana* collected in Nangqên Xian (just W of Jiangxi Forest Station on W side of the Zi Qu, SE of Mozhong; 32°5'N, 97°1'E, 3600 m in elevations) in Qinghai by Ho, Bartholomew, M. Watson & Gilbert on 27 August 1996 (no. 2438, E).

*Rhodiola alsia* (Fröd.) Fu subsp. *kawaguchii* H. Ohba was distinguished from subsp. *alsia* in having taller fastigiate densely leafy flowering stems 20–25 cm long, bisexual against gynodioecious nature, and shorter sepals 2.4–2.6 mm long. Our collection of subsp. *kawaguchii* from Dêngqên (Akiyama *et al.* 105761) approves these features to distinguish subsp. *kawaguchii* from subsp. *alsia*, and provides an isolated occurrence of subsp. *kawaguchii* in Tibet.

*Rhodiola purpureovirides* subsp. *phariensis* (H. Ohba) H. Ohba has been known only from Yadong Xian, Tibet (Fu and Ohba, 2001). Our collections from Baxoi and Nyalam make clear the extension of the range to eastern and western Tibet.

In *Orostachys O. spinosa* (L.) Sweet is known to be distributed in E Siberia, Mongolia, N and NE China and probably N Korea, and differs from *O. thyrsoiflora* Fisch. having the range from Tadzhikistan to W China (Xingjiang) through Kirgizia, Kazakhstan, Pakistan, Altai and Ural, Mongolia (Ohba, 2003). He did not record any species of *Orostachys* from Tibet. Fu (1985) recorded both species from Tibet, but he examined no specimen of *O. thyrsoiflora*. Fu wrote that the identification of *O. spinosa* is tentative, of which record is based on a specimen collected in Chaya Province, Tibet by Expedition Team of Tibetan Plateau (no. 12389) with ovate-oblong sepals and a note as flowers pale salmon pink. As noted our collection has pinkish petals and probably represents the same type. A specimen collected from Xiao Surmang Xiang in Yushu Xian, Qinghai Province (32°7'N, 97°16'E) collected by Ho, Bartholomew, M. Watson & Gilbert, no. 2341 on 24 August 1996 (E) also corresponds with this type. These might represent an unknown species of *Orostachys* occurring between the ranges of *O. spinosa* and *O. thyrsoiflora*. Further studies are needed to establish the novelty.

In *Sinocrassula* we found a new variety of *S. paoshingensis* (Fu) H. Ohba *et al.*, var. *spinulosa* H. Ohba *et al.* (Akiyama *et al.*, 2001). This variety differs from var. *paoshingensis* in having apically serrate leaves. The variety produces nodule-like structure on the roots. The presence of such structure has been not reported in the Crassulaceae.

Further results of taxonomic studies will be published in some separate papers on each systematic group.

#### List of plants collected in systematic order Crassulaceae

The collections of the genus *Rhodiola* made in 1999 were enumerated in a previous report (Akiyama *et al.*, 2000).

1. ***Orostachys spinosa*** (L.) Sweet, Hort. Brit., ed. 2: 225 (1830).

**Xizang (Tibet).** Baxoi: Rawu, 3850 m (Akiya-

ma *et al.* 105571, 25 July 2000).

On rocks.

Though this species is known to have yellowish green petals (Fu and Ohba, 2001), the plants we collected have pinkish petals.

2. **Rhodiola alsia** (Fröd.) S. H. Fu in Acta Phytotax. Sin. Add. **1**: 121 (1965).

subsp. **alsia**

**Xizang (Tibet).** Baxoi: Demu La, 4600 m (Akiyama *et al.* 105584, 26 July 2000). Markam–Zogang: Dongdala Shan, 5000 m (Akiyama *et al.* 105454, 15 July 2000). Nyngchi: Sezhailla Shan, 4450 m (Akiyama *et al.* 108019, 108020, 17 Aug. 2000).

On rocky slopes, *Rhododendron* scrub, open places.

subsp. **kawaguchii** H. Ohba in Acta Phytotax. Geobot. **32**: 192 (1981).

**Xizang (Tibet).** Dêngqên: Dêngqên–Pongda, 4800 m (Akiyama *et al.* 105761, 9 Aug. 2000).

On soil.

3. **Rhodiola bupleuroides** (Wall. ex Hook. f. & Thomson) S. H. Fu in Acta Phytotax. Sin. Add. **1**: 124 (1965).

var. **bupleuroides**

**Xizang (Tibet).** Baxoi: Yela Shan, 4550 m (Akiyama *et al.* 105546, 22 July 2000); Demu La, 4600 m (Akiyama *et al.* 105580, 26 July 2000). Gongbo'gyamda: Basum–Basum Lake–Basum, 3400 m (Akiyama *et al.* 106022, 15 Aug. 2000); 3450 m (Akiyama *et al.* 108005, 15 Aug. 2000). Maizhokunggar: Mt. Milha Shan, 4190 m (Akiyama *et al.* 106426, 7 Aug. 2001). Markam: a village ca. 10 km NW of Markam, 4000 m (Akiyama *et al.* 105427, 13 July 2000); Markam–Lawu Shan–Markam, 4300 m (Akiyama *et al.* 105442, 14 July 2000).

In *Salix* scrub, on mossy rocks in *Quercus* forest, on rocks, open rocky slopes, open soil slopes, stony slopes.

var. **parva** (Fröd.) H. Ohba in Univ. Mus., Univ. Tokyo, Nat. Cult. no. 4, 26 (1992).

**Xizang (Tibet).** Nagarzê: Nagarzê–Karo La (Pass), 4480 m (Akiyama *et al.* 106477, 11 Aug. 2001). Nyalam: Thong La, 5000 m (Akiyama *et al.* 106509, 18 Aug. 2001); on the way to

Tashigang from Nyalam, 4620 m (Akiyama *et al.* 106517, 19 Aug. 2001).

On rocky and stony places in alpine meadow.

4. **Rhodiola chrysanthemifolia** (H. Lév.) S. H. Fu in Acta Phytotax. Sin. Add. **1**: 127 (1965).

subsp. **chrysanthemifolia**

**Xizang (Tibet).** Zhag'yab–Qamdo: Langla Shan–Nianla Shan, 4020 m (Akiyama *et al.* 105500, 19 July 2000).

subsp. **sacra** (Raym.–Hamet) H. Ohba in J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. **12**: 384 (1980).

**Xizang (Tibet).** Dagzê: near Dagzê, 3650 m (Akiyama *et al.* 108035, 19 Aug. 2000). Markam: a village ca. 10 km NE of Markam, 4000 m (Akiyama *et al.* 105426, 13 July 2000).

On rocks, open rocky slopes.

5. **Rhodiola coccinea** (Royle) Boriss. in Kom., Fl. URSS **9**: 41 (1939).

**Xizang (Tibet).** Baxoi: Yela Shan, 4700 m (Akiyama *et al.* 105567, 23 July 2000).

6. **Rhodiola crenulata** (Hook. f. & Thomson) H. Ohba in J. Jap. Bot. **51**: 386 (1976).

**Xizang (Tibet).** Baxoi: Demu La, 4700 m (Akiyama *et al.* 105587, 26 July 2000). Nagarzê: Karo La (Pass), 4900 m (Akiyama *et al.* 106458, 10 Aug. 2001). Zogang: Dongdala Shan, 5000 m (Akiyama *et al.* 105472, 17 July 2000).

Among rocks, scree slopes, rocky slopes.

7. **Rhodiola himalensis** (D. Don) S. H. Fu in Acta Phytotax. Sin. Add. **1**: 121 (1965).

**Xizang (Tibet).** Baxoi: Rawu–Baxoi, 4500 m (Akiyama *et al.* 105754, 105755, 4 Aug. 2000).

On rocks.

8. **Rhodiola humilis** (Hook. f. & Thomson) S. H. Fu in Acta Phytotax. Sin. Add. **1**: 119 (1965).

**Xizang (Tibet).** Nyalam: on the way to Tashigang from Nyalam, 4620 m (Akiyama *et al.* 106518, 19 Aug. 2001); Nyalam–Zhangmu, 3690 m (Akiyama *et al.* 106555, 22 Aug. 2001).

On hard soil in alpine meadow.

9. **Rhodiola nobilis** (Franch.) S. H. Fu in Acta Phytotax. Sin. Add. **1**: 120 (1965).

subsp. **nobilis**

**Xizang (Tibet).** Baxoi: Yela Shan, 4580 m

(Akiyama *et al.* 105542, 22 July 2000); Demu La, 4600 m (Akiyama *et al.* 105586, 26 July 2000).

On rocky and open stony slopes, among rocks.

subsp. **atuntsuensis** (Praeger) H. Ohba in J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. **13**: 165 (1982).

**Xizang (Tibet)**. Baxoi: around Rawu, 4900 m (Akiyama *et al.* 105642, 105643, 29 July 2000). Zogang: Dongdala Shan, 5050 m (Akiyama *et al.* 105468, 16 July 2000); 5200 m (Akiyama *et al.* 105832, 16 July 2000).

On scree slopes, on rocks.

10. **Rhodiola prainii** (Raym.-Hamet) H. Ohba in J. Jap. Bot. **51**: 386 (1976).

**Xizang (Tibet)**. Nagarzê: around Yamzho Yumco, 4300 m (Akiyama *et al.* 106440, 9 Aug. 2001); Nagarzê-Karo La (Pass), 4480 m (Akiyama *et al.* 106469, 11 Aug. 2001).

On rocks, in rock crevices.

11. **Rhodiola pupureovirides** (Praeger) S. H. Fu subsp. **phariensis** (H. Ohba) H. Ohba in J. Jap. Bot. **61**: 206 (1986).

**Xizang (Tibet)**. Baxoi: Yela Shan, 4580 m (Akiyama *et al.* 105539, 22 July 2000); Demu La, 4700 m (Akiyama *et al.* 105588, 26 July 2000). Nyalam: Nyalam-Zhangmu, 3510 m (Akiyama *et al.* 106544, 21 Aug. 2001).

On soil slopes, grassy slopes.

12. **Rhodiola sherriffii** H. Ohba in J. Jap. Bot. **53**: 258 (1978).

**Xizang (Tibet)**. Nyingchi: Sezhaile Shan, 4450 m (Akiyama *et al.* 108020b, 17 Aug. 2000).

In *Rhododendron* scrub.

13. **Rhodiola smithii** (Raym.-Hamet) S. H. Fu in Acta Phytotax. Sin. Add. **1**: 122 (1965).

**Xizang (Tibet)**. Lhazê: Jia Tsuo La, 4610 m (Akiyama *et al.* 106489, 14 Aug. 2001).

On rocky slopes by a stream.

14. **Rhodiola stapfii** (Raym.-Hamet) S. H. Fu in Acta Phytotax. Sin. Add. **1**: 122 (1965).

**Xizang (Tibet)**. Maizhokunggar: Mt. Milha Shan, 4540 m (Akiyama *et al.* 106420, 7 Aug. 2001).

On hard soil.

15. **Rhodiola tibetica** (Hook. f. & Thomson)

S. H. Fu in Acta Phytotax. Sin. Add. **1**: 121 (1965).

**Xizang (Tibet)**. Maizhokunggar: Mt. Milha Shan, 4600 m (Akiyama *et al.* 106422, 7 Aug. 2001). Nagarzê: Karo La (Pass), 4680 m (Akiyama *et al.* 106464, 10 Aug. 2001); Nagarzê-Karo La (Pass), 4480 m (Akiyama *et al.* 106474, 11 Aug. 2001).

Among rocks, on rocks, stony places beside a stream.

16. **Rhodiola tsuiana** S. H. Fu in Acta Phytotax. Sin. Add. **1**: 127 (1965).

**Xizang (Tibet)**. Lhazê Xian: Jia Tsuo La, 4610 m (Akiyama *et al.* 106490, 14 Aug. 2001).

On rocky slopes by a stream.

17. **Rhodiola wallichiana** (Hook.) S. H. Fu in Acta Phytotax. Sin. Add. **1**: 125 (1965).

**Xizang (Tibet)**. Nyalam Xian: Nyalam-Zhangmu, 3620 m (Akiyama *et al.* 106535, 21 Aug. 2001).

On mossy rocks.

18. **Sedum gagei** Raym.-Hamet in Repert. Spec. Nov. Regni Veg. **8**: 263 (1910).

**Xizang (Tibet)**. Baxoi: Anjiu La, 4400 m (Akiyama *et al.* 105609, 27 July 2000); Rawu, 3850 m (Akiyama *et al.* 105572, 25 July 2000); around Rawu, 3900 m (Akiyama *et al.* 105636, 28 July 2000); Yela Shan, 4550 m (Akiyama *et al.* 105545, 22 July 2000). Dêngqên: Dêngqên-Pongda, 4100 m (Akiyama *et al.* 105767, 9 Aug. 2000). Nyalam: Nyalam-Zhangmu, 3510 m (Akiyama *et al.* 106543, 21 Aug. 2001); 3690 m (Akiyama *et al.* 106554, 22 Aug. 2001); on the way to Tashigang from Nyalam, 4620 m (Akiyama *et al.* 106515, 19 Aug. 2001).

On dry sandy slopes, open sandy slopes, open soil slopes, rocky places in alpine meadow.

19. **Sedum multicaule** Wall. ex Lindl. in Bot. Reg. **26** (misc.): 58 (1840).

**Yunnan**. Zhongdian: Haba, 2800 m (Wu *et al.* 103498, 12 Aug. 1999); Near Hutiaoxia, 2400 m (Wu *et al.* 103561, 26 Aug. 1999). **Xizang (Tibet)**. Bomi: Between Bomi and Tangmai, 2500 m (Akiyama *et al.* 105658, 31 July 2000); 2550 m (Akiyama *et al.* 105692, 1 Aug. 2000). Nyalam: Zhangmu, 2250 m (Akiyama *et al.*

106505, 17 Aug. 2001).

On roadsides, stone hedge, in *Pinus* and *Quercus* forests.

20. ***Sedum oreades*** (Decne.) Raym.-Hamet in Bull. Soc. Bot. France **56**: 571 (1909).

**Yunnan.** Lijiang: Laojun Shan, Longqun Lodge–Jiushijiu Longtan, 3900 m (Wu *et al.* 103578, 8 Sept. 1999). Zhongdian: Haba Xueshan, Haba Hai, 4200 m (Wu *et al.* 103953, 11 Aug. 1999).

On soil.

21. ***Sedum pampaninii*** Raym.-Hamet in Malpighia **26**: 59 (1913).

**Yunnan.** Deqin: Meili Xueshan, Suola to Meilishi, 2900 m (Wu *et al.* 103556, 24 Aug. 1999).

On soil.

22. ***Sedum przewalskii*** Maxim. in Bull. Acad. Imp. Sci. Saint-Pétersbourg, Sér. 3, **29**: 156 (1883).

**Xizang (Tibet).** Baqên–Biru: Baqên–Xagquka, 4400 m (Akiyama *et al.* 105769, 10 Aug. 2000). Baxoi: Rawu–Bazoi, 4500 m (Akiyama *et al.* 105747, 4 Aug. 2000). Lhazê: Jia Tsuo La, 5050 m (Akiyama *et al.* 106485, 14 Aug. 2001). Maizhokunggar: Mt. Milha Shan, 4900 m (Akiyama *et al.* 106411, 6 Aug. 2000). Nagarzê: Karo La (Pass), 4880 m (Akiyama *et al.* 106449, 10 Aug. 2001). Nyalam: on the way to Tashigang from Nyalam, 4620 m (Akiyama *et al.* 106516, 19 Aug. 2001).

On soil slopes, soils beside scree slopes, alpine meadow.

23. ***Sedum roborowskii*** Maxim. in Bull. Acad. Imp. Sci. Saint-Pétersbourg, Sér. 3, **29**: 154 (1883).

**Xizang (Tibet).** Nagarzê: Around Yamzho Yumco, 4300 m (Akiyama *et al.* 106441, 9 Aug. 2001).

On rocky soils in dry slopes.

24. ***Sedum steraliifolium*** Franch. in Nouv. Arch. Mus. Hist. Nat., sér. 2, **6**: 10 (1883).

**Yunnan.** Deqin: Meili Xueshan, Suola to Meilishi, 2600 m (Wu *et al.* 103559, 24 Aug. 1999); Mingyong Glacier, 2800 m (Wu *et al.* 103515, 16 Aug. 1999).

On scree slopes.

25. ***Sedum trullipetalum*** Hook. f. & Thomson in J. Proc. Linn. Soc. Bot. **2**: 102 (1858).

**Yunnan.** Deqin: Baima Xueshan, 4200 m (Wu *et al.* 103506, 15 Aug. 1999); Meili Xueshan, Suola, 4400 m (Wu *et al.* 103535, 21 Aug. 1999).

On soil and sandy ground.

26. ***Sinocrassula indica*** (Decne.) Berger in Engl. & Prantl, Nat. Pflanzenfam. 2 Auf. **18a**: 463 (1930).

**Yunnan.** Deqin: Meili Xueshan, Suola to Meilishi, 2750 m (Wu *et al.* 103557, 24 Aug. 1999).

27. ***Sinocrassula paoshingensis*** (S. H. Fu) H. Ohba, S. Akiyama & S. K. Wu in J. Jap. Bot. **75**: 296 (2000).

var. ***paoshingensis***

**Yunnan.** Deqin: Meili Xueshan, Suola to Meilishi, 2950 m (Wu *et al.* 103555, 24 Aug. 1999).

var. ***spinulosa*** H. Ohba, S. Akiyama & S. K. Wu in J. Jap. Bot. **76**: 223 (2001).

**Xizang (Tibet).** Qamdo–Zhag'yab: Qamdo–Nianla Shan, 3110 m (Akiyama *et al.* 105516, 20 July 2000).

On open stony slopes.

#### Asteraceae

1. ***Ainsliaea latifolia*** (D. Don) Sch. Bip. in Pollichia **18–19**: 169 (1861).

**Yunnan.** Deqin: Mingyong Glacier, 3000 m (Akiyama *et al.* 938, 28 July 2001).

On moist slope beside a forestry road.

2. ***Ajania purpurea*** C. Shih in Acta Phytotax. Sin. **17**(2): 115 (1979).

**Xizang (Tibet).** Lhazê: Jia Tsuo La, 5340 m (Akiyama *et al.* 106248, 14 Aug. 2001); 5300 m (Wu *et al.* 106687, 14 Aug. 2001). Maizhokunggar: Mt. Milha Shan, 4650 m (Akiyama *et al.* 106211, 7 Aug. 2001). Nagarzê: Karo La (Pass), 4900 m (Wu *et al.* 106621, 10 Aug. 2001).

Between rocks on rocky slopes.

3. ***Ajania tenuifolia*** (Jacq.) Tzvelev in Komarov, Fl. URSS **26**: 411 (1961).

**Xizang (Tibet).** Nyalam: Thong La (south of

- Lalung La), 4950 m (Wu *et al.* 106830, 18 Aug. 2001).
4. **Anaphalis contorta** (D. Don.) Hook. f., *Fl. Brit. India* **3**: 284 (1881).  
**Xizang (Tibet)**. Gongbo'gyamda: Basum–Basum Lake, 3550 m (Akiyama *et al.* 104738, 15 Aug. 2000).  
 On grazed grasslands.
5. **Anaphalis nepalensis** (Spreng.) Hand.-Mazz., *Symb. Sin.* **7**: 1099 (1936).  
 var. **monocephala** (DC.) Hand.-Mazz. in *Acta Horti Gothob.* **12**: 239 (1938).  
**Xizang (Tibet)**. Nyingchi: Bayizhen–Sezhaila Shan, 4500 m (Akiyama *et al.* 104749, 17 Aug. 2000).  
 On grazed grasslands.
6. **Anaphalis triplinervis** (Sims) C. B. Clarke, *Compos. Ind.*: 105 (1876).  
**Xizang (Tibet)**. Nyalam: Zhangmu, 2450 m (Akiyama *et al.* 106258, 16 Aug. 2001); 2600 m (Wu *et al.* 106720, 16 Aug. 2001); Nyalam–Zhangmu, 3800–4000 m (Wu *et al.* 106947, 21 Aug. 2001).  
 On moist slope beside a forestry road.
7. **Anaphalis viridis** Cumm. in *Kew Bull.* 1908: 19 (1908).  
**Xizang (Tibet)**. Zogang: Zogang–Dongdala Shan, 5150 m (Akiyama *et al.* 104632, 16 July 2000).  
 On scree.
8. **Anaphalis xylorhiza** Sch. Bip. ex Hook. f., *Fl. Brit. India* **3**: 281 (1881).  
**Xizang (Tibet)**. Maizhokunggar: Mt. Milha Shan, 4200 m (Wu *et al.* 106128, 7 Aug. 2001).  
 Markam: Markam—a village ca. 10 km NW of Markam, 4000 m (Akiyama *et al.* 104614, 13 July 2000).  
 Nagarzê: Nagarzê–Karo La (Pass), 4500 m (Wu *et al.* 106659, 11 Aug. 2001).  
 On grazed grassland slopes.
9. **Artemisia sieversiana** Ehrhart ex Willd., *Sp. Pl.* **3**: 1845 (1800).  
**Xizang (Tibet)**. Bomi–Baxoi: Bomi–Rawu, 3400 m (Akiyama *et al.* 105172, 3 Aug. 2000).  
 On sandy slopes.
10. **Artemisia speciosa** (Pamp.) Ling & Y. R. Ling in *Acta Phytotax. Sin.* **18**(4): 505 (1980).  
**Xizang (Tibet)**. Nyalam: Nyalam–Zhangmu, 3710 m (Akiyama *et al.* 106306, 21 Aug. 2001).  
 On sandy roadside.  
 New to Tibet.
11. **Artemisia vexans** Pamp. in *Nuovo Giorn. Bot. Ital. n. s.* **36**: 427 (1930).  
**Xizang (Tibet)**. Baxoi: Rawu–Baxoi, 4180 m (Akiyama *et al.* 104729, 4 Aug. 2000).  
 On sandy slopes beside streams.
12. **Aster albescens** (DC.) Hand.-Mazz. in *Acta Horti Gothob.* **12**: 205 (1938).  
**Xizang (Tibet)**. Markam–Zogang: Markam–Lawu Shan–Chuka–Dongdala Shan–Zogang, 3900 m (Akiyama *et al.* 105031, 15 July 2000).  
 Nyalam: Nyalam–Zhangmu, 3470 m (Akiyama *et al.* 106299, 21 Aug. 2001); 3400 m (Wu *et al.* 106976, 21 Aug. 2001).  
 Nyingchi: Bayizhen–Sezhaila Shan, 3500 m (Akiyama *et al.* 104753, 18 Aug. 2000).  
 On grassland slope.
13. **Aster asteroides** (DC.) Kuntze, *Revis. Gen. Pl.*: 315 (1891).  
**Xizang (Tibet)**. Markam: Markam–Lawu Shan, 4400 m (Akiyama *et al.* 104624, 14 July 2000).  
 On wet places in grazed grasslands.
14. **Aster batangensis** Bur. & Franch. in *J. Bot. (Morot)* **5**: 50 (1891).  
**Xizang (Tibet)**. Zogang: Zogang–Dongdala Shan, 4500 m (Akiyama *et al.* 104641, 18 July 2000).  
 On grazed grassland slopes.
15. **Aster diplostephioides** (DC.) C. B. Clarke, *Compos. Ind.*: 45 (1876).  
**Xizang (Tibet)**. Zogang–Qamdo: Zogang–Bamda–Langla Shan–Nianla Shan–Qamdo, 4060 m (Akiyama *et al.* 104648, 19 July 2000).  
 On grazed grasslands.
16. **Aster poliothamnus** Diels in *Repert. Spec. Nov. Regni Veg.* **12**: 503 (1922).  
**Xizang (Tibet)**. Qamdo–Zhag'yab: Qamdo–Nianla Shan, 3180 m (Akiyama *et al.* 104651, 20 July 2000).  
 On dry slopes.
17. **Aster souliei** Franch. in *J. Bot. (Morot)* **10**: 372 (1896).

- Xizang (Tibet).** Maizhokunggar: Mt. Milha Shan, 4200 m (Wu *et al.* 106156, 7 Aug. 2001). Zogang–Qamdo: Zogang–Bamda–Langla Shan–Nianla Shan–Qamdo, 4060 m (Akiyama *et al.* 104649, 19 July 2000).  
On grazed grasslands.
18. **Carpesium trachelifolium** Less. in *Linnaea* **6**: 233 (1831).  
**Xizang (Tibet).** Bomi: between Bomi and Tangmai, 2550 m (Akiyama *et al.* 104705, 31 July 2000).  
On moist slopes in *Quercus* aff. *semecarpifolia* forests.
19. **Cicerbita macrantha** (C. B. Clarke) Beauverd in *Bull. Soc. Bot. Genève* **2**: 130 (1910).  
**Xizang (Tibet).** Nyalam: Nyalam–Zhangmu, 3800–4000 m (Wu *et al.* 106964, 21 Aug. 2001).
20. **Cicerbita roborowskii** (Maxim.) Beauverd in *Bull. Soc. Bot. Genève* **2**: 135 (1910).  
*Chaetoseris roborowskii* (Maxim.) Shih in *Acta Phytotax. Sin.* **29**: 407 (1991).  
**Xizang (Tibet).** Bomi–Baxoi: Bomi–Rawu, 3400 m (Akiyama *et al.* 105169, 3 Aug. 2000).  
On moist slopes.
21. **Cousinia thomsonii** C. B. Clarke, *Compos. Ind.*: 213 (1876).  
**Xizang (Tibet).** Nyalam: Thong La (south of Lalung La), 4000–4500 m (Wu *et al.* 106840, 18 Aug. 2001).
22. **Cremanthodium bupleurifolium** W. W. Sm. in *Notes Roy. Bot. Gard. Edinburgh* **8**: 112 (1913).  
**Yunnan.** Deqen: Mt. Baima Xueshan, 4200 m (Akiyama *et al.* 919, 26 July 2001).  
In bush of *Rhododendron* shrubs.
23. **Cremanthodium campanulatum** (Franch.) Diels in *Notes Roy. Bot. Gard. Edinburgh* **5**: 190 (1912).  
**Yunnan.** Zhongdian: Tianchi, 3790 m (Akiyama *et al.* 912, 25 July 2001).  
Between shrubs of *Rhododendron* and *Potentilla glabra*, ca. 0.8 m tall, beside a lake.
24. **Cremanthodium decaisnei** C. B. Clarke, *Compos. Ind.*: 168 (1876).  
**Xizang (Tibet).** Zogang: Zogang–Dongdala Shan, 5000 m (Akiyama *et al.* 104636, 17 July 2000).  
On moist slopes beside a pond.
25. **Cremanthodium** aff. **ellisii** (Hook. f.) Kitam. ex Kitam. & Gould in Hara *et al.*, *Enum. Flow. Pl. Nepal* **3**: 22 (1982).  
**Xizang (Tibet).** Nagarzê: Karo La (Pass), 5020 m (Akiyama *et al.* 106236, 10 Aug. 2001).  
On rocky slopes.
26. **Cremanthodium helianthus** (Franch.) W. W. Sm. in *Notes Roy. Bot. Gard. Edinburgh* **14**: 289 (1924).  
**Yunnan.** Zhongdian: Tianchi, 3790 m (Akiyama *et al.* 915, 25 July 2001).  
Among shrubs of *Rhododendron* and *Potentilla glabra*, ca. 0.8 m tall, beside a lake.
27. **Cremanthodium laciniatum** Ling & Y. L. Chen ex S. W. Liu in *Acta Biol. Plateau Sin.* **3**: 65 (1984).  
**Xizang (Tibet).** Baxoi: Rawu–Demu La (a pass to Zayu), 4870 m (Akiyama *et al.* 104680, 26 July 2000).  
On scree.
28. **Cremanthodium nepalense** Kitam. in *Acta Phytotax. Geobot.* **15**: 105 (1954).  
**Xizang (Tibet).** Nyalam: on the way to Tashigang from Nyalam, 4790 m (Akiyama *et al.* 106278, 19 Aug. 2001); Nyalam–Zhangmu, 4060 m (Akiyama *et al.* 106317, 22 Aug. 2001).  
On grazed grassland slope.
29. **Cremanthodium oblongatum** C. B. Clarke, *Compos. Ind.*: 168 (1876).  
**Xizang (Tibet).** Nyalam: Nyalam–Zhangmu, 4060 m (Akiyama *et al.* 106318, 22 Aug. 2001).  
On grazed grassland slope.
30. **Dichrocephala integrifolia** (L. f.) Kuntze, *Revis. Gen. Pl.*: 333 (1891).  
**Xizang (Tibet).** Nyalam: Zhangmu, 2550 m (Akiyama *et al.* 106269, 17 Aug. 2001).  
On moist roadside beside a grazed grassland.
31. **Dolomiaea calophylla** Ling in *Acta Phytotax. Sin.* **10**: 88 (1965).  
**Xizang (Tibet).** Nagarzê: around Yamzho Yumco, 4410 m (Akiyama *et al.* 106221, 9 Aug. 2001); 4400 m (Wu *et al.* 106179, 9 Aug. 2001).  
On moist ground of rocky slopes.
32. **Dubyaea hispida** DC., *Prodr.* **7**: 247



- (1838).
- Xizang (Tibet).** Nyalam: Nyalam–Zhangmu, 3470 m (Akiyama *et al.* 106298, 21 Aug. 2001).  
On moist grassland slope.
33. **Eupatorium heterophyllum** DC., Prodr. **5**: 180 (1836).  
**Xizang (Tibet).** Bomi: between Bomi and Tangmai, 2700 m (Akiyama *et al.* 105143, 31 July 2000).  
On roadside at edge of *Pinus* forests.
34. **Gynura japonica** (Thunb.) Juel. in Acta Horti Berg. **1**(3): 86 (1891).  
**Yunnan.** Kunming: Guodong (near Aziying), 2200–2400 m (Wu *et al.* 627, 2 July 2000).
35. **Heteropappus boweri** (Hemsl.) Grierson in Notes Roy. Bot. Gard. Edinburgh **26**: 151 (1964).  
**Xizang (Tibet).** Nagarzê: Nagarzê–Karo La (Pass), 4500 m (Wu *et al.* 106665, 11 Aug. 2001).
36. **Heteropappus semiprostratus** Grierson in Notes Roy. Bot. Gard. Edinburgh **26**: 151 (1964).  
**Xizang (Tibet).** Nyalam: Thong La (south of Lalung La), 4950 m (Wu *et al.* 106817, 18 Aug. 2001).
37. **Hippolytia kennedyi** (Dunn) Ling in Acta Phytotax. Sin. **17**(4): 67 (1979).  
**Xizang (Tibet).** Maizhokunggar: Mt. Milha Shan, 4800 m (Wu *et al.* 106086, 6 Aug. 2001).
38. **Leontopodium dedekensii** (Bur. & Franch.) Beauverd in Bull. Soc. Bot. Genève **1**: 193, 195, & 374 (1909).  
**Xizang (Tibet).** Baxoi: Bamda–Yela Shan, 4160 m (Akiyama *et al.* 104670, 23 July 2000).  
On grazed grassland slopes.
39. **Leontopodium haastioides** Hand.-Mazz. in Beih. Bot. Centralbl. **44**(2): 84 (1927).  
**Xizang (Tibet).** Nyalam: on the way to Tashigang from Nyalam, 5140 m (Akiyama *et al.* 106289, 20 Aug. 2001); 4800–4900 m (Wu *et al.* 106901, 20 Aug. 2001).  
On rocky slope near a ridge.
40. **Leontopodium jacotianum** Beauverd in Bull. Soc. Bot. Genève **1**: 190, 373 (1909).  
**Xizang (Tibet).** Baxoi: Rawu–Demu La (a pass to Zayu), 4800 m (Akiyama *et al.* 104681, 26 July 2000). Nyalam: Nyalam–Zhangmu, 3800–4000 m (Wu *et al.* 106989, 21 Aug. 2001).  
On grazed grassland slopes.
41. **Leontopodium monocephalum** Edgew. in Trans. Linn. Soc. London **20**: 73 (1846).  
**Xizang (Tibet).** Nyalam: on the way to Tashigang from Nyalam, 5140 m (Akiyama *et al.* 106288, 20 Aug. 2001); 4500–4600 m (Wu *et al.* 106858, 19 Aug. 2001).  
On rocky slope near a ridge.
42. **Leontopodium muscoides** (Hook. f. & Thoms.) Hand.-Mazz. in Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. **59**: 252 (1922).  
**Xizang (Tibet).** Maizhokunggar: Mt. Milha Shan, 4500 m (Wu *et al.* 106141, 7 Aug. 2001). Qamdo–Riwoqe–Dengqen: Qamdo–Dengqen, 4200 m (Akiyama *et al.* 104731, 8 Aug. 2000).  
On grazed grasslands.
43. **Leontopodium stracheyi** (Hook. f.) C. B. Clarke ex Hemsl. in J. Linn. Soc. Bot. **35**: 181 (1894).  
**Xizang (Tibet).** Maizhokunggar: Mt. Milha Shan, 4000 m (Wu *et al.* 106138, 7 Aug. 2001). Nagarzê: around Yamzho Yumco, 4300 m (Akiyama *et al.* 106233, 9 Aug. 2001).  
Between rocks.
44. **Ligularia** aff. **cymbulifera** (W. W. Sm.) Hand.-Mazz., Symb. Sin. **7**: 1133 (1936).  
**Xizang (Tibet).** Gongbo'gyamda: Basum–Basum Lake, 3550 m (Akiyama *et al.* 104743, 15 Aug. 2000).  
On grazed grasslands.
45. **Ligularia hookeri** (C. B. Clarke) Hand.-Mazz. in Bot. Jahrb. Syst. **69**: 127 (1938).  
**Yunnan.** Zhongdian: Tianchi, 3790 m (Akiyama *et al.* 909, 25 July 2001).  
Among shrubs of *Rhododendron* and *Potentilla glabra*, ca. 0.8 m tall, beside a lake.
46. **Pulicaria insignis** Drumm. ex Dunn in Kew Bull. 1922: 118 (1922).  
**Xizang (Tibet).** Nagarzê: around Yamzho Yumco, 4340 m (Akiyama *et al.* 106220, 9 Aug. 2001); 4400 m (Wu *et al.* 106191, 9 Aug. 2001).  
On rocky slope.
47. **Pyrethrum tatsienense** (Bur. & Franch.)

- Ling ex C. Shih in *Acta Phytotax. Sin.* **17**(2): 113 (1979).  
 var. **tatsienense**  
**Xizang (Tibet).** Markam: Markam–Lawu Shan, 4400 m (Akiyama *et al.* 104623, 14 July 2000).  
 On wet places in grazed grasslands.  
 var. **tanacetopsis** (W. W. Sm.) Ling & C. Shih in *Acta Phytotax. Sin.* **17**(2): 113 (1979).  
**Xizang (Tibet).** Nyingchi: Bayizhen–Sezhaila Shan, 4500 m (Akiyama *et al.* 104746, 17 Aug. 2000).  
 On rocky slopes in grazed grasslands.
48. **Saussurea fastuosa** (Decne.) Sch. Bip. in *Linnaea* **19**: 331 (1846).  
**Xizang (Tibet).** Nyalam: Nyalam–Zhangmu, 3710 m (Akiyama *et al.* 106310, 21 Aug. 2001).  
 On grazed grassland.
49. **Saussurea graminea** Dunn in *J. Linn. Soc. Bot.* **35**: 509 (1903).  
**Xizang (Tibet).** Baxoi: Rawu–Anjiu La, 4430 m (Akiyama *et al.* 105098, 27 July 2000).  
 On grazed grassland.
50. **Saussurea graminifolia** Wall. ex DC., *Prodr.* **6**: 536 (1838).  
**Xizang (Tibet).** Nyalam: on the way to Tashigang from Nyalam, 5170 m (Akiyama *et al.* 106292, 20 Aug. 2001).  
 On grazed grassland.
51. **Saussurea kingii** C. E. C. Fisch. in *Kew Bull.* 1937: 98 (1937).  
**Xizang (Tibet).** Nagarzê: Nagarzê–Karo La (Pass), 4500 m (Akiyama *et al.* 106244, 11 Aug. 2001).  
 On grazed grassland.
52. **Saussurea laniceps** Hand.-Mazz. in *Notizbl. Bot. Gart. Berlin-Dahlem* **13**: 657 (1937).  
**Xizang (Tibet).** Nyalam: on the way to Tashigang from Nyalam, 4870 m (Akiyama *et al.* 106293, 20 Aug. 2001).  
 On rocky slopes.
53. **Saussurea leontodontoides** (DC.) Sch. Bip. in *Linnaea* **19**: 330 (1846).  
**Xizang (Tibet).** Baxoi: Rawu–Anjiu La, 4430 m (Akiyama *et al.* 105097, 27 July 2000).  
 On grazed grasslands.
54. **Saussurea leucoma** Diels in *Notes Roy. Bot. Gard. Edinburgh* **5**: 197 (1912).  
**Xizang (Tibet).** Zogang: Zogang–Dongdala Shan, 5100 m (Akiyama *et al.* 105044, 17 July 2000).  
 On scree.  
 New to Tibet.
55. **Saussurea obvallata** (DC.) Edgew. in *Trans. Linn. Soc. London* **20**: 76 (1846).  
**Xizang (Tibet).** Nyingchi: Bayizhen–Sezhaila Shan, 4500 m (Akiyama *et al.* 104745, 17 Aug. 2000). Qamdo–Riwoqe–Dengqen: Qamdo–Dengqen, 4400 m (Akiyama *et al.* 105185, 8 Aug. 2000).  
 On rocky slopes.
56. **Saussurea tridactyla** Sch. Bip. ex Hook. f., *Fl. Brit. India* **3**: 377 (1881).  
**Xizang (Tibet).** Nyalam: on the way to Tashigang from Nyalam, 4870 m (Akiyama *et al.* 106291, 20 Aug. 2001).  
 On rocky slopes.
57. **Saussurea werneroides** Sch. Bip. ex Hook. f., *Fl. Brit. India* **3**: 367 (1881).  
**Xizang (Tibet).** Nyalam: on the way to Tashigang from Nyalam, 5170 m (Akiyama *et al.* 106290, 20 Aug. 2001).  
 On grazed grassland.
58. **Senecio alatus** Wall. ex DC., *Prodr.* **6**: 368 (1838).  
**Xizang (Tibet).** Nyalam: Nyalam–Zhangmu, 3800–4000 m (Wu *et al.* 106944, 21 Aug. 2001).
59. **Senecio graciliflorus** (Wall.) DC., *Prodr.* **6**: 365 (1838).  
**Xizang (Tibet).** Nyalam: Nyalam–Zhangmu, 3470 m (Akiyama *et al.* 106301, 21 Aug. 2001).  
 On grassy slope beside a road.
60. **Senecio laetus** Edgew. in *Trans. Linn. Soc. Bot.* **20**: 74 (1846).  
**Xizang (Tibet).** Nyalam: Zhangmu, 2550 m (Akiyama *et al.* 106271, 17 Aug. 2001). Nyingchi: Bayizhen–Sezhaila Shan, 3500 m (Akiyama *et al.* 104751, 18 Aug. 2000).  
 On grazed grasslands.
61. **Senecio** aff. **tibeticus** Hook. f., *Fl. Brit. India* **3**: 340 (1881).

**Xizang (Tibet).** Nyalam: on the way to Tashigang from Nyalam, 4770 m (Akiyama *et al.* 106277, 19 Aug. 2001); 4600 m (Wu *et al.* 106887 & 106888, 20 Aug. 2001).

On rocky and sandy slope beside a stream.

This is similar to *S. tibeticus*, but differs in having long slender rhizomes, leaves without auricles at base and fewer ligulate florets.

62. **Sorosaris hookeriana** (C. B. Clarke) Stebbins in Mem. Torrey Bot. Club **19**(3): 45 (1940).

**Xizang (Tibet).** Lhasa–Maizhokunggar: 4900 m (Wu *et al.* 106070, 5 Aug. 2001).

63. **Syncalathium kawaguchii** (Kitam.) Ling in Acta Phytotax. Sin. **10**(3): 287 (1965).

**Xizang (Tibet).** Dêngqên: Dêngqên–Pongda, 4800 m (Akiyama *et al.* 104732, 9 Aug. 2000). Maizhokunggar: Mt. Milha Shan, 4800–4900 m (Wu *et al.* 106087, 6 Aug. 2001).

On sandy slopes.

64. **Taraxacum bicolor** DC., Prodr. **7**: 148 (1838).

**Xizang (Tibet).** Baxoi: Bamda–Yela Shan, 4550 m (Akiyama *et al.* 105069, 22 July 2000).

On moist place in grazed grassland.

65. **Taraxacum stenoceras** Dahlst. in Acta Horti Gothob. **2**: 166, f. 8, t. 2, f. 9–11 (1926).

**Xizang (Tibet).** Baxoi: around Rawu, 3900 m (Akiyama *et al.* 105113, 28 July 2000).

On sandy places.

66. **Youngia gracilipes** (Hook. f.) Babcock & Stebbins in Publ. Carnegie Inst. Wash. no. 484: 40 (1937).

**Xizang (Tibet).** Lhazê: Jia Tsuo La, 4800 m (Wu *et al.* 106689, 14 Aug. 2001). Nagarzê: Nagarzê–Karo La (Pass), 4500 m (Akiyama *et al.* 106243, 11 Aug. 2001); 4400 m (Wu *et al.* 106657, 11 Aug. 2001).

On sandy slope beside a stream.

67. **Youngia simulatrix** (Babcock) Babcock & Stebbins in Publ. Carnegie Inst. Wash. no. 484: 39 (1937).

**Xizang (Tibet).** Nyalam: Thong La (south of Lalung La), 5160 m (Akiyama *et al.* 106275, 18 Aug. 2001); 4950 m (Wu *et al.* 106828, 18 Aug. 2001).

On grazed grassland.

### Juncaceae

1. **Juncus allioides** Franch. in Nouv. Arch. Mus. Hist. Nat. Paris sér. 2, **10**: 99 (1887).

**Xizang (Tibet).** Baxoi: Rawu–Baxoi, 4180 m (S. Akiyama *et al.* 105181, 4 Aug. 2000).

On wet places beside streams.

2. **Juncus benghalensis** Kunth, Enum. Pl. **3**: 360 (1840).

**Xizang (Tibet).** Nyingchi: Sezhaile Shan, 4500 m (S. Akiyama *et al.* 105212, 17 Aug. 2000).

On muddy slopes in grazed grasslands.

3. **Juncus bufonius** L., Sp. Pl.: 328 (1753).

**Xizang (Tibet).** Gongbo'gyamda: Basum Lake, 3550 m (S. Akiyama *et al.* 105199, 15 Aug. 2000).

On wet places in grazed grasslands.

4. **Juncus cephalostigma** Sam. in Hand.-Mazz., Symb. Sin. **7**: 1233 (1936).

**Xizang (Tibet).** Baxoi: Demu La, 4870 m (S. Akiyama *et al.* 105089-bis, 26 July 2000).

On grounds in rocky slopes.

5. **Juncus concinnus** D. Don, Prod. Fl. Nepal.: 44 (1825).

**Xizang (Tibet).** Gongbo'gyamda: Basum Lake, 3550 m (S. Akiyama *et al.* 105203, 15 Aug. 2000).

On muddy banks.

6. **Juncus himalensis** Klotzsch in Klotzsch & Garcke, Bot. Reise Pr. Waldemar: 60, t. 97 (1862).

**Xizang (Tibet).** Gongbo'gyamda: Basum Lake, 3550 m (S. Akiyama *et al.* 105197, 15 Aug. 2000).

On wet places in grazed grasslands.

7. **Juncus minimus** Buchenau in Bot. Zeit. **25**: 145 (1867).

**Xizang (Tibet).** Nyingchi: Sezhaile Shan, 4500 m (S. Akiyama *et al.* 105214, 17 Aug. 2000).

On wet places in grazed grasslands.

8. **Juncus przewalskii** Buchenau in Bot. Jahrb. Syst. **12**: 401 (1890).

**Xizang (Tibet).** Baxoi: Demu La, 4870 m (S. Akiyama *et al.* 105089, 26 July 2000).

On grounds in rocky slopes.

9. **Juncus pseudocastaneus** (Lingelsh.) Sam. in Hand.-Mazz., *Symb. Sin.* **7**: 1230 (1936).

*Juncus sikkimensis* var. *pseudocastaneus* Lingelsh. in Limpricht, *Repert. Spec. Nov. Regni Veg. Beih.* **12**: 316 (1922).

**Xizang (Tibet).** Markam: Lawu Shan, 4400 m (S. Akiyama *et al.* 105023, 14 July 2000).

On wet places in grazed grasslands.

10. **Juncus sphacelatus** Decne. in Jacquem., *Voy. Inde 4, Bot.*: 172, t. 172 (1835).

**Xizang (Tibet).** Baxoi: Rawu–Baxoi, 4180 m (S. Akiyama *et al.* 105180, 4 Aug. 2000).

On sandy places beside streams.

11. **Juncus thomsonii** Buchenau in *Bot. Zeit.* **25**: 148 (1867).

**Xizang (Tibet).** Markam: Lawu Shan, 4400 m (S. Akiyama *et al.* 105025, 14 July 2000).

On wet places in grazed grasslands.

12. **Luzula oligantha** Sam. in *Svensk. Vet.-Akad. Handl.*, ser. III, **5**(1): 227 (1927)

**Xizang (Tibet).** Gongbo'gyamda: Basum Lake, 3550 m (S. Akiyama *et al.* 105207, 15 Aug. 2000).

On grazed grasslands.

13. **Luzula spicata** (L.) DC. subsp. *mongolica* Novikov in *Nov. Sist. Vyssh. Rast.* **26**: 34 (1989).

**Xizang (Tibet).** Baxoi: Anjiu La, 4720 m (S. Akiyama *et al.* 105090, 27 July 2000). Zogang: Dongdala Shan, 5150 m (S. Akiyama *et al.* 105033, 16 July 2000).

On rocky slopes.

### Eriocaulaceae

1. **Eriocaulon atrum** Nakai in *Repert. Spec. Nov. Regni Veg.* **9**: 466 (1911).

**Xizang (Tibet).** Gongbo'gyamda: Basum Lake, 3550 m (S. Akiyama *et al.* 105200, 15 Aug. 2000).

On wet places.

This species is new record from Tibet. *Eriocaulon atrum* is distributed from Nepal, Bhutan

and northern India across southwester China to Korea and from Yakushima Island to Hokkaido (Nemuro Peninsula) in Japan. From its distribution, this species is considered to be a Sino-Japanese element (Miyamoto & Ohba, 1998).

### Orchidaceae

1. **Cypripedium guttatum** Sw. in *Kongl. Vetensk. Acad. Nya Handl.* **21**: 251 (1800).

**Xizang (Tibet).** Markam: Markam–Hongla Shan (Boufford *et al.* 29384, 12 July 2000).

2. **Epipactis helleborine** (L.) Crantz, *Stirp. Austr. Fasc. ed. 2*, **2**: 467 (1769).

**Xizang (Tibet).** Bomi: Bomi–Sumzom, 3220 m (Akiyama *et al.* 105161, 2 Aug. 2000); (Boufford *et al.* 29897, 2 Aug. 2000); (Wu *et al.* 105726, 2 Aug. 2000). Gongbo'gyamda: Gongbo'gyamda–Basum (Boufford *et al.* 30031, 14 Aug. 2000).

On grazed grasslands.

3. **Habenaria arietina** Hook. f., *Fl. Brit. India* **6**: 138 (1890).

**Xizang (Tibet).** Bomi: between Bomi and Tangmai (Boufford *et al.* 29831, 31 July 2000).

4. **Habenaria purpureopunctata** K. Y. Lang in *Acta Phytotax. Sin.* **16**(4): 127, f. 2 (1978).

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On exposed rocks.

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var. **amoena** (M. Bieb.) H. Hara in J. Jap. Bot. **44**: 59 (1969).

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On grazed grasslands.

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