

SOME NOTES ON *NEUROSORIA PTEROIDES* (R.Br.)
Mett.

By W. WALTER WATTS, F.L.S.

With Plates III and IV.

[Read before the Royal Society of N.S. Wales, July 2, 1919.]

UNDER the name, *Acrostichum pteroides*, Robert Brown¹ published a brief description of a noteworthy fern from tropical Queensland, the scientific classification of which has not, to this day, been satisfactorily established. K. Domin² says, of this fern, that it needs to be investigated anew in ample material, seeing that the data regarding the structure of the sorus are contradictory. Pending the finding of such new material, the following notes will, the writer believes, help to elucidate the problem, and, at the same time, place on record the results of earlier research.

At the outset, he begs to acknowledge his indebtedness to the Government Botanist of Queensland, Mr. Cyril T. White, for placing at his disposal the material in the Queensland Herbarium; to Mr. E. E. Pescott, F.L.S., and Mr. C. C. Brittlebank, of the Science Branch of the Victorian Department of Agriculture, to the former for the excellent photograph of the fern (Plate III), and to the latter for the painstaking drawings of the nerve-structure, the sporangia, etc. (Plate IV); and, finally, to Miss Lilian S. Gibbs, F.L.S., of London, who was kind enough to copy out and send to him the whole of the valuable matter published by M. Kuhn,³ in 1869.

¹ "Prodromus," p. 145 (1810).

² "Pteridophyta," p. 147 (1913).

³ "Botanische Zeitung," Vol. xxvii, pp. 437 ff.

Robert Brown's original description of this fern (*loc. cit.*) was as follows:—

“frondibus bipinnatis glabris, pinnulis linearibus margine reflexis.”

This description, slight though it be, accurately enough covers the external characters of the fronds; and the specific name *pteroides*, marks the *Pteris*-like appearance of the pinnules. But, as pointed out by Kuhn (*loc. cit.*), the distinguished author was in error in assigning the plant to the genus *Acrostichum*. The mistake was easily made, seeing that the sporangia, when ripe, apparently cover the whole of the under side of the pinnules; but while, in *Acrostichum*, the sporangia arise from the parenchyma lying between the nerves, in Brown's plant they spring from the nerves themselves.

Desvaux¹ assigned the plant to his genus, *Phorolobus*, a genus related to *Pteris*, but not recognised in Christensen's “Index Filicum.” Hooker² kept it in *Acrostichum* (§*Leptochilus*?). Hooker and Baker,³ say, of Brown's plant, “*Acrostichum pteroides* R. Br., from tropical Australia, has an ebeneous naked stem 1' long, and distant lomarioid fertile pinnæ, the lower ones again sparingly pinnate, but the barren frond is not known.” There is a brief reference, later in the “Synopsis,”⁴ to Kuhn's new genus, *Neurosoria*, “as having the sori confined to the nerves,” but no opinion is expressed regarding the validity of the genus. Moore⁵ conjectured that the plant in question belonged either to *Gymnopteris* or *Cheilanthes*.

Kuhn (*loc. cit.*) reviews these facts, and adds that Mettenius wrote, “in his Mss.,”

“Vidi specimen fertile in herb. Desvauxii. Sori in decursu nervorum evoluti, nec parenchyma nervis interjectum intrantes

¹ Prodrôme, p. 291 (1827). ² Species Fil. V, p. 279.

³ Synopsis Fil., p. 424. ⁴ *Ibid.*, p. 524. ⁵ Index Fil., p. 13 (1857).

ansam præbuerunt, speciem ad huc incomplete notam ab *Acrostichaceis* removere."

Kuhn further states, that he himself had had in his possession an original specimen of Robert Brown's, but that, as in the case of the material in the Herbaria of Hooker and Desvaux, the rhizome was wanting. At that time, he had believed that the plant should be assigned to the genus *Allosorus* [a genus, equally with *Phorolobus* (vide supra), unrecognised in Christensen's "Index."] But more recently he had received for determination a small collection of ferns from Lizard Island, on the north-east coast of tropical Australia [Lizard Island is just above Cooktown], in which numerous specimens of this plant were included; and the result of his examination of the material had been the confirmation of Mettenius' opinion, that the species constituted a new genus.

Seeing that the "Botanische Zeitung" is difficult of access in Australia, Kuhn's description of the new genus (*loc. cit.*) may be advantageously reproduced in full:—

NEUROSORIA Mett. nov. gen.

Rhizoma repens abbreviatum paleis membranaceis lineari-lanceolatis in setam acuminatam cellula terminali globosa oleo repleta terminatis, ferrugineis, mox rigidis infuscatis; fasciculi rhizomatis 3 sphaerici; folia rigide membranacea, multifaria, conformia, sterilia minora, fertilia majora; petiolus basi dense paleis lineari-lanceolatis, minutis obsitus, supra et in costis segmentorum laxè paleaceus; sterilium petiolus 1" – 2" longus, leviter canaliculatus; lamina ovato-lanceolata 1" – 2" longa, bipinnatisecta, nervi infra anadrome supra catadrome disposita; segmenta primaria petiolulata, secundaria sessilia, integerrima, lineari-lanceolata; fertilium petiolus 3" – 7" longus, leviter sulcatus, gracilis cum rhachi ebeneus; lamina 3" – 6" longa, ovato-lanceolata bipinnatisecta; segmenta primæia alterna inferiora pinnatisecta, longe petiolulata petiolulo ad 6''' imposita, 1" – 2" longa, superiora sessilia,

pinnata 1" – 1½" longa; segmenta secundaria ½" – 1" longa, ½ – 1" lata, sessilia, linearia, margine attenuato vix revoluta; costa tenera, proëminens; nervi distantes medio laminæ furcati, apice vix incrassati; sori more *Allosori*, nervorum ramos occupantes, basis ima nervorum sterilis, annulus verticalis incompletus basin sporangii non attingens; paraphyses nullæ; sporæ magnæ, pyramidatae, globosæ.

The main points of this description must be considered in order.

1. The form of the vascular structure of the rhizome will be referred to in connection with the question of the classification of the genus *Neurosoria*.

2. The "conformity" of the sterile and the fertile leaves, the former being simply smaller than the latter, appears to depend entirely upon Kuhn's data, which Bentham¹ quotes, while saying that he had not seen the barren fronds. Bailey² follows Bentham. Personally, the writer has not found a single sterile frond among the specimens he has examined from the Queensland and the Victorian Herbaria. In one case, some very small leaves were, at first, taken to be sterile, but they proved, on closer examination, to be fertile, like the larger ones. Kuhn, however, seems to have seen sterile leaves, and his testimony ("sterilia et fertilia conformia") must be accepted, unless new material should compel a revision of his conclusion.

3. The evidence regarding the leaf-margin is somewhat confusing. Robert Brown's original description was "pinnulis . . . margine reflexis." Bentham's description (*loc. cit.*) is, "a very narrow margin recurved over the young sori." Bailey (*loc. cit.*) says "margin recurved over the sori." But Kuhn, as will be seen above, says "margine attenuato vix revoluta," and later in differentiating *Neuro-*

¹ Flora Austr., vii, p. 780. ² Fern World of Austr., p. 74, (1881).

soria from *Allosorus*, he says, of the former, "margo segmentorum vix revolutus," and, of the latter, "margo segmentorum ultimorum fertilium manifeste revolutus." The contradiction is perhaps more apparent than real. As distinguished from the ferns formerly assigned to *Allosorus* (now included in *Pellaea*, *Cryptogramma*, etc.), in which the indusium-like margin is widely bent back over the sori, the margin of *Neurosoria* may be regarded as, comparatively, "vix revolutus"; but Brown's original description (*vide supra*) cannot be ignored, nor the testimony of Bentham and Bailey. Judging from the material I have seen, the facts are as follows:—

(a) When specimens are dry, the opposite edges of a pinnule bend under to such an extent that, often, they nearly, sometimes quite, touch one another, almost completely hiding the sori. Moreover, when moistened, the pinnules are flattened out with difficulty.

(b) In addition to this bending back of the opposite edges of the pinnules, there is often visible a narrow recurving of the attenuated margin. It does not at all approach the strong, indusium-like, recurved margin of *Pellaea*, but the modified recurved margin is certainly present; and Bentham's "a very narrow margin recurved over the young sori," must be accepted. For the removal of any remaining doubt, it is much to be desired that living plants should be examined.

(c) A point overlooked by Kuhn must be noted. The attenuated margin is crenulated, as will be seen from Plate IV *a, d*; but the crenulations do not exhibit any regularity in structure, nor do they appear to stand in any definite relation to the ends of the nerve-branches.

4. The nerve-structure is of great importance in this fern. First of all, Kuhn's "costa tenera, proëminens" accurately describes one of the striking features of the

pinnules. The main nerve in each pinnule, while not robust (Kuhn's "tenera" may be accepted), projects very distinctly and prominently from the surface of the frond, being in this respect very similar to the costa of *Hypolepis tenuifolia*. The structure of the side-nerves is of much interest. These branch off from the main nerve at a very acute angle, and then ramify dichotomously, the branches curving towards the margin of the pinnule (see Plate IV *a, d*). The nerve-ends are free, and are more or less thickened and dentate. Kuhn's "apice vix incrassati" hardly does justice to the case (see Plate IV *b*).

5. The sorus now demands attention. This is the point at which, in Domin's opinion (*vide supra*), the data are contradictory. The figures drawn by Mr. Brittlebank show the sorus-structure accurately. The sporangia spring from the sides of the upper nerve-branches, and lie more or less on the surface of the lamina. There are no sporangia on the lowest parts of the nerve-branches (*cf.* Kuhn's "basis ima nervorum sterilis"), Plate IV *c* shows also that Kuhn's description of the annulus as "vertical and incomplete, not reaching the base of the sporangium" is quite correct.

We are now in a position to consider the proper place of this interesting plant in Fern-Classification.

1. That it is not an *Achrostichum* is already quite clear.
2. Kuhn associates it closely with the supposed genus *Allosorus*, of which *Cryptogramma crispa* (R.Br.) may be taken as typical. The similarity of the sorus-structure is certainly striking, and raises the question whether the name *Neurosoria*, is sufficiently distinctive; but the nerve-structure is quite different in *Cryptogramma crispa* and *Neurosoria pteroides*, being, in the former, simply pinnate, not dichotomously branched, and the nerve-ends not being free, but joined together submarginally, the lines of junction, as well as the upper nerve-branches bearing sporangia. All

the evidence points to the *Cheilanthineæ* as the section of the *Pterideæ* to which *Neurosoria* belongs, and to *Cheilanthes* and *Hypolepis* as its nearest relations. That is to say, that *Neurosoria* must find a place among the *Cheilanthineæ* with thickened nerve-ends. For, to return once more to a point already touched upon, there can be no longer any doubt as to the nerve-ends of *Neurosoria* being thickened (see Plate IVb); indeed Kuhn himself, while describing the nerve-ends as "vix incrassati," yet, when he comes to the comparison of *Neurosoria* with *Allosorus*, says, of the latter, nerve-ends "non incrassati," and, of the former, nerve-ends "paullulum incrassati."

3. The testimony derivable from the structure of the vascular bundles of the rhizome, while used by Kuhn to distinguish *Neurosoria* from *Allosorus*, with its one horseshoe-shaped fascicle, may perhaps be disregarded for the purposes of this paper. The writer has no specimen of the rhizome of *Neurosoria*, but what he takes to be a structure corresponding to the "fasciculi 3 sphærici" of Kuhn's description of the new genus is found in the rhizome of *Cheilanthes tenuifolia* Sw.

4. A fern that has a striking superficial resemblance to *Neurosoria pteroides*, and might easily be mistaken for it, is Brown's *Cheilanthes caudata*, which Domin (*op. cit.*) makes a subspecies of his amplified and emended *Ch. tenuifolia* (Sw.); but close examination shows this plant to be a true *Cheilanthes* with submarginal confluent sori, and a distinct indusium, though this latter, unlike most spp. of *Cheilanthes*, is practically continuous, as in *Pteris*. It comes from Tropical Queensland, and like *Neurosoria*, is very rare.

As the result of these considerations, the writer ventures to suggest that the following scheme, based partly on that of Diels in the "Pflanzenfamilien," indicates the place of *Neurosoria* in fern classification.

Cheilanthinæ.

Sori occupying the upper ends of the nerves, sometimes laterally confluent, sometimes extending backwards down the upper branches of the nerves; the leaf-margins mostly reflexed and often modified; stipes often black-polished.

i. Leaves uniform.

A. Nerve-ends scarcely thickened.

Pellæa, *Doryopteris*, *Notholæna*, etc.

B. Nerve-ends thickened.

a. Sori on the nerve-ends.

1. More or less laterally confluent: *Cheilanthes*

2. Solitary at the base of a leaf-sinus: *Hypolepis*

b. Sori occupying the whole of the upper nerve-branches:

Neurosoria

ii. Leaves, or segments of leaves dimorphous: *Plagiogyria**Summary of References.*

Acrostichum pteroides R. Br., *Prodromus*, p. 145 (1810); F. v. Mueller, *Fragmenta Phyt.*, v, p. 139 (1866), *Second Census*, p. 234 (1889); Bentham, *Fl. Austr.* vii, p. 780 (1878); Bailey, *Fern World of Australia*, p. 74 (1881), *Synops. Q. Fl.*, p. 723 (1883), *Catal. Q. Pl.*, p. 60 (1890), *Lithograms Q. Ferns*, t. 188 (1892), *Q. Fl.*, p. 1994 (1902).

Phorolobus pteroides Desvaux, *Prodrome*, p. 291 (1827).

Neurosoria pteroides Mettenius—Kuhn, *Bot. Zeit.*, xxvii, pp. 437 ff. (1869); Christensen, *Index Fil.* (1906); Domin, *Pteridophyta*, p. 147 (1913).

EXPLANATION OF PLATES.

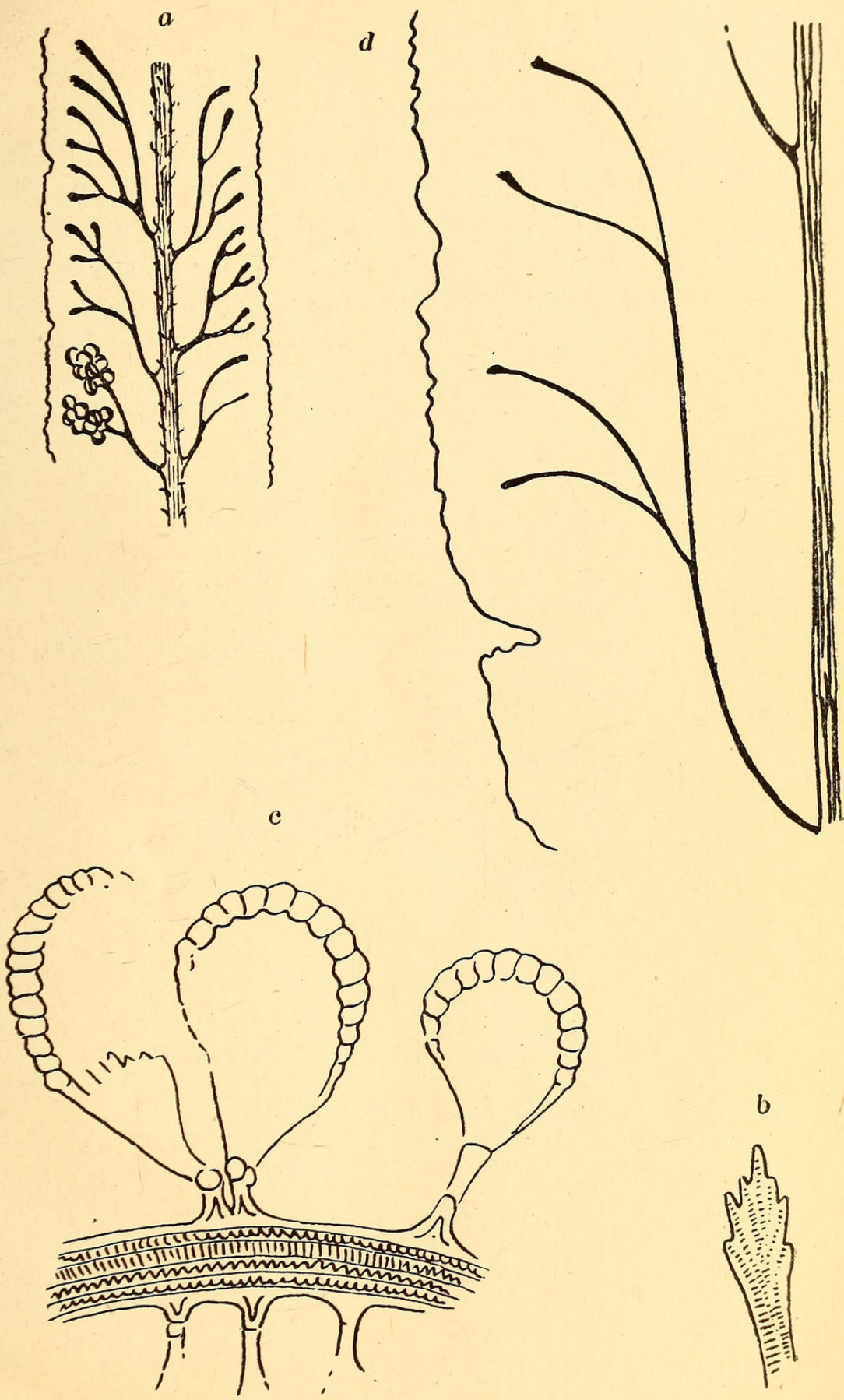
PLATE III.—Photographs by E. E. Pescott, F.L.S.

- a. Complete plant from Queensland Herbarium, natural size.
- b. Two fronds with parts of stipites, natural size.
- c. Rhizome with bases of stipites, natural size.

PLATE IV.—Microscopic drawings, *a* by Miss Phyllis Clarke; *b* to *d* by C. C. Brittlebank.

- a. Section of pinnule (underside).
- b. End of a nerve, magnified cir. 100 times.





- c. Sporangia *in situ* on nerve, magnified cir. 120 times.
- d. Section of lamina showing nerve structure and crenulated margin, magnified.

In addition to the acknowledgements made at the beginning of this paper, the author begs to thank Miss Phyllis Clarke for preparing the figures for the plates, and for drawing fig. "a" (Plate IV) from his rough copy. Unfortunately some cross-markings on the nerve were mistaken by the artist for short hairs; the nerve is quite smooth.

NOTES ON EUCALYPTUS, No. VII.

(WITH DESCRIPTIONS OF FOUR NEW SPECIES.)

By J. H. MAIDEN, I.S.O., F.R.S., F.L.S.

[Read before the Royal Society of N.S. Wales, July 2, 1919.]

Proposed New Species.

- | | |
|-----------------------------------|----------------------------|
| 1. <i>E. transcontinentalis</i> . | 3. <i>E. Hillii</i> . |
| 2. <i>E. Jutsoni</i> . | 4. <i>E. approximans</i> . |

Notes on Described Species.

1. *E. Bakeri* Maiden.
2. *E. Gillii* Maiden, var. *petiolaris* var. nov.
3. *E. macrocarpa* Hook.
4. *E. marginata* Sm., var. *Staerii* Maiden.
5. *E. melanophloia* F.v.M. Heteroblastic and hybrid forms.
6. *E. Morrisii* R. T. Baker.
7. *E. nitens* Maiden.
8. *E. quadrangulata* Deane and Maiden.
9. *E. sepulcralis* F.v.M.
10. *E. Todtiana* F.v.M.



Watts, William Walter. 1919. "Some notes on Neurosoria pteroides (R.Br.) Mett." *Journal and proceedings of the Royal Society of New South Wales* 53, 49–57. <https://doi.org/10.5962/p.359743>.

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