TELESCOPIC WORK FOR OBSERVERS OF PLANETS.

THE possessors of telescopes now have an interesting variety of planetary objects for examination. These are Venus, Mars, Jupiter, Saturn, and Uranus.

Venus is visible, as a crescent, in the morning sky, increasing to half-moon shape in the second week of July, and arriving at her greatest elongation, west of the sun, on July 6, when her distance from that luminary will be 45° 44′. The conjunction of Venus and Jupiter will form an attractive spectacle on July 4.

Mars has now declined in diameter to 13″, but the principal markings are still very distinct, and some of the more delicate canals remain observable. After July the planet will have receded so far from the earth that further telescopic study of his physical lineaments cannot be pursued successfully.

Jupiter has just emerged into view as a morning star, rising about 2¼ hours before the sun. The most interesting point to be determined is the present position of the great red spot. The motion of this remarkable object has been curiously variable in recent years. Between October, 1904, and March, 1905, the rotation period corresponded very closely with that of system ii. of the ephemeris based on 9h. 55m. 40·63s., and the longitude remained constant at about 26°, so that the spot followed the passages of the zero meridian by 43 minutes. The exact position of the marking should be ascertained as early and as frequently as possible during the coming opposition, and the following are the probable times of a few transits during ensuing weeks:—

Date 1905	Approximate Transit Time h. m.	Date 1905	Approximate Transit Time h. m.
July 1	16 32	July 30	15 35
6	15 41	Aug. 4	14 45
11	14 51	6	16 23
13	16 29	9	13 53
18	15 39	11	15 32
23	14 48	13	17 10
25	16 27	21	13 49

The large dark spot seen in the south temperate zone of Jupiter in and since 1901, if still visible, will be in longitude 191° at the end of June, and will therefore follow the zero meridian by 5¼ hours and the great red spot by 4½ hours.

Saturn rises 5 hours before the sun. It is most important to learn whether there are any lingering signs of the extensive disturbance which affected the northern hemisphere in the summer and autumn of 1903. It is singular that, though a large number of observations of the spots were made and promptly reported in 1903, we have heard practically nothing of similar results in 1904. Yet the markings remained visible, if much less conspicuously, in 1904.

Uranus was in opposition to the sun on June 23, and is therefore easily discernible at the present time, though his southern declination is 23¾°. An excellent opportunity will be afforded of identifying this planet during the third week in July, when he passes about 1 minute of arc north of the star 1 Sagittarii (mag. 5·3).

Added June 25.—The great red spot on Jupiter was seen by the writer at Bristol, and estimated central on June 24 15h. 43m. Its longitude was therefore 25°·1, and this sufficiently shows that its motion has exhibited no further change during the last three months.

Saturn was also carefully examined on the same morning, but no conspicuous spots were seen in a 12½-inch reflector by Calver, power 235. The observation of Jupiter was obtained with a 10-inch reflector by With-Browning, power 205.

W. F. DENNING.

THE ROYAL SOCIETY CONVERSAZIONE.

THE second, or ladies', conversazione of the Royal Society was held in the rooms of the society at Burlington House on Friday last, June 23, and was attended by a large and distinguished company. As on former occasions, many objects of scientific interest were exhibited, but most of them were shown at the earlier conversazione on May 17, and have already been described in these columns (May 25, p. 90). It is therefore only necessary now to refer to additional demonstrations and exhibits.

In the course of the evening there were demonstrations, with lantern illustrations, on recent work in mimicry and protective resemblance, by Prof. E. B. Poulton, F.R.S., and on the three-colour photographic process, by Sir W. de W. Abney, K.C.B., F.R.S. The photographs in colour that were shown were prints from three negatives taken of each subject. Each of the three negatives was taken through an appropriate coloured medium, and the three transparent prints were projected on a screen with appropriate coloured screens behind them, giving the colours of nature. The process and apparatus employed were based on those of Mr. Ives.

Brief descriptions of the new exhibits are given in the subjoined abstract of the official catalogue.

The metal sodium, prepared so as to show its true colour and lustre: Mr. G. T. Beilby. The specimen was prepared by Dr. Thomas Ewan by melting the metal *in vacuo* in one vessel and running the clean, bright part of the liquid into another communicating vessel which had been freed from condensed air or moisture by heating during exhaustion. After solidification of a crystalline crust on the glass, the surplus liquid was run back into the first vessel and the specimen globe was sealed off.—(1) Pictures produced in the dark on a photographic plate by different woods; (2) ordinary photographs of the same woods; (3) the woods used in the experiments: Dr. W. J. Russell, F.R.S. The pictures taken in the dark were obtained on an ordinary rapid photographic plate, the wood being in contact with the plate from one to eighteen hours at a temperature of 55° C. The pictures were developed in the same way as if they had been produced by light.

The entoptoscope, a new form of ophthalmoscope: Prof. W. F. Barrett, F.R.S. The instrument was devised by the exhibitor for the self-examination of the eye by means of pinhole vision—entoptic diagnosis (Listing). When an illuminated fine pinhole in a sheet of metal is held near the eye, sharp shadows of any opaque or semi-opaque object in the path of the rays within the eyeball are thrown on the retina. By this means the growth of cataract from its earliest stages can be traced. By using two closely adjacent pinholes in the revolving diaphragm, and the transparent scale in the eye-piece, the exact magnitude and distance from the retina of the opacity can be determined.—The Ettles-Curties ophthalmometer and ophthalmic microscope: Mr. C. Baker. The opththalmometer is an instrument for measuring the radius of curvature of the cornea, and consequently of ascertaining the dioptric value of the refracting medium bounded by that curvature. The instrument consists of an attachment by which the patient's head is steadied, and a telescope with Wollaston prism for observing the images of the "mires." The latter are carried on an arc graduated in terms of dioptres and radius of curvature, and prismatic steel bars provide a steady movement by rack and pinion to the adjustable parts. The whole is mounted on a telescopic floor standard which contains a plunger actuated by a spiral spring; by slight pressure this can be pushed down to the level of the patient's eye and clamped. The ophthalmometer can be detached and a microscope provided with electric illumination substituted.

Tantalum, and tantalum electric lamps: Messrs. Siemens Bros. and Co., Ltd. The exhibit comprised (1) specimens of the metal tantalum in the form of small blocks of more or less purity, also sheets and metallic powder, and specimens of wire of various thicknesses; (2) a series of tantalum glow lamps, requiring 110 volts and 0·34 ampere to give a light of 25 N.C. (1½ watts per candle-power).—The "Osmi" incandescent lamp: the General Electric Company. The lamp in appearance is similar to the ordinary electric bulb, but in place of carbon the filament is made from the rare metal osmium, which, when in a state of incandescence, glows with extreme brilliancy. The advantages claimed are:—high fusing point, white light, higher electrical efficiency, longer life, saving of current, less heat. The blackening of bulbs is inappreciable. The consumption of current with ordinary carbon filament lamp is 3·5 to 4 watts per candle-power. Consumption of current with Osmi lamp, 1·5 watts per candle-power.—Fery radiation pyrometer: the Cambridge Scientific Instrument Company. By means of a concave mirror the image of a hot body or of the inspection hole in a furnace wall is focused upon a copper-constantan thermo-couple connected to a direct-reading galvanometer on the centigrade scale. The instrument was shown working, being sighted upon a disc of hot iron within an electrical resistance furnace.

Drawings made from combined photographs of the solar corona in 1898, 1900, and 1901: the Astronomer Royal. In 1901 a change in the corona on the west side appears to have taken place in the interval (thirty-seven minutes) between two photographs taken at different stations. The drawings were by Mr. W. H. Wesley.—(1) Photographs, maps, curves, and diagrams, in connection with the more recent researches on the astronomical significance of British stone circles. (2) Contact positives showing some of the results taken with the Solar Physics Observatory spectroheliograph. Also four enlarged pictures showing disc and disc-and-limb photographs, and a photograph of the instrument itself. (3) A series of curves to illustrate the relationship between the flow of the river Thames and pressure and rainfall changes in Great Britain. The close association between British pressure and the barometric see-saw between the Indian and South American areas was also indicated: Sir Norman Lockyer, K.C.B., F.R.S.—A new sundial that tells standard time, designed by Prof. Albert Crehore: Sir W. H. Preece, K.C.B., F.R.S. The gnomon of the common form of dial is abandoned, and the shadow of a small bead fixed on a wire is cast on the interior of a true cylindrical surface, upon which figure-of-eight curves are drawn marking standard noon for each day of the year. The cylindrical surface is inclined so that its axis, upon which the bead is fixed, is parallel to that of the earth. It thus represents the latitude of the place. The shadow of the bead travels across the cylindrical surface parallel to, or on, one of the circles drawn thereon. These circles represent days of the month. Each hour described in the circle is always of the same length, and a scale of minutes engraved on the cylinder enables true mean time to be read off directly to a few seconds.

Photographs illustrating the annual growth of a deer's antlers: Mr. H. Irving. The deer photographed was a wapiti, full grown. The first photograph showed the deer on the second day after the antlers were cast. Succeeding photographs were taken at fortnightly intervals covering four months' growth. The antlers were also shown with the velvet in strips, and finally clean and hard. The antlers of the previous year were shown for comparison. —Mendelian heredity in rabbits: Mr. C. C. Hurst. A pure-bred "Belgian hare," mated with a pure-bred white Angora, gave all wild-grey rabbits. These, bred together, gave the ten types exhibited, in which appear all the possible combinations of four pairs of coat characters, viz. short and angora, coloured and white, grey and black, self-coloured and Dutch-marked. The breeding behaviour of these types demonstrates clearly the Mendelian principles of dominance, segregation, and gametic purity. Dominant characters are short, coloured, and grey coat. Recessive characters are Angora, white and black coat. The black and Dutch-marked characters were introduced by the white Angora.—(1) Individual, local, and orthogenetic variation in Mexican lizards of the genus Cnemidophorus; (2) three specimens of *Chirotes canaliculatus* from Rio Balsas, South Mexico: Dr. H. Gadow, F.R.S. The former exhibit included:—*Cnemidophorus deppei*, showing orthogenetic variation in the number of white dorsal stripes from 7 to 11. Local variation from completely white to black underparts; from lateral white spots to double red bands. *C. striatus* and *C. guttatus*. Leading from a sharply striped pattern to the dull-coloured and completely spotted form which is characteristic of the eastern forest region. *C. gularis, C. mexicanus, C. bocourti*, and other closely allied forms, varying in size, colour, pattern, and scales.—(1) Demonstration illustrating the life-history of wood-boring wasps (Crabronidæ); (2) photographs from life of transformations of the brimstone butterfly (*Gonepteryx rhamni*): Mr. Fred Enock. The Crabronidæ, or wood-boring wasps, excavate (with their mandibles) deep burrows in decaying tree trunks, palings, &c., their work being carried on day and night until a sufficient depth has been reached. The female wasp then flies off in search of prey to stock her cells with food for the larvæ. A number of species inhabit Great Britain. Each selects its prey from certain insects, and invariably keeps to the species so selected. The intelligence exhibited by the wasp when "collecting" is marvellous, a momentary glance as the insects dart past being sufficient to identify the right one.—The membranous labyrinth of man and some animals: Dr. Albert A. Gray. The exhibit represented the membranous labyrinths of man, illustrating normal and pathological conditions; the membranous labyrinth of the seal showing otoliths; the membranous labyrinths of the mouse, the rat, the rabbit, the sheep, the cat, the lemur, the duck, the hen. The brain of the haddock, with the otoliths in their natural position.

(1) Restoration of a British Jurassic theropodous Dinosaur of the genus Streptospondylus from the Oxford Clay, Oxford; (2) British armoured Dinosaur: Dr. Francis Baron Nopcsa. The bipedal dinosaurian reptile shown in the first exhibit is the most complete representative of the genus discovered in this country. The type exists in the Paris Museum, but is very imperfect. The specimen from which Baron Nopcsa's restoration is prepared is in the private museum of Mr. J. Parker, of Oxford, and is about to be described by the exhibitor. The restoration was executed under the direction of Dr. Francis Baron Nopcsa by Miss Alice B. Woodward. Diagram reconstruction of skeleton and bony dermal armour of *Polacanthus Foxi*, Hulke, from the Wealden of the Isle of Wight. Reconstructed by Dr. Francis Baron Nopcsa, under the direction of Dr. Arthur Smith Woodward, F.R.S., and set up in the geological department of the British Museum.

Ethnological specimens from southern Mexico: Mrs. Gadow. The specimens comprised embroidered leather dancing dress; decorated cotton huipiles, from eastern Oaxaca and South Guerrero; white cotton shifts, embroidered with beads, South Guerrero; dancing masks, from Coacoyulichan, South Guerrero; clay and stone idols and sacred vessels; clay whistles, kitchen utensils, ancient and modern; copper, flint, and stone implements; and duck-shaped water vessels.

Photographs of the White Nile and its tributaries, taken by the Survey Department of Egypt, 1903: Captain H. G. Lyons. (1) Bahr el Jebel. The stations of Gondokoro, Lado, Mongalla, and Kiro; in this part the valley floor is about 2–4 feet above low-water level; at Ghaba Shambe and Hellet Nuer it is only 1–2 feet above it, and in this reach the greatest development of the marshes occurs, as well as the blocks of vegetation (Sudd). (2) Bahr el Ghazal and Bahr el Zaraf, showing their flat flood plains. (3) Sobat River in flood near its junction with the White Nile. (4) The White Nile. (5) Shilluk Negroes of the White Nile and Sobat.—Photographic views illustrative of the scenery of Tibet: the Royal Geographical Society.

SUBMARINE NAVIGATION.[1]

SUBMARINE navigation has engaged the attention of inventors and attracted general interest for a very long period. Its practical application to purposes of war was made about 130 years ago. Under the conditions which prevailed a century ago in regard to materials of construction, propelling apparatus, and explosives, the construction of submarines necessarily proceeded on a limited scale, and the type practically died out of use, almost at its birth. Enough had been done, however, to demonstrate its practicability and to make it a favourite field of investigation for inventors, some of whom contemplated wide extensions of submarine navigation. Every naval war gave fresh incentive to these proposals, and led to the construction of experimental vessels. This was the case during the Crimean War, when the Admiralty had a submarine vessel secretly built and tried by a special committee, on which, amongst others, Mr. Scott-Russell and Sir Charles Fox served. Again, during the Civil War in America, the Confederates constructed a submarine vessel, and used it against the blockading squadron off Charlestown. After several abortive attempts, and a considerable

[1] Abstract of a discourse delivered at the Royal Institution on Friday, June 9, by Sir William H. White, K.C.B., F.R.S.