

***Hildegardia dauphinensis* (Malvaceae, Sterculioideae): a new species from southeastern Madagascar**

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ABSTRACT

Hildegardia dauphinensis J. G. Zaborsky, a new species from southern Madagascar, is described and illustrated. Closely resembling *Hildegardia perrieri* (Hochr.) Arènes, it differs in having distinctive multi-branched stellate hairs on the calyces and leaves, and in having flat (not revolute) leaf blades. Known only from the type specimen collected near Fort Dauphin, it is Critically Endangered. A key to the four Malagasy species of *Hildegardia* Schott & Endl. is also presented.

KEY WORDS

Sterculioideae,
Malvaceae,
Hildegardia,
conservation,
Madagascar,
new species.

RÉSUMÉ

Hildegardia dauphinensis (Malvaceae, Sterculioideae): une nouvelle espèce du Sud-Est de Madagascar.

Hildegardia dauphinensis J. G. Zaborsky, une nouvelle espèce du Sud de Madagascar, est décrite et illustrée. Elle est proche d'*Hildegardia perrieri* (Hochr.) Arènes, mais en diffère par des poils stellés multifides caractéristiques sur les calices et les feuilles et la présence de feuilles plates et non révolutes. Connue seulement du spécimen type récolté près de Fort Dauphin, cette espèce est considérée comme étant en Danger Critique. Une clé des quatre espèces malgaches d'*Hildegardia* Schott & Endl. est incluse.

MOTS CLÉS

Sterculioideae,
Malvaceae,
Hildegardia,
conservation,
Madagascar,
espèce nouvelle.

INTRODUCTION

While examining Malagasy specimens of *Hildegardia* Schott & Endl., I came across a specimen that did not match any of the three currently-accepted species. Its stellate indument differed from that of the other known species, and it was collected in a region where no other species have been recorded. This suggested that it was possibly a new taxon. After examining its calyx and leaf indument and that of the other species using a scanning electron microscope, the specimen's differences became even more apparent. I here describe it as a new species based on its distinctive indument, flat, not revolute leaf blades, and disjunct distribution. I also provide a new key to all four species of *Hildegardia* in Madagascar.

The genus *Hildegardia* Schott & Endl. (Malvaceae, Sterculioideae) contains 13 species of trees with a pantropical distribution. Three species are found in Africa, four in Madagascar, one in Australia, one in Cuba, and four in Asia. In Madagascar (Fig. 1), *Hildegardia ankaranensis* (Arènes) Kosterm. is located entirely in the northern part of the island with numerous collections from the Ankarana Reserve. It grows in dry forest on calcareous soils. *Hildegardia erythrosiphon* (Baill.) Kosterm. is widely distributed along the entire western side of the island. It grows in dry to subarid forest. *Hildegardia perrieri* (Hochr.) Arènes is known from three localities and occurs in humid forest. *Hildegardia dauphinensis* J. G. Zaborsky is markedly disjunct from the other species of the genus; it is found at the southeasternmost tip of the island near the town of Taolagnaro (formerly Fort Dauphin) in the humid bioclimatic zone.

MATERIALS AND METHODS

A Hitachi S3400 scanning electron microscope was used to record the features seen in Figure 3; uncoated, air-dried material was used from hand-made cuts of leaves and flowers. The specimens used were loaned from the Missouri Botanical Garden (MO).

While in Paris, France, around 50 specimens of all four Malagasy species were examined using a light microscope to assess calyx hair structure and variability. Back in the US at UWSP, a scanning

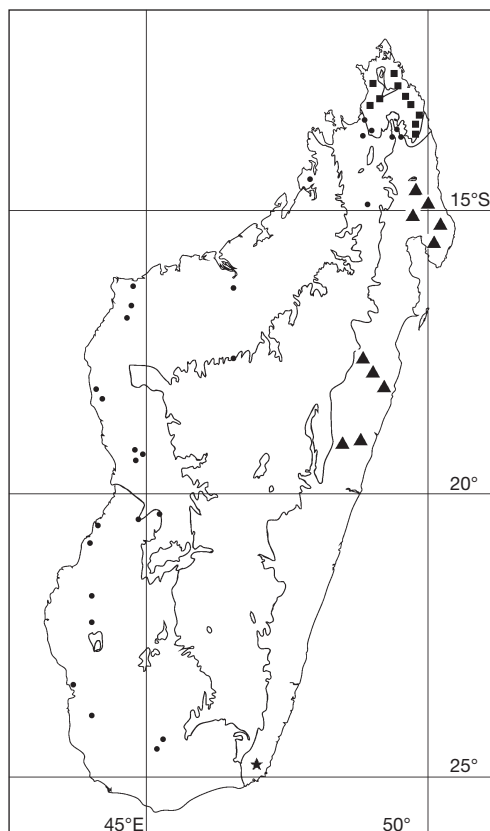


FIG. 1. — Distribution map of *Hildegardia* Schott & Endl. in Madagascar (after Cornet 1974; see Schatz 2000): ■, *H. ankaranensis* (Arènes) Kosterm.; ★, *H. dauphinensis* J. G. Zaborsky; ●, *H. erythrosiphon* (Baill.) Kosterm.; ▲, *H. perrieri* (Hochr.) Arènes.

electron microscope was used to take pictures of the leaf and calyx hairs of one specimen each of the four Malagasy species.

SYSTEMATICS

Genus *Hildegardia* Schott & Endl.

Hildegardia dauphinensis J. G. Zaborsky, sp. nov.
(Figs 2; 3A, B)

Differt a H. perrieri (Hochr.) Arènes *pilis stellatis* 18-22-ramosis, *calycibus et laminis insidentibus et marginibus laminarum non revolutis*.

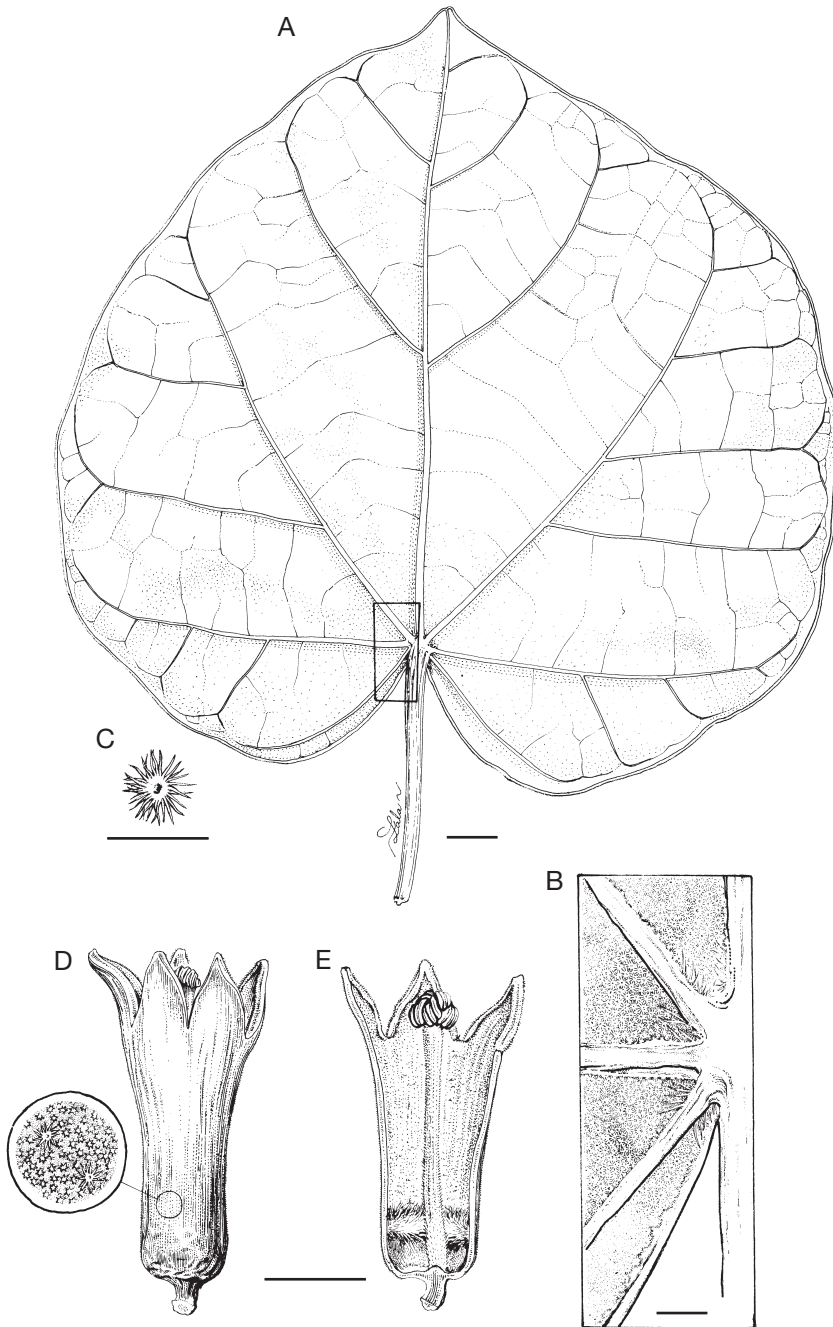


FIG. 2. — *Hildegardia dauphinensis* J. G. Zaborisky: **A**, lower leaf surface; **B**, close-up of lower leaf surface showing hair structure; **C**, enlarged stellate hair from lower leaf surface showing multiple arms; **D**, flower exterior, inset showing hairs; **E**, flower longitudinal section showing androgynophore and inner hairs. G. E. Schatz *et al.* 3001. Illustration by Roger Lala.

TYPUS. — Madagascar. Toliara Province, N of Ft Dauphin [Taolagnaro], on road to Ste Luce, 6 km E of main road, main block N of road, white sand littoral forest, block S-7 of QIT-FER, 24°47'S, 47°10'E, 15 m, 13.XI.1990, leaves and flowers, G. E. Schatz, N. Dumetz, D. Faber-Langendoen, A. Randrianasolo & R. Rabevohitra 3001 (holo-, MO!; iso-, P!, TAN!).

DESCRIPTION

Deciduous tree 14 m tall. Leaf blades 13-15 × 15-16 cm, subrotund, palmately 7-veined at the base, the apex obtuse to acute, the base cordate, the margins entire and flat, not revolute, glabrous above, covered beneath with stellate hairs 0.8-1.2 mm in diameter, each hair with 18-22 arms, hairs of domatia in axils of primary veins simple, 1 mm long. Inflorescence unknown, the flowers of the only known specimen collected from the ground. Pedicels not seen. Stipe 1.5-3 mm long; calyx 27-40 × 8-14 mm, campanulate to infundibuliform, slightly constricted at the middle, slightly flaring above, reportedly yellow-orange, thick, fleshy, the lobes 6-7.2 × 3-5 mm, narrowly triangular, acute, the entire outer surface of the calyx covered in simple and stellate hairs, simple hairs 0.4-0.6 mm long, stellate hairs 0.8-1.2 mm in diameter, the lowest 2 mm of the inside of the calyx tube filled with abundant simple hairs 2 mm long; androgynophore 28-30 mm long, covered by sparse stellate hairs 2-2.3 mm in diameter, the anthers 1-1.5 mm long, bilocular, arranged in a globose head of 5 groups, with 10 anthers per group, reportedly beige. Immature carpels 1 mm long. Fruit unknown.

REMARKS

Hildegardia dauphinensis most closely resembles *H. perrieri* (Hochr.) Arènes but lacks the revolute leaf margins characteristic of that species (Arènes 1959). It also has a unique indument of multi-branched stellate hairs that completely covers the leaf undersides (Fig. 3A). These multi-branched hairs are also interspersed among simple hairs on the calyces (Fig. 3B). These stellate hairs are unlike those seen in the other three Malagasy species. Each hair is stellate with 18-22 arms radiating from the center. This interesting hair structure immediately sets it apart from *H. perrieri* as

well as the other Malagasy species. Its fruit was not collected and is unknown. The new species does not match any of the known African species treated in Dorr & Barnett (1990). These authors hypothesize that the Malagasy and African species form a natural group based on the presence of a tubular calyx, short calyx lobes, and flowering when leafless. *Hildegardia dauphinensis* matches these criteria as well. Wilkie *et al.* (2006) provided evidence that *H. barteri* (Mast.) Kosterm., an African species, and *H. populifolia* Schott & Endl., an Asian species, were not closely related. It is beyond the scope of this paper to clarify the circumscription of *Hildegardia*; it is possible that further research may indicate the need to exclude the African and Malagasy species from this genus.

The new species, *H. dauphinensis*, is assessed as Critically Endangered because its EOO (Extent of Occupancy) is less than 100 km², it is only known to occur at a single location outside a protected area, and there is both current and predicted decline from human pressure and planned future mining activities, thus the criteria CR B1ab(i,ii,iii) of the IUCN (2001) apply.

DISCUSSION

Figures 3A and 3B show the unique multi-branched hairs, and simple hairs, of *Hildegardia dauphinensis* J. G. Zaborsky on its abaxial leaf surface and outer calyx surface, respectively. Figure 3C shows the calyx hairs of *H. erythrosiphon* (Baill.) Kosterm. Arènes (1959) recognizes many infra-specific taxa within *H. erythrosiphon* based on calyx shape and hair structure, however, those taxa are not accepted here. The examination of other specimens of *H. erythrosiphon* showed that there is much variability within this taxon, but too many intergradations to make recognizing the taxa easy. The long, simple hairs of *H. ankaranensis* (Arènes) Kosterm. can be seen in Figure 3D. Figures 3E and 3F show the simple and stellate hairs of the calyx of *H. perrieri* (Hochr.) Arènes; note the similarities to the hairs on the calyx of *H. dauphinensis*.

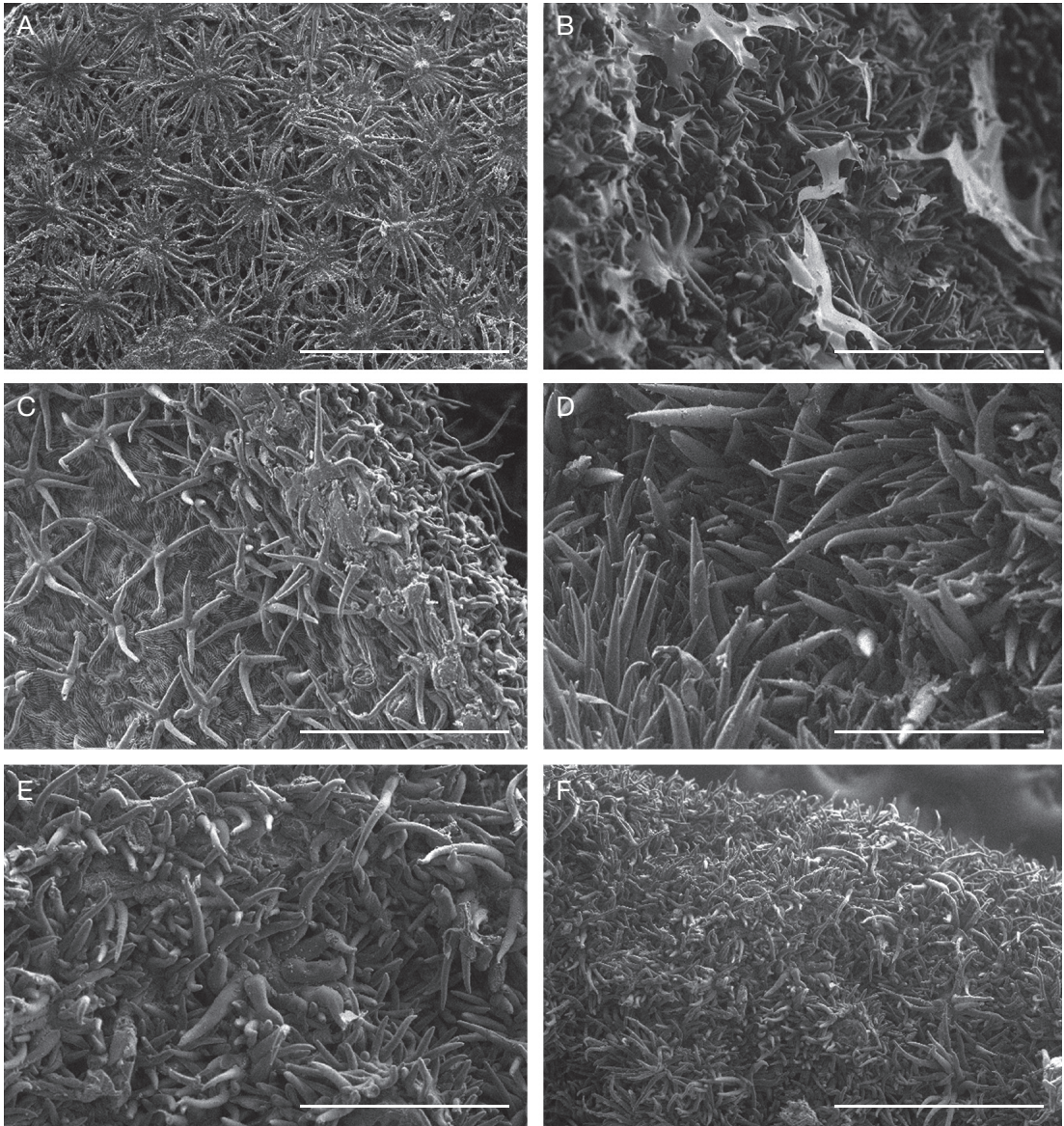


FIG. 3. — Scanning electron micrographs: **A**, *Hildegardia dauphinensis* J. G. Zaborisky, abaxial leaf blade surface showing stellate hairs, note 18-22 arms on each hair; **B**, *H. dauphinensis* outer calyx surface showing simple and stellate hairs; **C**, *H. erythrosiphon* (Baill.) Kosterm. outer calyx surface showing stellate hairs with 4-6 arms, and wrinkled calyx surface; **D**, *H. ankaranensis* (Arènes) Kosterm. outer calyx surface showing thick, simple hairs; **E**, *H. perrieri* (Hochr.) Arènes outer calyx surface showing thick, simple hairs with scattered stellate hairs; **F**, *H. perrieri* outer calyx surface showing thick, simple hairs with scattered stellate hairs. A, B, G. E. Schatz 3001 (MO); C, H. Van der Werff et al. 12715 (MO); D, Capuron 20101 (MO); E, Ralimanana 126 (MO); F, Ralimanana 126 (MO). Scale bars: A, F, 200 μ m; B-E, 500 μ m.

KEY TO THE SPECIES OF *HILDEGARDIA* SCHOTT & ENDL. IN MADAGASCAR

1. Calyces (26-)27-40(-46) mm long, covered with both simple and stellate hairs, simple hairs 0.4-0.8 mm long, stellate hairs 0.8-1.2(-1.8) mm in diameter with 10-22 arms 2
 — Calyces (13-)15-24 mm long, covered with only simple hairs or with only stellate hairs, simple hairs 1-1.2(-1.8) mm long, stellate hairs 2-2.6 mm in diameter with 4-6 arms ... 3
2. Stellate hairs of calyces with 18-22 arms, 0.8-1.2 mm in diameter, simple hairs 0.4-0.6 mm long; calyces 27-40 mm long; leaf margins flat, not revolute *H. dauphinensis*
 — Stellate hairs of calyces with 10 (12) arms, 1-1.2(-1.8) mm in diameter, simple hairs 0.6-0.8 mm long; calyces (26-)30-40(-46) mm long; leaf margins revolute *H. perrieri*
3. Calyces covered in reddish brown simple hairs 1-1.2 (1.8) mm long *H. ankaranensis*
 — Calyces covered in white stellate hairs, 2-2.6 mm in diameter *H. erythrosiphon*

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REFERENCES

ARÈNES J. 1959. — Sterculiacées in HUMBERT H. (ed.), *Flore Madagascar* 131. Muséum national d'Histoire naturelle, Paris: 22-30.

CORNET A. 1974. — Essai de cartographie bioclimatique à Madagascar. *Notice Explicative* 55, ORSTOM, Paris: 1-28.
 DORR L. J. & BARNETT L. C. 1990. — A new species of *Hildegardia* (Sterculiaceae) from Somalia. *Kew Bulletin* 45 (3): 577-580.
 IUCN 2001. — *IUCN Red List Categories and Criteria*. Version 3.1 IUCN Species Survival Commission. IUCN, Gland, Switzerland; Cambridge, UK, ii + 30 p.
 SCHATZ G. E. 2000. — Endemism in the Malagasy tree flora, in LOURENÇO W. R. & GOODMAN S. M. (eds), *Diversity and Endemism in Madagascar*. Mémoires de la Société de Biogéographie. Société de Biogéographie, MNHN, ORSTOM, Paris: 1-9.
 WILKIE P., CLARK A., PENNINGTON R. T., CHEEK M., BAYER C. & WILCOCK C. C. 2006. — Phylogenetic relationships within subfamily Sterculioideae (Malvaceae/Sterculiaceae-Sterculiidae) using the chloroplast gene *ndbF*. *Systematic Botany* 31 (1): 160-170.

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