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# Taxonomic Studies of *Bistorta* (Polygonaceae) in the Himalayas and Adjacent Regions (I)

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Four new species of the genus *Bistorta* (Polygonaceae), i. e., *B. griersonii* Yonek. & H.Ohashi from Bhutan, *B. longispicata* Yonek. & H.Ohashi from central Tibet, *B. ludlowii* Yonek. & H.Ohashi from southeastern Tibet, *B. burmanica* Yonek. & H.Ohashi from Myanmar (Burma), are described.

**Key words**: *Bistorta*, Himalayas, taxonomy, new species

The Himalayas form one of the diversity center of such polygonaceous genera as *Aconogonon, Bistorta, Fagopyrum* and *Koenigia*, where many characteristic endemic species of these genera have been recorded (Hong 1992, Hedberg 1997, Chen 1999a, 1999b). The genus *Bistorta* is composed of about 30 species in the temperate to arctic regions of the Northern Hemisphere, of which more than two thirds occur in the Himalayas and adjacent regions. The first author has paid special attention to variations and distinctness of Himalayan taxa in many populations when he had botanized in Nepal in 1995 and 1996. Based on these field observations we have investigated this genus by examining more than 3000 sheets of herbarium specimens kept in A, BM, E, GH, K, KANA, KATH, KYO, MAK, NY, P, PE, TI, TNS, TUS and TUSG. Here we describe four new species recognized in the course of this study. Although some of them are known only by a few specimens, we regard them as distinct because of their peculiar specific characters.

**Bistorta griersonii** Yonek. & H.Ohashi, sp. nov. [Figs. 1, 5]
*Bistorta milletii* auct. non H.Lév.; Grierson & D.G.Long, Fl. Bhutan **1**(1): 168 (1983).

Ex speciebus affinibus omnibus teparis 4, staminis 6, stylis 2, ovariis lenticularibus differt.

Herba perennis saxicola vel arenicola. Rhizoma crassum breve. Folia radicalia patentia 10–15 cm longa, laminis oblongo-lanceolatis 6–8 cm longis 1.5–2 cm latis apice obtusis basi cordatis costis purpureis nervis ad margine crassis subtus albo-tomentosis; petiolis purpureis apteris. Caules patentes? 15–20 cm longi glabri 2–3 foliati; folia caulina inferiora brevipetiolata lanceolata 4–5 cm longa 8–10 mm lata apice obtusa basi truncata; superiora minora sessilia. Ochreae foliorum caulinae mediae brunneae glabrae 5–8 mm longae. Inflorescentiae unicae terminales ascendentes dense racemosae brevi-spiciformes 2–4 cm longae 1.4–2.0 cm latae, nodis 1-floriferis. Bracteae et bracteolae castaneae quam pedicelli breviores. Pedicelli 3.5–4.7 mm longi. Flores carnei, teparis 4,

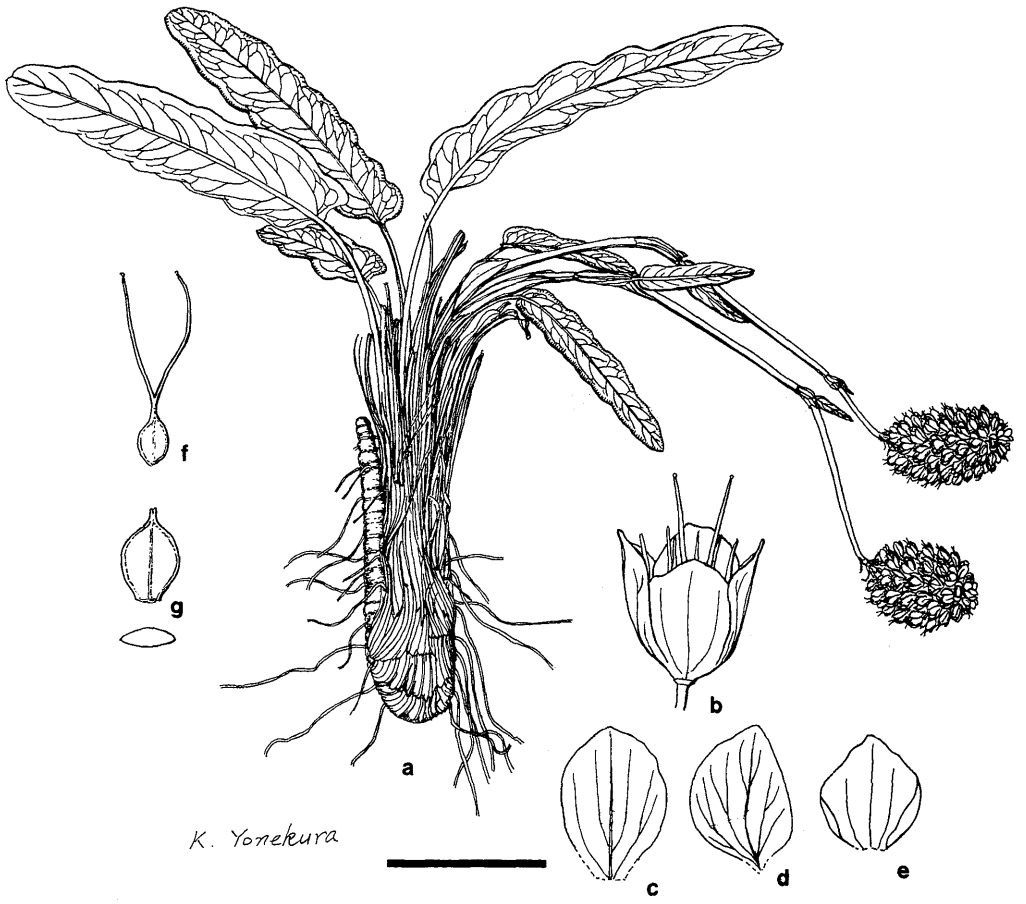


Fig. 1. *Bistorta griersonii* Yonek. & H.Ohashi. a: Habit. b: Flower; anthers fallen off. c: Adaxial tepal. d: Lateral tepal. e: Abaxial tepal. f: Pistil. g: Achene. (Ludlow & al. 19794, BM–Holotype). Scale bar: 3 cm for a; 6 mm for b–g.

rotundis, 4–5 mm longis, apice obtusis seu rotundatis 5-nervibus, margine plus minusive undulatis. Staminis 6, quam tepalis subequalibus, antheris ignotis. Stylis 2, stigmatibus capitatis, ovariis lenticularis. Acheniae late ovato-ellipticae lenticulariae ca. 3 mm longae, perianthiis inclusis.

Type. **BHUTAN**. Dhur Chu Distr., Jiu La, alt. 15500 ft. "Corolla brightest pink. Flowers mostly over. Some seeds collected. Among rocks, on cliff ledges and on steep sandy banks." (F. Ludlow, G. Sherriff & J. H. Hicks 19794, 3 Oct. 1949, Holotype in BM, Isotype in E).

This new species is known only from the type collection. It is endemic to central Bhutan. The specific epithet is dedicated to the honour of the late Dr. A. J. C. Grierson, Royal Botanic Gardens, Edinburgh, for his great contribution to Bhutanese flora.

Grierson and Long (1983) reported this plant for the first time from Bhutan as *Bistorta milletii* H.Lév., but mentioned that the plant differed from *B. milletii* in the thickness of rhizomes and hairiness of leaves, and presumed it as an intermediate between *B. milletii* and *B. subscaposa* (Diels) Petrov. This plant is, however, quite

different from not only the two species mentioned above but also any related species of *Bistorta* in having four tepals, six stamens, and lenticular ovaries with two styles. Only *Bistorta perpusilla* (Hook.f.) Greene is similar in numbers of the tepals and the styles, but entirely different from this new species by its much smaller habits, linear glabrous leaves and smaller flowers. All the other species of *Bistorta* have flowers with five tepals, eight stamens and trigonous ovaries with three styles.

**Bistorta longispicata** Yonek. & H.Ohashi, sp. nov. [Figs. 2, 5]

*Polygonum macrophyllum* D.Don var. *longispicatum* Kitam. in sched.

Haec species *Bistortae macrophyllae* affinis, sed ochreis foliorum caulinis summis vaginis subequalibus vel longioribus, inflorescentiis longioribus bracteis vulgo floribus subequalibus, floribus majoribus teparis adaxialibus 1.5–2-pro iis abaxialibus majoribus.

Herba perennis. Rhizoma crassum 5–10 mm diam. saepe tortuosum intus album. Folia radicalia 7–20 cm longa petiolata, laminis lanceolatis vel triangulari-lanceolatis, 3.5–12 cm longis 0.6–2.4 cm latis, apice acutis vel oblongis basi cordatis vel subtruncatis, subcoriaceis, supra leviter nitidis subtus albo-pubescentibus, margine revolutis cum nervos distincte incrassatis ad margine 50°–80°divaricatis; petiolis 4.5–9 cm longis apteris. Caules erecti 10–30 cm alti, 2–3 foliati, glabri, saepe purpurascenti. Folia caulina inferiora cum petiolis 0.5–1.5 cm longis, laminis anguste ovatis vel lanceolatis 1.3–5 cm longis 0.3–1.2 cm latis, apice obtusis vel subacutis basi cordatis raro rotundatis; superiora brevipetiolata vel subsessilis, laminis lanceolatis linearibusque, apice acutis basi truncatis vel subcuneatis. Ochreae castaneae membranaceae linearinervosae, quae foliorum caulinis summis 3–12 mm longae vaginis subequales vel longiores apice subtruncatae. Inflorescentia unica terminalis cylindrica, 2–8 cm longa, 9–15 mm crassa, nodis 2-floriferis. Bracteae hyalinae ovatae 4–7.5 mm longae floribus subequales vel longiores, acuminatae. Pedicelli 2–4.2 mm longi. Flores lilacini, perianthiis 3.8–6 mm longis. Tepala 5, oblongis apice obtusis, quae adaxialia iis abaxialibus 1.5–2 pro longiora. Stamina 8, filamentis 3.5–5.5 mm longis filiformibus, antheris atropurpureis. Styli 3, 4–5 mm longi, basi leviter connati, stigmatibus capitatis. Ovarium triquetrum ca. 1 mm longum. Acheniae oblongae trigonae ca. 2.5 mm longae, ca. 1 mm crassae, apice brevirostratae.

Type. **CHINA**. Tibet (Xizang). Hills north of Lhasa, 14000 ft. "Flowers rich pink. Habitat: On open steep slopes." (F. Ludlow & G. Sherriff 9794, 12 Jul. 1943, Holotype in BM, Isotype in E).

Other specimens examined. **CHINA**. Tibet (Xizang). Chu Nallah near Gyantse, 14500 ft. (F. Ludlow 179, BM); Tsa Tang, between Xigaze and Lhasa, W. of Qüxü (E. Kawaguchi 62, TNS); vicinity of Lhasa. (H. E. Richardson 174, BM, p. p.); vicinity of Lhasa, Elba Temple (E. Kawaguchi Lhasa-138, 146, 148, 152 & 156, TNS); Mt. Penbo Kola, N. of Lhasa (E. Kawaguchi Lhasa-267, TNS); Mt. Chomo Sese, 14–15 miles NE. of Lhasa (E. Kawaguchi Lhasa-244 & 245, TNS); ibid., the summit, ca. 17500 ft. (E. Kawaguchi s. n., 6 Sep. 1914, TNS, excl. rightmost individual); De la, 14–15 miles S. of Lhasa (E. Kawaguchi Lhasa-321, 340 & s. n., 16 Sep. 1914, TNS); Lhasa, Mt. Ximala-shan, 4800 m (Y. D. Zhang & K.Y. Lang 2111, PE); ibid., near Qiaqisi (temple), 4600 m (Y. D. Zhang & K.Y. Lang 2019, PE); ibid., Daxiqia, alt. 4300 m (Y. D. Zhang & K.Y. Lang 2657, PE); ibid., on the way to Jilungnanchaiqia, 4500 m (Y. D. Zhang & K.Y. Lang 2253, PE).

Distr.: Central Tibet (Xizang), China. Alpine grasslands. alt. 4200–5300 m. Flowering: June to September.

This new species is similar to *Bistorta macrophylla* (D.Don) Soják in its vegetative parts, but differs in having long cylindrical spikes, longer bracts and adaxial tepals much larger than abaxial ones. Adaxial petals of the other species of *Bistorta* are subequal to

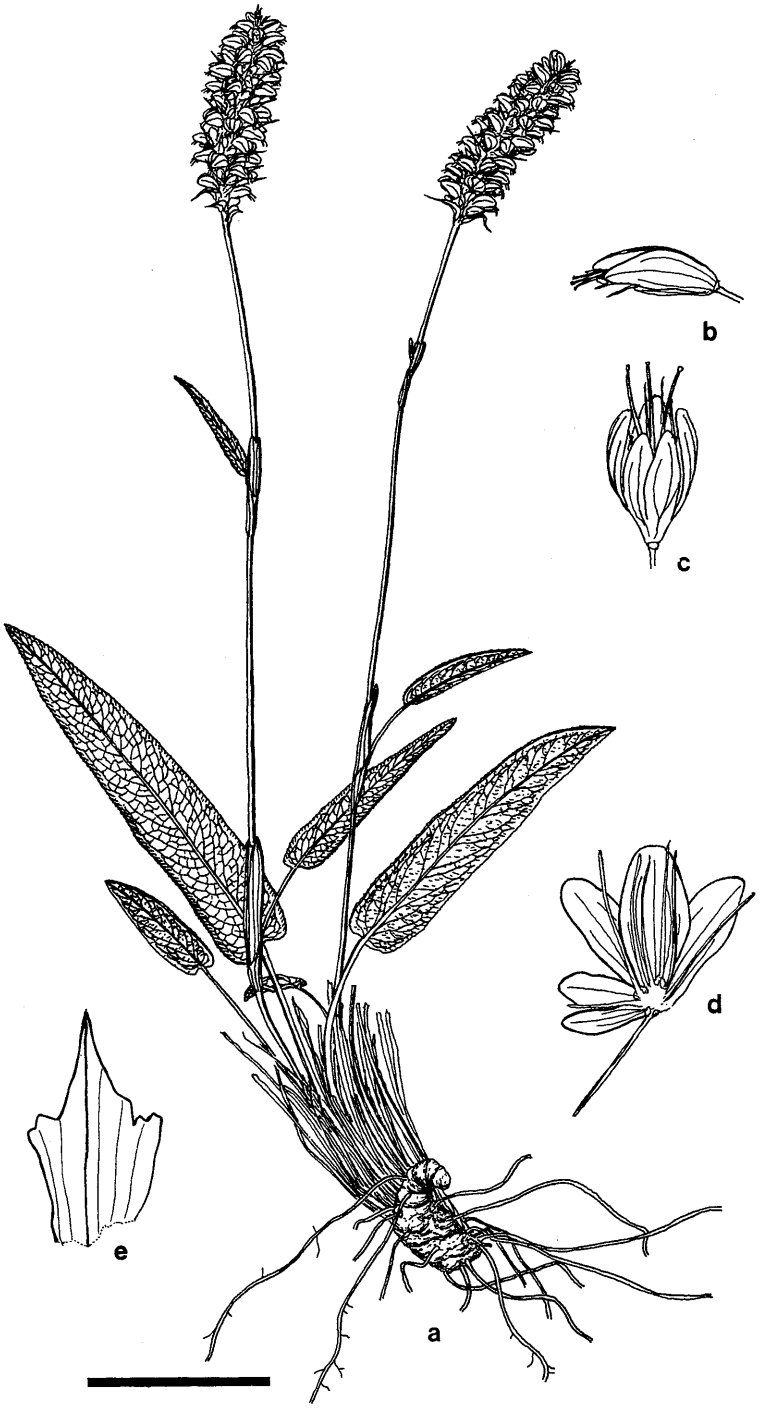


Fig. 2. *Bistorta longispicata* Yonek. & H.Ohashi. a: Habit. b–c: Flower. b: lateral view, c: abaxial view. d: Perianth with filaments, cut and spread out. e: Bract. (Ludlow & Sherriff 9794, BM –Holotype). Scale bar: 3 cm for a; 6 mm for b–e.

or slightly (less than 1.5 times) longer than the abaxial ones.

*Bistorta longispicata* seems to be rather common around Lhasa. It may be sometimes growing together with *B. macrophylla* because both species were collected at the same locality around Lhasa and mounted together on the same sheets (e. g.: Kawaguchi s. n., TNS; Richardson 174, BM), but no specimens intermediate between them are observed.

Specimens of this new species collected by E. Kawaguchi and kept in TNS were identified by Dr. S. Kitamura as "*Polygonum macrophyllum* D. Don var. *longispicatum* Kitam.", but this name is not published. We adopted Dr. Kitamura's epithet for our new species.

**Bistorta ludlowii** Yonek. & H.Ohashi, sp. nov. [Figs. 3, 5]

Haec species *Bistortae macrophyllae* valde affinis, sed ocreis foliorum caulinis summis quam vaginis foriorum longioribus vel subequalibus differt.

Herba perennis. Rhizoma breve 8–14 mm longum, tortuosum, nigro-brunneum. Folia radicalia ascendentia petiolata, laminis anguste triangulari-ovatis vel lanceolatis interdum oblongis vel lanceolati-oblongis, 6–12 cm longis 7–35 mm latis, apice acutis vel obtusis basi cordatis, coriaceis, supra glabris nitidis viridibus cum nervis elevatis, subtus albo-viridibus glabris vel albo-pubescentibus, margine revolutis cum nervis incrassatis marginibus ad angulum 45°–80° patentibus; petiolis 7–11 cm longis apteris. Caules erecti simplici, 14–35 cm alti, 2–4-foliati, glabri. Folia caulina inferiora cum petiolis 1–3 cm longis, laminis anguste ovatis seu lanceolatis interdum ovatis, (1.5–) 2.5–5 cm longis, 7–18 mm latis, apice acutis basi truncatis vel cordatis; superiora vulgo minora sessilia, laminis ovatis seu anguste ovatis apice acuminatis basi cordatis amplexicaulibus. Ochreae brunneae membranaceae apice bifidae, quae foriorum caulinae summae quam vaginae longiores vel subequales. Inflorescentiae cylindricae vel leviter coniciformes 21–35 mm longae 12–15 mm crassae. Flores cernui rosei protandri, perianthiis campanulatis compressis (3–) 3.5–3.8 mm longis; tepalis 5, ovato-ellipticis, apice subacutis vel obtusis; stamina 8, perianthiis subequalibus, filamentis roseis antheris atropurpureis, nectariis atropurpureis; stylis 3, perianthiis exsertis, roseis, stigmatibus capitatis. Achenia ignota.

Type. **CHINA**. SE. Tibet. Doshong La. 29°29′N, 94°59′E, 13500 ft. "On steep grassy hillsides. Leaves glaucous beneath. Perianth rose pink. Filaments rose pink. Anthers black. Dark crimson glands at base of filaments. Ovary green; styles pink." (F. Ludlow, G. Sherriff & G. Taylor 5271, 16 Jul. 1938, Holotype in BM, Isotype in E).

Other specimens examined. **CHINA**. SE. Tibet. Kongbo Prov., Doshong La, 29°29′N, 94°59′E, 12500 ft. (F. Ludlow & al. 14352, BM).

Distr.: endemic to Doshong La in south-eastern Tibet, China. Alpine grasslands. alt. 3800–4100 m. Flowering: July to August.

This species is very similar to *Bistorta macrophylla* (D.Don) Soják in its habit, but is easily distinguishable from the latter by the ochreae of upper cauline leaves longer than subsequent leaf sheathes and by the ovate to lanceolate amplexicaul upper cauline leaves. In *B. macrophylla*, the upper cauline leaves are usually linear or lanceolate and not amplexicaul, and the ochreae are much shorter than well-developed leaf sheathes.

Unusual inflorescences are observed in the specimen, Ludlow & al. 14352 (BM). They have many small globular short-peduncled spikes with several flowers arising from lower nodes of inflorescence axis. This specimen seems to be an abnormal form.


Fig. 3. *Bistorta ludlowii* Yonek. & H.Ohashi. a: Habit. b: Flower, abaxial view. Anthers fallen off. c: Perianth with filaments, cut and spread out. d: Pistil. (Ludlow & al. 5271, BM –Holotype). Scale bar: 3 cm for a; 3 mm for b–d.


Fig. 4. *Bistorta burmanica* Yonek. & H.Ohashi. a: Habit. b: Flower, abaxial view. Anthers fallen off. c: Perianth with filaments, cut and spread out. d: Pistil. (Kingdon-Ward 2584, E –Holotype). Scale bar: 3 cm for a; 3 mm for b–d.

**Bistorta burmanica** Yonek. & H.Ohashi, sp. nov. [Figs. 4, 5]

Habitu *Bistortae milletioides* affinis, sed foliis glabris petiolis apteris, ochreae foliorum caulinis apice subacutis, floribus sub anthesi leviter ascendentibus non cernuis differt.

Herba perennis. Rhizoma breve crassum tortuosum. Folia radicalia 19–25 cm longa pendula, laminis lanceolatis seu oblongis saepe falcatis, 12–17 cm longis 1.4–1.8 cm latis, apice obtusis basi truncatis vel cordatis, supra viridibus cum nervis plus minusive elevatis, subtus pallescentibus, glabris, margine plus minusive revolutis saepe undulatis cum nervis inconspicuis; petiolis 7–8 cm longis apteris. Caules ascendentes 18–27 cm longi glabri 2–3-foliati. Folia caulina cum laminis lanceolatis seu oblongo-lanceolatis saepe falcatis apice acutis vel obtusis basi rotundatis, subcordatis cel subcuneatis; quae inferiora et media petiolata (petiolis ad 2 cm longis) cum laminis 2–8 cm longis 2–12 mm latis; quae superiola subsessilia minora. Ochreae membranaceae brunneae apice subacutae, quae foliorum caulinae summae 3–28 mm longae vaginis 1–2.5 pro longiores. Inflorescentiae erectae

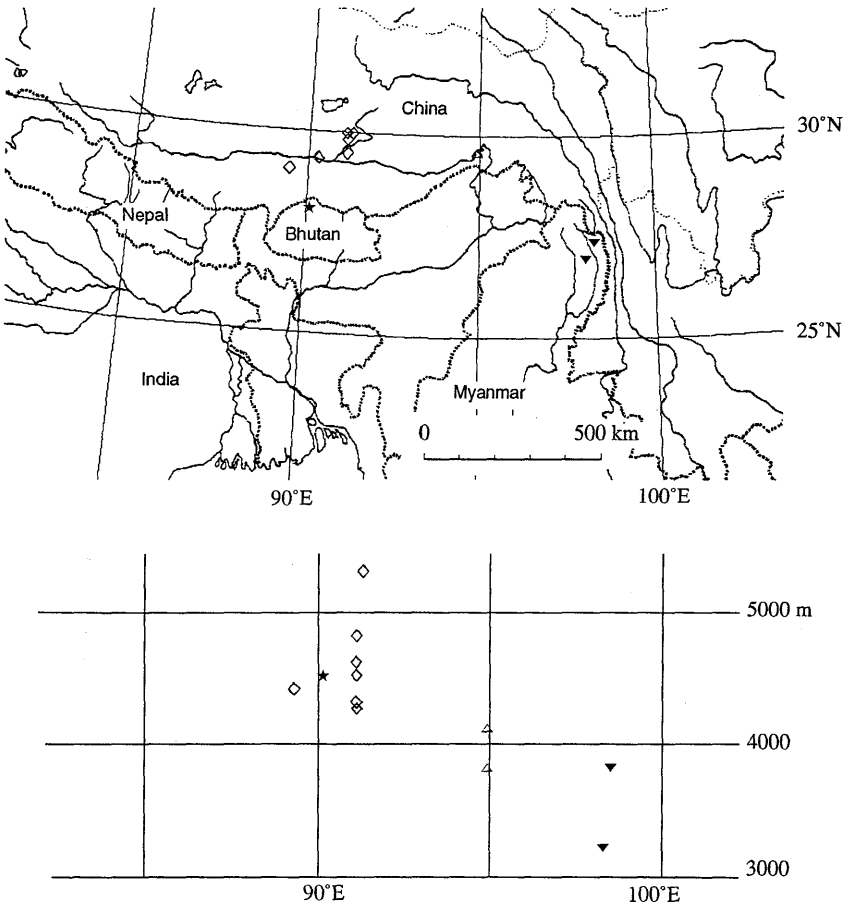


Fig. 5. Distribution of the four new species described in this paper. ★: *Bistorta griersonii*. ◇: *B. longispicata*. △: *B. ludlowii*. ▼: *B. burmanica*.

spiciformes cylindricae dense floriferae 1.3–4.7 cm longae 0.9–1.7 cm crassae, nodis 1-floriferis, bracteis hyalinis anguste-triangularibus 2.5–4.5 mm longis pedicellis subequalibus. Flores leviter ascendentes non cernui cum pedicellis 2.4–4.3 mm longis stramineis saepe purpurascentibus apice leviter incrassatis; perianthiis roseis late campanulatis compressis 2.5–5 mm longis; tepalis 5, oblongo-ovatis, 1.7–4.4 mm longis 1.7–2 mm latis apice obtusis vel rotundatis, 3–5-nervibus; stamina 8, perianthiis subequalibus vel leviter exsertis, filamentis roseis antheris atropurpureis; stylis 3, 2.0–3.5 mm longis, basi leviter connatis, stigmatibus capitatis; ovariis trigonis 1.1–1.8 mm longis. Acheniae ovatae trigonae 1.5–2.5 mm longae apice brevirostratae.

Type. **MYANMAR (BURMA)**. Imaw Bum. 12000–13000 ft. "Flowers brilliant rose pink in erect spikes. On rocks of cliffs or on boulder screes. In sheltered situations. Deeply rooted in black mud." (F. Kingdon-Ward 3584, 29 Aug. 1919, Holotype in E).

Other specimens examined. **MYANMAR (BURMA)**. North Triangle, Tama Bum, 10500 ft. (F. Kingdon-Ward 21476, BM, TI).

Distr.: Northern Myanmar (Burma). Rocky cliffs or boulder screes. Alt. 3200–3900 m. Flowering: August to October.

This new species known only from two collections by F. Kingdon-Ward in Upper Myanmar (Burma) is very similar to *Bistorta milletioides* H.Ohba & S.Akiyama described from Nepal in its pendulous falcate leaves without distinctly thickened marginal veinlets and long ochreae of upper cauline leaves (Yonekura and Ohashi 1999). Both species are also similar in their habitats growing on rocky cliff. These two species are, however, different by characters mentioned in the diagnosis.

We wish to express our sincere thanks to curators of the herbaria BM, E, PE, TI and TNS for making their specimens available. Visiting PE was supported by the Grant-in-Aid for Monbusho International Scientific Research Program no. 10041153 (1999) from the Ministry of Education, Science, Sports and Culture, Japan to H. O.

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米倉浩司[a]，大橋広好[b]：**ヒマラヤと周辺地域のイブキトラノオ属（タデ科）の分類学的検討 (1)**

ヒマラヤとその周辺地域はいくつかのタデ科植物の属の分化の中心であり，イブキトラノオ属も全体の2/3ほどの種がこの地域に固有である．しかし，同地域から記録されている分類群の相互関係や独立性等についてはなお十分に検討されているとは言いがたい．今回記載した4新種はいずれもヒマラヤのごく狭い地域に固有のもので，*Bistorta longispicata* Yonek. & H.Ohashi を除けば数点の標本がこれまで知られているに過ぎないが，いずれも明瞭な特徴を有し，独立の分類群として認められる．

*Bistorta griersonii* Yonek. & H.Ohashi はブータンで従来 *Bistorta milletii* H.Lév. に当てられてきた植物である．イブキトラノオ属の他の大多数の種

では花被片は5枚で雄蕊は8本，花柱は3本であるのに対して，本種は花被片4枚，雄蕊6本，花柱2本に減数している点が特徴である．本属では他に，ヒマラヤに産する *B. perpusilla* (Hook.f.) Greene で花部器官が減数しているが，これは線形の葉を有する矮小な植物で明らかに別種である．種小名は，Flora of Bhutan の共著者の一人であるエディンバラ植物園の故 A. J. C. Grierson 博士にちなんだ．

*Bistorta longispicata* Yonek. & H.Ohashi はチベット中部に固有で，とくにラサ付近で多く採集されている．本種の栄養器官はヒマラヤに広く分布する *B. macrophylla* (D.Don) Soják に似るが，花序が細長く苞が大形で，5枚の花被片のうち向軸側の3枚が背軸側の2枚に対して著しく大きい点で容易に区別できる．本種はしばしば *B. macrophylla* と混生するらしく，両者が同一標本台紙上に貼付された標本があるが，両者の間に中間型は認められない．なお，国立科学博物館に保管されている河口慧海師採集の本種の標本は，京都大学の北村四郎博士により '*Polygonum macrophyllum* var. *longispicatum* Kitam.' と同定されているが，この名は発表されていない．本種は *B. macrophylla* とは別種と考えられるので，北村博士の命名した形容語をここで採用し，新種として記載した．

*Bistorta ludlowii* Yonek. & H.Ohashi はチベット東南部の Doshong La に固有の種で，現在まで F. Ludlow らによって同地で2回採集されているに過ぎない．本種は *B. macrophylla* に全形が酷似するが，上部の茎葉は卵形で抱茎し，その托葉鞘は葉鞘よりも長いか同長である点で異なる．一方，*B. macrophylla* においては，上部の茎葉は普通線形ないし披針形で抱茎せず，その托葉鞘は痕跡的で葉鞘よりもはるかに短い．特に托葉鞘の特徴は安定しているので，本種は独立種と考えられる．

*Bistorta burmanica* Yonek. & H.Ohashi はミャンマー北部に固有で，F. Kingdon-Ward によって2ヶ所で採集されただけである．本種は岩場に生育し，葉がしばしば鎌状に曲がって下垂し，上部の茎葉の托葉鞘が長い等の点でネパール産の *B. milletioides* H.Ohba & S.Akiyama に似るが，葉は無毛で葉柄に翼がない点で異なる．

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