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Four new species of *Zygophyllum* (Zygophyllaceae) and one lectotypification

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Abstract

Eichler, Hansjoerg (Australian National Herbarium, CSIRO, G.P.O. Box 1600, Canberra, A.C.T. 2601) 1990. Four new species of Zygophyllum *(Zygophyllaceae) and one lectotypification. Telopea 4(1): 13–17.* The new species *Zygophyllum angustifolium*, *Z. confluens*, *Z. emarginatum* and *Z. simile* are described and their general distribution outlined. Representative specimens from New South Wales localities are listed. A lectotype of *Z. ammophilum* F.Muell. is designated.

The names of four new species of *Zygophyllum* need validation in order to be used in the forthcoming 'Flora of New South Wales'. The brief Latin descriptions of the salient features and the designation of the holotypes required by the International Code of Botanical Nomenclature, slightly more elaborate English descriptions, an indication of the distribution, and notes on distinctive characters of the species with which the new species had hitherto been confused, are provided below. As this paper is a precursor to the 'Flora of New South Wales', only specimens examined from localities in New South Wales are listed.

1. Zygophyllum angustifolium *H. Eichler*, **sp. nov.**

Fruticulus tenuis, plerumque 30–60 cm altus, glaber. Folia petiolata, unijugata; foliola linearia vel peranguste oblongi-elliptica, 10–30 mm longa, 2–4 mm lata, ad basim constricta, articulata, ad apicem acuta. Petala 4, flava, anguste obovata vel elliptica, 4–8 mm longa, sepalis ¼–⅓ plo longiora. Stamina 8; filamenta subulata, exalata, haud appendiculata. Discus 4-partitus; lobi disci discreti, carnosi, semiorbiculares, margine papilloso. Capsula obconica, 6–9 mm longa, tetragona, 4-cellularis, apice truncata; cellula 1- vel 2-seminalis.

HOLOTYPUS: *Hj. Eichler 20655*: South Australia. Gawler Ranges. Yandinga Gorge: in valley near waterfall c. 35 km north-north-east of Minnipa. 32° 33'S, 135° 20'E. 14 Oct 1969 (CANB 385209). ISOTYPI: AD, B, CANB, G, K, L, MEL, NSW, PERTH, US.

Slender, glabrous shrublet, usually 30–60 cm high, sometimes scrambling over taller plants and then reaching 150 cm or more. *Leaves* petiolate, with one pair of leaflets; leaflets succulent, linear to narrowly oblong-elliptic, 10–30 mm long, 2–4 mm wide, narrowed and articulate at base, acute at apex. *Petals* 4, pale yellow, narrowly obovate to elliptic, 4–8 mm long, about ¼–⅓ times longer than sepals. *Stamens* 8; filaments subulate, c. 3 mm long, without wings or appendage; anthers oblong, c. ¾ mm long. *Disc* 4-lobed; lobes free, succulent, semicircular, with papillose margin. *Ovary* broad-oblong, c. 2 mm long, truncate at apex, glabrous; style subulate, c. 1.5–2 mm long; stigma minutely 4-lobed. *Fruiting pedicels* 8–25 mm long. *Capsule* obconical, 6–9 mm long, 4-angled, 4-celled, truncate at apex, with 1 or usually 2 seeds per cell; style persistent, 1.5–3 (rarely 4) mm long.

Southern mainland Australia: Western Australia (Eucla), South Australia (Nullarbor, Gairdner-Torrens Basin, Flinders Range, Eastern Region, Eyre Peninsula, Northern Lofty, Murray, northern Yorke Peninsula), New South Wales (South Far Western Plains), and far north-western Victoria.

SELECTED SPECIMENS: NEW SOUTH WALES: South Far Western Plains: 'Prungle', Balranald, *G.M. Cunningham & P.L. Milthorpe 2445*, 23 Jul 1974 (NSW); near 'Bidura', north-west of Balranald, *J.H. Leigh & W.E. Mulham W269*, 12 Aug 1968 (NSW); Mallee Cliffs National Park, c. 60 km east of Mildura, *M. Fox 8310481 & H. Fallding*, 22 Oct 1983 (NSW); 25 km north-west of Balranald, red clay loam, *M. Fox 8402167a & 8402174*, 19 Feb 1984 (NSW); Balranald, *T. Lucas 22*, 1878 (MEL 94817); Murray River (locality not defined), *F. Mueller NSW 14437*, without date (NSW).

Z. angustifolium is well illustrated in G.M. Cunningham, W.E. Mulham, P.L. Milthorpe and J.H. Leigh, Plants of western New South Wales (1981), on p. 439 (colour photograph), wrongly under the name *Z. billardierei* var. *bilobum*, which is a synonym of *Z. confluens* and differs from *Z. angustifolium* by its leaflets being continuous with the petiole, larger petals and more robust habit. *Z. billardierei* DC., which is confined to coastal areas, is distinguished mainly by its more robust habit, longer and broader petals, and broader leaflets. *Z. ammophilum* F. Muell., with which *Z. angustifolium* has also been confused, is a small annual with much smaller, inconspicuous flowers, white petals, 4 stamens, and smaller capsules with 3 or 4 seeds per cell.

2. Zygophyllum confluens *H. Eichler*, **sp. nov.**

Suffrutex erectus, usque ad 70 cm altus, glaber. Folia petiolata, unijugata; foliola carnosa, linearia, 10–20 mm longa, in petiolum confluentia (i.e., ad basim non articulata), ad apicem acuta. Petala 4, aurea, obovata, 9–12 mm longa, sepalis conspicue longiora. Stamina 8; filamenta subulata, ad basim dilatata, haud appendiculata. Discus 4-partitus; lobi disci discreti, carnosi, semiorbiculares, margine papilloso. Capsula late obovata vel turbinata ad campaniformis, 8–11 mm longa, tetragona, 4-cellularis, apice truncata; cellula 1- vel 2-seminalis.

HOLOTYPUS: *Hj. Eichler 17211*: South Australia. Murray River District. C. 18 km west-south-west of Purnong, at turnoff to Walker Flat on road to Mannum; on roadside. 34° 51'S, 139° 29'E. 11 Aug 1963 (CANB 390427). ISOTYPI: AD, B, CANB, K, MEL, NSW.

Erect, glabrous subshrub, to 70 cm high. *Leaves* petiolate, with one pair of leaflets; leaflets succulent, linear, usually 10–20 mm long, continuous with the petiole (i.e. not articulate at base), acute or mucronulate at apex. *Petals* 4, golden yellow, obovate, 9–12 mm long, distinctly longer than sepals. *Stamens* 8; filaments subulate, c. 5.5 mm long, gradually broadened towards the base, without appendage; anthers oblong, c. 1.5 mm long. *Disc* 4-lobed; lobes free, semicircular to broader than long, densely papillose at the margin. *Ovary* 4-angled, 4-celled, oblong, c. 2.5 mm long, glabrous, ± abruptly narrowed into the style; style subulate, 2–4 mm long; stigma minute, not lobed. *Fruiting pedicels* 9–25 mm long. *Capsule* broadly obovate or turbinate to bell-shaped, 8–11 mm long, 4-angled, 4-celled, ± truncate at apex, with 1 or less frequently 2 seeds per cell; fruiting style 4–5 mm long.

South Australia (Lake Eyre Basin, Gairdner-Torrens Basin, Flinders Range, Eastern Region, Eyre Peninsula, Northern and Southern Lofty, Murray), and New South Wales (North Far Western Plains).

SELECTED SPECIMENS: NEW SOUTH WALES: North Far Western Plains: Barrier Ranges, *Mrs. Irvine s.n.*, Jun 1889 (MEL 95424); Umberumberka, Broken Hill, *A. Morris 310*, 4 Aug 1920 (NSW); Barrier Range, Umberumberka, *L.A.S. Johnson NSW 144844*, 29 Aug 1946 (NSW); near Silverton, *E.N. Charsley s.n.*, 1886 (MEL 94955); Broken Hill, *E.C. Andrews NSW 144842*, Sep 1918 & Dec 1919 (NSW); Broken Hill, *A. Morris 2067*, 1 Jul 1928 (BRI 068187); Broken Hill, *V. Benešova s.n.*, Aug 1950 (P).

Z. confluens has usually been confused with the coastal *Z. billardierei* DC., which is easily distinguished by its articulate, usually much broader leaflets. The two species rarely occur together.

3. Zygophyllum emarginatum *H. Eichler*, **sp. nov.**

Herba annua, usque ad 30 cm alta, glabra, plerumque basiramifera, effusa. Folia petiolata, unijugata; foliola carnosa, anguste obtriangularia, 4–8 mm longa, 3–5 mm lata, ad basim subarticulata, ad apicem plerumque emarginata. Petala 4, lutea, obovata vel elliptica, 2–3 mm longa, sepala aequantes vel paulo longiora. Stamina 8, c. 2 mm longa; filamenta in dimidio inferiore abrupte alata. Discus 4-partitus; lobi disci discreti, carnosi, oblongi, apice dense papilloso. Capsula late turbinata, 5–7 mm longa, tetragona, 4-cellularis, apice late tholiformi vel applanato; cellula 1- vel 2-seminalis.

HOLOTYPUS: *J.Z. Weber 2954*: South Australia. North West Plains. Sloanes Bore Outstation, which is on Millers Creek Station and c. 40 km north of Mount Eba on Stuart Highway. 30° 00'S, 135° 41'E. 9 Oct 1971. (CANB 326258). ISOTYPI: AD, CANB, COLO, HO.

Glabrous annual, to 30 cm high, usually spreading and branched from the base. *Leaves* petiolate, with one pair of leaflets; leaflets succulent, narrow-obtriangular, 4–8 mm long, 3–5 mm wide, at the base ± articulate, at the apex usually emarginate. *Sepals* 4, 2–3 mm long. *Petals* 4, yellow (when fresh), narrow-obovate to elliptic, as long as, or slightly longer than, sepals. *Stamens* 8, c. 2 mm long; filaments abruptly winged in the lower half (wing at top truncate or often with one tooth at each side of the filament). *Disc* 4-lobed; lobes free, succulent, oblong, densely papillose at apex. *Ovary* 4-celled, 4-angled, papillose along the angles, glabrous at truncate apex; style c. 0.5 mm long; stigma almost capitate. *Capsule* broadly turbinate, 5–7 mm long, 4 angled, 4-celled, at apex widely dome-shaped, with 1 or 2 seeds per cell.

Z. emarginatum is known to occur in dry inland Australia in the following regions: Northern Territory (Central North, Central South), Queensland (Gregory North, Gregory South), South Australia (eastern part of Northwestern Region, Lake Eyre Basin, Gairdner-Torrens Basin, northern Flinders Range), and New South Wales (North Western Plains, North Far Western Plains). In contrast to *Z. simile* and *Z. ammophilum*, which occur on sandy soils, *Z. emarginatum* prefers stony and rocky ground.

SPECIMENS EXAMINED: NEW SOUTH WALES: North Western Plains: Bourke, *L. Henry NSW 145379*, 1884 (NSW). North Far Western Plains: 1 mile south of Mt Poole Homestead, on stony plain, brown gibber with gilgai, *G.M. Cunningham & P.L. Milthorpe 1088*, 16 Sep 1973 (NSW); 5 km west of Milparinka on road to Hawker Gate, *B.G. Briggs 5406*, 26 Sep 1974 (AD, NSW, CANB); Fowlers Gap, *B. Rice 2732*, 2 Aug 1978 (CANB).

Z. ammophilum and *Z. simile* resemble *Z. emarginatum* in habit, but are both easily distinguished from it by their white petals, linear-oblong shape of leaflets and 4-lobed stigma. The yellow petals of *Z. emarginatum* fade to white when dried; therefore, the petal colour should be noted when fresh.

4. Zygophyllum simile *H. Eichler*, **sp. nov.**

Herba annua, usque ad 35 cm alta, glabra, basiramifera. Folia petiolata, unijugata; foliola carnosa, linearia vel anguste oblonga, 5–20 mm longa, ad basim articulata, ad apicem obtusa. Petala 4, alba, late obtrullata vel obovato-cuneata, 1–1.7 mm longa, apicem versus obscure trilobata vel irregulariter obtusa, sepalis semper breviora (plerumque ½–⅔ plo longiora). Stamina 8; filamenta basin versus sensim dilatata, haud appendiculata. Discus 4-partitus; lobi disci discreti, carnosi, oblongi, apice truncato papilloso. Capsula turbinata vel latissime obpyramidalis, 5–7 mm longa, tetragona, 4-cellularis, apice truncato; cellula 1- vel plerumque 2-seminalis.

HOLOTYPUS: *Hj. Eichler 17390*: South Australia. Far North-West. Musgrave Ranges. At the creek near the entrance to the Aboriginal Reserve between Mulga Park and Musgrave Park. 26° 03'S, 131° 18'E. 8 Sep 1963. (AD 96431090). ISOTYPI: B, CANB, K.

Glabrous annual, to 35 cm high, usually much-branched from the base; branches often spreading and ascending. *Leaves* petiolate, with one pair of leaflets; leaflets succulent, linear to narrowly oblong, 5–20 mm long, articulate at base, rounded at apex. Sepals 4, 2–3 mm long. *Petals* 4, white, broadly obovate-cuneate to obtrullate, 1–1.7 mm long, towards the apex almost 3-lobed or very blunt with irregularly wavy margin, distinctly shorter than sepals. *Stamens* 8; filaments gradually and sometimes irregularly broadened towards the base, without appendage. *Disc* 4-lobed; lobes free, succulent, oblong, truncate and papillose at apex. *Ovary* 4-celled, 4-angled, with the angles (at least in the lower part) papillose and the flat apex glabrous; style c. 0.5 mm long, stigma 4-lobed. *Capsule* turbinate to broadly reversed pyramidal, 5–7 mm long, 4-angled, 4-celled, truncate at apex, with 1 or usually 2 finely granular seeds per cell.

Widespread through temperate inland Australia; in all mainland States and southern Northern Territory. On sandy soils.

SELECTED SPECIMENS: NEW SOUTH WALES: North Western Plains: 10 km south of Enngonia along Mitchell Highway, *Hj. Eichler 22850*, 28 Sep 1981 (CANB); Lorne Station, Lightning Ridge, *D.F. Thompson 1900*, 4 Aug 1978 (NSW); Corella Station near Bourke, *H.F. Chilcott NSW 145387*, 27 Aug 1907 (NSW); Winbar Nature Reserve, *Hj. Eichler 22710*, 16 Sep 1978 (CANB); Cobar, *Haviland NSW 145381*, Jul 1911 (NSW). South Western Plains: Shuttleton, W. *Bäuerlen 3292*, Dec 1903 (NSW); Lake Cargelligo, *Rev. J.W. Dwyer NSW 145382*, Nov 1915. North Far Western Plains: 37 miles [59 km] from Wanaaring, *J.L. Boorman NSW 145384*, Oct–Nov 1912 (NSW); Tero Creek Stn, *P. Martensz 4141*, 4 Dec 1968 (CANB); 'Mount Mulyah', about 50 miles [80 km] north-west of Louth, grey-brown fine sandy loam, *C.W.E. Moore 4724*, 8 Dec 1966 (CANB); 7 km NE 'Mc Dougall's Well' homestead, 95 km NNW Broken Hill, *J.C. De Nardi 719*, 25 Sep 1971 (NSW); 36 miles [58 km] west of Wilcannia, *R.J. Hobson NSW 145386*, 20 Sep 1949 (NSW); Broken Hill, *I. Pidgeon & J. Vickery NSW 18742*, 22 Aug 1939. South Far Western Plains: Menindee, low sandy rise, *R.J. Stanley 2089*, 1 Aug 1978 (NSW); Kinchega National Park, *M. Fox 8402061*, 17 Feb 1984 (NSW); 22 miles [35 km] from Menindee to Ivanhoe, *H. Salasoo 5405a*, 22 Nov 1973 (NSW); 70 miles [112 km] south of Broken Hill, red sandy soil, *J.H. Leigh W57*, Oct 1966 (NSW); Mungo National Park, *M. Fox 8402144*, 19 Feb 1984 (NSW).

Z. simile strongly resembles *Z. ammophilum* in its habit. Among the Australian *Zygophyllum* species with truncate and 4-angled capsules, they are the only ones with white petals. *Z. ammophilum*, with which *Z. simile* has hitherto been confused, is characterized by its narrowly obovate to elliptical petals, 4 stamens, and usually 3 or 4 seeds per cell. Its distribution is restricted to south-eastern mainland Australia, where it often occurs together with *Z. simile*.

All four species described above were hitherto confused with *Z. ammophilum* F. Muell. *Z. angustifolium* and *Z. confluens* were, in addition, confused with *Z. billardierei* DC. When F. von Mueller described *Z. ammophilum*, he included, among the syntypes quoted, specimens of all four new species although they do not agree with his description. In order to define the application of Mueller's name indubitably, it seems appropriate to designate here a lectotype which agrees with Mueller's description as follows:

Zygophyllum ammophilum F. Muell., Fragm. Phytogr. Austral. 11(99): 28 (Nov 1878). LECTOTYPUS: *F. Mueller s.n*: Lachlan River, Sept. 1878 (MEL 56877). ISOLECTOTYPI: MEL, NSW.

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