

SOME SPORES AND POLLEN GRAINS FROM THE TERTIARY BROWNCOAL OF NEYVELI

F. THIERGART & U. FRANTZ

INTRODUCTION

THIS paper is to be a preliminary information about spores and pollen grains that are preserved in Indian Tertiary deposits of browncoal at Neyveli, 148 miles SSW of Madras and 35 miles west of Cuddalore at the Madras coast. The material for the examination was kindly supplied by Dipl. Ing. W. Riedel of the Pintsch — Bamag A. G.

It is a rather damp and soft "dead-coal". The sample comes from a brown coal deposit of about 1625 square miles at Neyveli. The layer is about 11 yards thick. The sample mentioned above was found in a vertical pit hewn out by miners.

METHOD

A small part of the sample was at first poured over with a nitric acid; after the beginning of the reaction the acid was thinned with the same amount of water and was left alone for about one week. Afterwards it was decanted and then alkali was added until the reaction set in. As the residue which had been passed through a fine sieve, still contained a small amount of fine sand, a treatment with hydrofluoric acid was necessary after the washing out of the alkali. After that, alkali was added again, "centrifugated" and washed out with water. The residue which was left over was mounted in glycerine jelly.

RESULTS

After examination of a single sample which can only give us an incomplete survey, the following may be stated about the composition of the coal.

The picture is dominated by the amount of tricolporate pollen grains of different size and forms. They belong — as shown by the photo too — to entirely different families, but "Araliaceae" as well as "Quercoid" — types might prevail besides the rather strong group of the small — 10 μ in size — "quis-

qualis" forms which have lately been regarded as belonging to the Leguminosae. Different spores of ferns which probably belong to Schizaeaceae, Polypodiaceae or Hymenophyllaceae are contained in the coal.

A mentionable percentage is represented by pollen grains of the Olacaceae. Spores and pollen grains are in a good state. This brown coal might date from the Miocene era.

DESCRIPTION OF MICROFOSSILS

SPORES OF PTERIDOPHYTA

Cuddaloria polyaperturata n.g., n.sp.

Organgattung: *Polypodiaceae*

Figs. 1, 2 (two focused levels)

Holotypus — Figs. 1, 2

Locus typicus — Neyveli.

Stratum typicum — Tertiary.

Spores 50 μ in lateral view, monolete scar extending for about three-quarters of the length of the longest equatorial diameter. Exospore ca. 2 μ thick, reticulate, small apertures ca. 1 μ in the diameter in panporate arrangement. Figs. 1 and 2 shows the spore in two focused levels.

Neyvelia riedeli n.g., n.sp.

Organgattung: *Schizaeaceae*

Fig. 8

Holotypus — Fig. 8.

Locus typicus — Neyveli.

Stratum typicum — Tertiary.

Spore bilateral, monolete. Type in lateral view 45 μ . Exospore striated. The striates seem to run parallel, therefore, we state a new "Gattung". A similar spore was published by Thiergart (1940) as belonging to the Schizaeaceae (*Sporites dorogensis* Thierg.). This type of spores belong to the family of Schizaeaceae but not to the Gattung: Schizaea.

***Polypodiaceasporites* (Thierg.) haardti**

Fig. 3

Spore 40 μ , monolete, bilateral, without perispore, probably belonging to the Polypodiaceae.

***Pastoria schizoneura* n.g., n.sp.**

Organgattung : *Schizaeaceae* or
Hymenophyllaceae

Figs. 5, 6, 7

Holotypus — Figs. 5, 6 (two foc. lev.)

Locus typicus — Neyveli.

Stratum typicum — Tertiary.

Spores trilete, global, about 40 μ in diameter, lists bordering the tetrad — scar prominent, not reaching the periphery. Sexine striato-reticulate. Perhaps these spores may be associated to the Schizaeaceae or Hymenophyllaceae.

ANGIOSPERMS***Riedelia simplex* n.g., n.sp.**

Organgattung : *Gymnospermae* (*Ginkgo-group*)
or *Palmae*

Fig. 4

Holotypus — Fig. 4.

Locus typicus — Neyveli.

Stratum typicum — Tertiary.

Pollen grain 1 — sulcate, polar diameter 25 μ .

We suppose that this type of pollen grain may be associated to the *Gymnospermae* of the *Ginkgo-group* or to *Palmae*.

DICOTYLEDONAE***Trioculata riedeli* n.g., n.sp.**

Organgattung : *Olacaceae*

Figs. 9, 10, 11, 12

Holotypus — Fig. 9.

Locus typicus — Neyveli.

Stratum typicum — Tertiary.

Grains rounded triangular, oblate, 3-diploforate. Exine reticulate. Equatorial diameter about 35 μ , foramina subequatorial. Affinity to the *Olacaceae*.

***Humboldtia neyvelii* n.g., n.sp.**

Organgattung : *Araliaceae*

Figs. 13, 14

Holotypus — Fig. 13.

Paratypus — Fig. 14.

Locus typicus — Neyveli.

Stratum typicum — Tertiary.

Pollen grains tricolporate, polar diameter about 35-40 μ . Those pollen grains are in German Tertiary deposits recorded as : *Tricolporopollenites edmundi* R. Pot.

***Triporocolpotus indicus* n.g., n.sp.**

Organgattung : *Dicotyledonae*

Figs. 15, 19, 20, 21, 22, 23, 26, 32

Pollen grains tricolpate or tricolporoidate, 10-40 μ . Exine \pm thick in various qualities. It is rather difficult to determine these grains exactly, but an affinity to the *Cupuliferae* may be mentioned.

***Lucknowia sahnii* n.g., n.sp.**

Organgattung : *Nyssaceae*

Figs. 16, 17, 18, 24, 25, 27

Pollen grains 3-colporoidate. Affinity to *Nyssaceae* seems to be probable.

***Erinaceus neyvelii* n.g., n.sp.**

Organgattung : *Aquifoliaceae*

Figs. 28, 29

Holotypus — Figs. 28, 29 (two foc. lev.)

Locus typicus — Neyveli.

Stratum typicum — Tertiary.

Pollen grains 3-colporoidate, spheroidal-prolate. Exine supplied with conspicuous warts.

***Hexaradiatus indicus* n.g., n.sp.**

Organgattung : *Labiatae* ?

Fig. 30

Holotypus — Fig. 30.

Locus typicus — Neyveli

Stratum typicum — Tertiary.

Pollen grain 6-colpate, sexine reticulate. Association to *Labiatae*? By Thiergart a similar type of pollen grain was published 1940.

***Triorites* (Cookson) *indica* n.sp.**

Organgattung : *Myricaceae*

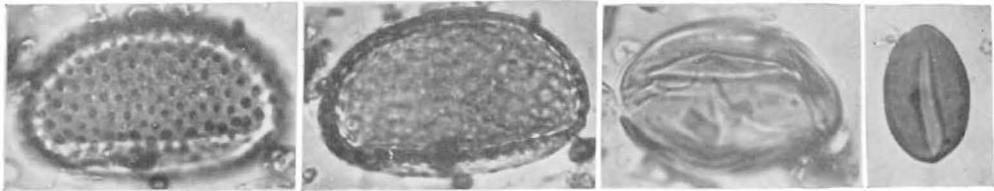
Fig. 31

Holotypus — Fig. 31.

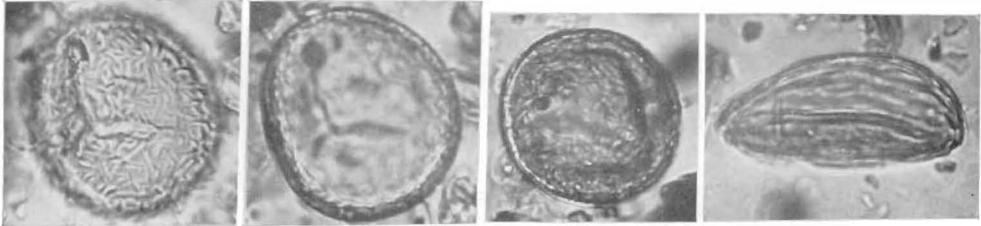
Locus typicus — Neyveli.

Stratum typicum — Tertiary.

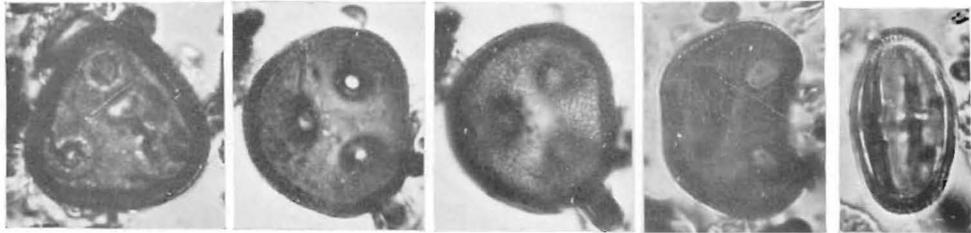
Pollen grains 3-porate, crassisexinous. This type of pollen grains is very abundant



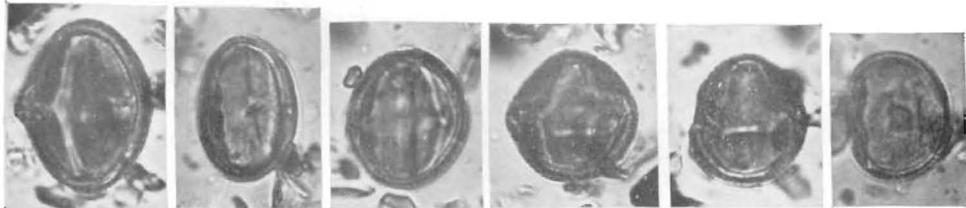
1 2 3 4



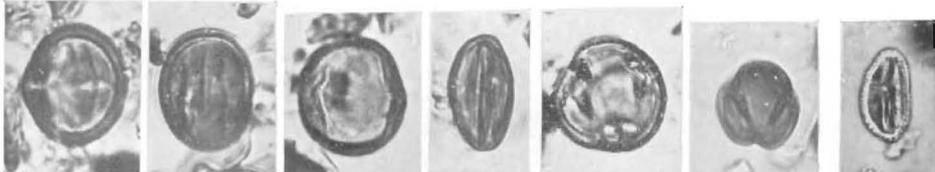
5 6 7 8



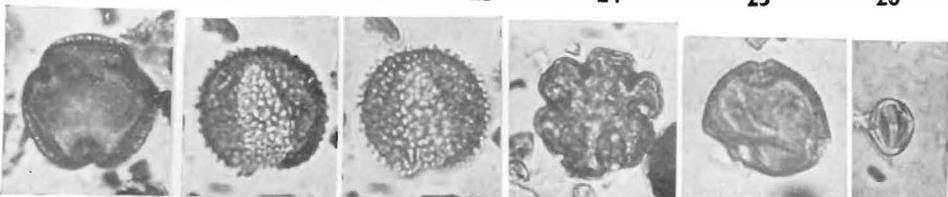
9 10 11 12 13



14 15 16 17 18 19



20 21 22 23 24 25 26



27 28 29 30 31 32

and widespread in Tertiary deposits in Europe too. An affinity to the Myricaceae can be established.

By I. Cookson (1953, Pl. 2, Fig. 98) a similar pollen grain is referred as "*Triorites harrisii* Couper".

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EXPLANATION OF PLATE I

(Magnification of the microfossils 1:700. Leica, Agfa Isopan IFF 13/10 Din. Photographed by Dr. U. Frantz)

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| 1, 2. <i>Cuddaloria polyaperturata</i> n.g., n.sp. | 16, 17, 18. <i>Lucknowia sahnii</i> n.g., n.sp. |
| 3. <i>Polypodiaceasporites</i> (Thierg.) <i>haardti</i> | 19, 20, 21, 22, 23. <i>Triporocolpatus indicus</i> |
| 4. <i>Riedelia simplex</i> n.g., n.sp. | 24, 25. <i>Lucknowia sahnii</i> |
| 5, 6. <i>Pastoria schizoneura</i> n.g., n.sp. | 26. <i>Triporocolpatus indicus</i> |
| 7. <i>Pastoria schizoneura</i> n.g., n.sp. | 27. <i>Lucknowia sahnii</i> |
| 8. <i>Neyvelia riedeli</i> n.g., n.sp. | 28, 29. <i>Erinaceus neyvelii</i> n.g., n.sp. |
| 9, 10, 11, 12. <i>Trioculata riedeli</i> n.g., n.sp. | 30. <i>Hexaradiatus indicus</i> n.g., n.sp. |
| 13, 14. <i>Humboldtia neyvelii</i> n.g., n.sp. | 31. <i>Triorites</i> (Cookson) <i>indica</i> n.sp. |
| 15. <i>Triporocolpatus indicus</i> n.g., n.sp. | 32. <i>Triporocolpatus indicus</i> |