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XI.—*Notes on the Fossils of the First Gilmerton Limestone.* By
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As hitherto little or nothing has been written with regard to the fossiliferous contents of the first Gilmerton Limestone, the present paper is an attempt to lay before the Society the results of our work in that direction. The limestone in question is seen in section a little to the north of the village of Gilmerton in the form of old quarry workings, extending in the line of strike for nearly half a mile. When these workings were last in operation we do not know. If we begin at the north end and proceed southwards, the first thing that strikes our eye is a thick compact limestone. Proceeding southwards we gradually perceive this to be overlaid by a series of more or less soft limestone shales, closely approximating in character to the limestone below it. These shales are in their turn overlaid by a series of blackish lime shales which are very fossiliferous. These latter shales, if we still keep going in the same direction, are seen to be overlaid by thin beds of sandstone and sandy shales. A little to the south of the Lasswade road, as it nears Gilmerton, the quarry workings come to an end, the highest bed in the series being a red sandstone. A limestone considered to be the same as this one is seen at a railway cutting on this side of Loanhead, and not far from Straiton brickworks. The striking feature here is the very thick red sandstone which overtops it; but if we remember that the overlying beds thicken as we proceed southwards, and that a red sand, similar though less thick, is seen near the northern end of the quarries, this fact is not so astonishing. All in all the result of our investigations has been the bringing to light of forty-three genera and eighty-five species and varieties. Two species are added on the authority of others. To the collector the Gilmerton limestone is a disappointing field for his labour. The fossils are as a rule poorly preserved, and in many cases very fragmentary. This applies more especially to the bivalves, of which there are a vast number in certain parts of the beds. The Polyzoa seldom show the celluliferous face on which one has to rely for the discrimination of species. In a few cases the Brachiopoda are well preserved, as *Lingula*, *Chonetes*, and *Productus*. This state of matters is little compensated by weathering. In some districts limestone shales rich in fossils are best worked when the weather has reduced

them to brittle fragments ; but the Gilmerton limestone offers no such facilities. Looking now at the whole series from top to bottom we notice that the thick compact limestone at the base is either non-fossiliferous or nearly so. Immediately above the limestone come the limestone shales, some of which are hard and others much softer. These shales yield a good number of fossils, but none in a good state of preservation except the Polyzoa, some Archæocidarid spines, and *Chonetes polita*. The blackish limey shale which overtops the limestone shales is full of fossils, especially the Lamellibranchiata, which occur in enormous profusion in a good state of preservation, but often tantalisingly fragmentary. The sandstones overtopping the whole series are non-fossiliferous. We will now take up the fossils group by group.

ECHINODERMATA.

This group includes the well-known Archæocidarid, with its species *A. scotica* and *A. Urei*. They occur as spines, inter-ambulacral plates, and portions of the masticatory apparatus. They are found throughout all the shales and in all stages of preservation. In some cases the plates and spines are scattered over the same slab.

We can say nothing definite with regard to the Crinoids. Throughout the shales the stems and ossicles of Crinoids may be seen on the weathered surfaces ; but as the forms of these stems are so variable it would be rash to commit oneself as to their identification. The limestone exposed further south of the Loanhead Railway shows more Crinoid remains than this one. At that locality we picked several small calices out of the weathered surface, but we have not had them identified.

ANNELIDA.

The remains of Annelids are seldom met with in the places where we have examined this limestone. *Serpulites carbonarius*, which occurs in some shales in such abundance at Roscobie and Ardross Castle, in Fife, is very rarely seen. The only other species is doubtful—*Spirorbis ambiguus*? The latter Annelid has been noted by us on the shell of *Edmondia unioniformis*.

CRUSTACEA.

Among the Crustacea we include three genera Entomoconchus? Leperditia and Dithyrocaris. The limestone shales do not impress one as likely to yield crustacean remains. The specimen of Dithyrocaris consists of one valve, and that in no very good state of preservation. Whether or not any Ostracods, such as *Bairdia*, *Kirkbya*, or *Cythere* occur in the limestone shales, we

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cannot say, as these shales never weather into a soft, crumbling mass.

POLYZOA.

Five genera and twelve species of Polyzoa have been noted by us. The genera include *Fenestella*, *Actinostoma*, *Glauconome*, *Rhabdomeson*, and *Cynocladia*. The genus *Fenestella* includes the most species namely, *F. ejuncida*, *F. tenuifila*, *F. tuberculo-carinata*, *F. quadridecimalis*, and *F. multiporata*. Of these, *F. multiporata* and *F. tuberculo-carinata* are the most common forms. *Rhabdomeson*, a fossil rather common in some limestone shales, is rare. We have only noticed it twice, yet its form is so marked that it is impossible to mistake it. *Cynocladia carbonaria* is an exceedingly common fossil in the blackish shales, lying above the main limestone. *Glauconome*, of which we have noted three species—*G. elegans*, *G. laxa*, and *G. stellipora*—is not uncommon in the shales, lying immediately over the thick limestone. It occurs in a fair state of preservation, and sometimes shows the cells. The abundance of Polyzoa is one of the chief features of this limestone, and the collecting of them is not a very difficult matter, as the edges of the "fronds" can be traced on the weathered surface.

BRACHIOPODA.

We record six genera, eleven species, and three varieties of Brachiopoda. The genera include *Productus*, *Chonetes*, *Lingula*, *Rhynchonella*, *Strophomena*, and *Terebratula*. *Productus* is the most numerous as regard species, of which we have noted the following :—*P. longispinus*, *P. muricatus*, *P. semireticulatus*, *P. scabriculus*, and *P. semireticulatus* var. *martina*. All these are more or less found in the limestone shales, and do not occur as far as we have noted higher up. *Rhynchonella pleurodon* and *R. pugnus* are only to be obtained in the shales at the very top of the section. They are in pretty good preservation, and present a silvery white exterior. *Chonetes polita* is a very common fossil in a soft bed near the bottom of the series. The species of *Terebratula* include *T. hasata* and *T. sacculus*, along with a variety. They are all very much crushed, and are in a very poor state of preservation. *Lingula mytiloides* occurs pretty much throughout the whole of the shales. *Lingula squamiformis*, a species common in other localities, has never been noted by us. On the authority of Mr J. Henderson we include in our list the important genus *Crania*, of which he obtained a specimen in this limestone.

LAMELLIBRANCHIATA.

The Gilmerton limestone will perhaps compare favourably

with any limestone in Scotland in regard to its bivalves. From the top of the shale to the bottom they occur everywhere. Nearly every bit of shale yields its quota of *Aviculopecten*, *Edmondia*, or *Modiola*. In all, we have noted fourteen genera and thirty-six species. The genera include *Aviculopecten*, *Edmondia*, *Axinus*, *Modiola*, *Cypricardia*, *Nuculana*, *Sanguinolites*, *Myacites*, *Posidonomya*, *Leptodomus*, *Venus*, *Pecten*, *Pteronites*, and *Arca*. The commoner genera are *Aviculopecten*, *Edmondia*, *Modiola*, *Nuculana*, and *Cypricardia*. The genus *Aviculopecten* yields a large number of species, twelve in fact, some of which are very common, as *A. dissimilis*, *A. arenosus*, *A. granosus*, and *A. plicatilis*; and some rare, as in *A. flexuosus* and *A. interstitialis*. The genus *Cypricardia* is represented by five species and a variety. It includes *C. rhombea*, *C. striatolamellosa*, *C. acuticarinata*, *C. glabrata*, and *C. cylindrica*. None of these are very common. *Modiola* is represented by *M. lithodomoides* and *M. lingualis*. Of the former good specimens may be obtained in the topmost beds. *Axinus* is represented by three species—*A. carbonarius*, *A. deltoideus*, and *A. aziniformis*. They are nearly all confined to the lower beds, and are often not well preserved. *Edmondia* is one of the commonest of the bivalves, and is represented by *E. rudis* and *E. unioformis*. They occur pretty much throughout the whole of the shales. The exteriors of all the bivalves are exceedingly brittle, and the task of collecting them is often very annoying. Sometimes you may get a specimen showing a part of the shells and the wings, as in *Aviculopecten*, and wanting the ventral margin. Then you get another showing a good ventral margin and no wing. So difficult is it to obtain reliable specimens that in some cases scores have to be flung away before a good, trustworthy specimen is obtained.

GASTEROPODA.

We have noted five genera and nine species of Gasteropods. The genera include *Macroheilus*, *Pleurotomaria*, *Loxonema*, *Bellerophon*, and *Naticopsis*. *Macroheilus acutus* is a common species in the upper beds. *Loxonema* we have only noted once, and that in the shape of a cast. *Pleurotomaria* and *Naticopsis* are not often met with. Among the Heteropoda we have *Bellerophon* represented by four species—*B. Urei*, *B. decussatus*, *B. Yvanii*, and *B. striatus*. The Gasteropods occur pretty much throughout the whole of the shales, but in comparison with the Polyzoa and Lamellibranchiata their numbers are scanty.

PTEROPODA.

The Pteropod *Conularia quadrilucatus* we obtained from the topmost beds, and in the usual crushed condition.

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CEPHALOPODA.

The Cephalopods include three genera and six species. The genera are *Orthoceras*, *Cyrtoceras*, and *Nautilus*. Three species of *Orthoceras* occur—*O. cinctum*, *O. cylindraceum*, and *O. attenuatum*. They occur pretty much throughout all the shales. *Cyrtoceras unguis* hails from the lower beds, and is usually found in a broken condition. *Nautilus quadratus* and *N. sub-sulcatus* occur freely, especially the former in the shales immediately above the thick limestone.

SELACHII.

Two specimens of *Petalodus Hastingsiæ* have been found, and a new species of spine, *Tristychius Fimbriatus*.

INCERTÆ SEDIS.

Of several oval striated impressions not uncommon in the shales, Mr John Young says—"I cannot make anything of these curious impressions, they are quite new to me. There is no structure to show whether they are due to plants or some soft bodied organism. The *Cypricardia rhombea* shows that the strata was marine."

GENERAL CONCLUSIONS.

The great distinguishing features of the First Gilmerton Limestone are the great abundance of bivalves and Polyzoa, the comparative scarcity in numbers of Brachiopods, and the total absence of corals of any description. Slight differences may be noticed between the higher and lower beds, but only those who have investigated the limestone for some time can observe them. The Productidæ are found usually at the bottom, and the bivalves attain their highest development, numerically and specifically, at the top shales. *Cynocladia carbonaria* occurs at the top as far as we have observed. To the beginner no limestone appears, at first sight, so unfruitful as a sphere of investigation, but upon continued working it is soon found that there is a plentiful if not a well-preserved store of fossiliferous remains.

We have to return unbounded thanks to Mr John Young of the Hunterian Museum, Glasgow, for the trouble he has taken in going over our specimens. No carboniferous invertebrates, especially univalves or Polyzoa, could go into more competent hands for naming. We have also to thank Mr Thomas Stock and Mr John Henderson for help and advice given us while examining this Limestone.

LIST OF FOSSILS from the First Gilmerton Limestone.

Echinodermata.

- Archæocidaris Urei, Flem.
" Scotica, J. Young.
Scattered Crinoid stems.

Annelida.

- Serpulites carbonarius, J. Young.
Spirorbis ambiguus ? Flem.

Crustacea.

- Entomoconchus ? (Cast.)
Leperditia Okeni, Münst.
Dithyrocaris spec.

Polysa.

- Glaucanome elegans, Y. & Y.
" stellipora, Y. & Y.
" laxa, Y. & Y.
" recticarinata, Y. & Y.
Actinostoma fenestratum, Y. & Y.
Cynocladia carbonaria, Ether.
Fenestella ejuncida, M'Coy.
" tenuifila, Phill.
" multiporata, M'Coy.
" tuberculo-carinata, Ether.
" quadridecimalis, M'Coy.
Rhabdomeson gracile, Phill.

Brachiopoda.

- Chonetes polita, M'Coy.
Lingula mytiloides, Sow.
Productus longispinus, Sow.
" muricatus.
" semireticulatus, Martin.
" semireticulatus var. Martini, Sow.
" scabriculus, Martin.
Rhynchonella pleurodon, Phill.
" pugnus, Martin.
Strophomena analoga Phill.
" analoga var. distorta, Martin.
Terebratula hastata, Sow.
" hastata var. Gillingensis, Dav.
" sacculus, Martin.
Crania (J. Henderson).

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Lamellibranchiata.

Monomyaria.

- Aviculopecten arenosus, Phill.
" deornatus.
" dissimilis, Flem.
" flexuosus, M'Coy.
" granosus, Phill.
" interstitialis, Phill.
" Knockonniensis, M'Coy.
" ornatus, Ether.
" papyraceus, Goldf. (Gall).
" plicatilis.
" plicatus, Sow.
Pecten Sowerbii, M'Coy.
Posidonomya vetusta, Sow.
Pteronites persulcatus, M'Coy.

Dimyaria.

- Arca Lacordaireana, De Kon.
Axinus axiniformis, Phill.
" carbonarius, Portl.
" deltoideus, Phill.
Cypricardia acuticarinata, Armstrong.
" cylindrica, M'Coy.
" glabrata, Phill.
" rhombea, Phill.
" striato-lamellosa, De Kon.
Edmondia rudis, M'Coy.
" unioniformis, Phill.
Leptodomus costellatus, M'Coy.
" sulcatus.
Modiola divisa, M'Coy.
" lingualis, Phill.
" lithodomoides, Ether.
Myacites sulcata, Flem.
Nuculana attenuata.
Sanguinolites plicatus? Portl.
" tricostatus, Portl.
Venus parallela.

Gasteropoda.

- Pleurotomaria Yvanii, Lév.
Loxonema spec.
Macroheilus acutus, Sow.
Naticopsis caniculatus, M'Coy,
" variata, Phill.

Heteropoda.

- Bellerophon decussatus, Flem.
" Dumontii, D'Orb.
" striatus.
" Urei, Flem.

Pteropoda.

- Conularia quadrisulcata, Sow.

Cephalopoda.

- Cyrtoceras unguis, Phill.
Nautilus quadratus, Flem.
" subsulcatus, Sow.
Orthoceras attenuatum, Flem.
" cinctum, Sow.
" cylindraceum, Flem.

Selachii.

- Petalodus Hastingsiæ, Owen.
Tristychius fimbriatus, Stock.