THURSDAY, MARCH 28, 1872

THE IRON AND STEEL INSTITUTE

THE Third Annual Meeting of the Iron and Steel Institute was last week held in London, under the presidency of Mr. Henry Bessemer, and has been numerously attended by representatives, not only of the principal iron and steel works in the United Kingdom, but also by those of many of the most important metallurgical establishments on the Continent, which in several instances have sent special delegates to this meeting.

It will perhaps be remembered that the Iron and Steel Institute was founded barely three years ago, and that upon the occasion of the Inaugural Address, delivered by the first president (the Duke of Devonshire), it had then only received the adherence of some two hundred gentlemen connected with the trade; whereas, on this occasion, notwithstanding that the rules of the society only allow the admission of those either practically engaged in the manufacture or application of iron and steel, or connected therewith by their scientific attainments, it has increased so rapidly in this short interval as to number at present about five hundred members, including in this list nearly all the influence and talent associated with the iron and steel industries of Great Britain. It is self-evident, therefore, that its establishment must be regarded as a complete success, such as could not have been expected had it not supplied a tacitly acknowledged previously existing want. That this conclusion is one accepted not only here at home, but also in every part of the world where the manufacture of these metals is carried on, may be considered as demonstrated on the occasion of this last meeting of the Institute, by the attendance of gentlemen connected with the iron and steel trades of France, Belgium, Germany, Sweden, Russia, Spain, and the United States, several of whom, although foreigners, have, we understand, been so impressed with the good service which the Institute is doing to these metallic industries, as to have enrolled themselves on its list of members.

This unexampled success is no doubt in great part due to the fact that the Council of the Institute have conscientiously adhered to the original programme, in not allowing any of what may be termed trade or purely mercantile considerations to interfere with the true objects for which the Institute was from the first established; these objects being, the scientific and practical inquiry into and the open discussion of all subjects bearing directly or indirectly upon the production and working of iron and steel, to provide the members with a means of intercommunication of their ideas and practical experiences, and to supply them with as accurate information as possible as to what is being done in the same direction in foreign countries as well as at home. How far these aims have been attained in practice, may best be judged of by the rapid increase in members, and by referring to the volumes of the Journal already published by the Institute, which, both abroad as well as at home, have been universally admitted to sustain the high standard aspired to from the first by this young but vigorous institution, and to stand alone in their line, whether regarded from a purely scientific or a practical point of view.

The two annual (London and country) meetings of the Institute may be likened to those of a permanent technical tribunal, before which everything new in connection with iron and steel has to be brought forward, and judged upon as to its merits, after having first passed through the ordeal of cross-examination by the scientific and practical members of the Institute, with the object, as the president tersely expressed it, of sifting out the grain from the chaff; and short as the existence of the Institute has as yet been it has still been long enough to prove how much the iron trade in general, and inventors in particular, may gain by the constitution of such a tribunal.

The most interesting and important feature of the present meeting has been the reports of the committee on machine puddling. The operation of puddling in the conversion of cast into wrought iron is one of so arduous and trying a nature to the workmen that it is daily becoming, in great part owing to the spread of education and the growing desire of men to better their position in society, more difficult to find hands willing to engage in such heavy work; and as it requires long training to make a good puddler, it has now become altogether impossible to obtain a supply of such workmen sufficient to keep pace with the increasing demand for the product; for which reason we find the manufacturer of wrought-iron completely at the mercy of these men, who, besides not ranking very high in the scale of humanity, keep the iron-masters in a perpetual state of terror by their frequent strikes, which, as a rule, do not benefit either party, yet always result in damaging the general iron trade of the kingdom, by driving it abroad and otherwise. This state of things has, as might naturally be expected, given rise to numerous attempts to supersede manual labour in puddling, by machinery, although it may be said, as yet, unsuccessfully; since, notwithstanding that attempts have been made in all directions, and on the most opposite systems, no one of them, when carefully examined into by the Puddling Committee of the Institute, has been considered to fulfil all the conditions requisite to insure its general adoption. When, therefore, at the meeting of the Institute last autumn, in Dudley, Mr. Danks (an American, although born in Staffordshire) declared that he had successfully solved this problem, his announcement was received with considerable incredulity, and he was requested to explain his system before the Institute. To the surprise, yet it may also be added gratification, of all, his explanations, after having been submitted to a severe cross-examination, were considered so far feasible that the members of the Institute unanimously decided upon taking up the matter, and at once sending out a commission (at an expense of some two thousand pounds) to test the system there, with the furnaces and machinery already erected by Mr. Danks, at the Cincinnati Iron-works, but taking with them sufficient pig-iron and other materials from England and Wales to enable them to thoroughly test the system on the large scale, and thereby insure that the process is adaptable to the products we have to treat in this country. After a most patient and painstaking investigation, the three gentlemen who composed this committee — Messrs.

Snelus, Jones, and Lester—reported the system as a complete success, and well suited for the treatment of the iron of this country, an announcement which was received with the greatest interest; and steps were immediately taken to erect similar appliances in England, so that already in the month of February, one of Mr. Danks's furnaces was at work with results which fully corroborated the report of the commissioners, and left no doubt but that the invention must entirely revolutionise this branch of the iron manufacture, doing away with the severe, and it might almost be called degrading, labour of manual puddling altogether, and in other respects producing wrought-iron of a more certain and superior quality to the product obtained from the same pig-iron by the old system.

It is almost impossible to over-estimate the direct and indirect benefits which must accrue to that greatest of all metallic industries, the iron manufacture; and as it might have been years before this invention had asserted itself had it not been taken up so energetically by the Iron and Steel Institute, this may be mentioned as a striking instance of the important results which may be expected from the labours of such a society.

NICHOLSON ON THE GRAPTOLITES

Monograph of the British Graptolitidæ. By H. A. Nicholson, M.D., &c. (Edinburgh: Blackwood and Sons.)

IT is with no small degree of satisfaction that we welcome the appearance of the first part of Dr. H. A. Nicholson's Monograph of the British Graptolites, the first English essay attempting a clear digest or history of this very difficult and perplexing group of fossils. Dr. Nicholson has, however, for years lived in those regions whose rock masses, life contents, and structure were long since elucidated and rendered classical and famous by the researches of Sedgwick in 1848; and where these organisms are most abundantly distributed. Patient investigation of the great stores of entombed materials at his command, combined with requisite knowledge of zoology, has favoured the author in the preparation of this valuable contribution to our hitherto limited knowledge of these extinct forms of life.

Much has been written upon the Graptolitidæ, but in a disjointed manner, by numerous writers since 1727; but Linnæus, in his "Skanska Resa" in 1768, first applied the name "graptolithus" to some or certain allied forms occurring in the Scandinavian rocks. Much controversy has been carried on about this original scalariform type of graptolite; some writers believing it to have been a monoprionidian, others a diprionidian genus. It signifies little now save as matter of history. Since then eighteen genera and ninety species have been established and recognised in Britain alone, and these have been mostly obtained from rocks of Lower Silurian age. Seven species out of the ninety are only known in the Upper Silurian rocks, and four of these are peculiar to that horizon, or do not range lower. The authenticity then of the character of the one and disputed Linnæan form, will do little more after all than add to the literature of the group. This original figure is sufficient to show us that it was a graptolite in our acceptation of the genus, and doubtless the form looked upon and drawn by the illustrious Swede was *one of millions* contained in the black and slaty rocks over which he travelled; a form, with many others since discovered, and now known to all students of those Silurian rocks which belt the earth from Canada to Britain, Scandinavia, Saxony, and Bohemia, and on to Australia. The historical notice of the Graptolitidæ occupies seventeen pages, and forms a compilation of the bibliography of the group, for which all students will gladly thank the author, from 1821-2, when Wahlenberg and Schlotheim advocated their alliance to the Cephalopoda, to Hopkinson's last paper in 1871 (*describing the reproductive capsules*). We have, in fact, a well-digested chronological history, enumerating about eighty notices, and embracing the labour of thirty-five authors.

To study and examine the graptolites *in situ*, or as they occur in the black paper like flaggy shales of the Arenig, Llandeilo, and Caradoc beds, to which they are chiefly confined in Wales, Westmoreland, Scotland, and Ireland, is no small pleasure; but after their stratigraphical position or succession in time is definitely settled in any area to the satisfaction of the physical geologist or stratigraphist, the question of their zoological affinities, or the position they hold in the animal kingdom with relation to modern and existing types becomes one of high importance and value, yet one even now not satisfactorily determined or established. Were they free swimming or floating bodies, in the old Silurian seas, or were they attached like the hydroid Sertularidæ of modern shores and time? These questions are dealt with by the author under two heads: first, *their mode of existence*, and secondly, their *systematic position and affinities*. To our mind the modes of existence of the Graptolitidæ have little weight in classification; a knowledge of their intimate structure alone must be the basis of their zoological position in the animal kingdom.

It was natural that the older writers should have referred this extinct group to many divisions which themselves were not then really understood; and they have been placed in no less than six divisions of the animal kingdom.

Modern systematists, however, have referred them to three groups—the Hydrozoa, Polyzoa, and Actinozoa. In 1839 Sir R. Murchison, in his Silurian System, placed them with the Actinozoa, assigning their position to the Pennatulidæ, and related to the Virgularia of the northern seas. No real analogy however exists between the tubular chitonous fibre of the graptolites, and the calcareous or sclerobasic rod of Virgularia, whose cænosarc secretes no external envelope, and where the polypes are not contained in, or protected by, special chitonous thecæ. All research also tends to show that the graptolites were free bodies and perhaps oceanic; the structure and condition of the radicle or initial point is conclusive on this point. With respect to their development we as yet know little; but the fact that, as in other Hydrozoa, the reproductive organs were outwardly developed processes of the body wall, strongly allies them to the Hydrozoa. Hopkinson has of late added much to our knowledge of the external reproductive sacs or gonothecæ of Diplograpsus.

To Colonel Pollock is undoubtedly due the suggestion of their sertularian affinities through Sertularia and Plumularia, but they certainly are not their fossil representatives.