

***Atalaya breviaolata* (Sapindaceae), a new species from the Northern Territory, Australia**

Ian D. Cowie^{1,3} and Benjamin Stuckey^{1,2}

¹Northern Territory Herbarium, Department of Land Resource Management,
P.O. Box 496, Palmerston, Northern Territory 0831

²Calma Gardens, The Narrows, Northern Territory 0820

³Corresponding author, email: ian.cowie@nt.gov.au

Abstract

Cowie, I.D. & Stuckey, B. (2012). *Atalaya breviaolata* (Sapindaceae), a new species from the Northern Territory, Australia. *Nuytsia* 22(6): 363–370 (2012). A new, rare species, *Atalaya breviaolata* Cowie & G.M. Wightman is described and illustrated. The species is unusual in the genus in having a greatly reduced wing on the samara and the suffruticose growth habit, the latter perhaps an adaptation to the region's wet-dry tropical climate and prevailing near-annual fire regime. It appears to have a restricted distribution to the south of Darwin and its conservation status is evaluated. A key to species of *Atalaya* Blume in the Northern Territory and Western Australia is provided.

Introduction

Atalaya Blume is a genus of around 17 species with 13 endemic in Australia, one species each in New Guinea and Wallacea and two or three species in southern Africa (Palgrave 1977; Leenhouts 1994; Short *et al.* 2011; Council of Heads of Australasian Herbaria 2012). The type species of the genus, *A. salicifolia* (DC.) Blume, occurs in the Lesser Sunda Islands, including Leti, Sumba, Sumbawa and Timor as well as in northern Australia. Queensland, with 13 species, has most of the Australian species, while three named species (*A. hemiglauca* (F.Muell.) F.Muell., *A. salicifolia* and *A. variifolia* F.Muell.) are known from the Northern Territory and Western Australia (Reynolds 1981, 1985; Koch 1992; Short *et al.* 2011). An undescribed, putative fourth species was first collected in the Darwin rural area in 1994, with two subsequent collections made from the same subpopulation in later years. Recent collections from newly discovered, additional subpopulations have enabled the further appraisal of the significance and constancy of various morphological characters and led to the conclusion that this taxon is clearly distinct from any known species. Additional field survey was conducted to establish the conservation status of the species.

Methods

This study was based on examination of dried herbarium specimens at DNA and BRI as well as fresh material collected in the field. Herbarium abbreviations follow Thiers (continuously updated). The distribution map was prepared using ArcGIS 10 from specimen data at DNA. Type images were captured using LEAF Aptus imaging apparatus. Adjectives used to describe the indumentum follow McCusker

(2012) while use of the terms ‘population’ and ‘subpopulation’ follows IUCN conventions (IUCN Standards and Petitions Subcommittee 2011). While duplicates of *G.M. Wightman* 6260 & *I.D. Cowie* were seen at the time of collection, they were distributed before the description below was prepared.

Taxonomy

Atalaya breviaalata Cowie & G.M.Wightman, *sp. nov.*

Typus: Jenkins Road, c. 2.5 km north-west of Noonamah, Northern Territory, 20 November 2011, *I.D. Cowie* 12865 (*holo*: DNA (2 sheets); *iso*: B, BRI, CANB, CNS, K, L, LD, MEL, MO, NSW, PERTH).

Atalaya sp. Elizabeth River (G.M. Wightman 6259), *I.D. Cowie* & D.A. Albrecht, *Checklist of Northern Territory Vascular Plant Species* (2005).

Atalaya (D123943) Elizabeth River, *in sched.*

Suffruticose *subshrub*, aerial parts annual, to 45 cm tall, stems slender, to 21 cm, rootstock perennial, woody, 8–15 mm diam. Branchlets thinly pubescent, hairs stramineous, 0.1–0.3 mm long. *Leaves* simple, sessile, alternate, linear, 65–410 mm long, 1.4–7.5 mm wide, concolorous, intersecondary venation reticulate and prominent, with a marginal vein or intramarginal vein c. 0.5 mm from margin, both surfaces with scattered short, patent or ascending hairs to almost glabrous, base attenuate or rounded, margin entire or indistinctly crenate, apex acute, rounded, rarely spatulate. *Inflorescence* paniculate or sometimes corymbose, axillary, supra-axillary or terminal, to 70 mm long, stems thinly pubescent, hairs patent, short, white. *Pedicels* 1.5–4.5 mm long, with short patent hairs. *Flowers* monoecious, creamy white. *Sepals* 5 or 6, unequal, ovate to elliptic, widely obovate or suborbicular, 1.5–2.5 mm long, 1.5–2 mm wide, adaxial surface glabrous, abaxial surface thinly pubescent, hairs appressed to patent, short, white, margins ciliolate; apex rounded, cream to pale brown. *Petals* 5 or 6, oblanceolate, ovate or lanceolate, 2.5–3.5 mm long, 1.1–1.2 mm wide, adaxial surface thinly pubescent, hairs scattered, c. 0.5 mm long, weak, ascending, white, abaxial surface thinly sericeous, hairs c. 0.5 mm long, white, base attenuate and shortly clawed, margins long-ciliate; apex rounded or truncate; scales entire or shortly bilobed, suborbicular to transversely oblong, apex villous. *Disc* annular, entire or slightly lobed, undulate or flat. *Stamens* 7–9, more or less equal, 3–3.5 mm long, often exerted in male flowers; filaments 2–2.5 mm long, hairs scattered in lower 2/3, c. 0.5 mm long, weak, ascending to patent; anthers c. 1 mm long. *Ovary* puberulent, 3-lobed. *Fruit* divaricately 3-lobed, separating into indehiscent, 1-seeded samaras. *Samaras* 3, oblong to ovate or broadly elliptic, 11–22 mm long, 7–12 mm wide, thinly pubescent, hairs 0.1–0.5 mm long, straight to slightly arcuate, ascending to patent, hyaline to stramineous, base turgid; wing, dorsal, erect, 0.5–6 mm long; apex rounded, entire, irregular or erose, brown when mature. *Seed* 1, obovoid, c. 8.5 mm long, c. 8 mm wide, surface uneven but otherwise more or less smooth, pale brown. (Figures 1, 2)

Diagnostic features. Distinguished from all other *Atalaya* species by the combination of a reduced wing on the samara, the simple, linear leaves and the suffruticose growth habit. While it shares the sericeous petals of *A. sericopetala* S.T.Reynolds (the only other species with this character), that species is a shrub or small tree, has an extended racemose or paniculate inflorescence 80–280 mm long (up to 70 mm long in *A. breviaalata*), sepals with a glabrous, hyaline margin (thicker and ciliolate in *A. breviaalata*) and staminal filaments sericeous throughout (glabrous at apex in *A. breviaalata*). In addition, the leaves of *A. sericopetala* are often compound, with 3 or 4 pairs of leaflets, the leaf blades or leaflets are usually elliptic or oblong-ovate, 20–60 mm wide, but very rarely linear as in *Wannan*

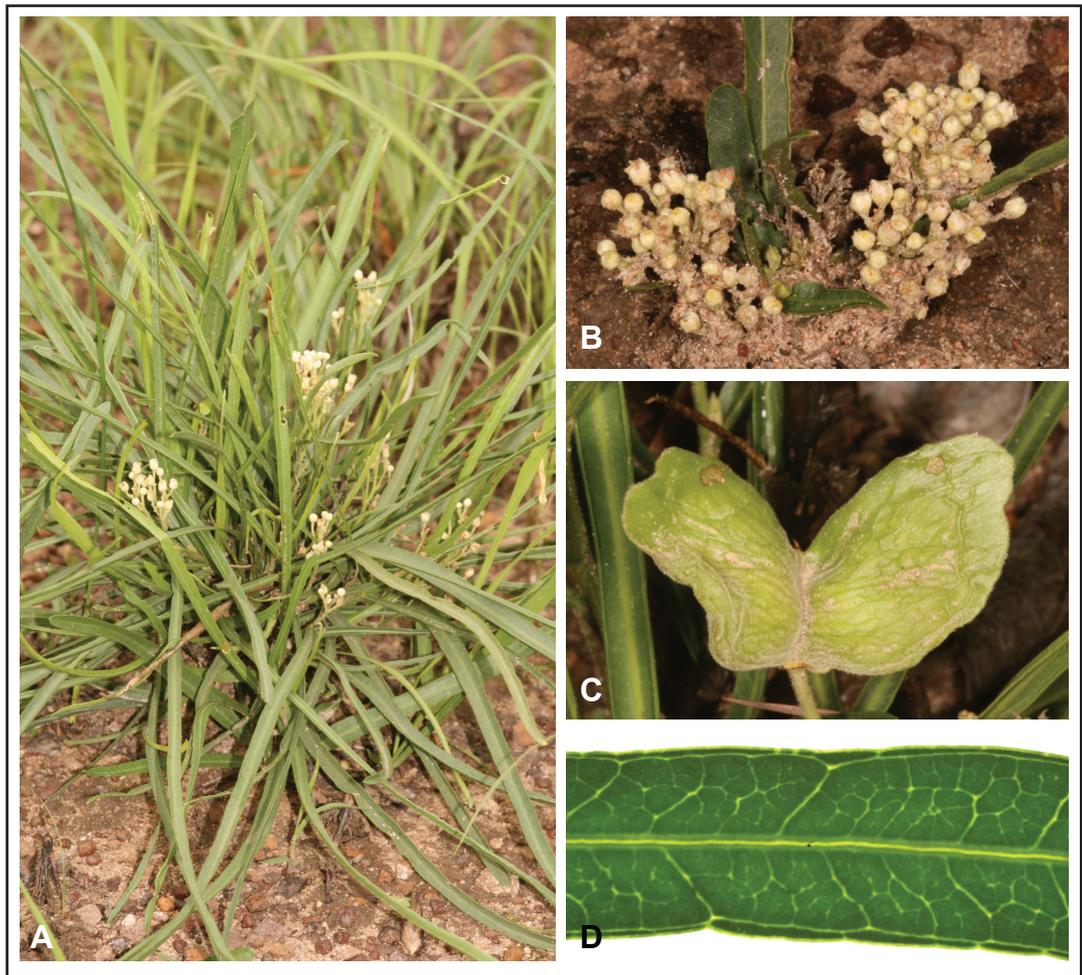


Figure 1. *Atalaya breviaolata*. A – habit; B – inflorescence emerging from the ground with young leaves; C – fruit showing two samaras (the left-hand one damaged); D – mid-section of leaf lamina showing venation. (I.D. Cowie 12865).

5638. *Atalaya angustifolia* is often suffruticose, but has compound leaves and different flowers.

Other specimens examined. NORTHERN TERRITORY: c. 2.3 km W of Noonamah, 4 Nov. 2011, I.D. Cowie 12849 & B. Stuckey (BRI, CANB, DNA, MEL, PERTH); 4.5 km NW of Noonamah, towards Virginia, 23 Nov. 2011, I.D. Cowie 12874 (BRI, DNA); near Elizabeth River, Virginia, 1 Nov. 2001, M. Elliot s.n. (DNA); Elizabeth River; Virginia Rd access, 21 Oct. 1994, G.M. Wightman 6259 (DNA); Elizabeth River, Virginia Rd access, 8 Nov. 1994, G.M. Wightman 6260 & I.D. Cowie (BRI, CANB, DNA, K, MEL, PERTH).

Distribution and habitat. The species is known only from a small area in the Elizabeth River valley south of Darwin, in the Northern Territory (Figure 3). The five known localities are near Virginia and west to north-west of Noonamah. It grows in woodland to open woodland with varying proportions of *Eucalyptus tectifica* and *Corymbia foelscheana* but also with scattered *Xanthostemon paradoxus*, *Terminalia grandiflora* and *Acacia hemignosta* in the overstorey with an open layer of perennial grasses such as *Eriachne avenacea*. It usually occurs on sandy soils in foot slope situations, often with a surface gravel layer. Occasionally it grows in mixed *Melaleuca viridiflora*, *Grevillea pteridifolia* and



Figure 2. Holotype of *Atalaya brevilata*. The scale is graduated in cm (LHS) and inches (RHS). (I.D. Cowie 12865).

Acacia leptocarpa low woodland in more poorly drained situations but on more gravelly, slight rises. Suitable habitat often occurs in a narrow band upslope of sandy, poorly drained flats dominated by the small tree *Grevillea pteridifolia* and *Dapsilanthus spathaceus*. In two locations, smaller populations occurred just upslope of the rear-mangrove community.

Phenology. Flowering: October and November. Fruiting: November. Flowering and fruiting appears to be restricted to the build-up to the wet season.

Conservation status. Until recently, *A. brevialata* was regarded as IUCN Data Deficient as much because of a lack of certainty regarding its taxonomic status as because it is difficult to detect for part of the year and was known from only one locality. Following intensive surveys in November and December 2011 it was found that almost the entire population is within the footprint of a proposed new urban hub for the greater Darwin area, with land releases scheduled to begin in 2014 and likely to continue over the next 20–30 years. Invasion of habitat by introduced weed species, especially Gamba Grass (*Andropogon gayanus*), is also a potential threat. Gamba Grass is a high-biomass producing perennial and is now established and common some kilometres to the east of the population with scattered stands already in the general area. Gamba Grass forms taller, denser stands than native grasses, curing later in the dry season. This results in substantial changes to savanna fire regimes. It can dramatically increase local fuel loads from the 2–4 tonnes/hectare typical for native grasses to 11–15 tonnes/hectare or sometimes even 30 tonnes/hectare for Gamba Grass resulting in later, more intense fires that can kill or reduce the vigour of tree species (Rossiter *et al.* 2003; Ferdinands *et al.* 2006). Gamba Grass may also out compete native woody species both by grossly altering the availability of nitrogen to native plant species and by using larger amounts of water than native grasses (Rossiter *et al.* 2004; Rossiter-Rachor *et al.* 2009). Large robust perennial species are also likely to simply shade out smaller species such as *A. brevialata*.

With clear threats, only five subpopulations, an area of occupancy of just 4.5 hectares and an extent of occurrence of 7.6 km², reassessment of the conservation status against IUCN criteria places it as Endangered based on Criterion B1, 2ab (i, ii, iii, iv, v) (IUCN 2001; IUCN Standards and Petitions Subcommittee 2011). Without threat abatement, the species is expected to suffer reductions in population size, area of occupancy, extent of occurrence and in habitat quality. A density estimate of 67,166 ± 3,353 mature plants/hectare was derived by counting individuals on 15 randomly located 2 m by 2 m quadrats at two subpopulations. Thus, the current population estimate is 302,247 ± 15,088 mature plants. At one subpopulation, good germination of seed was observed with an estimated 47,333 seedlings/hectare in December 2011. However, no seedlings were observed at a second subpopulation. Nothing is known of seedling survival through the subsequent dry season. Fresh seed germinates readily in cultivation and this may facilitate establishment of *ex situ* populations.

Enough field survey and collecting has been done in the Greater Darwin area to conclude that the distribution is very restricted. Following discovery of additional subpopulations near Amys Creek in November 2011 and review of its taxonomic status, survey targeted at apparently suitable habitat was conducted in the surrounding area over November and December 2011. Additional potential habitat was located using geological and topographic mapping, aerial photography and radiometric imagery. However, the species appears to be restricted to sites with a fairly specific combination of edaphic, topographic and drainage characteristics along a particular geological boundary and no additional populations were located substantially outside the extent of occurrence established in early November. In addition, an intensive flora and vegetation survey of the area surrounding the main subpopulations was conducted in the 2010–11 wet season without detecting the species and surveys of vegetation and flora in the wider Darwin rural area have also not located it (Price *et al.* 2005; Cuff & Brocklehurst

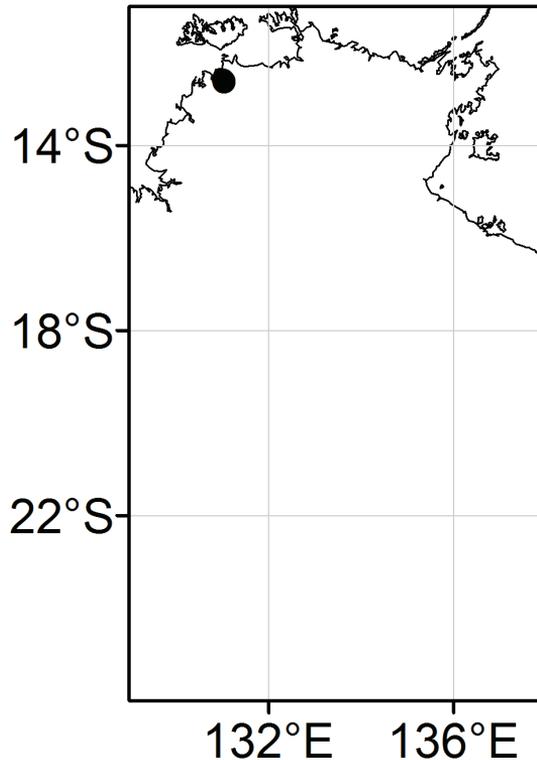


Figure 3. Distribution of *Atalaya brevialata* in the Northern Territory.

2011). The one degree grid cell (12–13° S, 131–132° E) for the area containing the population is one of the six best surveyed similar areas in the Northern Territory, with 167 plant records/100 km² on NT Herbarium survey and specimen databases and a total of 7,232 specimens collected. The one degree cell immediately to the west (which includes an area of sea) has 345 plant records/100 km² and 5,552 NT Herbarium specimens. On the other hand there is potential for additional small subpopulations to be found within the extent of occurrence. Additional survey of potential habitat in the Berry Creek catchment (Livingston Road) and further afield (Elizabeth River Valley, Blackmore River) is also recommended at a time of year when the plant has high visibility.

Etymology. The epithet *brevialata* means short-winged, from the Latin *brevis*, short, and *ala*, a wing; a reference to the short wing of the samara.

Affinities. As indicated above the species appears to be closest to the Queensland species, *A. sericopetala*. In both of Reynolds' keys it would key to couplet 1 with *A. sericopetala* (Reynolds 1981, 1985). In addition to the characters discussed above, it is also distinguished from *A. variifolia*, *A. hemiglauca* and *A. salicifolia* by the smaller, sericeous petals with an attenuate base and the lack of lobing of the scales. In *A. hemiglauca* and *A. salicifolia* the leaflets often dry darker above, are mostly opposite to subopposite and the sepals are dark reddish brown with paler margins. *Atalaya salicifolia* has glabrous sepals and samaras but in *A. hemiglauca* these are usually hairy. *Atalaya variifolia* and *A. brevialata* have more or less concolorous leaves with the sepals mostly cream to pale brown and in the former, leaflets are frequently subopposite or alternate. *Atalaya variifolia* sometimes produces simple leaves below the inflorescence (e.g. B. Gray 06370, B. Hyland 3466, G. Sankowsky 2008) or on the juvenile regeneration (e.g. P. Black 177a, M.B. Thomas BOI18, L.J. Webb 12504 & G.J. Tracey) but both the

leaves and stems are more robust than in *A. brevialata* and the juvenile regeneration appears to rarely produce flowers and fruit.

Notes. The suffruticose growth habit, with annual aerial parts dying back during the dry season to a more or less woody perennial rootstock is unusual in Australian Sapindaceae. However, this growth habit is found in a wide range of genera typical of the savanna understorey of the wet-dry tropics of Australia e.g. Asteraceae (*Pleurocarpaea*), Dilleniaceae (*Hibbertia*), Euphorbiaceae (*Euphorbia*, *Microstachys*), Fabaceae (e.g. *Crotalaria*, *Dendrolobium*, *Dunbaria*, *Flemingia*, *Galactia*, *Indigofera*, *Neptunia*, *Senna*, *Tephrosia*, *Zornia*), Malvaceae (*Helicteres*, *Urena*), Phyllanthaceae (*Phyllanthus*, *Sauropus*) and Picrodendraceae (*Petalostigma*). Thus it is perhaps not surprising that it should also have evolved in *Atalaya*.

Key to species of *Atalaya* in the Northern Territory and Western Australia

1. Petals sericeous on outer surface; wing of samara reduced, 6 mm long or less; leaves all simple; subshrub **A. brevialata**
- 1: Petals glabrous in upper half; wing of samara well developed; adult leaves compound; trees 2
2. Sepals and fruits glabrous **A. salicifolia**
- 2: Sepals and fruits hairy 3
3. Rachis and petiole winged, often broadly, wing leaf-like; many pinnae subopposite or alternate, green on both surfaces; petal margins ciliate **A. variifolia**
- 3: Rachis and petiole rarely winged, except in some juvenile leaves; pinnae mostly opposite, often darker above; petal margins glabrous **A. hemiglauca**

Acknowledgements

We would like to thank a number of people for their assistance in preparing this paper. Philip Short provided valuable discussion on a number of points. Two anonymous referees provide constructive criticism which improved the paper. Glenn Wightman was the first to collect the new species. He, Philip Short, Donna Lewis and Dave Liddle assisted with field surveys to assess its conservation status. The Director of BRI provided access to collections held there. The LEAF Aptus imaging equipment used to capture type images was provided by Atlas of Living Australia.

References

- Council of Heads of Australasian Herbaria (2012). *Australian Plant Census*. IBIS database. Centre for Australian National Biodiversity Research, Australian Government, Canberra. <http://www.chah.gov.au/apc/index.html> [accessed 20 January 2012].
- Cowie, I.D. & Albrecht, D.A. (2005). *Checklist of Northern Territory vascular plant species*. (Department of Natural Resources, Environment and the Arts: Darwin.)
- Cuff, N. & Brocklehurst, P. (2011). *Vegetation mapping and floristic survey of the proposed new township of Weddell, Darwin, Northern Territory*. (Department of Natural Resources, Environment, the Arts and Sport: Palmerston, Northern Territory.)
- Ferdinands, K., Setterfield, S.A., Douglas, M.M. & Barratt, J. (2006). Africanising the tropical woodlands: canopy loss and tree death following gamba grass *Andropogon gayanus* invasion. In: Preston, C., Watts, J.H. & Crossman N.D. (eds). *Proceedings of the 15th Australian Weeds Conference*. (Weed Management Society of South Australia: Adelaide.)
- IUCN (2001). *IUCN Red List Categories: Version 3.1*. Prepared by the IUCN Species Survival Commission. (IUCN: Gland, Switzerland and Cambridge, United Kingdom.)

- IUCN Standards and Petitions Subcommittee (2011). *Guidelines for using the IUCN Red List Categories and Criteria. Version 9.0*. Prepared by the Standards and Petitions Subcommittee of the IUCN Species Survival Commission. Downloadable from <http://intranet.iucn.org/webfiles/doc/SSC/RedList/RedListGuidelines.pdf>.
- Koch, B.L. (1992). Sapindaceae. In: J.R. Wheeler (ed.) *Flora of the Kimberley Region*. pp. 645–654. (Department of Conservation and Land Management: Como.)
- Leenhouts, P.W. (1994). *Atalaya*. *Flora Malesiana* Ser. 1, 11: 479–483.
- McCusker, A. (2012). *Flora of Australia glossary*. Australian Biological Resources Study, Canberra. <http://www.environment.gov.au/biodiversity/abrs/online-resources/glossaries/vascular/> [accessed 1 July 2012].
- Palgrave, K.C. (1977). *Trees of southern Africa*. (C. Struik Publishers: Cape Town.)
- Price, O., Rankmore, B., Milne, D., Brock, C., Tynan, C., Kean, L. & Roeger, L. (2005). Regional patterns of mammal abundance and their relationship to landscape variables in eucalypt woodlands near Darwin, northern Australia. *Wildlife Research* 32: 435–446.
- Reynolds, S.T. (1981). Notes on Sapindaceae in Australia, 1. *Austrobaileya* 1: 388–419.
- Reynolds, S.T. (1985). Sapindaceae. *Flora of Australia* 25: 4–164.
- Rossiter, N.A., Setterfield, S.A., Douglas, M.M. & Hutley, L.B. (2003). Testing the grass-fire cycle: exotic grass invasion in the tropical savannas of northern Australia. *Diversity and Distributions* 9: 169–176.
- Rossiter, N.A., Setterfield, S.A., Douglas, M.M., Hutley, L.B. & Cook, G.D. (2004). Exotic grass invasion in the tropical savannas of northern Australia: ecosystem consequences. In: Sindel, B.M. & Johnson, S.B. (eds) *Proceedings of the 14th Australian Weeds Conference*. (Weeds Society of New South Wales: Sydney.)
- Rossiter-Rachor, N.A., Setterfield, S.A., Douglas, M.M., Hutley, L.B., Cook, G.D. & Schmidt, S. (2009). Invasive *Andropogon gayanus* (gamba grass) is an ecosystem transformer of nitrogen relations in Australian savanna. *Ecological Applications* 19(6): 1546–1560.
- Short, P.S., Albrecht, D.E., Cowie, I.D., Lewis, D.L. & Stuckey, B.M. (eds) (2011). *Checklist of vascular plants of the Northern Territory*. (Northern Territory Herbarium, Department of Natural Resources, Environment, the Arts and Sport: Palmerston, Northern Territory)
- Thiers, B. (continuously updated). *Index Herbariorum: A global directory of public herbaria and associated staff*. New York Botanical Garden's Virtual Herbarium. <http://sweetgum.nybg.org/ih/> [accessed March 2012].