

tend throughout the lower levels towards the Jordan and Brighton.

From the character of the beds and their fossil contents, they may have formed part of the Richmond group.

The following contains particulars of the section sunk by Mr. Brock at Compton:—

SECTION OF BROCK'S COAL SHAFT AT COMPTON, OLD BEACH.

(a)	Sandstone...	...	...	...	...	—
	Sand	...	...	...	...	8.9
	Clay	...	...	...	...	6.0
	Grey shale	...	...	...	...	12.0
(b)	Hard laminated blue and grey shales, with impressions of <i>Zeugophyllites</i> <i>elongatus</i> , <i>Phyllothea Hookeri</i> , and <i>Thinnfeldia obtusifolia</i>					6.0
	Red friable shales	...	...	...	...	5.0
	Carbonaceous shales	...	...	...	...	0.3
(c)	Coal	...	...	...	...	2.0
	Carbonaceous shales	...	...	...	...	0.3
(d)						40.3
	Grey friable clay...	...	...	...	...	—
	With <i>P. Hookeri</i>...	...	...	...	...	—

REMARKS ON THE LONGFORD COAL BASIN.

By ROBT. M. JOHNSTON, F.L.S.

The Norwich coal seams near Longford, opened out by Mr. Mason and others, have only been discovered recently, although the existence of the Mesozoic Coal Measure Sandstones in the immediate neighbourhood—notably at Hadspen—had long been known.

The exact extent of this basin of coal has not yet been determined. A glance at the geological sketch map, coloured yellow, shows that nearly the whole of the plains north of the Western Tiers, drained by the Tamar and its tributaries, are superficially composed of sedimentary deposits belonging to an ancient lake or water system of Palæogene age (Lower Tertiary), which deposits were minutely described by the writer in 1873 and 1874, and termed the Launceston Tertiary Basin.*

These Tertiary rocks, with their accompanying intrusive sheets of basalt, together with deposits of tuffs, overlie and conceal the rocks of Mesozoic and Palæozoic age, as in parts of the Derwent Valley Basin.

Rocks of Mesozoic and Upper Palæozoic age are to be found everywhere bordering this ancient Tertiary Lake Basin, and even near its centre, as at Hadspen, Corra Lynn,

*Proc. Roy. Soc. Tas., 1873, pp. 39-47; 1874, pp. 53.62.

and Hunter's Mill, Perth, these systems crop up in limited patches.

That the rocks of both Mesozoic and Upper Palæozoic age are most intimately associated with the overlying Tertiaries is apparent from the great abundance of water-worn pebbles of silicified coniferous woods similar to those of the Jerusalem Basin, and also from the abundance of water-worn fragments of the *Fenestella* mudstones which testify of the close neighbourhood of the parent rock from which they were derived.

The great undulating plains, nowhere ranging much above or below from 500 to 800 feet above sea level, are bounded by the northern face of the Western Tiers as by a mountain wall, and suggest the shore line of an ancient plane of marine denudation. The fringe of marine beds of Upper Palæozoic age, everywhere found along the base of the Central Plateau, also support this idea, although it must be confessed that the evidence of lines of fault running almost parallel with the direction of the margin of the elevated plateau, and throwing the latter up to a great height, greatly complicates the solution of this question.

The coal seams, composed partly of dull and partly of lustrous bands, occurring at Norwich, are of somewhat similar character to certain seams in the Fingal Basin, and however related in point of sequence, it is clear from the abundance of the typical plants, *Zengophyllites elongatus*, (Morris), *Alethopteris Australis* (Morris), *Thinnfeldia obtusifolia* (Johnston), etc., that they belong to the same great Mesozoic system. There are also forms occurring in the greyish white shales at Norwich, which, as yet, have not been disclosed in the members of otherwise closely related basins of the same system.

The following is a more complete list of the plant forms identified by me in the shales associated with the coal seams at Norwich :—

FILICES.

- Sphenopteris lobifolia*. Morris.
- Thinnfeldia oblusifolia*. R. M. Johnston.
- ” ” *media*. Ten. Woods.
- Pecopteris caudata*. R. M. Johnston.
- Alethopteris Australis*. Morris.
- Danæa* (*Tæniopteris*) *Morrisiana*. R. M. Johnston.

Equisetaceæ.

- Phyllothea Australis*. Brongt.
- ” ” *Hookeri*. M'Coy.
- Annularia*. Sp. indet. (Seed).

Coniferae ?

- Zeugophyllites elongatus*. Morris. (Very abundant.)

Mr. Blanch Brain has also provided me with additional

information regarding the various beds associated with the coal seams. The principal seam crops out near the Longford and Muddy Plains Road in a creek which runs a somewhat sinuous course, in a narrow shallow valley, between low flattened hills and ridges of greenstone rock. As yet, the ground has not been fully explored, and the relation of the coal measures to the greenstones are not satisfactorily determined, that is—it has yet to be shown whether the greenstones have intruded and spread as caps over the coal measures, or whether the latter forms a small protected basin abutting and running out against the former.

In the latter case the extent of the basin north and east would be very limited or greatly broken up. Mr. Brain has ascertained that the principal seams tend to thin out northward against the neighbouring greenstone hills, while shafts sunk southward on the property of Messrs. Wise and Mason prove the gradual thickening of the seams in a southerly direction, towards which they gently dip. This circumstance had given hopes to many that the beds might be found extending in the direction of the Longford Plains, where there is a great expanse of country apparently undisturbed by intrusive greenstones, although superficially occupied by a great thickness of Tertiary beds composed of clays, lignites, pebble drift, sandstones, etc.

Mr. Ritchie and others have tested the underlying rocks at Longford to a depth of nearly 600 feet by means of the diamond-drill, but with the exception of a greyish sandstone at the greatest depth, whose position is doubtful, the core throughout consisted of sections of the well-known members of the Launceston Tertiary Basin. Bands of lignite, clays, and sandstones, with impressions of *Betula Launcestonensis* (Johnston), and other well-known Tertiary plants, were very common throughout the whole depth of the respective bores. There was nothing to be found in the character of the lowest rocks, composed of a blue or greyish sandstone, which would enable anyone to determine whether it belonged to the Tertiary group or to an older system.

The coal measures may yet be discovered at a greater depth at Longford, although, like at Hunter's Mill, Perth, it is possible that the Mesozoic rocks may have thinned out against the mudstones of Upper Palæozoic age. If coal had been struck at Longford there would be some probability that valuable coal seams existed underneath the greater part of the undisturbed plains of the Launceston Tertiary Basin.

About four shafts, from 20 to 70 feet in depth, have been sunk to the coal seams at Norwich, and a limited quantity of coal has been raised from the principal seam, which varies from 3 to 4 feet in thickness, and the coal, though often

friable, is of very fair quality. In working eastward from the middle shaft there is a curious sign of disturbance, which has bent the seam suddenly into a sharp rounded saddle, and although the continuity of the seam was unbroken, the coal was very much crushed at the sharpest parts of the flexure. It is evident from this that the coal measures have been subject to violent pressure laterally since their deposition. It is impossible to say whether this force was associated with the outbursts of the earlier greenstones or with the later Tertiary basalts, which are also of great extent in the neighbourhood of Evandale and Breadalbane.

The following particulars relating to sections of shafts at Norwich have been supplied to me by Mr. Brain:—

EAST END SHAFT (MASON'S).

	Feet.	In.
Common yellow clay	6	0
Brown coaly shale	0	3
Yellowish or white soapy clay, more or less laminated	6	0
Shaly or rotten coal	1	0
Greyish white clay, with plant remains	2	11
Coal with dull and lustrous bands ...	3	10
	<hr/>	<hr/>
	20	0
Fine-grained greyish sandstone ...	—	—

MIDDLE SHAFT (MASON'S).

<i>Shaft.</i>	Feet.	In.
Common yellow clay	6	0
Brown coaly shale	0	4
Yellowish or white soapy clay, more or less laminated	6	0
Hard bluish shale, with <i>Zeugophyllites elongatus</i> in great abundance ...	4	0
Lustrous coal	0	3
Hard bluish slate, with <i>Zeugophyllites</i> , etc.	2	0
Lustrous coal	—	4
Blue shale... ..	1	6
<i>Bore.</i>		
Coarse grey sandstone, in which bore was sunk to a depth of	11	9
	<hr/>	<hr/>
	32	2

SOUTH BORE HOLE (MASON'S).

	Feet.	In.
Yellowish clay	4	0
Iron gravel	1	0
Yellow clay	3	0
Coarse grey sandstone	10	0
Blue, hard shale, with plant impressions	0	6

Coal...	...	...	...	...	3	0
Blue clay shales	...	...	...	...	0	3
					21	9
Fine grey sandstone	...	...	...	...	—	—

WISE'S SHAFT.

					Feet.	In.
Yellowish-white clay, more or less laminated with impressions of <i>Zeugophyllites</i> , etc....	...	...	...	...	65	0
Coal	...	...	...	...	4	0
					69	0
Sandstone	...	...	...	...	—	—

FRESH CONTRIBUTION TO OUR KNOWLEDGE OF THE PLANTS OF MESOZOIC AGE IN TASMANIA.

By R. M. JOHNSTON, F.L.S.

Certain beds of the well-known grey shales have recently been exposed at Lord's Hill, New Town, by Mr. Dorman, builder, who kindly afforded me every facility for their examination. These beds are intimately associated with the beds containing the coal seams at New Town, and as they were unusually full of impressions of plant remains, I spent several days in making collections and in thoroughly examining the numerous forms. The results have far surpassed my utmost expectation, for in the following pages I shall be able to show that about 15 forms of great interest, new to science, have been added to the list of the Mesozoic plants of this island.

The cycadeous and coniferous plants especially are very important, and are more fully discussed under the section where they are specifically classed and described. The genus *Baiera* is of more than ordinary interest, as I was fortunate in obtaining both the male and female fructification attached to the pedicels of the plants, which are very numerous in these shales, and share with *Thinnfeldia obtusifolia*, Johnston; *Alethopteris Australis*, Morris; *Neuropteris Tasmaniensis*, Johnston; *Pterophyllum Strahani*, Johnston, in being the most abundant and typical of the numerous forms of plants occurring in great perfection in the shaly beds at the place indicated.

The following is a more complete list of the species observed by me at this place, all of which were obtained within the space of a few yards in width and one or two feet in