



The flora of James Cook's 'Botany Isle' (Îlot Améré) and the neighbouring islets of Kié and Nouaré (New Caledonia): revisited and re-evaluated after nearly 250 years

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Introduction

In advance of the approaching 250th anniversary of the discovery of New Caledonia by Europeans during James Cook's famous 2nd voyage (1772–1775) towards the South Pole and around the world (Cook 1779), it was deemed appropriate to revive the memory and records of one of the two sites where he went ashore within the archipelago, with a reviewed account of its botany.

Commander James Cook (1728–1779) left Plymouth, England, on 13 July 1772 aboard HMS *Resolution* for his second voyage commissioned by the British government in search of the hypothesised southern continent. The German Johann Reinhold Forster (1729–1798) and his son Georg Forster (1754–1794) were appointed as the Royal Society scientists for the voyage. Georg Forster was just 17 years old when he embarked on the ship but was already a talented draughtsman and translator. Later he became one of the most famous German characters of the 18th century, as a naturalist, taxonomist, ethnographer, writer, and even revolutionist introducing the ideals of the French Revolution to the German community (Harpprecht 1990). The Forsters were accompanied by the Scotsman William Anderson (1750–1778), surgeon of the ship

Abstract

When James Cook visited New Caledonia in 1774, one of the localities inspected was 'Botany Isle'. Cook's and Wales's journals are used to ascertain the position of Botany Isle and draw new maps. Crew members landing on Botany Isle (including scientists Johann Forster and Georg Forster) reported seeing about 30 plant species, yet only 7–15 species were documented, either with herbarium specimens or in subsequent literature. Based on our botanical inventory of Améré, Kié and Nouaré islets, the species that may or may not have been seen by the Forsters on their 'Botany Island' are discussed, raising nomenclatural questions. A comprehensive list of species found on these islets is provided and conservation issues discussed.

Keywords: Botanical inventory, historical herbarium specimens, Îlot Améré, maps, Yves Merlet Integral Natural Reserve.

but also an observant naturalist and collector. Anders Sparrman (1748–1820), a Swedish apostle of Linnaeus, embarked on the *Resolution* on 30 October 1772 in Cape Town (South Africa), and left the ship there again in July 1775. He was appointed as assistant naturalist to the Forsters. Finally, William Wales (1734–1798) was the astronomer for the voyage.

More than two years after its departure, and having just visited Vanuatu, the *Resolution* arrived, on 4 September 1774, in sight of a land new to the British and Europeans, later named New Caledonia by Cook. Following a stay of about one week at the north-east end of Grande Terre, now known as Balade, the ship went south-east along the coast, passed Cape Coronation and Queen Charlotte's Foreland, and sailed around the Isle of Pines in order to explore the western coast of Grande Terre. In doing so, Cook soon understood that they were trapped in a kind of dead-end, surrounded by reefs and small sandy islands to the east, by the southern tip of Grande Terre to the north, and by the large, south reef horn (Corne sud) to the west. It was an opportunity to solve the now famous debate that had arisen a few days earlier between Cook and the Forsters about the pillar-like structures they had been seeing along the south-east coast of Grande Terre, on many islets and the Isle of Pines. In Cook's opinion, the pillar structures were some "singular sort of trees", while in the Forsters' opinion they were pillars of basalt like those of the Giant's Causeway in Ireland (Cook 1779: 133–134). On 29 September 1774, Cook was determined to close the debate and anchored about one mile from the west side of an islet in water about 70 metres (39 fathoms) deep. Cook and the botanists went ashore to solve the mystery and, on this flat, coral sand island of 5.6 ha, discovered that the pillars were indeed a kind of "spruce pine". This eye-catching species was later described as *Cupressus columnaris* G.Forst. by the younger Forster (Forster 1786a), now placed in the genus *Araucaria* Juss. as *Araucaria columnaris* (G.Forst.) Hook. This species was also later named in honour of Cook by subsequent botanists as *Araucaria cookii* R.Br. ex D.Don or *Eutacta cookii* Carrière, both now regarded as synonyms of *Araucaria columnaris*. Surprised by the variety of plants on such a small island, as well as by the fact that such big trees were growing on it, Cook named the islet 'Botany Isle' (or 'Botany Island' in Forster 1777).

In this paper, we aim to: i) ascertain whether Botany Isle is the present day îlot Améré; ii) study the botany of Botany Isle at the time of Cook's visit on 29 September 1774 from a literature review perspective; iii) examine the specimens presumably collected on Botany Isle, and raise some nomenclatural questions; and iv) compare the historical data with those of a recent botanical inventory on îlot Améré, as well as neighbouring Kié and Nouaré islets, carried out by three of the authors from 1 to 3 April 2019.

Material and methods

The available standard literature by and/or concerning Cook (Cook 1772–1775, 1777, 1779), Forster senior (Hoare 1982) and junior (G. Forster 1777, 1778, 1780, 1786a, 1786b), Sparrman (Pisier 1974; Wästberg 2008), Anderson (Beasley 2012) and Wales (Wales 1772–1775) was studied.

In order to validate the true position of Botany Isle and other places named by Cook, two manuscripts were used: Cook's own journal (Cook 1772–1775) and the navigation logbook compiled by Wales (1772–1775) from 21 September until the arrival at Botany Isle on 28 September. It should be noted that Cook's journal follows a regular calendar, whereas Wales' navigation log gives astronomical days and hours, in which a day begins at noon. Consequently, the arrival at Botany Isle is recorded by Cook as the end of the morning of 29 September, while it is recorded by Wales as 22 h on 28 September. The dates and hours indicated in Figure 1 follow the astronomical calendar. Given the lower accuracy methods used to determine latitude and longitude at that time, a decision was made to use bearings from the 32-wind compass rather than the coordinates given by both documents and the Cook map (Cook 1772–1775: 340–341). All bearings taken were reported on SHOM (2010) marine charts using QGIS 3.4 advanced digitising tools. Bearings with at least three references on land are considered accurate; others are only used to adjust trajectories. Further data from the texts were used to confirm the positions and trajectories obtained. As for unit conversion, we considered a fathom to be 1.8 m (1/1000 of a nautical mile) and a league to be 4.8 km (three miles on land).

Available herbarium specimens presumably collected on Botany Isle during Cook's landing (Global Plants

on JSTOR: <https://plants.jstor.org/>; Kew Herbarium Catalogue, <http://apps.kew.org/herbcat/navigator.do>; and other web sources) and literature dealing with these specimens (e.g. Merrill 1954a, 1954b; Hiepko 1969; Fosberg 1993; Hansen & Wagner 1998; Nicolson & Fosberg 2004) were checked extensively. We also studied specimens collected more recently on the islets under consideration that are held in NOU (herbarium codes follow Thiers 2020 [continuously updated]).

For comparison, a botanical inventory of îlots Améré, Kié and Nouaré was conducted. Améré and Kié are part of the 'Yves Merlet Integral Natural Reserve' to which access, as well as the collection of specimens, is strictly forbidden. The South Province Direction de l'Environnement authority granted the authors special access to the reserve for this study and made available two boats (the *Améré* and *Noddi*). Inspections took place on Améré on 1 April, on Kié on 2 April and Nouaré on 3 April 2019. In order to limit the impact on the local flora and to comply with the special authorisation, the minimum number of specimens needed to identify plants at the species level were collected, but as many species as possible were recorded and photographed in the field, and their relative abundance rated from 1 to 3 (1=rare, 2=fairly common, 3=very common; Table 1). The specimens collected during the field trip are deposited in Nouméa (NOU), and the most significant collections also lodged as duplicates in Paris (P).

Results and Discussion

Îlot Améré the Botany Isle of Cook's journal?

Although Cook's Botany Isle has long been associated in the literature with present day îlot Améré, it was deemed important to cross-check and verify this assertion. With the help of Cook's very detailed and accurate journal, and Wales's navigation logbook, we were able to confirm Botany Isle as îlot Améré (Figures 1–2). Figure 1 shows all usable Wales bearings noted during the few days prior to the arrival at Botany Isle. In listing them, it was found that what is called Cape Coronation on most modern maps (e.g. Pisier 1971; Robson 2000; Georep 2020; IGN 2020) should, in fact, be called Queen Charlotte's Foreland, while the current Cape Pouaréti is a synonym of Cape Coronation. This confusion explains why Cook's bearings, setting the low and high points of Queen Charlotte's Foreland respectively at N14°30'W

and N20°W (Figure 2), actually point to Cape Coronation on modern maps (Georep 2020; IGN 2020). The correction of this error eliminates the last uncertainty about the position of Botany Isle. This misleading error merits further research and explanation, as one of the earliest accurate maps of New Caledonia is correct in its placement of Cape Coronation and Queen Charlotte's Foreland (Malte-Brun 1874). The first occurrence of this error likely appeared in 1886, on an official map (Gallet 1886).

It was not possible to establish with certainty who first identified îlot Améré as Cook's Botany Isle. However, as early as 1853, a footnote (Erskine 1853: 401) pointed out that the French Chart was erroneous in applying the name of 'Botany Islands' to two southern reef sandy islets (presumably the present day îlot Du Ami and îlot Dü-Ana or îlot Ndié) that do not have any pines (i.e. *Araucaria*) and which are "not offering any field for botanists". As far as could be ascertained, the first use of the name might have been by Bouquet de la Grys in his mapping of New Caledonia between 1855 and 1857. Bouquet de la Grys (1858) wrote about 'Amere' as 'Botany-Island' and later (Bouquet de la Grys 1862) placed îlot Améré quite accurately, setting Cook's anchorage place within the reefs on the east of Améré (instead of east by south *fide* Cook's journal). Based on Wales's writings, however, it was found that the anchorage was actually west of the islet ("we came to anchor under the lee of the proposed island which then bore N88°1/2E"), and this is confirmed by the subsequent bearings he made (Figure 2). This confirms the hypothesis of Pisier (1974), who wrote that Cook's comment that "the isle bore WbN, one mile distant" was probably a mistake. Furthermore, the other clues available regarding depth, wind, current and courses all converge on an anchorage on the lee (west) side of Botany Isle.

During our stay on îlot Améré, attempts were made to find tools and/or signs of Cook's passage on the islet. A specimen of *Araucaria columnaris* that was cut and later resprouted was located (Figure 3b), but it is difficult to assert that it was actually one of the 8–9 spars (it is not said how tall the trees were) cut down by Cook's carpenters (John Marra in Pisier 1974) since *Araucaria* stumps are unlikely to persist for 245 years. A torpedo glass bottle (most likely used for soda) made by John Starkey in Sydney, 140 Phillip Street, was also found on

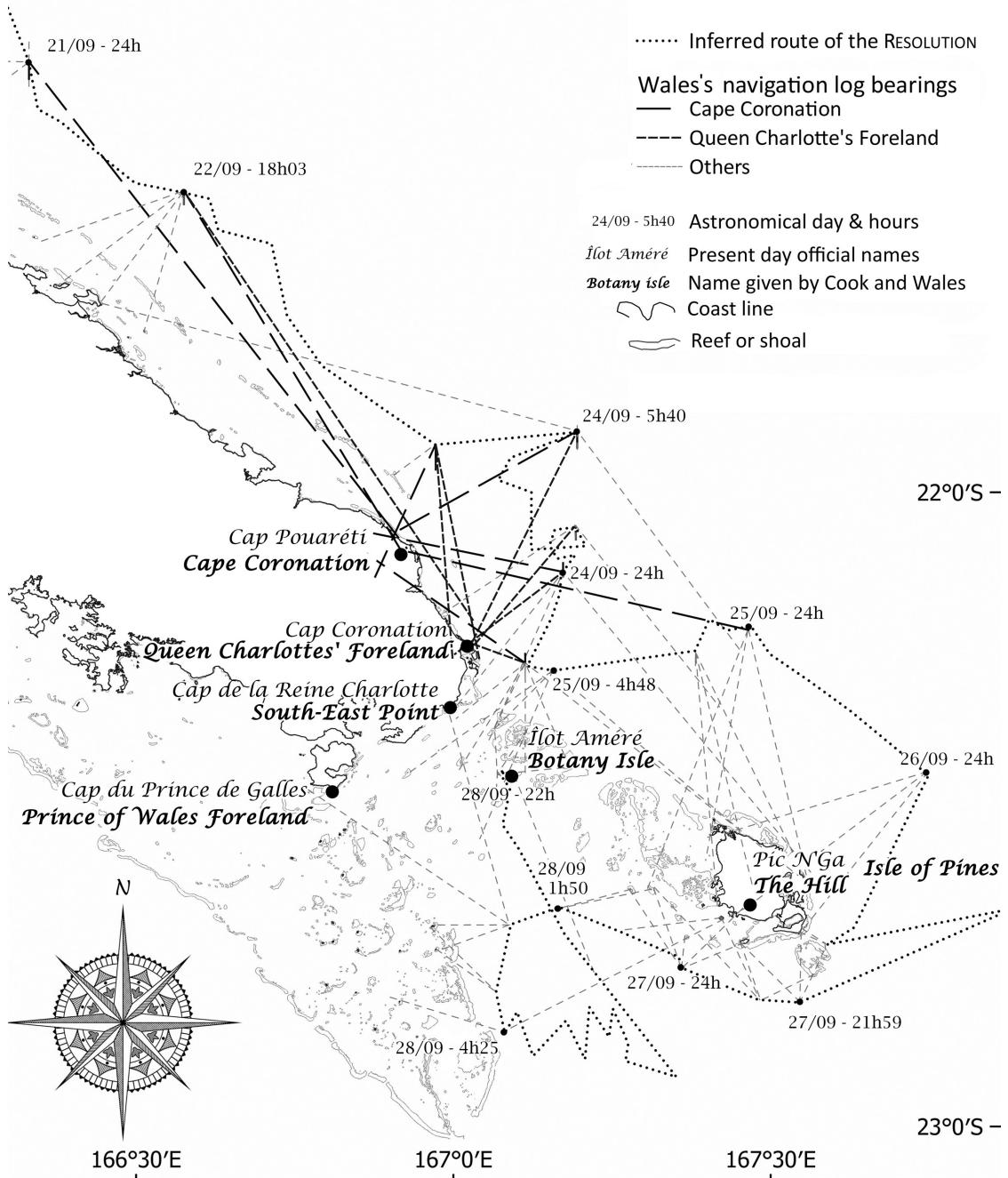


Figure 1: Map of the south of New Caledonia showing Cook's named localities (names in bold) and the H.M.S. *Resolution*'s route (dotted line) following Wales's bearings (dashed line). Present-day locality names from official maps are in normal font. Days and hours are given following the astronomical calendar. Black curved lines represent coast lines, and faded curved lines represent reefs or shoals. Map produced using GEOREP (2020).

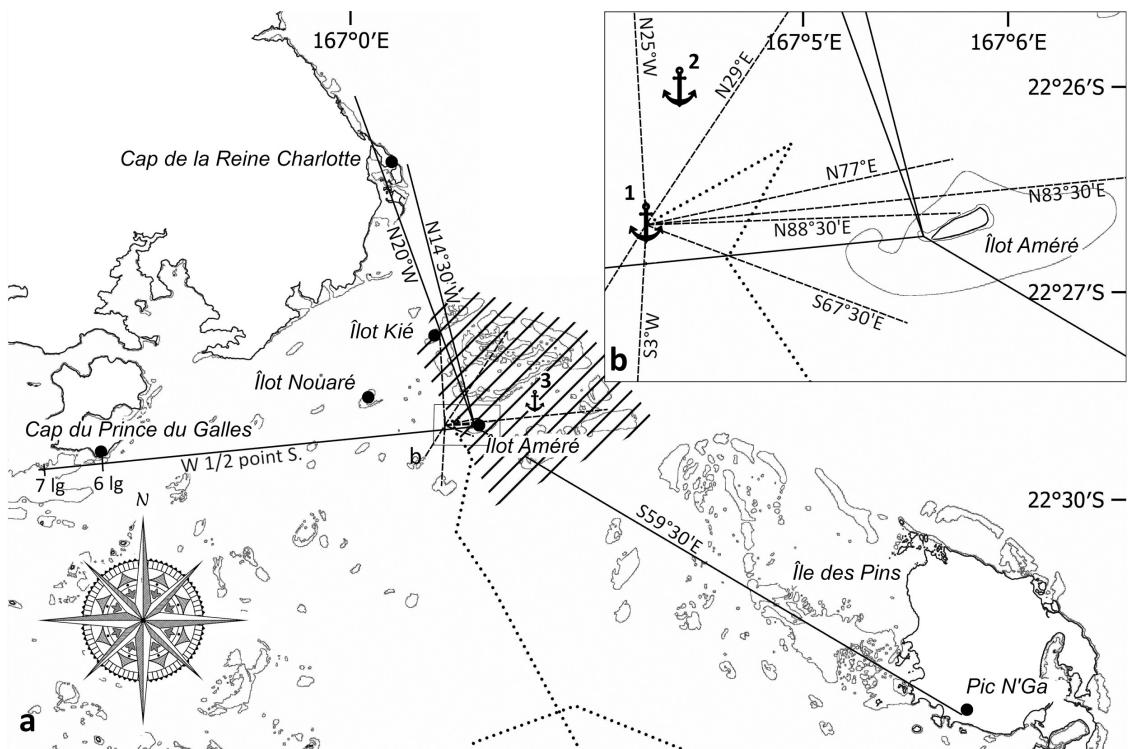


Figure 2: a. Map of the southern tip of New Caledonia's Grande Terre and Isle of Pines; b. Detailed map of îlot Améré and its surrounding reefs. Cook (1772–1775) bearings (plain line) made on Botany Isle, Wales (1772–1775) bearings (dashed line) made from the *Resolution* at anchorage and the putative arrival route to Botany Isle (dotted line). Anchors represent (1) our inferred position of the anchorage, (2) Pisier (1974) and Robson's (2000) inferred position, and (3) Améré anchorage on Bouquet de la Grye (1862) and Cook anchorage on Laporte (1903) maps. Azimuth given are those found in the manuscripts, Ig = leagues. Locality names are the present day French names, with Cap de la Reine Charlotte placed at its correct position following our deductions.

Hatched area represent the Yves Merlet Integral Natural Reserve.

îlot Améré (Figure 3c). It was probably produced around 1860–1870, and presumably abandoned on îlot Améré by Australian sandalwood traders that were active during this period (Shineberg 1967; Guillaumin 1970).

The Botany Isle from the original literature

Under the journal entry for Thursday 29 September 1774, Cook (1779: 139) described Botany Isle with these words: "The little isle upon which we landed, is a mere sand-bank, not exceeding three-fourths of a mile in circuit ("not more than two miles in circuit" acc. Forster 1777). On it were several water-snakes [Elapidae; *Hydrophis (Anguis) platurus* acc. Forster (1777); *Laticauda* sp. [most likely] according to Wales (1772–1775), who reported "snakes with skins ... in rings, alternately black and white..."], some pigeons and doves. One of the officers shot a hawk ... of the very same sort as

our English fishing-hawks". Two hundred and forty-five years after Cook's records, it was possible to make the same observations, as sea-snakes (*Elapidae: Laticauda saintgironsi*) were seen, along with sightings and the frequent calls of fishing-hawks (Western Osprey, *Pandion haliaetus* subsp. *melvillensis*; Figure 3a). However, pigeons were not observed rather, the island was highly populated by breeding *Ardenna* (Wedge-tailed shearwater; Figure 3f), and honeyeaters were also seen (Figure 3d). With regard to human presence, Cook also reported that "Several fire places ... showed that people had lately been on the isle", and "The hull of a canoe ... lay wrecked in the sand". Thus Cook and the Forsters were not the first human beings to set foot on this little piece of land. As a matter of fact, some local Kanak people from Touaourou (Queen Charlotte's Foreland area) went to îlot Améré immediately after

Cook's departure and observed the crew had cut some trees and lit a fire in a manner different to their own (Bouquet de la Grye 1858). The Kounié (inhabitants of Isle of Pines) also used to go to îlot Améré to hunt turtles (Pisier 1969). With regard to botany, Cook's interest while staying on Botany Isle was focused on *Araucaria* trees – the carpenters of the *Resolution* took the opportunity to cut trunks as perfect material for the substitution of spars. However, Cook (1779: 139–140) also wrote the following three sentences: "besides these pines, grew the Etos tree of Otaheite and a variety of other trees, shrubs and plants [...] besides these, there was another tree or shrub of the spruce fir kind, but it was very small [...] We also found on the isle a sort of scurvy-grass, and a plant, called by us Lamb's Quarters, which, when boiled eat like spinach". The *Etos* tree of Otaheite might refer to the common coastal ironwood *Casuarina equisetifolia* L. (Figure 3d). The other tree or shrub reminiscent of a "spruce fir" most probably refers to young heterophyllous *Araucaria columnaris* as no other

Araucaria, or indeed any other gymnosperm, grows on such islets. In English, scurvy-grass usually refers to species of the genus *Cochlearia* L. (Brassicaceae). During our survey, two species of Brassicaceae were found on the islets, *Cakile maritima* Scop. (Kié and Nouaré) and *Lepidium bidentatum* Montin (Améré, Kié and Nouaré); see Table 1 and Figure 3k). The *Lepidium* species is similar in appearance to *Cochlearia officinalis* L. and is most probably the one Cook referred to, but a species of Nyctaginaceae, *Boerhavia acutifolia* (Choisy) J.W.Moore, cannot be ruled out as it might also be confused with *Cochlearia* by a non-botanist. In Europe, the so-called 'Lamb's Quarters spinage' usually refers to *Chenopodium album* L. (Amaranthaceae). During our survey within the islets (Table 1), two taxa of Amaranthaceae were found: *Achyranthes aspera* L. and *Salsola* aff. *australis* R.Br. (usually found and known under the name *Salsola kali* L. in New Caledonia, e.g. Munzinger et al. 2020). However, other indigenous Amaranthaceae species can be seen in such sandy islets in New Caledonia, for

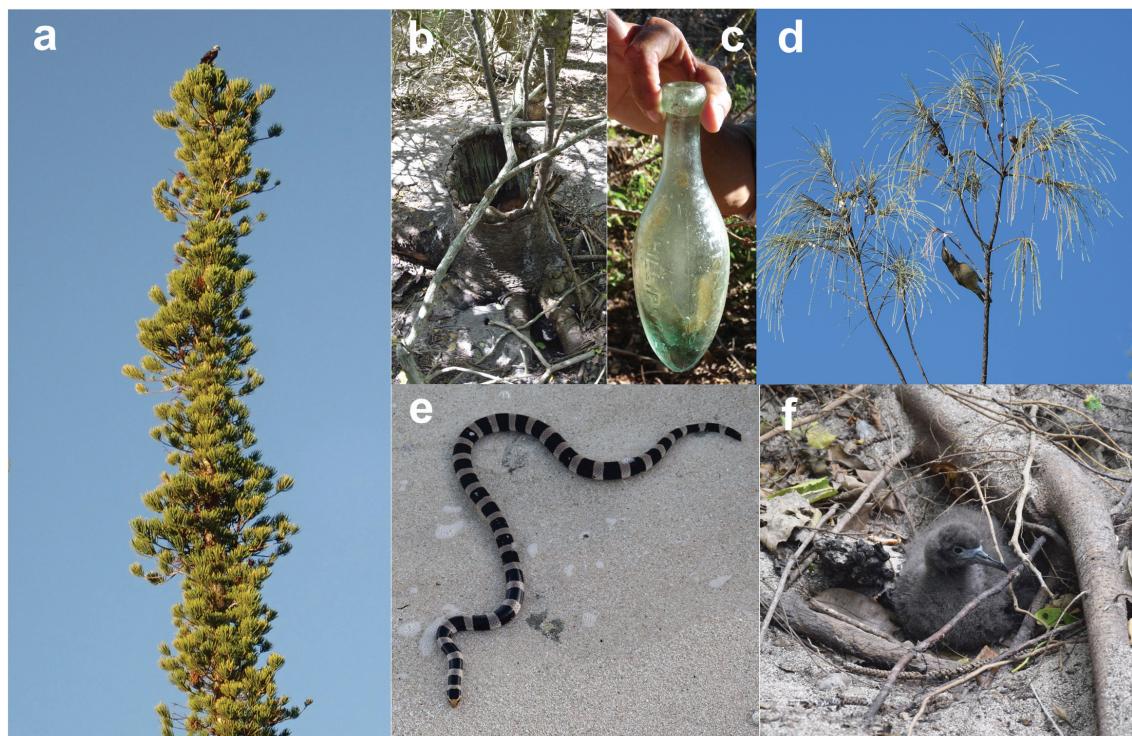


Figure 3: a. Upper third of *Araucaria columnaris* tree with Western Osprey (*Pandion haliaetus* subsp. *melvillensis*) sitting on top; b. *Araucaria columnaris* stump; c. Ancient torpedo glass bottle (manufactured by J. Starkey, Sydney) found on îlot Améré by E. Herlem on 1 April 2019; d. Grey-eared honeyeater (*Lichmera incana* subsp. *incana*) with unusual feeding behaviour on honeydew from mealybug on *Casuarina equisetifolia* (Cook's "Etos tree of Otaheite"); e. Yellow-lipped sea krait (*Laticauda saintgironsi*) coming to the beach; f. Juvenile of Wedge-tailed shearwater (*Ardenna pacifica*) at entrance of its burrow.

example *Atriplex jubata* S.Moore, *Enchytraea tomentosa* R.Br. and, to a lesser extent, *Chenopodium nutans* (R.Br.) S.Fuentes & Borsch, *Salicornia quinqueflora* Bunge ex Ung.-Sternb. and *Suaeda maritima* (L.) Dumort. Other tasty, spinach-like plants found on the three islets are the Aizoaceae species *Tetragonia tetragonoides* (Pall.) Kuntze (Figure 3l) and *Sesuvium portulacastrum* (L.) L. As *Salsola* aff. *australis* is spiny, it is our opinion that the most probable Lamb's Quarters plant *sensu* Cook was indeed *Tetragonia tetragonoides* (confirmed by J.R. and G. Forster and Sparrman texts) and less probably *Atriplex jubata* because the latter was not spotted on the three islets. It is also important to note that the taxonomy and/or the names used for Amaranthaceae in New Caledonia require broad revision in a wider Pacific context as the names cited above might not be the correct ones.

From G. Forster's journal (1777), not much more can be learnt than what was reported in Cook's journal (1772–1775). The most interesting parts dealing with the flora of Botany Island are the following: "The tall trees immediately demanded our first attention, and we found that they belonged to the genus of cypresses [...] A variety of other trees and shrubs grew up between them [...] We saw here also some scurvy-grass, and another plant (*tetragonia*), which we commonly made use of at New Zealand in our soups [...] We met with a variety of plants in the afternoon, which quite surprised us, on such a confined spot [...] Captain Cook gave this little islet the name of Botany Island, because it contained in so small a space a flora of near thirty species, among which we saw several new ones". From Hoare (1982), J.R. Forster's journal reads, "we saw several new plants

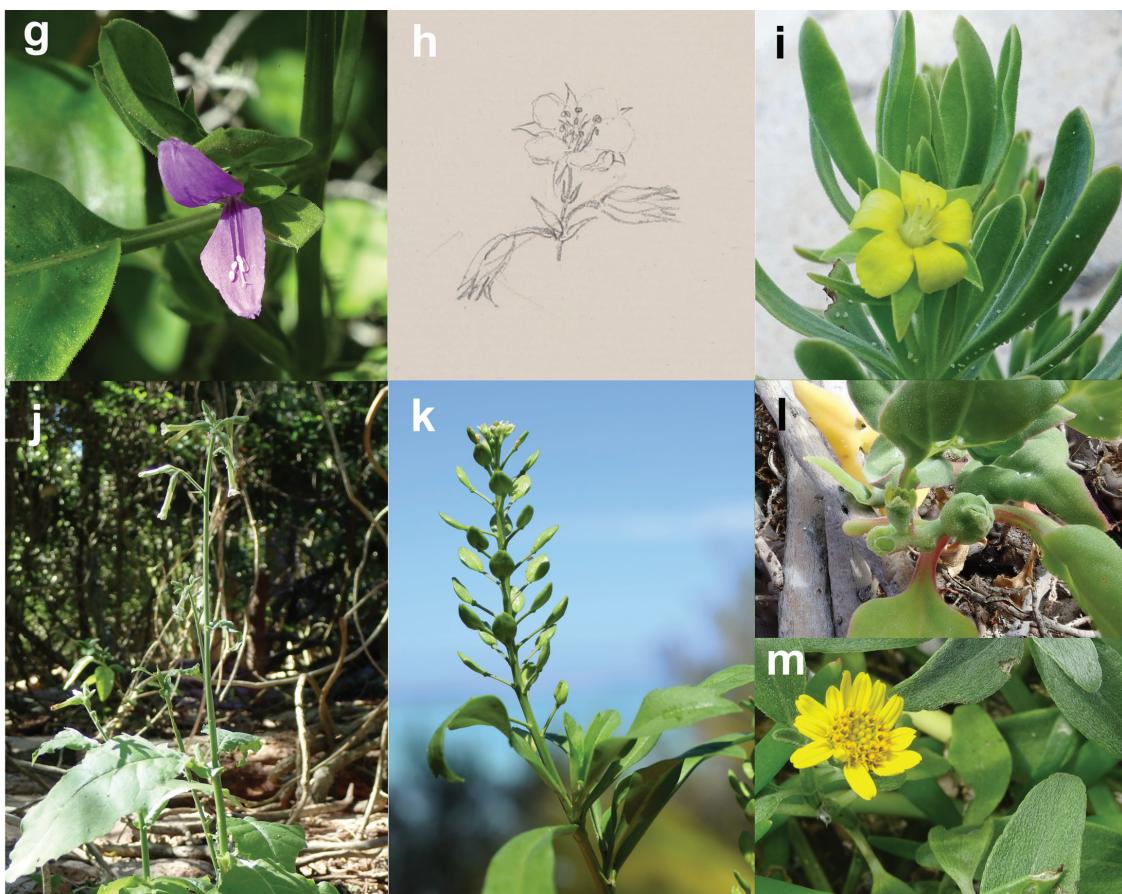


Figure 3 (continued): g. *Dicliptera caerulea*; h. *Suriana maritima* (section of Forster's Skizzenbuch drawing no. 39, s. text); i. *Suriana maritima*; j. *Nicotiana forsteri*; k. *Lepidium bidentatum* (Cook and Forsters' "scurvy-grass"); l. *Tetragonia tetragonoides* ('Lamb's Quarters' *sensu* Cook; eaten as spinach, s. text); m. *Wollastonia biflora*. [a–e, g, j–k: Améré, 1 April 2019; f, i: Kié, 2 April 2019; l, m: Nouaré, 3 April 2019. [Photos: a, j, U. Meve; b, d–f, k, G. Gâteblé; c, C. Geoffray; g, i, l, m, S. Liede-Schumann].

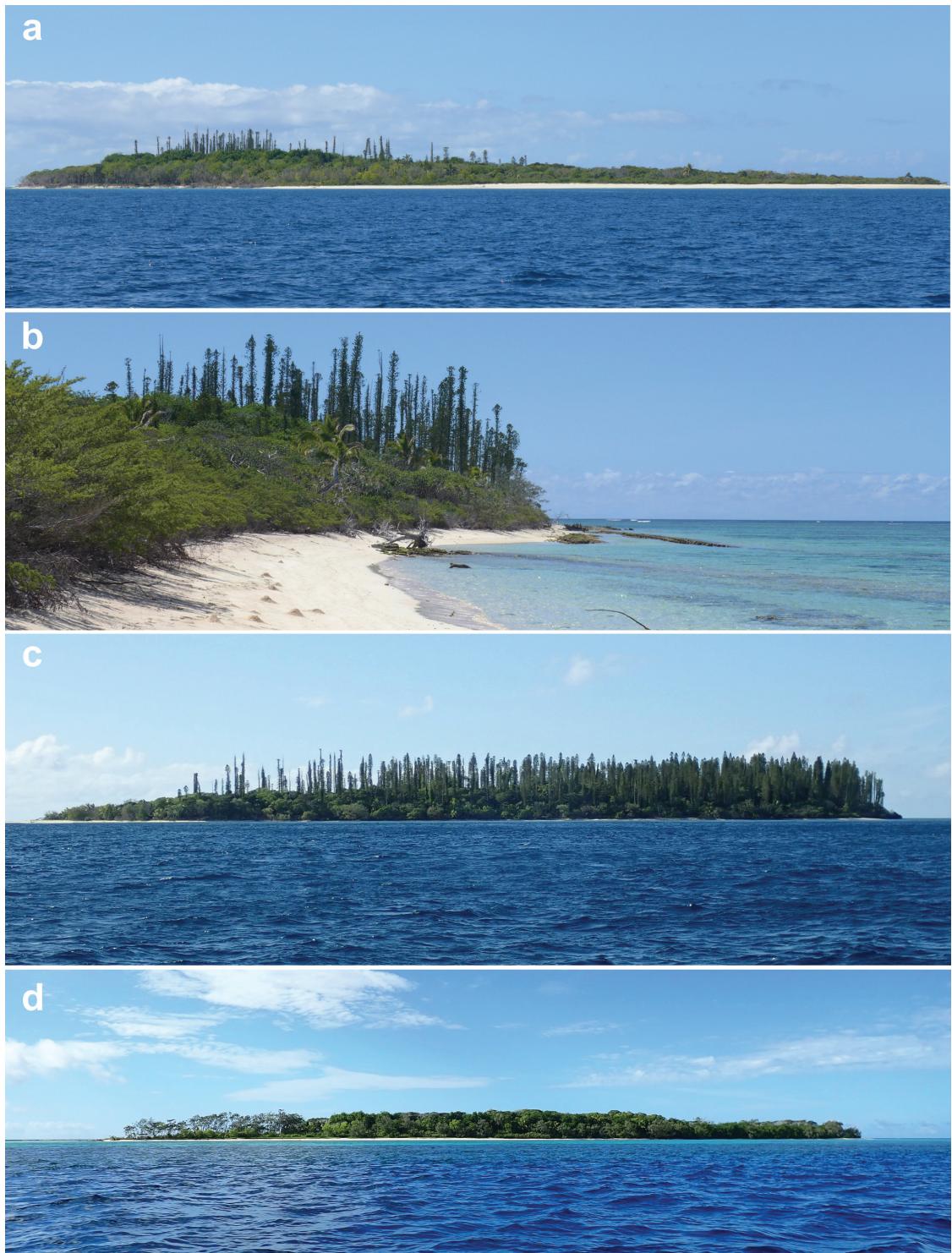


Figure 4. Views of Améré, Kié and Nouaré islets. a. Îlot Améré as seen from the Améré boat looking from the north with few *Araucaria* on its east side; b. Îlot Améré south-eastern beach, view east with the *Araucaria* stand; c. Îlot Kié as seen from the north-west, almost entirely covered with *Araucaria*; d. Îlot Nouaré as seen from the north without any *Araucaria*. [Photos: a-d: U. Meve]

& likewise the *Lepidium piscidium* & *Tetragonia oleracea* [...] & the curious thing was at last found to be the Spruce fir-tree (a *Cypress ratheo* [*Araucaria columnaris*]) of a new kind". Georg Forster (1786a, 1786b) reported ten species as coming from Botany Island as 'Botanices Insula' or 'Botanicesque Insula'; the numbers refer to the ones used in Forster (1786a): *Dicliptera caerulea* (G.Forst.) Schinz & Guillaumin (as *Dianthera caerulea* G.Forst., 14), *Nicotiana forsteri* Roem. & Schult. (as *Nicotiana fruticosa*?, 104), *Cynanchum viminale* subsp. *brunonianum* (Wight & Arn.) Meve & Liede (as *Cynanchum viminale* (L.) L., 127), *Salsola* aff. *australis* R.Br. (as *Salsola kali*, 130), *Haloragis prostrata* J.R.Forst. & G.Forst. (as *H. prostrata*, 179), *Suriana maritima* L. (as *S. maritima*, 199), *Myoporum crassifolium* G.Forst. (as *M. crassifolium*, 240), *Lepidium bidentatum* (as *Lepidium piscidium* G.Forst., 249, 39) *Sesbania coccinea* (L.f.) Poir. (as *Aeschynomene coccinea* L.f., 273) and *Scaevola taccada* (Gaertn.) Roxb. (as *S. sericea* Vahl., 504). Compared with our inventory, the five species of the genera *Dicliptera* Juss., *Lepidium* L., *Nicotiana* L., *Scaevola* L. and *Suriana* Plum. ex L. were observed on îlot Améré in 2019, while *Cynanchum viminale* and *Haloragis prostrata* were observed on Nouaré and Kié islets, respectively, but not on Améré. The three species *Myoporum crassifolium*, *Salsola australis/kali* and *Sesbania coccinea* were not retrieved on any of these islets. The species of *Salsola* L. is a common one on such sandy beaches of islets in New Caledonia and is more or less short-lived and probably prone to vanish after high tide events combined with storms. The date of our inventory (April) differing from the September landing of Cook's crew might also explain its absence. *Myoporum crassifolium* is also a common but long-lived shrub or small tree on rocky (generally limestone) New Caledonian coasts; its absence in 2019 legitimately raises the question whether or not it was really collected from îlot Améré by the Forsters. The fact that a second species of *Myoporum* Banks & Sol. ex G.Forst., *M. tenuifolium* G.Forst., was also collected and described at the same time from New Caledonia (without locality) renders Forster's assertion even more debatable. It is most probably simply based on an error. The last species, *Sesbania coccinea*, is an even more intriguing case as G. Forster presents it both from the French Polynesian Society Islands and from what has been interpreted as Botany Island (as *Societas insulae, Botanicesque insula*) by previous botanists (Smith 1985;

Sachet 1987; Fosberg 1993). In his manuscript, G. Forster used the term *Botanicesque insula* only once, and for this species, and was thus probably not referring to Cook's Botany Isle but to another island from the Society Islands. Further evidence of this misunderstanding is that what we name *Sesbania coccinea* in New Caledonia is a rare plant only found on calcareous cliffs on Lifou and Ouvéa islands, i.e. not matching at all the ecology of sandy îlot Améré (see below for nomenclature and typification issues). Among the further 52 species located and said to be occurring at least in New Caledonia (as *Noua Caledonia* but without a more precisely named locality, e.g. in Balade or Botany Island) according to Forster (1786a), one, *Araucaria columnaris*, was undoubtedly observed on Botany Isle (and even drawn by G. Forster as pl. 54); and five, possibly so, namely: *Pavetta opulina* (G.Forst.) DC. listed as *Coffea opulina* G.Forst., 93; *Dianella adenantha* (G.Forst.) R.J.F.Hend. listed as *Anthericum adenantha* G.Forst., 149; *Ximenia americana* L. listed as *X. elliptica* G.Forst., 162; *Acacia simplex* (Sparrm.) Pedley listed as *Mimosa mangium* G.Forst., 395; *Breynia disticha* J.R.Forst. & G.Forst. listed as *B. disticha*, 400 (see Table 1 for comparison). Other species listed in Forster (1786a) may also have been collected or seen in New Caledonia and/or Botany Island without being mentioned specifically, especially pantropical or widely distributed Pacific taxa like *Sophora tomentosa* L., or the ones tagged as 'Paffim intra tropicos' like *Casuarina equisetifolia*. The complex taxonomic and nomenclatural case of *Wollastonia lifuana* (Hochr.) Fosberg is a good example of this uncertainty (see page 50).

William Wales (Wales 1772–1775; Pisier 1974) harvested a large amount of the 'Lamb's Quarters' plant (Figure 3l) and mentioned the "Etoe tree". On board, they ate a meal composed of the plants gathered on the islet with salted pork. Wales did not eat much because he was afraid to become sick after a long period of abstinence and, indeed, those that ate too much suffered from severe digestive pain ("gripings") (Wales 1772–1775).

Sparrman (in Pisier 1974) reported seeing or possibly collecting about 30 species on Botany Isle. He also reported that an officer who collected and ate a fresh salad of *Tetragonia* L. was made sick, probably because he mixed it with some *Euphorbia* or other plants. Since *Tetragonia tetragonoides* actually grows together with two *Euphorbia* species (*Euphorbia obliqua* Endl. and *E.*

tannensis Biehler, see Table 1) on îlot Améré, Sparrman was probably right.

The botany of Botany Isle from Cook's second voyage specimens

Our intention is to review what is available from herbarium databases, JSTOR Global Plants and specimens mentioned and discussed by previous specialists of Pacific botany and history in order to make a comparison with our 2019 inventory and to cross-check the information retrieved from the literature. Naturally, it was not possible to examine all specimens presumably collected on Botany Isle given the sheer amount of time involved, the high degree of expertise of many families and genera, not to mention the cost of travel to the large number of European herbaria that house Forster's herbarium material (e.g. Nicolson & Fosberg 2004). As recommended by Hansen and Wagner (1998), large and old herbaria should seek out Forsters' specimens and ensure that any information gained is shared with appropriate organisations. More recently, Nicolson and Fosberg (2004) published an almost full account of the botany of the second Cook expedition. Fosberg (1993) explained in detail the difficulties surrounding the correct lectotypification of Forster species because of a) specimen duplicates are not really true duplicates but, rather, syntypes, b) mixed collections occur at species level and/or at locality level, c) some specimens are without any locality, d) on some specimens the locality has been copied from the published account, e) specimens were not individually labelled but only put into cover folders with only one label outside, f) Forster's original labels were sometimes removed and replaced with new labels by subsequent owners of the collection. To exemplify the nomenclatural problems, the species said to be collected or putatively collected on Botany Isle are treated hereafter with a review when needed.

Araucaria columnaris (G.Forst.) Hook. (Araucariaceae) (Figures 3a, b, 4a–c). Nicolson and Fosberg (2004) found five specimens of *Araucaria* from the second Cook voyage. One supposedly collected by Cook himself in BM (BM000649821!) "on a low island in the South Sea in 1774", and four collected by the Forsters; Forster 249 in GOET (GOET012735!) as *Cupressus columnaris* without locality, Forster s.n. in LE (LE00009049!), (Forster) 134 in MW without locality

and Forster s.n. in UPS (UPS V-136104) without locality. Another specimen, the best so far, but not seen by Nicolson and Fosberg (2004), is the one by Anderson in BM (BM000649849!) from 'Isle of Pines' in 1774. De Laubenfels (1972: 106) and Farjon (2005, in herb.) agree about this specimen being the holotype of the species. Nicolson and Fosberg (2004) think that this is unlikely because Anderson refused to share his specimens with J.R. Forster with whom he was angry. Forster (1786a) described *Cupressus columnaris* as being from New Caledonia and Norfolk Island. In describing and combining *Araucaria columnaris*, Hooker (1852) made reference to "*Dombeya columnaris* G.Forst." from Forster (1786a: 67), although it is described as *Cupressus columnaris*. Hooker's (1852) emendavit and combination of *A. columnaris* was based on newly collected material and young cultivated plants sent by Moore during his trip on H.M.S. *Havannah* with Captain Erskine (Moore 1850; Gâteblé 2015: 24–25). Hooker (1852) did not state that he had really seen any original Forster, Cook or Anderson specimens from New Caledonia but he excluded the Norfolk Island text from Forster (1786a). Since some of the Forster specimens seem to be mixed and comprise New Caledonian and Norfolk Island material, and since it is not known on which specimen the name *C. columnaris* is based, further typification work may be needed. Finally, there is also a single colour drawing of *Araucaria columnaris*, Forster's pl. 52, depicted in the reprint of G. Forster's German translation 'Reise um die Welt' (Forster 2007: 496), and in Vorpahl (2018: 431), and housed at the State Library of New South Wales, Sydney, Australia (Vorpahl 2018: 430). The modern printed caption says 'Amérée/Neukaledonien' while the original G. Forster handwritten caption is "Isle of Pines on the Southland of New Caledonia".

Casuarina equisetifolia L. (Casuarinaceae) (Figure 3d). There is no specimen of this species said to be collected on Botany Isle (Nicolson & Fosberg, 2004) but the species is common on îlot Améré (Figure 4b) and could have been collected there. Cook (1777) himself mentioned for Botany Isle the observation of "the Etos tree of Otaheite", which represents *Casuarina* (acc. Beaglehole 1961, as "Etoo"). Most of the Forsters' specimens seem to come from Tahiti (as Otaheite, Otaheiti, Taheitee or Taiti) and/or other Pacific islands (as *Insulis oceanici Pacificis*, *Insulae maris Pacifici intra tropicos*

or *Insulae maris austr. intra tropicos*). G. Forster's artwork (pl. 254; NHM-UK-L-5623-357-M-1!) is labelled in the BM database as from New Caledonia in September 1774, though 'Taheitee' is written on the sheet.

***Cynanchum viminale* subsp. *brunonianum* (Wight & Arn.) Meve & Liede** (Apocynaceae). According to Nicolson and Fosberg (2004; as *Cynanchum viminale*), no specimen has been located anywhere. However, we found a specimen at BM (BM001252105!) from Cook's second voyage collected in New Caledonia without further location detail. Seemann (1865–1873: 161) reported having seen a Cook specimen from New Caledonia and one of Forster's from 'Botanist Island'. During his stay in Balade, Moore (1850) reported a species of "*Sarcostemma*" that could match the *Cynanchum* the Forsters and/or Cook had collected. During our 2019 botanical survey on îlot Améré, the species was not found there, but it was found on nearby Nouaré islet. It is thus difficult to say if this sample was indeed collected on Améré or in Balade. This taxon is widely distributed in New Caledonia, especially in coastal habitats, but so far no formal specimen has been collected in the northeast of Grande Terre (incl. Balade, the first New Caledonian collecting area of the Forsters; Liede-Schumann et al., 2020).

***Dicliptera caerulea* (G.Forst.) Schinz & Guillaumin** (Acanthaceae) (Figure 3g). According to Hansen and Wagner (1998), *Dianthera caerulea* and *Justicia pubescens* Vahl have the same type while the name *Dicliptera pubescens* (Vahl) Juss. is also accepted by POWO (2020). According to Nicolson and Fosberg (2004), there is a label confusion between *Dicliptera clavata* from Society islands and *D. caerulea* from Botany Isle and the correct name to use is *D. caerulea* (see Fosberg 1993 and Nicolson & Fosberg 2004 for a full list of herbarium specimens from the Forsters, synonymy and typification).

***Haloragis prostrata* J.R.Forst. & G.Forst.** (Haloragaceae). See Nicolson and Fosberg (2004) for a full list of herbarium specimens from Anderson, the Forsters and Sparrman with synonymy and typification.

***Lepidium bidentatum* Montin** (Brassicaceae) (Figure 3k). See Nicolson and Fosberg (2004) for a full list of herbarium specimens from the Forsters and Sparrman with synonymy.

***Myoporum crassifolium* G.Forst.** (Scrophulariaceae).

In his Prodromus, Forster (1786a: 44) published four species of *Myoporum*, two from New Zealand (*M. laetum* G.Forst. and *M. pubescens* G.Forst) and two from New Caledonia (*M. crassifolium* and *M. tenuifolium*). According to Nicolson and Fosberg (2004), several specimens identified as "*M. crassifolium*" of Cook's expedition from Anderson, Forsters and Sparrman are available, labelled as from New Caledonia, New Zealand, India or Botany Island. Chinnock (2007) designated the K specimen (K000961360!) from "India" as the lectotype of the name. The name *M. laetum* has also been lectotypified by Chinnock (2007) on the supposedly mixed Forster specimen (K000961364!) said to be collected in New Caledonia and bearing one branch of *M. crassifolium* and three branches of *M. laetum*. Other specimens of the Forsters and Sparrman from New Zealand, South Sea Islands or without locality are available in C, G, K and S (Nicolson & Fosberg 2004). Chinnock (2007) put the name *M. pubescens* under synonymy of *M. laetum* and designated as the lectotype the Forster specimen (UPS V-125556) labelled as Botany Island (fide Nicolson & Fosberg 2004) or Botany Bay (fide Chinnock 2007; Sweden's Virtual Herbarium Database, 2020). The last name, *M. tenuifolium*, was also lectotypified by Chinnock (2007) on a Forster specimen in BM (BM001040912!) from New Caledonia. Other specimens of Anderson, the Forsters and Sparrman are stored under this name and usually labelled as from New Caledonia and sometimes from New Zealand and South Sea Islands (Nicolson & Fosberg 2004). A further G. Forster drawing in BM (pl. 180; NHM-UK-L-5623-251-M-1!) is labelled from New Caledonia on 6 September 1774 and this date matches the Balade locality. From the above discussion and the mixture of specimens and localities for the specimens recorded under the names *M. crassifolium*, *M. laetum* and *M. pubescens*, plus the fact that we did not see any *Myoporum* species on any of the three islets, it is legitimate to ask if a *Myoporum* specimen was collected on Botany Isle at all, or whether the name *M. crassifolium* should be removed from the flora of New Caledonia. In addition, the sandy habitat of îlot Améré does not fit well with the ecology of this *Myoporum* (though it sometimes occurs on sandy islets) in New Caledonia. In contrast, there is a high probability for *M. tenuifolium* having been collected in Balade, New Caledonia.

***Nicotiana forsteri* Roem. & Schult.** (Solanaceae)

(Figure 3j). See Nicolson and Fosberg (2004) for the single herbarium specimen from the Forsters and typification, and Marks (2010) for synonymy. A few individuals of this species were seen on Îlot Améré, only, and not on the other two islets (Table 1).

Salsola aff. australis R.Br. (Amaranthaceae). See Nicolson and Fosberg (2004, as *Salsola kali*) for the two herbarium specimens (GOET 012581!, MW) from the Forsters. The species of *Salsola* usually cited in the literature for New Caledonia is *S. kali* L. but we prefer to assign to it the name *S. aff. australis* before a complete revision of the genus in the region becomes available (see Borger *et al.* 2008; Chinnock 2010; and Mosyakin 2018 for taxonomic discussion of Australian taxa).

Scaevola taccada (Gaertn.) Roxb. (Goodeniaceae). See Nicolson and Fosberg (2004, as *Scaevola sericea*) for a full list of herbarium specimens from Cook and the Forsters with synonymy and typification.

Sesbania coccinea (L.f.) Poir. (Fabaceae). Several of the Forsters' specimens are listed as originating from New Caledonia, Botany Island, New Zealand and Society Islands (Nicolson & Fosberg 2004). According to Nicolson and Fosberg (2004), there is no single specimen that bears only New Caledonia or Botany Island on the labels. One (in S-LINN) is said to be from "Nova Zeelandia", another one (in P) is said to be from "Taiti et Nouvelle-Calédonie" and the last one (in UPS) from "Society Island et Botany Island" Nicolson and Fosberg (2004). It was not possible to find any locality data on the high-resolution scan of the P specimen (P00320361!). The UPS specimen (V-129250) could not be seen online for further verification but is portrayed in Sachet (1987: 19). Another specimen, not cited by Nicolson and Fosberg (2004), is in Munich (M-0233481!). It is said to be from "*Insula arenosa prope Novam Caledoniam*" on a supplementary label not in Forster's handwriting. The type of the name *Aeschynomene coccinea* L.f. is the specimen seen by Linnaeus's son now held in S-LINN (LINN-HS1208-5!), which is cited from New Zealand in Linnaeus's (1782) protologue. The label is most probably not in Forster's handwriting, so this locality is even more dubious, though Merrill (1954b) wrote New Caledonia was the intended (Linnaeus f.?) locality. Fide Sachet (1987) and Butaud (pers. comm. 2020) the holotype does not match Society Islands, or even French Polynesian plants, so the proper locality might rather be

Niue, Tonga or even Vanuatu. As previously stated, the species was not seen during our botanical inventory of the îlot Améré, and the ecology of this sandy island does not fit the calcareous rocks it prefers on Lifou and Ouvéa. Although Fosberg (1993) considered the LINN specimen as "one of the relatively few Forster specimens that may be unequivocally considered holotypes", in our view, the nomenclature and taxonomy of *S. coccinea* need to be revised in light of these new facts. In consequence, the Lifou and Ouvéa taxon might eventually be treated as a species or subspecies of its own.

Sophora tomentosa L. (Fabaceae). Seemann (1865–1873: 66) reported that he saw a specimen of this species collected by Forster on 'Botanists' Island' but nobody has been able to relocate this specimen. *Sophora tomentosa* is a common plant on îlot Améré and on most coastal areas of New Caledonia and it would not be surprising if the Forsters collected a specimen there. It can also be hypothesised that some locality labels were mixed with the ones of *Sesbania coccinea*.

Suriana maritima L. (Surianaceae) (Figure 3h, i). See Nicolson and Fosberg (2004) for a full list of herbarium specimens from Anderson and the Forsters. *Suriana maritima* (Figure 3h) is also under the (presumably two) plants from Botany Isle drawn by G. Forster in Sept. 1774. Two rough but significant pencil sketches are part of Georg Forster's "Skizzenbuch" kept at the Forschungsbibliothek Gotha (Germany); one partial drawing (no. 39) just showing the inflorescence is depicted here (Figure 3h). This sketch is without a caption, but the corresponding no. 21 (showing the habit of a plant) says "*Suriana maritima*, Sandy Isl., New Caledonia, Sept 1774" (cf. also Nicolson 1998).

Wollastonia lifuana (Hochr.) Fosberg (Asteraceae) (Figure 3m). The original Forster specimens of *Bupthalmum helianthoides* G.Forst. (K001065750!) and *Bupthalmum uniflorum* G.Forst. ex Willd. (B-W16422-010!) were also retrieved in order to check if they might not belong to *Wollastonia lifuana*, a common species found on îlot Améré and many other New Caledonian shores. The first specimen belongs to *Wollastonia biflora* (L.) DC., most probably collected at Balade and drawn by G. Forster on the ship after leaving New Caledonia and Botany Island, on its way to Norfolk Island, 06 October 1774 (fide Nicolson 1998; Nicolson & Fosberg 2004; see also Fosberg 1993). An exquisite coloured drawing is

part of Forster's *Skizzenbuch* under no. 70, subtitled as "Anthemis proteus". The second specimen represents the type of *W. uniflora* (Willd.) Orchard and was collected on Norfolk Island. However, there is another Forster specimen in BM (BM000820296!) also said to be collected on "Norfolk Island Oceani Pacifici" that matches *W. lifuana*, a species endemic to New Caledonia and Vanuatu (Wagner & Robinson 2001; Orchard 2013; Edwards *et al.* 2018). Contacted on that matter, Tony Orchard agreed that this specimen belongs to *W. lifuana* and has published a correction for its typification (Orchard 2019). *Wollastonia lifuana* should then be added to the specimens and list of species collected on Botany Isle. Our survey retrieved this species, and none of its congeners on all three islets (Table 1).

The botany of Îlot Améré based on recent specimens at NOU and our 2019 botanical inventory of Améré and nearby Kié and Nouaré islets, compared with the historical data

The vegetation covering these Pacific coral sand islands is typically dominated by some littoral forest in the centre, surrounded by littoral shrubs and beach vegetation (cf. Butaud & Jacq 2015, Figure 4). During our 2019 botanical inventory, 64 species were observed and identified on Améré, 74 on Kié and 59 on Nouaré (Table 1). The 46 specimens from Améré housed at NOU [21 from H.S. MacKee, 1 from J.-F. Cherrier (leg. H.S. MacKee), 1 from T. Sevenet, 7 from B. Suprin and 16 from J.-M. Veillon] represent 30 species to which two more species can be added from Veillon's pers. comm. in 2019 (Table 1). There are eight additional M. Le Corre specimens at NOU from "Réserve Merlet" without data, collected on Améré or Kié, and 3 specimens (2 Suprin, 1 MacKee) from Nouaré islet. In crosschecking our Améré inventory with specimens at NOU, three species (one determined as *Dianella stipitata* Schlittler but most probably *Dianella adenantha*, as well as *Pavetta opulina* and *Spinifex sericeus* R.Br.) were not seen in our 2019 survey (Table 1). The five species recorded during Cook's second voyage and not seen in 2019 were discussed in the previous paragraph. Comparing our data, Forster's (1777) assertion "it contained in so small a space a flora of near thirty species", suggests that they saw fewer than half of the species that grow on Îlot Améré while collecting, and reported a maximum of 15 taxa (Table 1). With 74

species, Îlot Kié (ca 8.5 ha, 520 x 230 m) has the richest flora of the three islets. Îlot Améré is the second most species-rich islet with 64 (+3) taxa for a surface of ca. 5.6 ha (510 x 160 m). Îlot Nouaré (3.5 ha, 510 x 120 m), which is outside of the "Yves Merlet Integral Natural Reserve" has the fewest species, with 59 in total. With regard to the number of species per hectare, Îlot Nouaré is the richest with 16.8 species/ha, Îlot Améré is the second with 11.4 species/ha and Îlot Kié is the third with 8.7 species/ha. This plant diversity, ranging from 59 to 74 species, can be considered high for such small, sandy islets, but it is in fact relatively low compared to rainforests on mainland Grande Terre where, for example, Ibanez *et al.* (2018) found an average of 95 species of plants with a dbh \geq 10 cm in 1 ha plots. The endemism rate is also very low, with only ten taxa (Table 1) considered as endemic for New Caledonia by Munzinger *et al.* (2020). Among the 89 established species recorded (in 50 different families) from at least one islet (2019 inventory, plus three species from specimens at NOU), this makes a relatively low endemism percentage of 11.2 % compared to the average 75.1% for the whole New Caledonian native flora (Munzinger *et al.*, 2020)—but it is much in accordance with the average 11.4% endemism recorded for halophytic vegetation (Morat *et al.*, 2012). The most unusual findings from our inventories are probably the presence of the endemic species of the genera *Ficus* Tourn. ex L., *Ixora* L. and *Parsonsia* R.Br. on the richest island, Kié (Table 1). In addition to the established plant species recorded in Table 1, we were also able to record the presence of naturally dispersed and sea-water buoyant fruits on the beaches of Îlot Améré and Îlot Kié (*Heritiera littoralis* Aiton) and Nouaré [*Barringtonia asiatica* (L.) Kurz].

Retrospectively, it could be asked why more than twice the number of species reported by the *Resolution*'s team was found during our research? It is possible that the time they had on the island was limited. Forster (1778) tells us that they, after rowing to shore, had a brief reconnaissance ("...das Land ein wenig recognoscirt..."), but rowed back to the *Resolution* to have lunch on board. They then returned to the islet to spend the afternoon there until sunset. While botanising they also shot birds. One discrepancy, however, remains: in Hoare (1982:661), J.R. Forster reported: "a small islet, full of such pyramidal things". And G. Forster, during the journey, reported that

the little island was covered in *Araucaria* ("... eine kleine Insel...mit säulenförmigen Bäumen überwachsen ..."). Nowadays, *Araucaria* inhabits only the eastern part of the island, covering probably less than 15% of the island's landmass in all (Figure 4a, b). We also learned that Cook most probably approached the island from the (north)-west, and probably landed on Botany Isle by rowing a boat through the only narrow channel on the north-west, where no *Araucaria* actually grow—contrast this with G. Forster's (1778) statement that they, upon leaving the boat, were immediately attracted by a kind of cypress ("Die schlanken hohen Bäume zogen, gleich beym Aussteigen aus dem Boote, unsre ganze Aufmerksamkeit auf sich"). There are good reasons to believe that deforestation driven by naval interest in the trees occurred on these islets (cf. Gill 1976), as suggested by Cook. In any case, it can only be speculated whether or not *Araucaria* was really more frequent on the island in the past.

From a conservation point of view, and based on our actual inventory (Table 1), it can be stated that very few species are introduced and invasive. The conservation status of these islets therefore seems very good. The worst weedy exotic species on the three islets is *Passiflora suberosa* L. Other species that might be considered as more or less recent human introductions are *Achyranthes aspera* L., *Cocos nucifera* L., *Morinda citrifolia* L., *Rivina humilis* L. and *Stenotaphrum secundatum* (Desv.) C.E.Hubb., but they do not currently pose a threat to the native flora. Nevertheless, *Rivina humilis* can become weedy. The recently introduced myrtle rust *Austropuccinia psidii* (Soewarto *et al.*, 2018) is severely damaging the endemic *Eugenia gacognei* Montrouz., as we saw many trees close to death on the three islets. Ironically, the main threat to the overall vegetation of these islets may be the protected native bird *Ardenna pacifica* (*Puffinus pacificus*; fam. Procellariidae), the wedge-tailed shearwater, which forms large colonies. Neither Cook nor the Forsters reported on these birds or on the burrows they dig, maybe because they landed before their breeding season (November–April) or because there was no colony on Botany Isle 245 years ago. Pandolfi Benoit and Bretagnolle (2002) indeed reported many *Ardenna pacifica* breeding pairs (5,501–12,000 on Améré, 2,001–5,500 on Kié and Nouaré) with high numbers (0.4–0.75 on Améré and Kié, 0.2–0.4 on Nouaré) of breeding pairs/m² (a breeding pair is counted

for each occupied burrow). In most places on Améré and Kié, the sandy substrate is so full of burrows that shrubs and trees are not well rooted and are thus prone to falling down more easily during tropical storms. The trees and shrubs are also suffering from drought and their regeneration is low, probably intensified by the many burrows.

Concluding remarks

Nearly 250 years after Cook's visit to Botany Isle, a number of questions concerning the species and specimens really collected on îlot Améré still remain unanswered. By compiling available literature and specimens, and by comparing these with our 2019 inventory, these questions have been addressed to the extent possible and a review conducted. Some nomenclatural and taxonomic problems were already well known for many of the Forsters' specimens collected during Cook's second voyage, and a few more have been identified. The lectotypification of additional taxa has been avoided owing to too much remaining uncertainty, but it is hoped that this account will encourage specialised taxonomists and nomenclaturists to do so, as already done by Orchard (2019) following our query. Some focused studies using the latest DNA sequencing techniques on extant historical specimens might help to resolve some remaining typification questions.

The localisation of Botany Isle, apparently first synonymised with îlot Améré by Bouquet de la Grye, was confirmed to be accurate. However, as an unexpected result, we found some mistakes in the interpretation of Cook's maps and the localisation of certain named capes.

Botany Isle is home to more than 60 species (our inventory); Forster, Cook and Sparmann each reported about 30 species seen/collected on the islet, but only ten species are documented with herbarium specimens that most likely originated from Botany Isle, and only 13 species were mentioned specifically. Thus, it is possible to conclude that, despite the promising naming of 'Botany Isle'/'Botany Island', neither Cook nor the Forsters found it possible to describe the flora and vegetation of îlot Améré in comprehensive detail, whether through their textual descriptions or their documented material gatherings. It is conceivable that the time they had on the island was limited and that their attention was much drawn to "Cook's pine", *Araucaria columnaris*, surely the

most impressive plant seen by them in New Caledonia.

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Table 1. Vascular plant species recorded from Améré, Kié and Nouaré islets. The numbers refer to the relative abundance of the species: -- = not documented, 1 = rare, 2 = quite common, 3 = very common. Taxon names in bold refer to NC endemics; numbers in bold refer to those species where we prepared specimens and deposit at NOU. **C**, refers to existing historical specimens from Cook's second voyage; **H**, refers to herbarium specimens in NOU; **V**, refers to Veillon's pers. comm. of species seen on 10 December 1981; **T**, refers to Cook's second voyage literature (Cook 1772–1775; Forster 1777; 1786a, 1786b; Pisier 1974; Hoare 1982).

Taxon	2019 Inventory and abundance		NOU Herbarium specimens		Botany Isle specimens and literature
	Améré	Kié	Nouaré	Améré	
<i>Abutilon indicum</i> (L.) Sweet	1	1	--		
<i>Acacia simplex</i> (Sparrm.) Pedley	2	2	2		
<i>Achyranthes aspera</i> L.	2	2	2	H	
<i>Allophylus timoriensis</i> (DC.) Blume	--	1	--		
<i>Alyxia stellata</i> (J.R.Forst. & G.Forst.) Roem. & Schult.	2	2	--	H	
<i>Araucaria columnaris</i> (G.Forst.) Hook.	2	3	--	V	T, C
<i>Asplenium nidus</i> L.	--	2	2		
<i>Boerhavia acutifolia</i> (Choisy) J.W.Moore	2	2	2	H	
<i>Breynia disticha</i> J.R.Forst. & G.Forst.	--	1	--		
<i>Cakile maritima</i> Scop.	--	1	1	H	
<i>Calophyllum inophyllum</i> L.	1	1	--		
<i>Canavalia rosea</i> (Sw.) DC.	2	2	2		
<i>Cassytha filiformis</i> L.	2	2	2		
<i>Casuarina equisetifolia</i> L.	2	2	2		T
<i>Celastrus subspicatus</i> Hook.	--	1	--		
<i>Celtis paniculata</i> (Endl.) Planch.	3	2	2		
<i>Cocos nucifera</i> L.	2	2	2		
<i>Colubrina asiatica</i> (L.) Brongn. var. <i>asiatica</i>	2	2	2	H	

Taxon	2019 Inventory and abundance			NOU Herbarium specimens		Botany Isle specimens and literature
	Améré	Kié	Nouaré	Améré	Nouaré	
<i>Cordia subcordata</i> Lam.	2	2	2	H		
<i>Crinum asiaticum</i> L.	1	--	--			
<i>Cynanchum viminale</i> subsp. <i>brunonianum</i> (Wight & Arn.) Meve & Liede	--	--	1			T, C?
<i>Dianella stipitata</i> Schlittler	--	--	--	H		
<i>Dicliptera caerulea</i> (G.Forst.) Schinz & Guillaumin	1	--	2	H		T, C
<i>Elaeodendron curtipendulum</i> Endl.	3	3	2	H		
<i>Eragrostis scabriiflora</i> Swallen			1			
<i>Eugenia gacognei</i> Montrouz.	3	3	3	H		
<i>Euphorbia obliqua</i> Endl.	2	1	2	H		
<i>Euphorbia tannensis</i> Biehler subsp. <i>tannensis</i>	1	2	2	H		
<i>Excoecaria agallocha</i> L.	--	--	1			
<i>Ficus cf. lifouensis</i> Corner	--	1	--			
<i>Ficus obliqua</i> G.Forst.	2	2	2			
<i>Flagellaria indica</i> L.	--	--	1			
<i>Guettarda speciosa</i> L.	2	3	2			
<i>Guilandina bonduc</i> L.			1	3		
<i>Gymnema tricholepis</i> Schltr.	3	3	3			
<i>Gynochthodes</i> cf. <i>myrtifolia</i> (A.Gray) Razafim. & B.Bremer	1	1	--			
<i>Haloragis prostrata</i> J.R.Forst. & G.Forst.	--	1	--			T, C
<i>Heliotropium arboreum</i> (Blanco) Mabb.	2	2	2			
<i>Hernandia nymphaeifolia</i> (C.Presl) Kubitzki	1	1	2	H		
<i>Hibiscus tiliaceus</i> L.	--	2	2			
<i>Ipomoea pes-caprae</i> (L.) R.Br.	1	1	2			
<i>Ipomoea violacea</i> L.	1	2	2			
<i>Ixora collina</i> (Montrouz.) Beauvis.	--	2	--			
<i>Jasminum didymum</i> G.Forst. subsp. <i>didymum</i>	1	1	--			
<i>Lepidium bidentatum</i> Montin	2	2	2	H		T, C
<i>Lepturus repens</i> (G.Forst.) R.Br.	1	1	1			
<i>Manilkara dissecta</i> (L. f.) Dubard	3	3	3	H		
<i>Meryta denhamii</i> Seem.	--	2	--			
<i>Micromelum minutum</i> (G.Forst.) Wight & Arn.	--	1	--			
<i>Microsorum punctatum</i> Copel.	1	2	2	V		
<i>Mimusops elengi</i> L.	3	3	3	H		
<i>Morinda citrifolia</i> L.	--	1	--			
<i>Murraya crenulata</i> (Turcz.) Oliv.	2	--	--	H		
<i>Myoporum crassifolium</i> G.Forst.	--	--	--			T, C?
<i>Myrsine novocaledonica</i> (Mez) Ricketson & Pipoly subsp. <i>novocaledonica</i>	2	2	--			
<i>Nicotiana forsteri</i> Roem. & Schult.	1	--	--	H		T, C

Taxon	2019 Inventory and abundance		NOU Herbarium specimens		Botany Isle specimens and literature	
	Améré	Kié	Nouaré	Améré		
<i>Ochrosia elliptica</i> Labill.	2	3	2	H		
<i>Opismenus hirtellus</i> (L.) P. Beauv.	1	--	--			
<i>Pandanus tectorius</i> Parkinson ex Du Roi	2	2	2			
<i>Parsonia scabra</i> (Labill.) Markgr.	--	1	1			
<i>Passiflora suberosa</i> L.	3	3	3	H		
<i>Pavetta opulina</i> (G.Forst.) DC.	--	--	--	H		
<i>Pemphis acidula</i> J.R.Forst. & G.Forst.	--	1	2			
<i>Phymatosorus grossus</i> (Langsdorff & Fischer) Brownlie	1	1	--	H		
<i>Pisonia aculeata</i> L.	1	1	--			
<i>Pisonia grandis</i> R.Br.	3	3	3	H		
<i>Planchonella cinerea</i> (Pancher ex Baill.) P.Royen	3	3	3	H	H	
<i>Planchonella linggensis</i> (Burck) Pierre	1	2	1		H	
<i>Premna serratifolia</i> L.	2	3	--			
<i>Rivina humilis</i> L.	3	3	3	H		
<i>Salsola aff. australis</i> R.Br.	--	--	--		T, C?	
<i>Sarcocapnos cf simplicifolia</i> subsp. <i>neoscotica</i> (McGill. & P.S.Green) T.G.Hartley	1	--	--			
<i>Scaevola taccada</i> (Gaertn.) Roxb.	2	2	2		T, C?	
<i>Secamone elliptica</i> R.Br.	--	--	1			
<i>Sesbania coccinea</i> (L.f.) Poir.	--	--	--		T, C?	
<i>Sesuvium portulacastrum</i> (L.) L.	3	3	3	H		
<i>Solanum tetrandrum</i> R.Br.	2		1	H		
<i>Sophora tomentosa</i> L.	2	2	2		C?	
<i>Spinifex sericeus</i> R.Br.	--	--	--	H		
<i>Stenotaphrum micranthum</i> (Desv.) C.E.Hubb.	2	2	1			
<i>Stenotaphrum secundatum</i> (Walter) Kuntze	1	2	2			
<i>Suriana maritima</i> L.	3	3	3	H		
<i>Terminalia rubricarpa</i> Baker f.	1	1	2			
<i>Tetragonia tetragonoides</i> (Pall.) Kuntze	1	1	2	H		
<i>Thespesia populnea</i> (L.) Sol. ex Corréa	1	2	2			
<i>Thuarea involuta</i> (G.Forst.) R.Br. ex Sm.	2	2	2	H		
<i>Triumfetta procumbens</i> G.Forst.	1	2				
<i>Vigna marina</i> (Burm.) Merr.	1	1	2			
<i>Volkameria inermis</i> L.	1	1	2			
<i>Wikstroemia indica</i> (L.) C.A.Mey.	--	2	--			
<i>Wollastonia lifuana</i> (Hochr.) Fosberg	2	2	2	H		
<i>Ximenia americana</i> L.	--	--	1			
Total	64	74	59	32	2	15?