work will lead to more quantitative studies of the catalytic action of the enzymes proper, the importance of which in both animal and plant physiology is becoming every day more manifest.

SOME of the papers published in the reports and other volumes of the Smithsonian Institution are printed separately for sale or exchange. A classified list of the papers at present available has been issued, and students of all branches of science will find in it many publications of value.

THE additions to the Zoological Society's Gardens during the past week include a Rhesus Monkey (*Macacus rhesus*, ♀) from India, presented by Mrs. W. W. Baker; a Red-flanked Duiker (*Cephalophus rufilatus*, ♂) from West Africa, presented by Mr. Th. Leportier; two Crested Curassows (*Crax alector*) from Guiana, presented by Mr. Robert Thom; two Vulturine Eagles (*Aquila verreauxi*) from the Gwatyn District, Cape Colony, presented by Mrs. Joplin; a Derbian Zonure (*Zonurus giganteus*) from South Africa, presented by Mr. W. Champion; a Blue and Yellow Macaw (*Ara ararauna*), a Brazilian Tortoise (*Testudo tabulata*) from South America, a Red-masked Conure (*Conurus rubrolarvatus*) from Ecuador, a Starred Tortoise (*Testudo elegans*) from India, two American Glass Snakes (*Ophiosaurus ventralis*) from Mexico, seven Stink-pot Mud Terrapins (*Cinosternum odoratum*), twelve Pennsylvanian Mud Terrapins (*Cinosternum pennsylvanicum*) from North America, deposited; three Mandarin Ducks (*Æx galericulata*) from China, purchased; a Thar (*Hemitragus jemlaica*, ♂), a White Stork (*Ciconia alba*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

THE RECENT TOTAL ECLIPSE OF THE SUN.—From the *Comptes rendus* we learn that a French expedition under M. Binot made successful observations at the island of Réunion, near Mauritius, so that very valuable comparisons may be hoped for between these and the photographs obtained at the Royal Alfred Observatory further east.

A telegram from Pulkowa states that during the eclipse at Padang, six photographs were obtained through cirrus clouds, the form of the corona corresponding to that of minimum solar activity.

SNOW ON THE MOON'S SURFACE.—Several accounts have appeared in the daily Press stating that observers from the Harvard College Observatory working in Jamaica have obtained photographs of the moon which afford evidence of the existence of some variable substance, probably snow, on many of the mountain peaks. The astronomer, presumably Prof. W. H. Pickering, has taken photographs of the lunar disc under as varied conditions of lighting as possible during several nights, and the inference now drawn depends on the interpretation of the changes in appearance of the highest tips of the lunar craters. Up to the time of writing no direct confirmation of these observations has been received in this country.

OXFORD UNIVERSITY OBSERVATORY.—The twenty-sixth annual report of the Savilian professor of astronomy to the board of visitors contains an account of the work of the observatory from 1900 May 1 to 1901 April 30. Prof. Turner states that the staple work during the year has been the measurement and reduction of the plates for the Astrographic Catalogue. This has been partly hindered by the building of the new dome and the arrangements for observing the minor planet Eros during its recent opposition, and also the Nova Persei. However, seventy-eight plates have been completed during the year, making a total of 783 in five years, out of the 1180 required. For the Eros determinations 114 plates were obtained, involving 757 different exposures, about half of these having been measured.

The instruments used in India (1898) and Algiers (1900) were taken to Sumatra by Mr. Newall, who will endeavour to make similar determinations with them of the brightness and polarisation of the corona, so that data on a uniform scale from all three coronas may be available for measurement.

All the instruments are in fairly good working order; the new dome by Messrs. Cooke and Sons gives every satisfaction.

THE ROYAL OBSERVATORY, GREENWICH.

ON Saturday last the Astronomer Royal presented his report for the past year to the Board of Visitors of the Royal Observatory. The weather was not all that could be desired on such an occasion, but the rain, which fell later in the afternoon was not sufficiently heavy to mar the proceedings.

Among the numerous guests were M. and Madame Lœwy from Paris.

Below will be found a brief *résumé* of the report:—

Transit Circle.

The sun, moon, planets and fundamental stars have been regularly observed on the meridian as in previous years. The number of transits, the separate limbs being counted as one observation, amounts to 10,938.

The number of stars observed in 1900 is 4787.

The apparent correction for discordance between the nadir observations and stars observed by reflexion for 1900 was found to be $-0''\cdot39$. The results of recent years are as follows:—

	Mean.	Range in Yearly Means.
	$''$	$''$
1880–1885	$-0\cdot34$	From $-0\cdot29$ to $-0\cdot45$
1886–1891	$+0\cdot03$	,, $-0\cdot12$ to $+0\cdot09$
1892–1900	$-0\cdot30$	,, $-0\cdot25$ to $-0\cdot41$

The New Altazimuth.

This instrument is in good working order, and the new chronograph has worked satisfactorily. Some inconvenience has, however, been caused by breakages in the system of spider lines, which has a larger span than is really necessary.

The instrument has been used during the year mainly as a reversible transit-circle in the meridian in four positions for the better investigation of systematic errors, and for observation of the Eros reference stars and fundamental stars.

Throughout the year 6937 observations have been made, including those for the determination of the chief instrumental errors.

The 28-inch refractor has been used throughout the year for micrometric measurements of double stars.

With the 26-inch Thompson equatorial, the most important work has been the photographing of the planet Eros during the recent opposition for determination of the solar parallax. 255 photographs have been obtained, 197 of which show the planet satisfactorily.

Astrographic Equatorial.

Up to May 10, 682 plates have been taken on 167 nights; 72 of these, for various reasons, have, however, been rejected. In addition to the plates for the chart, 7 photographs were secured for the adjustment of the instrument, two of standard areas, 294 of Eros, 139 of Nova Persei, and 3 of Comet *b* 1900.

The report states that 144 chart plates have been copied on glass, and during the year 81,000 measures of pairs of images (6m. and 3m.), as well as of the diameters of the 6m. images, have been made. The number of plates measured in the twelve months in two positions of the plates is 137.

The measurement of the plates is now completed for 1412 square degrees out of 2087 (which is the area of the Greenwich zone), so that two-thirds of the whole work of measurement has now been done.

Spectroscopic and Heliographic Observations.

With the Thompson equatorial and the photographic spectroscope mounted on it, 22 photographs of the spectra of Capella, Regulus, Arcturus, Spica, α and μ Ursæ Majoris with comparison spectra have been obtained, and some preliminary measures of these give satisfactory results. The spectroscope is now in good adjustment.

For the year 1900, Greenwich photographs have been selected for measurement on 146 days, and photographs from India and Mauritius (filling up gaps in the series) on 214 days, making a total of 360 days out of 365 on which photographs are at present available. The decline in the number of spots noticed in the last report has been continued, and the minimum may be considered as reached, no Greenwich photograph showing a spot since March 7.

Magnetic Observations.

The variations of magnetic declination, horizontal force and vertical force, and of earth currents, have been registered photographically, and accompanying eye observations of absolute

declination, horizontal force and dip have been made as in former years.

The regular determinations of magnetic declination, horizontal force and dip have been made with the new declinometer, the Gibson deflexion instrument, and the Airy dip circle mounted in the new Magnetic Pavilion.

The principal results for the magnetic elements for 1900 are as follow :—

Mean declination	16° 29′·0 West.
Mean horizontal force	4·0014 (in British units).
	1·8450 (in Metric units).
Mean dip (with 3-inch needles) ...	67° 8′ 27″.

These results depend on observations made in the new Magnetic Pavilion, and are free from any disturbing effect of iron.

The magnetic disturbances in 1900 have been few in number. There were no days of great magnetic disturbance and eight of lesser disturbance.

The question of the possible effect of disturbances from electric railways on the magnetic work carried on at the Royal Observatory has required very careful consideration in regard to the conditions under which electric traction may be used without injuriously affecting the magnetic registers.

It may be remarked that the French magnetic observatory at St. Maur is in much the same position as Greenwich in respect to electric tramways, and recently M. Moureaux, in charge of that observatory, has found that copper "dampers" (such as have been in use at Greenwich for sixty years, but had not previously been applied to the magnets at St. Maur) reduce the vibratory disturbances from electric tramways to about one-tenth of their amount. This has recently been verified at Greenwich by the converse process of removing the copper "dampers" which are in regular use with the declination and horizontal force magnets, when it was found that the disturbances from existing electric railways were increased to about ten times their amount. It is proposed to apply a "damper" to the vertical force magnet, the need for which has not hitherto been felt, and it is possible that the "dampers" for the other two magnets may be improved by the use of copper of much higher conductivity than was obtainable when they were made sixty years ago.

It is hoped, however, that, in the event of future proposed electric tramways, regulations will be laid down by the Board of Trade to secure adequate protection for the magnetic work at Greenwich, which has now been carried on continuously on the same general system for a period of sixty years, and which could not be transferred to another site.

Meteorological Observations.

The meteorological instruments are all in good order. The registration of atmospheric pressure, temperature of the air, and of evaporation, pressure and velocity of the wind, rainfall, sunshine and atmospheric electricity has been continuously maintained.

The mean temperature for the year 1900 was 50°·5, being 1°·0 above the average for the fifty years 1841–90. During the twelve months ending 1901 April 30, the highest temperature in the shade (recorded on the open stand in the Magnetic Pavilion enclosure) was 94°·0 on July 16. The highest temperature recorded in the Stevenson screen in the enclosure was 91°·8, and in that in the Observatory Grounds 93°·4 on the same day. This is the highest shade temperature recorded in July since 1881. It has been twice exceeded in July in the sixty years 1841–1900, viz., on 1881 July 15, when the temperature reached 97°·1, and on 1868 July 22, when it was 96°·6. A reading of 94°·0 was also recorded on 1876 July 17. The monthly mean temperature for July was 66°·6; it has been exceeded only four times in the preceding sixty years, viz., in 1852, 67°·0; 1859, 68°·9; 1868, 68°·1; and 1876, 66°·7. The month of December was also excepfionally warm, the mean temperature for the month being 45°·7, which is 6°·0 in excess of the fifty years' average. This value has been exceeded three times in the preceding sixty years, viz., in 1852, 47°·6; in 1868, 46°·1; and in 1898, 45°·8. The lowest temperature of the air recorded in the year was 20°·4, on February 14. There were forty-seven days during the winter on which the temperature fell below 32°, a number slightly below the average.

The mean daily horizontal movement of the air in the twelve months ending 1901 April 30 was 298 miles, which is 17 miles above the average for the preceding thirty-three years. The greatest recorded daily movement was 973 miles on January 27, and the least 72 miles on December 23. The greatest recorded pressure of the wind was 34·4 lbs. on the square foot, and the greatest hourly velocity 54 miles, both on January 27.

The number of hours of bright sunshine recorded during the twelve months ending 1901 April 30, by the Campbell-Stokes instrument, was 1513 out of the 4457 hours during which the sun was above the horizon.

The rainfall for the year ending 1901 April 30 was 20·22 inches, being 4·32 inches less than the average of fifty years. The number of rainy days was 151. The rainfall has been less than the average in each year since 1894.

The remaining portion of the report deals with the work done in the remaining departments—namely, chronometer, time-signal, &c. It may be here remarked that arrangements have been made for a re-determination of the Greenwich-Paris longitude in conjunction with observers from the Paris Observatory, two of the four portable transit instruments used in former longitude work being available for the French observers, and the other two for the English.

It has been arranged with M. Lœwy that the first part of the longitude observations shall be made in October next, and the second part in the spring of 1902.

The eclipse of May 28, 1900, was observed by the Astronomer Royal with Mr. Dyson and Mr. Davidson in Portugal, while this year Mr. Dyson, with the assistance of Mr. Atkinson, went to Sumatra, and Mr. Maunder to Mauritius, for the recent eclipse of May 18.

In his general remarks the Astronomer Royal points out the great pressure of work that has fallen on all members of the staff during the past year. Two eclipse expeditions have been prepared and sent out, the revision of Groombridge's Catalogue for 1810, in connection with the Greenwich Second Ten-Year Catalogue (1890), the transfer of books and records to the New Observatory, and the rearrangement of the library and record rooms, all have added considerably to the ordinary work of the Observatory. Finally, he points out that within the last five months one-third of the whole staff of computers have left the Observatory for other posts and have had to be replaced by boys new to their work. Such an extensive change in the temporary staff has, to a certain extent, disorganised the work and has thrown a great strain on the assistants, who are charged with carrying it on under such difficult conditions. Considering the training and experience required in the varied work which, at Greenwich, has to be done by computers, a greater degree of permanence in the staff appears to be necessary for the continued efficiency of the Observatory.

THE MECHANICAL FORCES OF NATURE AND THEIR EXPLOITATION.

THE question of the probable end of the world's coal supply, in the not far distant future, is one which has in recent years been the cause of much discussion. In connection with this subject a pamphlet published by the Urania Gesellschaft of Berlin, on "Die mechanischen Naturkräfte und deren Verwertung," by F. Reuleaux, is of interest. In a clear and popular manner the author traces and explains the gradual utilisation by mankind of the various natural forces, from the ancient Assyrian water wheel to the installations of Niagara, and the Parsons steam turbine. It has been calculated that the supply of coal in England can only last at the most 200 years more; and though the coal-fields of the other European countries have not been used to the extent that the English ones have, still their eventual exhaustion can already be anticipated. The total consumption is now about 600 million tons per year, or, measured as a volume, about 500 million cubic yards. Assuming a yearly increase of 5 per cent. (it is at the present moment greater than this) this would mean that during the present century 6½ billion cubic yards of coal will be taken from the earth's coal mines. A cube of this volume would have a side over ten miles long.

It may be urged that this is not a matter of immediate importance; still, in considering the future industrial state of the world one must admit that great changes must take place, and that countries which have been indebted for their growth to their natural resources of power in the form of coal must give way to those countries where power is supplied in another form. On examining the natural sources of power, one sees that really