

Miscellaneous Notes on Australian Plants. 2. *Chrysanthemoides* (Compositae)

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Abstract

Gray, M. Miscellaneous notes on Australian plants. 2. *Chrysanthemoides* (Compositae). *Contrib. Herb. Aust.* 16: 1-5, 1976. *Chrysanthemoides monilifera* (L.) T. Norl. ssp. *rotundata* (DC.) T. Norl. is recorded from Australia for the first time and its distribution, along with that of the ssp. *monilifera*, is documented by the citation of specimens from the major Australian herbaria. A key to the two subspecies is provided and the need for detailed studies of their introduction, spread and ecology in Australia, which are only briefly touched upon in this paper, is indicated.

CHRYSANTHEMOIDES [Tourn. ex] Medik.

The genus *Chrysanthemoides* is native to South Africa and consists of two species, *C. incana* (Burm. f.) T. Norl., and *C. monilifera* (L.) T. Norl., the latter species being naturalized in Australia.

C. monilifera (syn. *Osteospermum moniliferum* L.) is commonly known as Boneseed (or Bitou Bush, Jungle Weed, Jungle Flower, South African Star Bush or Higgin's Curse). The oldest record from Australia known to me is the specimen quoted by Norlindh (1943) from the Naturhistoriska riksmuseet, Stockholm, i.e., MacLeay's trädgård (garden), nära (near) Sidney, Nova Hollandia, N. J. Andersson, 1852 (S). According to Parsons (1973) it was first introduced into Victoria in 1858 and was subsequently grown in Melbourne suburbs as a garden plant. It was collected in the West Terrace Cemetery, Adelaide, as early as 1892.

For some decades now it has been causing increasing concern in some areas as a vigorous weedy invader of natural vegetation (Wheeler 1964; Pescott 1968, etc.). This situation was certainly not improved by its use in New South Wales, for example, in soil conservation work, e.g. dune stabilization and revegetation after beach mining operations (Mort and Hewitt 1953; Sless 1958a, 1958b, etc.), but fortunately this practice appears to have been discontinued.

T. Norlindh (1943), in his excellent monograph of the genus, divided *C. monilifera* into six subspecies and quoted specimens of the type subspecies from Australia. It has been subsequently assumed that this was the only subspecies present in this country. However, examination of a range of material from New South Wales shows that a second subspecies, namely ssp. *rotundata* (DC.) T. Norl., is also thoroughly naturalized along the coast, and is also apparently the only subspecies present on Lord Howe Island.

The two subspecies can readily be distinguished by the following key (modified from Norlindh 1943):

- 1a. Putamen (hard stone within the fleshy pericarp) globose or subglobose, about as broad as long, \pm smooth; inner phyllaries broadly ovate or broadly lanceolate; leaves mostly obovate, elliptical or oblanceolate, coarsely and irregularly serrate-dentate; erect shrub *C. monilifera* (L.) T. Norl. ssp. *monilifera*
- 1b. Putamen obovoid, about half as broad as long, \pm obscurely longitudinally ribbed; inner phyllaries narrowly ovate or lanceolate; leaves mostly broadly obovate to sub-rotund, the margins subentire or obscurely dentate (occasionally distinctly toothed); sprawling shrub with long decumbent branches *C. monilifera* (L.) T. Norl. ssp. *rotundata* (DC.) T. Norl.

In South Africa, the ssp. *monilifera* is found mainly in the south-western Cape districts, especially around Cape Town (Norlindh 1943). It is an erect shrub about 1-2 m high and has become widely naturalized in Australia mainly in the coastal and near-coastal regions of New South Wales, Victoria, Tasmania, South Australia and the south-western portion of Western Australia. More recent discoveries, reported by Parsons (1973), have extended its range considerably inland into north-western Victoria.

The ssp. *rotundata* is a littoral plant occurring naturally in south-eastern coastal areas of southern Africa from Port Elizabeth to Lourenço Marques (Norlindh 1943), and it retains this habitat preference where it has become naturalized in eastern Australia. The first record available from Australia is from Stockton, New South Wales, in 1908, and it is virtually restricted to the coasts of that state, including Lord Howe Island. It forms a dense sprawling shrub up to 1-2 m high, often covering an area of 2-6 m in diameter, and is usually found on the sea dunes or invading behind-dune areas where the country is low and sandy. It competes strongly with, and in places totally eliminates, native dune species, e.g. *Leucopogon parviflorus* (Andr.) Lindl., *Correa alba* Andr. var. *alba*, and particularly *Acacia longifolia* var. *sophorae* (Labill.) F. Muell., which has a similar growth habit.

The history of the introduction and spread of the two subspecies of *Chrysanthemoides* in Australia needs to be reassessed and thoroughly documented, and their natural history and ecology studied in some detail, so that hopefully some form of biological control of these plants can be achieved before further incursions into the natural vegetation occur. In addition to the references given above, Barr (1965), Garnet (1965), Welsh (1970), Aveyard (1971) and McDonald (1971) refer to the occurrence of *C. monilifera* in Australia or to its use in dune stabilization work.

The following collections from the major Australian herbaria give some indication of the distribution in Australia of the two subspecies, as well as much useful data on their ecology and introduction in various parts of the country.

***C. monilifera* (L.) T. Norl., Studies in *Calenduleae* 1: 374. 1943. ssp. *monilifera*.**

NEW SOUTH WALES: Broken Hill, mine dump (Zinc Corp.), near ditch in sandy country, shrub 1 m, flowers yellow, *L. A. S. Johnson* E43, 29.viii.1946 (NSW); between Woodford and Hazelbrook, S. of railway line, *P. H. Edwards*, (vii-xii) 1971 (NSW 133391); Mt Colah, grows in masses on cliffs of railway line and surrounding country at Mt Colah, *C. Daunt*, 6.ix.1971 (NSW 133392); Beecroft, a few plants on edge of forest, *L. A. S. Johnson*, 10.ix.1950 (NSW 133396); Chatswood, *A. F. Fitzhardings*, ix.1910 (NSW 133398); Nielsen Park, thick spreading shrub, *Rev. Canon Michael* 1968, 1929 (NSW); Nielsen Park, Sydney, subspontaneous, shrub 1.5 m, very dense growth, leaves rather fleshy, achenes drupaceous, *C. T. White* 10317, 24.xii.1935 (BRI); Rose Bay, received from Dr Norton, *J. J. Fletcher*, 31.viii.1893 (NSW 133400); Botanic Gardens, Sydney, cultivated, viii.1898 (NSW 133406); Botanic Gardens, Sydney, cultivated,

viii. 1899 (NSW 133386); Botanic Gardens, Sydney, cultivated, *J. L. Boorman*, x.1910 (NSW); Botanic Gardens, Sydney, cultivated, bed 53, flowers yellow, *G. Chippendale*, 30.viii.1951 (NSW 133408); ½ mile from Wallacia, Mulgoa road, some dozen yellow-flowered shrubs up to 5 ft high, waste land, *E. J. McBarron* 9224, 31.viii.1964 (NSW); Macquarie Fields, single yellow-flowered shrub, 4 ft, roadside, *E. J. McBarron* 9338, 19.ix.1964 (NSW); Campbelltown road, Leumeah, yellow-flowered erect shrub 4 ft high, single plant on roadside, *E. J. McBarron* 8351, 5.x.1963 (NSW); Heathcote, roadside, *R. G. Coveny* (NSW 133401); Shellharbour, north of Kiama, spreading herb on bank above beach with *Lantana*, scarce, *E. F. Constable* 6027, 5.vii.1965 (NSW); south coast district, *F. G. Sargood*, viii.1915 (NSW 133397); Bannister Head, Mollymook near Ulladulla, cleared *Eucalyptus pilularis*-*E. gummifera*-*E. botryoides* association, shrub to 3 ft high, very common weed on cleared area, *M. Gray* 5809, 2.xii.1965 (CANB; NSW); Bannister Head, Mollymook beach near Ulladulla, cleared eucalypt forest on headland, degraded laterite profile, tall shrub to 8 ft high, flowers bright yellow, *M. Gray* 6234, 31.viii.1968 (CANB; NSW; BRI).

VICTORIA: 1¼ miles S. of Hurstbridge, c. 20 miles NE. of Melbourne, altitude 300 ft, shrub 4 ft high, a weed, many plants in the vicinity, rays yellow, *Helen I. Aston* 330, 28.ix.1959 (MEL); Warburton, 60 miles NE. of Melbourne in Dandenong Mountains, 500–1000 ft altitude, large bush near railway station, *F. V. Di Giovanni* 52, i.x.1961 (MEL); Lilydale, large shrub, flowers yellow, *A. Morris* 1372, 27.ix.1925 (NSW); Lilydale, *A. Morris*, 27.ix.1925 (ADW 10876); Brighton Beach, cultivated, *Tadgell*, 1910 (MEL 49304); Black Rock, *J. C. Goudie*, 17.ix.1940 (MEL 49310); Cheltenham, *A. Meebold* 21803, xi.1936 (NSW); the You Yangs, about 25 km N. of Geelong, ubiquitous on this range and particularly on the sunnier slopes, forming virtually pure stands over hundreds of acres and apparently blocking post-fire regeneration of acacias and other native plants, shrubs to 1.5 m tall, mostly 80–100 cm, flowers bright yellow, gravelly brown soil, numerous granite outcrops, *A. Rodd*, 26.viii.1969 (NSW 133389); Mornington, fairly plentiful, *J. Bowen*, ix.1940 (NSW ex Herbarium F. A. Rodway No. 11643); Mornington Peninsula, *R. Christian*, ix.1963 (CANB 136205); Mt Martha, E. Port Phillip, thoroughly naturalized and abundant in a strip along top of quartzite cliffs near bay, *L. A. S. Johnson*, ii.1949 (NSW); Somers, behind the sand dunes, *C. Hay*, 8.ix.1962 (MEL 49306); Portland, junction of Derril Rd and Wellington Rd, small patch of eucalypt forest, sand, shrub with bright yellow flowers, *J. C. Anway* 419, 22.ix.1965 (MEL; NSW; PERTH); Lorne, *A. G. F. Gates*, 19.viii.1921 (MEL 49305); *C.J.H.* no location or date (MEL 49303).

SOUTH AUSTRALIA: Mt Lofty Range, Tanunda, c. 55 km NE. of Adelaide, *D. J. E. Whibley* 1429, i.ix.1964 (AD); Mt Lofty Range, southern side of Anstey's Hill, c. 16 km NE. of Adelaide, *N. N. Donner* 864, 14.ix.1963 (AD); Mt Lofty Range, Basket Range c. 15 km E. of Adelaide, *H. v. Dam* 209, 15.viii.1969 (AD); Mt Lofty Range, Stonyfell, Lot K Marble Terrace, c. 8 km ESE. of Adelaide, widespread, many seeds which readily germinate, easy to eradicate by persistent uprooting, *K. Preiss* 27, 22.viii.1971 (AD); Adelaide Plains, West Terrace Cemetery, *J. G. O. Tepper*, i.viii.1892 (AD 96803389); Adelaide Hills, *A. Morris*, x.1920 (ADW 10875); Waite Hillside, Glen Osmond, *R. J. Best*, 10.x.1954 (ADW 11307); Belair, *R. A. Perry*, x.1943 (CANB 18390); National Park, Belair, *J. W. Banfield*, 6.ix.1953 (ADW 13069); National Park, *Rex Filson* 1335, 7.ix.1958 (MEL); Woods and Forests Nursery, Belair, *D. E. Symon* 745, 11.x.1960 (ADW); Mt Lofty Range, Crafers, c. 15 km SE. of Adelaide, *N. N. Donner* 111, 13.viii.1961 (AD); Sleeps Hill, near Eden Hills, layered woodland altitude 600 ft, hillside, red-brown earth, dense leafy shrub 4 ft high, flowers bright yellow, *R. W. Purdie* 99, 16.ix.1966 (AD); Mt Lofty Range, lot 408 Euro Avenue, Eden Hills, c. 10 km S. of Adelaide, shrub c. 2 m high, *B. J. Blaylock* 1448, 16.viii.1970 (AD); Mt Lofty Range, Scotts Creek c. 17 km SE. of Adelaide near Mt Lofty, *N. N. Donner* 1166, 20.x.1964 (AD); Happy Valley Reservoir Reserve, site of W.A.R.I. plots, sandy loam, rounded shrub to 6 ft, occasional, *D. E. Symon* 1245, 25.vii.1961 (ADW); Lower Mt Lofty Range, Sellicks Beach c. 50 km SSW. of Adelaide, large yellow-flowered composite, bushy shrub up to 4 ft growing along cliffs, *D. N. Kraehenbuehl* 2353, 9.ix.1969 (AD); cultivated per Red Cross Flower Festival S.A., ix.1948 (NSW 133407).

WESTERN AUSTRALIA: Nabawa, *H. B. Fawcett*, x.1954 (PERTH); Armadale, gravelly soil, shrub 4 ft tall, *Bro. Kissane* 59, 27.viii.1948 (PERTH); Tuttnanning Reserve, 17 miles SE. of Pingelly, in limestone rubble on *Banksia attenuata* sandplain, perennial herb to 80 cm tall, *A. S. George* 9264 (per. A. R. Main), 30.iii.1969 (PERTH).

TASMANIA: Ulverstone, hillside 175 ft altitude, shrub 5 ft high, flowers yellow, *F. H. Long* 570, 28.viii.1931 (HO); Sandy Bay, *W. M. Curtis*, 26.ix.1943 (HO).

C. monilifera (L.) T. Norl. ssp. *rotundata* (DC.) T. Norl., *Studies in Calenduleae* 1: 391. 1943.

QUEENSLAND: between Burleigh and Brunswick Heads, 28°10'S., 153°30'E. (approx.) possibly Coolangatta, *Sister M. Dominic*, 11.v.1970 (BRI 100708).

NEW SOUTH WALES: Fingal Pt, c. 3 miles SE. of Tweed Heads, 28°10'S., 153°32'E. in sand behind beach, bushy shrub to c. 1 m and 1 m in diameter lying on sand, flowers yellow, may have been planted, *R. J. Henderson* H 507, 8.v.1969 (BRI); Cudgen, open wind-swept sand dunes, ± prostrate or forming dense clumps 6 m long and 1 m high, leaves light green, flowers yellow, mature fruits black, soft, *H. S. McKee* 9539, 28.vii.1962 (CANB; NSW); Cudgen-Hastings Point, 28°20'S., 153°34'E., reclaimed sandmining areas, low spreading shrub to 3–4 ft, *F. D. Hockings*, 26.ix.1971 (BRI 123781); approx. ½ mile S. of Cape Byron lighthouse, open dunes, sea level, spreading shrubs, fairly common among dune community, *C. Totterdell* 387, 16.v.1973 (CANB); c. 1 mile S. of Byron Bay, approx. 28°41'S., 153°37'E., common on disturbed sand (after rutile mining operations) behind beach, altitude c. 5 m, up to c. 1 m tall fleshy herb, stems mid-green, outer bracts pale green, ligular flowers yellow, tubular flowers orange-yellow, fruits fleshy, glossy mid-green turning black, *R. D. Hoogland* 11674, 11.x.1969 (CANB); Yamba, approx. 70 yards N. of lighthouse on cliff top c. 30 ft above sea level, disturbed area, low shrub not common at this locality, *C. Totterdell* 388, 17.viii.1973 (CANB); Yamba, at the mouth of the Clarence River, dominant vegetation with *Acacia sophorae* on sand dunes and flats around the township, sprawling shrub about 3 ft high, leaves bright green, young growth covered with a web of white woolly hairs, flowers yellow, young fruits green and succulent, mature fruits black and hard, *B. Lebler*, 26.viii.1966 (BRI 063206); Kempsey district, *W. J. Atkinson* (soil conservationist) 18.xii.1970 (NSW 133394); Point Plomer, N. of Port Macquarie, exposed situation on headland, prostrate woody shrub, sandy soil, mature fruit turning black, *P. Martensz* Q 139, 25.v.1968 (CANB); Port Macquarie, collected at Soil Conservation Service experimental area, *G. W. Mort*, 11.xii.1950 (NSW 133395); Nelson Bay, creeping over sand dunes near sea, very common, *G. M. Lithgow* 125, 21.iii.1965 (NSW); Stockton, *Mayor of Stockton*, vi.1908 (NSW 133399); Newcastle, 32°56'S., 151°46'E., on headland, referred to locally as 'saltbush', *M. Schamburg*, 3.ix.1969 (BRI 088615); Carrington district, *A. J. Beck*, iv.1966 (NSW 133403); Merewether, on dunes at sea shore, *H. Salasoo* 3683, 21.ix.1969 (NSW); Redhead, 4 miles S. of Newcastle, locally abundant with *Macchia* on sand dunes, spreading 3 ft bush with bright yellow rays, *R. Story* 7227, 28.iv.1960 (CANB); Kilcare Beach near Woy Woy, deep silica sand on foredune, diffuse shrub to about 3 ft high and 8–10 ft diameter, *C. W. E. Moore* 6156, 19.iv.1972 (CANB; ADW); Palm Beach, north end, 33°35'S., 151°19'E., occasional on sand dunes, a large spreading shrub c. 1.5 m tall, 4 m spread, foliage very dense, rays bright yellow, *A. Rodd* 2275, 12.xi.1972 (NSW); northern shore of Botany Bay, spreading, *Dr E. McClure*, 8.vi.1971 (NSW 133393); Sunpatch Beach near Burrewurra Point, south coast, sea dunes, one large plant approx. 20 ft diameter with sprawling decumbent branches, *M. Gray and C. Totterdell* 6682, 24.xii.1972 (CANB; NSW; MEL); Moruya airstrip, at edge of road by beach on sand, *L. A. Mound*, 28.iv.1968 (CANB 186976); Moruya Beach, south coast, on beach dunes and invading behind-dune *Banksia integrifolia* association, dense sprawling shrub to 6 ft high and covering large areas to exclusion of native species, *M. Gray and C. Totterdell* 6502, 17.ix.1971 (CANB; PERTH; NSW).

LORD HOWE ISLAND: foreshore bank of the lagoon opposite the corner of Blinky Road and Lagoon Road, *H. Ward*, v.1965 (NSW 133405)*; near Lagoon Beach, S. end, two colonies and forming thickets 3 ft high, *A. C. Beaglehole* ACB 7804, 18.ix.1963 (CANB); Prince William Henry Bay, 31°33'S., 159°3'E., sprawling shrub among grass on sandy soil just behind beach, in places so abundant as to exclude all other vegetation, stems red-tinged, leaves thick, almost fleshy,

* This specimen has an attached copy of a letter dated 21.vii.1965 with the additional information: 'It is not known when the plant was first introduced to the island, but it is known to have been in the same area for at least 30 years and possibly longer; the plant appears to have been growing in one cluster for many years and only during the last five years has it begun to spread along the foreshore. No reason can be offered for the recent increase'.

involucre green, flowers yellow, styles orange, *M. M. J. v. Balgooy* 1138, 28.vii.1965 (NSW); Mt Gower, half way up mountain, *Ward*, viii.1963 (NSW 133404).

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