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Volume I

Not scanned

Published paper
"ON THE FOSSIL FLORA OF THE BRISTOL AND SOMERSET COALFIELD"

(Dissertation for the degree of Ph.D.).

Part II is now in the press.

This work was conducted independently: the late Dr. Kidston, however, visited Bristol on two occasions, checking the identification of most of the specimens, and expressing agreement with the results obtained, which are as follows:

<table>
<thead>
<tr>
<th>Series/Group</th>
<th>Palaeobotanical horizon.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RADSTOCK SERIES.</td>
<td>Radstock Group of the Radstockian Series.</td>
</tr>
<tr>
<td>Southern Area.</td>
<td>Keele Group of the Radstockian Series.</td>
</tr>
<tr>
<td>FARRINGTON SERIES.</td>
<td>? Central Area.</td>
</tr>
<tr>
<td>PENNANT ROCK.</td>
<td>(In the Northern Area) Staffordian Series.</td>
</tr>
<tr>
<td>NEW ROCK AND VOBSTER SERIES.</td>
<td>Blackband Group of the Staffordian Series.</td>
</tr>
<tr>
<td>UPPER BEDS OF &quot;MILLSTONE Grit&quot;.</td>
<td>(probably) Yorkian Series.</td>
</tr>
</tbody>
</table>

June 1st., 1925.

Department of Botany,
UNIVERSITY OF BRISTOL.
ON THE FOSSIL FLORA OF THE BRISTOL AND SOMERSET COALFIELD.

Part II.

by Robert Crookall.
ON THE FOSSIL FLORA OF THE BRISTOL AND SOMERSET COALFIELD.

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The present paper is a continuation of that published in the Geological Magazine, vol. LXII, No. IV. April, 1885, pp. 145-180.

I. ADDITIONAL RECORDS.

In recording the additional species of plants from the Bristol and Somerset Coalfield, the following abbreviations for localities are used: -

CL = Clandown, near Radstock; BR = Braysdown, near Radstock; DK = Dunkerton, near Radstock; K = Kilmersdon, near Radstock; CM = Camerton, 2 miles north of Radstock; R = Radstock, Somersetshire; OM = Old Mills Pit, Farrington Gurney, 7½ miles north of Shepton Mallet, Somersetshire; ML = Marsh Lane Pit, Farrington Gurney; BS = Bishop Sutton New Pit, Bishop Sutton, Somersetshire; NH = Norton Hill Pit, Midsomer Norton, near Radstock; F = Foxhole Pit, near Radstock; FF = Parkfield Pit, near Pucklechurch, Gloucestershire; FC = Coalpit Heath Pit, Gloucestershire; PM = Broad Oak Colliery, Pensford, 2 miles north of Clutton, Somersetshire; B = Bromley Colliery, 1 mile west of Pensford, Somersetshire; D = Deep Pit, Kingswood, Bristol; SB = Speedwell Pit, Kingswood, Bristol; NR = South Liberty Colliery, Bedminster, Bristol; M = Mells Colliery, Somersetshire; NB = Newbury Colliery, Somersetshire; HH = Hanham Pit, Hanham, near Bristol.

Where known, the horizon of the specimen is given after the reference to locality, and, following this, a number indicating the frequency with which the plant occurs at that locality, thus:

3-10 = very common;
3-4 = fairly rare;
1-2 = very rare;
6-7 = fairly common;
CL (3); ML, 21 in. seam, (1);
ML (1).

PTERIDOSPERMAE AND FILICALES.

Sphenopteris neuropteroides, Boul.sp.,
Sphenopteris macilenta, L & H.
Sphenopteris sp.,
Sphenopteris T sauveuri, Crépin,
Corynepteris sternbergii, Ett.sp.,
Renaulia sp.,
Oligocarpia brongniartii, Stur,
Rhodia sp.,
Alliospasia sp.,
Crossotheca pinnatifida, Gut.sp.,
Crossotheca crepini, Zeiller,
Radstockia sphenopteroides, Kidat.sp.,
Alethopteris serpentii, Brongt.sp.,
Alethopteris of costai, Zeiller,
Alethopteris grandini, Brongt.sp.,
Alethopteris aquilina, Schl.sp.,
Alethopteris aquilina, Brongt.sp.,
Pecopteris crenulata, Brongt.,
Pecopteris polymorpha, Brongt.,
Pecopteris arboraeang, Schl.sp.,
Pecopteris unia, Brongt.,
Pecopteris miltoni, Artis sp.,
Pecopteris bucklandii, Brongt.,
Pecopteris cyathae, Schl.sp.,
Dicksonites plumkenetti, Schl.sp.,
Dactylotheea plumosa, Art.sp.,
Mariopteris muricata, Schl.sp.,
Mariopteris muricata, (Schl.) forma nervosa,
Neuropteris ovata, Hoffm.,
Neuropteris rarinervis, Bum.,
Neuropteris smithae, Hoffm.,
Neuropteris simbiata, Lesq.,
Neuropteris macrophylla, Brongt.,
Neuropteris sp.,
Neuropteris flexuosa, Sternb.,
Neuropteris heterophylla, Brongt.,
Neuropteris obliqua, Brongt.,
Neuropteris pseudogigantea, Potonie,
Dictyopteris obliqua, Bum.,
Dictyopteris munsteri, Bichw.sp.,
Cylopteris sp.,
Cylopteris orbicularis, Brongt.,
Rhacophyllum spinosum, Lesq.,
Rhacophyllum poldenbergii, Weiss,
Aplebia criosa, Gut.,
Odontopteris lindlayana, Sternb.,
Gaulopteris anglica, Kidst.,
Spiropteris sp.,
Seminaria incertae sedis.

Trigonocarpus parkinsoni, Brongt.,
Carpolithus sp.,
†Radiospermum grande, Arber,
Radiospermum sp.,
Radiospermum perpusillum, Lesq.sp.,
Holospermum sp.,
†Whittlesea sp.,
Samaropsis sp.,

LYCOPDDIALES

Sigillaria cumulata, Weiss,
Sigillaria tessellata, Stein.sp.,
Sigillaria rugosa, Brongt.,
Sigillaria ovata, Sauv.,

SEMINA INCERTAE SEDIS.

PP (2); OM (2); R (1).
F (1).
R (1).
R, Middle Vein,(1); OM (2);
ML, 21 in. seam, (1).
CL (4); K (4); F (3); BR (5).
OM (3); NR (1); K (3); BR (3);
CM (2).
OM (2); K (3); F (3); BR (2).
BS (2); NR (1); K (4); F (2).
BR (5); CM (6).
OM (1); BS (1); ML, 21 in. seam,
ML, 21 in. seam, (2).
BS (1).
F (3); BR (4); R (4).
F (3); CL (2).

SEMEN INCERTAE SEDIS.

Trigonocarpus parkinsoni, Brongt.,
Carpolithus sp.,
†Radiospermum grande, Arber,
Radiospermum sp.,
Radiospermum perpusillum, Lesq.sp.,
Holospermum sp.,
†Whittlesea sp.,
Samaropsis sp.,

LYCOPDDIALES

Sigillaria cumulata, Weiss,
Sigillaria tessellata, Stein.sp.,
Sigillaria rugosa, Brongt.,
Sigillaria ovata, Sauv.,

SEMINA INCERTAE SEDIS.

Trigonocarpus parkinsoni, Brongt.,
Carpolithus sp.,
†Radiospermum grande, Arber,
Radiospermum sp.,
Radiospermum perpusillum, Lesq.sp.,
Holospermum sp.,
†Whittlesea sp.,
Samaropsis sp.,

LYCOPDDIALES

Sigillaria cumulata, Weiss,
Sigillaria tessellata, Stein.sp.,
Sigillaria rugosa, Brongt.,
Sigillaria ovata, Sauv.,
Sigillaria sp.,

Sigillariophyllum bicarinatum, L & H sp., R (3); CL (2); H (1); K (4); F (6); BR (5); DK (3); CL (3); CM (4); OM (1); ML, Inferior Seam, (1); NR (1); F (3); BR (3); CM (3); R (2).

Lepidodendron lanceolatum, Lesqx.,

Lepidodendron wortheni, Lesqx.,

Lepidodendron simile, Kidst.,

Lepidodendron aculeatum, Sternb.,

Lepidodendron loricatum, Arber (pars),

Lepidodendron sp.,

Lepidophloios laricinus Sternb.,

Lepidostrobus lanceolatus, L & H sp.,

Lepidostrobus majus, Brongt.sp.,

Lepidostrobus radianus, Schimp.

Lepidostrobus minor, Goode,

Lepidostrobus sp.,

Stigmaria ? ficoides, Sternb.sp.,

Stigmaria ? minuta, Göpp.,

Bark of unknown Lycopod

EQUISETALES.

Calamites suckowii, Brongt.,

Calamites sp.,

Annularia stellata, Schl.sp.,

Annularia sphenophylloides, Zenk.sp.,

Annularia ? microphylla, Sauv.,

Asterophyllites charaeformis, Sternb.,

Asterophyllites longifoliaceus, Sternb.,

Palaeostahya pedunculata, Will.,

Pinnularia cabillacea, L & H.

Sphenophyllum emarginatum, Brongt.,

Sphenophyllum fasciculatum, Lesqx.,

Sphenophyllum cuneifolium, Sternb.,

Sphenophyllum majus, Brong,

Sphenophyllum ? oblongifolium, Germ.sp.,

CORDAITALES.

Cordaites sp.,

Cordaiacarpus ovicidae, (Berg.),

BR (2); PK (3);

S H (1); K (4);

BR (2); CL (2); H (1); K (4); F (6); BR (5); DK (3); CL (3); CM (4); OM (1); ML, Inferior Seam, (1); NR (1); F (3); BR (3); CM (3); R (2).

Lepidodendron lanceolatum, Lesqx.,

Lepidodendron wortheni, Lesqx.,

Lepidodendron simile, Kidst.,

Lepidodendron aculeatum, Sternb.,

Lepidodendron loricatum, Arber (pars),

Lepidodendron sp.,

Lepidophloios laricinus Sternb.,

Lepidostrobus lanceolatus, L & H sp.,

Lepidostrobus majus, Brongt.sp.,

Lepidostrobus radianus, Schimp.

Lepidostrobus minor, Goode,

Lepidostrobus sp.,

Stigmaria ? ficoides, Sternb.sp.,

Stigmaria ? minuta, Göpp.,

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Sphenophyllum emarginatum, Brongt.,

Sphenophyllum fasciculatum, Lesqx.,

Sphenophyllum cuneifolium, Sternb.,

Sphenophyllum majus, Brong,

Sphenophyllum ? oblongifolium, Germ.sp.,

CORDAITALES.

Cordaites sp.,

Cordaiacarpus ovicidae, (Berg.),

OM (1); K (4); F (5); BR (4);

BR (2); D (1).
II. REFERENCES, DESCRIPTIONS & REMARKS.

PTERIDOSPERMAE & FILICALES.

SPHENOPTERIS, Brongniart.


Remarks: This species being very variable, the single fragment collected is difficult to identify. The rachis is slightly flexuous, the pinnules point forward, and the veins are indistinct, as is usual in S. sauveuri.

2. Sphenopteris sp., Plate IV. fig. 6.

Description: Ultimate pinnae alternate, up to 3 cm. long, leaving the longitudinally grooved rachis at an angle of about 40 degrees, directed forward. Pinnules leave rachis at an angle of about 30 degrees, up to 8 mm. long by 2 mm. broad, lanceolate, divided into rounded lobes which are directed forward; lowest pinnules bear 6 pairs of lobes, uppermost 2-4 pairs.

Remarks: The specimen, which was collected at Bishop Sutton New Pit, bears some general resemblance to Urnatopteris tenella, (Brong.) but the lobes on the pinnules are not so pronounced and are more numerous than in that species.

RHODEA, Presl.

Rhodea sp., Plate IV fig. 5.

Description: Rachis smooth. Ultimate pinnae lanceolate, directed forward, leaving the rachis at an angle of about 50 degrees. Pinnules alternate, 2-5 mm. long by 2-3 mm. broad, divided into 2-4 linear, spreading segments, into each of which a single vein enters.

* The serial numbers following an author's name refer to the list of works cited on page 36.

Brongniart, 9, p.186, pl.49, f.1.--Kidston, 21, pl.29, f.1-3; 28, pt.4, p.356, pl.83, f.1-5, pl.84, f.1-3.
Remarks: The specimens, which are fragmentary, were collected at Deep Pit. They differ from *R. sparsa*, Kidst. (28, p.237, pl.56, f.3, pl.59, f.5,6) and from *R. goepberti*, Ett. sp. (Kidst., 28, p.233, pl.57, f.1) in that both the pinnae and the pinnules leave the rachis at a more acute angle. The pinnules are smaller than in *R. goepberti*, and not so scattered as in *R. sparsa*. On the other hand there is some similarity to *Sphenopteris schaumburg-lippeana*, Stur sp., as figured by Kidston (24, pl.3, f.1,2).

**RENAULTIA**, Zeiller.

*Renaultia* sp.,

Remark: In general appearance this specimen, collected at Bromley Colliery, is reminiscent of *R. germanica*, Potonie sp., as figured by Kidston (28, pt.4, p.324, pl.81, f.1,1a), but it is not sufficiently well preserved for specific determination.

**RADSTOCKIA**, Kidston.

*Radstockia sphenopteroides*, Kidston sp., Plate IV. fig.3.

Kidston, 28, pt.4, p.373, pl.75, f.3,3a.

Remark: The specimens here recorded are the only ones known other than the type specimen.

**OLIGOCARPIA**, Göppert.

?*Oligocarpia brongniartii*, Stur.

Zeiller, 38, p.97, pl.11, f.3-5.--Renier, 32, pl.61.--Kidston, 28, pt.4, p.289, pl.69, f.2,2a.3,3a; text f.19. p.285.

Remark: This very rare species has not previously been met with outside the Yorkian Series, and, if correctly determined, this is the first record of the plant from the Staffordian Series.

**CROSSOTHECA**, Zeiller.

(1). *Crossotheca pinnatáfida*, Gut. sp.,

Kidston, 28, pt.4, p.346, pl.90, f.1-5, text f.28.
Remark: A single well preserved pinnule of this species was collected at Parkfield Pit. The plant is very rare, and this is the first record from the Staffordian Series.

(2). Crossotheca crepini, Zeiller.

Zeiller, 38, p.112, pl.13, f.1-3, text f.21, p.33.--Renier, 32, pl.68,--Kidston, 28, pt.4, p.344, pl.87, f.1,2, text f.27.

Remarks: This rare species has not been recorded previously from outside the Yorkian Series.

NEUROPTERIS Brongniart.

(1). Neuropteris obliqua, (Brongt.) Plate II. fig.3.

Zeiller, 38, p.284, pl.48, f.1,2,4,7.---Arber, 7, p.355, pl.61, f.1-3.

Remarks: Some of the specimens are typical examples of Brongniart's species, while others are of the form N. impar, Weiss, as figured by Kidston (24, p.83, pl.8, f.1-3). These two "species", provisionally kept apart by Kidston, were regarded by Arber (loc. cit.) as representing the upper and lower pinnules respectively of the same plant.

(2). Neuropteris sp., Plate IV. fig.7.

Remarks: The single specimen, collected at Parkfield Colliery, resembles N. crenulata, Brongt., in the flexuous rachis, the articulation of the pinnules, the small terminal pinnule, the crenulated margins, and in the venation. It is possibly a terminal pinna of Brongniart's species.

(3). Neuropteris sp.,

Description: Pinnules 25 mm. long by 12 mm. broad at the base (the broadest part). Veins almost straight, dichotomising 2 or 3 times, leaving the central vein at an angle of about 25 degrees.

Remarks: This plant, collected at Parkfield Pit, does not agree...
with any known species of Neuropteris, but the preservation is poor. The pinnules are smaller and the veins much further apart than in N. cordata. Brongt.. (9. 1. p.229, pl.64, f.5).

**DICTYOPTERIS**, Gutbier.

*Dictyopteris obliqua*, Bunbury.

Bunbury, 10, p.427, pl.21, f.2.---Kidston, 17, p.76, pl. f.3. *D. sub-brongniartii*, Zeiller. 38, p.290, pl.49, f.6. pl.50, f.1,2.

Remarks: Most of the specimens collected consist of isolated pinnules. *D. obliqua* has been recorded once only from outside the Yorkian Series.

**ALETHOPTERIS**, Sternberg.


Remarks: The pinnules are from 10 to 15 mm. in length, leaving the rachis at about 90 degrees. The central vein is strongly-marked and the lateral veins bifurcate once or twice.

If the specimens are correctly identified, this is the first record of the species from Britain.

**SEMINA INCERTAE SEDIS.**

**Samaropsis**, Göppert.

(1). *Samaropsis sp.*, Plate VI. fig.6.

Description: Seeds oval, 12 mm. long by 8-9 mm. broad; nucule ovate, 5-6 mm. long by 4-5 mm. broad, with a clearly-marked median line, surface longitudinally striated. Wing distinctly emarginate at base and produced above the nucule for about 3 mm. around the micropyle.

Remarks: These seeds, which were collected at Newbury Pit, differ from *S. fluitans*, Dawson (11, p.165, pl.12, f.74) in size, in the surface of the nucule being striate instead of pitted, and in the wing being broad at the base. From *S. bisectum*, Dawson (11, pl.12, f.73), in which the nucule is also striate, they differ in
that the wing is neither "widely notched at the apex" nor "more narrowly notches below". In S. gutbieri, Geinitz (Kidston, 26, p.1059, pl.5, f.6) the surface is smooth and the seed is broader in proportion to its length. Compared with S. emarginata, Göpp. & Berger (Kidston, 26, p.1058, pl.5, f.7) our specimens are more acute as regards the apex of the wing and of the nucule.

(2). Samaropsis sp., Plate VI. fig.4.
Description: Seed broadly cordate, 15 mm. long by 18 mm. broad, base emarginate, apex bluntly rounded. Nucule cordate, central; wing 1 mm. broad laterally, 3 mm. broad at base.
Remarks: This seed was collected at Deep Pit. It differs from any known species of Samaropsis, but the specimen is incomplete.

CARPOLITHUS, Sternberg.
Carpolithus sp..
Remarks: Two seeds from Deep Pit, though in size and form resembling Carpolithus ovoideus, Göpp. & Berger sp., (Kidston, 16, p.404, pl.23, f.7,8) cannot be referred to that species as the testa bears distinct striations, oblique in one case and longitudinal in the other.

HOLCOSPERMUM, Nathorst.
Holcospermum sp., Plate VI. fig.3.
Description: Seed elongately elliptical, 3.3 cm. long, 1.8 cm. broad in middle. Broadest part occurs about one third along the seed, where it measures 2 cm. across. Base and apex rounded. Seed bears 4 prominent longitudinal ribs which gradually approach each other at base and apex. Between the ridges are several fine grooves, some traversing the whole length of the seed, others discontinuous. Testa also bears fine oblique striae.
Remarks: This seed bears some slight similarity to Radioespernum elongatum, Arber (4, p.101, pl.7, f.42,43), but is broader towards the base and narrower towards the apex. The ribs are more strongly marked than in Arber's species, while the testa is not smooth.
LYCOPODIALES.

LEPIDODENDRON, Sternberg.

(1). Lepidodendron simile, Kidst..M.S. Fide Dr. Kidston. Plate VIII fig.5.

Kidston, 24, p.137; 25, p.134; 26, pp.1038,1079.---Vernon, 35, p1.57, f.7.

Remark: Several fossils, from Speedwell, Deep and Wells Pits, which I had identified as L. ophiurus, Brongt. were referred by the late Dr. Kidston to his species, the description of which has not been published. Arber (2, p.151; 8, p.200) rejected L. simile, but the specimens are retained provisionally under that name.

(2). Lepidodendron sp..

Description: Leaf-cushions elongate-rhomboidal, 7 mm. long by 3 mm. broad, apex bluntly pointed, lower angle inflected. Leaf-scar 2 mm. broad by 1 mm. high, situated 1½ mm. down the leaf-cushion, rhomboidal, upper and lower margins rounded, lateral angles prominent and sharp. The three cicatricules are placed half-way down the scar, all punctiform. Ligular cicatricule visible. Field beneath scar ornamented by a vertical series of broad transverse lines which open out as the cushion is descended, forming rhomboidal markings which, in some cases, are almost as large as the leaf-scar itself. In addition, the field bears numerous fine transverse lines, visible only under the lens.

Remarks: The specimens, which were collected at Bromley, differ from L. rimosum, Sternb. (Zeiller, 38, p.449, pl.67, f.4.5) in the less elongated and less sharply-pointed apex of the leaf-cushion, and in the absence of lines leaving the lateral angles of the scar, while the ornamentation of the field appears to be peculiar.

LEPIDOSTROBUS, Brongniart.

Lepidostrobus radians, Schimper.

Schimper, 33, II, p.63.---Arber, 8, p.184, pl.9, f.28-31.
Bark of unknown Lycopod.

Remarks: A single specimen of bark was collected which is very similar to the "Bark of an unknown plant" as figured by Vernon (35, p.623, pl.58, f.4) who remarks that, "The specimen appears to be the bark of a Lycopodiaceous plant somewhat similar to but quite distinct from Bothrodendron". In the specimen in hand there are numerous strongly-marked transverse wrinkles in addition to the longitudinal striations on Vernon's specimen, and the leaf-scars are not so distant. The leaf-scars are 2 mm. wide by 1 mm. high, and the three cicatricules are situated half-way down the scar.

EQUISETALES.

ASTEROPHYLLITES, Brongniart.

(1). Asterophyllites longifolius, Sternb. sp.

L. & H., 30, pl.18.--Zeiller, 38, p.374, pl.59, f.3.--White, 37, p.153, pl.49, f.2-4.--Renier, 32, pl.49.

(2). Asterophyllites charaeformis, Sternb. sp.

Kidston, 24, p.119, pl.11, f.2-5.--Kidston, 25, p.121.

Palaestachya, Weiss.

Palaestachya pedunculata, Williamson.

Zeiller, 38, p.382, pl.60, f.1,2.--Kidston, 24, p.126.--Kidston, 21, pl.34, f.5.

Annularia, Sternberg.

Annularia ? microphylla, Sauveur.

Kidston, 25, p.172, pl.10, f.1-3.

Sphenophyllales.

Sphenophyllum, Brongniart.

(1). Sphenophyllum (?Asterophyllites) fasciculatum, (Lesq.) Plate X fig.3.

White, 37, p.183, pl.50, f.1-4.
Description: Stem up to 1 mm. broad. Whorls of 3-6 leaves at nodes, bifurcated near base, up to 5 mm. long. Leaves linear, spreading with sharply pointed apex, single-veined.

Remarks: This is the first record of S. fasciculatum from Britain.

(2). Sphenophyllum majus, Bronn. Plate X fig. 5.
Zeiller, 30, p. 420, pl. 64, f. 1-2.—White, 37, p. 180, pl. 50, f. 5-6a, pl. 51, f. a, pl. 73, f. 3.—Arber, 2, pl. 16, f. 2.—Kidston, 24, p. 221, pl. 14, f. 1-4, pl. 15, f. 2, 9. 

Remarks: While Zeiller and others regarded S. longifolium, Germar as distinct from S. majus, Bronn, White (loc. cit.) regarded the former as a more dissected and larger form of S. majus.

An examination of the specimens collected tends to confirm White's view.


Cordaicarpus ovoideus, (Berg.)
Arber, 4, p. 100, pl. 17, f. 30.—Carpolithes ovoideus, Kidston, 16, p. 404, pl. 23, f. 7, 8.—Kidston, 22, p. 367, pl. 52, f. 1.

Description: Seeds oval with a smooth testa, 3-4 mm. long by 2-3 mm. broad.

III. PALAEOBOTANICAL HORIZONS.
Fossil plants were first used in subdividing the Upper Carboniferous Formation of Britain by the late Dr. Kidston (19, p. 183) who, in 1894, proposed the following classification:
In 1905, Kidston (23, p. 308) pointed out that these terms had often been used in a purely local sense and the following change in nomenclature was proposed: -

**Upper Coal Measures** = Hadstockian Series (including Keele Group).
**Transition Series** = Staffordian Series.
**Middle Coal Measures** = Westphalian Series.
**Lower Coal Measures**, including part of Millstone Grit = Lanarkian Series.

Watts (36, p. 238) has recently suggested that the term "Yorkian" should be substituted for "Westphalian" Series as applied to the Middle Coal Measures of Britain.

The Staffordian Series of North Staffordshire have been shown by Walcot Gibson (12, p. 37-8; 13, p. 51) to be composed of three groups: -

2. Etruria Marl Group.

and the fossil floras of these divisions were described by Kidston (23, p. 301-321), while Arber (5, pp. 129-130) recorded 58 species of plants from the Etruria Marl Group of South Staffordshire.

The classification of the Upper Carboniferous Rocks of Britain here adopted is as follows: -

<table>
<thead>
<tr>
<th>RADSTOCKIAN SERIES</th>
<th>STAFFORDIAN SERIES</th>
<th>YORKIAN SERIES</th>
<th>LANARKIAN SERIES</th>
</tr>
</thead>
</table>

The characteristic floras of these divisions are indicated below:

<table>
<thead>
<tr>
<th>RADSTOCKIAN SERIES</th>
<th>Positive evidence.</th>
<th>Negative evidence.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flora rich in number of species, and especially of the Cyatheites-Facopteridae.</td>
<td>The typical Yorkian and Lanarkian assemblages of plants are absent.</td>
<td></td>
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<tr>
<td>In the basal beds (the Keele Group) a few Yorkian plants also occur (very rarely).</td>
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<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>STAFFORDIAN SERIES</th>
<th>Positive evidence.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newcastle-under-Lyme Group: Yorkian plants few and rare, Hadstockian plants preponderate.</td>
<td></td>
</tr>
<tr>
<td>Etruria Marl Group: intermediate.</td>
<td>ditto.</td>
</tr>
<tr>
<td>Positive evidence.</td>
<td>Negative evidence.</td>
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<td>------------------</td>
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</tr>
<tr>
<td><strong>STAFFORDIAN SERIES</strong></td>
<td>The typical Yorkian and Lanarkian assemblages of plants are absent.</td>
</tr>
<tr>
<td>Blackband Group:</td>
<td>Many species (especially of Sigillaria, Neuropteris, and Sphenopteris) are confined to this division; other plants, which are rare elsewhere, are here characteristically common.</td>
</tr>
<tr>
<td>Radstockian plants few and rare.</td>
<td>The Cyatheites-Pecopteris are absent.</td>
</tr>
<tr>
<td>Yorkian plants preponderate.</td>
<td>ditto.</td>
</tr>
<tr>
<td>(The relative abundance of the plants occurring, important in all divisions, is of special importance in the Staffordian Series).</td>
<td>As many Lanarkian plants are found in the Yorkian Series also, the chief criterion is negative, consisting in an admixture of Yorkian and Lanarkian species without a typical Yorkian flora.</td>
</tr>
<tr>
<td><strong>YORKIAN SERIES</strong></td>
<td></td>
</tr>
<tr>
<td>Many species are confined to this division; other plants, which are rare elsewhere, are here characteristically common.</td>
<td></td>
</tr>
<tr>
<td><strong>LANARKIAN SERIES</strong></td>
<td></td>
</tr>
<tr>
<td>Some species are confined to this division, though most are rare and some are restricted in horizontal distribution.</td>
<td></td>
</tr>
</tbody>
</table>

It should be pointed out that, owing to the rapid progress in palaeobotany, Kidston's original list of the vertical distribution of Coal Measure plants now need revising, and this is true of most subsequently published lists (which were mainly or entirely based on Kidston's).

(1) THE RADSTOCK SERIES.

Kidston (16, pp.405-409) showed that THE RADSTOCK SERIES BELONGS TO THE TRUE UPPER COAL MEASURES OF BRITAIN, which he regarded as "part of the Upper Coal Measures or Stephanian of the Continent"† and in 1894, (20, p.571) observed that, "Although such strata as the Radstock and Farrington Series of the Somerset Coalfield------are true members of the Upper Coal Measures as developed in Europe, they belong to the lower part of the series; the upper beds, such as occur in certain parts of France, being entirely absent from Britain".‡ Zeiller also held this view (in Kidston, 16, loc. cit.).

All subsequent work has confirmed the above conclusions.

(2) THE FARRINGTON SERIES.

With regard to the Farrington Series of the Southern or Radstock Area, Kidston (16, p.410) remarked that, "Palaeontologically, the Farrington Series cannot be separated from the Radstock Series, of which, in fact, they seem to form a part."

Lillie (29, p.67) investigated the Farrington Series of the Northern or Gloucestershire Area which he also referred to the Upper Coal Measures.

The writer visited several pits which had not been investigated previously from a palaeobotanical point of view and, on the basis of the fossil floras obtained, regards Bishop Sutton New Pit, Marsh Lane Pit and Norton Hill Pit as very probably working certain of the lower Farrington seams.¶

In view of the present increase in the known flora of the Farrington Series, it is necessary to re-examine the palaeobotanical horizons represented. In Table I are given the floras

‡ Kidston, R., 25, p.74.
† Arber (6, p.8-11, and 1, p.37-38) regarded all the recorded British Coal Measure floras as Westphalian in affinity, maintaining that, "There is no evidence of any true Stephanian flora from British rocks".
of the Southern and Northern Areas (columns 1 and 2), and the zone in which a species is most frequent or characteristic (column 3: R = Radstockian Series, Y = Yorkian Series, L = Lanarkian Series). In columns 4 and 5 are shown those plants which are known elsewhere from the Keele Group and from the Newcastle-under-Lyme Group respectively.

**TABLE I - THE FLORAS OF THE FARRINGTON SERIES.**

<table>
<thead>
<tr>
<th>Southern Area</th>
<th>Northern Area</th>
<th>Zone</th>
<th>Keele Group</th>
<th>Newcastle Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Renaultia chaerophyloides</em> Brong. sp.</td>
<td>X</td>
<td>X</td>
<td>Y</td>
<td>X*</td>
</tr>
<tr>
<td><em>Sphenopteris neuropteroidea</em> Boul. sp.</td>
<td>X</td>
<td>X</td>
<td>Y</td>
<td>X*</td>
</tr>
<tr>
<td>&quot; alata, Brongt.</td>
<td>X</td>
<td>X</td>
<td>R</td>
<td>XX</td>
</tr>
<tr>
<td>&quot; pecopteroides, Kidst.</td>
<td>X</td>
<td>X</td>
<td>R</td>
<td>XX</td>
</tr>
<tr>
<td>&quot; magilenta, L. &amp; H.</td>
<td>X</td>
<td>X</td>
<td>R</td>
<td>XX</td>
</tr>
<tr>
<td><em>Radstockia sphenopteroides</em> Kidst. sp.</td>
<td>X</td>
<td>X</td>
<td>R</td>
<td>XX</td>
</tr>
<tr>
<td><em>Neuropteris macrophylla</em> Brongt.</td>
<td>X</td>
<td>X</td>
<td>R</td>
<td>XX</td>
</tr>
<tr>
<td>&quot; scheuchzeri, Hoffm.</td>
<td>X</td>
<td>X</td>
<td>R</td>
<td>XX</td>
</tr>
<tr>
<td>&quot; marinervis, Boulb.</td>
<td>X</td>
<td>X</td>
<td>R</td>
<td>XX</td>
</tr>
<tr>
<td>&quot; flexuosa, Sternb.</td>
<td>X</td>
<td>X</td>
<td>R</td>
<td>XX</td>
</tr>
<tr>
<td>&quot; ovata, Hoffm.</td>
<td>X</td>
<td>X</td>
<td>R</td>
<td>XX</td>
</tr>
<tr>
<td>&quot; fimbriata, Lesq.</td>
<td>X</td>
<td>X</td>
<td>R</td>
<td>XX</td>
</tr>
<tr>
<td><em>Cyclopteris orbicularis</em> Brongt.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>XXX</td>
</tr>
<tr>
<td><em>Pecopteris unita</em> Brongt.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>XXX</td>
</tr>
<tr>
<td>&quot; graminula, Brongt.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>XXX</td>
</tr>
<tr>
<td>&quot; arborisemis, Schl. sp.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>XXX</td>
</tr>
<tr>
<td>&quot; pecopteroides, Brongt.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>XXX</td>
</tr>
<tr>
<td>&quot; ovathes, Schl. sp.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>XXX</td>
</tr>
<tr>
<td>&quot; miltoni, Art. sp.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>XXX</td>
</tr>
<tr>
<td>&quot; orgopteridia, Schl. sp.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>XXX</td>
</tr>
<tr>
<td>&quot; polymorpha, Brongt.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>XXX</td>
</tr>
<tr>
<td>&quot; bucklandii, Brongt.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>XXX</td>
</tr>
<tr>
<td><em>Dactylothece plumosa</em> Art. sp.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>XXX</td>
</tr>
<tr>
<td><em>Dicksonites pluckentielii</em> Schl. sp.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>XXX</td>
</tr>
<tr>
<td><em>Odontopteris lindleyana</em> Sternb. sp.</td>
<td>X</td>
<td>X</td>
<td>YL</td>
<td>XXX</td>
</tr>
<tr>
<td><em>Aletopteris lonchitica</em> Schl. sp.</td>
<td>X</td>
<td>X</td>
<td>YL</td>
<td>XXX</td>
</tr>
<tr>
<td>&quot; grandini, Brongt. sp.</td>
<td>X</td>
<td>X</td>
<td>Y</td>
<td>XXX</td>
</tr>
<tr>
<td>&quot; gerlia, Brongt.</td>
<td>X</td>
<td>X</td>
<td>Y</td>
<td>XXX</td>
</tr>
<tr>
<td>&quot; davreuxi, Brongt. sp.</td>
<td>X</td>
<td>X</td>
<td>Y</td>
<td>XXX</td>
</tr>
<tr>
<td>&quot; aquilina, Schl. sp.</td>
<td>X</td>
<td>X</td>
<td>Y</td>
<td>XXX</td>
</tr>
<tr>
<td>&quot; pontica, Zeiller.</td>
<td>X</td>
<td>X</td>
<td>Y</td>
<td>XXX</td>
</tr>
<tr>
<td><em>Dictyopteris oblique</em> Bun.</td>
<td>X</td>
<td>X</td>
<td>Y</td>
<td>XXX</td>
</tr>
<tr>
<td><em>Mariopteris muscata</em> Schl. sp.</td>
<td>X</td>
<td>X</td>
<td>Y</td>
<td>XXX</td>
</tr>
<tr>
<td><em>Crossotheca pinnatafida</em> Gut. sp.</td>
<td>X</td>
<td>X</td>
<td>Y</td>
<td>XXX</td>
</tr>
<tr>
<td>&quot; crepini, Zeiller.</td>
<td>X</td>
<td>X</td>
<td>Y</td>
<td>XXX</td>
</tr>
<tr>
<td><em>Aphlebia crispa</em> Gut. sp.</td>
<td>X</td>
<td>X</td>
<td>Y</td>
<td>XXX</td>
</tr>
<tr>
<td><em>Rhaophyllum spicatum</em> Lesq.</td>
<td>X</td>
<td>X</td>
<td>Y</td>
<td>XXX</td>
</tr>
<tr>
<td>&quot; goldenbergi, Weisse.</td>
<td>X</td>
<td>X</td>
<td>Y</td>
<td>XXX</td>
</tr>
<tr>
<td>&quot; tilliciforme, Gut. sp.</td>
<td>X</td>
<td>X</td>
<td>Y</td>
<td>XXX</td>
</tr>
</tbody>
</table>

* Arber, E. A. N. (3, p.233-231). The whole of the productive Coal Measures of the Forest of Dean Coalfield are referred to the Upper Coal Measures, but, while Kidston (28, p.54) refers the First Division (= Woorgreens Coals) to the Radstock Group, the Second Division Coals and the Yorkley Seam are referred to the Newcastle-under-Lyme Group. For floras of Keele and Newcastle-under-Lyme Groups see also Kidston, 23, pp.311-314; 26, pp.1020-1022, 1078-1080; 27, pp.46-49, and Vernon, R. D., 35, p.587.
(TABLE I, contd.)

<table>
<thead>
<tr>
<th>Southern Area</th>
<th>Northern Area</th>
<th>Zone</th>
<th>Keele Group</th>
<th>Newcastle Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caulopteris macrodiscus, Brongt.</td>
<td>X</td>
<td>R</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Schizospermum noeggerathi, Stb. sp.</td>
<td>X</td>
<td>R</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Radiospermum elongatum, Arber</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Phadocarpus lillianus, Arber</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cordaicarpus ovoides, Gopp. &amp; Berg</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sigillaria elongata, Brongt.</td>
<td>X</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot;voltzii, Brongt.</td>
<td>X</td>
<td>Y</td>
<td>Y</td>
<td>X</td>
</tr>
<tr>
<td>&quot;reniformis, Brongt.</td>
<td>-</td>
<td>Y</td>
<td>?Y</td>
<td>-</td>
</tr>
<tr>
<td>&quot;rugosa, Brongt.</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot;major, L. &amp; H.</td>
<td>X</td>
<td>Y</td>
<td>Y</td>
<td>X</td>
</tr>
<tr>
<td>&quot;tessellata, Stein. sp.</td>
<td>X</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot;mammillaris, Brongt.</td>
<td>-</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot;deutschian, Brongt.</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot;cumulata, Weiss.</td>
<td>-</td>
<td>Y</td>
<td>Y</td>
<td>-</td>
</tr>
<tr>
<td>&quot;murtriei, Kidst.</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot;principis, Weiss.</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot;nortenosisis, n. sp.</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ovata, Sauv.</td>
<td>-</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lepidodendron lanceolatum, Lesq.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>&quot;loricatum, Arber (pars)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>&quot;aquifolium, Sternb.</td>
<td>X</td>
<td>Y</td>
<td>Y</td>
<td>X</td>
</tr>
<tr>
<td>&quot;limosum, Sternb.</td>
<td>X</td>
<td>Y</td>
<td>Y</td>
<td>X</td>
</tr>
<tr>
<td>&quot;northeni, Lesq.</td>
<td>X</td>
<td>Y</td>
<td>Y</td>
<td>X</td>
</tr>
<tr>
<td>Lepidostrobus triangularis, Zeill.</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot;majus, Brongt.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot;bastauius, Lesq.</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot;brevifolia, Lesq.</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot;minor, Goode</td>
<td>X</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot;lanceolatus, L. &amp; H. sp.</td>
<td>X</td>
<td>Y</td>
<td>Y</td>
<td>X</td>
</tr>
<tr>
<td>Asolanus camptotepenia, Wood</td>
<td>-</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sigilliariophyllum bicarinatum, L &amp; H.sp.</td>
<td>X</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lepidophloios larinicus, Sternb.</td>
<td>X</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stigmaria ficoides, Sternb. sp.</td>
<td>X</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Calamites carinatus, Sternb.</td>
<td>X</td>
<td>Y</td>
<td>Y</td>
<td>X</td>
</tr>
<tr>
<td>&quot;suckowii, Brongt.</td>
<td>X</td>
<td>Y</td>
<td>Y</td>
<td>X</td>
</tr>
<tr>
<td>&quot;cistii, Brongt.</td>
<td>X</td>
<td>Y</td>
<td>Y</td>
<td>X</td>
</tr>
<tr>
<td>Annularia stellata, Schl. sp.</td>
<td>X</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot;sphenophyloides, Zemk. sp.</td>
<td>X</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot;radiata, Brongt.</td>
<td>X</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Asterophyllites equisetaiformis, Schl. sp.</td>
<td>X</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot;longifolius, Sternb. sp.</td>
<td>X</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pinnularia capsilaceae, L. &amp; H.</td>
<td>X</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Macrostachys ?infundibulariformis, Bgt.sp.</td>
<td>X</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sphenophyllum emerginetum, Brongt.</td>
<td>X</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot;majus, Brongt.</td>
<td>X</td>
<td>Y</td>
<td>Y</td>
<td>X</td>
</tr>
<tr>
<td>&quot;cuneiformi, Sternb.</td>
<td>X</td>
<td>Y</td>
<td>Y</td>
<td>X</td>
</tr>
<tr>
<td>Cordaites angulosostriatus, Kidst.</td>
<td>X</td>
<td>Y</td>
<td>Y</td>
<td>X</td>
</tr>
</tbody>
</table>

(A) The flora of the Farrington Series of the Southern Area consists of 27 Radstockian and 14 Yorkian (and Lanarkian) species, in addition to 13 plants which are of doubtful or of no zonal value. All the common and fairly common plants recorded are Radstockian, while the Yorkian species are invariably of rare occurrence.

*Recorded from the Newcastle-under-Lyme Group (for the first time) in the present work. (see Flora of Central Area of Coalfield, page 1#.)
Though the Cyathætes-Pecopteris are comparatively well-represented, they are less frequent than in the Radstock Group of the Radstockian Series, and some of the rarer Radstockian plants are unknown from these rocks. The proportion of Yorkian plants present is higher than in the Radstock Group. On this evidence, THE FARRINGTON SERIES OF THE SOUTHERN AREA IS REFERRED TO THE LOWEST GROUP OF THE RADSTOCKIAN SERIES, NAMELY, THE KEELE GROUP.

(B) The flora of the Farrington Series of the Northern Area contains 38 Radstockian, 23 Yorkian (and Lanarkian) and 14 doubtful or non-zonal species. Although the Radstockian species again preponderate, they are usually rarer than in the Southern Area, while the proportion of Yorkian species is greater. The flora includes several species which are unknown from the Radstock Group or from the Farrington Series of the Southern Area. The rare occurrence of a number of Radstockian plants and the apparent absence of others, combined with the presence of a fairly high proportion of Yorkian species, indicate that these beds belong to the Transition or Staffordian Series, and THE FARRINGTON SERIES OF THE NORTHERN AREA IS REFERRED TO THE UPPERMOST OR NEWCASTLE-UNDER-LYME GROUP OF THE STAFFORDIAN SERIES. Reference to columns 4 and 5 of Table I, in which these floras are compared with those of the Keele and Newcastle-under-Lyme Groups as developed elsewhere, lends support to the above determinations.

(3) THE CENTRAL AREA OF THE COALFIELD.

In Table II, here given, are shown the floras of the Broad Oak Colliery, Pensford, and the Bromley Colliery, near Pensford. The fourth and fifth columns show which of the plants have been recorded elsewhere from the Staffordian Series and from the Newcastle-under-Lyme Group of that Series respectively.
<table>
<thead>
<tr>
<th>Pecopteris creopteridia, Schl. sp.,</th>
<th>X</th>
<th>?X</th>
<th>R</th>
<th>X</th>
<th>X*</th>
</tr>
</thead>
<tbody>
<tr>
<td>polymorpha, Brongt.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>miltoni, Art. sp.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>crenulata, Brongt.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>arborescens, Schl. sp.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>candolliana, Brongt.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>bucklandii, Brongt.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>unita, Brongt.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Daetylothea plumosa, Art. sp.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lupeopteris camertonensis, Kidst.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Corynepteris sternbergi, Stt.sp.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sphenopteris neuropteroides, Boult.sp.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>macilenta, L &amp; H.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>laurenti, Andrae.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>Renaultia chaerophylloides, Bgt.sp.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Marchoptis muriicata, Schl. sp.,</td>
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<td>X</td>
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<td>Alethopteris serlii, Brongt. sp.,</td>
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<td>X</td>
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<td>davyrenzi, Brongt. sp.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>aquilina, Schl. sp.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>Neuropteris flexible, Sternb.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>X</td>
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<tr>
<td>schenckleri, Hoffm.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>limosa, Lesqz.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>ovata, Hoffm.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>sclechani, Stur.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>rarinervis, Bunb.</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>X</td>
</tr>
<tr>
<td>macrophylla, Brongt.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>heterophylla, Brongt.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>Aphelis crispa, Gthb.</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Qontopteris lindleyana, Sternb.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>alpina, (Stb). Gein.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>Cyclopteris orbicularia, Brongt.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>X</td>
</tr>
<tr>
<td>Trigonaecarpus parkinsoni, Brongt.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Radiospemnum perpusillum, Lx. sp.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Holospemnum manillatum, Lx. sp.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Cordaecarpus ovoides, Gopp.&amp; Berg.,</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>Sigillaria ovata, Sauv.</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
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<td>tessellata, Stein. sp.,</td>
<td>X</td>
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<tr>
<td>cumulata, Weiss, var. nodosa, L &amp; H.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>mauricii, Grand Eury.,</td>
<td>X</td>
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<td>X</td>
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</tr>
<tr>
<td>transversalis, Bgt. var.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>sparsifolia, Boul.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>kidstoni, n.sp.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sigillariophyllum bicarinatum,L &amp; H.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lepidophyllum aculeatum, Sternb.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>mortheni, Lesqz.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>lanceolatum, Lesqz.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>distans, Lesqz.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>calcaratum, Sternb.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lepidostrobus brevifolius, Lesqz.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lanceolatus, L &amp; H sp.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>minor, Goode.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>triangularis, Zeill.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>majus, Brongt., sp.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Stigmeris floories, Sternb., sp.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Calamites carinatus, Sternb.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>suckowii, Brongt.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Asterophyllites squaristiformia, Schl. sp.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Annularia sphenophylloides.Zenk.sp.,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Table II. (contd.)

<table>
<thead>
<tr>
<th>Species</th>
<th>Pensford</th>
<th>Bromley</th>
<th>Zone</th>
<th>Staffordian Series</th>
<th>Newcastle Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annularia stellata, Schl. sp.</td>
<td>X</td>
<td>X</td>
<td>R</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Pinnularia radiata, Bronst.</td>
<td>X</td>
<td>YL</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Pinnularia capillacea, L. &amp; H.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Stachanullaria tuberculata, Sternb.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sphenophyllum majus, Bronn.</td>
<td>X</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>&quot; emarginatum, Sternb.</td>
<td>X</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>&quot; fusiformum, Lesq.</td>
<td>X</td>
<td>YL</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Cordaites angulosostriatus, Kidst.</td>
<td>X</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>&quot; borassifolius, Sternb.sp.</td>
<td>X</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Poacordaites microstachyus, Gold.sp.</td>
<td>X</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

The Pensford flora includes 28 Padstockian and 18 Yorkian (and Lanarkian) species, while the Bromley flora contains 20 Radstockian and 15 Yorkian (and Lanarkian) plants. Although, at both pits, all the common species present are Radstockian, the characteristic assemblage of that division is, as a whole, absent. (Only 8 species of Pecopteris occur at Pensford, and 6 at Bromley, and all are infrequent or rare, whereas in the Radstockian Series the genus is richly represented and several species are characteristically common. Many other typical Radstockian plants are absent from the Pensford and Bromley floras.)

Though the Yorkian species present are comparatively few and of rare occurrence, the majority of these plants have never been recorded from the Radstockian Series. Thus, at Pensford and Bromley the floras are predominantly, though not characteristically, Radstockian, and these Coal Measures must be classed with the Staffordian Series.

The next consideration is to which Group of the Staffordian Series the beds belong. As the proportion of Yorkian plants is small, while all the common species are Radstockian, the uppermost Group is indicated, and THE COAL MEASURES WORKED IN THE CENTRAL AREA OF THE COALFIELD AT PENSFORD AND BROMLEY ARE REFERRED TO THE NEWCASTLE-UNDER-LYME GROUP OF THE STAFFORDIAN SERIES. Reference to columns 4 and 5 of Table II (above) shows that almost the

* Recorded from the Newcastle-under-Lyme Group (for the first time) in the present work. (See Flora of Farrington Series of Northern Area, p. 15.)
entire flora of the Central Area has been recognised previously from the Staffordian Series, and the bulk of it from the Newcastle-under-Lyme Group, thus justifying our determination.

On the floral evidence it is probable that certain of the lower Farrington seams are worked at Pensford and Bromley.

(4) THE NEW ROCK AND VOBSTER SERIES.

The New Rock and Vobster Series were referred by Kidston to the Transition (= Staffordian) Series.

Table III, below, gives the known flora of these rocks, which has been considerably increased in the present work. In the second and third columns are shown those plants which are also found elsewhere in the Staffordian Series and in the Blackband Group of that Series respectively.

TABLE III - THE FLORA OF THE NEW ROCK AND VOBSTER SERIES.

<table>
<thead>
<tr>
<th>Pecopteris oreopteridia, Schl. sp.</th>
<th>Staffonian Series</th>
<th>Blackband Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot; arborescens, Schl. sp.</td>
<td>P</td>
<td>X</td>
</tr>
<tr>
<td>&quot; volkmanni, Sauv.</td>
<td>R</td>
<td>-</td>
</tr>
<tr>
<td>&quot; miltoni, Art. sp.</td>
<td>Y</td>
<td>X</td>
</tr>
<tr>
<td>Dactylothes plumosa, Art. sp.</td>
<td>Y</td>
<td>X</td>
</tr>
<tr>
<td>Lariopteris muriaca, Schl. sp.</td>
<td>Y</td>
<td>X</td>
</tr>
<tr>
<td>Neuropteris pseudocigantea, Pot.</td>
<td>R</td>
<td>X</td>
</tr>
<tr>
<td>&quot; scheuchzeri, Hoffm.</td>
<td>R</td>
<td>X</td>
</tr>
<tr>
<td>&quot; heterophylla, Brongt.</td>
<td>R</td>
<td>X</td>
</tr>
<tr>
<td>&quot; macrophylla, Brongt.</td>
<td>R</td>
<td>X</td>
</tr>
<tr>
<td>&quot; oblqua, Brongt.</td>
<td>R</td>
<td>X</td>
</tr>
<tr>
<td>&quot; rarinervis, Bumb.</td>
<td>R</td>
<td>X</td>
</tr>
<tr>
<td>Cyclopteris orbicularis, Brongt.</td>
<td>R</td>
<td>X</td>
</tr>
<tr>
<td>Dictyopteris munsteri, Eich., sp.</td>
<td>R</td>
<td>X</td>
</tr>
<tr>
<td>Sphenopteris tenuissima, Presl.</td>
<td>R</td>
<td>X</td>
</tr>
<tr>
<td>&quot; laurenti, Andree.</td>
<td>R</td>
<td>X</td>
</tr>
<tr>
<td>&quot; dilatata, L. &amp; H.</td>
<td>R</td>
<td>X</td>
</tr>
<tr>
<td>&quot; neuropteroides, Boul., sp.</td>
<td>R</td>
<td>X</td>
</tr>
<tr>
<td>&quot; trifoliata, Art. sp.</td>
<td>R</td>
<td>X</td>
</tr>
<tr>
<td>Corynepteris sternbergii, Ett., sp.</td>
<td>Y</td>
<td>X</td>
</tr>
<tr>
<td>&quot; corallides, Gut. sp.</td>
<td>Y</td>
<td>-</td>
</tr>
<tr>
<td>Diplomotema furcata, Brongt., sp.</td>
<td>Y</td>
<td>-</td>
</tr>
<tr>
<td>Alsthopteris longitica, Schl. sp.</td>
<td>Y</td>
<td>-</td>
</tr>
<tr>
<td>&quot; decurrens, Art. sp.</td>
<td>Y</td>
<td>-</td>
</tr>
</tbody>
</table>

Kidston, R., 23, pp. 311, 321; 27, pp. 46-9; 28, pp. 316, 355.
<table>
<thead>
<tr>
<th>Zone</th>
<th>Staffordian Series</th>
<th>Blackband Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

Desmopteris elongata, Presl.
Nemalopernum inflatum, Lescx. sp.
Sigillaria elongata, Brongt.
  Cordigera, Zeill.
  Tesselata, Stein. sp.
  Major, L. & H.
  Cumulata, Weiss.
  Mamillaris, Brongt.
  Scutellata, Brongt.
  Rugosa, Brongt.
  Tenuis, Achep. &
  Saulii, Brongt.
  Ovata, Sauv.
Asolanus camptotaenias, Wood.
Stigmaria ficoides, Sternb. sp.
  Minuta, Göpp.
  Lepidodendron aculeatum, Sternb.
  Terebratum, Sternb.
  Ophiurus, Brongt.
  Worheni, Lescx.
  Lanceolatus, Lescx.
  Similis, Kidst.
Lepidostrobus minor, Cop.
  Triangularis, Zeill.
  Morissianum, Lescx.
  Majus, Brongt. sp.
  Incertus, Lescx.
  Radians, Schimp.
  Lanceolatus, L. & H. sp.
Sigillariophyllum bicornatum, L. & H. sp.
Calamites suckowii, Brongt.
  Carinatus, Sternb.
  Unculatus, Sternb.
Annularia radiata, Brongt.
  Sphenophylloides, Zenk. sp.
  Asterophyllum equisetiformis, Schloes.
  Grandis, Sternb. sp.
  Charaformis, Sternb. sp.
Palaeostachya pedunculata, Will.
Plinaria capillacea, L. & H.
  Sphenophyllum cuneifolium, Sternb.
  Myriophyllum, Crépin.
  Trichomatosum, Stur.
  Emerginatum, Brongt.
Dorycordites palmaformis, Gut.
Cardites principales, Germ. sp.
  Borassifolius, Sternb. sp.
  Angulosstriata, Kidst.
Artisia approximata, Brongt. sp.
  Transversa, Art. sp.
Cordaicarpus cordai, Gein. sp.
  Aregatus, Bouń sp.
  Ovoideus, Göpp. & Berg.

* Recorded from the Staffordian Series (for the first time) in the present work. See floras of Northern and Central Areas, pp. 15-17.
† Recorded (Kidst. 16, p. 413) as S. tesselata, see Kidst. 23, p. 317.
‡ Recorded (Kidst. 16, p. 415) as S. siliimanii, see Kidst. 20, p. 577.
§ Recorded (Kidst. 16, p. 415) as S. scholethimii, see Kidst. 20, p. 576.
The flora of the New Rock and Vobster Series is seen to contain 14 Radstockian in association with 51 Yorkian (and Lanarkian) species.

The Radstockian species present are not only comparatively few, but are invariably of rare occurrence, many of the records being represented by a single specimen only.

Of the 51 Yorkian species recorded, most are unknown from the Radstockian Series, the remainder being extremely rare in those rocks.

In spite, however, of the preponderance of Yorkian plants in the New Rock and Vobster Series, the typical Yorkian assemblage cannot be recognised in the flora. Thus, (a) At least 37 species of Sigillaria are known which occur only in and below the Yorkian Series, and none of which are found in the New Rock and Vobster Series.

Further, the 11 Yorkian Sigillarias recorded above from the New Rock and Vobster Series are all rare or fairly rare in these rocks, whereas several are characteristically common in the Yorkian Series.

(b) With regard to the Sphenopteridae, constituting one of the main features of the Yorkian flora, and of which over 100 species are known only from or below that Series, 8 species only have been found in the New Rock and Vobster Series, and 6 of these are represented by a single specimen in our collection.

(c) The Yorkian Neuropterida here recorded are also rare, (whereas they are mostly common in that Series), and many other species of Neuropteris characteristic of the Yorkian Series are absent. It will be seen that these rocks contain a transition flora in which, though the proportion of Yorkian plants is large, a typical assemblage of that division cannot be recognised, and it is evident that THE NEW ROCK AND VOBSTER SERIES MUST BE REFERRED TO THE LOWEST GROUP OF THE STAFFORDIAN SERIES, NAMELY THE BLACKBAND GROUP.
This determination receives support by a comparison of the flora of the New Rock and Vobster Series with that of the Blackband Group of the Staffordian Series of other British coalfields. (columns 2 and 3 of Table III, above).

(5) THE PENNANT ROCK.

With regard to the horizon of these beds, Kidston (20, p.578) remarked that, "The few fossils I have been able to identify from the Pennant Rocks represent so few species that there is no palaeontological evidence available for deciding this point. If, however, we examine the fossil plants of the Upper Coal Measures which overlie the Pennant, and compare them with those of the New Rock Series on which the Pennant rests, and which is clearly transitionary between the Upper and Middle Coal Measures, the Pennant Rock of Somerset must obviously be either the basement beds of the Upper Coal Measures or the upper portion of the Transition Series."

We have few additions to make to the flora of the Pennant Rock, but, as the Farringdon Series (in the Northern Area) has been referred (above) to the Staffordian Series, it is evident that THE PENNANT ROCK OF THE NORTHERN AREA BELONGS TO THE STAFFORDIAN SERIES.

(6) THE UPPER BEDS OF THE "MILLSTONE GRIT".

Although comparatively few species of plants were collected from the upper beds of the "Millstone Grit", some are of very frequent occurrence.

*Sphenophyllum trichomatosum, Stur., is extremely common, and hitherto has not been found outside the Yorkian Series.

*Odontopteris conwayi, L. & H. sp., which is equally abundant,

---Stamp, (34, p.158) observes. "---In the Bristol and Somerset Coalfield the Pennant Grit occurs high up in the Staffordian", but cites no authority.
is known from the Yorkian Series only.

*Lepidodendron distans*, Lesq., is a characteristic Yorkian and Lanarkian plant, and has not hitherto been found above the Yorkian Series.

*Lepidophloios laricinus*, Sternb., occurs chiefly in the Yorkian Series, though it is found, very rarely, in the higher divisions.

*Calamites undulatus*, Sternb., is much more common in the Yorkian and Lanarkian Series than elsewhere.

*Lepidostrobus lanceolatus*, L. & H. sp., is frequent both in the Yorkian and the Lanarkian Series, and becomes rarer in the Staffordian Series.

*Stigmaria ficoides*, Sternb., sp., and *Sigillariophyllum bicarinatum*, L. & H. sp., are of no zonal value, as they occur more or less abundantly throughout the Coal Measures.

Observing the entire absence of Radstockian species in the above flora, together with the very common occurrence of certain typical Yorkian plants, although a rich variety of Yorkian species has not been found, the upper beds of the "Millstone Grit" of this district is provisionally referred to the Yorkian Series.

Thus, although lithologically the upper beds of the "Millstone Grit" of the Bristol and Somerset Coalfield resembles that of the North Midlands Coalfields, it appears to be palaeontologically referable to the Yorkian Series, as was shown by Goode (14, p. 275) to be true of the "Millstone Grit" of Pembrokeshire.

*Kidston, (28, p. 10) has remarked that, "The term "Millstone Grit" as frequently used in geological writings, has been applied very loosely to coarse sandstone beds belonging to the lower Carboniferous as well as to the upper Carboniferous, and their true geological position can only be determined by their fossil contents, frequently difficult to obtain". See also Arber, (3, p. 269) and Kidston, (26, p. 1065)
IV. GENERAL REMARKS ON DISTRIBUTION OF FLORA.

PTERIDOSPERMAE and FILICALES.

1. Pecopterideae. The Radstock Series is chiefly characterised by the presence of 16 species of Pecopteris, the most frequent of which are P. miltoni, P. arborescens, P. oreopteridia, and P. unita. Many of the Radstockian Pecopteris are found in the Farrington Series of the Southern Area, where, however, they are generally less frequent. In the Central Area, and in the Farrington Series of the Northern Area they are still less frequent. From the New Rock and Vobster Series only two Radstockian species of Pecopteris have been recorded, both being extremely rare, while the Yorkian plant, P. volkmanni, is found here.

Dactylotheca plumosa occurs throughout the coalfield, though it is more abundant in the Radstock Series than elsewhere. Dicksoniites pluckeii is nowhere common, and is confined to the Radstock and Farrington Series.

Moripteris muricata, widely distributed throughout the coalfield, is rare in the Radstock Series and becomes more frequent in the lower rocks.

2. Alethopterideae. Of the six species of Alethopteris known from the Radstock Series, only one, A. serlii, is common, and this is extremely abundant. It is less frequent in the Farrington Series, and especially in the Northern Area. In the New Rock and Vobster Series this typical Radstockian species is unknown, and the Yorkian plants A. lonchitica and A. decurrens are found. Desmopteris elongata is extremely rare.

3. Odontopterideae. Odontopteris lindleyana, found in the Radstock and Farrington Series at several localities, is rare, while O. alpina is known from one locality only. O. conwayi is very abundant in the upper beds of the "Millstone Grit" but has not been found elsewhere in the coalfield.
4. **Sphenopterideae.** While several species of *Sphenopteris* have been recorded from the Radstock and Farrington Series, nearly all are rare, the most frequent being *S. neuropteroides.*

In the New Rock and Vobster Series the Radstockian *Sphenopteris* are absent and are replaced by 7 rare or fairly rare species which are unknown from the Radstock Series.

The genera *Radstockia, Renaultia, Crossotheca* and *Unatheca* are rare.

5. **Neuropterideae.** In the Radstock and Farrington Series the genus *Neuropteris* is represented by six species, the most common forms being *N. macrophylla, N. scheuchzeri, N. ovata* and *N. flexuosa.*

These plants are absent from or very rare in the New Rock and Vobster Series, where *N. pseudogigantea* and *N. heterophylla* appear.

None of the species of *Dictyopteris* or *Rhaophyllum* is common or widely distributed.

6. **Fern Stems.** The genera *Megaphyton* and *Caulopteris* are restricted to the Radstock and Farrington Series, where they are of rare occurrence.

**SEMINA INCERTAE SEDIS.**

*Schizospernum noeggerathi* is confined to the Radstock and Farrington Series, *Holcospernum mammillatum* to the Central Area, *Radiospernum elongatum* and *Rhabdocalyptra lillianus* to the Farrington Series, and *Megalospernum inflatum* to the New Rock Series.

All the species of seeds found in the coalfield are more or less rare, and are restricted in horizontal distribution.

**LYCOPODIALES.**

(1) With regard to the *Lepidodendraceae,* *L. wortheni,* known from the Middle to the Upper Coal Measures, is the most common species throughout the coalfield. *L. aculeatum* and *L. lanceolatum* are also frequent in the Radstock and Farrington Series.

*L. loricatum,* a typical plant of the Transition Coal Measures,
appears in the Farrington Series.

L. simile, L. ophiurus, and L. obovatum are found in the New Rock and Vobster Series, where they are rare.

(2) The genus Lepidophloioös is extremely rare, and is recorded from two or three localities only.

(3) The commonest Sigillaria of the Radstock and Farrington Series is S. cumulata. Several species of Sigillaria are confined to the New Rock and Vobster Series, but none is frequent.

(4) Asolanus occurs at several localities but is very rare.

(5) While Sigillariostrobus has been found in the Radstock Series only, certain species of Lepidostrobus (L. minor and L. lanceolatus) occur throughout the coalfield, while others (L. morissianum and L. incertus) are restricted to the lower rocks, where they are rare.

EQUISETALES.

The genus Calamites is fairly rare, though certain species (C. suckowii and C. carinatus) are found in each Series. C. undulatus, extremely rare in the Radstock Series, is more frequent in the New Rock Series.

Asterophyllites equisetiformis occurs, though rarely, throughout the coalfield, while A. grandis and A. characiformis are restricted to the New Rock Series.

Annularia stellata and A. sphenophylloides, common and characteristic plants of the Radstock Series, are less frequent in the Farrington Series, and the former is unknown while the latter is extremely rare in the New Rock and Vobster Series. A. radiata appears in the Farrington Series of the Northern Area and becomes more frequent in the New Rock Series. The fructifications of Calamites are rarely found.

SPHENOPHYLLALES

The genus Sphenophyllum is represented in the Radstock Series by S. emarginatum, a common and characteristic plant. This
species is rarer in the Farrington Series, extremely rare in the New Rock Series and absent from the Vobster Series. S. majus and S. cuneifolium appear in the Farrington Series, and the latter becomes much more frequent in the New Rock and Vobster Series, where it is joined by S. myriophyllum and S. trichomatosum. The last, which is rare in the New Rock Series, is found, in great abundance, in the upper beds of the "Millstone Grit".

CORDAITALES.

Cordaites angulosostriatus, a common and characteristic plant of the Radstock Series, is rarer in the lower rocks, where C. borassifolius and C. principalis occur. Poacordaites microstachya is confined to the Radstock and Farrington Series.

Cordaicarpus areolatus and C. cordai are known only from the New Rock Series, where they are rare.

It will be seen that each Series in the Bristol and Somerset Coalfield contains a distinctive flora by which it can be readily identified.

The writer endeavoured to test the value of the flora accompanying the individual coal-seams as a means of identifying them from place to place. The results, however, though not conclusive, were so variable that the flora appears to be of little value for this purpose in the Bristol and Somerset Coalfield.

* This conclusion was also arrived at with regard to the Radstock Series by Greenwell and M'Murtrie ("On the Radstock Portion of the Somerset Coalfield", 1864, Newcastle-upon-Tyne, p.20).
V. SUMMARY AND CONCLUSIONS.

(1). With the additional species recorded in Part II of this work, the known flora of the Bristol and Somerset Coalfield has been increased as follows:

- New records from various localities: 444.
- New records from the Coalfield: 79.
- New records from Great Britain: 8.
- New species (described and figured): 2.

In addition, many species which are already known from particular localities in the Coalfield are recorded for the first time from definite horizons.

(2). The known vertical distribution of 45 species has been extended to the Staffordian Series.

(3). Palaeobotanical horizons have been determined as follows:

<table>
<thead>
<tr>
<th>Location</th>
<th>Previous determination</th>
<th>Present determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>RADSTOCK SERIES.</td>
<td>Upper Coal Measures</td>
<td>Radstock Group of the Radstockian Series.</td>
</tr>
<tr>
<td></td>
<td>(= Radstockian Series)</td>
<td>(Kidston, 1887)</td>
</tr>
<tr>
<td></td>
<td>Radstock Group</td>
<td>Keele Group of the Radstockian Series.</td>
</tr>
<tr>
<td></td>
<td>of the Radstockian</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Series</td>
<td></td>
</tr>
<tr>
<td>Southern Area</td>
<td>ditto.</td>
<td>Newcastle-under-Lyme Group of the Staffordian</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Series.</td>
</tr>
<tr>
<td>FARRINGTON SERIES.</td>
<td>unknown.</td>
<td>Newcastle-under-Lyme Group of the Staffordian</td>
</tr>
<tr>
<td>? Central Area</td>
<td></td>
<td>Series.</td>
</tr>
<tr>
<td></td>
<td>Upper Coal Measures.</td>
<td>Newcastle-under-Lyme Group of the Staffordian</td>
</tr>
<tr>
<td>Northern Area.</td>
<td>(Lillie, 1910)</td>
<td>Series.</td>
</tr>
<tr>
<td>PENNANT ROCK.</td>
<td>Either basement beds</td>
<td>(In Northern Area)</td>
</tr>
<tr>
<td></td>
<td>of Upper Coal Measures</td>
<td>Staffordian Series.</td>
</tr>
<tr>
<td></td>
<td>or upper portion of</td>
<td>(In Northern Area)</td>
</tr>
<tr>
<td></td>
<td>Transition (=Staffordian Series)</td>
<td>Staffordian Series.</td>
</tr>
<tr>
<td></td>
<td>Staffonian Series.</td>
<td>(Kidston, 1894).</td>
</tr>
<tr>
<td>NEW ROCK AND VOBSTER SERIES.</td>
<td>Transition (=Staffordian Series)</td>
<td>Blackband Group of Staffordian Series.</td>
</tr>
<tr>
<td></td>
<td>(Kidston, 1894).</td>
<td></td>
</tr>
<tr>
<td>UPPER BEDS OF &quot;MILLSTONE GRIT&quot;.</td>
<td>unknown.</td>
<td>(probably) Yorkian Series.</td>
</tr>
</tbody>
</table>
The late Dr. Kidston expressed entire agreement with the above results, and I gladly record my indebtedness to Dr. Kidston for his assistance and encouragement in the work.

My thanks are also due to Miss E. M. Lee for continued help, and to Professor Darbishire for his interest and advice.

I have again to thank the Bristol University Colston Research Society for defraying the cost of travelling when collecting specimens.

During the course of this investigation I have been in receipt of a maintenance grant from the Department of Scientific and Industrial Research.

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LITERATURE CITED.

The following works and papers are referred to in the text by serial numbers given after the author's name:—


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EXPLANATION OF PLATES

Plate I.
Geological Map of the Somerset and Bristol Coalfield. Reduced (x 3) in photographing from drawing.

Plate II.
Fig.1. - Horizontal Section from Combe Down, near Bath, to Chewton Mendip. Reduced (x 3) in photographing from drawing.
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(All figures reduced, x 4, in photographing from drawing.)

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PLATE XVIII.

(All figures reduced, x 4, in photographing from drawing.)

Fig. 1. - *Diplatema sp.*, from Norton Hill Pit, Midsomer Norton, x 2 (No. 657).

Fig. 2. - *Sphenopteris sp.*, from Norton Hill Pit, Midsomer Norton, x 4 (Specimen given to Kidston Collection).

Fig. 3. - *Lepidostrobus majus*, Brongt. sp., from Newbury Pit, x 2 (No. 1799).

Fig. 4. - *Lepidostrobus incertus*, Lesq., from Deep Pit, Kingswood, Bristol. x 2 (No. 1807).

Fig. 5. - *Lepidostrobus morissianum*, Lesq., from Deep Pit, Kingswood, Bristol. x 2 (No. 1734).
  " " sphenophylloides, Zenk. sp., Pt.I, p. 150, 154, Pt.II, p. 27.
  " " longifolius, Zeiller, Pt.I, p. 150, 152.
  " " sphenophylloides, Zenk. sp., Pt.I, p. 150, 154, 155.
  " " sphenophylloides, Zenk. sp., Pt.I, p. 150, 154, 155.
  " " chamaeformis, Sternb. sp., Pt.I, p. 3, 10, 27.
  " " longifolius, Sternb. sp., Pt.I, p. 3, 10.
  " " Artisia approximata, Broagt. sp., Pt.I, p. 156.
  " " " transversa, Art. sp., Pt.I, p. 156.
  " " suckowi, Brongt., Pt.I, p. 150, 152, 154, 155, 156.
  " " principalis, Germar, Pt.I, p. 151, 156, 175, Pt.II, p. 28.
  " " areolatus, Boul. sp., Pt.I, p. 150, 156.


Diplopteris furcatum, Brongt.sp., Pt.I,p.154,162.


Desmopteris elongata, Presl.


Dolophyllum sp., Pt.I,p.150,153,154,156.


  " fimbriata, Lesq.,
  " schielsani, Stur,
  " spiropteris
  " cf raymondii, Zell.
  " pseudocigantea, Pot.,
  " heterophylla, Brongt.,
  " obliqua, Brongt.,
  "
  "
  "
  "
  "

  " alpina , (Sternb) Gein. sp.,
  " conwayi, L & H sp.,
  "

Oligocarpia bronchiarti, Stur, Pt.II. p.1,5.


  " arborescens, Schl.sp.,
  " miltoni, Art.sp.,
  " " forma abbreviata,
  " unata, Brongt.,
  " eyathea, Schl.sp.,
  " greuneata, Brongt.,
  " Sp.,
  " oreopteridia, Schl.sp.,
  " bucklandii, Brongt.,
  " candolliana, Brongt.,
  " volkmanni, Sauv.,

Poacordaites microstachys, Gold.sp., Pt.I. p.150,152,154,155,156,173, Pt.II.p.28.

Pinnularia capillacea, L & H .
  " columnaris, Art.spx,

Radiospermum ? grande, Arber, Pt.II.p.2.
  " sp.,
  " perpusillum, Lesq. sp.,
  " elongatum, Arber.


Radstockia sp., Pt.I p.150,151.
  " sphenopteroidee, Kidst. sp., Pt.II.p.2,5.

  " sp.,

Rhaeophyllum spinosum, Lesq., Pt.II.p.2.
  " goldenbergii, Weiss,
  " filiciforme, Gut.sp.,


  " M'Urtriei, Kidst.,
  " nortemensis, n.sp.,
  " ovata, Sauv.,
  " Kumulata, Weiss, var. nodosa L & H ,
  " major, L & H .

10 Neuropteris macrophylla, Brongt.,
  " fimbriata, Lesq.,
  " schielsani, Stur,
  " spiropteris
  " cf raymondii, Zell.
  " pseudocigantea, Pot.,
  " heterophylla, Brongt.,
  " obliqua, Brongt.,
  "
  "
  "
  "
  "

  " alpina , (Sternb) Gein. sp.,
  " conwayi, L & H sp.,
  "

Oligocarpia bronchiarti, Stur, Pt.II. p.1,5.


  " arborescens, Schl.sp.,
  " miltoni, Art.sp.,
  " " forma abbreviata,
  " unata, Brongt.,
  " eyathea, Schl.sp.,
  " greuneata, Brongt.,
  " Sp.,
  " oreopteridia, Schl.sp.,
  " bucklandii, Brongt.,
  " candolliana, Brongt.,
  " volkmanni, Sauv.,

Poacordaites microstachys, Gold.sp., Pt.I. p.150,152,154,155,156,173, Pt.II.p.28.

Pinnularia capillacea, L & H .
  " columnaris, Art.spx,

Radiospermum ? grande, Arber, Pt.II.p.2.
  " sp.,
  " perpusillum, Lesq. sp.,
  " elongatum, Arber.


Radstockia sp., Pt.I p.150,151.
  " sphenopteroidee, Kidst. sp., Pt.II.p.2,5.

  " sp.,

Rhaeophyllum spinosum, Lesq., Pt.II.p.2.
  " goldenbergii, Weiss,
  " filiciforme, Gut.sp.,


" transversalis, Bgt. var. sparsifolia, Boul., Pt. I. p. 153, 166


" sp., Pt. I. p. 148, 150, 156.

Sigillariostrobus sp., Pt. I. p. 150.


" forma saxifragaei, Stb. sp., Pt. I. p. 154, 156.


" oblongifolium, Germar, Pt. II, p. 3, 11.


Fig. 1. Sphenopteris Neuropteroides, Bouček, SP.

Fig. 2. Sphenopteris SP.

Fig. 3. Sphenopteris SP., Kudr., SP.

Fig. 4. S. Dilatata, L. & H. SP.

Fig. 5. Rhodea SP.

Fig. 6. Sphenopteris SP.

Fig. 7. Neuropteris SP.

Fig. 8. S. Sauveuri, CHR.

Fig. 9. Sphen. Alata, B.B.
PLATE VII

FIG. 1. MARIOPTERIS MURICATA, SCHL. SP.

FIG. 2. DOLEROPHYLLUM SP.

FIG. 3. DICTYOP. MÜNSTERI, CICH. SP.

FIG. 4. RHAC. SPINOSUM, LEGG.

FIG. 5. CYCLOP. ORBICULARIS, BATE.

A

B

FIG. 7. ODONTOP. LINDLEYANA, STR.
Fig. 1. CAULOPTERIS ANGLICA, N-rich.

Fig. 2. MELOGLOLUS INFLATUM, LEAD. S.

Fig. 3. HOLCOSPERMUM SP.

Fig. 4. SAMAROPSIS SP.

Fig. 5. CORDAIкарп. ARGOLATUS.

Fig. 6. SAMAROPSIS SP.

Fig. 7. CYCLOPTERIS SP.
PLATE XI

FIG. 1. ANNULARIA STELLATA, SCHL. SP.

FIG. 2. A. RADIATA, BAGN. SP.

FIG. 3. A. STELLATA, SCHL. SP.

FIG. 4. CALAMITES UNDULATUS, EAY.

FIG. 5. ASTEROPHYLLITES EQUISITIFORMIS, SCHL. SP.

FIG. 6. MACROSTACHYA INFUNDIBULIFORMIS, OOT. SP.

FIG. 7. CALAMITES SP.

FIG. 8. ANNULARIA SPHENOPHYLLOIDES, EAY.

FIG. 9. SPHENOPHYLLUM MYRIOPHYLLUM, CRENN.
FIG. 1. *Sphenophyllum emarginatum*, Bremer.

FIG. 2. *Sphenophyllum cuneifolium*, Stw. sp.


FIG. 4. *Poacordaites microstachys*, Gold. sp.


