very promising foundation of the great Australasian group of colonies was laid by the establishment of a small convict establishment at Botany Bay.

Turning to the east, we find Malacca captured from the Dutch in 1795, though it did not finally become English till 1823. Penang was colonized in 1785, and Province Wellesley in 1798. Much more important was the capture of Ceylon from the same once supreme colonial power in 1796. The battle of Plassey was fought in 1757, and within about half a century thereafter, through the genius of Clive and Hastings and Wellesley, English supremacy was virtually established, directly or indirectly, over a great part of the Indian peninsula. Bengal was ceded in 1765, and Madras conquered in 1792–1800, having between them an area estimated at two hundred and ninety thousand square miles, and a population of fifty-five millions.

Thus, then, during the latter half of the eighteenth century, England had succeeded in rapidly increasing her foreign possessions by something like six and a half millions of square miles, reckoning the whole of Australia as virtually annexed. During the present century she has been able to increase this area by about one-third, half of it, at least, in India. While, during the last eighty-six years, she has been extending and confirming her hold over India, and while she has acquired one or two really important additions to her colonial possessions, it will be seen that her chief work has been to develop and consolidate the acquisitions of the latter half of the eighteenth century.

In the West India region, British Guiana was finally annexed in 1803, and St. Lucia in the same year, thus completing the present list of her possessions in that quarter. Also in 1803 the first settlement was established in Tasmania. While in this quarter, twenty-six years later (1829) West Australia was settled, followed, seven years after (1836), by the modest beginnings of South Australia at Port Philip. In 1841 New Zealand began her wonderful career as a British colony. Ten years later (1851) Victoria separated from New South Wales, and set up for herself, — an example followed by Queensland in 1859. In 1806 the Dutch were compelled to hand over to England their possessions in South Africa, which by the formation of the Natal colony in 1838, and other subsequent annexations, have been extended far beyond their original boundaries. In 1807 England captured the tiny islet of Heligoland, and three years later (1810) Mauritius capitulated, her possession of the island being confirmed by the treaty of Paris, 1814. A year later (1815) she acquired the Ionian Islands by treaty, only to give them up to Greece some fifty years after; and in the same year she established her naval station in Ascension. Singapore was settled in 1818, and the Falklands in 1833. Aden as an outpost of India was occupied in 1833. Labuan was ceded in 1846, followed by Lagos in 1861, and Fiji in 1874. The Straits Settlements were detached from India in 1867, and set up for themselves as a separate colony; and in 1874 the native states of Perak, Selangore, and Sungei Ujong, were placed under its protection.

We all remember the excitement over the occupation of Cyprus in 1878; and while England pays tribute for it to the sultan, her real relation to the interesting island is indicated by the fact that it figures among her other colonies at South Kensington. The British North Borneo company was incorporated by royal charter in 1881; and the fact of its having a court to itself at South Kensington may be taken as a tacit admission that its territory is reckoned among her colonies. England has hardly yet recovered from the excitement of raising the British flag over southern New Guinea, the Niger mouths, and Bechuanaland, in 1884; while at this very moment her soldiers and civil servants are busy getting into working-order the extensive territory of upper Burmah, proclaimed English on the first day of the present year. This last annexation, however, belongs rather to the record of her dominion in India, which has advanced so rapidly that the two hundred and ninety thousand square miles and the fifty-five million inhabitants of 1800 have grown to something like a million and a half of square miles and two hundred and eighty millions of population. To the above might be added such outlying spots as the Kuria-Muria Islands, the Keeling Islands, and Port Hamilton, in Asiatic waters; Berbera on the north-east African coast, and Socotra off it; the islands of Rotumah, Auckland, Lord Howe, Caroline, Starbuck, Malden, and Fanning, in the Pacific; not to mention the Nicobars and Andamans, attached to India.

Thus, then, while the beginnings of the greatest colonial empire on record go back some three hundred years, by far the greater proportion of England's foreign possessions have been acquired during the last hundred and twenty years.

LONDON LETTER.

THE *conversazione* of the Royal society, on Wednesday evening last (May 12), was even more successful than usual, special pains having been taken to bring together objects of interest. Partly, perhaps, on this account, and also because it was the first reception of the new president, Prof. G.

G. Stokes, the attendance also was unusually brilliant. Prominent among the exhibits was a microscopic section of the third or parietal eye discovered three days previously in the New Zealand lizard, Hatteria punctata, by Mr. Baldwin Spencer of the University museum, Oxford, who has described it in full in *Nature* for May 13. Mesial sections of a frozen chimpanzee and a frozen orang-outang, by Prof. D. J. Cunningham, attracted much attention, as did a collection of micro-organisms by Mr. F. R. Cheshire, and of photomicrographs of bacteria by Mr. E. M. Crookshank. To chemists, specimens of the new element germanium, which appears to be the ekasilicium predicted by Mendellieff in his periodic law (lent by Professor Winkler of Freiburg), were specially interesting. Mr. Howard Grubb exhibited a model of the proposed equatorial and observatory for the great 36-inch refractor for the Lick observatory in California, in which *all* the required motions of telescope, dome, and rising floor are effected by water-power, and are controlled by an electrical arrangement, the commutator of which is portable, and carried by the observer, thus obviating the necessity of assistants. Various electrical appliances, such as the powder-magazine lamps of Mr. J. Pitkin, weighing six pounds, and lasting ten hours, De la Rue's chloride-of-silver battery, arranged for electric lighting, and the miner's electric lamp of Mr. Swan, illustrated the advances in practical electricity; the chief object of purely scientific interest in this connection being the voltaic cells, with solid electrolytes, described by Mr. Shelford Bidwell in the *Philosophical magazine* for October, 1885, and the induction bridge of Professor Hughes. Objects connected with the Hell Gate explosion, near New York, exhibited by Dr. H. Sprengel, were shown, and near them was a new and extremely powerful electrical-influence machine with eight disks working within a glass case. Captain Abney and General Festing exhibited their color-photometer; and several series of stellar and solar photographs by the brothers Henry, Janssen, the solar physics committee, Common, Dr. Gill, and others, illustrated the recent advances in celestial photography. Dr. Auer von Welsbach's incandescence system of burning gas, whereby a light of twenty-five candle-power was obtained with a consumption of two and one-half cubic feet per hour, attracted much attention. An ordinary Bunsen flame is used, the incandescence being obtained from a cylindrical 'wick' of net or muslin soaked in a solution of metallic salts, zirconium being one.

The arrangements for the Birmingham meeting of the British association are now completed. On Wednesday evening, Sept. 1, the president-elect, Sir William Dawson, of the McGill college, Montreal, will deliver his address. The other two evening discourses at general meetings will be on Sept. 3, by Prof. W. Rutherford, on 'The sense of hearing;' and on Sept. 6, by Mr. A. W. Rücker, on 'Soap-bubbles.' The various sections will be presided over by (A.) Prof. G. H. Darwin, (B.) Mr. W. Crookes, (C.) Prof. T. G. Bonney, (D.) Mr. W. Carruthers, (E.) Maj.-Gen. Sir F. J. Goldsmid, (F.) J. Biddulph Martin, (G.) Sir J. N. Douglass, (H.) Sir George Campbell. The meeting will conclude on Wednesday, Sept. 18.

The Colonial and Indian exhibition, opened by the queen on May 4, with an amount of public and state ceremonial not seen since the corresponding ceremony in 1851, well illustrates in many ways the advances in practical science made in the various colonies. The grounds are lighted every evening by 9,700 glow-lamps, which are simultaneously illuminated, the current for which is supplied by four Elwell-Parker self-regulating dynamos, each of which can supply a current of 250 ampères with an electromotive force of 250 volts when running at 300 revolutions. The official catalogue contains a vast mass of statistical information, most carefully compiled, relating to the history, recent advances, and present condition, of India and the chief colonies.

The still exceptional weather deserves a word of comment. On the night of April 30, 13° of frost were registered close to London; on the afternoon of May 7, 79° in the shade, and 130° in the sun, were registered at the same place. The temperature that week was 6° above the average; and at the present moment (May 15) accounts are coming to hand of floods in all parts of the country heavier than have been experienced for many years, by which railway embankments and bridges have been wrecked, while in the north of Scotland and Ireland severe snow-storms have occurred. The details of the ten-minutes hurricane at Madrid two days ago, which uprooted two thousand trees, wrecked several houses, palaces, etc., killed twenty-four people and injured hundreds, and devastated a large country district, read more like those of the American or tropical tornadoes than of any thing known in Europe.

The Iron and steel institute has just been holding its three-days' annual meeting in London, under the presidency of Dr. Percy, who contributed two papers himself, — on steel wire of high tenacity, and on a rare blast-furnace cinder. Mr. F. W. Gordon of Philadelphia furnished an account of some points in American blast-furnace practice. The international character of the institute was shown by the fact that one-third of

the papers were by other than British subjects. Dr. Sorby's paper on the application of very high powers to the study of the microscopical structure of steel was probably the paper of most purely scientific interest.

On May 12 occurred the annual presentations for degrees at the University of London, when a very large number of graduates of both sexes had their degrees formally conferred. The chancellor, Lord Granville, being in attendance on the queen at Liverpool, the ceremony was performed by the vice-chancellor, Sir James Paget, who, after referring to the loss sustained by the university in the deaths of Dr. Carpenter and Dr. Storrar (both noticed at the time in this correspondence), gave some interesting statistics of its growth. It was now fifty years old, and 54,630 students had graduated. In 1838 it only had 23 candidates; in 1860, 788; and in 1885, 3,477. With its numbers its influence had increased, and it attracted students from all the colonies and from India, as well as from England. Among its distinguished graduates were Sir H. Roscoe, Sir W. Jenner, Lord-Justice Fry, and the present lord-chancellor. At the meeting of convocation on the previous day, a scheme for degrees in engineering science was, on the motion of Prof. W. C. Unwin and Mr. W. Lant Carpenter, unanimously adopted, and sent up to the senate for consideration. A movement is in contemplation to celebrate the jubilee of the university.

In an interesting paper given last night before the Society of telegraph engineers, upon long-distance telephony, by Mr. W. H. Preece, the system of trunk-line (American, 'extra territorial') working was described, and some very curious statistics were given. At the end of 1877, 780 telephones existed in the United States, and at the end of 1885 there were 325,570 telephones, and 782 telephonic exchanges. In England at the same date there were only 13,000, or about as many as were used in New York and Brooklyn alone; while Canada, with its population of three millions, employed 18,000. Of European cities, Berlin possessed the most, 4,248, London coming second with 4,193. The most complete development he had seen in any country was in the group of towns of which Newcastle-on-Tyne was the centre. Long-distance speaking was entirely a question of line wire, not of instruments. M. Van Rysselberghe spoke in the discussion, and detailed some of his recent experiments in the states. He is about to connect Paris, Brussels, Amsterdam, and Rotterdam by his simultaneous telegraphic and telephonic arrangements.

The report for 1885, of the inspectors on experiments on living animals, under the vivisection act, has just been issued. The total numbers of experiments was 800; 210 being done under the restrictions of the license alone, and 82 lecture demonstrations under similar restrictions. In all, except those under a special certificate, the animal is rendered insensible during the whole of the experiment. In most of the experiments where anæsthetics were dispensed with, the operation was simple inoculation or hypodermic injection; so that the number of animals that suffered any appreciable pain was 35 or 40, and these, for the most part, frogs. Although the number of experiments in 1885 was nearly double that in 1884, there was no increase of suffering to the animals employed.

The report of the inspector of fisheries has just been issued, and gives interesting details on the trade in eels between London and the continent. From Holland 1,000 tons are sent annually to Billingsgate (London) alone, the total annual value of eels consumed in England being about two and a half million dollars. An admirable contrivance is described for reviving them from their exhausted condition on arrival. At the Society of arts this week, Mr. J. Willis Bund read a paper on the proposed fishery board for England and Wales, showing that their fisheries had relations at present with at least five government departments: viz., the home office, the foreign office, the admiralty, the customs, and the board of trade. The total value of the English and Welsh fisheries was probably between eight and ten million dollars, but an annual statistical account of them was a very great want.

Mr. W. Bateson of St. John's college, Cambridge, is about to proceed to Central Asia for the purpose of investigating the fauna of the Sea of Aral and the smaller lakes in its neighborhood. Mr. Bateson is already well known as a morphologist, having paid two visits to the Chesapeake zoölogical laboratory of the Johns Hopkins university for the purpose of studying the development of the American species of Balanoglossus; and he now proposes to collect large numbers of the Mollusca and Crustacea of the Central Asian lakes, for the purpose of studying the range of variation within specific limits. W.

London, May 14.

NOTES AND NEWS.

ALTHOUGH the university of the state of New York exists only on paper, yet its annual convocations are meetings of considerable scientific interest and importance. This year the convocation will be held at Albany on July 6, 7, and 8. The announcement includes the following important papers, all of which will be followed by a discus-