

# *Eulophia edwardii* (Orchidaceae), a new species from the Pondoland Centre of Endemism in South Africa

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## Abstract

**Background and aims** – Despite the fact that the orchid flora of South Africa is well documented, new species are still being discovered. The identity of an *Eulophia* subpopulation from near Port Edward in KwaZulu-Natal has been ambiguous. Some thought that it belongs to *Eulophia schnelliae*, currently considered a synonym of *Eulophia macowanii*, whereas others were of the opinion that it was potentially a new species. Both hypotheses are investigated here.

**Material and methods** – Plants were studied in the field and herbarium specimens, including types, were consulted. The relevant published literature was revised.

**Key results** – *Eulophia schnelliae* is confirmed as a synonym of *Eulophia macowanii*. The Port Edward subpopulation does not match any known *Eulophia* taxon and is newly described as *Eulophia edwardii*, endemic to the Pondoland Centre of Endemism. It is only known from one subpopulation of about 200 individuals, which is threatened by urban development. It is, therefore, assessed as Critically Endangered according to Criterion B2ab(i,ii,iii).

**Conclusion** – The newly described species increases the number of *Eulophia* species in South Africa to 29 and the number of endemic *Eulophia* species to 10. This discovery underlines the need for continued botanical inventories and protection of sensitive grasslands.

## Keywords

Cymbidiaceae, Eulophiinae, KwaZulu-Natal, new species, Orchidaceae, Pondoland

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## INTRODUCTION

The terrestrial epidendroid orchid genus *Eulophia* R.Br. ex Lindl. is widespread in the tropical and subtropical areas of Africa, Asia, and the Americas. It is most diverse in tropical and southern Africa, particularly in the dambos (shallow wetlands), grasslands, and miombo woodlands of south-central Africa (Williamson 1977; la Croix and Cribb 1998; Cribb 2009).

*Eulophia* in the traditional sense (Cribb 2009) consisted of about 200 species, but was shown to be paraphyletic and was, therefore, split into two genera: *Eulophia* sensu stricto and *Orthochilus* Hochst. ex A.Rich. (Martos et al. 2014). Bone et al. (2015), based on a more extensive sampling, particularly of the endemic Malagasy genera, confirmed the paraphyly of *Eulophia* and followed the

taxonomic opinion of Martos et al. (2014), i.e. to resurrect the genus *Orthochilus*. As a result, Martos et al. (2014) and Bone et al. (2015), in line with long-standing tradition, recognise nine Eulophiinae genera namely, *Acrolophia* Pfitzer, *Cymbidiella* Rolfe, *Eulophia*, *Eulophiella* Rolfe, *Geodorum* Andrews, *Grammangis* Rchb.f., *Oeceoclades* Lindl., *Orthochilus*, and *Paralophia* P.J.Cribb & Hermans, of which *Eulophia* remains by far the largest (165 species). For future research on the group, both author teams recommended extending the phylogenetic analysis with the inclusion of more *Eulophia* taxa (so far only 30% have been sampled), particularly with Asian species. They also stressed the need for a comprehensive monographic treatment of *Eulophia* (as well as the other Eulophiinae genera), particularly in view of the fact that many species are widespread and show considerable regional variation.

Chase et al. (2021) based on the same data, and without adding any new molecular or morphological analysis, argued for lumping all Eulophiinae genera, except *Grammangis*, into *Eulophia* (sensu lato), making *Eulophia* amorphous and difficult to circumscribe.

*Eulophia* (sensu stricto) contains approximately 165 species (Martos et al. 2014). With 28 currently recognised species, it is the fourth largest orchid genus in South Africa after *Disa* P.J.Bergius (145 spp.), *Satyrium* Sw. (43 spp.), and *Habenaria* Willd. (30 spp.) (Johnson and Bytebier 2015). Nine species are endemic to South Africa and although several are rare (e.g. *Eulophia meleagris* Rchb.f.), only one, i.e. *Eulophia coddii* A.V.Hall, can be considered a narrow endemic. Several species are pollinated by bees but autonomous self-pollination has also been recorded (Peter 2009; Johnson and Bytebier 2015).

Here, I investigate the identity of an *Eulophia* population from near Port Edward in KwaZulu-Natal, South Africa, which was discovered back in 2008 by a group of orchid enthusiasts lead by Martin Rautenbach. These plants did not match the circumscription of any of the South African *Eulophia* species and could not be immediately named. McDonald (2009) in a note in the magazine “Orchids South Africa” suggested that they belong to *Eulophia schnelliae* L.Bolus, a taxon only known from the type and considered to be a synonym of *Eulophia macowanii* Rolfe by Hall (1965) in his monograph on the South African species of *Eulophia*. Others thought that this may possibly be a new species (Martin Rautenbach pers. comm.). Here, I examine both hypotheses.

## MATERIAL AND METHODS

Forty herbarium specimens from BOL, GRA, NBG, NH, NU, PRE, and SAM (Thiers 2023) of *Eulophia macowanii*, and including the type material of *Eulophia schnelliae*, were examined and compared with those of the Port Edward population (Appendix 1).

The only known population of the new taxon was visited by the author in February 2014 and 2015, during the flowering period, to record basic morphometric data and to collect herbarium material for further study.

The preliminary IUCN conservation assessment was done following the guidelines in the IUCN Red List Categories and Criteria (IUCN 2022).

## RESULTS AND DISCUSSION

Comparison of the holotype specimen of *Eulophia schnelliae* (*Schnell s.n.* in Herb. Bolus 22,860 [BOL149961]) with specimens of *Eulophia macowanii* confirms the opinion of Hall (1965), i.e. that *Eulophia schnelliae* fits entirely within the concept of *Eulophia macowanii* and should be considered as a synonym of the latter.

Comparison of the *Eulophia* material from Port Edward with the holotype of *Eulophia schnelliae* and

specimens of *E. macowanii* clearly shows that these belong to two different taxa. Flowers of the Port Edward plants are fully resupinate at anthesis, whereas those of *E. schnelliae* and *E. macowanii* are not resupinate. The papery sheaths on the peduncle of the Port Edward plants are always overlapping, whereas those in *E. schnelliae* cover at maximum only half the size of the internode, and those in other *E. macowanii* specimens only occasionally reach the base of the sheath above. Furthermore, these sheaths are of a much firmer texture. Flowering time of *E. schnelliae* is November and peak flowering of *E. macowanii* is November/December, whereas the Port Edward plants consistently flower in mid to late February. King William’s Town (now called Qonce), the type locality of *E. schnelliae*, is 40 km inland from the sea, whereas the Port Edward plants are just a few hundred meters from the beach and in coastal grassland. Furthermore, as the crow flies, King William’s Town is about 335 km from Port Edward. Thus, assigning the Port Edward plants to *E. schnelliae* was an error of judgment most likely resulting from comparison of photos of these plants with the painting in the protologue of *E. schnelliae* (Bolus 1946), rather than with the actual type specimen. To summarise, *E. schnelliae* is a synonym of *Eulophia macowanii*, and the Port Edward population neither matches the concept of *E. schnelliae*, nor that of *E. macowanii*.

A specimen from this population was included in the phylogenetic analysis of Martos et al. (2014) as “*Eulophia ?schnelliae*” and although weakly supported, seemed to be more closely related to *Eulophia ovalis* Lindl. than to *Eulophia macowanii*. Thus, in view of the fact that the Port Edward plants do not fit in the concept of *E. schnelliae*, *E. macowanii*, or any other *Eulophia* species, I here describe it as a new species.

## TAXONOMIC TREATMENT

***Eulophia edwardii*** Bytebier, **sp. nov.**

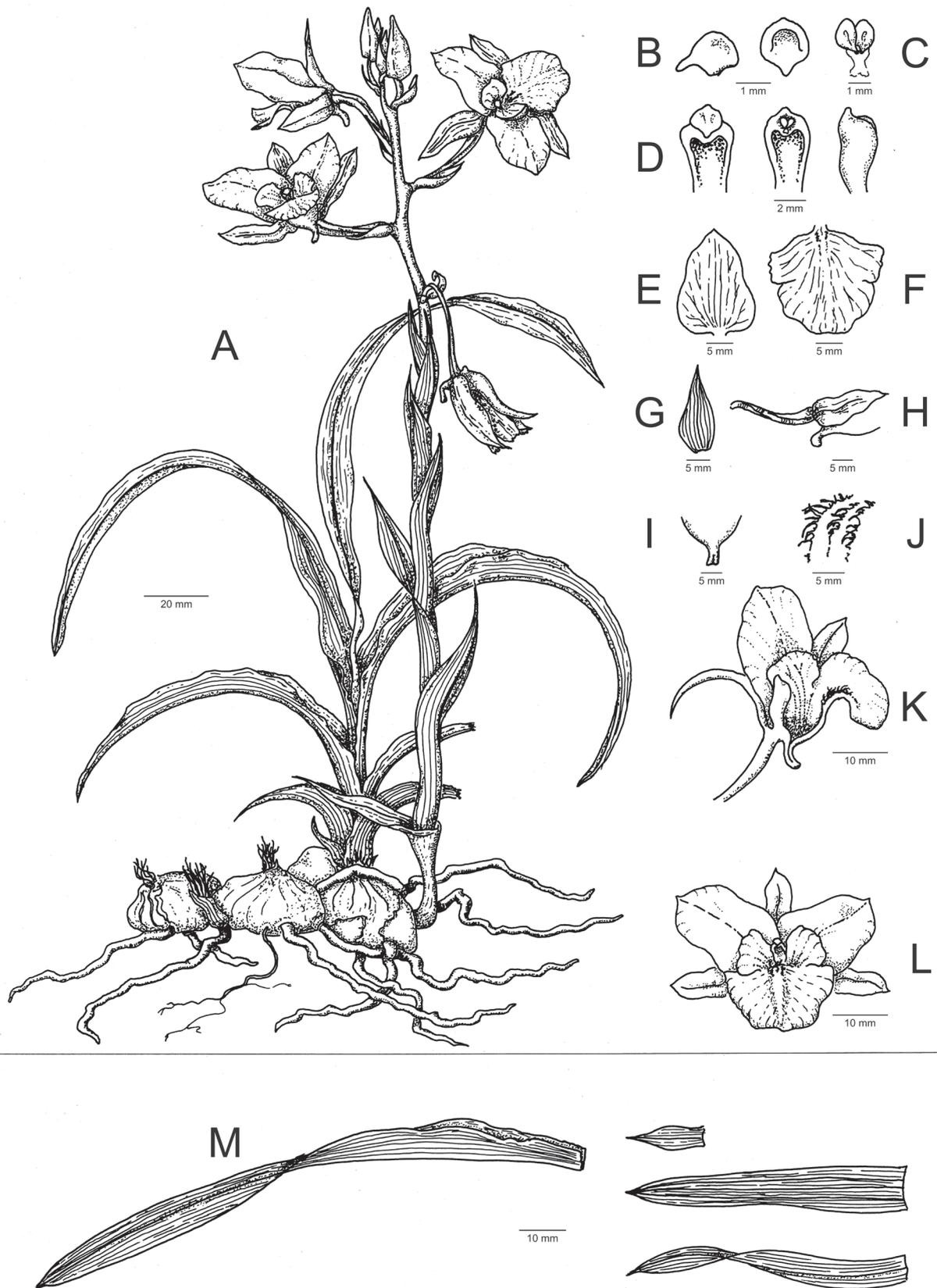
urn:lsid:ipni.org:names:77318678-1

Figs 1, 2, 3

**Type.** SOUTH AFRICA – **KwaZulu-Natal** • Port Edward, RENNIES BEACH; 31°04’S, 30°12’E; 15 m; 8 Feb. 2015; fl.; B. Bytebier, K.W. Grieve & G.R.H. Grieve 3501; holotype: NU [NU0094001]; isotypes: BR, NH, NU [NU0094003].

**Diagnosis.** *Eulophia edwardii* is morphologically most similar to *E. macowanii*, but differs from *E. macowanii* by having fully resupinate flowers at anthesis vs non-resupinate in *E. macowanii*, by having white petals vs creamy-yellow petals; and by having papery, overlapping sheaths on the peduncle vs more sturdy, non-overlapping sheaths or occasionally the tip of one sheath only just reaching the bottom of the next one. It differs from *E. ovalis* by having spreading petals instead of petals that cover the column and are bent over the lip.

**Description.** Terrestrial herb, 220–325 mm tall. Perennating organs subterranean, forming a beaded



**Figure 1.** *Eulophia edwardii*. A. Habit. B. Anther cap: side view and view from below. C. Pollinarium. D. Column: front and side view. E. Petal. F. Lip. G. Sepal. H. Pedicel, ovary, median sepal and part of lip showing spur. I. Apex of spur. J. Papillae on lip. K. Side view of flower. L. Front view of flower. M. Leaves. Figure drawn by Kate Grieve.

rhizome up to 110 mm long with up to 7 globose to ovoid tuberous units, each 15–20 mm in diameter and 10–17 mm tall, covered with fibrous remains of leaf bases; roots white, up to 170 mm long  $\times$  3–5 mm wide. Leaves 5–9, fully developed at anthesis, arranged in an arcuate fan, plicate, linear to linear-lanceolate, acute, the uppermost up to 270 mm long  $\times$  20 mm wide, the lowermost 2–3 much smaller and dry at anthesis. Inflorescence erect, lax to subdense, 5–14-flowered; peduncle slender, 2–3 mm in

diameter, covered with 6–8 papery, overlapping sheaths, up to 115 mm long  $\times$  14 mm wide; rachis 30–50 mm with papery, lanceolate to elliptic, acuminate bracts 15–17 mm long  $\times$  5–9 mm wide, slightly shorter than the ovary. Flowers fully resupinate at anthesis, sepals brownish green to green, petals and lip white, papillae pale yellow, spur greenish to greenish brown. Sepals spreading; median sepal 19–22 mm long  $\times$  6–7 mm wide, apex acute to attenuate; lateral sepals 23–25 mm long  $\times$  7–9 mm



**Figure 2.** *Eulophia edwardii*. A. Inflorescence. B. Flower. C. Plant in habitat. Photographs A and B by Florent Martos; C by Graham Grieve.

wide, apex acute to attenuate. **Petals** spreading, 21–25 mm long  $\times$  10–14 mm wide, ovate to elliptic, apex obtuse to rounded. **Lip** 3-lobed, 19–21 mm long  $\times$  20–24 mm wide; side lobes elliptic to obovate, 12 mm long  $\times$  6 mm wide; midlobe orbicular with 3 undulate ridges in basal third and 3 tomentose veins on either side of the ridges, ridges passing into relatively few, long, slender, branched papillae ending abruptly midway along the lip. **Spur** 5 mm, conical to cylindrical, slightly dorsoventrally flattened, incurved and often slightly bifid at apex. **Column** 5–6 mm. **Anther cap** 1.5–2 mm wide, beaked. **Pollinia** 2 attached to stipe of 1 mm. **Ovary** 19–29 mm long. **Fruit** ellipsoidal, pendent.

**Distribution.** Only known from the type locality (Fig. 3).

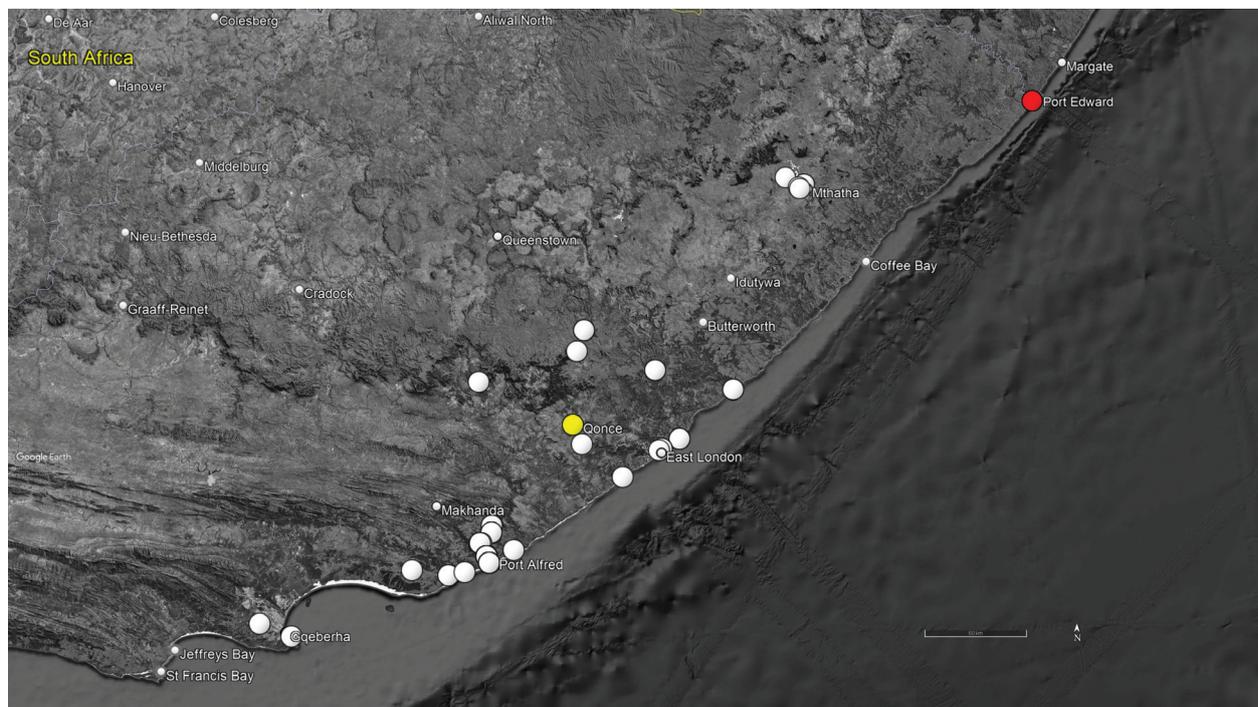
**Habitat and ecology.** Growing in moist, hygrophilous, lightly sloping, windswept, species-rich coastal grassland, dotted with clumps of *Strelitzia nicolai* Regel & Körn. CREW (Custodians of Rare and Endangered Wildflowers) Pondoland members have documented more than 370 species of indigenous angiosperms on this piece of land, including 16 other orchid species (Kate Grieve and Graham Grieve pers. comm.).

**Phenology.** Flowering in February (end of summer).

**Etymology.** Named in honour of Edward (Ted) George Hudson Oliver for his lifelong dedication to botany, particularly the study of Ericaceae and Orchidaceae. Indirectly, it also refers to Port Edward, so far, the only place where this taxon is known to occur.

**Preliminary IUCN conservation assessment.** Critically Endangered: CR B2ab(i,ii,iii). As far as can be judged from repeated monitoring by the author and the CREW Pondoland team, the subpopulation is stable, and although the number of flowering individuals (the only possible

way of counting the individual plants) changes from year to year, the maximum number of flowering specimens has never been more than an estimated 200. These occur in one subpopulation spread out over an area of about one hectare (B2a). CREW Pondoland has surveyed the very few remaining patches of coastal grassland near Port Edward in KwaZulu-Natal, as well as several along the Eastern Cape Pondoland coast. Despite numerous efforts, no additional subpopulations have so far been traced. A decline in the extent of occurrence (B2bi), area of occupancy (B2bii), and extent and quality of habitat (B2biii) is inferred in view of the fact that north of the Mtamvuna river (as far north as Durban, which is well beyond the limits of the Pondoland Center of Endemism) almost no untransformed grasslands close to the sea and matching the type locality still exist. North of Durban, coastal grasslands in proximity to the highwater mark do not exist until near the mouth of the Tugela. The loss of comparable habitat in KwaZulu-Natal is now nearly complete at least over this 225 km of coastline between the Mtamvuna and Tugela Rivers. A further decline of potential habitats is almost not possible as they are all already lost, making this species highly vulnerable to a catastrophic event, such as an attempt to develop the plot, which borders an important, interprovincial road and is close to the beach. The land on which the plants occur is currently privately owned and is unprotected, despite the fact that it contains 13 Pondoland endemics, six Near Threatened, five Vulnerable, one Endangered (*Eriosema umtamvunense* C.H.Stirt.), and one Critically Endangered (*Hyobanche fulleri* E.Phillips) species (<http://redlist.sanbi.org>). Furthermore, it has four species of *Indigofera* that



**Figure 3.** Distribution map of *E. macowanii* (white circles and a yellow circle for the type specimen of *E. schnelliae*) and *E. edwardii* (red circle). Map produced with Google Earth Pro (data SIO, NOAA, U.S. Navy, NGA, GEBCO; image Landsat / Copernicus).

have just been described (Grieve et al. 2023), as well as an overlooked *Exochaenium*, which will be described in another paper. A potential long-term solution would be to extend the close-by Red Desert Nature Reserve, a conservation Stewardship Site managed by the Red Desert Conservation Trust, so that it incorporates the land on which the single subpopulation of *E. edwardii* occurs.

**Additional material examined.** SOUTH AFRICA – KwaZulu-Natal • 3130AA; Port Edward, Rennies Beach; 10 m; 18 Feb. 2010; *Abbott 9097*; PCE [PCE0007850] photo, PRU, NU spirit • *ibid.*; 6 Feb. 2013; *K.W. Grieve 726*; NU spirit • *ibid.*; 17 Feb. 2014; *Bytebier 3477*; NU spirit • South of Port Edward; 27 Feb. 2011; *Church & Goodman s.n.*; BR, NU.

**Phylogenetic placement.** Martos et al. (2014) included this taxon (as *E. ?schnelliae*) in their phylogenetic sampling, where it was placed sister to *E. ovalis*, although only with weak support.

**Taxonomic notes.** Apart from the diagnostic characters mentioned above, there are several, more subtle differences between *E. edwardii* and *E. macowanii*. The former has between 6 and 8 papery leaf sheaths, whereas the latter has seldom more than 5 leaf sheaths, which are of a firmer

texture. The longest leaf sheath, found in the middle of the peduncle, is on average 80 mm in the former (and up to 115 mm), whereas in the latter it is seldom more than 60 mm. The lateral sepals are 7 mm wide or more in the former whereas they are seldom more than 6 mm in the latter. The width of the lip is usually more than 20 mm in the former and seldom more than 17 mm in the latter. *Eulophia edwardii* flowers in mid to late February, while most records for *E. macowanii* are from November and December. *Eulophia macowanii* is endemic to the Eastern Cape province, whereas *E. edwardii* occurs in KwaZulu-Natal (Fig. 3). *Eulophia edwardii* is also superficially similar to *E. ovalis* var. *ovalis*. Vegetatively they look very much alike, but the flowers are not comparable. The petals of *E. edwardii* are clearly spreading, whereas those of *E. ovalis* are bent forward over the lip. The side lobes of the lip are rounder and bigger in *E. edwardii* as compared to those of *E. ovalis*, and the papillae in *E. edwardii* end abruptly half way the lip, whereas those in *E. ovalis* extend further than half way. *Eulophia ovalis* has also not been recorded along the Pondoland Coast. The closest known population of *E. ovalis* occurs along the Mzimkhulu River about 70 km north-northeast of Port Edward.

## Key modification

The following modification to the key to *Eulophia* in Linder and Kurzweil (1999) is proposed after following steps 1b, 2b, 7b, 17b, 19b, 36a, 37b, 38b, 39b.

- 40a Leaves less than half the length of the scape at anthesis; spur 1.2–2.2 mm long; crest papillae few, confined to the basal 1/3 of the lip midlobe ..... *E. cooperi*
- 40b Leaves usually more than 2/3 length of the scape at anthesis; if less, then the spur more than 3 mm long and crest papillae numerous over most of lip ..... **41**
- 40c Leaves approximately half the length of the scape at anthesis; spur 5 mm long; crest papillae few, branched and restricted to middle of the lip ..... *E. edwardii*

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## APPENDIX

### Appendix 1. Material examined of *Eulophia macowanii*.

SOUTH AFRICA – **Eastern Cape** • Frasers Camp; 11 Jan. 1947; *Compton R.H.* 19095; NBG [NBG0056558-0] • 3128DA; Umtata; 27 Nov. 1954; *Lowry C. s.n.*; BOL [BOL69482] • 3128DB; Umtata, Unitra Campus; 18 Nov. 1982; *Hutchings A.* 50; GRA • 3128DB; *ibid.*; 28 Nov. 2001; *Peter C.* 429; NU [NU0005494] • 3128DB; Umtata; Dec. 1915; *McLoughlin A.G.* 4174; BOL [BOL69481] • 3226DB; Chumie Peak; 1884; *Scully W.C.* 173; BOL [BOL69484] • 3227CB; Dohne Peak; 27 Jan. 2001; *McMaster J.C.* DP 2701; NBG [NBG0182626-0] • 3227CD; King William's Town; 28 Nov. 1942; *Schnell I.A. s.n.*; BOL [BOL69483, BOL149961] • 3227CD; Mount Coke; 457 m; 1891; *Sim T.R.* 20111; PRE [PRE0053622-0] • 3227DB; Komgha; 609 m; Dec. 1893; *Flanagan H.G.* 2254; BOL [BOL73224], PRE [PRE0053609-0] • 3228CB; Kei Mouth; 30 m; Jan. 1892; *Flanagan H.G.* 1033; PRE [PRE0053610-0] • 3228CB; *ibid.*; 30 m; Jan. 1892; *Flanagan H.G.* 1032; PRE [PRE0053611-0] • 3228CC; Gonubie; Mar. 1980; *Howe W. s.n.*; GRA • 3325CD; Bridgemead; 175 m; 21 Jan. 1997; *Dold T.* 2482; GRA • 3325DC; Frames Drift; Feb. 1917; *Holland M.A.* 18; BOL [BOL73221] • 3326BD; Oribi Reserve; 375 m; 11 Jan. 1995; *Dold T.* 1252; GRA • 3326BD; Trappe's Valley; 19 Dec. 1965; *Bayliss R.D.A.* 3083; NBG [NBG0083410-0] • 3326BD; Trappe's Valley; 26 Dec. 1903; *Ansley E.* 15; PRE [PRE0053621-0] • 3326CB; Alexandria; 213 m; 24 Jan. 1955; *Acocks J.P.H.* 17879; PRE [PRE0053615-0] • 3326DA; Hayes Siding; 28 Nov. 1983; *Weeks D.C.* 127; GRA • 3326DA; Bushmans River; Jan. 1932; *Holland F.H.* 3815; BOL [BOL51691, BOL73225] • 3326DB; Port Alfred; 29 Mar. 1903; *White G.* 73; GRA • 3326DB; Kowie West; Feb. 1917; *Tyson W. s.n.*; BOL [BOL73222]; 3326DB; Kowie; Aug. 1915; *Tyson W.* 16845; BOL [BOL73223] • 3326DB; *ibid.*; 60 m; 9 Nov. 1895; *Galpin E.E.* 3025; PRE [PRE0053620-0] • 3326DB; Port Alfred; 1893; *South B. s.n.* PRE [PRE0053613-0] • 3326DB; Bathurst; 1890; *South B. s.n.*; PRE [PRE0053616-0] • 3326DB; *ibid.*; Sep. 1915; *Marloth H.W.R.* 8523; PRE [PRE0053612-0] • 3326DB; Kowie; Dec. 1890; *Hutton H.* 1215; BOL [BOL149962] • 3326DB; Bathurst; 10 Jan. 1974; *Retief E.* 310; PRE [PRE0611551-0] • 3326DB; Kowie; *MacOwan P. s.n.*; PRE [PRE0053619-0] • 3326DB; *ibid.*; Jan. 1907; *Britten L.L.* 10813; PRE [PRE0053614-0] • 3326DB; Kowie; 518 m; Dec. 1890; *Hutton H.* 1215; SAM [SAM0020352-0] • 3327BA; Kidd's Beach; Dec. 1943; *Giffen M.H.* FH 1770; PRE [PRE0540057-0] • 3327BB; East London; Dec. 1888; *Thode J.* 7716; NBG [NBG0182627-0] • 3327BB; East London Cemetery; 30 m; Dec. 1926; *Smith C.A.* 3787; PRE [PRE0053617-0] • 3327CA; Kleinemund River; *MacOwan P.* 1280; BOL [BOL69485].