SANTALACEAE

THE MINOR GENERA *KUNKELIELLA* AND *THESIDIUM* INCLUDED IN *THESIUM*

Santalaceae (sensu APG III 2009: including Viscaceae) comprise ± 1 100 species of hemiparasites or aerial parasites assigned to ± 47 genera distributed worldwide (Der & Nickrent 2008). The southern African representatives include ± 300 species in six genera, of which *Thesium* L. (± 180 spp.) and *Viscum* L. (17 spp.) are the largest (Germishuizen 2000; Jordaan & Burgoyne 2000). Phylogenetic relationships in the family were analysed by Der & Nickrent (2008) using a multigene data set. Eight clades were identified with strong support. One of these, the *Thesium* clade, included the genus *Osyridocarpos* A.DC. as sister to a clade comprising *Kunkeliellia* W.T.Stearn, *Thesidium* Sond. and *Thesium* L. This clade, treated as the segregate family Thesiaceae by Nickrent *et al.* (2010), is predominantly African, with the monotypic *Osyridocarpos* widespread through the continent; *Kunkeliella*, with just four species, endemic to the Canary Islands; *Thesidium*, with eight species, endemic to the Western and Eastern Cape; and the large genus *Thesium* (± 340 spp: www.parasitic-plants.siu.edu) distributed widely through the Old World but most diverse in southern Africa and with two species in South America. Previously segregated as the genus *Austroamericium* Heyndrich (1963), the South American species were included in *Thesium* by Der & Nickrent (2008).

A subsequent molecular phylogenetic analysis focussed on investigating the phylogenetic relationships within *Thesium* and allied species (Moore *et al.* 2010). It confirmed that the segregate *Austroamericium* was deeply embedded in the tropical clade of *Thesium*, affirming its inclusion in *Thesium* accepted earlier by Der & Nickrent (2008). More relevantly in the southern African context, *Thesidium* was confirmed as monophyletic but also nested within the genus *Thesium* as sister to the Eurasian species, with the remaining species of *Thesium* forming a clade sister to this. In order to render

Thesium monophyletic, it is thus necessary either to subsume *Thesidium* in *Thesium* or to restrict the circumscription of *Thesium* to the Eurasian clade and to treat the remaining species, which comprise the majority of the genus, in another genus. Aside from the nomenclatural disruption that such a step would occasion, Moore *et al.* (2010) could identify no morphological basis for separating the Eurasian species of *Thesium* from the rest of the genus, and therefore proposed that the first option be adopted.

The taxonomy of the genus *Thesidium* was bedevilled by the almost simultaneous publication of reviews of the group by both Candolle (1857a) and Sonder (1857a), with Candolle's work appearing while Solander's was in press (see Sonder 1857a). The species of *Thesidium* were originally treated in *Thesium* as sect. *Hagnothesium* by Candolle (1857a), defined by their monoecious habit and mostly 4-merous flowers. Sonder (1857a) initially segregated them as the separate genus *Thesidium* but almost immediately Sonder (1857b) reverted to Candolle's treatment. The genus was later resuscitated by Hill (1915a, b), a decision accepted by later authors.

The characters defining *Thesidium* bear closer examination. The number of floral parts is variable in both *Thesium* and *Thesidium*. *Thesidium* is mostly 4-merous but 5-merous flowers do occur (Candolle 1858a, b; Hill 1915b), and although southern African *Thesium* are invariably 5-merous, the Eurasian species immediately allied to *Thesidium* are variable for the character, with *T. alpinum* L. usually 4-merous and *T. arvense* Horvátovszky occasionally 4-merous (Hendrych 1964). The difference between the two genera thus lies solely in the breeding system, namely monoecious vs. bisexual flowers. Although potentially significant at first sight, breeding systems within Santalaceae are highly variable. Approximately half of the genera have strictly bisexual flowers, but the remaining half have mostly unisexual flowers in various sexual systems that include dioecy, monoecy, androdioecy and trioecy (Der & Nickrent 2008). There is thus a clear precedent in Santalaceae for including both bisexual and unisexual taxa within a single genus. In the absence of any morphological impediment to enlarging the circumscription of *Thesium* to include *Thesidium*, and in view of the obvious nomenclatural advantages, we implement the recommendation of Moore *et al.* (2010) that *Thesidium* be included in *Thesium*, placing it in the separate sect. *Hagnothesium* as originally proposed by Candolle (1857a) and followed by Sonder (1857b).

Following on from this conclusion it is apparent that the small Canary Island endemic genus *Kunkeliella*, which is placed between *Thesium* and *Thesidium* in the molecular phylogeny of Der & Nickrent (2008), must also be included in *Thesium*. Although its exact relationships within *Thesium* have not yet been established (no species of *Kunkeliella* were included in the study of Moore *et al.* 2010), the genus is clearly nested within the enlarged circumscription of *Thesium* adopted here. This is not surprising: at the time that Stearn (1972) established *Kunkeliella* for the species previously treated as *Thesium psilotocladum* Svent. plus a second allied species, which differed from *Thesium* in their drupaceous fruits and isopolar pollen, he suggested that it might in fact represent a new section in *Thesium*. We accordingly reduce the genus to *Thesium* as sect. *Kunkeliella*.

Thesium *L.* in Species plantarum: 207 (1753). Type: *Thesium alpinum* L., lecto., designated by Hitchcock: 135 (1929).

Kunkeliella W.T.Stearn: 17 (1972), syn. nov. Type: *Kunkeliella canariensis* W.T.Stearn (= *Thesium canariensis* (W.T.Stearn) J.C.Manning & F.Forest).

Thesidium Sond.: 364 (1857a). Type: *T. thunbergii* Sond. (= *Thesium fragile* L.f.), lecto., designated by Pilger: 85 (1935).

sect. **Hagnothesium** *DC.* in Espèces nouvelles du genre *Thesium*: 4 (1857a); Sond.: 405 (1857b). Type: *Thesium fragile* L.f., lecto., designated here.

Thesidium Sond.: 364 (1857a). Type: *T. thunbergii* Sond. (= *Thesium fragile* L.f.), lecto., designated by Pilger: 85 (1935).

Thesium confusum *J.C.Manning & F.Forest*, nom. nov. pro. *Thesidium fragile* Sond. in Flora: 364 (1857a), non *Thesium fragile* L.f. (1782).

Thesium fragile *L.f.* in Supplementarum plantarum: 162 (1782).

Thesium podocarpum A.DC. in Espèces nouvelles du genre *Thesium*: 5 (1857a). *Thesidium podocarpum* (A.DC.) A.DC.: 674 (1857b). *Thesidium thunbergii* Sond.: 364 (1857a), nom. illegit. superfl. [*T. podocarpum* was treated as conspecific with *T. fragile* L.f. by Sonder (1857a) under the illegtimate superfluous name *Thesidium thunbergii.*]

Thesium fruticulosum *(A.W.Hill) J.C.Manning & F.Forest*, comb. nov. *Thesidium fruticulosum* A.W.Hill in Kew Bulletin 1915: 99 (1915).

Thesidium longifolium A.W.Hill: 99 (1915). [This was identified as the shade-form of *T. fruticulosum* by Levyns (1950).]

Thesium leptostachyum *A.DC.* in Espèces nouvelles du genre *Thesium*: 5 (1857a). *Thesidium leptostachyum* (A.DC.) Sond.: 405 (1857b).

Thesium microcarpum *A.DC.* in Espèces nouvelles du genre *Thesium*: 5 (1857a). *Thesidium microcarpum* (A.DC.) A.DC.: 674 (1857b). *Thesidium exocarpaeoides* Sond.: 365 (1857a), nom. illegit. superfl.

Thesium minus *(A.W.Hill) J.C.Manning & F.Forest*, comb. nov. *Thesidium minus* A.W.Hill in Kew Bulletin 1915: 98 (1915).

Thesium strigulosum *A.DC.* in Espèces nouvelles du genre *Thesium*: 4 (1857a). *Thesidium strigulosum* (A.DC.) A.DC.: 673 (1857b). [*T. globosum*, based on male plants, and *T. strigulosum*, based on female plants, were both included under the illegitimate superfluous name *Thesidium hirtum* by Sonder (1857a). His conclusion as to their taxonomic status was confirmed by Hill (1915) and we follow it here, selecting *T. strigulosum* as the name for the taxon.]

Thesium globosum A.DC.: 4 (1857a), syn. nov. *Thesidium globosum* (A.DC.) A.DC.: 673 (1857b).

Thesidium hirtum Sond.: 365 (1857a), nom. illegit superfl. pro *Thesium globosum* A.DC. et *T. strigulosum* A.DC.

sect. **Kunkeliella** *(W.T.Stearn) J.C.Manning & F.Forest*, stat. et comb. nov. *Kunkeliella* W.T.Stearn in *Cuaderno Botanica Canariensis* 16: 17 (1972). Type: *Thesium canariensis* (W.T.Stearn) J.C.Manning & F.Forest.

Thesium canariensis *(W.T.Stearn) J.C.Manning & F.Forest*, comb. nov. *Kunkeliella canariensis* W.T.Stearn in Cuaderno Botanica Canariensis 16: 18 (1972).

Thesium psilotocladum *Svent.* in Additamentum ad Floram Canariensem 1: 5 (1960). *Kunkeliella psilotoclada* (Svent.) W.T.Stearn: 20 (1972).

Thesium retamoides *(A.Santos) J.C.Manning & F.Forest*, comb. nov. *Kunkeliella retamoides A.Santos* in Anales del Jardín Botánico de Madrid 51: 145 (1993).

Thesium subsucculentum *(Kämmer) J.C.Manning & F.Forest*, comb. nov. *Kunkeliella subsucculenta Kämmer* in Cuadernos de botánica Canaria 23–24: 72 (1975).

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