

ART. XIV.—*On the Carboniferous and other Geological Relations of the Maranoa District in Queensland in Reference to a Discovery of Zoological Fossils in Wollombilla Creek and Stoney Creek, West Maitland.* By Rev. W. B. CLARKE, M.A., F.G.S., &c.

[Read 30th December, 1861]

In the admirable inaugural address delivered by His Excellency, the President of the Royal Society of Victoria, at the beginning of the present year, some remarks were made respecting the probable future discovery of further evidence of the existence of true Secondary or Mesozoic formations in Australia. The existence of the middle division of those formations, as supposed to be exemplified by the coal measures of New South Wales, has been disputed by me, and that upon grounds which have already, in part, been laid before this Society, and in publications of other kinds.

Strictly speaking, the existence of *Mesozoic formations* has not been disputed by me; all that my proposition amounts to is the denial that the coal beds of New South Wales are *Oolitic*, and that up to a certain date (August, 1860), no one had detected a jurassic fossil in any part of Australia.* Sir Henry Barkly, in dealing with this statement, pointed out that *since it was made*, certain fossils had been discovered at Bellerine (which might be either *Oolitic* or *Triassic*), viz., species of *Zamites*, and that subsequently *Mesozoic Unios* had been detected at Portland Bay coal-fields.

Well established facts of such kinds must have their due weight; but whilst they bear upon a general declaration as to the non-detection of fossils of *Mesozoic* age up to a certain period, they leave the particular facts relating to the coal-fields of New South Wales untouched.

The correlation of those coal-fields with certain alleged *Oolitic* coal-fields of Europe, India, and America, has, however, lately received some discouragement from the results of examinations undertaken by competent Palæontologists. And—as appears in the number of the *Quarterly Journal of the Geographical Society of London*, published in August,

* Southern Gold-fields, p. 252.

*To accompany Mr Clarke's paper
on Coal seams at Stony Creek. N. S. W.*

SECTION FROM SEA LEVEL AT MAITLAND TO ANVIL CREEK EXHIBITING THE POSITION
OF COAL SEAMS BEDDED WITH PALAEOZOIC ROCKS

LENGTH 13 MILES. VERTICAL SCALE 384 F. TO AN INCH.

W. B. C.

COAL PITS AT STONY CREEK N.S. WALES, (NEAR WEST MAITLAND,

SCALE 24 FEET TO ONE INCH.

Dip E by S.

Pit B begins

Pit A begins

Pit B ends

1. Reddish surface Clay.
2. Ferruginous Clay.
3. Gray grit and conglomerate of quartz porphyry, so sandstone and seamy clay muddy and blue; consistency variable. Full of *Spirifers*, *Fenestellae*, *Comatariæ*, *Orthoceras*, *Asteridae*; with bands of Shale with *Cyclopteris*, Fossil wood and patches of coal interspersed in the conglomerate.
4. Same as above but with more Shale either mixed with the pebbles or distinct and associated with coal pipes and fossils.
5. Yellowish gray grit with large shells *Fenestellae*, *Inoceramus*, *Comatariæ* so passing to gray grit and conglomerate like those of Newcastle; patches of calcareous rock with *Endoceras* and pebbles; at 100 feet fossil wood and coal; at 104 feet water where the rock becomes a brownish white sandstone.
6. Conglomerate with vegetable impressions in light blue shale, amidst it and a few *Spirifers*.
7. Rotten soft decomposing conglomerate of a greenish hue with *Spirifers*, coal pipes, shale, fossil wood and ironstone. Shale obliged to be limeised.
8. Very hard fine conglomerate with coal pipes, passing to grit.
9. Coarse conglomerate with pebbles of flinty rock and unrolled fragments of sandstone.
10. Grit with well rounded pebbles, slightly ferruginous.
11. Coal seam 5 feet 7 inches S.G. 1.281; charcoal of *Glossopteris*, chiefly cannel coal.
12. Shale or clay, two feet thicker in Pit A than in Pit B. Fern leaves and stems abundant.
13. Bright soft coal, reduced to 1 foot in Pit A.
14. White clay. Sandy.
15. Clay and sandy shale.
16. Cannel coal passing to splint. Top of working seam in Pit A.
17. Sandstone band reduced to two feet in Pit A.
18. Coal.
19. Blue clay; in Pit A full of *Glossopteris*, *Phyllothea* and leaves of *Neggerathia*.
20. Very hard conglomerate.
21. Ironstone band.
22. Conglomerate.
23. Coal.
24. Blue clay, full of large *Glossopteris* leaves so same as end N/2.
25. Boring. Fine conglomerate and clay intermixed; continued to depth of 50 feet.

1861—the tendency of present opinions is to remove the alleged *Oolitic* coal to a *lower horizon*. Thus Sir C. Bunbury considers the *Glossopteris* and *Phyllothea* beds of India as either Palæozoic or Mesozoic, the “*question*” being “*an open one*.” Mr. Hislop considers that these beds, together with those of New South Wales, “probably represent the Jurassic (or possibly the *Triassic*) period.” Professor Huxley, examining the reptilian remains of the Bengal coal-fields, pronounces them to have a connection with the reptiles of the African Karroo beds (in which *Glossopteris* occurs), and that the rocks in which these reptilian remains occur are probably “*Triassic or perhaps of Permian age*.”*

Sir Charles Lyell has already surrendered the reputed “*Oolitic*” coal of Virginia to the *Trias*, and Dr. Oldham, in India, maintains, that the India and New South Wales coal is even older than that.

Whilst then advocating my own view of the probable age of the coal-beds of New South Wales, from the fact, that the vegetable fossils, which are taken as the datum for the *Oolitic* age of the coal, have been traced into a position between rocks assigned, from their distinctive zoological fossils, to be as low as the “base” of the old “*Carboniferous system*,” I have not been indifferent to the opinions or determinations of others with respect to the younger period assigned by them to the disputed beds.

Under the influence, therefore, of a hearty desire to co-operate in the endeavour to ascertain the truth of opinions, promulgated on one hand or the other, as affects the succession of geologic epochs in Australia, I requested a friend, who is resident in the Maranoa district (now a portion of the new colony of Queensland), to search the rocks in his district, and to forward to me any fossils that he might discover, having been led to consider it likely that, under the wide-spread tertiary deposits of the plains westward of Darling Downs, if any where, traces of formations of Mesozoic age would be discovered.

I was induced to look in that direction from circumstances which it may be well to mention. On the return of the late Sir T. Mitchell from his survey of the head of the Victoria, and on the subsequent return of the late Mr. Kennedy, I had an opportunity of inspecting a few of the specimens collected by them, consisting chiefly of fossil

* Abstracts of Proceedings. No. 63. Session 1861-2.

wood, and of some concretions of a peculiar kind, such as I had not seen in any part of the colonies traversed by myself.* After the publication of Sir T. Mitchell's report, I found that he had placed on one of his charts the word "*Belemnite*," and as all his collections had been placed in the British Museum, I wrote to the Very Rev. Dr. Buckland to ask him to ascertain for me whether such a fossil had been sent from Australia. The silence of my friend was accounted for by his subsequent illness and death. I then renewed my request to Professor Owen, but to this hour I have not heard a syllable on the subject of the fossil in question, the geological age of which I was anxious to determine, and which I thought might have been an *Orthoceratite*. All the further light that I had been able to procure, respecting the formations between Darling Downs and the rivers diverging on the parallel of 25° S. and the country up to 24° S., centred on the conviction that a very extensive carboniferous formation existed in that region, and that in certain localities equivalents of the Newcastle coal beds existed, whilst the higher points of the formation were much more allied to what I have denominated the Wianamatta and Hawkesbury rocks.† There were also, it appeared to me, certain differences for which, in absence of reliable knowledge, I could not account. I was in great doubt, in consequence, whether, besides rocks of Permian age, the existence of which I believed to be probable from some fossils I had received from the country between the river Claude and the "Newcastle" coal-beds of the Mackenzie, and which is geologically, as I believed, above the latter, there might not be other beds of still more recent age. The investigations I had myself made along the Condamine proved to me that the coal of that region was *higher* in level than the Moreton Bay coal, or the coal seams of the Hunter River and Illawarra, and I also concluded that it belonged to a geologically higher portion of the series, inasmuch as, though bearing strong resemblance to some portion of the carboniferous series on the eastern side of the Cordillera, and containing fossils known therein, it did not exhibit those *peculiar* genera of plants which distinguish the beds of Newcastle and Illawarra, although some of the plants appeared to be identical. Thus, I did not find *Gloss-*

* See Kennedy's Diary, with notes by myself, Journal of the Royal Geographical Society, vol xxii.

† See Southern Gold-fields, pp. 247-249.

opteris, *Vertebraria* or *Phyllothea*, though *Sphenopteris* was abundant. I reported the existence of this coal-field and the resemblance of some of the beds to those of the Hawkesbury, in my Report, No. X. (14th October, 1853), to the Government of New South Wales.*

It did not surprise me to find coal without *Glossopteris* in Darling Downs, since I knew of its existence in the Hawkesbury rocks under similar circumstances.

The researches of Mr. Gould, in Tasmania, have shown that coal exists, not only in beds allowed to be parallel with those of Newcastle, in New South Wales, but in the beds along the Mersey, which are the equivalent of those on the Hunter, considered to be on the horizon of the base of the old "Carboniferous system" of Ireland. And I was glad to find that Mr. Gould† confirmed my own statements respecting the latter fact, made on the spot in 1860, considering, as I did, that the Mersey rocks were in the same position as those at Stony Creek, near West Maitland.

I have since, and only by the last mail, learned that coal, in association with "Carboniferous fossils," has been detected in Western Australia; whilst, in another part of that colony, Ammonites and Trigonizæ have been found, and have been referred to "probably the Cretaceous formation."‡

When there, my friend, Mr. W. P. Dawson, of Wollumbilla, on the Yaboo River, sent me a collection of fossils from the eastern part of the Maranoa district, and which I recognised as Mesozoic, though, at first, I considered them, from the occurrence of certain genera and other particulars, to be at the base of the Cretaceous system, and which I afterwards found to be incorrect. I saw at a glance that it was possible they might illustrate some portion of the series from the Wianamatta beds downwards, and knowing the deep interest which His Excellency takes in the subject, I reported them to him, and suggested that I should be willing and ready to forward them for the examination of Professor M'Coy, to whom they were most appropriately submitted, considering the interest he also has in the question, and the fact that most of the previous palæontological determinations, on which a controversy hinged, had

* Geology of Basin of the Condamine River. Blue Book, December 1854, p. 33, 34.

† Report to Government of Tasmania.

‡ Letters from Geological Society, June 1861.

been made by himself. And, whatever be his determination as to the age of these fossils, I cannot but express my thanks publicly to him for undertaking the inspection of them.

Should they eventually be found to occupy a position in any Wianamatta or Hawkesbury rocks, then, of course, an alteration must be made in that part of the series which I now consider to be persistent. But the fact still insisted on, that the genera, chiefly distinctive of the age of the Newcastle coal, viz., *Glossopteris*, *Phyllothea*, &c., are found in beds interpolated between those ranked with the base of the old "Carboniferous system," cannot be so disposed of. At the time of writing this, being in ignorance of the epoch to which Professor M'Coy eventually assigns the Wollumbilla fossils, I can add no more than that I believe them, from all the information I possess, to be above the horizon of the New South Wales coal along the coast. I have only been informed that he considers they are "*probably Triassic*." If so, I can understand their influence upon previous opinions, and shall be ready to arrange the coal-bearing rocks in consonance with such evidence as they may supply. The New South Wales series admits of certain divisions, which I have marked in my present arrangement, there can be no difficulty, therefore, on that head. And should further investigations, which I have done my best to institute, cause me to modify the views which I have hitherto entertained, in accordance with the fresh light now coming upon us, I shall be quite satisfied with having been the chief agent in the discovery of the data upon which much of the history of the Carboniferous rocks of Australia depends.

Seeing, that in New Zealand Dr. Hochestetter discovered Permian fossils, and a formation which Viscount d'Archiac considers may be "Oxfordian,"* having also examined reptilian remains from that country, which appear to me to be as high up as the base of the Cretaceous system (viz., vertebræ,† which much resembled those of *Plesiosaurus pachyomus*), and recollecting that Mr. Mantell had already determined the existence of Cretaceous rocks in the district from which the reptile comes; further, learning that in New Guinea‡ a portion of the Jurassic formation has been

* Progres de la Géologie. Tom. VIII.

† I forwarded a cast of these to the President at the time.

‡ See "Contributions to the Knowledge of New Guinea." By Dr. Solomon Müller. Journal Roy. Geogr. Soc., vol. xxviii., p. 268.

supposed to be detected, I shall have no difficulty in admitting, on sufficient evidence, the existence of any portion of the Mesozoic rocks in New Holland, whether upper, middle, or lower. And although I have maintained with some earnestness certain opinions as to the age of the New South Wales coal-beds, and those, too, in accordance with similar opinions as strenuously maintained by other observers; yet, if the evidence already possessed be overweighed by fresh light, it will be no part of my philosophy to resist the force of it.

I will now enter upon a few remarks relating to the district in which the Wollumbilla fossils were found, with some particulars of the physical features of the country.

The districts, called Darling and Fitzroy Downs, lie to the westward of the meridional part of the Cordillera, and are at a higher level above the sea on the northern and eastern border than are the coal-bearing beds on the coast side. Thus, the profitable seams of the Illawarra range from the sea level to about 800 feet above it, whilst on the Hunter River country many are a long way below the sea level. On the Condamine and its feeders the level is from 1,300 to 1,600 feet.

Thus, also, whilst on the eastern side of the Cordillera the escarpment is very steep and the workable coal lies generally at the base of the Hawkesbury rocks, which range above the sea along the coast to the height of 2,000 feet, on the western side, where the country at the base of the Cordillera gradually slopes away into the interior, the occurrence of the coal is at a height which is only attained by the Hawkesbury rocks above Illawarra.

In the small coal-seams of the Hawkesbury and Wianamatta beds, the *Glossopteris* shales are wanting, as they are, so far as I know at present, in the Downs, where the plants are like those of the Wianamata beds.

Over the coal-bearing beds of the latter districts, which are chiefly a *Psammite* or argillaceous flagstone, lie the deep blacksoil of the plains (which appears to me to resemble the *Regur* of India), in which the remains of gigantic marsupials, fishes, fragments of drift-gravel, fossil-wood, jasper, &c., abound.

The Condamine river, which rises in the northern extremity of the granitic plateau of New England, runs first north and then west parallel with the range of the Cordillera, and is then joined by the Balonne River, which comes

from the corner of the curve, and the drainage of the Cordillera flows in channels, between north and south ridges, to the united channel. A great part of the district is covered by dense scrubs, and only two main routes through it exist, one of which is described in the Diary of Dr. Leichardt, in 1847, which I published, with his original chart, in *Waugh's Sydney Almanac*, in 1860. A copy of this I placed in the hands of Sir Henry Barkly. Since then, the chart has been much improved and altered by subsequent additions. But though some chaining has been done, no final survey has been yet made of the district, and I believe that the country south of the Balonne and west of the Condamine is almost a *terra incognita*. It is, therefore, not improbable that hereafter some important geological discoveries may be made in that region.

The Balonne, which has a southerly trend from its head, about the 149th meridian, turns to the south and is joined by the Cogoon, which traverses the Fitzroy Downs, and rises not far from Mount Abundance, on the west of which Mitchell found his "Belemnite." West of the Cogoon, but coming further from the north, runs the Maranoa River, upon which occurs Mount Sowerby, about forty-five miles north-west of Mount Abundance, and here again, in red ferruginous sandstone, shells, wood, and other fossils were found by Mr. Kennedy. Drift coal was found in a creek near by, at the height of 1,190 feet above the sea. I have made arrangements for the examination of that neighbourhood, and hope to report on it hereafter.

Wollumbilla Creek appears to be near the eastern limit of this geological region, and as between it and Mount Abundance fossils of like age have been found, the area, in which the Wollumbilla formation has now been found, may be roughly estimated at 6,500 square miles. It is possible that that whole area is not composed of one set of beds, and there is evidence to show this. But at the limits of this area, the fossils, described by Mr. M'Coy below, have been found.

The Maranoa has a direct length of 200 miles, and a fall of about five feet per mile ; the Cogoon seventy miles, with a fall of about eight feet per mile ; the Condamine and the Balonne fall at the rate of from three to four feet per mile, through a course of 300 miles. These data are assumed from calculations made either by the late Rear-Admiral King, from Sir T. L. Mitchell's observations, with the instrument

which I had with me in the interior in 1852, 1853, or from recalculations made by myself from observations by Dr. Leichardt, with the boiling-water apparatus, which I lent him, and which he took with him in his last fatal journey. And in any elevations used in this paper, the same sources are adopted.

It may be well to mention here, that within a week or two, a north and south reef, as it is called, of calcareous rock has been detected at Camboon, about 120 miles N.E. from Wollumbilla, and a little east of the Dawson River, near the range which separates its basin from that of the Auburn Creek, a tributary of the Burnett. Mr. Findlay, who detected it, found also fossil-wood and remains, as he thought, of fish or reptiles. I made application to see them, and duplicates were forwarded for inspection. The "fish" vertebræ turned out to be *encrinital* stems, and as these are associated with Producti and other Palæozoic fossils, we have there either a Permian or old Carboniferous formation.

The waters of the Dawson collect from the north side of the Cordillera, and its southern creeks rise in a low part of the range, whence also Wollumbilla and other Balonne creeks find their sources. This range also bounds the Fitzroy Downs to the north-east. On one part of the fall of the Dawson to Great Sandy Creek (which Leichardt wrongly called the Dawson), about E. by N. from Wollumbilla, at an elevation of 1,590 feet above the sea, occur impressions of plants; and at Charley's Creek, about fifty miles S. E. from the latter spot, and 100 miles from Wollumbilla, coal was found in the creek, which Leichardt considered to belong to the Flagstone seam, which I examined in 1853.

The rock on the lower part of Wollumbilla Creek, at Adungadoo and Bungeewaragui Creeks, on the slope of the Grafton Range, and elsewhere in the country north of it (as about Ruined Castle Creek, on the left bank of the Dawson), is a calcareous Psammite of exceedingly fine grain, with a little white mica and very little quartz, being an extremely rotten stone and easily decomposing into the picturesque castellated forms which the ranges in that district assume. The stratification of this Psammite is nearly horizontal, except in the neighbourhood of igneous rocks.

Over the surface in the Fitzroy Downs occur vast quantities of pebbles of red conglomerate and sandstone, which have been transmuted by igneous action; pebbles of coarse

conglomerate, and grits of various kinds, together with flinty and cherty nodules, which were one of the supposed data on which I based my idea of a cretaceous formation. Having ground down their sections and examined them microscopically, I have not been able to detect any organic remains; they have, therefore, had another origin. Similar pebbles occur to the eastward along the Condamine creeks, and in the bed of the Balonne far to the westward.

Now, between the head of the Cogoon and the Maranoa River, a small tributary to the latter, called the Umby, collects from the trappean hills of Tagundo. The course of the main channel is to S.W., and the waters collect from elevations between 1,200 and 1,600 feet. Sandstones, partly what Mitchell called black (which consist, so far as I have seen them, of white pebbles of quartz held by a black ferruginous cement), and partly red, as well as greyish white, strike at the head of the Umby S.W. and N.E., which is parallel to the strike of the Grafton Range. The dip at the head of the Umby is S.E. Red gravel occurs in the Maranoa; and various red rocks distinguish the Cogoon and the sandstone formation beyond the Maranoa, at the head of which, yellow sandstone, much rippled, and like those in the Wianamata basin, near Paramatta, occur.

The N.E. strike of the coarser sandstones on the Umby agrees very well with the main strike of the Hawkesbury rocks in New South Wales; and the horizontal deposit of the Psammite is like that of similar rocks in the Wianamata region, where also the ground is frequently *red*. The occurrence of red rocks in all this region and far away to the westward, the desert interior exhibiting masses of such detritus and red sand as found by Kennedy, Sturt, and Gregory, has a significance which cannot be overlooked.

Having traced myself the beds of Hawkesbury rock into the low interior along the Groyder and other western rivers belonging to the basin of the Darling, and having found many of them becoming red (far more so than in the coast region of New South Wales), I cannot doubt that those red deposits belong to some part of the Hawkesbury division of the rocks above the coal; but it is also possible that some of the conglomerates of that division have been recomposed in a later epoch, as seems to have been the case at Jerrawa, near Yass, where a recomposed conglomerate of the kind is capped by a sandstone very hard and silicified, full of leaves of deciduous plants, probably of the Miocene epoch. The



Clarke, William Branwhite. 1865. "On the Carboniferous and other geological relations of the Maranoa District in Queensland in reference to a discovery of zoological fossils in Wollombilla Creek and Stoney Creek, West Maitland." *Transactions and Proceedings of the Royal Society of Victoria* 6, 32–42.

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