Thilachium madagascariense (Capparaceae), a new species from eastern Madagascar with a key to the species of the genus

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Summary. Thilachium madagascariense Fici, a small tree characterised by 1-foliolate leaves with articulate petioles, leaf blades elliptic or narrowly obovate with base attenuate and apex acuminate, flowers in groups of 2 – 3 at the top of lateral twigs and a high number of stamens, is described and illustrated from forest habitats of eastern Madagascar. The new species is similar to T. laurifolium Baker, a species endemic to central and eastern Madagascar, differing in the longer leaves with acuminate apex, flowers conferted at the top of lateral twigs, shorter pedicels, higher number of stamens and shorter gynophore. Its affinities are discussed and an updated key is provided for all the species of the genus Thilachium.

Key Words. endemism, historical collections, 1-foliolate leaves, taxonomy.

Introduction

The genus Thilachium Lour. (Capparaceae Juss.) comprises 15 species, seven of which endemic to Madagascar, six widespread in eastern Africa from Somalia southwards to Natal, one species, T. africanum Lour., recorded from both Madagascar and eastern Africa and one species, T. panduriforme Lour., from Madagascar and Mauritius (Ellfers et al. 1964; Hadj Moustapha Haddade 1965; Harvey et al. 1995). The genus includes small trees, shrubs and a single herbaceous species (T. rosomaculatum Y.B.Harv. & Vollesen), with simple or 1 – 3-foliolate leaves and in some cases with tuberous roots, occurring in dry lowland and mountain forests, riverine formations, deciduous woodlands, xerophilous bushlands and thickets, secondary scrubs, dunes and grasslands, from sea level up to 1600 m a.s.l. With regard to the generic name, the spelling Thyilacium was adopted in Flora Zambesiaca (Wild 1960), Thylachium in Flora of Tropical East Africa (Ellfers et al. 1964) and in Flore de Madagascar et des Comores (Hadj Moustapha Haddade 1965). Later the original spelling Thilachium was conserved (McVaugh 1968), and adopted in Flora of Somalia by Thulin (1993), and by Harvey et al. (1995) in describing a new species from Kenya. Historically Thilachium was included by Pax & Hoffman (1936) — with the genera Maerua Forssk. and Courbonia Brongn. — in the tribe Maerueae Baill. belonging to the subfamily Capparoideae Burnett. Later DeWolf (1962) treated Courbonia as a synonym of Maerua and underlined that Thilachium “is a somewhat anomalous genus” showing affinities also with the genus Ritchiea R.Br. More recently Kers (2003) did not retain the subdivision of Capparoideae in tribes proposed by Pax & Hoffman (1936), stating that Thilachium is related, in addition to Maerua and Ritchiea, to other Old World woody genera, i.e. Boscia Lam., Bachmannia Pax and Cadaba Forssk. The same author (Kers 2003) distinguished Thilachium from the allied genera mainly by the sepal connate, rupturing transversally at the midline, the conical calyptra tardily falling off and the absence of petals. With regard to the phylogeny of Capparaceae, Hall et al. (2002), based on chloroplast sequence data, identified within subfamily Capparoideae a mostly African Old World clade including Thilachium, Maerua, Ritchiea, Boscia and Cadaba.

Since the treatment of family Capparaceae provided by Hadj Moustapha Haddade (1965) no recent studies are available for Madagascar, which constitutes a centre of speciation of the genus Thilachium. During investigations on herbarium collections, material from the Lam & Meeuse expedition to Madagascar in 1938, originally identified as Capparis sp., turned out to belong to the genus Thilachium. Based on various differential features from the species known from Madagascar and eastern Africa, this specimen is referred to as a new species, distinguished by its leaf morphology and by the inflorescence and flower characters. The new species is here described and illustrated, its affinities are discussed and a key to the species of the genus is provided.
Materials and Methods
Herbarium investigations were carried out on historical and recent collections of Capparaceae from the Old World kept at the National Herbarium Nederland, Leiden University branch (L). To my knowledge the new species here described has been collected only once, in December 1938, by Lam & Meuse in eastern Madagascar (Lam & Meuse 5840).

The description and illustration are based on herbarium material. The species concept follows the one adopted by Elffers et al. (1964) and Hadj Moustapha Haddade (1965). The terminology of the vegetative and reproductive structures, as well as the main diagnostic characters within the genus, are based on the same treatments. The herbarium acronyms follow Thiers (continuously updated), while authors and plant names are based on IPNI (2020). The examination of type specimens of other species of Thilachium was carried out through electronic images available at JSTOR Global Plants (n.d.). The online collections available at P, K and MO and the Catalogue of the Vascular Plants of Madagascar (n.d.) were also consulted. The conservation status was provisionally assessed according to IUCN Red List Categories and Criteria (IUCN 2012).

Taxonomic Treatment
Thilachium madagascariense Fici sp. nov. Type: Madagascar, Soanierana-Antasibe [Andasibe], 350 m, 10 Dec. 1938, Lam & Meuse 5840 (holotype L 1851991); isotype P 05457232 digital image!).

http://www.ipni.org/urn:lsid:ipni.org:names:77218374-1

Small tree c. 5 m tall. Branches greyish or reddish, beset with lenticels; twigs glabrous. Leaves 1-foliolate; blade chartaceous, elliptic or narrowly obovate, (7.5 – 10 – 15.3 × (2 – 3 – 5) cm; base attenuate; apex acuminate, short spines at the base when mature; surfaces glabrous; veins c. 5 – 8 on each side of the midrib; petiole (1.1 –) 2 – 4 cm long, glabrous, striate, articulate at the top; stipules 0.5 mm long or caducous. Flowers white, 2 – 3usted at the top of lateral twigs; pedicels 12 – 18 mm long, glabrous; bracts 0.2 – 0.5 mm long; flower buds c. 9 – 10 × 7 – 9 mm, with calyx at maturity rupturing transversely, the calyptra remaining attached at one side in the available material; receptacle c. 2 – 3 mm in diam.; petals 0; androgynophore 1 – 1.5 mm long, glabrous; stamens c. 57 – 70, filaments (20 –) 23 – 30 mm long, anthers 1.5 – 2 mm long with thecae divergent at the base when mature; gynophore (20 –) 23 – 26 mm long, glabrous; ovary obovate, 3 – 4 × 1 – 1.5 mm long, glabrous, striate, stigma sessile, flattened. Fruit unknown. Fig. 1.

RECOGNITION. Related to Thilachium laurifolium Baker in the articulate petiole of similar length and pauci-flowering inflorescence, but differs in the longer, acuminate leaf blade, (7.5 –) 10 – 15.3 cm long vs submarginate, 2.5 – 7.5 cm long, flowers 2 – 3usted at the top of lateral twigs vs 4 – 6 in corymbs, shorter pedicels, 1.2 – 1.8 cm long vs (3 –) 3.5 – 5 cm long, higher number of stamens, c. 57 – 70 vs c. 30 – 46, and shorter gynophore, (2 –) 2.3 – 2.6 cm long vs c. 5 – 7 – 8 cm (Table 1). With regard to other 1-foliolate species from Madagascar, T. madagascariense differs from T. monophyllum Hadj-Moust. in the longer pediole, (1.1 –) 2 – 4 cm long vs 0.8 – 1.2 cm long, shorter leaf blade, (7.5 –) 10 – 15.3 cm long vs 5 – 8 cm long, shorter pedicels, 1.2 – 1.8 cm long vs 2.3 – 2.5 cm long and higher number of stamens, c. 57 – 70 vs 25 – 90, and from T. pouponii Aubrèv. & Peligr. in the shorter pediole, (1.1 –) 2 – 4 cm long vs c. 10 cm long, larger leaf blade, (7.5 –) 10 – 15.3 × (2 –) 3.3 – 5 cm vs 4 – 5 × 0.5 – 1 cm, shorter pedicels, 1.2 – 1.8 cm long vs 3 – 4 cm long, lower number of stamens, c. 57 – 70 vs c. 90 – 100 and shorter gynophore, (2 –) 2.3 – 2.6 cm long vs 6 – 7 cm (Table 1).

DISTRIBUTION AND HABITAT. The new species is only known from the type, which was collected in forest habitats of eastern Madagascar with Sphenomeris decipiens C.Chr., Caythia boivinii var. hildebrandtii (Kulm) Janssen & Rakotondr., Tambioaurissa capuronii Cavaco, Exacum subacaulis Humbert, Burasaria sp., Neodypsis lastelliana Baill., Dyops nodifera Mart., Ravenala madagascariensis Sonn., at an elevation of 350 m.

SPECIMENS EXAMINED. MADAGASCAR. Soanierana-Antasibe [Andasibe], 350 m, 10 Dec. 1938, Lam & Meuse 5840 (holotype L; isotype P).

CONSERVATION STATUS. Lacking information to assess its risks, Thilachium madagascariense is categorised as Data Deficient (DD).

PHENOLOGY. Flowering in December (based on the available material).

VERNACULAR NAME. “Tafolona” (malagasy).

NOTES. Thilachium madagascariense is mainly distinguished by its leaf and inflorescence characters, as well as by the length of pedicels, number of stamens and length of gynophore. As mentioned above, among the species of the genus with 1-foliolate leaves T. madagascariense shows some affinities with T. laurifolium, endemic to central and eastern Madagascar (Hadj Moustapha Haddade 1965; Catalogue of the Vascular Plants of Madagascar n.d.) (Table 1). The new species is also related to T. thomasii Gilg, recorded from eastern Kenya and southern Somalia, which is distinguished by the shorter pedioles (0.4 –) 0.5 – 0.9 (– 1.4) cm long, shorter, coriaceous or slightly fleshy leaf blade 3 – 9 cm long, inflorescence a 1 – 10-flowered loose corymbose raceme and lower number of stamens (c. 18 – 25) with longer anthers c. 3 mm long (Elffers et al. 1964; Thulin 1993) (Table 1). Other species with 1-foliolate leaves from Madagascar and eastern Africa, e.g. T. monophyllum, T. pouponii, T. paradoxum Gilg, T. roseomaculatum Y.B.Harv. & Vollesen, are readily recognisable by several vegetative and reproductive characters (Table 1). A key to all the...
Fig. 1. *Thilachium madagascariense*. A flowering branch; B flower bud; C flower; D ovary. All from Lam & Meeuse 5840 (holotype L). Drawn by Silvio Fici.
Table 1. Characters differentiating *Thilachium madagascariense* and related taxa.

| Character           | *T. madagascariense* | *T. laurifolium* | *T. thomasii* | *T. monophyllum* | *T. paradoxum* | *T. pouponii* | *T. roseomaculatum* |
|---------------------|----------------------|-------------------|---------------|------------------|----------------|--------------|---------------------|
| Habit               | small tree           | shrub or small tree | shrub or small tree | shrub or small tree | shrub          | small tree | suffruticose perennial herb |
| Height (m)          | c. 5                 | up to c. 10       | 1 – 4         | 4 – 9            | up to c. 0.6   | 6 – 10      | up to 0.15         |
| Petiole length (cm) | (1.1 –) 2 – 4        | c. 1.9 – 2.7     | (0.4 –) 0.5 – 0.9 | 0.8 – 1.2        | 8 – 30         | c. 10       | 0.4 – 0.8           |
| Leaf blade size (cm) | (7.5 –) 10 – 15.3 x (2 –) 3.5 – 5 | 2.5 – 7.5 x 2.5 – 3 | 3 – 9.5 x 1.8 – 7.2 | 5 – 8 x 3 – 4 | 0.9 – 5 x 0.2 – 0.45 | 4 – 5 x 0.5 – 1 | 6.2 – 12.5 x 3.4 – 7.5 |
| Shape               | elliptic or narrowly obvate | obvate or elliptic | suborbicular, elliptic, ovate or obvate | ovate, obvate-elliptic to ovate-oblong | oblong to oblong-lanceolate | oblong-lanceolate | elliptic or obvate |
| Inflorescence       | 2 – 3 flowers at the top of lateral twigs | 4 – 6-flowered terminal corymb | 1 – 10-flowered terminal, loose corymbose raceme | up to c. 10-flowered terminal, corymbose raceme | some flowers solitary | 5 – 7-flowered terminal, corymbose raceme | 2 – 3 flowers in groups on the branches |
| Pedicel length (cm) | 1.2 – 1.8            | (3 –) 3.5 – 5     | up to 2       | 2.5 – 2.5        | 0.7 – 0.8      | 3 – 4        | 0.25 – 0.6          |
| Diameter of flower buds (mm) | c. 0.7 – 0.9    | c. 12             | up to 11      | c. 10 – 12       | c. 10          | 20 – 25      | c. 5               |
| Number of stamens   | c. 57 – 70           | c. 30 – 46        | c. 18 – 25    | 25 – 30          | c. 37 – 43     | c. 90 – 100  | c. 30 – 47         |
| Anthers length (mm) | (2 –) 2.5 – 3        | 3.1 – 3.5         | (1.6 –) 2.5 – 3 | 1.8 – 2.5        | c. 2 – 3       | 5 – 6        | 1 – 1.4             |
| Gynophore length (cm) | (2 –) 2.5 – 2.6    | c. 5 – 7 – 8     | 2 – 2.6       | c. 3 – 3.6       | c. 2.5 – 3     | 6 – 7        | 1.4 – 3             |
| Ovary size (mm)     | 3 – 4 x 1 – 1.5     | 3.5 – 4 x 1.5 – 2 | 3 – 4.5 x 1.2 – 1.5 | 3 – 4 x 1.5 – 2 | 3 – 4 x 1.5 – 2 | 3 – 4 x 2   | c. 2 x 1            |
| Shape               | oblong              | ovoid-oblong      | oblong        | ovoid            | ovoid-oblong   | ovoid       | cylindrical          |
species of *Thilachium* known from eastern Africa and Madagascar is provided below.

The description of this new species confirms Madagascar as a centre of speciation of the genus *Thilachium*, which includes here three other species with 1-foliolate leaves, i.e. *T. laurifolium*, *T. monophyllum* and *T. pouponii*, and six species with 3-foliolate leaves, in some cases intermixed with 1-foliolate leaves, i.e. *T. africanum* Lour., *T. angustifolium* Bojer, *T. humbertii* Hadj-Moust., *T. panduriforme* Juss., *T. seyrigii* Hadj-Moust. and *T. sumangui* Bojer. All these taxa, with the exception of *T. africanum* and *T. panduriforme*, are endemic to the island, where they are widespread along the coast and inland in xerophilous bushlands and woodlands, deciduous forests, dunes and riverine formations on limestone, gneiss, laterite, sandstone, alluvial and sandy-clay soils (Hadj Dunes and riverine formations on limestone, gneiss, ilous bushlands and woodlands, deciduous forests, ... are widespread along the coast and inland in xerophytes that historical collections are still a relevant source of data for taxonomic studies in less explored areas.

### Key to the species of *Thilachium*

1. Leaves always simple or 1-foliolate ................................................................. 2
   - Leaves 3-foliolate, rarely with simple leaves intermixed or on fertile branches ................................................................................................. 10
2. Suffruticose perennial herb; leaves with conspicuous pink spots ........................................ *T. roseomaculatum*
   - Shrubs or small trees; leaves without pink spots ................................................ 3
3. Filaments up to 12 mm long ........................................................................... 4
   - Filaments more than 16 mm long .................................................................. 5
4. Leaf blade 15–24 × 8–11 cm; filaments 11–12 mm long ...................................... *T. macrophyllum*
   - Leaf blade 8.3–14 × 4.3–6.4 cm; filaments 7–8 mm long ................................... *T. alboviaceum*
5. Petioles more than 8 cm long; leaf blade up to 1 cm wide ............................... 6
   - Petioles up to 4 cm long; leaf blade more than 1.8 cm wide ............................. 7
6. Petioles 8–30 cm long; leaf blade small, 9–50 × 2–4.5 mm, or frequently absent ................................. *T. paradoxum*
   - Petioles c. 10 cm long; leaf blade 40–50 × 5–10 mm ........................................... *T. pouponii*
7. Petioles (1.1–) 1.9–4 cm long; stamens ≥30 ......................................................... 8
   - Petioles up to 1.2 (–1.4) cm long; stamens ≤30 .............................................. 9
8. Leaf blade subemarginate 2.5–7.5 cm long; 4–6 flowers in terminal corymbs; pedicels (3–) 3.5–5 cm long; stamens c. 30–46; gynophore c. 5–7 (–8) cm long ........................................ *T. laurifolium*
   - Leaf blade acuminate (7.5–) 10–15.3 cm long; 2–3 flowers at the top of lateral twigs; pedicels 1.2–1.8 cm long; stamens c. 57–70; gynophore, (2–) 2.3–2.6 cm long .................................................. *T. madagascariense*
9. Pedicels 2.3–2.5 cm; fruit 1.5–2 cm long .............................................................. *T. monophyllum*
   - Pedicels up to 2 cm long; fruit 3–6 cm long ...................................................... *T. thomasi*  
10. Inflorescence a dense corymb, usually with more than 20 flowers ...................... *T. densiflorum*
   - Inflorescence loose, with 1–10 (–20) flowers .................................................... 11
11. Leaflets linear or oblong, 0.9–1.2 cm wide ....................................................... 12
   - Leaflets elliptic, lanceolate or oblanceolate, ovate, obovate or panduriform, (0.6–) 1–5.3 cm wide .......... *T. angustifolium*
12. Leaflets heteromorphic, lanceolate and panduriform; simple leaves present on fertile branches ................................................................. *T. panduriforme*
   - Leaflets not heteromorphic .............................................................................. 13
13. Pedicels 6–8 mm long ...................................................................................... 14
   - Pedicels 10–21 mm long ................................................................................. 14
14. Filaments up to 3.6 cm long ........................................................................... 15
   - Filaments c. 1 cm long .................................................................................. 15

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15. Pedicels c. 1–1.3 cm long; stamens c. 15; fruit 4–5 cm long ................................. T. humbertii
   – Pedicels 1.5–2 cm long; stamens 30–40; fruit 0.7–0.8 cm long ............................ T. seyrigii

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References
Catalogue of the Vascular Plants of Madagascar (n.d.). Missouri Botanical Garden, St. Louis, & Antananarivo, Madagascar. Available from: http://legacy.tropicos.org/Name/40013340?projectid=17. Accessed 16 March 2021.

DeWolf, G. P. (1962). Notes on African Capparidaceae: III. Kew Bull. 16: 75–83.

Effers, J., Graham, R. A. & DeWolf, G. P. (1964). Capparidaceae. In: C. E. Hubbard & E. Milne-Redhead (eds), Flora of Tropical East Africa. Whitefriars Press Ltd., London and Tonbridge.

Hadj Moustapha Addade, S. E. M. (1965). Capparidacées. In: H. Humbert (ed.), Flore de Madagascar et des Comores, 83. Muséum national d’Histoire Naturelle, Laboratoire de Phanérogamie, Paris.

Hall, J. C., Sytsma, K. J. & Ilits, H. H. (2002). Phylogeny of Capparaceae and Brassicaceae based on chloroplast sequence data. Amer. J. Bot. 89: 1826 – 1842.

Harvey, Y. B., Luke, W. R. Q. & Vollesen, K. B. (1995). Thilachium roseomaculatum (Capparaceae): new species from Kenya. Kew Bull. 50: 155 – 160.

IPNI (2020). International Plant Names Index. Royal Botanic Gardens, Kew, Harvard University Herbaria & Libraries and Australian National Botanic Gardens. Available from: http://www.ipni.org. Accessed 12 Jan. 2021.

IUCN (2012). IUCN Red List categories and criteria: Version 3.1. 2nd ed. IUCN, Gland and Cambridge.

Jacobs, M. (1984). Herman Johannes Lam (1892–1977), the life and work of a Dutch Botanist. Rodopi, Amsterdam.

JSTOR Global Plants (n.d.). Ithaka. Available from: https://plants.jstor.org/. Accessed 16 March 2021.

Kers, L. E. (2003). Capparaceae. In: K. Kubitzki & C. Bayer (eds), The Families and Genera of Vascular Plants. Vol. 5. Flowering Plants. Dicotyledons. Malvales, Capparales and Non-betalain Caryophyllales: 36 – 56. Springer, Berlin, Heidelberg.

McVaugh, R. (1968). Report of the Committee for Spermatophyta: Conservation of Generic Names, IX. Taxon 17: 325 – 329.

Pax, F. & Hoffman, K. (1936). Capparidaceae. In: A. Engler & K. Prantl (eds), Die Natürlichen Pflanzenfamilien, ed. 2, 17b: 146 – 233. W. Engelmann, Leipzig.

Thiers, B. (continuously updated). Index Herbariorum: A Global Directory of Public Herbaria and Associated Staff. New York Botanical Garden’s Virtual Herbarium. Available from: http://sweetgum.nybg.org/science/ih/. Accessed 13 Jan. 2021.

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