

***Phyllagathis phamhoangii* (Sonerileae, Melastomataceae), a new species from central Vietnam**

VAN THE PHAM^{1*}, TIEN CHINH VU^{2,3}, RANIL RAJAPAKSHA⁴, NGOC BON TRINH⁵, LEONID AVERYANOV⁶ & THI LIEN THUONG NGUYEN⁷

¹Department of Plant Resource, Institute of Ecology and Biological Resources, Vietnam Academy of Sciences and Technology, Hanoi, Vietnam.

²Department of Specimen Collection Management, Vietnam National Museum of Nature, Vietnam Academy of Sciences and Technology, Hanoi, Vietnam.

³Graduate University of Science and Technology, Vietnam Academy of Sciences and Technology, Hanoi, Vietnam

⁴Department of Crop Science, Faculty of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka.

⁵Department of Plant Resource, Silviculture Research Institute, Vietnamese Academy of Forest Sciences, Duc Thang ward, Tu Liem Northern, Hanoi, Vietnam.

⁶Komarov Botanical Institute, Russian Academy of Science, Prof. Popov Str. 2, RU-197376 St.-Petersburg, Russia.

⁷Center of Scientific Research and Practice, Thu Dau Mot University, No 06, Tran Van On street, Phu Hoa ward, Thu Dau Mot city, Binh Duong province, Vietnam.

* Corresponding author: E-mail: phamvthe@gmail.com; phamvthe@iebr.ac.vn

Abstract

Phyllagathis phamhoangii V.T.Pham, T.C.Vu & Ranil is described and illustrated from Quang Nam province, central Vietnam. Diagnostic features of the new species are the short acaulescent rhizomatous herbs with pink flowers. The described species is distinct from the closely allied *P. nanakorniana* in the sparse hairs on all its parts except petals and stamens, much longer petioles, dichasial inflorescences, longer hypanthia, stamens unequal in length, longer petals and ovary; and from *P. subrotunda* by the taller plants, smaller leaves with longer petioles, cordate to reniform blades with a shortly acuminate apex, dichasial inflorescences, longer and cylindrical peduncles, longer and narrower hypanthia. We suggest the IUCN conservation status for *P. phamhoangii* as Vulnerable.

Key words: Vietnam, plant diversity, new species, *Melastomataceae*, *Phyllagathis*

Introduction

The genus *Phyllagathis* Blume (1831: 507) (Sonerileae, Melastomataceae) comprises approximately 70 species (Cellinese & Renner 1997, Cellinese 2002, Chen & Renner 2007, Wangwasit *et al.* 2010, Lin *et al.* 2015, 2017, Mathew *et al.* 2016, Tian *et al.* 2016) distributed from South China, Vietnam, Laos, Thailand, and Malacca Peninsula, to Sumatra and Kalimantan (Cellinese 2002). In Vietnam, *Phyllagathis* shows relatively high diversity and remarkable endemism (Hansen 1990, 1993, Nguyen 2003, Pham 2003). Twenty-seven species are known from in eastern Indochina and China (Hansen 1993) including 15 species in Vietnam (Hansen 1990, 1993, Nguyen 2003, Pham 2003).

During fieldwork in Quang Nam Province in Central Vietnam, several populations of an unknown *Phyllagathis* species were discovered. Detailed studies revealed some characters of the newly collected species that do not fit any of the previously reported *Phyllagathis* species described from Vietnam (Hansen 1990, 1993, Nguyen 2003, Pham 2003) and the Indochina region (Hansen 1990, 1993), China (Chen & Renner 2007), Burma, Thailand, Peninsular Malaysia and Sumatra (Cellinese & Renner 1997, Cellinese 2002, Renner *et al.* 2001, Wangwasit *et al.* 2010). The distinctiveness of the new species was confirmed when we conducted a survey of herbarium specimens deposited at A, C, HN, HNU, K, LE, MO, P and VNMN. Furthermore, it shows substantial morphological differences from its closely allied species, *P. nanakorniana* Wangwasit, Norsangsri & Cellin. (2010: 246) reported from Thailand, and *P. subrotunda* C. Hansen (1990: 40) reported from north of Vietnam. Therefore, we describe and illustrate our plant here as a species new to science.

Taxonomy

Phyllagathis phamhoangii V.T.Pham, T.C.Vu & Ranil, *sp. nov.* (Fig. 1)

Type:—VIETNAM. Quang Nam Province, Dai Loc District, Dai Hong Municipality, environs of Dai Hong town, on large shady mossy boulders on very steep humid rocky slope in rich secondary broad-leaved evergreen forest, 500 m, 15°49'44"N 107°57'19"E., 19 May 2011, L.Averyanov, P.K.Loc, N.Q.Hieu, P.V.The, N.T.Vinh, CPC 3419, (holotype: HN!; isotype: LE!).

Acaulescent rhizomatous herb, with leaves up to 25 cm tall, sparsely hairy in all parts except petals and stamens, fewer on the leaves. *Rhizome* creeping to suberect, tuberous, orange-brown setose, 1.5 cm in diameter, with conspicuous leaf scars. *Leaves* 3–5, petiolate; petiole 14–17 cm long; leaf blade cordate to reniform, 7–11 cm wide, 8–13.5 cm long, at base cordate, apex shortly acuminate, margin finely denticulate; lamina with 4 pairs of basal veins and a midrib, membranous, adaxial surface often light green, abaxial surface often light purple with prominent veins. *Inflorescence* a dichasial cyme; peduncle reddish, 14.5–18.5 cm long, cylindrical, usually longer than petioles, with minute glands. *Flowers* 4-merous, subtended by a few subulate bracts 1.5–2 mm long; pedicel ca. 1 cm long, with minute glands. *Hypanthium* campanulate, 4-ridged, about 6–7 mm long and 2.8 mm wide, with minute brown glands. *Sepals* triangular, about 0.5 mm long, acute. *Petals* pink, broadly obovate to almost round, obtuse or, shortly acuminate, glabrous, 6.5–7 mm long, 8.5–9 mm wide. *Stamens* 8, dimorphic, unequal in length, arranged in 2 whorls; antesealous stamens 4, filaments 7.5–8 mm long, glabrous, anthers narrowly ovate, glabrous, 6.5–7 mm long, light violet, strongly curved on ventral side, connective with an inflated base, ventrally with two laterally compressed lobes, pore 1, apical, more or less oblique on the ventral side; antepetalous stamens 4, filaments 5.5 mm long, anthers narrowly ovate, 2.5 mm long, yellow, glabrous, connective with a short dorsal spur. *Ovary* 4-locular, ca. 2.5 mm long, a little longer than one third of hypanthium length, crown consisting of four thick connate lobes. *Styles* ca. 7 mm long. *Capsules* subquadrangular, cup-shaped, about 3 mm wide and 4–5 mm long (when dry), crown persistent. *Seeds* numerous, ca. 0.25 × 1 mm (when young), narrowly conical, glabrous.

Phenology:—Flowering was observed in April to May. Fruiting started in May.

Diagnostic characters:—The described species is closely allied to *P. nanakorniana* from Thailand and *P. subrotunda* from north of Vietnam in habit and some morphologic characters, such as the tuberous rhizome and leaf shape. However, it differs from *P. nanakorniana* in the sparse hairs on all of its parts except petals and stamens, much longer petioles, dichasial inflorescences, longer hypanthia, stamens unequal in length, longer petals and ovary. It differs from *P. subrotunda* by the taller plants, smaller leaves with longer petioles, cordate to reniform blades with a shortly acuminate apex, dichasial inflorescences, longer and cylindrical peduncles, longer and narrower hypanthia. The detailed comparison between *P. phamhoangii*, *P. nanakorniana* and *P. subrotunda* are given in Table 1.

Distribution:—The species is only known from Quang Nam and Quang Binh Provinces of Vietnam (Fig. 2).

Habitat and ecology:—The new species grows in rich secondary broad-leaved evergreen forests at an elevations of 400–500 m as a lithophytic herb on large wet mossy boulders and cliffs composed of eroded sandstone on steep slopes.

Conservation status:—*Phyllagathis phamhoangii* was recorded only from two small subpopulations in Quang Nam and Quang Binh provinces of Vietnam. Though it is locally abundant, existing populations are facing a risk of extinction in the wild, since the areas where this species is found do not belong to any protected forest. The habitats are highly disturbed by local people for collecting timber, fire-wood and non-timber forest products. In addition, the new species has beautiful plants and flowers, and may be used as ornamental and collected by local people in the future. The estimated total known area of its distribution is less than 20,000 km², in habitats that are seriously threatened. Based on our information, we propose a conservation status of *P. phamhoangii* as Vulnerable (VU) under IUCN criteria B1 a b(iii) (IUCN 2017).

Etymology:—The species is named after Prof. Pham Hoang Ho, who spent most of his life studying the flora of Vietnam. He has published many books on the flora which are useful for students, teachers and researchers all over Vietnam.

Vernacular name:—Vietnamese: Me nguồn phạm hoàng hộ

Additional specimen examined:—VIETNAM. Quang Binh province, Minh Hoa District, Dan Hoa Municipality, Giang Man Mountain, Vietnam-Laotian border, about 6 km to N of Cha Lo border station, ca. 1100 m, 17°41'09"N, 105°45'54"E, 21 April 2008, L. Averyanov, P.K. Loc, N.T. Vinh, N.S. Khang, HAL 11790 (HN!, HNU!, MO!, LE!).



FIGURE 1. *Phyllagathis phamhoangii* V.T. Pham, T.C. Vu & Ranil. **a.** flowering plant in its natural habitat. **b.** flattened flowering specimen. **c.** portion of stem. **d.** leaf adaxial surface. **e.** leaf abaxial surface. **f.** leaf blade margin, adaxial surface. **g.** leaf blade margin, abaxial surface. **h, i.** inflorescence. **j, k.** petals adaxial (left) and abaxial (right) views. **l, n.** removed stamens. **m.** intact stamens. **o.** removed antepetalous stamen. **p.** style. **q.** style and ovary, longitudinal section. **r.** flower bud. **s.** petals, transverse section of flower bud, view from below. **t.** transverse section of flower bud, view from above. **u.** inflorescence with flower buds and young fruits. **v.** young fruit, view from above. **w.** young fruit transverse section. **x.** young fruit longitudinal section. **y.** young seeds. **z.** scape apex. Scale bars : a, b, d, e = 5cm; c = 1cm; f, g, h, i, j, k, m = 0.5cm; l, n, o, p, q, r, s, t, v, s, y = 1 mm; u = 5 mm; z = 2 mm. Photos and design by Pham Van The based on the type, HAL 11790 (LE, VNMN).

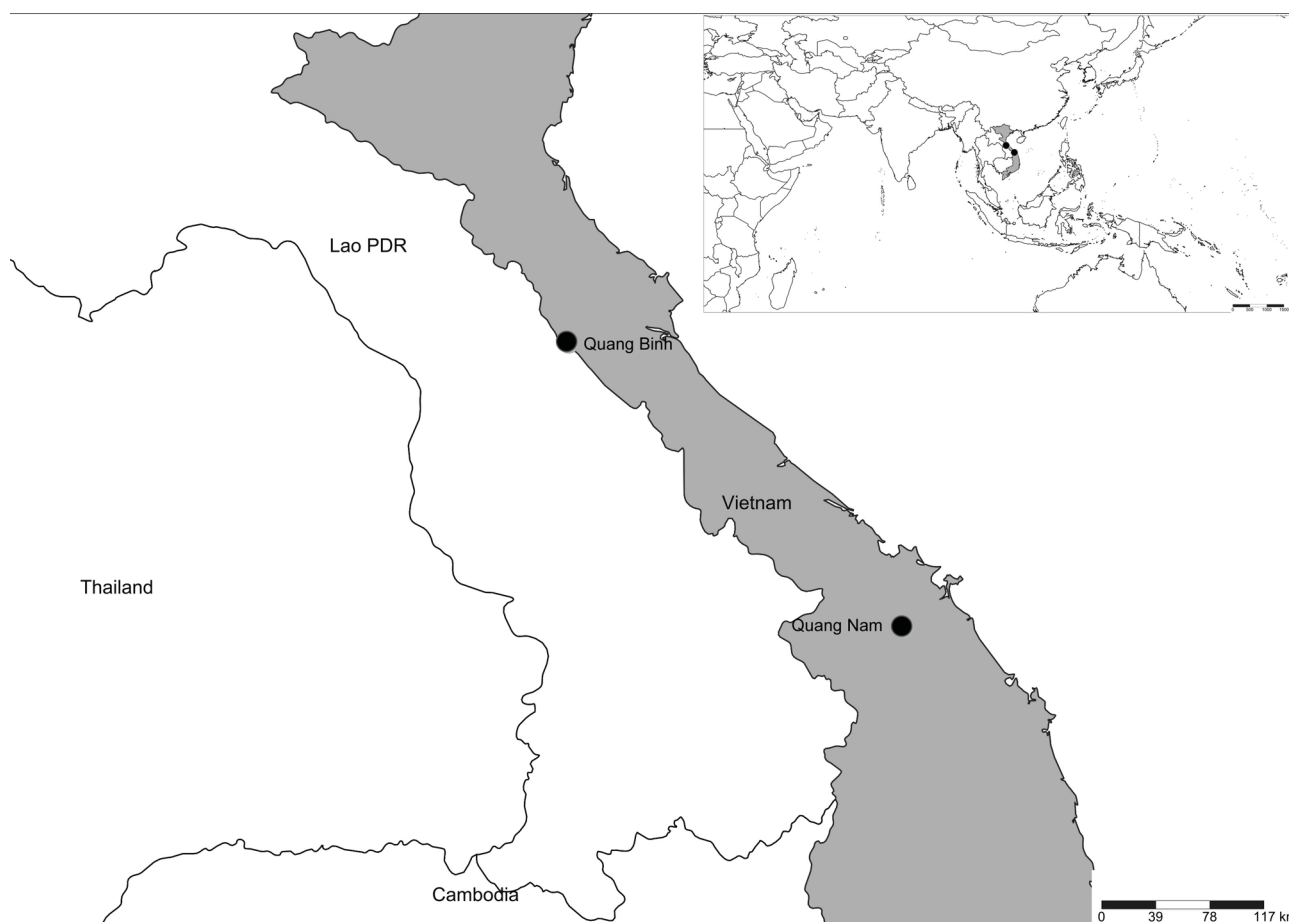


FIGURE 2. Distribution of *Phyllagathis phamhoangii* V.T.Pham, T.C.Vu & Ranil. Locations in Quang Binh and Quang Nam provinces are marked by black rounds.

TABLE 1. Comparison of diagnostic features of *Phyllagathis phamhoangii* with *P. nanakorniana* and *P. subrotunda*.

Character	<i>P. phamhoangii</i>	<i>P. nanakorniana</i>	<i>P. subrotunda</i>
Stem			
Hairs	hispid	glabrous	hispid
Length (cm)	up to 25	8–19	up to 8
Leaf			
Number	3–5	1	1–5
Size (cm)	7–11 × 8–13.5	2.7–10.5 × 3.7–15	4.5–15 × 6–17
Lateral veins	3–4 pairs	3–5 pairs	3–4 pairs
Petiole length (cm)	14–17	(0.5)1.5–4.5	5–8
Shape	cordate to reniform	broadly cordate to reniform	orbiculate
Apex	shortly acuminate	subacute, round or obcordate	subacute, round or obcordate
Inflorescence			
Type	dichasial	scorpioid	thyrs
Peduncle length (cm)	14.5–18.5	7–15	10–15
Peduncle shape	cylindrical	quadrangular	quadrangular
Hypanthium length (mm)	2.8 × 6–7	1–2 × 3	3 × 5
Sepals length (mm)	0.5	0.2–0.3	–
Petals length (mm)	8.5–9	5–6	–
Ovary length (mm)	2.5	0.2	3
Style length (mm)	7	2	–
Capsule length (mm)	3 × 4–5	2.5–3 × 2	–

Acknowledgements

The authors thank Dr. Nguyen Tien Hiep, Nguyen Quang Hieu from the Center for Plant Conservation, Vietnam Union of Science and Technology Associations and Prof. Phan Ke Loc from Hanoi University of Sciences for their support and for arranging field work. The financial support from the U.S.A. National Geographic Society research program on “Exploration of primary woods along constructed highway Hanoi-Ho Chi Minh for their sustainable conservation (in limits of Ha Tinh, Quang Binh, Quang Tri, Thua Thien-Hue, Quang Nam and Kon Tum provinces of central Vietnam) (Grant No.8800-10) is also acknowledged with many thanks.

References

- Blume, C.L. (1831) Ueber einige Ostindische, und besonders Javanische Melastomaceen. *Flora oder Allgemeine botanische Zeitung* 14: 507.
- Cellinese, N. & Renner, S.S. (1997) New species and combinations of *Sonerila* and *Phyllagathis* (Melastomataceae) from Thailand. *Novon* 7: 106–112.
<https://doi.org/10.2307/3392181>
- Cellinese, N. (2002) Revision of the genus *Phyllagathis* Blume (Melastomataceae: Sonerileae). I. The species of Burma, Thailand, Peninsular Malaysia and Sumatra. *Blumea* 47: 463–492.
- Chen, C. & Renner, S.S. (2007) Melastomataceae. In: Wu, Z.Y., Raven, P.H. & Hong, D.Y. (Eds.) *Flora of China* vol. 13. Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis, pp. 377–384.
- Hansen, C. (1990) New species and combinations in *Allomorphia*, *Phyllagathis*, and *Sporoxeia* (Melastomataceae) in Indo-China. *Bulletin du Muséum National d'Histoire Naturelle, Section B, Adansonia, 4^e série* 12 (1): 37–41.
- Hansen, C. (1993) The genus *Phyllagathis* (Melastomataceae): Characteristics; Delimitations; The species in Indo-China and China. *Bulletin du Muséum National d'Histoire Naturelle, Section B, Adansonia, 4^e série* 14 (3–4): 355–428.
- IUCN Standards and Petitions Subcommittee (2017) *Guidelines for Using the IUCN Red List Categories and Criteria, Version 13*. Prepared by the Standards and Petitions Subcommittee. Available from: <http://www.iucnredlist.org/documents/RedListGuidelines.pdf> (accessed 24 June 2017)
- Lin, C.W., Chen, C.F. & Yang, T.A. (2015) Two new taxa of Melastomataceae Trib. Sonerileae: *Phyllagathis rajah* and *Sonerila metallica* from Batang Ai, Sarawak, Borneo. *Phytotaxa* 201 (2): 122–130.
<https://doi.org/10.11646/phytotaxa.201.2.2>
- Lin, C.W., Chen, C.F. & Yang, T.A. (2017) Ten new species of *Phyllagathis* (Trib. Sonerileae, Melastomataceae) from Sarawak, Borneo. *Phytotaxa* 302 (3): 201–228.
<https://doi.org/10.11646/phytotaxa.302.3.1>
- Mathew, J., Yohannan, R. & George, K.V. (2016) *Phyllagathis* Blume (Melastomataceae: Sonerileae), a new generic record for India with a new species. *Botany Letters* 163 (2): 175–179.
<https://doi.org/10.1080/23818107.2016.1166453>
- Nguyen, K.D. (2003) Melastomataceae. In: Nguyen, T.B. (Ed.) *Checklist of plant species in Vietnam* vol. 2. Agriculture Publishing House, Hanoi, pp. 911–923.
- Pham, H.H. (2003) *Phyllagathis* (Melastomataceae). In: Pham, H.H. (Ed.) *Cay Co Viet Nam: an illustrated flora of Vietnam* vol. 2. Tre Publishing House, Ho Chi Minh, pp. 71–103.
- Renner, S.S., Clausen, G., Cellinese, N. & Meyer, K. (2001) Melastomataceae. In: Santisuk, T. & Larsen K. (Eds.) *Flora of Thailand* vol. 7(3). Forest Herbarium, Royal Forest Department of Thailand, Bangkok, pp. 468–475.
- Tian, J., Pen, L., Zhou, J.C., Tian, X.H., Yi, R.Y., Liu, L., Cai, X.Z., Kuang, R.P. & Liu, K.M. (2016) *Phyllagathis guidongensis* (Melastomataceae), a new species from Hunan, China. *Phytotaxa* 263 (1): 58–62.
<https://doi.org/10.11646/phytotaxa.263.1.6>
- Wangwasit, K., Cellinese, N. & Norsaengsri, M. (2010) *Phyllagathis nanakorniana* (Melastomataceae), a new species from Thailand. *Blumea* 55: 246–248.
<https://doi.org/10.3767/000651910X543682>