

The Decline of the Redwood *Trochetiopsis erythroxylo* on St Helena

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ABSTRACT

Redwood Trochetiopsis erythroxylo was still a common tree when the English East India Company colonised St Helena in 1659. It was, however, the most important indigenous plant to the settlers as its bark is suitable for tanning leather, and it provided the best timber. Within 50 years it was very scarce but was saved from extinction by being planted in island gardens from the early 18th century onwards. By the end of the 19th century only two wild trees remained even though the pressure of exploitation had by then been removed by the introduction of new timber trees and the importation of timber. It still fails to regenerate in St Helena and only through an exact knowledge of its requirements can vigorous trees be re-established there.

INTRODUCTION

St Helena (Lat. 15° 55' S, Long. 5° 40' W) is an isolated volcanic island in the South Atlantic Ocean. As far as is known its indigenous vascular flora comprised about 50 species, of which 40 were endemic. Several of these endemics are isolated taxonomically and are said to be of great antiquity (e.g. Mabberley, 1975). The oldest dated rocks on the island are ca. 14·5 million years old (Baker, 1973).

Amongst these endemics the genus *Trochetiopsis* is interesting. The genus, of small sterculiaceae trees of great beauty, comprises two

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species, both of which are endemic to St Helena (redwood *T. erythroxylon* (Forst.) Marais, and ebony *T. melanoxylon* (Ait.f.) Marais). It is closely related to the Mascarene genus *Trochetia*, in which it was formerly included (Bentham, 1862; Marais, 1981). Interestingly no closely related species are found in the intervening African continent.

The nature of St Helena's original vegetation at the time of its discovery by the Portuguese in 1502 is a mystery. The extent of the changes wrought by the introduction of feral vertebrates, before the first records were made, is unknown. The early accounts are brief and unreliable.

The remains of the indigenous flora suggest that it originally formed roughly four altitudinal zones:

- (1) ca. 0–ca. 400 m, barren ground with scrubwood *Commidendron rugosum* DC and sparse grass.
- (2) ca. 400–ca. 600 m, drought resistant gumwood *Commidendron robustum* DC woodland.
- (3) ca. 600–ca. 720 m, mesophytic woodland.
- (4) ca. 720–ca. 820 m, tree fern *Dicksonia arborescens* L'Hérit. thicket.

The redwood was a plant of the mesophytic woodland, along with other rare or extinct endemics such as *Senecio redivivus* Mabb. and *Acalypha rubra* Roxb. Occupying probably the best land for plant growth in the island, this conjectured woodland has entirely disappeared and with it many of its constituent endemics. The redwood is extinct in the wild. This paper outlines the events leading to its extinction.

PRE-SETTLEMENT RECORDS (1501–1658)

To the early navigators, St Helena was a gift of Providence for the facilitation of the East India trade (Hakluyt, 1589). In the absence of indigenous fruit trees and game, introductions were made. The plantations (mainly of lemons) established by the Portuguese in certain coastal valleys had little effect on the indigenous vegetation. The introduction of vertebrates, however, certainly did, but the exact extent is not known. By Cavendish's visit in 1588 goats had multiplied exceedingly, pigs and cattle also being present (Hakluyt, 1589, 1600).

Nevertheless, Peter Mundy (visiting in 1634) was able to report that trees were still plentiful at least on the higher ground, despite the

depredations of grazing animals. Of the interior he says: 'aloft in some places faire woods of small Trees with straight stems and broad bushey spreading Topps [redwood?], and in other places of other sorts; fine round smoothe hills with excellent grasse; many thickets of Ferne, etts. runninge water in the bottomes [hollows] etts. and groves of trees' (Temple, 1914). Mundy visited the island again in 1638 and 1656, and his later accounts confirm this general pattern.

No botanical collecting was carried out during this time, but we may suppose that the redwood was not uncommon in the woody interior of the island. Indeed François Pyrard, visiting in 1601 and 1610 (travelling to and returning from the East Indies), notes: 'Sur le haut de la montagne il y a force arbres d'Ebene, et de bois de Rose' (Pyrard, 1679). This 'bois de Rose' is the first and only definite notice of the redwood before the island's settlement.

The picture that emerges, then, 140 years after the island's discovery, is of a still wooded interior, but the woodland has already become fragmented (with perhaps an associated spread of grass) by the massive onslaught of large herbivores. Likewise the scrubby vegetation of the coastal region has become yet more barren.

EARLY SETTLEMENT (1659–1727)

The vicissitudes of a civil war, pirates, and hostilities culminating in Cromwell's Dutch and Spanish wars, led the English East India Company (from 1649) to require its returning East Indiamen to wait for each other at St Helena, and to complete the voyage in company. This gave St Helena a new importance and, lest it should fall into Dutch hands, Cromwell granted the East India Company a charter for its acquisition in 1657. In 1659 Capt. Dutton was commissioned 'to settle, fortifie and plant upon the island of St Helena' (Foster, 1919). The company had to offer various inducements to encourage settlers and the island has never been entirely self-supporting (Gosse, 1938). Provisions were supplied by passing ships for an often scanty return of fresh vegetables and meat. Settlers generally built their houses in the intermediate elevations where they could find soil and moisture for crops. They would journey down to the newly established port of Jamestown to sell or barter their goods.

The scarcity of timber and good land for crops resulted in the almost complete destruction of the indigenous woodland during the East India

Company period (1659–1826). Nevertheless, mention of redwood in the island records (Janisch, 1885) indicates that it was an important but soon uncommon tree.

To quote from the Janisch extracts: ‘May 3 1694 Fort House &c. very much decayed. Timber growing very scarce in the Island—ordered that none of the companies Timber trees [redwood] be sold for private use.’ And on 19 July, 1709 is the complaint: ‘The Redwood and Ebony trees are most of them destroyed by the Tanners that for laziness never took the pains to bark the whole tree but only the bodies.’

On 9 April, 1713 a similar complaint is recorded: ‘as to those trees being barked for tanning leather they . . . [grow] . . . under the Main Ridge called Redwood Trees the best and most proper for building houses of which there’s but very few now the nature of those trees seldom producing young ones although enclosed. . . .’ Again in January, 1718: ‘It being the custom for every one when they kill a beast to tann the hide, such a great quantity of bark was wasted that it was shameful it should be suffered any longer—but now we think there is no need of our order, it will be an end of itself for there are very few cedar trees [redwood] so few that the Governor could not get seeds or seedlings of that sort of wood to plant.’

Finally, on 29 May, 1727 it is recorded: ‘Redwood Trees excellent Timber of good colour and fine scent and much resembles a Red Cedar. Yet it was nearly lost to the island, but about five years ago the Governor got a couple of young plants neither of them above an inch high set them in his garden, took great care of them and now they produce seed in great abundance.’ Redwoods were never to recover their number in the wild but have, from that time on, been continually preserved in island gardens.

Of the indigenous flora only two trees seem to have had usable timber. The gumwood *Commidendron robustum* had a resinous, spongy wood (it made a ‘delightful fire’ Burchell was later to note!) and was thus less esteemed for building than that of the redwood which was hard and durable. This was undoubtedly the wood preferred by the first English settlers in 1659 when they set about building their houses. Indeed they had no other material except stones and gumwood timber. (Gumwood, however, unlike the redwood, regenerated freely from seed when enclosed to prevent goats and pigs from eating the young growth.)

Furthermore the early settlers depended greatly upon the wild cattle left by the Portuguese and those subsequently imported. Of the indigenous trees only the redwood and the ebony seem to have had sufficient tannins in their bark to tan the hides of the slaughtered cattle.

For timber and tanning large quantities must have been felled and it was probably the most important indigenous plant to the settlers.

EARLY SCIENTIFIC INTEREST (1690–1771)

Around 1690, men such as Petiver, Plukenet and Sir Hans Sloane began to encourage travellers to bring back dried plants for their *horti sicci* (Dandy, 1958). As St Helena was by this time a regular port of call on the East India route, several St Helena specimens reached England about this time. A pre-Linnaean description of the redwood is to be found in Plukenet's (1700) *Mantissa*. Sloane later acquired most of Plukenet's specimens, and consequently specimens of redwood are now preserved in the Sloane Herbarium at the British Museum (N.H.)(*BM*) on folio 7 of H.S. 92 and (collected by G. Stonestreet) on folio 23 of H.S. 87.

Natural history, however, was not the primary occupation of these early collectors and they gathered only fragments of conspicuous plants. No notes reached England with the specimens except the vernacular name (Plukenet, 1700). It was not until 1771 that gifted observers were to visit the island as naturalists.

Joseph Banks (later Sir Joseph) sailed with Capt. Cook as naturalist on the *Endeavour* voyage (Hooker, 1896). His assistant on the voyage, Daniel Solander, later planned to prepare an account of the St Helena endemics, but died before the task could be completed. In 1775 when Cook called at St Helena in the *Resolution*, Georg Forster was the naturalist on board. Forster was later the first person to publish a post-Linnaean binomial for the redwood (Forster, 1787). His account of the voyage adds a few details to that of Banks (Forster, 1777).

Banks spent 3 May, 1771 botanising on the highest parts of the island 'where the cabbage trees [ie. *Senecio leucadendron* Benth. et Hook.f., *Senecio redivivus* and *Melanodendron integrifolium* DC.] grow'. He did not find the redwood in this fragment of natural vegetation on the peaks (probably above 750 m), but only at lower altitudes where it may have been planted. Redwood was also absent from the valley bottoms, as these were choked with introduced plants.

The writings of Banks, Solander and Forster give some idea of how far the introduction of alien plants had progressed. The pastures of intermediate elevations were principally composed of *Anthoxanthum odoratum* L. (still an abundant grass on the island) and were overrun by

Ulex europaeus L. (used for fuel which was otherwise very short—N.B.). Solander (MS) gives a list of about 300 introduced plants collected. Many are European or cosmopolitan weeds (eg. *Rumex crispus* L., *Solanum nigrum* L., etc.). Also mentioned is *Rubus pinnatus* Willd., a plant that still grows vigorously on the island and competes with native plants on the central ridge.

As Plukenet had already described the redwood, Solander gave no additional information. However, several ornamental and fruit trees are recorded, but not timber trees. Indeed, attempts to alleviate the timber shortage by introducing suitable trees were late in developing. The first was *Pinus pinea* L., introduced in 1758. *Juniperus bermundiana* L., which now has the vernacular name 'Cedar' in the island (a name once given to the redwood), is a 19th century introduction. Indeed the 18th century alien flora of St Helena was probably quite small when compared with the next century.

With Banks' encouragement (Dawson, 1958) a small botanic garden was established at Jamestown, St Helena (1789), which may have helped several plants from the Cape and from the Indies to become established in the island. Its main function, however, was to facilitate the importation of exotic plants to Britain by breaking the long and injurious sea-journey. Only after the expansion of the Royal Botanic Gardens at Kew in the 19th century did intentional introduction to the island intensify.

Banks himself introduced the redwood to cultivation in England in 1772. Aiton (1789) included it in his *Hortus Kewensis* and it appeared in the second edition (1812) before being lost from cultivation.

BURCHELL TO MELLISS (1805–1875)

The first thorough collection of St Helena plants was made by W. J. Burchell from 1805 to 1810 (McKay, 1934). He arrived just in time to find *Heliotropium pannifolium* Burch. ex Hemsl.—known only from his type specimen. As the destruction of the indigenous vegetation had in large measure been completed prior to his visit, many plants may have become extinct before he arrived. Certainly the redwood was very rare. He records it as growing 'near Diana's Peak' (Burchell MS1) but in his manuscript journal (Burchell MS 2) he only mentions finding one plant in the wild. Some passages in his journal were written in a particularly grand style for sending a copy home to his family, which accounts for the purple prose of

the following extract relating to his first expedition to Diana's Peak on 11 October, 1807. Describing the vicinity of the peak he says: 'In one of these woody glens I was struck with the beauty of a noble large Redwood tree, which rose exultingly above the thicket seemingly vain of its handsome large white flowers which, resolving to grace their tree even when fading, change to a lively pink hue.

'I fancied that this tree seemed proud of my admiration of its beauty and I lamented that its flowers should open and fade unadmired or that *one* even should drop without having been seen'.

So rare and inaccessible were the wild trees that when he wished to make a drawing of the plant he went to a garden tree. As his journal for 31 August, 1809 records: 'Went to Brooke's in the country for the purpose of making a drawing of the Redwood tree of which there are several in his garden now in full flower. And after dining there came home bringing some specimens to finish my drawing'. His beautiful drawing is now in the folio of his *St Helena* drawings at Kew (Burchell MS 3), and the specimen in the Kew herbarium (*K*).

Also in this folio of drawings is a reversed copy of his sketch—the original being in the Johannesburg Public Library (Africana Museum)—entitled *The Great Redwood tree at Longwood*. Judging from the gumwood trees in the background, it is perhaps as much as 8 m high (Fig. 1). This, together with its earlier use as a timber tree, indicates that the species formerly grew to considerable dimensions. Plants existing today are no more than shrubs.

The economic botanist W. Roxburgh spent nearly a year on the island



Fig. 1. A drawing by W. J. Burchell, dated 27.12.1807, of 'The Great Redwood Tree at Longwood'. In the background are gumwood trees *Commidendron robustum*.

(1813–14) to recuperate from illness on his return from India. Despite his poor health he compiled some useful notes on the flora (Beatson, 1816). Of redwood he says: 'Red-wood-tree the vernacular name on *St Helena* where it is indigenous on moderately high hills, where if the soil is suitable, it grows rapidly with a straight *trunk* to be a middling sized tree of great beauty'. This brings out a very important point. Attempts in recent times to establish young plants in *St Helena* have met with complete failure to produce plants with a strongly growing leader.

Melliss (1875) provided the first complete flora of the island and has some interesting comments on the redwood. 'One or two specimens of this beautiful indigenous plant still remain growing amongst the Cabbage-trees, Ferns, and other native plants in the glens near Diana's Peak and High Peak [alt. 760 m]. It is, however, very quickly disappearing and ere long will probably become altogether extinct. Some cultivated specimens exist in gardens as low down as [alt. 410 m]; but altogether not more than seventeen or eighteen plants are now to be found in the island—viz., two at Arnos Vale; one at Oakbank; three or four at Bowers's in Sandy Bay; two at Sam. Alexander's; one at Southens; six or eight young trees at the Hermitage; one at Diana's Peak and one at High Peak'.

DISAPPEARANCE FROM THE WILD (1936–1981)

In 1936 K. E. Toms, then Agriculture and Forestry Officer in *St Helena*, collected a specimen of redwood which is now in the Forest Herbarium in Oxford (OXF). The label notes: 'All the trees which now remain (about two doz.) are in gardens about 2000 ft. (600 m)'.

In 1970 N. R. Kerr visited the island to assess the possibilities of conserving the remaining endemic plants. He reported one wild tree and 'several' in gardens. These included one at Scotland (the Agricultural Station), one at Plantation House (the Governor's Residence) and two fine specimens at Teutonic Hall.

When I visited the island in 1980, only two plants of flowering age remained. The two trees at Teutonic Hall (formerly 2–3 m high) had died during a prolonged drought in 1975. The stumps still remained, one being double-stemmed from the base (diam. 12 cm at base), the other having four stems arising from the base (16 cm diam. at base). The Plantation House specimen was also dead. The specimen at Scotland (alt. 540 m) was flowering and fruiting abundantly (evidently self-compatible). It was 1.1 m high with a 2 m crown spread. The trunk diameter at soil level was

10 cm. Several small seedlings were coming up in the hoed soil beneath the crown. The trunk was covered by a thick lichen growth, which presumably indicates that it is growing extremely slowly.

The other plant of flowering age on the island was planted in about 1957 on an exposed part of the central ridge near High Peak (alt. 680 m). It was 2.5 m high with a crown spread of 2.5 m, and gnarled decumbent limbs. The plant was not flowering when I examined it in November, 1980, and had only a few seed capsules. This may be due to exposure and indeed the leaves and twigs were in constant motion from the strong prevailing wind.

The remaining trees are near the upper and lower altitudinal limits of their growth and their poor performance may be due to exposure and drought respectively. The Scotland plant, however, produces abundant seed and seedlings and recently attempts have been made by Mr R. O. Williams, Mr A. R. Barlow and Ms L. C. Brown of the Agriculture and Forestry Department to establish young plants. This has met with little success; small plants introduced to island gardens either fail to establish or remain small without producing a strongly growing leader.

J. A. Varley, concerned by the extreme rarity of the redwood, became interested in this problem during his visit to the island in 1976. He concluded from the results of soil analysis (Varley, 1980) that the plant was a calcifuge. He suggested that erosion followed the destruction of the indigenous forest cover, and removed the leached topsoil, leaving soils in many places with a pH too high for good growth of redwood.

Two three-year-old plants which I examined at the Clifford Arboretum (680 m) were less than 0.3 m high and lacked leaders. Another three-year-old plant in the garden at Wranghams was only a few centimetres high and showed pronounced inter-veinal chlorosis.

Varley brought seed back to Britain and many of the plants he raised were passed on to Kew and subsequently distributed. In 1981 I examined the one plant of this batch still remaining at Kew, 5 years old and about 2.5 m high—showing strong leader growth. When they had been received at Kew as two-year-old plants they were apparently already ca. 1.5 m high. This is very different from its present performance in St Helena.

CONCLUSION

In conclusion it can be re-emphasised that the redwood became scarce as early as the beginning of the 18th century through human exploitation for

timber and tanning. It failed to regenerate for reasons that are still obscure although the conversion of natural habitats into farmland and the introduction of alien plants undoubtedly contributed. It has only been saved from extinction by cultivation. Interestingly, conservation measures date back to before 1718.

It is now quite extinct as a wild tree, suitable sites being taken up by alien plants and agricultural land. In St Helena young plants fail to establish (although seed and seedlings are produced) and only through an exact knowledge of its requirements can vigorous trees be re-established there. Regeneration failure of redwood was first reported in 1713.

In addition to the redwood, five other endemics have dwindled to populations of less than 10 individuals (besides those already extinct). These are *Psidia rotundifolia* Hook.f., *Commidendron spurium* DC., *Trochetiopsis melanoxylon*, *Nesiota elliptica* Hook.f. and *Wahlenbergia linifolia* (Roxb.) A.DC., with populations of ca. 1, 3, 2, 1 and ca. 5 individuals respectively. Unless action is taken these will soon be extinct.

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REFERENCES

- Aiton, W. (1789). *Hortus Kewensis; or, A Catalogue of the plants cultivated in the Royal Botanic Gardens at Kew*, 1st edn. London, George Nicol.
- Baker, P. E. (1973). Islands of the South Atlantic. In *The ocean basins and margins*, 1, *The South Atlantic*, ed. by A. E. M. Nairn and F. G. Stehli, Chapter 13, 493–553. New York, Plenum Press.

- Beatson, A. (1816). *Tracts relative to the island of St Helena; written during a residence of five years*. London, Bulmer & Co.
- Bentham, G. (1862). Notes on *Malvaceae* and *Sterculiaceae*. *J. Linn. Soc. (Bot.)*, **6**, 97–123.
- Burchell, W. J. (MS. 1). *Flora Insulae Sanctae Helenae* in the Archives Room of the Royal Botanic Gardens, Kew.
- Burchell, W. J. (MS. 2). *St Helena Journal*. Transcript by Professor E. B. Poulton in the library of the Hope Department, University Museum, Oxford.
- Burchell, W. J. (MS. 3). *St Helena*. Folio volume of topographical and botanical sketches in the Library, Royal Botanic Gardens, Kew.
- Dandy, J. E. (1958). *The Sloane Herbarium*. London, British Museum (Natural History).
- Dawson, W. R. (ed.) (1958). *The Banks letters*. London, British Museum (Natural History).
- Forster, G. (1777). *A voyage round the world in HBM Sloop, Resolution, commanded by Capt. James Cook, during the years 1772, 3, 4, and 5*. **2**. London, B. White, J. Robson, P. Elmsly and G. Robinson.
- Forster, G. (1787). *Plantae Atlanticae*. *Comm. Soc. Reg. Sci. Gott.*, **9**, 46–74.
- Foster, W. (1919). The acquisition of St Helena. *English Historical Review*, **34**(135), 281–9.
- Gosse, P. (1938). *St Helena 1502–1938*. London, Cassell.
- Hakluyt, R. (1589). *The Principall Navigations, Voiages and Discoveries of the English nation*, 1st edn. p. 812. Facsimile with an introduction by D. B. Quinn & R. A. Skelton, 1965. Cambridge, University Press.
- Hakluyt, R. (1600). *The principall navigations, voiages, traffiques and discoveries of the English nation*, **3**, 2nd edn. Republished 1927–8 in 10 vols. (Vol. 8, 251–4). London, Dent.
- Hooker, J. D. (ed.) (1896). *Journal of the Right Hon. Sir Joseph Banks during Captain Cook's first voyage on HMS Endeavour*. London, Macmillan.
- Janisch, H. (1885). *Extracts from the St Helena Records*. Jamestown, privately printed.
- Mabberley, D. J. (1975). The pachycaul *Senecio* species of St Helena, 'Cacalia paterna' and 'Cacalia materna'. *Kew Bull.*, **30**, 413–20.
- McKay, H. M. (1934). William John Burchell in St Helena, 1805–1810. *S. Afr. J. Sci.*, **31**, 481–9.
- Marais, W. (1981). *Trochetiopsis* (Sterculiaceae), a new genus from St Helena. *Kew Bull.*, **36**, 645–6.
- Melliss, J. C. (1875). *St Helena*. London, Reeve.
- Plukenet, L. (1700). *Almagesti botanici mantissa plantarum novissime detectarum ultra Millenarium numerum complectens*. London, privately printed.
- Pyrard, F. (1679). *Voyage de F. Pyrard de Laval. Nouvelle édition . . . augmentée . . . par Du Val*. Paris, L. Billaine.
- Solander, D. (MS). *Plantae Insulae Sanctae Helenae*. Manuscript in the Botany Library, British Museum (Natural History).

- Temple, R. C. (1914). *The travels of Peter Mundy 1608–1667*, 2, *Asia 1628–1634*. London, Hakluyt Society.
- Varley, J. A. (1980). Physical and chemical soil factors affecting the growth and cultivation of endemic plants. In *Survival or extinction*, ed. by H. Synge and H. Townsend, 199–205. London, Wiley.