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## **The Transfer of *Eulophia Beravensis* Rchb. f. to *Oeceoclades* Lindl., a Genus with Its Centre of Diversity in Madagascar (Eulophiinae, Orchidaceae)**

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# The transfer of *Eulophia beravensis* Rchb. f. to *Oeceoclades* Lindl., a genus with its centre of diversity in Madagascar (Eulophiinae, Orchidaceae)

Ruth E. Bone, Ernesto Sanz & Sven Buerki

## Abstract

BONE, R. E., E. SANZ & S. BUERKI (2014). The transfer of *Eulophia beravensis* Rchb. f. to *Oeceoclades* Lindl., a genus with its centre of diversity in Madagascar (Eulophiinae, Orchidaceae). *Candollea* 69: 201-205. In English, English and French abstracts.

Recent phylogenetic inferences among *Eulophiinae* genera have resolved *Eulophia beravensis* Rchb. f. as nested within the near-endemic Malagasy genus *Oeceoclades* Lindl. This result is supported by several morphological characters found in *Eulophia beravensis* that are diagnostic for *Oeceoclades*, and we therefore propose here to transfer this species to *Oeceoclades*. A species distribution map and a preliminary conservation assessment are also provided.

## Key-words

ORCHIDACEAE – EULOPHIINAE – *Oeceoclades* – *Eulophia* – Madagascar

## Résumé

BONE, R. E., E. SANZ & S. BUERKI (2014). Le transfert d'*Eulophia beravensis* Rchb. f. à *Oeceoclades* Lindl., un genre avec son centre de diversité à Madagascar (Eulophiinae, Orchidaceae). *Candollea* 69: 201-205. En anglais, résumé français et anglais.

De récentes études phylogénétiques incluant tous les genres d'*Eulophiinae* ont montré l'appartenance d'*Eulophia beravensis* Rchb. f. au genre *Oeceoclades* Lindl. Ce résultat est également confirmé par la présence de caractères morphologiques diagnostique du genre *Oeceoclades* chez *Eulophia beravensis*. Sur la base de ces évidences, nous proposons ici le transfert d'*Eulophia beravensis* dans *Oeceoclades*. Une carte de distribution ainsi qu'une évaluation du statut de conservation de cette espèce sont aussi présentées.

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## Introduction

*Oeceoclades* Lindl. is a genus of terrestrial orchids that has a centre of diversity in Madagascar (67% of the 39 species; WCSP, 2014) where many species are restricted to dry forests and most are narrow endemics (BOSSER & LECOUFLE, 2011; CRIBB & HERMANS, 2009). The remaining species of the genus are endemic to other Western Indian Ocean islands (Réunion, the Seychelles, and the Zanzibar Archipelago) or have an Afro-Malagasy distribution (Madagascar and the Comoros islands, and Tanzania to Mozambique), while a few are widespread in central Africa and two species, *Oeceoclades maculata* (Lindl.) Lindl. and *O. pulchra* (Thouars) Lindl., are almost pantropical (WCSP, 2014).

*Oeceoclades* was reinstated by GARAY & TAYLOR (1976), however, few morphological characters can be used to consistently distinguish it from the much more speciose and widespread genus *Eulophia* R. Br., a terrestrial genus with a centre of diversity in Africa (CRIBB, 1987). The presence of two fleshy keels on the basal section of the lip (the hypochile) in *Oeceoclades* (SUMMERHAYES, 1957; BOSSER & MORAT, 2001), and the absence of these keels at this position in *Eulophia* appears to be the only diagnostic character that, to our knowledge, does not show intermediate forms in both genera. Until recently, the unpublished study cited in PRIDGEON & al. (2009) was the only available molecular phylogenetic analysis to include *Eulophia beravensis* Rchb. f. It revealed a paraphyletic *Oeceoclades* due to the nested position of a sample of *Eulophia beravensis* within this genus, suggesting that either *Oeceoclades* should be treated as part of *Eulophia*, or that *E. beravensis* should be transferred to *Oeceoclades*. However, this study included few species and was based on a single plastid DNA region (*matK*; PRIDGEON & al., 2009). A recent molecular phylogeny conducted by the authors, based on an extensive sampling of *Oeceoclades* and representatives of all *Eulophiinae* genera, recovered a similar phylogenetic position for *E. beravensis*, within the monophyletic *Oeceoclades* (Fig. 1).

The phylogenetic position of *Eulophia beravensis* is not unexpected. This Malagasy endemic, which was previously included in the genus *Lissochilus* R. Br. (as *Lissochilus beravensis* (Rchb. f.) H. Perrier), displays the diagnostic floral character of *Oeceoclades*, as described above. In addition, this species occurs in dry-forest and shrub-grassland habitats on sandy soils, which are ecologically more typical for the genus *Oeceoclades* than for *Eulophia* (which are more commonly found in dry and seasonally inundated grasslands; WILLIAMSON, 1977; LA CROIX & CRIBB, 1998). GARAY & TAYLOR (1976) regarded the coriaceous conduplicate leaf character, such as is found in *E. beravensis*, as diagnostic for *Oeceoclades*, but appear to have overlooked *Eulophia beravensis* when they transferred other Malagasy *Lissochilus* to this genus.

Here we propose the transfer of *Eulophia beravensis* to the genus *Oeceoclades*. In addition, we provide a distribution map and a preliminary conservation assessment based on IUCN Red List Categories and Criteria (IUCN, 2012).

## Taxonomy

*Oeceoclades beravensis* (Rchb. f.) R. Bone & Buerki, **comb. nova.**

- ≡ *Eulophia beravensis* Rchb. f. in Bot. Zeitung (Berlin): 39: 449. 1881.
- ≡ *Graphorkis beravensis* (Rchb. f.) Kuntze, Revis. Gen. Pl. 2: 662. 1891.
- ≡ *Lissochilus beravensis* (Rchb. f.) H. Perrier in Humbert, Fl. Madagascar Comores 49(2): 42. 1941.

**Typus:** MADAGASCAR. Prov. Mahajanga: Beravi, VII. 1879, *Hildebrandt 3055* (holo-: W [W-Rchb.Orch.0010984] image seen; iso-: BM [BM000525715]!, GOET [GOET008578] image seen, K [K000410344]!, M [M0103484] image seen, P [P000108614]!).

*Habitat and Ecology.* – *Oeceoclades beravensis* has a broad distribution in the sub-humid to sub-arid areas of Madagascar to the west and south, where it grows in sandy soils, often forming dense stands in the understorey of western dry forest and wooded grassland-bushland mosaic (sensu MOAT & SMITH, 2007) (Fig. 2).

*Conservation status.* – *Oeceoclades beravensis* is currently considered to be endemic to Madagascar, where it is widespread. The vegetation types that it occupies are threatened, however. The wooded grassland-bushland mosaic, generally considered to be a secondary vegetation type (MOAT & SMITH, 2007; although see BOND & al., 2008 for alternative views on grassland origins) is disturbed by cattle grazing, clearance for fuelwood and human mediated fires (MOAT & SMITH, 2007). The western dry forest is targeted for charcoal and fuelwood and, according to MOAT AND SMITH (2007), is being cleared at a faster rate than any other forest type in Madagascar. Based on 40 collections from several herbaria (BM, K, MO and P; acronyms follow THIERS, 2014) an “Extent of Occurrence” of 397,139 km<sup>2</sup>, an “Area of Occupancy” (AOO) of 360 km<sup>2</sup> and 39 subpopulations (calculation following CALLMANDER & al., 2007), including six in the Protected Area network (Andranomena, Ankarafantsika, Ankarana, Baie de Baly, Namoroka, and Zombisty), *O. beravensis* is assigned a preliminary status of “Near Threatened” [NT] following IUCN Red List Categories and Criteria (IUCN, 2012). Under the “B” Criteria, based solely on EOO, this species would be categorized as “Least Concern”, however it occurs in vegetation that is threatened by land use change (see above) and we adopt a precautionary approach as recommended by the Red List Guidelines (IUCN, 2014). The specimens used for the assessment are included on the “Eulophiinae Scratchpad” (BONE, 2014).

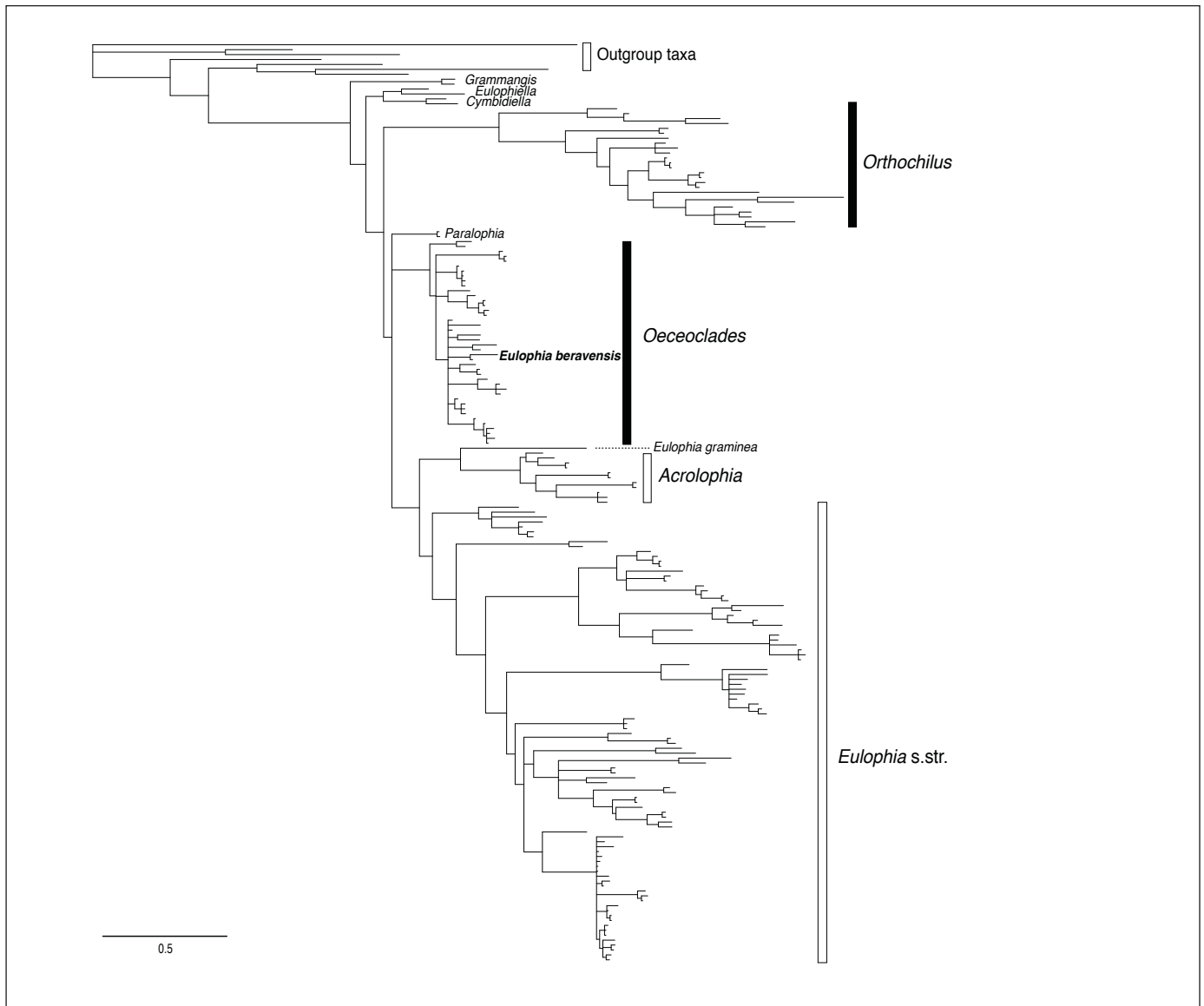


Fig. 1. – Simplified Bayesian plastid phylogeny of the tribe Eulophiinae showing *Eulophia beravensis* (Rchb. f.) R. Bone & Buerki nested within species of *Oeceoclades* Lindl.

*Observations.* – *Eulophia beravensis* is morphologically unique among all Malagasy *Eulophiinae* taxa, including *Oeceoclades*, by having cane like stems that form large clumps or dense stands in scrub and forest understorey. Like the xerophytic *Eulophia* species *E. leachii* A. V. Hall (from Southern Africa) and *E. petersii* (Rchb. f.) Rchb. f. (a widespread species across dryland Africa and extending into the Arabian Peninsula; WCSP, 2014) the leaves of *E. beravensis* have minutely serrate margins (Fig. 3). They are, however, narrow and coriaceous, unlike these *Eulophia* species, that have somewhat fleshy almost succulent leaves. These morphological traits (that appear to be adaptations to arid and sub-arid environments)

are clearly shown to have evolved independently based on unpublished molecular data produced by the authors, with all three taxa belonging to separate lineages.

The affinity of a species of *Eulophia* from Mozambique (*E. biloba* Schltr.), that was not sampled by the authors, should be investigated to determine whether it is conspecific with *Oeceoclades beravensis* (P. J. CRIBB, pers. comm.). If this is found to be the case, the validity of our *comb. novae* would be maintained since it bears the older basionym. The conservation assessment would require revision, however, to take into account a broader geographical distribution that would encompass Mozambique.

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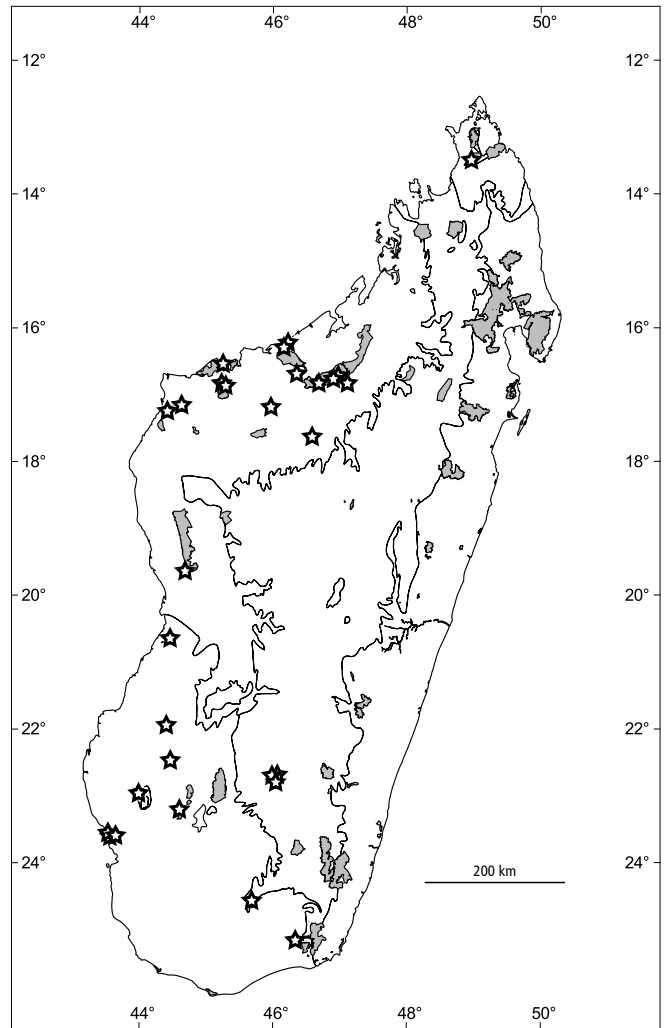


Fig. 2. – Distribution map of *Oeceoclades beravensis* (Rchb. f.) R. Bone & Buerki (stars), based on herbarium specimens mapped on the bioclimatic zones of Madagascar (after CORNET, 1974; see SCHATZ, 2000). Protected areas are highlighted in grey.



**Fig. 3.** – *Oeceoclades beravensis* (Rchb. f.) R. Bone & Buerki (near Ihoay airport, Fianarantsoa Prov. in 1996).

[Photo : J. Hermans]