



Contributions to the Flora of Myanmar IV: A new species and a newly recorded taxon of the genus *Sapria* (Rafflesiaceae)

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(Manuscript received 10 May 2019; accepted 2 August 2019; online published 20 August 2019)

ABSTRACT: In the course of our intensive floristic inventories for the flora of Myanmar, a new species of the genus *Sapria* (Rafflesiaceae), *S. myanmarensis* Nob. Tanaka, Nagam., Tagane & M.M. Aung is described and photographed. In addition, *S. himalayana* Griff. f. *albovinosa* Bänziger & B. Hansen is newly recorded in the country. A key to the species of *Sapria* presently occurring in Myanmar is provided.

KEY WORDS: Burma, Inventory, Myanmar, Parasitic plant, Rafflesiaceae, *Sapria myanmarensis*, *Sapria himalayana* f. *albovinosa*.

INTRODUCTION

Myanmar is under-collected of plant specimens among continental Southeast Asian countries, and much more collecting is required to produce a complete account of the vascular flora of the country. The general introduction to our present inventory studies of Myanmar vascular plants, as well as the materials and methods, was given in the first paper of this series (Tanaka *et al.*, 2018), and is therefore not repeated here.

In the course of our floristic inventories in Chin Hills, Kachin State and the Sagaing Region in the Northwestern part of Myanmar, two species *Sapria* Griff. (Rafflesiaceae) were collected. One species was identified as *Sapria himalayana* Griff., and another species did not match the protologues of all published names.

The genus *Sapria* Griff. is one of three genera belonging to the family Rafflesiaceae, in which all members are holoparasitic on *Tetrastigma* (Vitaceae) (Trần *et al.*, 2018). Rafflesiaceae produce reduced and modified vegetative bodies, and the flowering shoot arises from the undifferentiated endophyte (Nikolov *et al.*, 2014). *Sapria* is well distinguished from the other two genera of Rafflesiaceae, *Rafflesia* R.Br. ex Thomson and *Rhizanthus* Dumort. by the presence of ten perianth lobes in two whorls (Hansen, 1972; Meijer, 1997; Nikolov and Davis, 2017). Most members of Rafflesiaceae have a large floral chamber defined by a diaphragm. However similar floral chambers in *Rafflesia* and *Sapria* are constructed very differently. The diaphragm is derived from the petal whorl in *Rafflesia*, on the other hand, in *Sapria* it is derived from elaboration of a ring structure located between the perianth and the

stamen whorl (Nikolov *et al.*, 2013). The genus *Sapria* consists of three species with an infraspecific taxon, namely *Sapria himalayana* Griff., *S. himalayana* f. *albovinosa* Bänziger & B. Hansen, *S. poilanei* Gagnep. and *S. ram* Bänziger & B. Hansen (Bänziger and Hansen, 1997; Bänziger *et al.*, 2000). *Sapria poilanei* is endemic to Cambodia, and *S. ram* is endemic to Thailand. Among them, only *S. himalayana* has wide distribution range from India to Vietnam (India, Myanmar, SW China, Thailand, and Vietnam). In India, *Sapria* has been recorded only from Arunachal Pradesh (Arunachalam *et al.*, 2004; Borah and Ghosh, 2018). Hurdley and Ko (1961) reported *S. himalayana* from Myanmar, however no herbarium specimens have been deposited in any herbaria keeping Myanmar materials (BM, E, K, RAF). Recently Trần *et al.* (2018) studied the identification and ecological aspects of *S. himalayana* f. *albovinosa* from Vietnam and well compared it with the two related species, *S. poilanei* and *S. ram*.

In this study, the morphology of materials collected in Myanmar were examined. Based on the detailed morphological examination, the plant that was collected from Kachin State and in the Sagaing Region (northwestern Myanmar) is morphologically similar to *S. himalayana*, but distinguished by its vermilion perigone lobes with many fewer white-colored warts, a much shorter perigone tube, a large flat central disk, a greater diameter of the disk crest, and infundibuliform ramentae with crateriform apices.

Consequently, it is confirmed to be a hitherto-undescribed taxon, and thus we describe it as a new species, *Sapria myanmarensis* Nob. Tanaka, Nagam., Tagane & M.M. Aung as in the taxonomic treatment

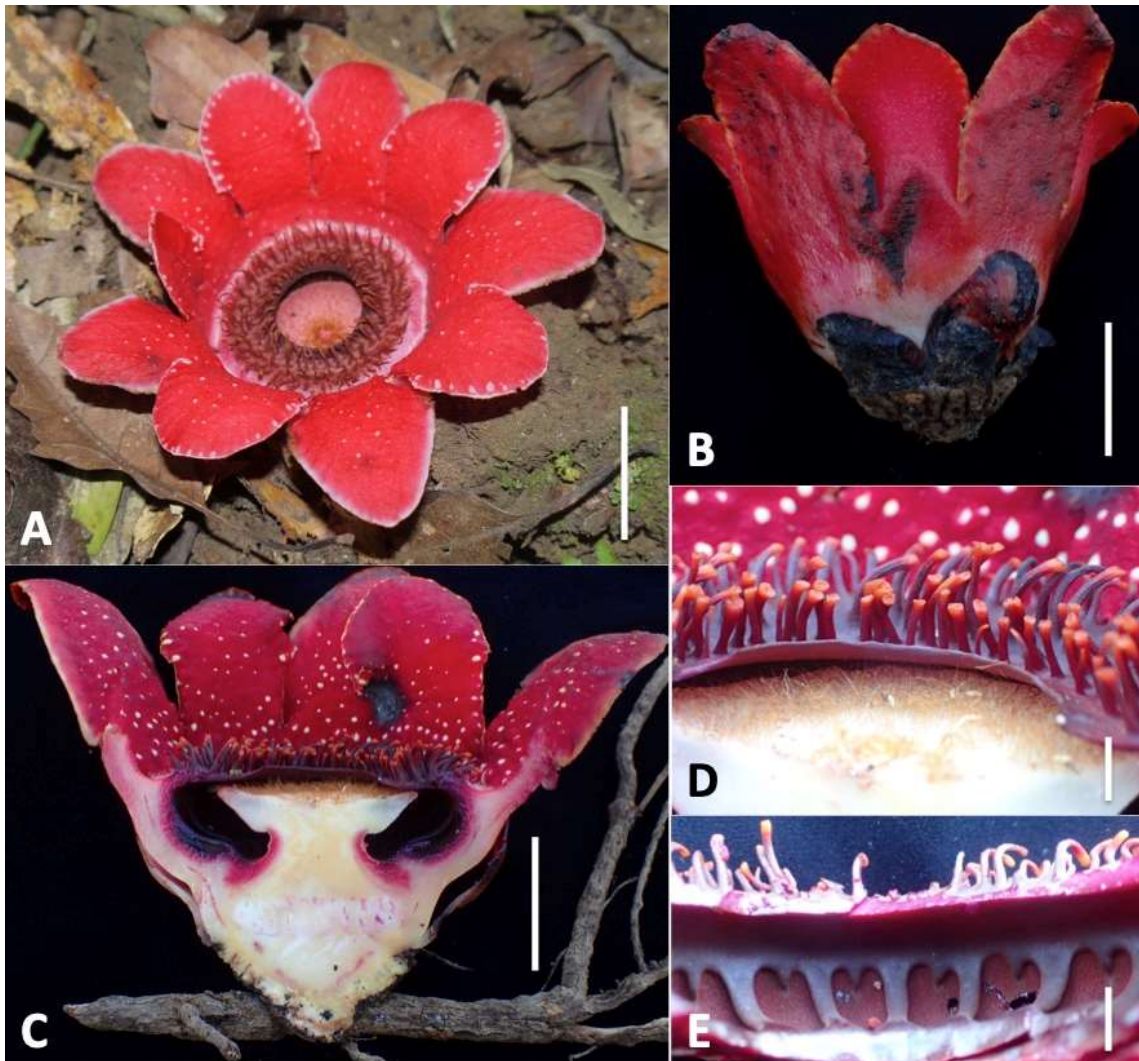


Fig. 1. *Sapria myanmarensis* (female flower) from the type locality (*Mu Mu Aung & Aung Khaing Win MY3336*) **A:** Fully opened flower. **B:** Side view of flower. **C:** Longitudinal section of a flower attached to a *Tetrastigma* root. **D:** Upper surface of disk and ramenta on collar. **E:** Inner surface of perigone tube. Scales: 3 cm for A, B and C; 1 cm for D and E. (Photographs: Mu Mu Aung).

below. The taxonomic description below was made based on the living plants in the field, alcohol preserved specimens, and dried herbarium materials. The terminology used in the description follows Bänziger and Hansen (1997) and Trần *et al.* (2018). Types are deposited in RAF and TNS.

In addition to this new species, *S. himalayana* f. *albovinosa*, not previously reported for Myanmar, was collected from Chin State. Thus, a total of two species of *Sapria* are now recorded in Myanmar. Taxonomic descriptions of both species are given below as well as an identification key.

TAXONOMIC TREATMENT

Sapria myanmarensis Nob. Tanaka, Nagam., Tagane & M.M. Aung, *sp. nov.*

Figs. 1 & 2

TYPE: MYANMAR. Kachin State: Mohnyin Township, Indawgyi Wildlife Sanctuary, in hill evergreen forest, 24°58'26.9"N, 096°22'47.6"E, ca. 500 m elev., 22 January 2018, *Mu Mu Aung & Aung Khaing Win MY 3336* (holo TNS; iso RAF).

Diagnosis: Similar to *Sapria himalayana* Griff., but it is distinguished from it by a combination of features including vermilion perigone lobes with white-colored warts distributed only basally, a shorter perigone tube (1.5–2 cm vs. 3–4 cm in *S. himalayana*), a flat central disk (not bowl- or pan-shaped), a greater diameter of the disk crest (4–4.5 cm in diam. vs. 3.5–3.9 cm in diam. in *S. himalayana*) and crateriform ramenta.

Parasitic on the roots of *Tetrastigma* (Vitaceae). Flower buds prior to bloom ca. 7 cm in diam. Cupule 1.5–2 cm high. Bracts 10 in two whorl, triangular-obtuse, those in outer whorl 5, 2–3 cm long, those in inner whorl 5, 4–4.5 cm long. Both of male and female flowers 10 cm



Fig. 2. *Sapria myanmarensis* (male flower). **A:** Fully opened flower. **B:** Flower bud. **C:** Longitudinal section of flower. **D:** Central column viewed from the bottom showing stamens. **E:** Side view of central column and a tangential section of the disk from a flower bud. Scales: 3 cm for A and B; 1 cm for C, D and E. Photographs: A–B, Mu Mu Aung, C–D, Win Nwe (*Mu Mu Aung & Win Nwe MM140*); E, S. Tagane (*Tagane et al. MY1103*).



in diam., 10 cm in height. Perigone tube 20–25 cm in circumference. Perigone lobes 10 in two whorls (5 in inner whorl and 5 in outer whorl), broadly obovate to slightly rhomboid, vermilion dotted with white-coloured warts basally, 4–4.5 cm long, 3.5–4 cm wide, rounded at apex, margin entire, size and shape of perigone lobes in the inner whorl and the outer whorl almost equal. Diaphragm 6–6.3 cm in diam.; collar 2.1–2.4 cm wide, basal band of collar 5–6 mm wide, pink, median band of collar (ramenta band) 1.2–1.3 cm wide, dark wine-red, distal band of collar 4–5 mm wide, dark red turning purplish black with age, ramenta linear, slightly curved, dark purple, with apices crateriform and orange, 0.6–1 cm long; aperture of collar 2–2.5 cm in diam. Central column (female) 1.4–1.5 cm high, 1.7 cm wide at the narrowest point; disk almost flat, 7–8 mm high, 4–4.5 cm wide at the crest, upper surface pale pink, inside white, depth of disk 2–3 mm, stigmatic fascia 1.5 cm wide, dorsal part of disk densely covered by cinnamon hairs, outer wall sparsely bristly; reduced anthers 20 on the stalk of column, protruding ca. 1 mm. Central column (male) 1.5 cm high, 1 cm wide at the narrowest point; disk flat, 5–6 mm high, 4.5 cm wide at the crest, upper surface pale pink, inside reddish pink, dorsal part of disk densely covered by cinnamon hairs, outer wall sparsely bristly; anthers 20, set in a ring on the stalk of column, each anther 2.5 mm wide, located on tissue slightly elevates as protuberance, blackish purple, pollen exuded as dull yellow mush. Ridges of tube topped by the flange, 3–4 mm high, flange transversely roof-shaped, 2–3 mm wide. Fruits not seen.

Phenology: Flowering in dry season (December to March). Fruiting period unknown.

Distribution: Endemic to Myanmar. Thus far known only from northwestern part (Kachin State and Sagaing Region).

Etymology: The specific epithet is derived from the name of the country.

Vernacular name (Myanmar): Taung Kyar, meaning “mountain lotus flower”.

Preliminary conservation assessment: Less than ten flowers were observed in each location. Although further investigation is required on its distribution and population size, the IUCN category of this species should be assignable to be “Critically endangered” (CR) based on the current situation with less than 50 individuals in a narrow distribution range in northern central Myanmar (Fig. 3) under the criteria D of the IUCN Red List Categories and Criteria (IUCN 2017). The population is possibly continuing decline due to habitat disturbance such as the expansion of croplands in the future and need to attention to conserve its habitat.

Note: So far *Sapria myanmarensis* was collected from three locations in the country but we failed to specify the host species of *Tetrastigma* in the field.

Other specimens examined (paratypes): MYANMAR.

Kachin State: Mohnyin Township, Indawgyi Wildlife Sanctuary, in hill evergreen forest, 24°58'26.9"N, 96°22'47.6"E, 515 m elev., 7 December 2016, *Shuichiro Tagane, Hidetoshi Nagamasu, Norikazu Okabe, Mu Mu Aung, Yunn Mi Mi Kyaw & Aung Khaing Win MY1103* (RAF, TAI, TNS); loc. cit., 800 m elev., 9 December 2016, *Shuichiro Tagane, Hidetoshi Nagamasu, Norikazu Okabe, Mu Mu Aung, Yunn Mi Mi Kyaw & Aung Khaing Win MY1415* (RAF, TNS). **Sagaing Region:** Mt. Zalon, Banmauk Township, 847 m elev., 5 March 2018, *Mu Mu Aung, Win Nwe & Aung Khaing Win MM 140* (RAF).



Fig. 3. Distribution of *Sapria myanmarensis* (●) and *S. himalayana* f. *albovinosa* (○) in Myanmar.

A newly recorded taxon

Sapria himalayana Griff. forma *albovinosa* Bänziger & B. Hansen in Nat. Hist. Bull. Siam Soc. 48: 214 (2000); Trần *et al.* in Bot. Stud. 59: 29 (2018).

Fig. 4.

Phenology: Flowering in November (in Myanmar).

Distribution: Myanmar, Thailand and Vietnam.

Note: *Sapria himalayana* has been cited in the checklist of Myanmar plants by Hundley and Ko (1961) and Kress *et al.* (2003), however, no herbarium specimens were mentioned in these citations. Our material that was collected from the Chin Hills is applicable to *S. himalayana* f. *albovinosa* based upon its white warts dotting the wine red perigone lobes as noted by Bänziger *et al.* (2000) and Trần *et al.* (2018). Forma *albovinosa* is newly recorded from Myanmar in this study. We have thus far not collected f. *himalayana* in Myanmar.



Fig. 4. *Sapria himalayana* f. *albobinosa* (female flower). **A:** Side view of flower. **B:** Fully opened, slightly senescent flower from the top. **C:** Central column and bowl-shaped disk. **D:** Inner surface of perigone tube (central column removed). Scales: 5 cm for A and B; 2 cm for C and D. Photographs: N. Tanaka (Tanaka *et al.* 2013).

Specimen examined: MYANMAR. Chin State: north of Matupi, along the Hakka road, between Matupi and Hakka, Matupi Township, 21°58'42.06"N, 93°24'53.87"E, 1350 m elev., 25 November 2017, Nobuyuki Tanaka, Shinobu Akiyama, Mu Mu Aung & Aung Khaing Win 2813 (RAF, TNS).

A key to taxa of *Sapria* in Myanmar

- 1a. Flowers vermilion, 15–20 cm in diam., dotted with white-coloured warts scattered at the base and margins of the perigone lobes, inner and outer whorls of perigone lobes almost equal; diaphragm pale pink to dark wine red, disk crest 4–4.5 cm in diam., occurring at elevations less than 850 m. *Sapria myanmarensis*
- 1b. Flowers blood-red, 10–20 cm in diam., dotted with numerous yellow-white warts across the entire lobe surface; inner whorl perigone lobes smaller than outer whorl; diaphragm pinkish white; disk crest 3.5–3.9 cm in diam. occurring at elevations more than 1200 m. *Sapria himalayana* f. *albobinosa*

ACKNOWLEDGMENTS

This study was carried out by the international cooperative project “Biological Inventory in SE Asia with special attention to Myanmar” as the integrated research initiated by the National Museum of Nature and Science, Japan based on a memorandum of understanding (MoU) with the Forest Department, Ministry of Natural Resources and Environmental Conservation, Myanmar. The authors are grateful to Forest Department of Myanmar for permitting and supporting our botanical surveys in the protected areas. Thanks are due to Prof. Emeritus Dr. Daniel L. Nickrent for his very helpful and constructive comments on the draft, and also reviewing the English. This study was also partially supported by JSPS KAKENHI (Grant numbers 18KK0210 & 15H02640) and the Environment Research and Technology Development Fund (4-1601).



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