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# Towards a comprehensive taxonomic revision of *Nemesia* Vent. (Scrophulariaceae, Hemimerideae): **diversity, morphology and phylogenetic insights**

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## INTRODUCTION

The Hemimerideae represents the earliest branching lineage of the Scrophulariaceae, with *Nemesia* among its most species-rich and horticulturally significant genera. *Nemesia* has ± 77 species of annual and perennial herbs, all endemic to southern Africa with many taxa restricted to the winter-rainfall region. The Cape Floristic Region and Succulent Karoo are centres of diversity, with species also in Eswatini, Lesotho, Mozambique, Namibia and Zimbabwe.

Since Hiern's (1904) revision, numerous species have been described – particularly through the work of Steiner (1994–2010) – yet many remain poorly defined, underscoring the need for a modern, comprehensive revision of the genus.

## MORPHOLOGICAL OVERVIEW

Delicate annual herbs to robust perennial subshrubs, glabrous or sparsely pubescent, often forming compact, colourful patches in spring landscapes. *Stems* quadrangular, ascending to erect. *Leaves* opposite, sessile to petiolate; lanceolate to ovoid; base sometimes cordate; margins entire to dentate. *Flowers* zygomorphic, bi-lipped; upper lip consisting of four lobes, lower lip of two lobes; palate on lower lips in various forms, glabrous or pubescent, usually with single spur; corolla colours vary (white, pink, purple, yellow, orange, blue) often with contrasting throats or nectar guides (Figure 1–3). *Fruit* laterally compressed capsule, varies in shape, expression of horns (when present) and size (Figure 4). *Seeds* cylindrical to ellipsoid, with entire or fragmented membranous wings, varies in size and shape (within and between species) (Figure 5).

Figure 1. Floral diversity – variation in colour and corolla shape.

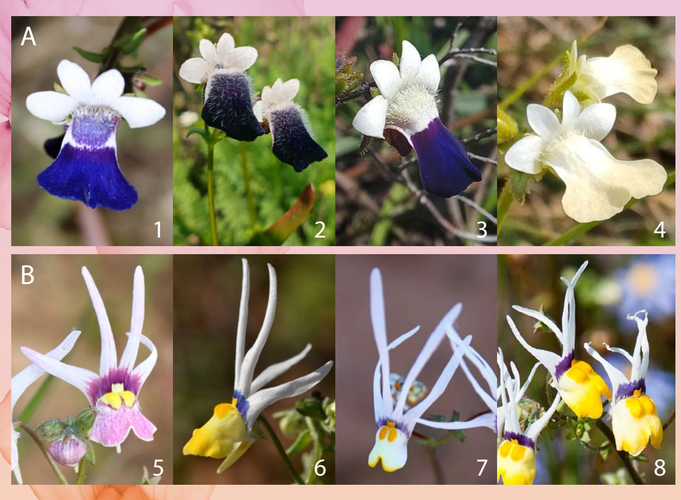

Figure 2. Intraspecific variation: A, *N. barbata*; B, *N. cheiranthus*.

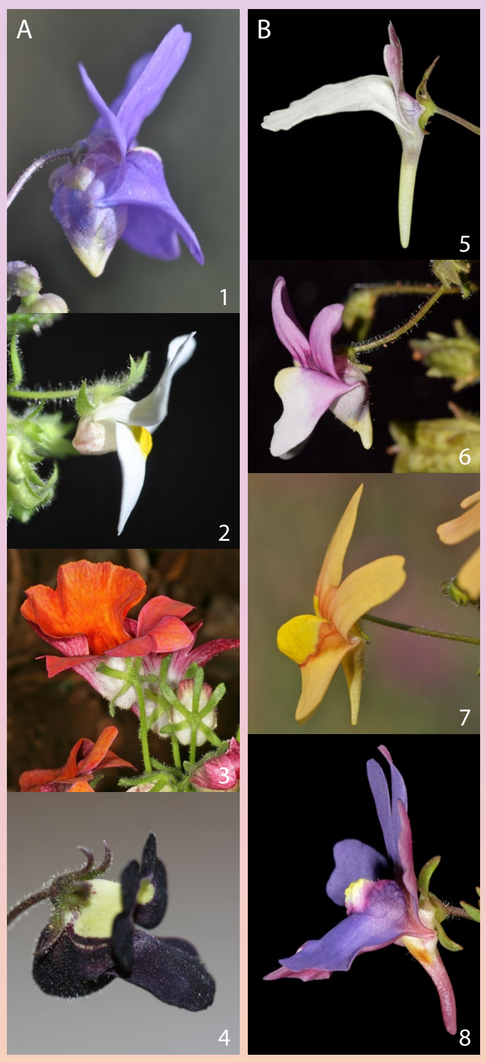

Figure 3. Spur types: A, saccate; B, tubular.

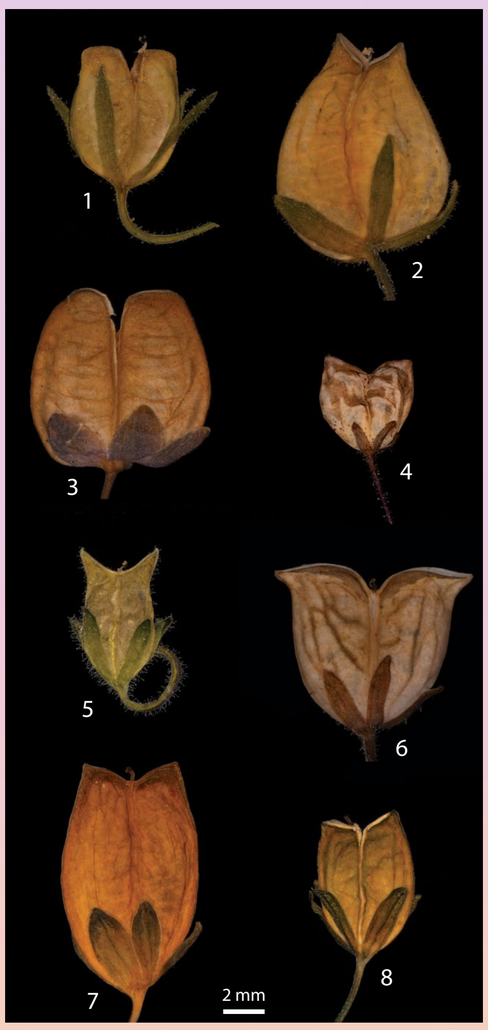

Figure 4. Fruit variation – calyx size and shape, capsule shape, horn development, valve angles and locule symmetry.

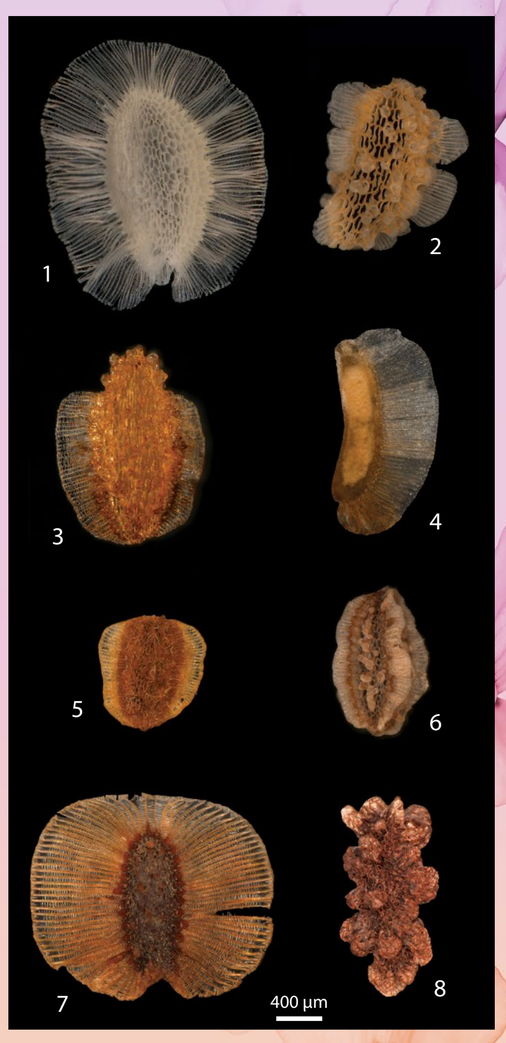

Figure 5. Seed morphology – from circular and winged to unwinged forms; variation in wing number, size and kernel width.

## PHYLOGENETIC SIGNIFICANCE

Recent analyses of 48 species, based on nuclear (ITS, ETS) and plastid (*trn*L intron) markers, identify two major lineages and five geographically structured subclades, including provisionally recognised taxa (Jackson et al. 2025).

## CONCLUSIONS

*Nemesia* represents one of the most diverse and evolutionarily significant lineages within Scrophulariaceae.

The integration of morphological, molecular and distributional data is advancing a comprehensive taxonomic revision of the genus. This ongoing research aims to describe new taxa, update species circumscriptions, refine identification keys and distribution maps, and expand herbarium and molecular reference collections.

Continued study of *Nemesia* will further clarify species boundaries, resolve synonymy and enhance understanding of evolutionary and biogeographic patterns within Hemimerideae.

## REFERENCES

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Jackson, M., Grobler, H., Sedimo, G., Bester, S.P. & Joubert, L. 2025. The systematics of *Nemesia* Vent. (Scrophulariaceae): The current status. The 1st International Online Conference on Taxonomy: Boom Or Doom? Taxonomy In The 21st Century, 3–4 December 2025. Oral presentation.

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***Nemesia* species: figure (number)** – *acornis* 3(2); *affinis* 1(2); *arenifera* 4(5); *barbata* 2(1–4); *bicornis* 1(4), 4(6); *bodkinii* 3(4); *cheiranthus* 2(5–8); *deflexa* 4(1); *euryceras* 3(6), 5(5); *fruticans* 1(5); *gracilis* 1(6); *hemiptera* 5(4); *karroensis* 4(2), 5(6); *leipoldtii* 3(1), 4(3); *linearis* 1(7); *macrocarpa* 3(5); *pageae* 1(1), 5(1); *petiolina* 5(3); *pinnata* 4(4); *rupicola* 4(8); *saccata* 5(2); sp. 3(7); *strumosa* 1(3), 3(3); *umbonata* 4(7); *versicolor* 1(8, 9), 3(8); *williamsonii* 5(7, 8).

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