

## New records of pteridophytes from Annobón Island

E. FIGUEIREDO\*, A. GASCOIGNE\*\* and J.P. ROUX\*\*\*

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### ABSTRACT

Eight new records of pteridophytes are listed for the flora of Annobón (Equatorial Guinea). Specimen information is provided for 12 literature-based records in the *Flora de Guinea Ecuatorial*. An account of pteridophyte collecting on the island is provided. Pteridophyte diversity in Annobón is updated to 49 species.

### INTRODUCTION

The pteridophytes of Equatorial Guinea were recently revised for the *Flora de Guinea Ecuatorial* (Velayos *et al.* 2008). In the introduction of that work, 36 species (Velayos *et al.* 2008: xi) are recorded for the island of Annobón (Gulf of Guinea). However, in the text of the Flora, 41 species are recorded as present in Annobón, 23 of these being specimen-based and 18 based on literature citations. These figures differ from our own unpublished data on the pteridophytes of that island. Our data were compiled on our previous research on the pteridophyte flora of the islands in the Gulf of Guinea (Figueiredo 1998, 2000, 2001, 2002; Figueiredo & Gascoigne 2001) and after the second author participated in the Annobón 2000 Expedition when several more collections of these plants were made. A comparison of both data sets revealed additional records and confirmed records that lacked specimen citation (Table 1) in Velayos *et al.* (2008).

### MATERIAL AND METHODS

Two little-known collection sets from Annobón were examined during this work: the collections of Bernard Descouings, kept at the Université de Montpellier (MPU) (examined by the first author) and the Melville/Wrigley collection, kept at the Natural History Museum (BM) in London (examined by the second author). We also had access to an unpublished list of the Melville/Wrigley collections determined by J.A. Crabbe. These collections were not examined by Velayos *et al.* (2008) for the *Flora de Guinea Ecuatorial*.

In this paper we list eight new records for the flora of Annobón and provide specimen information for 12 of 18 literature-based records in Velayos *et al.* (2008), bringing the number of pteridophytes currently known for the island to 49 species (Table 1). The nomenclature follows Roux (2009). Forty collections are cited. The list of new

records and confirmed occurrences is given in alphabetical order. The names of the actual localities (Instituto Geográfico Nacional de España 1982) are given in square brackets. An account of botanical collecting on the island is presented. Herbarium acronyms follow Holmgren & Holmgren (1998).

### COLLECTORS ON ANNOBÓN

The island of Annobón is situated in the Gulf of Guinea,  $\pm$  400 km from Gabon. It has a surface area of only 17 km<sup>2</sup>. Due to the remoteness of the island, it is rarely visited and botanical exploration on Annobón has thus been limited when compared with the other Gulf of Guinea islands (Bioko, Príncipe and São Tomé). Exell (1944) gives an account of the first plant collections made on the island by Andrew B. Curror who visited it some time between 1839 and 1842 but only collected two specimens of flowering plants. Between 1861 and 1864, Richard Burton, then the British Consul in Bioko, collected on the island but again neglected the pteridophytes.

The first collections of ferns were made by the Portuguese explorer Francisco Newton who spent three months on the island from November 1892 to January 1893. Newton was employed as an official collector of the Portuguese government and was the first to collect much of the fauna of Príncipe, São Tomé and Annobón but his botanical collections are of less importance (Sobrinho 1953). Six fern species were collected by Newton: *Adiantum mettenii*, *Asplenium africanum*, *Dicranopteris linearis*, *Microgramma mauritiana*, *Ophioglossum reticulatum* and *Pellaea doniana*. Newton's collections were deposited at the University of Lisbon Herbarium (LISU) and treated by Sobrinho (1953). Newton returned to Annobón later in 1893, but this visit lasted no more than one day and he was unable to make any further collections.

The most important botanical collections were made by Gottfried Wilhelm Johannes Mildbraed who spent over a month on the island from 5 September to 13 October 1911 at the end of the Duke of Mecklenburg's second German Central Africa Expedition. Mildbraed collected 32 pteridophyte species, and made detailed notes on the island's vegetation (Exell 1944). Alston (1944) examined some of Mildbraed's collections.

\* South African National Biodiversity Institute, Private Bag X101, 0001 Pretoria. H.G.W.J. Schweickhardt Herbarium, Department of Botany, University of Pretoria, 0002 Pretoria.

\*\* C.P. 289, São Tomé, São Tomé e Príncipe.

\*\*\* Compton Herbarium, South African National Biodiversity Institute, Private Bag X7, 7735 Claremont, Cape Town.

+ Author for correspondence: email address:

estrelafigueiredo@hotmail.com

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TABLE 1.—List of pteridophytes recorded on Annobón Island

Taxon	Notes
<i>Abrodictyum rigidum</i> (Sw.) Ebihara & Dubuisson	Literature-based
<i>Adiantum mettenii</i> Kuhn	Literature-based
<i>Alsophila manniana</i> (Hook.) R.M.Tryon	Confirmed
<i>Arthropteris orientalis</i> (J.F.Gmel.) Posth.	-
<i>Asplenium africanum</i> Desv.	-
<i>Asplenium anisophyllum</i> Kunze	-
<i>Asplenium annobonense</i> Viane	-
<i>Asplenium nigritianum</i> Hook.	-
<i>Asplenium sandersonii</i> Hook.	-
<i>Asplenium variabile</i> Hook.	New record
<i>Blechnum attenuatum</i> (Sw.) Mett.	Confirmed
<i>Christella dentata</i> (Forssk.) Brownsey & Jermy	-
<i>Cochlidium serrulatum</i> (Sw.) L.E.Bishop	Confirmed
<i>Crepidomanes africanum</i> (H.Christ) Ebihara & Dubuisson	Literature-based
<i>Crepidomanes melanotrichum</i> (Schldl.) J.P.Roux	Confirmed
<i>Crepidomanes mettenii</i> (C.Chr.) Ebihara & Dubuisson	Confirmed
<i>Cyclosorus striatus</i> (Schumach.) Ching	New record
<i>Davallia chaerophylloides</i> (Poir.) Steud.	Confirmed
<i>Dicranopteris linearis</i> (Burm.f.) Underw.	-
<i>Didymoglossum erosum</i> (Willd.) J.P.Roux	Literature-based
<i>Diplazium proliferum</i> (Lam.) Kaulf.	-
<i>Dryopteris aurantiaca</i> J.P.Roux	-
<i>Huperzia ophioglossoides</i> (Lam.) Rothm.	Literature-based
<i>Hymenophyllum hirsutum</i> (L.) Sw.	Confirmed
<i>Hymenophyllum kuhni</i> C.Chr.	-
<i>Lepisorus excavatus</i> (Bory ex Willd.) Ching	-
<i>Loxogramme abyssinica</i> (Baker) M.G.Price	-
<i>Lycopodiella cernua</i> (L.) Pic.Serm.	-
<i>Marattia fraxinea</i> Sm.	-
<i>Microgramma mauritiana</i> (Willd.) Tardieu	-
<i>Microlepia speluncae</i> (L.) T.Moore	New record
<i>Microsorium punctatum</i> (L.) Copel.	Confirmed
<i>Nephrolepis biserrata</i> (Sw.) Schott	-
<i>Nephrolepis undulata</i> (Afzel. ex Sw.) J.Sm.	New record
<i>Oleandra annettii</i> Tardieu	New record
<i>Oleandra distenta</i> Kunze	Confirmed
<i>Ophioglossum reticulatum</i> L.	Confirmed
<i>Pellaea doniana</i> J.Sm. ex Hook.	-
<i>Pityrogramma calomelanos</i> (L.) Link	-
<i>Pneumatopteris oppositifolia</i> (Hook.) Holttum	-
<i>Pneumatopteris venulosa</i> (Kuntze) Holttum	Confirmed
<i>Psilotum nudum</i> (L.) P.Beauv.	-
<i>Pteris linearis</i> Poir.	New record
<i>Pteris togoensis</i> Hieron.	Confirmed
<i>Tectaria camerooniana</i> (Hook.) Alston	New record
<i>Tectaria fernandensis</i> (Baker) C.Chr.	-
<i>Trichomanes crispiforme</i> Alston	Literature-based
<i>Vittaria guineensis</i> Desv.	-
<i>Vittaria owariensis</i> Fée	New record

The British botanist Arthur Wallis Exell only made a visit of a few hours on 15 February 1933. However, Exell's (1944) contribution to our knowledge of the island's flora cannot be underestimated as his *Catalogue of the vascular plants of S. Tomé (with Principe and Annobon)* and his later additions to this work (Exell 1956, 1959; Exell & Rozeira 1958) have remained the most important botanical references on the Gulf of Guinea islands.

In 1956, Rose and Denizot (first names unrecorded) of the Muséum National d'Histoire Naturelle in Paris visited the island as part of a multidisciplinary team on board the research vessel the *Calypso*. It is unfortunate that their results have not been published and we were unable to study their collections for this work.

The most significant biological expedition since that of Mildbraed was made in 1959 by a joint Spanish-British expedition, which included the botanists Thomas Christopher Wrigley and Fenella Ann Melville (later Mrs Wrigley). They stayed on the island from July to August that year (Exell 1963). Although Exell (1963) studied some, but not all, of their spermatophyte specimens, their pteridophyte collections have never been studied until now. These collections are housed in the herbarium of the Natural History Museum, London (BM) but have never been incorporated into the main collection. They were determined in an unpublished list by J.A. Crabbe (1960).

The botanist Bernard Descouings visited Annobón in 1964 and made several collections that are deposited at the Montpellier Herbarium (MPU). He arrived at Annobón by boat, from Pointe Noire, as part of an expedition with several researchers. During his stay on the island, which lasted from 24 February to 3 March 1964, he collected 233 numbers (12730–12963). Fifty-six of these collection numbers are pteridophytes and they were examined by the first author at MPU.

In 1987, a Spanish expedition including the botanist Manuel Fidalgo de Carvalho, financed by Cooperacion Espanhola and led by the Asociacion Amigos de Doñana, visited the island. The specimens collected are kept at Real Jardín Botánico (MA), Madrid.

In October 2000, the second author visited the island for nine days as part of the multidisciplinary Annobón 2000 Expedition constituted of a British, Equatorial Guinean and Spanish team. Botanical collections were made by Crissantos Obama of the Equatorial Guinea National Herbarium and Angus Gascoigne; the pteridophyte specimens of the latter are housed in the Centro de Botánica (LISC) in Lisbon.

## LIST OF TAXA

(+ = new record; ! = confirmed record)

! *Alsophila manniana* (Hook.) R.M.Tryon

ANNOBÓN: s.l., ± 500 m, 03-03-1964, *Descouings 12958* (MPU); towards top of Surcado [Macizo Santa Mina], 1900 ft [579 m], forming a closed community of its own, 02-08-1959, *Wrigley 226* (BM).

Note: this species is apparently limited to the very top of Macizo Santa Mina, the highest peak on the island (695 m), as it was not observed on the second highest, Pico Quioveo (598 m).

+ *Asplenium variabile* Hook.

ANNOBÓN: SW of Crater Lake [Lago A Pot], under forest, on floor, some below other ferns, 1500 ft [457 m], plantlets at tips of some leaves in shade, 29-07-1959, *Melville 198* (BM).

Distribution: Angola, Bioko, Cameroon, Central African Republic, Côte d'Ivoire, DRC, Equatorial Guinea, Gabon, Ghana, Guinea, Kenya, Liberia, Madagascar, Príncipe, São Tomé, Sierra Leone, Sudan, Tanzania, Uganda (Roux 2009).

Note: J.A. Crabbe (1960) described this specimen as belonging to the *Asplenium variabile* complex and noted 'the most decompound example I have seen; possibly warranting new specific rank'.

! *Blechnum attenuatum* (Sw.) Mett.

ANNOBÓN: summit section of Macizo Santa Mina, above 500 m, 03-03-1964, *Descoings 12954* (MPU).

Note: *Wrigley/Melville 268* cited in J.A. Crabbe's list of specimens from the 1959 expedition (Crabbe 1960) is no longer in the same box as the other specimens. A handwritten note on the box states '*Blechnum* removed TCC 10/77', referring to T.C. Chambers. The specimen could also not be found in the Natural History Museum Herbarium's main *Blechnum* collection.

! *Cochlidium serrulatum* (Sw.) L.E. Bishop

ANNOBÓN: summit section of Macizo Santa Mina, above 500 m, 03-03-1964, *Descoings 12963* (MPU); Pico del Centro, (also on top of Surcado), epiphyte on 236, 2050 ft [625 m], small acrosticoid fern, grey-green colour, 05-08-1959, *Wrigley 237* (BM).

Note: Exell (1963) does not cite *Wrigley 236* (on which 237 was an epiphyte) and the present authors have not located the specimen at BM.

! *Crepidomanes melanotrichum* (Schltdl.) J.P. Roux

ANNOBÓN: Monte del Centro, W face, 400–600 m, 27-02-1964, *Descoings 12879b* (MPU).

! *Crepidomanes mettenii* (C. Chr.) Ebihara & Dubuisson

ANNOBÓN: Monte del Centro, W face, 400–600 m, 27-02-1964, *Descoings 12888* (MPU).

+ *Cyclosorus striatus* (Schumach.) Ching

ANNOBÓN: round Crater Lake, marshy ground extending into the water, 885 ft [270 m], *Wrigley 279* (BM).

Distribution: Bioko, Burundi, DRC, Equatorial Guinea, Guinea-Bissau, Liberia, Rwanda, Sierra Leone, Sudan (Roux 2009).

! *Davallia chaerophylloides* (Poir.) Steud.

ANNOBÓN: path from San Antonio del Norte [Palé] to the Crater Lake [Lago A Pot], 100–200 m alt., 25-02-1964, *Descoings 12830* (MPU); near the Crater Lake [Lago A Pot], ± 280 m, epiphyte in woodland, *Exell 896* (BM); on path from Anganchi (S. Pedro) to Cus, 50 m, 22-10-2000, observed from 50–480 m in the Anganchi Valley, very common, *Gascoigne 60* (LISC); NE side of Pico de Fogo, rocky places, just fertile, (rare), 24-07-1959, *Melville 185* (BM).

Note: in the main entry for *Davallia denticulata* (Burm.f.) Underw. (= *D. chaerophylloides*) in Velayos *et al.* (2008: 41) there is only a literature record for Annobón. However, *Gascoigne 60* was listed in the index to collections, referring to this species (Velayos *et al.* 2008: 149).

! *Hymenophyllum hirsutum* (L.) Sw.

ANNOBÓN: Monte del Centro, W face, 400–600 m, 27-02-1964, *Descoings 12879a* (MPU); summit section of Macizo Santa Mina, above 500 m, 03-03-1964, *Descoings 12957b* (MPU).

+ *Microlepia speluncae* (L.) T. Moore

ANNOBÓN: Pico Santiago, W of the Crater Lake [Lago A Pot], 200–320 m, 26-02-1964, *Descoings 12866* (MPU); S shore of Crater Lake [Lago A Pot], under *Elaeis*, 885 ft [270 m], fertile, 2 × pinnate pinnatifid, 31-07-1959, *Wrigley 225* (BM).

Distribution: Angola, Bioko, Botswana, Burundi, Cameroon, Central African Republic, Comoro Is., Congo, Côte d'Ivoire, DRC, Equatorial Guinea, Ethiopia, Gabon, Ghana, Guinea, Kenya, Liberia, Madagascar, Malawi, Mozambique, Namibia, Nigeria, Réunion, Rwanda, São Tomé, Seychelles, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe (Roux 2009).

! *Microsorium punctatum* (L.) Copel.

ANNOBÓN: around San Antonio del Norte [Palé], 24-02-1964, *Descoings 12790* (MPU); path from San Antonio del Norte [Palé] to the Crater Lake [Lago A Pot], 100–200 m, 25-02-1964, *Descoings 12813* (MPU); SW of Crater Lake, on rocks beneath forest and epiphytic on trees, quite commonly, 1500 ft [457 m], more common than [*Melville*] 202 [*Asplenium africanum*], forms communities on rocks and trees, 29-07-1959, *Melville 203* (BM).

Note: although not collected on the Annobón 2000 Expedition, this species was observed as very common at all localities visited, e.g. Anganchi Valley, around Lago A Pot, with the exception of the very highest or driest locations, e.g. slopes of Macizo Santa Mina and Pico Quioveo, and near the town of Palé.

+ *Nephrolepis undulata* (Afzel. ex Sw.) J. Sm.

ANNOBÓN: Pico Santiago, W of the Crater Lake [Lago A Pot], 200–320 m, 26-02-1964, *Descoings 12863* (MPU); Pico de Fogo, under overhanging rocks, 1200 ft [366 m], simply pinnate, runners with small tubers in soil, 24-07-1959, *Wrigley 89* (BM).

Distribution: Angola, Benin, Bioko, Burundi, Cameroon, Cape Verde Is., Central African Republic, Comoro Is., Congo, Chad, Côte d'Ivoire, DRC, Eritrea, Equatorial Guinea, Ethiopia, Gabon, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nigeria, Príncipe, Rwanda, São Tomé, Senegal, Sierra Leone, Socotra, Sudan, Tanzania, Uganda, Zambia, Zimbabwe (Roux 2009).

+ *Oleandra annetii* Tardieu

ANNOBÓN: Pico Santiago, W of the Crater Lake [Lago A Pot], 200–320 m, 26-02-1964, *Descoings 12868* (MPU); Monte del Centro, W face, 400–600 m, 27-02-1964, *Descoings 12900* (MPU); S side of Lago A Pot, 450 m, climbing fern, 25-10-2000, *Gascoigne 78* (LISC).

Distribution: Bioko, Cameroon, Seychelles (Roux 2009).

Note: *Oleandra annetii* was recorded as absent from Annobón, in Velayos *et al.* (2008: 88). However, in the index to collections, *Gascoigne 78* was listed, referring to this species (Velayos *et al.* 2008: 149).

! *Oleandra distenta* Kunze

ANNOBÓN: Pico del Centro, rock face, some crescent-shaped, rhizome blue-green, long trailers hanging from bushes over rock face, leaf stalk jointed, with abrasion layer, 01-08-1959, *Melville 216* (BM).

! *Ophioglossum reticulatum* L.

ANNOBÓN: fields at base of Pico S. Estephania [Pico do Fogo?], 400 m, this species is excessively abundant on the island, *Newton s.n.* (LISU); near Ambo (E), pathside, 100 ft [30 m], very abundant locally but only one locality seen, creeping rhizome when young, 17-07-1959, *Wrigley 47* (BM).

! *Pneumatopteris venulosa* (Kuntze) Holttum

ANNOBÓN: towards Pico Surcado from San Pedro, forest, pinnules tending to overlap the rachis, not often fertile, *Wrigley 231* (BM).

Note: a duplicate of this collection, *Wrigley 231* (K), was cited by Velayos *et al.* (2008: 112) under *Pneumatopteris oppositifolia* (Hook.) Holttum. It is possible that one of these specimens is misdetermined. *P. venulosa* was previously recorded in the literature for Annobón, as referenced by Velayos *et al.* (2008: 112).

+ *Pteris linearis* Poir.

ANNOBÓN: path from San Antonio del Norte [Palé] to the Crater Lake [Lago A Pot], 100–200 m, 25-02-1964, *Descoings 12827* (MPU); Pico Santiago, W of the Crater Lake [Lago A Pot], 200–320 m, 26-02-1964, *Descoings 12859* (MPU); Ambo, near our houses, rocky bed of rivulet with [*Melville*] 136 [*Tectaria camerooniana*], 80 ft [24 m], edges of pinnules form sori, 12-07-1959, *Melville 138* (BM).

Distribution: Bioko, Burundi, Cameroon, Comoro Is., Congo, Côte d'Ivoire, DRC, Equatorial Guinea, Gabon, Ghana, Guinea, Liberia, Madagascar, Mali, Mauritius, Príncipe, Réunion, Rwanda, São Tomé, Sierra Leone, Sudan, Tanzania, Uganda, Zambia, Zimbabwe (Roux 2009).

! *Pteris togoensis* Hieron.

ANNOBÓN: summit section of Macizo Santa Mina, above 500 m, 03-03-1964, *Descoings* 12955, 12956 (MPU); on path from Cus to Aual, next to dry stream bed,  $\pm$  150 m, 23-10-2000, *Gascoigne* 65 (LISC); Monte Santiago, 350 m, 25-10-2000, *Gascoigne* 85 (LISC); rocky outcrop to SSE of Pico do Fogo, rock face, bare, facing west, fertile fern, *Melville* 186 (BM).

+ *Tectaria camerooniana* (Hook.) Alston

ANNOBÓN: Ambo, near our houses, waste ground, 80 ft [24 m], sparsely fertile, much of it up in the forest, 12-07-1959, *Melville* 136 (BM).

Distribution: Bioko, Cameroon, DRC, Equatorial Guinea (Roux 2009).

+ *Vittaria owariensis* Fée

ANNOBÓN: Pico Santiago, W of the Crater Lake [Lago A Pot], 200–320 m, 26-02-1964, *Descoings* 12862 (MPU); Monte del Centro, W face, 400–600 m alt., 27-02-1964, *Descoings* 12897 (MPU).

Distribution: Congo, Gabon, Ghana, Liberia, Nigeria, Príncipe, São Tomé (Roux 2009).

Note: the maximum altitude of Monte Santiago, over which the path to Quioveo passes, is 257 m. This is the first record for Equatorial Guinea. Velayos *et al.* (2008: 123) excluded this species for lack of specimens.

Additionally, the occurrence of the genus *Adiantum* on Annobón can be confirmed. The collection *Newton s.n.* (LISU) was cited in the literature (Sobrinho 1953) as *Adiantum mettenii* Kuhn but Velayos *et al.* (2008) report it as not located at LISU. During the Annobón 2000 Expedition, a species of *Adiantum* was encountered and photographed in the Anganchi Valley at S1°26.368' E5°38.649' at approximately 70 m. The photograph does not show sufficient detail to allow positive identification at species level but confirms the presence of the genus on Annobón.

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