XXIV. *Obituary Notice of the late Mr J. W. Kirkby.* By Dr Horne, F.R.S.

(20th March 1902.)

Among the devoted followers of the science of geology, the late James Walker Kirkby held a prominent position. Though in the early part of his career he was engrossed in business and had little time to devote to his favourite research, he spent all his available leisure in examining the geological formations within his reach, and in studying their fossil contents so as to determine the distribution and sequence of organic life. From his earliest observations to the close of his career, palæontology had for him an intense fascination. But he did not rest content with the mere determination of the fossils from any given horizon. With the instinct of a true naturalist he paid special attention to the association of the various life-groups, and to their respective habitats with the view of throwing light on the physical conditions of the period to which they belonged. This seems to me to be the distinctive feature of the geological work achieved by Mr Kirkby which entitles him to a high position among local British palæontologists. When to this feature is added the distinction that he was one of the recognised authorities on British Entomostraca, it will be seen that he was a geological worker of no common order.

Born at Bishopwearmouth, Sunderland, on 10th April 1834, Mr Kirkby was educated at a private school on the Green, at his native place. In his journals which he has left behind him, he mentions that he first saw fossils at the house of the late Mr David Gibson of Sunderland; indeed he acknowledges the cordial assistance then given to him by Mr and Mrs Gibson. No less interesting are the references which he makes to Albany and John Hancock of Newcastle, cousins of his mother, who evidently had a keen love for natural science. At their home he was a frequent visitor. Under the influence of Albany Hancock, who worked much with the microscope, he was led to study Entomostraca, and he received valuable aid from the same kindly hand in naming the fossils collected by him. They had many geological rambles together; indeed there can be little doubt that these early influences helped to foster and extend young Kirkby's strong bent for the study of palæontology.[1]

[1] In his early years he was assisted also in his special study of Entomostraca, by Professor Brady, and of other life-groups by the late Mr Richard Howse.

Fortunately for the youthful investigator he acquired a practical knowledge of coalfield work under Mr Lishman at the Etherley colleries—a training which proved of great service to him in after years when he came to study the Carboniferous rocks of Fife.

That Mr Kirkby's scientific tastes were rapidly developed and bore fruit at an early age is evident from the fact that his first communication to the Geological Society of London was made at the age of twenty-three.[1] The subject of his paper was "Permian Fossils from Durham," in which he described two imperfect specimens of one of the higher crustaceans, referred by Mr Bates to the Isopoda, though of an abnormal character when compared with recent forms. He also recorded a new species of *Chiton* which he named after Mr R. Howse, the author of "The Catalogue of the Fossils of the Permian System of the Counties of Northumberland and Durham," and of "Notes on the Permian System of Durham." These fossils were found in the Magnesian Limestone.

In the following year, 1858, at the age of twenty-four, appeared a remarkable paper on "Permian Entomostraca from the fossiliferous limestone of Durham," which was published in the Annals and Magazine of Natural History. In the introduction of this paper Mr Kirkby mentions that the first notice of the occurrence of Entomostraca in the Permian system of England was made by Mr Rupert Jones—a reference which immediately led to correspondence and to the formation of a life-long friendship between these two investigators. Each recognised the other's merits, and both worked for a common purpose to extend our knowledge of the special branch of palæontology in which they were recognised authorities. Prof. Rupert Jones states in a note, that Mr Kirkby's "amiability, his earnest and self-sacrificing friendship have long been known to a large circle of admirers. In my long correspondence and scientific co-operation with my old friend, I have been fully able to appropriate his willingness and readiness to receive and to communicate information and often have I profited by his good offices and scientific help." Throughout the long period of their friendship, Professor Jones and Mr Kirkby published about thirty conjoint papers on Entomostraca.

These two investigators first met in 1863 at the time of the annual gathering of the British Association at Newcastle, where he also made the acquaintance of Sir Roderick Murchison. By that time Kirkby had collected a valuable series of fossils—now deposited in the Newcastle Museum.

In 1859,[2] Mr Kirkby communicated a paper to the Geological

[1] *Q. J. G. Soc.*, vol. xiii. p. 213. [2] *Ibid.*, vol. xv. p. 607.

Society on "The Permian *Chitonidae*," a life group ranged with the Gasteropods and dating from early Palæozoic time. He described the various representatives of this family occurring in Permian strata. He called attention to their local distribution in rocks of this age in Britain, and that no traces of them had then been found in the Permian strata of Russia or Germany.

Incidentally he refers to the fact that the specific distribution of Gasteropoda in the Magnesian Limestone of Tunstall Hill is greater than at any other locality either in England or in Germany, which he attributes to a slight difference in the depth of the Permian sea over the Tunstall area. He likewise reviews our knowledge of the distribution of the Chitonidae in the Palæozoic rocks of Britain and the Continent.

In 1861 appeared an elaborate paper in the *Quarterly Journal of the Geological Society*, "On the Permian Rocks of South Yorkshire and on their Palæontological Relations." Following the classification of the Permian rocks in South Yorkshire, established by Prof. Sedgwick, he described the sub-divisions, and compared their development in that region with the corresponding zones in Durham. He regarded the sub-divisions in the two areas as equivalents, and as having been deposited contemporaneously. He described the various life groups represented in the Permian rocks of South Yorkshire, and compares them with the fossils of the corresponding zones of Durham. When comparing the fauna of the compact limestone of Durham with that of the Lower Limestone of South Yorkshire, both of which he regarded as stratigraphical equivalents, he notes that in the Yorkshire fauna nine of the species are Gasteropods, while in the compact limestone there is only a single member of the same class. In the compact limestone fauna, eleven of the species are Brachiopods, in the other there is only one. He does not rest content with the enumeration of these and other differences, he attempts to explain them. He says that, in these differences, in two contemporaneous assemblages of Permian species, we have a good illustration of some of the peculiarities that pertained to the distribution of marine life in Palæozoic times. It is thus shown that, according to present researches, there is only about one-third of the species of each fauna common to both groups, thus leaving about two-thirds that are peculiar to each. We can scarcely refer these differences to the result of geographical distribution of species, for we cannot but consider that the Permian deposits of Durham and Yorkshire were accumulated in the same sea. To changes belonging to the distribution of species in depth, however, the differences would seem easily referable, it being now well-

Yours faithfully
Jas W. Kirkby

known that great differences obtain in the distribution of marine life, as the zone of depth varies, even within short distances. I would, therefore, refer the differences observed in these local faunæ to a change in the conditions of depth of sea; the sea being deeper over the Durham area than to the south-west in Yorkshire.

In this elaborate paper he also compares the fossils of the Permian rocks of South Yorkshire with those from equivalent strata in Lancashire and Ireland. He likewise refers to the palæontological features of the Zechstein, and to the distribution of the Permian fauna in time.

In 1864 he communicated another paper to the Geological Society of London "On some remains of Fish and Plants from the Upper Limestone of the Permian Series of Durham." Fish remains had previously been got from the inferior beds of the Lower Limestone and Marl Slate, but this new discovery brought them to within 150 feet of the top of the Upper Limestone. Here again we find that the organic remains inevitably led him to think of the physical conditions of the period to which they belonged. He referred the fish remains to *Acrolepis* and *Palæoniscus*, and he adds that the facies of the small fauna seemed to him to be decidedly estuarine, though with a greater tendency to approach freshwater than marine conditions. He displays the instinct of the true naturalist in this further suggestion, "that the presence of so predaceous-looking a fish as *Acrolepis* among small and comparatively harmless *Palæonisci*, evidently indicates that the latter were pursued and preyed on by it. The mere association of these fishes suffices to justify this inference. But the occasional presence of undigested remains of the Palæonisci between the scales of the abdominal region of the *Acrolepis* would as certainly seem to prove it. The occurrence of so many uninjured individuals of the *Palæonisci* along with the *Acrolepis* would further indicate that both the pursuers and the pursued were ultimately overtaken by circumstances that rendered their instincts powerless in one common catastrophe."

These papers have been chosen by me for special reference, in order to show the indomitable industry, the energy, and the thorough methods of Mr Kirkby. When we remember that all these results were achieved and published ere he was thirty years of age, and that the work was done during the time that he could spare from his ordinary business career, we may justly express our admiration for the man. He confined his attention to the Permian formation so largely developed in the north of England, he examined all the typical sections, he studied the fossil zones, he compared the organic remains with those from

Permian rocks in other areas in Britain and the Continent, he studied the literature till, in fact, he acquired an intimate knowledge of all branches of the subject.

Fortunately for Scottish geology his business arrangements led him to that happy hunting ground for geologists the kingdom of Fife where he found an excellent field for the exercise of those qualities which he had so carefully developed in the north of England.

His removal to Scotland arose in rather an interesting manner. Mr Kirkby's knowledge of geology and his practical experience of mining were so marked that Mr E. W. Binney, F.R.S. of Manchester, availed himself of Mr Kirkby's help in his mining operations. It seems that Mr Binney was engaged in the famous lawsuit about the Torbane Hill coal and oil question and became deeply interested in the subject of Torbanite or Boghead Coal. He leased one or more pits in the shale near Leven in Fife, which yielded Parrot Coal, good for paraffin. In 1867 Mr Kirkby removed to Fife and assumed the management of the Pirnie Colliery and the oilworks at Methil. The lease lapsed in 1877 and the colliery passed into the hands of the Fife Coal Company. Having gained a moderate competence Mr Kirkby then retired and devoted his attention entirely to geology.

Soon after being located in Fife he set himself to study in detail the sub-divisions of the Carboniferous system as there developed. The Geological Survey of Central and Eastern Fife was then completed and the sheets were published (sheet 41 in 1861 and sheet 40 in 1867) without any description of the geology of those areas.

In 1880 Kirkby communicated to the Geological Society an important paper "On the Zones of Marine Fossils in the Calciferous Sandstone Series of Fife," which embodied the results of his researches. He therein gives an account of the geological structure of the area occupied by these Lower Carboniferous rocks, proving by means of the fossils the existence of marine bands in this series, he furnishes a vertical section of the Calciferous Sandstone from the west of Pittenweem to Anstruther showing the position of the marine zones, with a list and vertical range of the species.

In 1882, in a conjoint paper with Mr Binney "On the Upper Beds of the Fifeshire Coal-measures," contributed to the Geological Society, Kirkby called attention to the red sandstones that overlie the profitable part of the coal-measures, which are well exposed on the coast from the mouth of the Leven to East Wemyss. The authors suggested that these red rocks of Fife occupy a higher geological position than any Coal-measures

which they had observed in Northumberland, Durham, Yorkshire and Derbyshire, and that they might be the equivalents of the upper Coal-measures of Lancashire and other western districts of England.

The prolonged conjoint researches of Prof. Rupert Jones and Mr Kirkby led to the publication of a comprehensive paper by these authors "On the Distribution of the Ostracoda of the Carboniferous Formations of the British Isles" in the *Quarterly Journal of the Geological Society* in 1886. Valuable tables are appended to this paper showing the stratigraphical distribution of the Ostracoda in Britain.

In recent years he has contributed various papers to the "Transactions" of this Society on subjects mainly connected with the geology of Fife.

Special reference ought to be made to the generous assistance which Kirkby gave to Sir A. Geikie in the preparation of his memoir on "The Geology of East Fife." He handed over, for publication in that volume, his detailed measurements of the coast sections in which the positions of the various fossiliferous zones are defined and their characteristic fossils are noted. Those who have had an opportunity of examining Kirkby's original manuscript giving the detailed measurements of these Fife sections frankly acknowledge the accuracy and permanent value of his work. These records furnish ample testimony of his power as a field geologist and of his thorough knowledge of the palæontology of the Carboniferous rocks of Fife.