THE INTERNATIONAL FISHERIES EXHIBITION. — THIRD PAPER.

IN eight weeks over seven hundred thousand persons have visited the exhibition; and there are no signs of any decrease in the daily attendance, which averages from twelve thousand to eighteen thousand, except on Wednesdays, when, the price of admission being half a crown instead of one shilling, the number is only about half as great. Wherever one travels by public conveyance, some of his neighbors in the car or the omnibus are always laden with the ponderous blue catalogue of the exhibition. London is thoroughly permeated by the interest in fish and fisheries. On Sunday I felt a desire for a change of topic, and sought refuge under the dome of St. Paul's; but the canon of Worcester, who officiated at the service, preached a sermon on the miraculous draught of fishes.

Since the middle of July the galleries have been lighted by electricity until ten o'clock. The result has been very satisfactory, the illumination in many cases being more effective than that by sunlight. The annoyance of heavy shadows is avoided by the use of a large number of lamps. All the principal systems being represented, there is an excellent opportunity for comparison. The following is the official distribution of the electric lighting of the exhibition: —

1. Siemens Brothers and company (limited)	Conservatory	4 arc-lights, 6,000-candle power.
	Main gallery, Great Britain	1,200 incandescent lamps (Swan).
2. Swan united company (limited)	Royal pavilion	280 incandescent lamps (Swan).
3. Gülcher electric-light company (limited)	China, New South Wales, etc.	600 incandescent lamps (Crookes).
	Canada and United States, Norway and Sweden	30 arc-lights, 1,000-candle power.
4. Electric-light supply company (limited)	Fish-market	7 arc-lights (Volta) 50 incandescent lamps.
5. Ferranti, Thompson, and Ince	Aquarium and west corridor	1,000 incandescent lights.
	Machinery in motion, Electric-light machine-shed, Greece, Italy, Great Britain	25 arc-lights (Ferranti), 5,000-candle power each.
6. H. Edmunds	Promenade	50 arc-lights.
	Upper terrace	6 large arc-lights on mast.
	Eastern corridor and fine arts vestibule,	500 incandescent lamps.
7. Charles Lever	Council-room, Lecture-hall, Dining-rooms, Kitchens	28 arc-lamps (Lever).
8. Jablochkoff electric-light company (limited)	Netherlands, Belgium, Part of the United States, etc., Part of Sweden, etc	60 lamps (Jablochkoff).
9. Mackie	Life-saving apparatus shed	15 arc-lamps (Lea).
	Board of trade shed	6 arc-lamps (Werrdemann).
10. Brockie	North corridors, for exhibition of stuffed fish	20 arc-lamps (Brockie).
11. Gérard	Spain and Russia	36 arc-lamps (Gérard).
12. Sun-lamp electric-light company	Entrance vestibule	24 lamps (Soleil).
13. Goulard and Gibbs	Sixteen stations in different parts of the building	Arc and incandescent lamps of various characters.

My observations at the exhibition have been confirmed by what I saw at the Royal college of surgeons at the conversazione recently given by the president and Lady Wells. The museum was perfectly lighted by about six arc-lamps in each of its spacious halls. The arc-lights, too, are used in the art museum at South Kensington with very excellent effect; six of them accomplishing what is done, no more effectively

I have been particularly interested in studying the adaptability of the various lights to museum purposes, and am thoroughly satisfied that a few large arc-lamps are preferable to a great number of small ones. The light seems softer, more powerful, and more evenly diffused, in a room like the main gallery assigned to the United States, where there are six lamps in a room fifty by a hundred and forty feet, at a distance of perhaps fifteen feet from the floor, than by a system like that in the British sea-fishery gallery, where the twelve hundred Swan incandescent lamps are used 'to demonstrate the possibility of lighting large areas by incandescence,' as the official catalogue states. Thirty lights of the Gülcher or Edmunds patterns would give a much better effect in this great shed, eight hundred and forty by fifty feet in dimension. The effect of a large number of incandescent lamps disposed along the roof of a room in every direction is very bewildering: they detract the attention, and give one the feeling that a long stay will be sure to result in a headache. In the Chinese court the Crookes incandescent lamps are used, each suspended under a shade of brightly-colored glass: the general effect is rather pretty, but the collections are scarcely discernible.

though perhaps more agreeably, in a hall of the same size by about two hundred gas-jets. The expense of lighting some twenty halls by gas in this generous manner must be far greater than by electricity.

On the 18th of June the International fishery conference began its sessions in the conservatory of the Royal horticultural society, adjoining the exhibition galleries. Meetings have since been held every day except Wednesdays and Saturdays. The inaugural address was delivered by Professor Huxley, and was an admirable introduction to the papers which were to follow. First referring to the antiquity of fisheries and their influence upon the history of man, he spoke at some length of the fisheries of the Phoenicians, the Romans, and the early Britons. Insisting upon the importance of fish as food, he next took up the question, 'Are the fisheries exhaustible?' and, after tacitly admitting that certain fisheries may be destroyed, went on to describe the enormous abundance of cod, mackerel, herrings, and sardines, and to express his firm belief that their numbers cannot be effected by human agency. He concluded with a very strong condemnation of unnecessary legislation.

Upon this occasion the Prince of Wales presided, and there was an impressive assemblage of diplomats and state officials. On the following day the prince again was present, and read a paper an hour and a half in length, written by his brother the Duke of Edinburgh, who is absent in Russia attending the coronation of the czar. This paper, entitled 'Notes on the sea-fisheries and fishing population of the United Kingdom,' is in many respects the most remarkable which has been presented to the conference. It is by far the most exhaustive and scholarly essay on the fisheries of Great Britain which has ever been published, and contains a great store of valuable facts gathered by the Duke of Edinburgh during the three years in which he served as admiral in command of the naval reserve, together with extensive statistics obtained at his instance by the men of the coast-guard. On the 21st Sir James Gibson Maitland, the proprietor of the most extensive fish-cultural establishment in Europe, located at Howieton, near Stirling, read a paper on the 'Culture of Salmonidae and the acclimatization of fish,' and the following day Professor Leone Levi of University college, London, on the 'Economic condition of fishermen,' — an important contribution to social economy. On Monday, the 25th, the American commissioner read a paper on the 'Fisheries of the United States and the work of the U. S. fish-commission.' Mr. James Russell Lowell occupied the chair, and made one of his wise and witty little speeches which are so thoroughly enjoyed by the English people.

On the 28th Mr. R. W. Duff, M.P., spoke on the 'Herring fisheries;' on the 29th Prof. A. A. W. Hubrecht of Utrecht university, on 'Oyster-culture and the oyster-fisheries in Holland,' and Mr. R. B. Marston, on 'Coarse fish-culture,' — 'coarse fish' in England signifying fresh-water fish other than the Salmonidae. On July 1 Mr. L. Z. Joncas read a paper on the 'Fisheries of the Dominion (of Canada);' and, on the 3d, Professor Huxley spoke most instructively upon the 'Diseases of fishes,' confining his remarks to the history of the salmon-infesting Saprolegnia ferax. On the 5th several of the commissioners from continental European nations spoke of the fisheries of their respective countries, and on the 6th Capt. Temple gave an account of the antarctic seal-fisheries.

The discussions have been in some instances important, though the usual disposition to ramble has been difficult to check. In fact, the ponderous British system of closing each session with four formal speeches, in connection with the votes of thanks to the chairman and the speaker, has rather tended to encourage the utterances of generalities. The 'practical men,' as they style themselves, who take the very unnecessary precaution of informing their hearers that they make no claim to being 'scientific,' have been rampant at these meetings. Professor Huxley's inaugural address has caused great unhappiness to those who believe in legislative protection without limit or reason. Close seasons for river-fisheries are needful and useful; but what is to be done with economists who claim that legislation will relieve the salmon from its pestilential parasite, the Saprolegnia ferax?

The juries began their sessions about the middle of the month; and the galleries are still daily invaded by enterprising little groups of men with note-books. Their task is not a light one; for the number of exhibiters must be at least three thousand, and the heat is greater than London has known since 1860. Science is well represented among the jurymen: Professor Flower, Professor Allman, Mr. John W. Clark of the Cambridge museum, Mr. Henry Woodward of the British museum, Professor Moseley of Oxford, Mr. John Murray of the Challenger, Lord Russell, Dr. Murie (secretary of the Linnaean society), Dr. Francis Day, Professor Huxley, Mr. R. H.

Scott, Professor Ray Lankester of University college (London) and Professor Jeffrey Bell of Kings college, Dr. Spencer Cobbold, Mr. Romyn Hitchcock of New York, Mr. R. E. Earll of Washington, Dr. Hubrecht of Utrecht, Professor Smitt, Professor Torell and Dr. Trybom of Sweden, Dr. W. A. Buch of Norway, Professor Giglioli of Florence, Dr. Steindachner of Vienna, and Mr. E. P. Ramsay of the Sydney museum (New South Wales), — are all here in the work. Just before the opening of the exhibition, *Nature*, in an editorial, after stating that the management of affairs had been trusted almost entirely to 'practical' men, to the exclusion of English men of science, expressed some doubt as to whether this policy would effect as satisfactory results as that of the Berlin exhibition. It would be interesting to know how far this hint has influenced the action of the executive committee. The committee has shown itself singularly sensitive to the voices of well-meaning advisers, and changes are constantly being made for the better in the management of affairs. For instance: the conference chamber has been removed from the conservatory, where it was torture either to speak or to listen, to one of the picture-galleries near the main entrance; and the experimental fish-market in connection with the exhibition has been thrown open to the public without admission-fees, and a separate entrance cut through from Exhibition road.

The papers read at the conferences are being printed in full, together with the discussions which follow them, and will form a valuable little library, when supplemented by the shilling handbooks to the exhibition, which are being rapidly printed. Fifteen of these handbooks are announced, in addition to the eighteen or more 'papers of the conferences.' The literature of the exhibition is reserved for future discussion. It is much to be hoped that the authorities will crown the series with an illustrated report, prepared by scientific committees, similar to the valuable 'Amtliche berichte über die Internationale fischereiausstellung zu Berlin.'

The closing address at the conference by Professor Ray Lankester will be upon 'The scientific results of the exhibition.' It would not be surprising if Professor Lankester were to choose to act the part of the prophet rather than that of the recorder, and to point out in his discourse what the exhibition ought to do for science. A number of prominent educators and investigators have already addressed to the executive committee a memorial advocating the establishment of a national marine zoölogical station with a part of the surplus funds, which, from present appearances, are likely to remain over at the end of the exhibition. In another letter I hope to review briefly the most important features of the exhibits of the several countries. G. BROWN GOODE.

Richmond Hill, July 10.

THE PARIS OBSERVATORY.

WE abstract from *Nature* the items of chief interest in the report of Admiral Mouchez, the director of the Paris observatory, on the state of that institution during the past year. Its service has been considerably deranged by the preparations for the transit of Venus. The various members of the expedition attended the observatory to be trained either in photography or in the use of the artificial transit, and no less than five of the *personnel* of the observatory themselves took part in the work. The grounds of the observatory have been extended, the equatorial *coudé* has been installed, and several underground chambers have been constructed for the purpose of studying magnetism and terrestrial physics generally. A revision of Lalande's catalogue of stars, numbering forty thousand, has been going on for the past four years. The general catalogue, which will form eight volumes in quarto, is well in hand; and four volumes will be published during the next three years. Meridian observations, numbering a hundred and ten thousand, have already been made, to assist in the construction of the catalogue.

The common inconveniences attending the use of equatorials of the usual form of construction have led M. Loewy to conceive the idea of adapting to the equatorial the system of '*lunette brisée*,' employed first in England, and afterward to a greater extent in Germany, especially in small transit instruments. The new *coudé* equatorial may be thus described: the polar axis of the instrument is supported at its extremities on two pillars, like a meridian instrument; round this axis the telescope turns, forming a right angle at the lower support; by means of a mirror placed at the summit of this angle, the light is reflected along the pierced axis, at the end of which the eye-piece, or micrometer, is placed. Under these conditions, with the telescope at rest, objects on the celestial equator pass across the observer's field of view. In order to secure the observation of objects not on the equator, a mirror free to rotate is placed before the object-glass, and connected with the declination-circle. The inclination of this mirror may be changed so as to throw into the tube the light coming from a star of any declination. The observer may thus explore every part of the heavens without quitting his position at one end of the polar axis. The telescope may practically, by a rotation of this axis, be directed toward any part of the celestial equator, whilst a star of any declination may be made to throw its light down the broken telescope by means of the external mirror. Preliminary ex-