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ON "DICKSONIOPTERIS" NAUMANNI
NATHORST

By

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With 2 Text-figures

(Contribution from the Department of Geology and Mineralogy, Faculty
of Science, Hokkaidô Imperial University, Sapporo; No. 210).

The name *Dicksoniopteris Naumanni* was first proposed by NATHORST⁽¹⁾ for a bipinnate frond from the Ryôseki Series of Haginotani, Koti pref., which he considered from the form and position of the sori to belong to a new genus, *Dicksoniopteris*. NATHORST defined the species as follows:

"Blätter (wenigstens) doppelt gefiedert mit ziemlich senkrecht gegen die Rachis gestellten Fiedern, deren Fiederchen dicht gedrängt lineal und ganzrandig(?) sind. Sori rundlich (einzeln oder mehrere?) am äusseren Rande der Fiederchen."

YOKOYAMA⁽²⁾, in describing some fossil plants of the Ryôseki Series from Kozuke, Kii, Awa, and Tosa in 1894, identified a fructified bipinnate frond from Katazi in the Ryôseki district, Koti pref., with *Dicksoniopteris Naumanni*. The sketch of that specimen shows that round sori are arranged along the intra-margin of each pinnules.

The writer, who had the opportunity of examining the original specimen of *Dicksoniopteris Naumanni* of YOKOYAMA in the Tôkyô Imperial University through the courtesy of Profs. T. KATÔ and T. KOBAYASHI, to whom the best thanks of the writer are due, found that the sori show certain structure not mentioned in YOKOYAMA's paper.

(1) A. G. NATHORST: Beitrage zur Mesozoischen Flora Japans. Denkschr. k. Akad. Wiss. Wien, Math.-naturwiss. Kl., Bd. LVII, 1890, p. 11, Pl. V, fig. 4.

(2) M. YOKOYAMA: Mesozoic Plants from Kozuke, Kii, Awa, and Tosa. Jour. Coll. Sci., Imp. Univ. Tôkyô, Vol. VII, Pt. 3, 1894, p. 214, Pl. XXV, fig. 4.

The specimen⁽¹⁾ (text-fig. 1) is, as YOKOYAMA describes, a slender frond, at least bipinnate, traversed by a thin rachis less than 1 mm. thick with slender pinnae more or less distantly placed, rising oppositely from, and at an angle of 60°–65° to, the rachis. The pin-



Text-fig. 1. The original specimen of *Dicksoniopteris Naumannii* described by Dr. YOKOYAMA from Katazi. $\times 1$. The outline of pinnules is somewhat obscure, but the sporangia are clearly seen as distinct black dots. Some of them show apical annulus.

nules are elongated, finger-like, set closely, obtusely rounded at the apex, and attached to the rachis by the whole base somewhat decurrent downwards. The margin of the pinnules seems to be almost entire. The midnerve is given off from the pinna-axis at an acute angle and then bends outward and persists to the tip of the pinnules forming a wide angle with the pinna-axis. The secondary nerves seem to be simple; however, this feature is very indistinct.

The sori unfortunately are not satisfactorily preserved on account of the coarseness of the matrix on which the specimen is impressed. The majority of them are obliterated. However, in a few cases they show the structure: they are in all probability not intra-marginal, but intra-laminar, 4–5 in number on each side of midnerve, round, ca. 0.7 mm. in diameter and made up of a central circular area, from which radiates about 14 fine straight lines nearly in equal length which divide the surrounding area into an equal number of narrow loculi. A similar structure is seen also in other soral impressions. Therefore, it is perhaps beyond doubt that all such round soral impressions in this specimen show a similar structure.

According to the writer's view the structure represents a single sporangium and not a group of sporangia. This view may be

(1) The observation of the specimen was made under a binocular microscope after moistening the specimen with a solution of zinc sulphocarbolate in weak glycerine which brings out several features otherwise indistinct; also the cedar-wood oil was used for this purpose.

strengthened by the fact that such a structure is very suggestive of an annulus of sporangium of schizaeaceous ferns rather than a group of sporangia forming a circular sorus as can be seen in the sori of the marattiaceous and some certain other ferns.

Thus, the writer considers that the central circular area and the surrounding divergent narrow linear loculi represent the distal face and the cells of an apical annulus of a sporangium, respectively, as are characteristic to the ferns of Schizaeaceae. As to the question why the sporangia, if they were truly solitary, do not show any other than the apical part, the writer can herewith make answer that they might have been very flat. Accordingly only the apical part is impressed on the specimen now at hand.

A similar case may be met with in the solitary sporangia of *Naktongia*⁽¹⁾, a genus recently established by the writer for a fern described by Prof. YABE⁽²⁾ from the Naktong Series of Korea as *Sphenopteris* sp. In the structure of sporangia, *Naktongia* resembles very closely those of the present specimen, though in the former the central circular area, that is the distal face, is somewhat smaller than in the latter.

In respect to the habit of the sterile frond and also in the structure of sporangia the present specimen must be compared with *Klukia Raciborski* which with little doubt referable to the Schizaeaceae. The latter presents a fructification borne on a pectopteroid frond and 3-4 solitary sporangia with an apical annulus arranged on each side of the midnerve of a pinnule. Thus a question arises as to the position of sporangia on the pinnules. RACIBORSKI's figure of *Klukia* shows that they are not always close to the margin, and this is also the case in the earliest known fossil Schizaeaceae, *Senftenbergia elegans* CORDA. On the contrary, YOKOYAMA, in describing *Dicksoniopteris Naumannii*, wrote that the sori are marginal and also from the illustration of the specimen they appear to be so. The examination of YOKOYAMA's specimen by the writer, however, shows that they seem to be rather close to the margin.

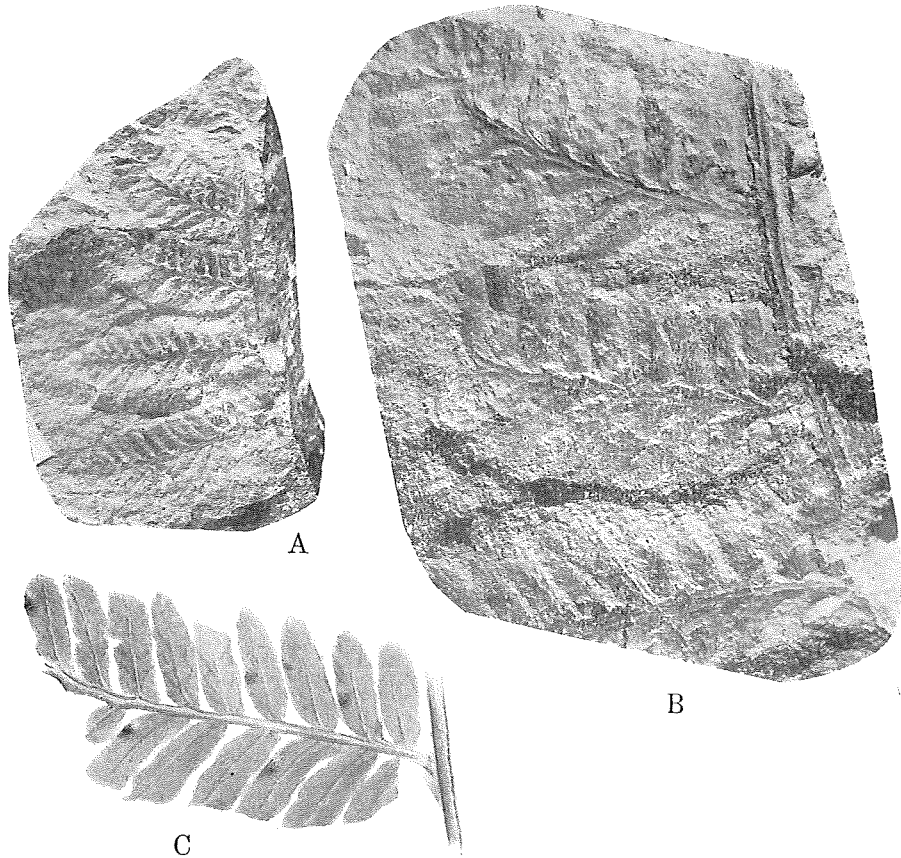
If the difference in the position of sporangia should thus really exist, the difference may be of generic value. However the margin of the pinnules itself in YOKOYAMA's specimen is somewhat imperfect-

(1) S. OISHI: Notes on Some Fossil Ferns from the Naktong Series of Korea. This number of this Journal, p. 305.

(2) H. YABE: Mesozoic Plants from Korea. Journ. Coll. Sci., Imp. Univ. Tôkyô, Vol. XX, Art. 8, 1905, p. 38, Pl. I, fig. 15.

ly impressed and thus the present writer can not make any definite statement on this point. The best way, therefore is, for the time being, to refer the present specimen to the genus *Klukia* with which the habit of the frond, especially the shape of pinnules, is similar.

Now, there is another question whether the specimen referred by YOKOYAMA to NATHORST's *Dicksoniopteris Naumannii* is certainly specifically identical with the type-specimen. If the two specimens were specifically identical, then the generic name *Klukia* should be



Text-fig. 2. The type-specimen of *Dicksoniopteris Naumannii* described by Dr. NATHORST from Haginotani. The photographs and sketch were prepared by HALLE in Stockholm and sent to the writer. A, $\times 1$; B, a part of A, $\times 3$; C, a sketch of a part of A showing soral impressions, $\times 3$. As to the sketch in C, Dr. HALLE kindly wrote the writer that "the drawing, too, is of little value because what can be seen very much depends on subjective interpretation or imagination."

substituted for *Dicksoniopteris*, a genus founded on an unsatisfactory basis.

Through the courtesy of Dr. T. G. HALLE in Stockholm, to whom the sincere thanks of the writer are due, photographs of the type-specimen of NATHORST's *Dicksoniopteris Naumanni* in addition to enlarged photographs and sketches could be obtained. Dr. HALLE kindly wrote his own observation of the specimen saying "Margin and venation are indistinct. Small markings which probably represent sori occur singly at the margin, but they are very indistinct and no details can be made out. . . . In my opinion the specimen is too indistinct to serve as a type-specimen. If you have better preserved specimens which you are thinking of identifying with it, I would in your place make a new species of them and regard *Dicksoniopteris Naumanni* as an obscure species with which better preserved material ought not to be identified." Some of the photographs of NATHORST's type-specimen kindly prepared by Dr. HALLE are shown in text-fig. 2, through the permission of Dr. HALLE.

If *Dicksoniopteris Naumanni* NATHORST was thus an obscure species, then YOKOYAMA's specimen which, though superficially reminding one of the illustration of *Dicksoniopteris Naumanni*, shows a sporangial structure suggestive of Schizaeaceae ought not, as Dr. HALLE kindly suggested, to be identified with *D. Naumanni* of NATHORST.

Such being the case, the writer proposes to give a new specific name, *Yokoyamae*, to YOKOYAMA's *Dicksoniopteris Naumanni* and to call it provisionally *Klukia Yokoyamae* nov. nom.

Klukia Yokoyamae differs from *K. exilis* in having larger and elongated pinnules.

A fertile specimen figured by HEER⁽¹⁾ from Amurland under the name *Dicksonia Saportana* represents a type very close to the present species.

Occurrence: Katazi and Isiseki, Koti pref. Ryôseki Series.

(1) O. HEER: Beitrage zur Juraflora Ostsibiriens und des Amurlandes. Mém. l'Acad. Imp. d. Sci. d. St.-Petersbourg, Ser. VII, Tom. XXII, No. 12, 1876, p. 89, Pl. XVIII, fig. 1