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The Genus *Sciaphila* Blume (Triuridaceae) in the Flora of Vietnam

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ABSTRACT: Two species of *Sciaphila*: *S. arcuata* and *S. stellata* (Triuridaceae) discovered in Vietnam are described as new taxa for the genus and one discovered species (*S. nana*) is first recorded for the country. The key for identification and illustrated descriptions are provided for all species of this genus in the flora of Vietnam.

KEY WORDS: Triuridaceae, Taxonomy, *Sciaphila arcuata, Sciaphila stellata*, new species for science, Vietnam.

INTRODUCTION

The genus *Sciaphila* Blume includes about 35 species concentrated mainly in Indonesia and Malesia with few findings in mainland Asia, Japan, Taiwan, Hainan, tropical Africa, Australia and Pacific islands (Meerendonk, 1984; Dahlgren et al., 1985; Maas van de Kamer and Weustenfeld, 1998; Ohashi, 2000). All species of the genus are very small, delicate, terrestrial achlorophyllous reddish saprophytes growing in deep shade of wet closed evergreen forests. Most species ere remarkably rare being known from few or even single collections. Five species were reported up to now from mainland Southeast Asia (Larsen, 1972; Triboun and Larsen, 1999; Maneenoon and Sirirugsa, 2002; Chantanaorrapint and Thaithong, 2004). They are *Sciaphila arfakiana* Becc., *S. maculata* Miers, *S. nana* Blume, *S. secundiflora* Thwaithes ex Benth. and *S. thaidanica* K. Larsen. All these species were discovered and reported from Thailand. Only one species of the genus was known in the flora of Vietnam before our studies, namely – *S. arfakiana* Becc., reported under the name *S. clemensae* Hemsl. from southern Vietnam (Dalat city area) and based on a single collection (Ho, 2000). Recent botanical explorations revealed a number of new findings of representatives of this genus in Vietnam, which belong to 4 species. Two of them are new taxa for the genus (*S. arcuata* and *S. stellata*) and one (*S. nana*) is a new record to Vietnam. Below follows taxonomical treatment of the genus *Sciaphila* in the flora of Vietnam including key for identification of species and their illustrated descriptions.

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TAXONOMIC TREATMENT

Sciaphila Blume, Bijdr. 10 : 514. 1826.

Aphylleia Champion, Calc. J. Nat. Hist. 7 : 468. 1847.
Andruris Schlechter, Bot. Jahrb. 49 : 71. 1912, p.p.

Key to the species in the flora of Vietnam

1. The apex of tepals of female flower long hairy; pedicels of all female flowers usually distinctly arcuate ..... 1. *S. arcuata*
1. Tepals of female flower glabrous throughout; pedicels straight, sinuous or slightly arcuate 2
2. Stem 4-6 cm tall; raceme secund, 1.5-2 cm long, with 5-7 flowers turned to one side; tepals narrowly cuneate, acuminate; anthers 1-celled, sessile; style club-shaped, clavate, papillose at the apex, slightly exceeding the carpel ..... 4. *S. stellata*
2. Stem (4)6-16 cm tall; raceme (0.5) 2-6 cm long, usually with 5-50 flowers, flowers in raceme spirally arranged all around; tepals triangular-ovate, acute; anthers 4-celled, subsessile, on short filament; style awl-shaped, acute, glabrous, distinctly exceeding the carpel 3
3. All tepals of male flower at the apex with a thick stipulate knob; pedicels commonly patent or perpendicular to the raceme axis, 2-14 mm long ..... 2. *S. arfakiana*
3. Three tepals of male flower at the apex with a thick stipulate knob alternate with three tepals having no distinct thick knob; pedicels commonly erect, 2-5 mm long ..... 3. *S. nana*

1. *Sciaphila arcuata* Aver., sp. nov. Fig. 1

Species nova a speciebus sui generis plurimis stylo subterminali stigmate sessili vel subsessili differt. Ea species fortasse ad S. micrantham Giesen propinqua est, a qua sepalis florum femineorum aequalibus distincte differt.

Typus: S. Vietnam, Khanh Hoa Prov., Khanh Son Distr., 42 km to NE from Dalat city, on E slope of Hon Giao Ridge around point 12°12'N, 108°44'E, 24 April 1997, *L. Averyanov, N. Q. Binh, N. T. Hiep, VH 4269* (holo HN, iso LE).

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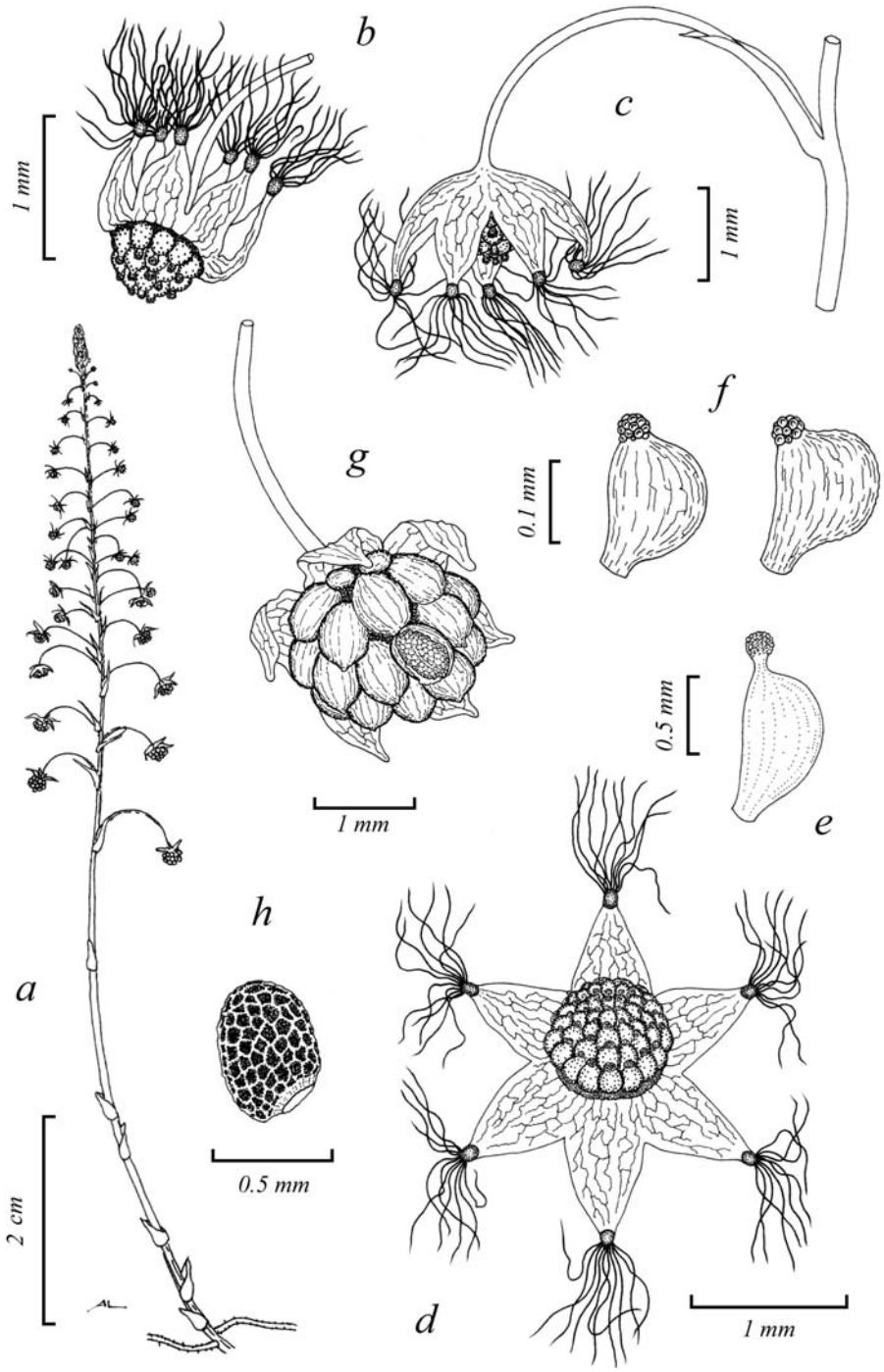


Fig. 1. *Sciaphila arcuata* Aver. a: Flowering and fruiting plant. b & c: Open female flower. d: Female flower with reflexed and flattened tepals. e: Young carpel (from flower bud). f: Ripe carpels (from open flower). g: Fruit with ripe seeds. h: Seed without pericarp (all drawn from the type by author).

Achlorophyllous herbs with few sparse roots. Roots dirty pinkish to yellowish-brown, sinuous, not branching, 0.2-0.3 cm in diam., with sparse papillae-like hairs. Stem slender, simple or branching at the base, erect, more or less straight, indistinctly longitudinally wrinkled, pink to reddish, glabrous, 0.4-0.6 mm in diam., 9-14 cm tall, with 5-7 small yellowish-brown, bract-like, much reduced, alternate, distant leaves. Leaves sessile, ovate to triangular-lanceolate, obtuse, appressed to the stem, 1.5-2.5 mm long and 0.5-1.5 mm broad. Inflorescence (in samples with female flowers) lax

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raceme 7-12 cm long, with 30-45 flowers; spirally all around arranged. Floral bracts narrowly ovate to lanceolate, acute to acuminate, pinkish, 1-2 mm long, 0.4-0.8 mm wide, conduplicate, appressed to the pedicel, usually amplexicaul. Pedicels 4-7 mm long, 0.2-0.3 mm in diam., usually patent on 45-90° and characteristically down arcuate. Male flowers unknown. Female flowers actinomorphic, deep reddish-pink, 2-2.2 mm in diam., with back reflexed tepals, or campanulate with straight or slightly incurved perianth segments; at the center with numerous free carpels in dense sub-spherical head 0.6-0.8 mm in diam., placed on low finely verrucose receptacle. Tepals of female flower 6, equal, connate on 1/3 of their length from the base, triangular-ovate to triangular, 0.8-1 mm long, 0.5-0.6 mm wide, shortly tapering at the apex into stipitate, thick, obovate or broadly-ovoid knob; the knob bears dense tuft of pinkish hairs 0.7-0.9 mm long. Carpels oblique, broadly-falcate to nearly half-round, glabrous, finely wrinkled, 0.1-0.15 mm long, 0.03-0.1 mm wide; style sub-apical (shifted to adaxial side) very short or stigma sessile. Stigma head-like, in young carpels finely papillose, later with few large blister-like globular papillae. Achenes in globose aggregate heads 1.5-2 mm in diam; each achene ovoid to broadly-ellipsoid, 0.5-0.7 mm long, 0.3-0.5 mm broad, glabrous, finely longitudinally wrinkled, apically often with umbo-like remnant of style. Fruits deep purple-violet. Seed ovoid to broadly-ellipsoid, 0.5-0.6 mm long, 0.35-0.4 mm wide, with irregular alveolate surface.

Related species: *Sciaphila micranthera* Giesen.

Diagnostic features: New species differs from most known species of the genus in sub-terminal style with sessile or sub-sessile stigma. *Sciaphila arcuata* may be more or less close to *S. micranthera* Giesen from which it distinctly differs also in equal perianth segments of female flowers.

Flowering period: April - May.

Living form: Achlorophyllous reddish-pink terrestrial mycotrophic herbs.

Ecology: Primary broad-leaved evergreen forests on granite, gneiss and sandstone at elevations 1500-1600 m a.s.l.

Distribution: Vietnam (Khanh Hoa Province. Fig. 4, 1). Endemic.

Etymology: Species name reflects a characteristic usual curvature of pedicels.

Notes: This is probably very rare species known up to now on the base of few found samples. It certainly belongs to the group of strict local endemics of South-Annamese floristic province like, such famous orchids as, *Paphiopedilum delenatii* Guillaum. or *Arachnis annamensis* (Rolfe) J.J.Smith.

2. *Sciaphila arfakiana* Becc., Malesia 3 : 336, tab. 41, fig. 6-14. 1890. Figs. 2A & B

S. clemensae Hemsl., in Hook. Ic. Pl. 29, tab. 2850, fig. 7-14. 1907; Ho, Illustr. Fl. Vietnam 3 : 329, fig. 9032. 2000.

Achlorophyllous herbs with few sparse roots. Roots pinkish to yellowish, sinuous, not branching, filiform, 0.1-0.15 mm in diam., with sparse, long, clavate, papillae-like hairs. Stem slender, simple to much branching, erect to flexuose, sometimes ascending, indistinctly longitudinally wrinkled, yellowish-pink to purple-brown, glabrous, 0.4-0.6 cm in diam., usually 6-16 cm tall, with 5-8 small light pink-brownish, bract-like, much reduced, alternate, distant leaves. Leaves sessile, ovate, obtuse to sub-acute, appressed to the stem, 1-2 mm long and 0.2-0.7 mm broad. Inflorescence rather lax simple or branching raceme 0.5-6 cm long, with (1)3-100 flowers spirally arranged all around; lowest flowers female, the upper ones staminate. Floral bracts lanceolate to narrowly cuneate, acute to acuminate, 0.5-2 mm long, 0.1-0.8 mm wide, pink, appressed to the pedicel or patent. Pedicels 4-8 mm long and 0.1-0.15 mm in diam., patent, straight, or slightly apically recurved. Flowers actinomorphic, unisexual, pink, reddish-pink, purple-violet to deep dirty violet, with 6 perianth segments. Male flowers 1.4-2.2 mm in diam.; tepals triangular-ovate, 3 larger ones alternating with 3 slightly smaller ones, 0.6-1 mm long, 0.3-0.4 mm wide at the base, tapering at the apex into stipitate globose or ellipsoid glabrous thick knob. Stamens 3, with erect filiform filaments much exceeding anthers. Anthers white, subsessile, 4-celled, sub-quadrate, about 0.2 mm wide. Female flowers 1.2-1.7 mm in diam.; tepals more or less equal, ovate-triangular, acute, 0.6-1 mm long, 0.3-0.5 mm wide, apex without appendages, but often slightly thickened; at center with numerous free carpels in dense sub-spherical aggregate head. Carpels obovoid, 0.2-0.4 mm long, finely papillose at the apex; style adaxial, filiform, awl-shaped, acute, glabrous, inserted laterally at the base, 0.6-1.2 mm long, much exceeding carpel. Achenes in sub-globose aggregate heads 1.5-2 mm in diam; each achene sub-globular or oblique broadly-ellipsoid, 0.5-0.8 mm long, 0.3-0.45 mm broad, glabrous, with reddish-purple, juicy pericarp, later dry, finely longitudinally wrinkled. Seed ovoid to broadly-ellipsoid, 0.4-0.5 mm long, 0.35-0.4 mm wide, with irregular alveolate surface.

Specimens examined: Ninh Thuan Prov., Ninh Son Distr., Phuoc Binh Municipality and Lam Dong Prov., Lac Duong Distr., Da Chay Municipality border, in 34 km to NE from Dalat city (12°07'N, 108°41'E), 4 April 1997, *L. Averyanov*,

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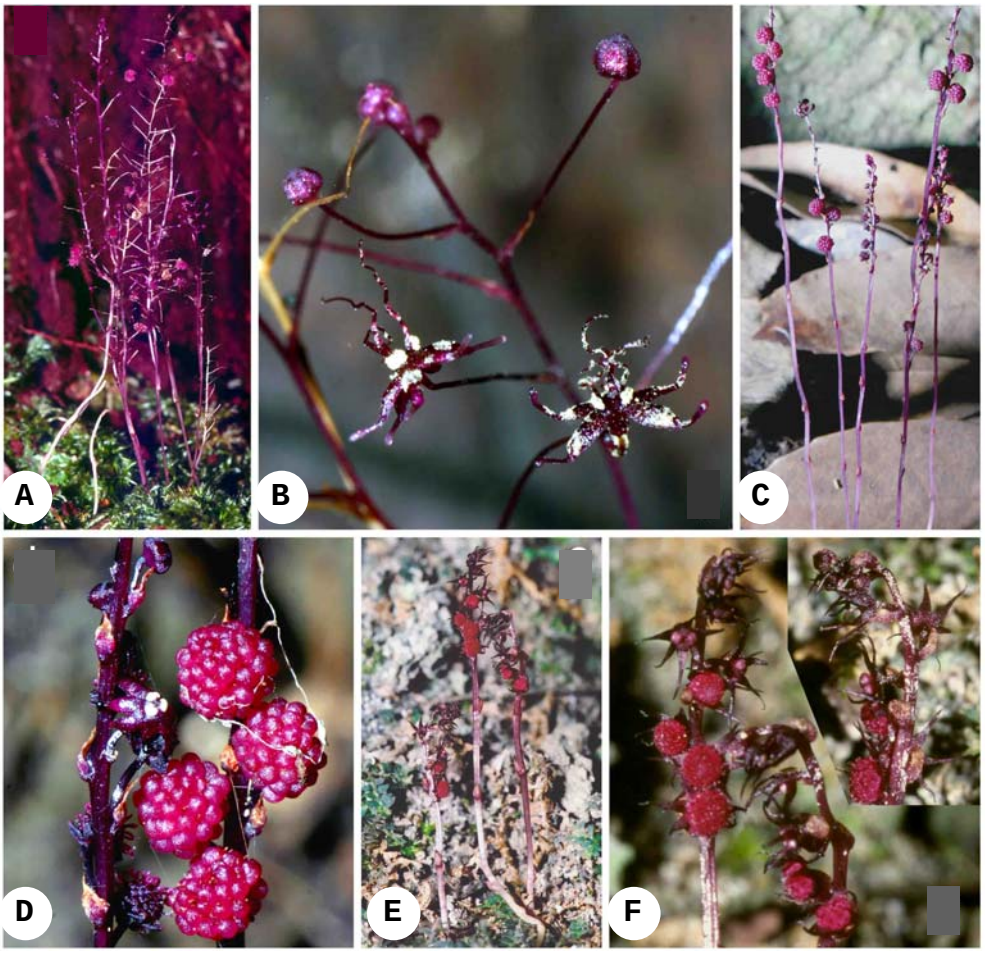


Fig. 2. Species of *Sciaphila* in Vietnam. A & B: *S. arfakiana* in fruits (A) and male flowers (B). C & D: *S. nana* with male flowers and fruits. E & F: *S. stellata* with male and female flowers (type specimen, *HAL 4842*).

N.Q.Binh, P.K.Loc, VH 3686 (HN, LE photo). Kontum Prov., Kon Plong Distr., Hieu Municipality, Mang La forest enterprise (14º39'N, 108º25'E), 22 April 2000, *L.Averyanov, P.H.Hoang, D.X.Du, N.T.Vinh, VH 5539* (HN). Thua Thien – Hue Prov., Nam Dong Distr., Huong Son Municipality, around point 16º09'52"N, 107º36'22"E, 27 March 2005, *L.Averyanov, N.T.Hiep, P.K.Loc* et al., *HAL 6979* (HN, LE photo). Quang Tri Prov., Huong Hoa Distr., Huong Phung Municipality, Sa Mui pass, around point 16º48'36''N 106º34'44''E, 29 March 2006, *N.T.Hiep, L.Averyanov, P.K.Loc, P.V.The* et al., *HLF 5879* (HN).

Flowering period: March - April.

Living form: Achlorophyllous pink to purple-violet terrestrial mycotrophic herbs.

Ecology: Primary broad-leaved and coniferous wet shady forests on granite, gneiss, clayey shale and sandstone, usually along ridge edges and on steep slopes at elevations 300-1900 m a.s.l.

Distribution: Vietnam (Kontum, Lam Dong, Ninh Thuan, Quang Tri, Thua Thien – Hue Provinces. Fig. 4, 2). Thailand, Malaya, Indonesia, New Guinea, Philippines, Pacific islands.

Notes: One of the most widespread and common species of the genus. This species is probably also relatively common throughout southern Vietnam. It grows in primary forests of different kinds at various elevations, but rarely collected due to unattractive inconspicuous appearance.

3. *Sciaphila nana* Blume, Mus. Bot. Lugd. Bat. 1: 322, fig. 48. 1851. Figs. 2C & D

Achlorophyllous herbs with few sparse roots. Roots pinkish to light violet, sinuous, not branching, filiform, 0.1-0.2 mm in diam., with sparse hairs. Stem slender, simple, rarely branching, erect or slightly flexuose, indistinctly ribbed, pink-yellowish to dirty dark-violet, glabrous, 0.3-0.8 cm in diam., 5-16 cm tall, with 6-10 small, light brownish, bract-like, much reduced, alternate, distant leaves. Leaves sessile, ovate to oblong-ovate, acute, appressed to the stem, not amplexicaul, 1-2.5 mm long and 0.2-0.7 mm broad. Inflorescence lax raceme

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0.5-6 cm long, with (1)3-30 flowers spirally arranged all around; lowest flowers female, the upper ones staminate. Floral bracts triangular-ovate to lanceolate, acute, 0.5-1 mm long, 0.2-0.3 mm wide, appressed to the pedicel or patent. Pedicels 2-5 mm long and 0.1-0.2 mm in diam., dark violet, usually erect and more or less straight. Flowers actinomorphic, unisexual, reddish-purple to dark purple-violet, with 6 equal triangular-ovate, straight or reflexed perianth segments. Male flowers 1.4-2 mm in diam.; tepals 0.6-1.2 mm long, 0.2-0.4 mm wide at the base, three of them tapering at the apex into stipitate globose or ellipsoid glabrous thick glossy knob, they alternating with 3 tepals bearing no appendages or with reduced insignificant thickness at the apex. Stamens 3, with filaments hardly exceeding anthers. Anthers white, subsessile, 4-celled, sub-quadrate, about 0.2 mm wide. Female flowers 1-1.4 mm in diam.; tepals patent, straight, acute, 0.5-0.6 mm long, 0.2-0.3 mm wide, apex without appendages; at center with numerous free carpels in dense sub-spherical aggregate head 0.8-1.2 mm in diam. Carpels obovoid, 0.25-0.35 mm long.; style adaxial, inserted laterally near the top, awl-shaped, acute, 0.4-0.6 mm long, not much exceeding carpel. Achenes in sub-globose aggregate heads 1.6-2.2 mm in diam; each achene globular or broadly-ellipsoid, 0.4-0.6 mm long, 0.3-0.4 mm broad, glabrous, with purple, juicy pericarp, later dry, finely longitudinally wrinkled. Seed ovoid to broadly-ellipsoid, about 0.4-0.5 mm long, 0.35-0.4 mm wide.

Specimens examined: Dak Lac Prov., Krong Bong Distr., Cu Pui Municipality, elevation from Dak our village to main peak of Chu Yang Sinh mt system (12º24'N, 108º26'E) along Dak Tour river (N slope), 6 May 2000, *L.Averyanov, N.T.Hiep, N.Q.Hieu* et al., *VH 6277* (HN). Dak Lak Prov., Krong Bong Distr., Hoa Son Municipality, Chu Yang Sinh National Park, vicinities of Krong Kmar river, NE slopes of Chu Yang Sinh mt system, 28 October 2005, *L.Averyanov, T.V.Thao, N.T.Vinh, HLF 5425* (HN, LE photo).

Flowering period: April – May, October – November.

Living form: Achlorophyllous pink-yellowish to dark dirty violet terrestrial mycotrophic herbs.

Ecology: Primary broad-leaved and coniferous wet shady forests on granite, usually along ridge edges and on steep stream slopes at elevations 800-1250 m a.s.l.

Distribution: Vietnam (Dak Lac Province. Fig. 4, 3). Thailand, Malaya, Sumatra, Java, Philippines.

Notes: *Sciaphila nana* was recently discovered and reported from Thailand (Chantanaorrapint, Thaithong, 2004) that make finding of this species in Vietnam quite expectable. Meanwhile, this is very rare species in Vietnam known up to now from alone very restricted area (Chu Yang Sinh mountains).

4. *Sciaphila stellata* Aver., sp. nov. Figs. 2E, F & 3

Species nova ab affini Sciaphila thaidanica K. Larsen sepalis angustis acuminatis et stylo clavato bene differt

Type: N.Vietnam, Bac Kan Prov., Cho Don Distr., Ban Thi Municipality, Phia Khao village, around point 22º17'31"N, 105º31'51"E, Cau Muc mountain, 24 May 2004 *L. Averyanov, N.T.Hiep, P.V.The, N.T.Vinh, HAL 4842* (holo HN; iso LE).

Paratype: N.Vietnam, Bac Kan Prov., Na Ri Distr., Liem Thuy Municipality, village Na Bo, around point 21º56'44"N, 106º05'09"E, 27 May 2004, *L.Averyanov, N.T.Hiep, P.V.The, N.T.Vinh, HAL 4903* (HN).

Perennial achlorophyllous herbs with short rhizome and numerous clustered roots. Roots yellowish-brown, flexuose, not branching, 0.2-0.4 mm in diam., with numerous scattered clavate papillae-like hairs. Stems on rhizome 1-4, slender, flexuose at the base, ascending and erect, simple, indistinctly ribbed, purple-brown, glabrous, 0.4-0.6 cm in diam., 4-5.5 cm tall, with 6-8 small brownish, bract-like, much reduced, alternate, distant leaves. Leaves sessile, ovate to triangular, obtuse, appressed to the stem, 1-2 mm long and 0.4-0.8 mm broad. Inflorescence secund, rather lax raceme 1.5-2 cm long, with 5-7 flowers; 2-3 lowest female, the upper ones staminate. Floral bracts ovate, obtuse, deep violet, 1-1.2 mm long, 0.4-0.6 mm wide, more or less appressed to the pedicel. Pedicels 0.8-1.2 mm long, 0.2-0.3 mm in diam., patent, slightly apically recurved. Flowers actinomorphic, unisexual, deep violet, with 6 equal straight tepals. Male flowers 5.5-6.5 mm in diam., tepals narrowly cuneate to filiform, acuminate, 2.5-3 mm long, 0.2-0.3 mm wide at the base, with 3 sessile anthers on low papillose pillow forming the center of the flower. Anthers transversely ellipsoid, 0.3-0.4 mm broad, 1-celled, opening transversally. Female flowers 4-5 mm in diam., tepals broadly cuneate, acuminate (distinctly shorter than tepals of male flowers), 1.8-2 mm long, 0.4-0.5 mm wide, with numerous free carpels in dense sub-spherical aggregate head. Carpels sub-globose to obovoid, 0.2-0.4 mm in diam., papillose at the apex; style adaxial, clavate club-shaped, papillose at the apex, inserted laterally at the base and exceeding carpel. Ripening fruits deep purple-violet.

Related species: *Sciaphila thaidanica* K. Larsen. and *S. secundiflora* Thwaites.

Diagnostic features: New species distinctly differs from closely related *S. thaidanica* in narrow, acuminate tepals and clavate style. From *S. stellata* it differs in short, stout, not branching stem and in dense secund inflorescence.

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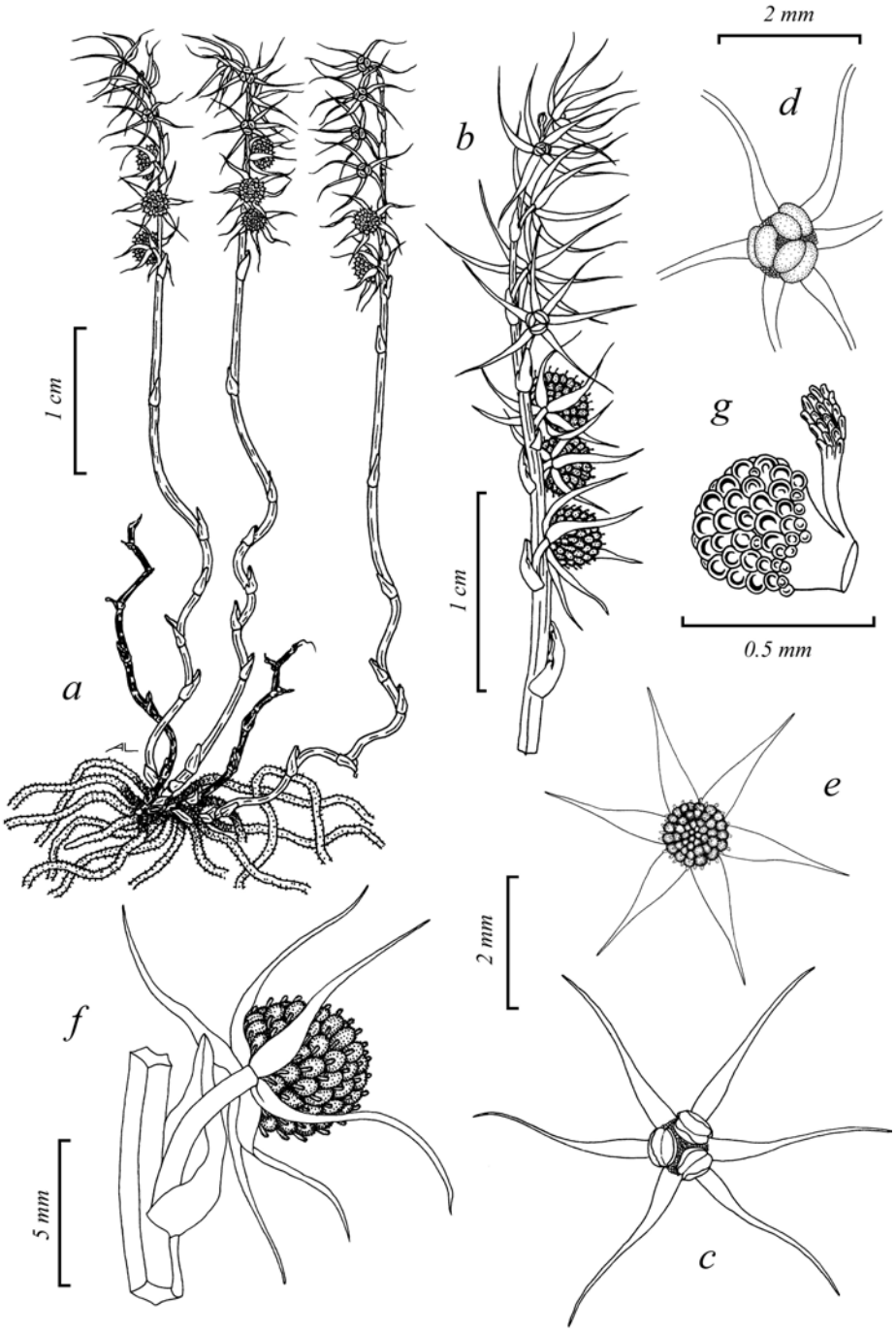


Fig. 3. *Sciaphila stellata* Aver. a: Flowering plant. b: Inflorescence. c: Staminate flower with open anthers. d: Ripening anthers. e & f: Female flower. g: Carpel (all drawn from the type by author).

Flowering period: May - June.

Living form: Achlorophyllous purple-brown terrestrial mycotrophic herbs.

Ecology: Primary broad-leaved evergreen forests on solid marble-like stratified limestone.

Distribution: Vietnam (Bac Kan Province. Figs. 2 & 4). Endemic.

Etymology: Species name refers stellar appearance of fresh open flowers.

Notes: This very rare species was observed only in areas of rocky limestone that may indicate its obligate calcium dependent nature. Most probably, it belongs to the group of local endemics of South-Chinese floristic province with very restricted.

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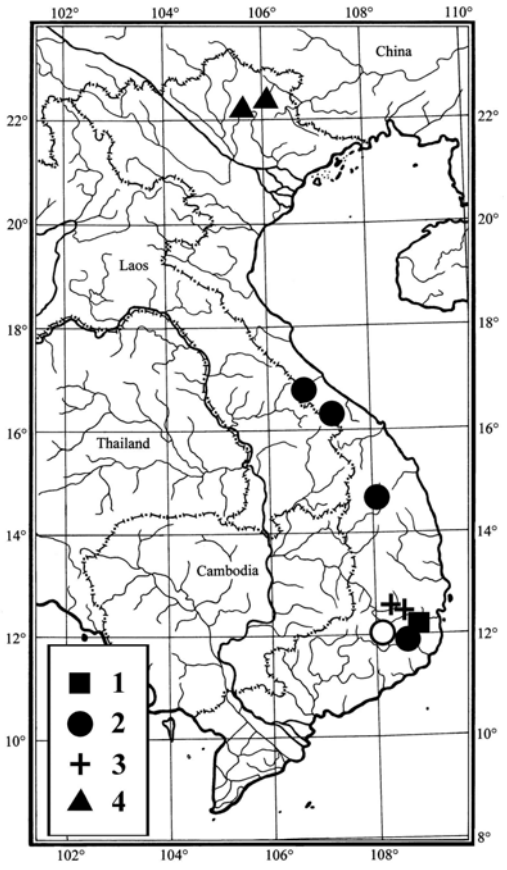


Fig. 4. Distribution of *Sciaphila* species in Vietnam. 1: *Sciaphila arcuata*. 2: *S. arfakiana* (black rings indicate localities of studied collections, ring filled with white means literature report). 3: *S. nana*. 4: *S. stellata*.

distribution like *Paphiopedilum emersonii* Koop. & P.J.Cribb, *P. hangianum* Perner & Gruss and *P. vietnamense* Gruss & Perner.

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越南霉草屬 (霉草科) 植物

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摘　　要

本文首次報導越南霉草屬 (霉草科) 二新種及一新紀錄種，並提供檢索表、插圖和描述以供鑑定。

關鍵詞：霉草科、分類學、*Sciaphila arcuata* 、*Sciaphila stellata*、新種、越南。

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