

## GENTIANACEAE

THE TAXONOMIC AND CONSERVATION STATUS OF *SEBAEA FOURCADEI*

## INTRODUCTION

*Sebaea* Sol. ex R.Br. (Gentianaceae tribe Exaceae) likely consists of about 65 species, mainly in South Africa, with a few in Tropical Africa, Asia, Australia and New Zealand (Kissling *et al.* 2009a, b). The southern African species were revised by Marais (1961) and Marais & Verdoorn (1963), but no recent worldwide taxonomic treatment exists for *Sebaea*, and species estimates range from a conservative  $\pm 60$  species up to  $\pm 150$ –159 species (Kissling *et al.* 2009a). *Sebaea fourcadei* was described by Marais (1961) from only two specimens collected near Humansdorp and Knysna in the Eastern Cape in South Africa. Since then only one additional specimen has been identified, collected from Hofman's Bosch near Humansdorp by L. Britten in 1919. It remained unidentified in the Selmar Schonland herbarium (GRA) until 2012. Fourcade was thought to have been the first person to discover the species, but his collection dates from 1932 and Britten was therefore the first to find it.

*Sebaea fourcadei* is closely allied to *Sebaea ramosissima* (Marais & Verdoorn 1963), which has a much wider and slightly more easterly distribution. The two species are both slender herbs with flowers superficially similar, but differ in that the former has capitate stigmas and smaller anthers, whereas stigmas of *S. ramosissima* are clavate. The ranges of the two species are parapatric since *S. fourcadei* has been found only east of Port Elizabeth, between Knysna and Humansdorp, whereas *S. ramosissima* occurs between Port Elizabeth and East London in the Eastern Cape and as far north as Middelburg. However, considering the morphological similarities, the possibility remained that the two might be conspecific if it was found that anther length and stigma shape were variable characters within the two species. *Sebaea fourcadei* was accordingly classified as DDT (Data Deficient with taxonomic problems) in the Red List of South African Plants (Raimondo *et al.* 2009). The flag, 'T' indicates that there is insufficient information to

adequately assess its conservation status, mainly because of taxonomic uncertainty (Victor 2006).

We aimed to clarify the distinction between the two species, and to try to rediscover it in its original habitat, allowing for a better assessment of its conservation and taxonomic status.

## MATERIAL AND METHODS

All herbarium specimens of *Sebaea ramosissima* Gilg. in PRE and one of *S. fourcadei* Marais housed in GRA were studied. Special attention was given to the diagnostic characters, i.e. the length of the anthers and the shape of the stigma. Type specimens were viewed on the ALUKA website (<http://plants.jstor.org>). Acronyms for herbaria are listed in Holmgren *et al.* (1990) and Smith & Willis (1999).

## RESULTS

*Morphology*

Both *Sebaea fourcadei* and *S. ramosissima* are slender annual herbs, simple or branched, growing up to 25 cm high. Examination of the herbarium specimens confirmed the similarities and differences between specimens as follows. Leaf size and shape are similar, as well as inflorescence. The yellow corolla is slightly smaller in *S. fourcadei*, with the tube measuring 3–4 mm long and lobes 2.7–3.5 mm long, whereas in *S. ramosissima* the flowers are larger with the tube 3.5–6.0 mm long and lobes 5.5–8.0 mm long. The most distinctive characters separating the two species are the capitate stigma in *S. fourcadei*, whereas in *S. ramosissima* the stigma is clavate; in addition, the anthers of *S. fourcadei* are much smaller, up to 1.25 mm long, whereas those of *S. ramosissima* are 2–3 mm long. These differences are consistent across specimens examined, and we therefore confirm that the two species are distinct.



FIGURE 1.—Belvedere, the settlement in Humansdorp where *Sebaea fourcadei* used to occur. Photographer: J.E. Victor.

### Ecology

Field trips were undertaken in September 2011 and December 2012 to search the Knysna and Humansdorp sites to rediscover the species. Unfortunately, the known localities at Belvedere, near Knysna (Figure 1) and the farm Geelhoutboom, near Humansdorp, are now transformed by residential development and agricultural practices. It is therefore unlikely that *S. fourcadei* still exists there. We also searched possible habitats nearby, e.g. Goukamma Nature Reserve but were unable to relocate the species.

### Specimens examined

#### *Sebaea fourcadei*

EASTERN CAPE.—**3424** (Humansdorp): Geelhoutboom, Lower Tsitsikimma, 500' [132 m], (–BB), Nov. 1932, *H.G. Fourcade 4880*, (Bolus, iso.—ALUKA image!); Hofman's Bosch, Jan. 1919, *Britten 1110* (GRA!); **3423** (Knysna): Belvedere, (–AA), Oct. 1931, *V.A. Duthie 1175*, (K, —scanned image!).

#### *Sebaea ramosissima*

EASTERN CAPE.—**3326** (Bathurst): (–DB) *Burchell 3784* (K—ALUKA image!, PRE!, syn.); **3227** (King William's Town): (–CD) *Tyson 3129*, (SAM.—ALUKA image!, syn.); Cape, *Ecklon 661* (M.—ALUKA image!). **3124** (Graaff Reinet): Old Wapadsberg Pass road, (–DD), 26 Nov. 1977, *Hilliard 10688* (PRE). **3124** (Middelburg): Compassberg farm, (–AD), 1 Mar. 1962, *Acocks 22090* (PRE). **3226** (Mpopu Game Reserve): Intloni area Section 9. Upper Blinkwater River area, (–DA), 2 Feb. 2006, Von Staden. **3226** (Mpopu Game Reserve): Public road to post Retief Conservancy, (–DA), 28 Feb. 2006, *Bredenkamp 3329* (PRE). **3227** (King William's Town): Hatcheries, Pirie forest, (–CC), 9 Nov. 1901, *Galpin 5933* (PRE). **3326** (Partly: Southwell): Lower Albany, (–BA), Nov. 1893, *Schonland 780* (PRE). **3327** (Peddie District): Bell, (–AA), Dec. 1906, *Galpin 7708* (PRE).

### CONCLUSION

The two localities in which *Sebaea fourcadei* was formerly found are both transformed, and the species is unlikely to still occur there. It may still exist in suitable pristine habitats between Knysna and Humansdorp, but intensive surveys need to be conducted to rediscover this species. At present, we consider that the species may be extinct, having been unable to relocate it at the known localities due to transformation brought about by agriculture around Humansdorp and housing developments at Belvedere (Figure 1).

It is recommended that the IUCN conservation status of *Sebaea fourcadei* be changed to CR: PE (Critically Endangered, possibly extinct).

### ACKNOWLEDGEMENTS

The Botanical Education Trust is gratefully acknowledged for the financial grant that enabled this study to be conducted. We thank the Selmar Schonland (GRA) herbarium for providing us with the material for this study. We are grateful to Dr John Manning and two anonymous reviewers for their valuable input into this manuscript.

### REFERENCES

- HOLMGREN, P.K., HOLMGREN, N.H. & BARNETT, L.C. 1990. Index herbariorum, Part 1: *The Herbaria of the World*. New York Botanical Garden, New York.
- KISSLING, J., YUAN, Y.-M., KÜPFER, P. & MANSION, G. 2009a. The polyphyletic genus *Sebaea* (Gentianaceae): a step forward

- in understanding the morphological and karyological evolution of the Exaceae. *Molecular Phylogenetics and Evolution* 53: 734–748.
- KISSLING, J., ENDRESS P.K. & BERNASCONI G. 2009b. Ancestral and monophyletic presence of diplostigmy in *Sebaea* (Gentianaceae) and its potential role as a morphological mixed mating strategy. *New Phytologist* 184: 303–310.
- MARAIS, W. 1961. *Sebaea*. *Bothalia* 7: 463–464.
- MARAIS, W. & VERDOORN, I.C. 1963. Gentianaceae. *Flora of Southern Africa* 26: 171–243.
- RAIMONDO, D., VON STADEN, L., FODEN, W., VICTOR, J.E., HELME, N.A., TURNER, R.C., KAMUNDI, D.A & MANYAMA, P.A. (eds). 2009. Red List of South African Plants 2009. *Strelitzia* 25. South African National Biodiversity Institute, Pretoria.
- SMITH, G.F. & WILLIS, C.K. 1999. Index herbarium: South African supplement. Second edition. *South African Botanical Diversity Network Report No.8*. SABONET, PRETORIA.
- VICTOR, J.E. 2006. Data deficient flags use in the red list of Southern African plants. *Bothalia* 36: 85, 86.
- Website: ALUKA digital library. <http://plants.jstor.org> (Accessed September 2012).
- Website: <http://www.calflora.net/southafrica/plantnamesA-Ghtml> (Accessed September 2012).

O. BALOYI\*, J.E. VICTOR\*\* & N. SWELANKOMO\*

\* National Herbarium (PRE), South African National Biodiversity Institute. Private Bag X101, 0001 Pretoria, South Africa. E-mail: J.Victor@sanbi.org.za.†

MS. received: 2013-03-12