this meeting Sir John Franklin took part, and as he sailed on his last voyage shortly afterwards it is possible that his absence prevented the matter from being further discussed. The provisional resolution come to by the committee was to give the following names and limits to the oceans:—Arctic Ocean and Antarctic Ocean, to the waters lying within the Arctic and Antarctic Circles respectively. The Atlantic and Pacific Oceans stretched from the Arctic to the Antarctic Circles, and were separated from each other by the meridian of Cape Horn. The Indian Ocean extended from India to the Antarctic Circle, divided from the Atlantic by the meridian of Cape Agulhas and from the Pacific by that of the south point of Tasmania. Mr. Arrowsmith, the eminent cartographer, was present at the meeting, and it is customary in Continental works to refer this systematic definition of the oceans to him. As a matter of fact his maps had a great deal to do with the nomenclature acquiring popularity. The committee proposed a triple sub-division of the Atlantic and Pacific into a northern, southern, and intertropical part. This has not come into general use. It is time that the question of oceanic nomenclature should be seriously considered again, and that the morphology and physiology of these great features be taken into account as well as their superficial outlines in determining a scientific classification.

THE IRON AND STEEL INSTITUTE.

A MEETING of the Iron and Steel Institute was held on Wednesday and Thursday of last week, May 24 and 25. There was a somewhat short programme, only five papers being on the agenda, and one of these was not read. There were, however, two additional papers afterwards brought in, but they were only read by title, and as they were not discussed, had very little influence on the proceedings. The papers read were as follows:—On the elimination of sulphur from iron and steel, by J. E. Stead, of Middlesbrough; on the Saniter process of desulphurisation, by E. H. Saniter, Wigan; notes on puddling iron, by John Head; on the recording pyrometer, by Prof. W. H. Roberts Austen. On the members assembling on Wednesday morning, the president, Sir Frederick Abel, occupied the chair, and the usual formal business of reading the minutes was first undertaken, after which the report of the council was read by the secretary, from which it appears that the advance of the institute in respect to membership has not been altogether satisfactory of late. The resignation of the secretary, Mr. Jeans, was also mentioned. The opportunity has been taken by the council, of Mr. Jeans's retirement, to introduce some modifications in the secretarial and editorial arrangements. Mr. Bennett H. Brough, an Associate of the Royal School of Mines, who has for some time past been an assistant professor at the Royal College of Science, has been appointed to the office of secretary and editor to the institute.

Sir Frederick Abel next evacuated the presidential chair, which was then occupied by Mr. E. Windsor Richards, the new president. Mr. Richards is an excellent representative of the practical steel manufacturer, having been engaged in the iron and steel trades all his life. He was for some time manager at the important steel works at Eston in Middlesborough. Some time ago he vacated his position there to take the management of the Lowmoor Iron Works, an establishment almost classical in its antiquity, in an industry which has been so entirely reformed within the last few years. Lowmoor, however, keeps to its old traditions and still produces best Yorkshire iron in the manner practised from a period extending back into the early days of iron manufacture, and this in spite of the improvements and advances made in the manufacture of mild steel. Mr. Richards having been conducted to the chair, at once proceeded to deliver his inaugural address. One of the most important parts was his reference to the remarkable extent to which English steel is made from foreign ore. It is, of course, unnecessary to state at any length the reason for this, as the fact must be well known to nearly all our readers. The iron ores of Britain, upon which our engineering supremacy was so long supposed to rest, is, with some not very important exceptions, unfitted for the production of ingot iron, more generally known as Bessemer, or mild steel. The chief reason for this is the considerable percentage of phosphorus it contains. We have, however, in Lancashire and Cumberland, hæmatite ores which are of a suitable description, but these are not so largely worked as at first might be thought they would be, and the bulk of hæmatite ore required for steel making in England is brought from Bilbao, in North Spain. It has been generally thought of late that these deposits are being rapidly exhausted, and though the use of calcium will perhaps somewhat extend the life of the supply, the end may be sufficiently near to the present time to make it worthy of the serious consideration of steel makers. In the basic process, there is, however, a means by which our native phosphoric ores can be rendered suitable, to a large extent, for steel making purposes, and the successful working of the basic system is therefore a matter of national concern. In England, the process has received serious opposition. Perhaps we have been over-conservative in this matter; or perhaps, on the other hand, we have displayed no more than salutary caution. However this may be, the Germans have gone far ahead of us in the production of basic steel. Germany, like England, has large deposits of phosphoric ore and, unlike England, has not that free sea communication with Spain, which has rendered the importation of hæmatite ores a matter of little difficulty and small expense. It was natural, therefore, that Germany should take hold of the new system with less caution and more vigour than the English steel makers, but the result has been somewhat antagonistic to English interests. Mr. Windsor Richards, in his presidential address, told us that the west coast of England has raised $2\frac{3}{4}$ million tons of ore, free from phosphorus, and could probably increase that quantity to produce $1\frac{1}{2}$ million tons of pig iron, should the demand arise. During the twelve months ending December 1892, the quantity of basic steel made in England was 406,839 tons. In Germany and Luxemburg 2,013,484 tons of steel were made from phosphoric ores.

Mr. Windsor Richards is now, as we have said, an "ironman," which seems a curious thing in the present day, after he has held, perhaps the most important position of his time in the steel trade; however, there is yet a large demand for Lowmoor iron, and the old-fashioned methods of production are still in vogue. Of this he gave some very interesting particulars. The address dealt at some length with the question of over-production, and it seems pretty evident that our facilities for making steel are far ahead of the demand for the material. In spite of this money is still being expended in steel-making plant, although so large a part of that already existing is at present lying idle, and appears likely to do so. The year 1892 was in many respects one of the very worst the iron and steel industry has ever known.

The two papers by Mr. Stead and Mr. Saniter on the elimination of sulphur from iron, were contributions of great value. The subject is one of very considerable importance, and fortunately has been occupying the attention of metallurgists for some time past. It would be impossible for us, in a brief notice of this kind, to give an abstract of these two papers; indeed they are only complementary to papers already read by the authors at former meetings. Calcium chloride is the purifying material in admixture with lime, and the process is adapted, either for purifying fluid iron or pig iron direct from the blast furnace. The process is effected by running the fluid metal into a ladle having a layer of the purifying materials on the bottom, and afterwards running the metal into pigs or plate metal for subsequent use in the puddling process; or the crude sulphury pig may be treated in the basic Siemens furnace or Bessemer converter, with the desulphurising mixture. About $\frac{1}{2}$ cwt. of crude calcium chloride is used per ton of steel, in conjunction with an excess of lime above that which is usually employed; the cost of the calcium chloride is about 35*s.* per ton. About 70 per cent of sulphur can be removed from the charge of metal in an open hearth furnace by this process. It may be added that the process is in practical working at Wigan. What we have already said with regard to dephosphorisation of ore in its bearing on the use of our native ores also applies, to a great extent, to desulphurisation, and although Mr. Saniter does not stand alone in the introduction of a desulphurising process, there is no doubt that he has rendered this country considerable service by his efforts in this direction. The reading of these two papers, together with the introductory business and the presidential address, occupied the whole of the Wednesday sitting, and the discussion on both papers was taken jointly on Thursday morning. The chief point raised was whether the process was one requiring such delicacy in manipulation that ordinary workmen could not be trusted to carry it out so as to produce uniform results. Whether this objection will be fatal time will show, but the general opinion appeared to be that by employing fairly

skilled workmen the difficulties of manipulation were not such as could not be got over, and that fairly uniform results would follow reasonable care in working.

The next business was the reading of Prof. Roberts-Austen's paper on the recording pyrometer. It will be remembered that at the annual meeting of two years ago, Prof. Roberts Austen gave a description of the Le Chatelier pyrometer, and the application of it, which he had introduced, by which it was adapted for recording work in blast furnace practice. The object of the present paper was to give some particulars of the most recent form of this recording pyrometer, which Prof. Roberts-Austen has devised. At the request of Mr. E. P. Martin, Managing Director of the Dowlais Iron Works, Cardiff, an instrument was made and put into operation as a means of recording temperature of the blast in an iron smelting furnace. The spot of light from the mirror of a galvonometer is thrown on sensitised paper, the paper itself being traversed at a uniform speed. In this way the record of temperature at all times is obtained. The author gave an instance of the value of the instrument. The blast to the furnace in question was supplied by a number of hot blast stoves on the ordinary regenerative principle. When the chequer work in a stove has been heated up sufficiently and the blast is first turned on for supply of the furnace, the temperature of the blast is naturally at its maximum. As the blast cools the chequer work, by abstracting heat from it, the temperature gradually falls, and it continues to decrease until it is considered desirable to re-heat the stove, and then a new stove is switched on. It will be seen therefore, that the temperature of the blast in the main, common to two or more stoves, will vary regularly, so that a curve on the diagram indicating temperature, will consist of a number of more or less steep inclinations; in fact, very much representing the teeth of a saw. That would be the normal inclination; occasionally, however, the gas valves leak, and then the stove may be receiving hot gases when it ought only to be passing air. The average temperature when this leaky stove is in use will naturally be higher than that due to another stove; in fact, it will be heated at the expense of the remaining number of the group. The result is antagonistic to regular working which is so much desired in blast furnace practice, and though the evil effect may be neutralised by the heat absorbing property of the large mass of material in the blast furnace—acting, as it were, as a fly-wheel for heat—the state of irregularity, if carried to excess, might be very harmful. It is also, of course, desirable that the blast furnace operator should know at the earliest time when his valves are going wrong; in fact, the whole system upon which the Cowper stove is based bears on the proper reversal of the blast. Prof. Robert Austen's apparatus fulfils the required conditions in supplying the knowledge required, and the invention cannot fail to be one of the greatest service to the metallurgist.

A paper by Mr. John Head on puddling iron was next read and was followed by a short discussion, after which the meeting concluded with the usual votes of thanks.

ROYAL GEOGRAPHICAL SOCIETY ANNIVERSARY MEETING.

THE anniversary meeting of the Royal Geographical Society held on Monday afternoon was, as we anticipated, exceptionally large and representative. The report of the council stated that the membership of the Society on the 1st of May was 3691 (including 22 ladies), a net increase of 166 fellows since May 1st, 1892, being the largest net addition to the membership of the Society since 1875. The total net income for the year was £93,000, and the expenditure £9012. In addition to the services performed to the fellows and the public by means of evening meetings, the use of the Map Room and Library and the publication of the *Geographical Journal*, twenty four intending travellers have received instruction in practical astronomy and route-surveying from Mr. Coles, and instruments have been lent to eleven travellers for use in all parts of the world.

In order to express disapproval of the words we italicise in the first paragraph of the report, which ran as follows:—

Membership.—The question of electing Ladies as Ordinary Fellows was considered by a Special General Meeting on April 24th, when it was decided in the negative by a considerable majority. The Council regard this vote (unless hereafter rescinded by a General Meeting) as conclusive against any further election of Ladies as Ordinary Fellows, *without prejudice to the* status *of those already elected.* They consider that, under the circumstances, all the legal expenses incurred in connection with this important question may equitably be defrayed by the Society, and they have accordingly provided for their being so defrayed.

Mr. Dibden, seconded by Colonel Montague, moved the rejection of the report, but on a division being taken the report was accepted by a large majority. The medals and other awards for the year were then presented as follows:—

The Founder's Medal, to Frederick Courtney Selous, in recognition of his extensive explorations and surveys in British South Africa. The Patron's Medal, to W. Woodville Rockhill, for his travels and explorations in Western China, Kokonor, Tsaidam and N.E. Tibet. The Murchison Grant for 1893, to Mr. R. W. Senior, who, for several years in succession, has carried out a most laborious duty in the higher ranges of Kulu and Lahaul, Punjab Himalayas, and the results achieved in point of accuracy, expedition, and amount of work done, have been exceptional in the face of great hardships and great physical difficulties. The Gill Memorial, to Mr. Henry O. Forbes, for his explorations and natural history observations in New Guinea, the Malay Archipelago, and the Chatham Islands. The Cuthbert Peek Grant, to Mr. Charles Hose, for explorations and natural history observations and collections in Saráwak, North Borneo. Six prizes of £5 each, and eight of books, given by the Royal Geographical Society to Students in Training Colleges for 1893, were presented to the successful candidates who were introduced by Mr. Mackinder.

A ballot was then taken for the election of officers and council for the ensuing year, and the list proposed by the council was, as usual, adopted. The new president is Mr. Clements R. Markham, F.R.S., and the vice-presidents are the Hon. G. C. Brodrick, Sir Joseph Hooker, F.R.S., Sir John Kirk, F.R.S., Dr. W. T. Blanford, F.R.S., General R. Strachey, F.R.S., and Captain W. J. L. Wharton, F.R.S.

Sir M. E. Grant Duff, the retiring president, then read the anniversary address on the progress of geography, in which he summarised the various activities of the Society. In the course of this he said that during the four years in which he had the honour to be president, he had seen the number of Fellows increase by three hundred and fifty-eight, and they were now close upon three thousand seven hundred. Before long the Society would have to take into the most serious consideration the acquisition of a new domicile. "Our constantly increasing collections would of themselves, as I have pointed out before, ere long drive us from our present quarters, and we have, in addition, reason to believe that even if we could extend our borders where we now are, on anything like reasonable terms, which we cannot, certain changes in the streets in this part of the town would ere long improve us off the face of creation. Then, although the University of London has been most kind to us in lending us their theatre, and although the character of our papers and of our publications, as well as our position as the leading geographical society of the world make us, I think, not unworthy recipients of the kindness of a university, whose operations extend over the whole of the British Empire, we cannot look forward to the present state of things continuing for an indefinite period. A vote of the Senate might at any time put an end to it."

An epitome of the year's exploration—which has been sufficiently recorded in our "Geographical Notes" from week to week—concluded the address, which was received with great applause. On the motion of Lord Northbrook, seconded by Sir John Lubbock, an enthusiastic vote of thanks was passed to the retiring president, who briefly replied.

At this stage a controversy regarding the question of the admission of women to the Society was started, and after some spirited speaking, the leading opponents of the recent action of the council stated that they were perfectly prepared to concur with the wishes of a majority of the Society as ascertained by means of a *plébiscite*, or a special general meeting to be convened at an early date.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The number of entries for the Honour School of Natural Science this year is 41, which compares favourably with