

connected by metallic rollers or brushes with two stationary conductors, which are insulated, and constitute the poles of the machine. The currents obtained on rotating the shell may be made either continuous or intermittent, or they may be alternately reversed. The iron cylinder itself may be rendered magnetic by coiling upon it longitudinally an insulated wire after the manner of the rotating armature of Siemens.

To enumerate the possible applications of induction machines would be simply to describe all the applications which have already been made, or may hereafter be made, of current electricity to useful purposes. Among the former, the electric telegraph, the electric light, and electro-plating are perhaps the most important; among the latter, it will be sufficient to mention two proposals, one to facilitate the ascent of steep gradients by increasing, by means of magnetism, the adhesion of the wheels of locomotives to the iron rails; the other, to decompose, by electrolysis, common salt so as to obtain directly, and in a state of purity, the valuable chemical products hydrochloric acid and soda.

#### THE GOVERNMENT ECLIPSE EXPEDITION TO SIAM

THE following few details concerning the above Expedition will probably be of interest to the readers of NATURE; having just returned from Siam, I am unable at present to give full particulars. The general results obtained by our party have already been published in this country by means of the telegraph. The fact that any results were obtained at all is far more than might have been expected considering the very brief time we had to adjust the instruments. We had only five days to land, unpack, fit up, and test the instruments, most of which were quite new and untried. This want of time was in the first place owing to unavoidable delays on the way out, and to the fact that there was no steamer ready to take us on to the Observatory Camp at once, thus necessitating a visit to Bangkok prior to the eclipse. Our partial success is in a large measure due to the valuable assistance of Capt. A. J. Loftus, an English gentleman in the service of his Majesty the King of Siam; Capt. Loftus was sent out by his Majesty to prepare the camp for us at Choulai Point.

As previous to our departure from London there appeared in one of the leading journals a letter, signed "Monitor," in which some very unpleasant statements were made with regard to the probable reception our party would receive in Siam—although Mr. D. K. Mason, the Siamese Consul in London, published at the time a total denial of the absurd insinuations—I feel it my duty, in the name of all who took part in the expedition, to state that during our prolonged stay in the kingdom of Siam we received nothing but the greatest hospitality and kindness. Everybody, from the King downwards, showed the greatest desire to make our visit as pleasant as possible, and to aid the expedition in every way; difficulties were surmounted at great expense and trouble, and everything we asked for was at hand or was obtained with the least possible delay. Our drinking-water was brought nearly 100 miles by water to the camp; many tons of ice were brought up from Singapore, and every kind of wine was ready at hand.

The King sent several of his officials, both European and Siamese, to assist us, and ordered such observations to be made at Bangkok as the chief of the expedition, Dr. Schuster, might consider of use to the expedition; the King himself observed and made a drawing of the corona. Our camp and observatory were situated some fifty miles from the city of Bangkok, on the west of the Gulf of Siam, in the central line of totality. On our

arrival we found what had formerly been a waste of jungle converted into a magnificent camp, and all the houses fitted up ready for our reception.

The eclipse itself differed from former ones in respect to the greater brightness of the corona and the smallness and fewness of the red flames. As far as we could make out, the time as calculated by the *Nautical Almanack* was some ten seconds wrong.

In a "Reuter's" telegram, Dr. Schuster stated that the spectroscopic cameras had failed. As failures arise from many sources, this must be regarded as only a general statement. It merely implied that no results were obtained by these instruments, not that as instruments for observing eclipses they were found to be a failure. Several of the instruments were to have been tested during the outward voyage, but owing to the breaking-down of the *Surat*, and consequent transshipment of cases, no opportunity for such work was found, and, on arriving at the camp, the time was far too short, owing to other accidents, to enable anything like satisfactory focussing and adjustments.

There were two sets of instruments employed as telescopes, one working in the large observatory, the other in the Siderostat Observatory, where we had the large new siderostat working with Mr. Lockyer's  $9\frac{1}{4}$ -inch reflecting telescope and a spectroscopic camera. The first two instruments were in splendid order, working together beautifully, but the spectroscopic camera, not having been tested previously, could not be brought to give anything like a well-focussed photograph prior to the eclipse. The image of the corona, which appeared very distinct and bright on the slit-plate, although exposed during the whole of totality, gave no visible results on the photographic plate; even the sun itself, exposed for two seconds for the purpose of obtaining an index, gave likewise no result.

Before making any statements on the results obtained, I must wait the issue of the report of the Royal Society's Eclipse Committee.

Numerous drawings were sent in by the Siamese, which will be very valuable along with the general observations. After the eclipse, owing to three of our party being too ill to leave, we remained longer in the city of Bangkok than we had expected. During our stay Mr. and Mrs. Henry Alabaster, our hosts, on behalf of the King, entertained us in the most hospitable manner, taking care that those who were ill should have all possible attention, and be restored to health as fast as good doctors and kind nursing could accomplish it.

The following is a complete list of all who assisted us in the observatories during the eclipse, as well as of the members of the expedition sent out, with the part taken by each person:—

#### THE EXPEDITION.

DR. ARTHUR SCHUSTER.—Chief of the Expedition; in charge of large Observatory, attending to the Equatorial.

FRANK EDWARD LOTT.—Dr. Schuster's Assistant. In charge of the Siderostat Observatory.

F. BEAZLEY, Jun.—Photographic Department. Developing negatives in dark room No. 1.

OSCAR ESCHKE.—Photographic Department. Preparing plates in dark room No. 2.

#### Officers from H.M.S. *Lapwing*.

Hon. H. N. SHORE, Lieut. R.N.—Taking drawings of Corona in large Observatory.

ANDREW LESLIE MURRAY, Nav. Lieut. R.N.—Keeping time in large Observatory by Chronometer from H.M.S. *Lapwing*.

W. J. FIRKS, Assist. Eng., R.N.—Attending to the clock of Mr. Penrose's instrument.

#### Europeans and Siamese from Bangkok.

Capt. A. J. LOFTUS, R.S.N.—Founder of the Observatory and Camp. In charge of Mr. Beazley's Camera, taking direct photographs of Corona with 2—4—8—16 seconds' exposure.

Mrs. M. LOFTUS.—Keeping time for Capt. Loftus.  
 FRANCIS CHIT.—Royal Photographer to the King. Preparing and developing in dark room No. 3 for Capt. Loftus.  
 W. BRAY.—Attending to plates for Capt. Loftus.  
 F. G. PATTERSON.—Keeping time in large Observatory with Mr. Murray.  
 — HENDRICKE and W. H. LANG.—Attending to the Prismatic Camera in large Observatory.  
 C. BETHJE.—Dr. Schuster's amanuensis during totality.  
 Capt. J. THOMPSON, R.S.N., and EDWARD H. LOFTUS.—Signalling time between the large Observatory and the Siderostat Observatory.  
 Capt. CHUNG, R.S.W.—In charge of thirty Siamese, guarding the Observatory ground.

*Six Seamen from H.M.S. Lapwing.*

Carpenter, Blacksmith, and Two Seamen in large Observatory, taking plates between dark rooms and instruments.  
 Two Seamen in Siderostat Observatory: one to bring plate from dark room and watch the Corona, and the other to open and shut the Camera slide.

It was not till the day of the eclipse that we got the instruments in anything like position, and even then they were but half tested. We then had a couple of rehearsals, and by mid-day everyone was fully prepared and thoroughly knew the part he would have to perform during totality. This was entirely due to the indefatigable and untiring manner in which Dr. Schuster examined into every detail, and to the readiness with which everyone, without exception, undertook the part allotted him, and did his utmost to understand all the requirements of the position.

After leaving Siam our party separated at Singapore, Dr. Schuster bound for Simla, Mr. Beazley for Japan and China, Mr. Eschke for Berlin, the writer alone returning to England with the results obtained by the Expedition.

FRANK EDW. LOTT

### NOTES

THE deaths of two eminent astronomers are announced: Prof. d'Arrest, of the University of Copenhagen, who died on June 14, in his fifty-third year; and Prof. Winlock, the distinguished Director of Cambridge Observatory, U.S.

WE learn with the greatest pleasure that a thorough and systematic observation of the cirrus clouds is in the course of being established in other countries than Sweden. The great importance of these observations we recently urged on the attention of meteorologists in reviewing Dr. Hildebrandsson's "Essay on the Upper Currents of the Atmosphere," vol. xii. p. 123. Dr. Hildebrandsson has undertaken the discussion of these observations, and already the meteorological institutes and societies of Norway, Denmark, France, Austria, Portugal, and Scotland have promised their assistance and agreed to send to Sweden observations from several stations in their respective countries.

THE following Commission has been appointed to inquire into "the practice of subjecting live animals to experiment for scientific purposes, and to consider and report what measures, if any, it may be desirable to take in respect of any such practice:"—Viscount Cardwell, Baron Winmarleigh, W. E. Forster, Sir J. B. Karslake, Prof. Huxley, Prof. Erichsen, and R. H. Hutton.

DR. GERALD F. YEO has been elected to the professorship of Physiology in King's College, London.

IN vol. xi. p. 475, we announced the discovery of a boiling lake in the island of Dominica. The *Trinidad Chronicle* of May 21 contains an account of a visit to the spring by Mr. H. Prestoe, superintendent of the Trinidad Botanic Gardens. The lake lies in the mountains behind Roseau, and in the valleys around many *souffrères*, or solfataras, are to be met with. The Boiling Lake is a gigantic solfatara, with an excess of

water-volume over the ejective power exerted by its gases and heat. It is affected by a very considerable volume of water derived from two converging ravines which meet just on its north-west corner, and owing to the existence of a small hill immediately opposite (which has had the effect of diverting the course of the ravine-water into its present channel), the action of the solfatara has caused the formation of a crater-like cavity, which is now the Boiling Lake with its precipitous and ever-wasting banks on its north and south sides, of some sixty feet depth. The temperature of the lake ranges from 180° to 190° F. The point of ebullition seems to vary its position somewhat; the water rising two, three, and sometimes four feet above the general surface, the cone dividing occasionally into three, as though ejected from so many orifices. During ebullition a violent agitation is communicated over the whole surface of the lake. The sulphurous vapour arises in pretty equal density over the whole lake, there being no sudden ejection of gas observed from the point of ebullition; there are no detonations; the colour of the water is a deep dull grey, and it is highly charged with sulphur and decomposed rock. As the outlet of the water is constantly deepening, the surface of the lake must gradually become lower, and it will, Mr. Prestoe thinks, ultimately be destroyed, and its character be changed to that of a geyser. It will then gradually fill up by the reduction of the adjacent hillsides, and innumerable solfataras will be formed in the place of the present gigantic one. Mr. Prestoe found no bottom with a line of 195 feet, ten feet from the water's edge. One great result of the action of solfataras is the decomposition of the volcanic rock and the development therefrom of various kinds of gypsum. Some blocks met with have a very strong resemblance to the Tuscan or Volterra marble. Mr. Prestoe thinks that these large solfataras have had much to do in bringing about the present conformation of the district.

DOMINICA, which was formerly one of the chief coffee-producing countries, has of late years almost entirely ceased to grow the plant. The capabilities of the island, however, are apparently so great, not only for the cultivation of coffee, but also for many other food products, that the attention of the authorities has been directed to the matter, and the result is that Mr. Prestoe, of the Botanic Gardens, Trinidad, has been commissioned to examine and report on the prospects of the island generally, and the best means of developing its resources. We anxiously await the details of Mr. Prestoe's report upon an island so fertile and beautiful as Dominica, but which has, no doubt, through want of European capital and energy, been allowed to drift almost into an unprofitable waste.

THE *Times* of last Thursday contains a letter, dated Yokohama, April 11, from its correspondent on board the *Challenger*, giving an account of the cruise from Mindanao by New Guinea and the Admiralty Islands to Japan. An extremely interesting account is given of the natives of New Guinea at Humboldt Bay and of the Admiralty Islanders. The following are the principal results of the soundings made:—The greatest depth in the section, 2,250 miles long, from the Admiralty Islands to Japan, was found on the 23rd of March in 4,575 fathoms, between the Carolines and Ladrones. This is the deepest trustworthy sounding on record, with the exception of two taken by the *Tuscarora* off the east coast of Japan, in 4,643 and 4,655 fathoms respectively, but no sample of the bottom was procured on either of these occasions. A second sounding gave 4,475 fathoms. The tube of the sounding machine contained an excellent sample of the bottom, which was of a very peculiar character, consisting almost entirely of the siliceous shells of *Radiolaria*. Three out of four Miller-Casella thermometers sent down to these depths were crushed to pieces by the enormous pressure they had to bear; the fourth withstood the pressure, and registered, when corrected for the pressure, at 1,500 fathoms, the usual temperature for that