

shown that a similar change must be made in the position of a species which I referred to *Pericosmus compressus* (Duncan). He removes the specimen figured to *Eupatagus* on the ground of the tubercles on the abactinal surface; but this alone would be insufficient to necessitate its removal. I have, however, worked away the matrix covering the subanal area of the type-specimen, a risk to which I did not previously care to subject it. This shows that a subanal fasciole is present; the species must therefore be removed from the Prymnae to the Prymnaesman group. But in *Eupatagus* the species has not reached its final resting place, for in that genus the petals of the paired ambulacra are broad and flush, with large poriferous zones: in this species they are long, narrow, and depressed, and the pores are small, and not so strikingly dissimilar in size. It therefore belongs to the genus *Macropneustes*, which Prof. Duncan regarded as only a sub-genus of *Eupatagus*,¹ but which most authors keep as a quite distinct genus. The synonymy of this species will therefore be:

Pericosmus compressus, Dunc. non M'Coy. Gregory, GEOL. MAG. 1890, p. 485, Pl. XIV. Fig. 1.

Eupatagus decipiens, Tate. Trans. Roy. Soc. S. Australia, vol. xiv. p. 282.

Macropneustes decipiens, Tate. Gregory.

DESCRIPTION OF PLATE XII.

FIG. 1.—*Laganum decagonale* (Less.) var. *riatum*, n. var. Shark's Bay, W. Australia.

Figs. 1a. Abactinal side; 1b. Actinal side; 1c. Lateral view. Nat. size.

FIGS. 2, 3 and 4.—*Cassidulus florescens*, n. sp. Middle Murravian. Fyan's Ford, near Geelong. Figs. 2a. Abactinal side; 2b. Actinal side; 2c. Lateral view: each $\times 2$ dia.

FIG. 3a.—Abactinal side; 3b. Actinal side; 3c. Lateral view; 3d. Apical system: $\times 4$ dia. FIG. 4.—Posterior view of another specimen: $\times 2$ dia.

II.—ON LIASSIC SECTIONS NEAR BRIDPORT, DORSETSHIRE.

By JOHN FRANCIS WALKER, M.A., F.G.S.

DURING my visits to West Bay, Bridport, in the years 1887 and 1888, I was able to examine the following inland sections of the Lias Junction Bed, and I communicated a paper to the British Association at Leeds in 1890; an abstract of this paper appeared in the Report. I had hoped to obtain more evidence of the nature of this deposit, but, unfortunately, last year, 1891, I found that the working of the Allington brickfield was being abandoned, and that it was difficult to further work the roadside cuttings without doing considerable damage. I therefore think it better to lay before the readers of the GEOLOGICAL MAGAZINE my notes on this deposit, which I shall be able to show is variable in different sections, due to the amount of denudation which has taken place.

Several notices of the Junction bed have been written, but chiefly with reference to the sea-coast section. I will only refer to those required for discussion in this paper.

In the Quarterly Journal of the Geological Society, 1863, Mr. Day gave an account of the junction bed of the Upper and Middle

¹ M. Cotteau has recently given admirable figures of the type-species *Macropneustes deshayesi*, Ag., Pal. Franç. Echinides Eocènes, pl. xxxi-xxxiii.

Lias on the sea-coast of Dorset. He describes it as "a remarkable band of stone, the lower part of which is in a great part a conglomerate, the pebbles being imbedded in a more or less ferruginous matrix with Oolitic granules." "In places, however, this bed assumes more the appearance of the Marlstone of other districts." The higher part is composed of thin beds of a hard, dense, almost chert-like, limestone, separated by thin laminæ of yellow ochreous clay, the whole being consolidated into one block; he states the thickness of the Marlstone and Limestone to be from two to three feet; that *Ammonites serpentium* (*falciferum*) occurs in the lower part of the Upper Lias Limestone in some abundance, though badly preserved, and considers denudation of that bed had taken place.

This junction bed is also well described by H. B. Woodward, in his valuable work on "The Geology of England and Wales," "as a pink and cream-coloured limestone in the upper part, and a brown nodular marlstone below." Mr. S. S. Buckman, in a paper (Quart. Journ. Geol. Soc. 1890), refers to this rock, and states the limestone of the fallen blocks is in two layers, *Hildoceras bifrons* being dominant in the upper layer, and *Harpoceras falciferum* in the lower.

I have very little to add to these remarks on the sea-coast section, except that I have found blocks of the limestone four feet thick, generally cream-coloured in the upper and pink in the lower part, and that the sandy part is sometimes a conglomerate, and at other times a marlstone, as pointed out by Mr. Day. Blocks of this stone were collected from Down Cliffs and under Thorncombe Beacon, and used for building walls at Chideock, hence the fossils in old collections are labelled from Chideock.

The following are the Inland Sections which I have examined:—

I.—The roadside cutting at North Allington below the brickfield (1887):

A.	Clay, worked as a brickfield.	ft. in.
B. (1)	White limestone	0 8
(2)	Clay	0 1
(3)	Brown and red limestone	0 11
(4)	Marlstone	0 8
C.	Sandy Clay	3 2
D.	Brown sandy limestone, blue in centre	0 5
E.	About two yards of sandy marl, partly covered with grass and roadside scrapings	6 0
F.	Brown friable sandstone	2 1

From the brickfield I obtained a block of stone, probably from the next stone band, which contained *Monotis inæquivalvis* and *Rhynchonella amalthei*.

The fossils which I have been able to determine from bed D are:

<i>Rhynchonella tetrahedra</i> , var. <i>Northamptonensis</i> .	<i>Pecten</i> , sp.
<i>Rhynchonella furcillata</i> .	<i>Plicatula spinosa</i> .
<i>Waldheimia</i> (<i>Zeilleria</i>) <i>perforata</i> , var.	<i>Pholodomya ambigua</i> .
<i>Spiriferina pinguis</i> .	<i>Pleuromya costata</i> .
<i>Monotis inæquivalvis</i> .	<i>Belemnites paxillosus</i> .

About one foot of the clay above this stone band contained the same fossils, and others which were too imperfect to name.

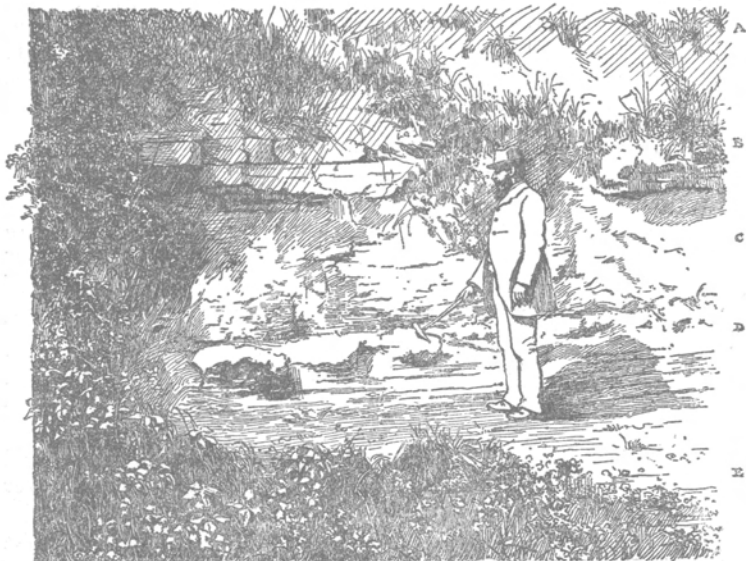
This bed, D, probably belongs to the upper part of the *Margaritatus* zone.

It was impossible to work the pink and white rocks without destroying the bank on the roadside. I was unable to obtain any fossils from the brick-clay, although I told the workmen to search for them.

The chief interest of this section is that it shows a division in the stone band, and the position of the stone band D, which contains fossils that correspond to those found on the beach in a bed of brown sandy limestone.

II. In the field opposite, which was formerly worked as a brick-field, about 15 feet of brick-clay having been removed, the following section was exposed in 1888:

					ft.	in.
A.	1.	Surface soil	...	...	0	6
	2.	Clay	...	...	2	10
	3.	Ferruginous marl	...	...	0	3
B.	1.	Hard limestone	...	...	1	2
	2.	Marlstone	...	...	0	6
C.		Sandy clay	...	...	0	6



SECTION AT NORTH ALLINGTON.
(From a photograph by Mrs. E. Penton.)

I obtained the following fossils from the loose blocks of marlstone:

Rhynchonella tetrahedra.
— *serrata*.
— *egretta*, var.
Terebratulina punctata.
Spiriferina rostrata.

Lima, sp.
Pleuromya costata.
Cryptæna expansa.
Belemnites paxillosus.

From the lower part of the hard limestone :

<i>Rhynchonella Bouchardi.</i>	|	<i>Ammonites (Hildoceras) bifrons.</i>
<i>Waldheimia Lycetti</i>		<i>Ammonites (Harpoceras) falciferum.</i>

And from the Upper part *Ammonites (Harpoceras) striatulum*. Mr. H. B. Woodward also records the occurrence of this Ammonite at Allington. It will be observed that the thickness of the bed B, including the marlstone, is only 1 foot 8 inches; in the section on the other side of the road it was 2 feet 4 inches, but the bed was probably thicker in some parts of this field, as I was informed that large quantities of stone were formerly obtained from it. The Marlstone fossils in this quarry were not found mixed with Upper Lias species in the same blocks of stone.

There is an indication of the presence of the Jurenses zone in the upper part of the stone band.

Some peculiar forms of Brachiopoda occur in this quarry which require careful study.

III.—A deep cutting in Shoots Lane, Symondsburys, which was overgrown with vegetation, appeared to show the following sections :

	ft.	in.
(1) Sandy clay, overgrown, about... ..	10	0
(2) Dark ferruginous rock containing nodules and worn small specimens of <i>Ammonites (Hildoceras) bifrons</i>	0	5
(3) Light coloured stone	1	2
(4) Stone band (in three divisions)	1	6
(5) Marlstone	2	11
(6) Soft brown sandy stone	0	4
(7) Clay	0	6
(8) Overgrown	3	4

This section was again carefully measured by the Rev. J. L. Templer and myself in 1891. The chief peculiarities are—the occurrences of a conglomerate bed above the junction bed containing worn specimens of *Hildoceras bifrons*. Mr. S. S. Buckman kindly examined these specimens and agreed with my determination of them; this indicates that while this bed was being deposited in this section, denudation of the bifrons zone was taking place elsewhere. The junction bed appears to be represented by the three stone bands.

The marlstone contains *Rhynchonella serrata* in its upper, and *Rhynchonella tetrahedra* in its lowest part. Should this lane ever have to be widened no doubt many fossils will be found.

IV.—In the year 1887, the supply of stone from the Forest Marble having fallen short, a hole was made on the roadside of Shipton Long Lane, Bothenhampton, for road metal; unfortunately the police ordered this hole to be filled up before it had time to weather. It was about $5\frac{1}{2}$ yds. long, 3 yds. wide, and $6\frac{1}{2}$ ft. deep, which is equal to between 30 and 40 cubic yards of solid stone. It was all in one block and required 11 lbs. of gunpowder to blast it. From information obtained from the workman, by measurement of the blocks and many days' work at breaking them and carefully collecting the fossils, the following appeared to have been the section :—

	ft.	in.
(1) Unfossiliferous sandstone, about	0	4
(2) Top band of white stone	1	0
(3) Brown stone	1	0
(4) Brown conglomerate often with pink stone at the base	2	0
(5) Marlstone	1	0
(6) Blue unfossiliferous limestone	0	8

The above may be regarded as the average thickness of the bed.

The *blue limestone*, which the workman said was the base of the rock, was coated on its lower surface with calcite, and rested on sand.

The *Marlstone* was of the usual brown colour, becoming yellow and more friable in some blocks, but towards its upper part was redder, and appeared in many blocks to gradually pass into the pink limestone which generally occurred at the base of the conglomerate; the pink rock appeared to have been slowly deposited on the surface of the marlstone.

The *Conglomerate* bed varied in colour, being mostly brown, differing from the marlstone in being harder and of a lighter colour; in some parts it had a greenish tint; its lower part was a pink rock with Oolitic grains, in the upper part it contained nodules, and some of the blocks were perforated by boring shells. Above this was a light brown stone which joined the hard cream-coloured stone. The top bed was an unfossiliferous sandstone which reached the surface of the road.

The fossils, especially the Brachiopoda, were carefully collected by breaking the blocks; after a few days' work we were able to sort the blocks, and to tell what species they would contain. No specimens of Vertebrata were obtained. Many specimens of Gasteropoda were found, but owing to the hardness of the rock it was impossible to extract them entire. It also contained several species of *Pecten*, *Lima*, etc.

The Marlstone contained in its lower part:

<i>Spiriferina rostrata</i> .	<i>Waldheimia (Aulacothyris) resupinata</i> ,
<i>Rhynchonella tetrahedra</i> , Sow.	Sow.
_____ <i>egretta</i> ? E. Desl.	_____ (<i>Aulacothyris</i>) <i>Moorei</i> , Desl.
<i>Terebratula punctata</i> , Sow.	_____ (<i>Zeilleria</i>) <i>indentata</i> , var.
_____ sp. (<i>T. Jauberti</i>)? E. Desl.	Sow.
_____ <i>Edwardsii</i> , Dav.	_____ (<i>Zeilleria</i>), sp.
	_____ <i>subnumismalis</i> , Dav.

Along with *Ammonites (Amaltheus) spinatus*.

In the upper part of the Marlstone *Rhynchonella serrata*, Sow.

Remarks.—It will be noticed that *Rhyn. serrata* occurs in the upper part of the Marlstone. It is stated by Mr. C. Moore to occupy the same position near Ilminster; this species, generally a rare fossil, was very abundant. I obtained nearly 200 specimens, more or less perfect, in a bed about three inches thick. It will be remembered that the area of the pit was about seventeen square yards. Some varieties of *Rhyn. serrata* show that it is related to *Rhyn. quinqueplicata*, Quenstedt.

Rhynchonella tetrahedra was not common, and was a fine ribbed variety.

Rhynchonella egretta? This species is referred by Davidson in

his Ool. Suppt. to *Rhyn. egretta*; but some specimens closely resemble E. Deslongchamps's figure of *Rhynchonella fallax*; it will have to be compared with the French specimens, which are very difficult to obtain; it is a very variable form.

Mr. Day gives *Rhynchonella acuta* from the Down cliffs, where I have also found it. I did not see a fragment of it in this section. There is a remarkable form of *Terebratula*, of which I obtained three perfect specimens, probably a variety of *T. Jauberti*, E. Desl.

Waldheimia (Aulacothyris) resupinata does not appear to have been found by Mr. Day, as he states it is altogether absent in the sea-coast section. It is rare at Bothenhampton; I only obtained eight specimens, two of which were imperfect; it agrees with the South Petherton form.

Waldheimia (Aulacothyris) Moorei, one typical specimen.

Waldheimia (Zeilleria) indentata, rare, a wide variety.

Waldheimia (Zeilleria) sp., this may be new, it is nearest to *W. scalprata*, Quenstedt. It is a small triangular form belonging to the *W. Waterhousei* and *W. digona* group.

Waldheimia (Zeilleria) subnumismalis, rare, and not so fine as those of the coast section.

The Conglomerate bed, in its lower part, contained in some blocks large quantities of a *Belemnite* probably *B. pazillosus*; also worn specimens of *Ammonites (Harpoceras) falciferum*. But in many blocks the pink stone rested upon the *Rhynchonella serrata* bed, the *Ammonites*, which occurred very abundantly, were *Ammonites (Hildoceras) bifrons*; they are fine, large, and very well preserved specimens, although difficult to extract on account of the hardness of the matrix; they are filled with the pink rock, showing them to be of the age of that deposit.

The Brachiopoda in the pink rock were *Rhynchonella Bouchardi*, Dav.; *Rhynchonella Moorei*, Dav.; *Waldheimia (Zeilleria) Lycetti*, Dav. *Rhynchonella Bouchardi* was the most abundant species, and exhibited all the varieties which occur in the same horizon near Ilminster. *Rhynchonella Moorei* was rare and small. *Waldheimia Lycetti* was of the typical form, and also resembled the Ilminster specimens. A few specimens of a variety of *Ammonites (Stephanoceras) communis*, and a large *Nautilus*, occurred sparingly in the conglomerate bed, generally of a yellowish colour.

In the brown stone over the conglomerate fine specimens of *Ammonites (Grammoceras) Thouarcense*, d'Orb., were obtained. In the hard white stone *Ammonites Germani*, d'Orb., were found in a very fine condition, and exactly resemble d'Orbigny's figures in the *Paléontologie Française*. This species is considered by some authors to be the same as *Ammonites hircinus* of Schlotheim. The presence of these *Ammonites* shows that the Jurenses zone is here represented.

A curious *Rhynchonella*, character ill-defined, occurs in the brown rock, and appears to extend downwards into the conglomerate bed; some of the specimens seem to agree with *Rhynchonella jurensis*, Quenstedt, but they are generally more globose and larger shells, it may be called var. *Bothenhamptonensis*.

No specimens of marlstone Brachiopoda or Cephalopoda were found in the Conglomerate bed.

The results I arrive at are—(1) That the true Marlstone exists in the lower part of the stone band containing its characteristic Brachiopoda and *A. spinatus*; the upper part being full of *Rhynchonella serrata*, which is often overlain by a pink rock of the zone of *Rhynchonella Bouchardi*.

(2) That the conglomerate bed in the Bothenhampton section is not older than the age of *Ammonites bifrons*—the zones of *Ammonites falciferum* and *Ammonites communis* having been denuded and their worn fossils deposited in this bed. That in other localities the zone of *Am. bifrons* has been denuded.

(3) That no fossils derived from the marlstone were found in the conglomerate; and as so many fine specimens of *Rhynchonella serrata* were found, it is probable that the marlstone did not suffer denudation in this locality. We know from sections round Ilminster that *Rhynchonella serrata* is only found in the upper part of the marlstone.

(4) That the section at Bothenhampton showed that the zone of *A. jurensis* formed the upper part of the rock band.

In conclusion, I regret that want of material prevented my paper being more complete; but I must thank my Bridport friends for their kindness in affording me facilities for examining these beds, and hope that they will carefully record any excavations which may be made in this interesting deposit.

III.—FURTHER REMARKS ON THE CONISTON LIMESTONE.

By J. E. MARR, M.A., F.R.S., Sec.G.S.

I QUITE agree with Mr. Goodchild's statement in the July Number of the GEOL. MAG. that the stratigraphy of some of the areas in which the Coniston Limestone Series is developed "presents very considerable difficulties," so much so that in the areas of Cross Fell and Settle portions of the "country might be described as consisting of a gigantic fault-breccia," and that it is necessary "to go over a large part of this faulted area again and again" in order to interpret its structure. I do not know whether Mr. Goodchild would class me amongst the "less fortunate" ones who have not been over the ground again and again; possibly I have not devoted the amount of time which he has been able to give to the study of the rocks of the Cross Fell Inlier, but it must be remembered that Prof. Nicholson, with whom I had the pleasure of working at this inlier, has returned to the ground again and again during a long course of years, whilst more recently, he and I have devoted several vacations to its study, and we have carefully compared the beds and their fossils with those of adjoining and more distant areas. Under these circumstances we are, perhaps, justified in speaking with some confidence as to the order of succession of the series; for our knowledge of adjoining regions would certainly lead us to place more reliance on the fossils of the beds than on the apparent succession of the beds themselves, where the