the Coniferales themselves sprang from the Cordaitales, which is widely but not universally accepted as a working hypothesis, would then receive strong support, and the Cordaitan-like leaves would be easily explained. Even in some modern Araucariæ, such as *Agathis* (*Dammara*) *loranthifolia*, Sal., the leaves also to some extent recall those of a modern Monocotyledon, and are not entirely dissimilar to those of *Cordaites*.

I am thus inclined to regard the question of the affinities of this family of Mesozoic plants as an entirely open one until the fructification is discovered. At the same time I think it probable that the fructification will be found eventually to have departed somewhat from the type characteristic of the Cordaitales.

There remains the discussion of the name by which these Bunter and Keuper fossils should be known. Unless we adopt the attribution to *Cordaites* outright, which seems to me to be hardly justifiable, and if we regard the affinities of this plant as still wholly obscure, there seems to be no better course than to fall back on the original name *Yuccites vogesiacus* of Schimper & Mougeot, as a temporary and provisional expedient until more information is available. At present the genus *Yuccites* does not appear to have any established position. The name is of course open to the grave objection that it suggests affinity with the Monocotyledons, to which group, as also in the case of *Eolirion*, it was originally referred. Yet, on the other hand, there do not appear to be any species of *Yuccites* known beyond doubt to belong to the Monocotyledons, and the invention of a new genus, whether implying affinity to the Cordaitales on the one hand or to the Coniferales on the other, does not appear to me to be advisable on the present evidence. I propose, therefore, to retain temporarily the name *Yuccites vogesiacus*, Schimp. & Moug., for these specimens from the Bunter of the Vosges and the Keuper of Bromsgrove.¹

IV.—*LIMULUS WOODWARDI*, SP. NOV., FROM THE LOWER OOLITE OF ENGLAND.

By D. M. S. WATSON, B.Sc., Beyer Fellow of the Victoria University of Manchester.

MY friend Mr. F. H. Gravely during September, 1908, obtained from the ruins of an old wall at Doddington, near Wellingborough in Northamptonshire, the carapace of an Arthropod, the value of

¹ I take this opportunity of correcting two slips which appeared on p. 110, paragraphs 2 and 3, of my previous paper with regard to the horizons on which some of the earlier Cycadophyteen fronds occur in the Palæozoic rocks. I am indebted to Professor Zeiller for calling my attention to these errors. The oldest known specimens of *Zamites*, *Plagiozamites*, and *Pterophyllum* should there be stated to be derived from the Stephanian, and not from the Westphalian. Similarly, the beds in the Vosges from which *Plagiozamites* was obtained are of Permian age, and not Westphalian as stated. Professor Zeiller also informs me that the fossil recorded by Zalessky as *Plagiozamites* from Manchuria has proved to be a *Rhacopteris*. Professor Zeiller, in his "Bassin Houiller et Permien de Blanzy et du Creusot", a memoir which I did not see until after my paper had appeared, includes the *Zamites Planchardi* of the Commeny Flora in the genus *Plagiozamites*. Consequently the genus *Zamites* is as yet unknown from the Palæozoic rocks, and it is doubtful if any typical representatives have been described of earlier age than the Rhætic.

which he at once recognized. This specimen he has now presented to the Manchester Museum, and by his kindness I am enabled to offer a short description of it here.

The fossil consists of an iron-stained cast of the dorsal surface of a carapace, the left side of which had suffered considerable abrasion before the specimen was collected. The matrix is a grey, fine-grained sandstone, somewhat calcareous, and containing small Pelecypods and apparently some oolitic grains. I do not know any rock exactly like it from any other locality, but it considerably resembles some types of the Northampton sand to which it almost certainly belongs, as most walls in the neighbourhood are built with rocks belonging to that formation. Despite this uncertainty as to the exact horizon of the specimen, it seems to me worth description as being the only known example of a Mesozoic Merostome in Britain.

Cephalic shield or carapace of *Limulus Woodwardi*, Watson, sp. nov. Natural size.
From the Inferior Oolite (?) of Doddington, Northamptonshire.

The anterior edge of the carapace is smooth and forms a large arc of a circle, considerably more than 180° .

The posterior edge of the carapace is bounded by three distinct lines; these are a central, nearly straight edge, to which the abdomen was attached. This attachment is about half the entire width of the carapace, and is considerably in advance of the genal angles. From the ends of this line two other edges curve out in gentle ogees to the genal angles. These angles are not produced, but end in blunt spines. The edge of the carapace along these lateral portions is curved downwards, forming a groove.

The carapace bears the following marks:—In the centre, starting from the back, is a distinct area—the glabella—separated by grooves from the general surface. These bounding grooves approach each

other anteriorly, and then rather suddenly separate before quite touching; they then shortly die out. The glabella is divided transversely by two grooves, one a little behind the point of minimum width, the other half-way between that and the back of the carapace.

In the same line as this last groove are the lateral eyes. They are situated about three times the width of the glabella apart and stand up above the general level, just as in *Limulus Polyphemus*. Their structure cannot be seen.

On the right side is a trace of a small projection continuing the line of the eye ridge at the extreme back of the carapace. The carapace is strongly arched from side to side and is quite uncrushed.

The measurements are as follows :—

	cm.
Width between genal angles	7·64
Greatest width	8·1
Length on median line	4·2
Width on glabella at back	1·5
Width of attachment of abdomen	4·2
Distance of eye in front of line of attachment of abdomen	1·1
Distance apart of lateral eyes	4·2
Depth of carapace at back	1·8

There can be no doubt that the carapace described above is that of a *Limulus*. Its resemblances to the recent *L. Polyphemus* are extremely striking, the differences being slight variations in certain proportions.

In *L. Polyphemus* the carapace is longer than wide, and the articulation of the abdominal dorsal shield is wider than in the British form. The lateral eyes are placed somewhat further forward, and the glabella is not so obviously divided by transverse grooves.

The British specimen differs considerably from *L. Walchi*, the species which occurs in considerable abundance in the Solenhofen Slate; in *L. Walchi* the glabella is not divided by transverse grooves, and the lateral eyes are apparently not mounted on a distinct projection as they are in the new species. On the other hand, the upper oolitic species has the same downturned edge of the lateral parts of the posterior edge which is such a feature of the Northamptonshire species. *L. syriacus* from the Cretaceous of Hakel, Syria, differs greatly in the general shape of the carapace and in the crimping of the very narrow glabella.

There remain only *Limulus Decheni* from the Oligocene of Tenchern near Merseburg, which is a large species; two small and simple species from the Trias of Germany, and one from the European Rhætic. These last are forms with a simple carapace of small size. It thus appears that the Doddington specimen is distinct from all known species, and I suggest that it be called *Limulus Woodwardi* after Dr. Henry Woodward, to whom our knowledge of the British Merostomes is so largely due.