

# *Fagopyrum urophyllum* (Polygonaceae), a new record for India and notes on its typification

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**Abstract:** *Fagopyrum urophyllum* (Bureau & Franch.) H.Gross (Polygonaceae), is reported here as a new record to the Indian flora. The species, earlier known only from China, has been collected from the Namchi and Tendong region of the South district, Sikkim, India at an altitude of 1845 m. A description along with illustration, photo plate of dissected flower parts, and a distribution map in India is provided herewith. Notes on the lectotypification of the name *Fagopyrum urophyllum* and a national conservation status of this species in India is also provided.

**Keywords:** Flora, Lectotype, New distribution, *Polygonum*, Sikkim, Tendong.

## Introduction

The genus *Fagopyrum* Mill. (Polygonaceae) comprising of 28 species, is native of Indo–China to South Siberia (POWO, 2020). It is characterized by an ascending annual or perennial habit with deltoid to hastate leaves, oblique ochrea, heterostylous flowers and largely plaited cotyledons in the achenes (Dash, 1996). Hooker (1890) reported three species of *Fagopyrum* from the British India, while Steward (1930) reported four species from India. With regard to the Indian Himalayan region, four species viz., *F. kashmirianum* Munshi, *F. cymosum* (Trevir.) Meisn., *F. esculentum* Moench, *F. tataricum* (L.) Gaertn. have been reported (Dash, 1996, 2004; Srivastava, 2014; Sinha *et al.*, 2019). Out of these, the latter three species are reported from

Sikkim Himalaya (Grierson & Long, 1983; Dash, 2004).

As part of an ongoing taxonomic study of the family Polygonaceae in Eastern Himalaya, India, the authors collected flowering specimens of *Fagopyrum* from Namchi, South district, Sikkim in flowering condition. A critical examination of collected materials from field, study of the relevant literature (Hooker, 1890; Hara, 1966; Grierson & Long, 1983; Dash, 1996, 2004; Sinha *et al.*, 2019) and comparing the recent collected voucher specimens with earlier collected herbarium specimens housed at different herbaria (CAL, BSHC, ASSAM, ARUN, P, NY and K) the plant was identified as *Fagopyrum urophyllum* (Bureau & Franch.) H.Gross which is hitherto unrecorded from India. A detailed description along with a colour photo plate, line drawings, locality map and field notes have been provided herewith.

## Materials and Methods

Flowering specimens were collected from South district of Sikkim at an altitude range of 1800–1900 m during post monsoon and processed for the preparation of voucher specimens following a standard protocol (Jain & Rao, 1977). Photographs were taken in the field with a HX 400V camera (Sony, Tokyo, Japan). Flowers were dissected and observed under a SMZ1500 stereo microscope (Nikon, Tokyo, Japan) to study micro-morphological characters. Earlier collections of the species lodged in Indian herbaria were also examined; the description was prepared based on the field observations and vouchers specimens.

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The current distribution status of *Fagopyrum urophyllum* in the Indian Himalayan region was assessed using the software ArcGIS 10.5 (ESRI, 2016). The geographical coordinates of each of the populations were collected with the help of a GPS (Garmin eTrex® 30x, Taiwan) during the survey. In view of the absence of any data on the population size of previous collected specimens from the Indian Himalayan region, only the latitude and longitude of the particular localities were considered to estimate the geographic range of this species. The software Conservation Assessment Tool (CAT) developed by the Royal Botanic Gardens, Kew, UK was used as an extension for ArcView 3.x, version 1.2, for estimating the extent of occurrence (EOO) and the area of occupancy (AOO) for a conservation assessment based on IUCN Categories and Criteria (2019).

## Taxonomic Treatment

***Fagopyrum urophyllum*** (Bureau & Franch.) H.Gross, Bull. Géogr. Bot. 23: 21. 1913. *Polygonum urophyllum* Bureau & Franch., J. Bot. (Morot) 5(10): 150. 1891.

*Lectotype* (designated here): CHINA, Se-tchuen (Sichuan) province, around Ta-Tsien-Lou, *s.d.*, Prince Henri d'Orléans, collected during the trip of M. Bonvalot and Prince Henri d'Orléans (Voyage de M. Bonvalot et du Prince Henri d'Orléans à travers l'Asie), *s.n.* (P [P04963938 digital image!]); isolecoto P [P04963934 digital image!]).

Figs. 1 & 2

Perennial undershrubs. Stems 60–90 cm long, simple, terete, sub-erect, brownish, much branched, 2–3 mm in diam., glabrous, finely striate, slightly woody; internodes 3.5–7 cm long, upper half of stems with shorter internode than lower half, reddish brown to green, finely pubescent at nodes. Ochrea membranous, tubular, 5–9 mm long, oblique at mouth, eciliate, prominently veined, glabrous, brown. Petioles 2–6 cm long, terete, densely pubescent, greenish. Leaves deltoid to hastate, 2–8 × 1.5–4 cm, broadly sagittate at base, margin entire, attenuate to long acuminate at apex

(acumen 1–2 cm long), coriaceous; upper surface dark green, glaucescent, midrib prominent, minutely pubescent along veins, otherwise glabrous; lower surface light green, densely pubescent along veins, usually with whitish hair; lateral veins 6–7 pairs, palmately arranged; Inflorescence terminal, lax spreading branched panicles, 7–20 cm long; peduncle minutely pubescent, rarely glandular, 5–12 cm long; bracts greenish, narrowly funnel-shaped, 2–3 mm, apex acute to shortly acuminate, entire, glabrous, each 3 to 4-flowered. Pedicels 3–4 mm long, slender, glabrous, articulate at apex. Flower pentamerous, 2.5–4.5 mm long. Perianth lobes (tepals) 5, white, in two whorls, elliptic or elliptic-oblong, 2–3 × 1.5–2 mm, obtuse at apex, margins entire, persistent. Stamens 8, alternating with yellowish glandular discs; filaments unequal, 1.5–2 mm long, glabrous; anthers purple, 0.5–1 mm long, dorsifixed, dehiscence longitudinally. Ovary superior, trigonous, 0.5–0.8 mm long; styles 3, free, 0.7–1 mm long; stigmas capitate. Achenes broadly ovoid, abruptly trigonous, 3–4 × 1.5–2 mm, much exceeding or equalling the persistent perianth, black-brown, glabrous.

*Flowering & fruiting*: Flowering from June to August; fruiting from July to November.

*Habitat*: Scatterley grows on gravelly hill slopes, forest margins, footpaths, brushes in valleys; at an elevation range of 1500–2200 m.

*Distribution*: INDIA: Namchi, Tendong Reserve, South district, Sikkim. CHINA: South and Central.

*Specimens examined*: INDIA, Sikkim, South district, near Namchi, N 27° 92 57.543, E 88° 222 8.463, 1848.5 m, 24.10.2020, M.Das & S.S.Dash 84754 (CAL); *Ibid.*, N 27° 92 26.13, E 88° 252 133, 1801 m, 24.10.2020, M.Das & S.S.Dash 84758; near Tendong, N 27° 122 6.623, E 88° 232 463, 1785 m, 24.10.2020, M.Das & S.S.Dash 84755 (CAL); Namchi, 06.08.2000, B.K.Shukla 23548; *Ibid.*, 06.08.2000, B.K.Shukla 23540; Tendong R.F., 17.08.1985, A.K.Verma 3785 (BSHC).

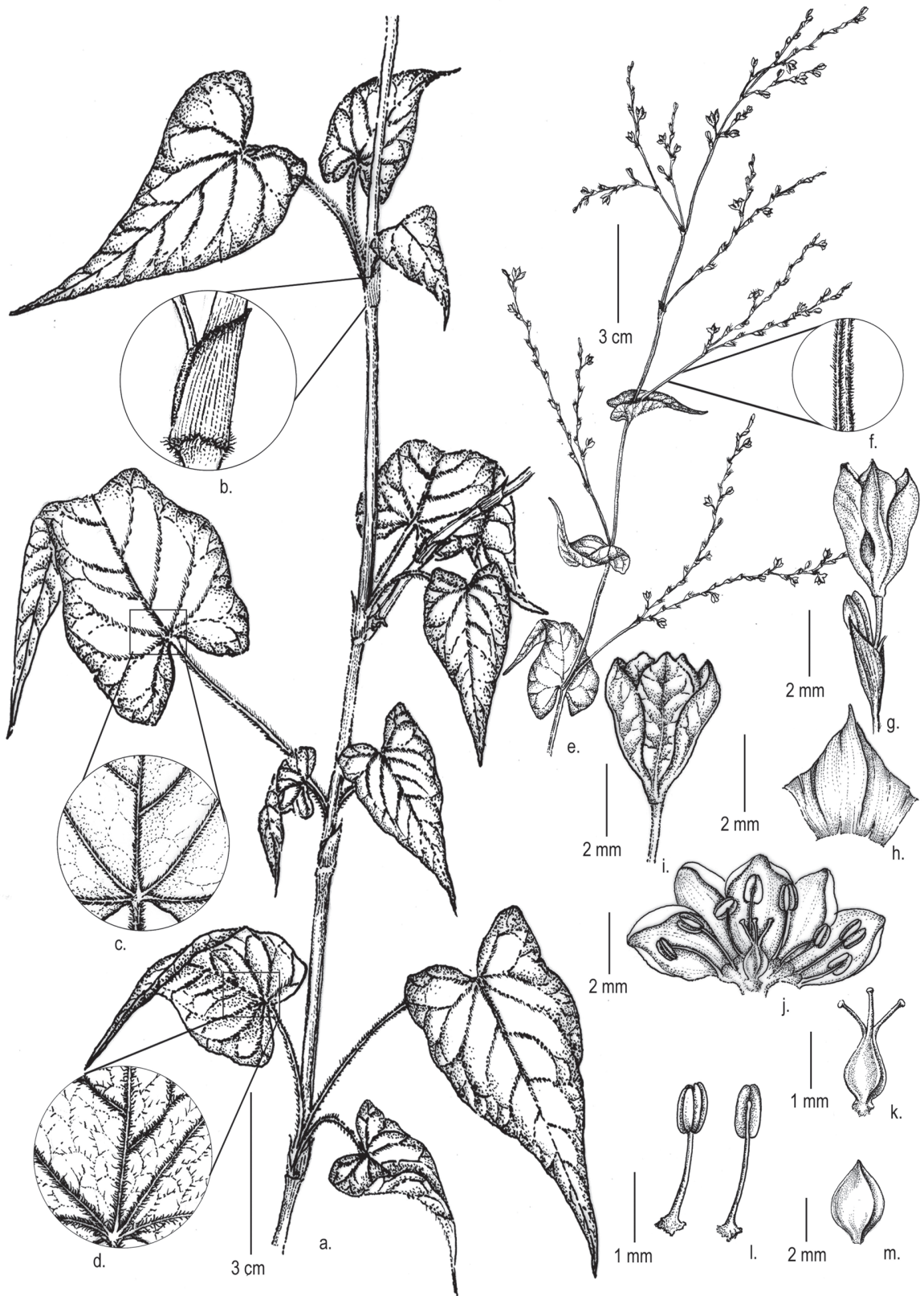
*Conservation status*: During our studies, we were able to locate eight populations of *Fagopyrum*





**Fig. 1.** *Fagopyrum urophyllum* (Bureau & Franch.) H.Gross **a.** Habit; **b.** Inflorescence; **c.** Flower; **d.** Adaxial surface of leaf; **e.** Abaxial surface of leaf; **f.** Petiole; **g.** Ochrea; **h.** Flower twig; **i.** Peduncle; **j.** Bract: adaxial surface; **k.** Flower; **l.** Tepal split open; **m.** Stamens; **n.** Pistil (photos by Monalisa Das).





**Fig. 2.** *Fagopyrum urophyllum* (Bureau & Franch.) H.Gross: **a.** Habit; **b.** Enlarged view of ochrea; **c.** Enlarged view of adaxial leaf surface; **d.** Enlarged view of abaxial leaf surface; **e.** Inflorescence; **f.** Enlarge view of Peduncle surface; **g.** Flower twig; **h.** Bract: abaxial surface; **i.** Flower; **j.** Tepal split open; **k.** Pistil; **l.** Stamens; **m.** Achene (drawn by Monalisa Das).



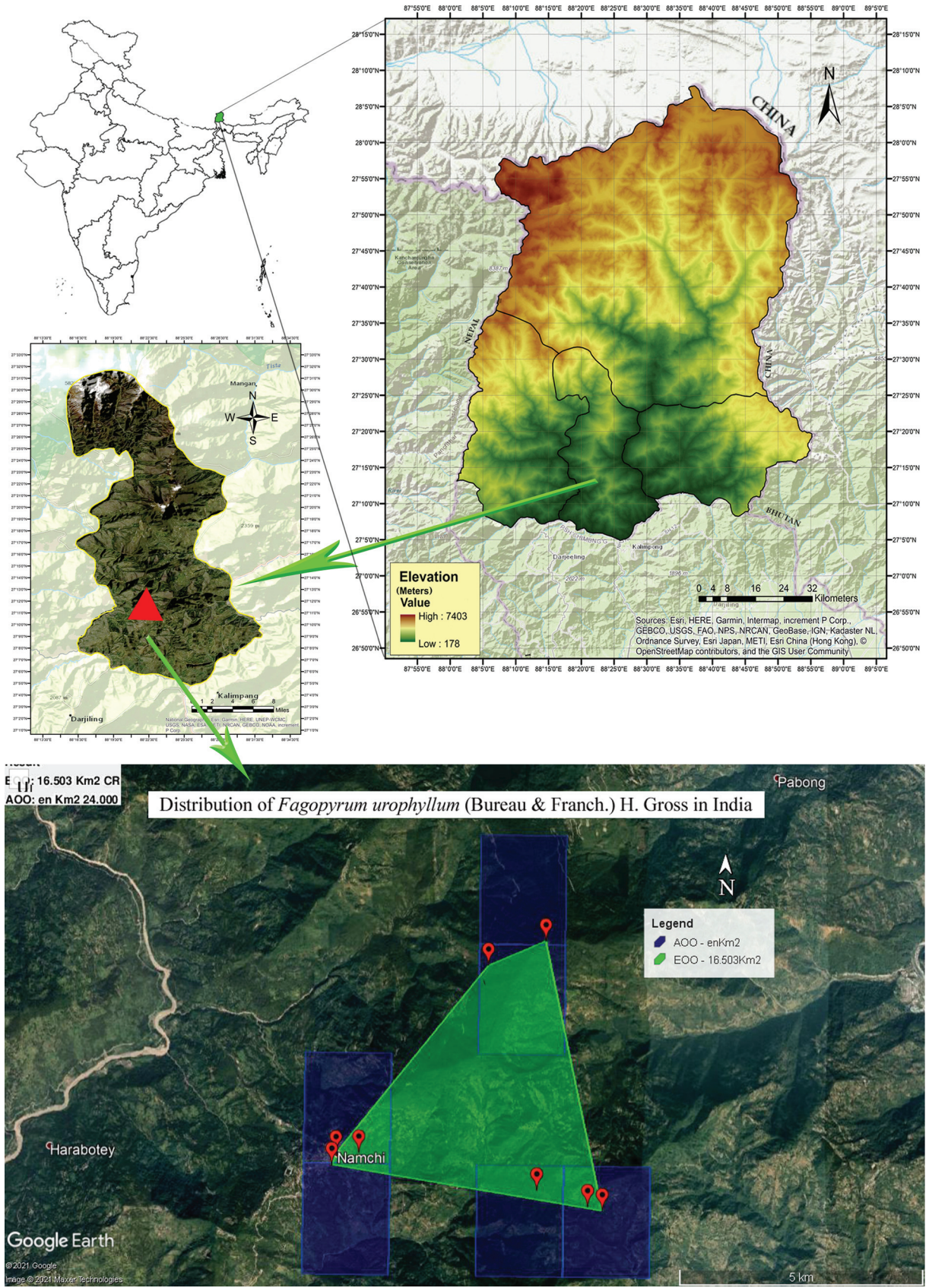
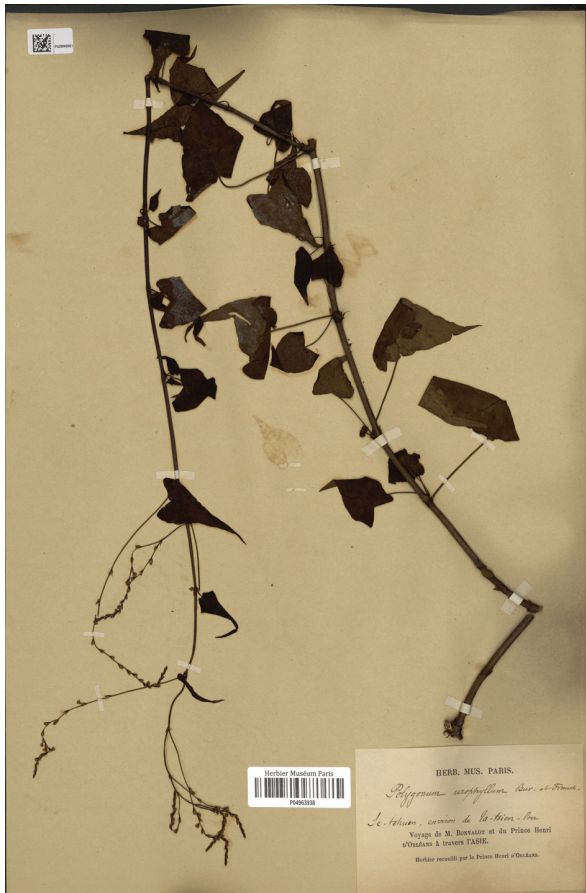


Fig. 3. Locality maps and current distribution status of *Fagopyrum urophyllum* (Bureau & Franch.) H.Gross, near Namchi, Sikkim, South district, India.



*urophyllum* in Namchi South district, Sikkim and its surrounding areas (GPS coordinates: N 27° 92 57.543, E 88° 222 8.463; N 27° 122 6.623, E 88° 232 463; N 27° 92 26.13, E 88° 252 133; N 27° 92 28.633, E 88° 252 23 ; N 27° 92 54.133, E 88° 212 513; N 27° 92 39.13 , E 88° 242 243; N 27° 102 1.763, E 88° 212 543; N 27° 122 23.243, E 88° 242 28.913.) (Fig. 3). Each population consisted of 5–10 mature plants in various flowering stages. According to the GPS coordinates, the extent of occurrence (EOO) of the species *F. urophyllum* was calculated to be 16.5 km<sup>2</sup>, and the area of occupancy (AOO) 24 km<sup>2</sup>. While calculating the EOO and AOO we have also taken into consideration earlier collections. The species is dwindling in its natural habitat due to severe habitat fragmentation and vulnerable because of its low density of adult plants.



**Fig. 4.** Lectotype of *Polygonum urophyllum* Bureau & Franchet (P04963938). <http://coldb.mnhn.fr/catalognumber/mnhn/p/p04963938> © Muséum National d'Histoire Naturelle, Paris, France, Collection: Vascular plants (P), Specimen P04963938, Reproduced with permission.

Moreover, the natural habitats of the species are under continuous pressure from various developmental activities in the region, such as road construction, Building construction etc. Other possible threats are land clearance for agriculture expansion, high grazing and forest fires. Since no data on the population sizes of previous collections were available, we only used the geographic coordinates of the collected localities to estimate the geographic range of this species (Moat, 2007) through the Conservation Assessment Tool GeoCAT. With the currently available information, the threat status for *Fagopyrum urophyllum* in India has been assessed as 'Critically Endangered' [CR B1ab(iii)+2ab(iii);].

**Notes:** This species was initially placed in section *Tiniaria* of genus *Fagopyrum* (Gross, 1913), but later Steward (1930) treated it under section *Fagopyrum* of genus *Polygonum*. Haraldson (1978) elevated section *Fagopyrum* to generic rank. The species also shows similarity in leaf characteristics with *Fallopia convolvulus* (L.) Love. *Fagopyrum urophyllum* can be easily differentiated from its allied species by its shrubby habit, broadly sagittate leaves with long acuminate or caudate apex.

### Lectotypification

Bureau and Franchet (1891), while describing *Polygonum urophyllum* provided for their collection of specimens from China only the locality information, Sichuan province, around Ta-Tsien-Lou in 1890 during a trip of M. Bonvalot and Prince Henri d'Orléans. Gross (1913), while transferring the species to *Fagopyrum*, did not indicate any original collection. Therefore, the species name requires lectotypification. We traced two specimens with locality given as: "Chine, province du Setchuen, autour de Ta-tsien-lou" at P (Muséum National d'Histoire Naturelle, Paris) with barcodes P04963934 and P04963938 (digital images!).

The sheet P04963938 (digital image!) bears all the characteristics mentioned in the protologue and is well preserved. Hence, the material, P04963938 has been selected here as the lectotype of the name

*Polygonum urophyllum* (basionym of *Fagopyrum urophyllum*) as per Art. 9.3 of the ICN (Turland *et al.*, 2018).

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