

## *Sciaphila nana* Blume (Triuridaceae) : Unrecorded species from Korean flora

Eun-Young Yim<sup>2</sup>, Moon-Hong Kim<sup>1</sup> and Gwanpil Song\*

Biodiversity Research Institute, Jeju Technopark, Jeju 697-943, Korea

<sup>1</sup>Department of Biology, Jeju National University, Jeju 690-756, Korea

<sup>2</sup>Graduate School of Science and Technology, Nagasaki University, Nagasaki-si 852-8521, Japan

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**ABSTRACT:** In this study, we described and illustrated an unrecorded species from the Korean flora, *Sciaphila nana* Blume, which is included in the order Pandanales and the family Triuridaceae. This taxon was found at Mul Oreum in Namwon-eup, Seogwipo-si, Jeju Special Self-Governing Province for the first time in Korea. The order Pandanales can be distinguished from the order Liliales by the anomocytic or tetracytic stomata and syncarpous or apocarpous gynoecia of the Pandanales. The family Triuridaceae and the other four taxa in the Pandanales, Cyclanthaceae, Pandanaceae, Stemonaceae, and Velloziaceae, are easily distinguished because the Triuridaceae are microtrophic herbs with scaly leaves. *S. nana* has a subulate style with a glabrous apex, ovate to narrow ovate leaves and bracts, male perianth segments with a knob-like structure at the apex, and a dimorphic perianth. Therefore, it is easily distinguished from *S. tenella*, *S. multiflora*, *S. secundiflora*, *S. thaidanica*, *S. ramosa*, and *S. arfakiana*.

**Keywords:** genus *Sciaphila*, unrecorded taxa, Pandanales, saprophytic herb

The family Triuridaceae Gardner consists of nine genera with approximately 45 species and is primarily distributed in tropical America, Africa, and Asia, with most species found in the Austral-Asian region (Maas-van de KAM and Weustenfeld, 1998). In China, Japan, Taiwan, and Thailand, three, five, four, and five species have been reported, respectively (Hsieh et al., 2003; Chantanaorrapint and Thaithong, 2004; Ohashi et al., 2008; Guo and Cheek, 2010). However, Triuridaceae has not been reported in Korea until now.

The family Triuridaceae has been linked to a wide range of taxa including the Orchidaceae, Burmanniaceae, *Petrosavia*, and the alismatid families (Maas-van de KAM and Weustenfeld, 1998; Furness et al., 2002). However, Triuridaceae was placed in Pandanales Lindl., which includes the Pandanaceae, Cyclanthaceae, Velloziaceae, and Stemonaceae, based on a recent combined molecular analysis using a single 18S nuclear rDNA sequence (Chase et al., 2000). In addition, pollen and tapetal characters and recent molecular data further supported categorization in Pandanales (Furness et al., 2002; Angiosperm Phylogeny Group II, 2003; Davis et al., 2004). Among the genera of the family Triuridaceae, the taxonomic positions of *Lacandonia* Martinez and Ramos and *Sciaphila* Blume have been in dispute. *Lacandonia*

is characterized by an inverted arrangement of the stamens and carpels (Martinez and Ramos, 1989). However, Ambrose (2006), APG II (2003), Davis et al. (2004), Igersheim et al. (2001), and Maas-van de KAM and Weustenfeld (1998) placed *Lacandonia* within the tribe Triurideae because it shares appendaged tepals, an apical style, indehiscent fruits, and bisporangiate anthers with other members of that group. Meerendonk (1984) included the genus *Andruris* Schltr. in the genus *Sciaphila*. The 15 species that have been described by Giesen (1938) and were reported to belong to *Andruris* have been placed in synonymy with several species of *Sciaphila*. Maas-van de KAM and Maas (1994) and Maas-van de KAM and Weustenfeld (1998) reported that the five species of *Andruris* would be best placed within the tribe Sciaphileae. However, in the most recent study, *Andruris* was combined into *Sciaphila* (Ohashi et al., 2008). The distribution of *Sciaphila* include habitats of *Andruris* (Maas-van de KAM and Weustenfeld, 1998).

Makino (1902) reported that *S. japonica* resembled *S. nana* in the original description. However, the diagnostic features of *S. japonica* that separated it from *S. nana* were not described. Ohashi et al. (2008) considered both to be identical species.

The main objective of this study was further characterize *S. nana*, which was classified in a new family and order, Triuridaceae

\*Author for correspondence: selfpoet@jejutp.or.kr

and Pandanales, from Korea.

## Materials and Methods

Populations of *S. nana* were first found on 8 August 2007 at Mul Oreum in Seogwipo-si, Jeju Special Self-Governing Province, Korea. Its presence was reconfirmed between 14 August 2007 and 10 September 2008 at Ipseok-dong and Sinlye-ri, which is adjacent to the original site. Voucher specimens of *S. nana* were deposited in the Herbarium of the Jeju Biodiversity Research Institute, Jeju Hi-Tech Industry Development Institute. We also examined the type specimens of *S. nana* deposited in The Makino Herbarium in order to describe this species.

## Taxonomic Treatment

**Triuridaceae** Gardner, Proc. Linn. Soc. Lond. 1: 177 (1843)-Lacandoniaceae E. Martinez & Ramos (1989).

Achlorophyllous, microtrophic, white, yellow, or purple, usually perennial herbs; stems erect, arising sympodially from a creeping or sometimes erect rhizome; rhizome and stem provided with small scalelike, alternate leaves; roots filiform, mostly hairy, containing the mycelia of mycorrhizal fungus. Inflorescences monoecious or dioecious, a terminal bracteate raceme. Flowers unisexual or rarely bisexual, regular, pedicellate, white, yellow, purplish, or red. Perianth of 3-6(-10) valvate tepals in a single cycle, the tepals persistent, mostly triangular to deltate, often with apical perianth appendages. Bisexual flowers, stamens 2-6, free; carpels many, free. Male flowers, stamens 2-6(-8); sessile, provided with a filament or sessile on a small or large, central androphore; anthers 2-, 3-, or mostly 4-sporangiate, extrose (to introse), longitudinally to transversely dehiscent; staminodes and connective appendages rarely present. Female flowers with 10-numerous free, ovoid carpels each containing 1 basal, anatropous ovule. Style (sub)basal to (sub)apical, linear, the stigmatic part either densely papillate to penicillate, or glabrous. Fruits a follicle or an achene; seeds with copious endosperm and small, undifferentiated embryo.

**Korean name:** Young-Ju-Pul-Gwa (영주풀과)

This family and other four taxa in the Pandanales, Cyclanthaceae, Pandanaceae, Stemonaceae, and Velloziaceae, are easily distinguished because the Pandanales are microtrophic herbs with scaly leaves.

***Sciaphila* Blume**, Bijdr. 10: 514 (1825)-*Andruris* Schltr., Bot.

Jahrb. Syst. 49: 71 (1913)-*Parexuris* Nakai & F. Maek., Icon. Pl. As. Orient. 1: 23 (1936).

Simple or branched herbs with rhizomes and scale-like leaves. Inflorescence monoecious, a raceme, sometimes branched. Flowers unisexual or bisexual; tepals 4-10, usually 6, equal or unequal, bearded, papillate, or ending in a globose knob or short point. Male flowers with 2, 3, or 6 stamens opposed the tepals; anthers 3- or 4-sporangiate, sessile or on short filaments, often connate at the base forming a very small and flat circular androphore in the center of the flower. Female flowers with numerous free carpels; style (sub)basal, apex papillate to penicillate or glabrous. Fruits; follicle, dehiscent.

**Korean name:** Young-Ju-Pul-Sok (영주풀속)

***Sciaphila nana* Blume**, Mus. Bot. 1:322 (1851)-*Andruris nana* (Blume) Giesen in Engler, Pflanzenreich IV. 18: 18 (1938)-*Sciaphila japonica* Makino, Bot. Mag. Tokyo 16: 211-212 (1902)-*Seychellaria japonica* (Makino) T. Ito, Bot. Mag. Tokyo. xxi. 84 (1907)- *Parexuris japonica* (Makino) Nakai et F. Maekawa, Ic. Pl. As. Or. i. 24 (1936)-*Andruris japonica* (Makino) Giesen, Das Pflanzenreich IV. 18 (Heft 104): 21 (1938).

**Korean name:** Yeong-Ju-Pul (영주풀) 국명신청

Plants 3-11 cm long; stems 0.3-0.8 mm in diameter, often branched with few appressed scaly leaves; leaves narrowly ovate, approximately 1.5 mm long. Inflorescences monoecious, terminal, with unisexual flowers, 1-5 cm long; racemes loosely 4-15-flowered, with male flowers on upper part; pedicels 2-7 mm long, longer than flowers; bracts minute, linear or narrowly ovate, acuminate. Male flower approximately 0.5-1.5 mm across, with 3 reduced carpels; perianth usually 6, connate at the base, segments narrowly ovate, glabrous, 3 slightly broader than alternating 3, acuminate, narrower 3 with a globose knob at apex; stamens 3, anthers sessile, filament-connective extended into a minute cylindrical appendage. Female flowers approximately 2 mm across; perianth usually 6, ovate, acute; carpels numerous, approximately 0.7 mm long, globose at apex; style attached above the middle on ventral side of carpel, subulate, acuminate, approximately 0.8 mm across, exerted above. Fruits globose, approximately 0.5-1.5 mm across, with shriveled style near base.

**Distribution:** Japan (Ohashi et al., 2008), Malaysia, Indonesia, Philippines (Chantanaorrapint and Thaithong, 2004), Korea

**Specimens examined:** Korea. Jeju Special Self-Governing

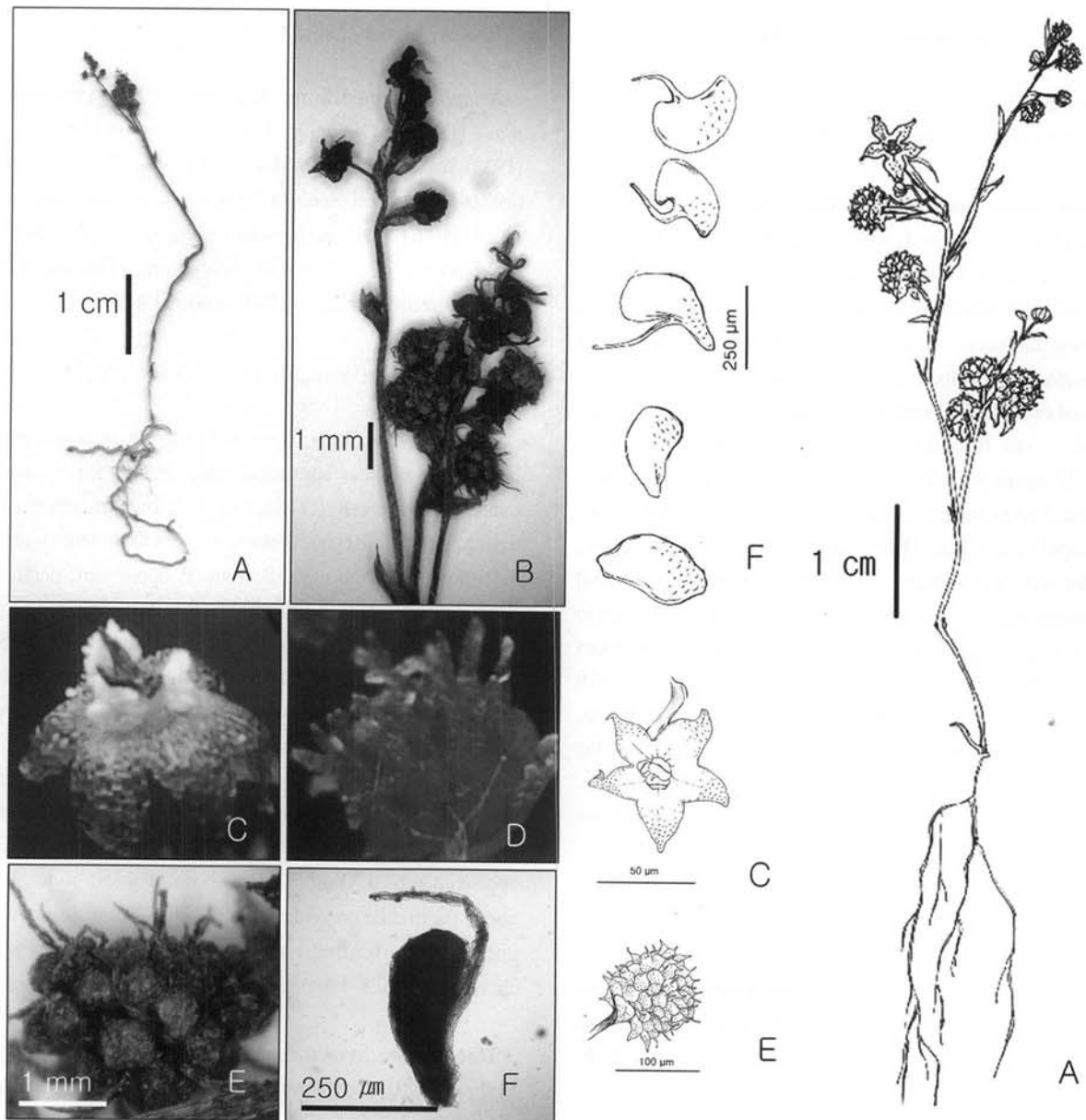
Province. Seogwipo-si: **Namwon-eup. Sumang-ri. Mul Oreum.** 8 Aug. 2007, Kim, C. U. & C. G. Oh 20070808008 (JBRI), 14 Aug. 2007, Kim, C. U. & C. G. Oh 20070814001 (JBRI), 23 Aug. 2007, Kim, C. U. & C. G. Oh 20070823001 (JBRI); **Ipsok-dong.** 4 Aug. 2008, Yim, E. Y. et al. 20080804001 (JBRI); **Namwon-eup. Sillye-ri.** 10 Sep. 2008, Song, G. & E. Y. Yim 20080910004 (JBRI).

**Habitat:** Margins or gaps of *Cryptomeria japonica* plantations with *Ardisia crenata* Sims, *Burmannia championii* Thwaites, *B. cryptopetala* Makino, *Eurya japonica* Thunb., *Trachelospermum asiaticum* (Sieb. et Zucc.) Nakai, etc., moist humus soil, southeastern

slopes from 320 to 380 m above sea level on Mt. Halla, Jeju.

*Sciaphila nana* is easily distinguished from *S. tenella*, *S. multiflora*, and *S. secundiflora* by the subulate style with a glabrous apex, and ovate to narrow ovate leaves and bracts. In addition, this species is easily distinguished from *S. thaidanica* and *S. ramosa* by the male perianth segments, which contain a knob-like structure at the apex, and from *S. arfakiana* by the dimorphic perianth.

We chose the Korean name Yeong-Ju-Pul because 'Young-Ju' is the old name of Jeju, where this species was first discovered.



**Fig. 1.** *Sciaphila nana* Blume: A. habit, B. inflorescence, C. male flower, D. female flower, E. aggregate fruit, F. fruit.

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