

(*Ann. and Mag. Nat. Hist.*, pl. ii., 1895); "On Four New British Amphipoda (Stebbing and Robertson, *Zool. Soc. Trans.*, vol. xiii., pl. v.-vi., 1891).

#### CHARLES STEWART,

M.R.C.S., President of the Linnean Society. Conservator of the Museum of the Royal College of Surgeons, and Hunterian Professor of Human and Comparative Anatomy. Late lecturer on Comparative Anatomy, and joint lecturer on Physiology at St. Thomas's Hospital. Distinguished as a Biologist. Author of the following papers:—"On the Structure and Cause of Colour in the Nacreous Layer of Shells" (*Devon. Assoc. Trans.*, 1864); "On the Spicula of the Regular Echinoidea" (*Trans. Linn. Soc.*, 1865); "On a New Sponge, *Tethyopsis columnifer*" (*Quart. Journ. Micros. Sci.*, 1870); "On the Minute Structure of certain Hard Parts of the genus *Cidaris*" (*ibid.*, 1871); "Note on the Scalp of a Negro" (*Monthly Micros. Journ.*, 1873); "Note on the Calcareous Parts of the Sucking Feet of an Echinus, *Podophora atrata*" (*ibid.*, 1873); "Notes on *Bucephalus polymorphus*" (*ibid.*, 1875); "On the Lachrymal Gland of the Common Turtle" (*ibid.*, 1877); "On a New Coral, *Stylaster stellulatus*, and Note on *Tubipora musica*" (*ibid.*, 1878); Note on an Abnormal *Amblypneustes griseus*" (*Journ. Linn. Soc.*, 1880); "On certain Organs of the *Cidaridae*" (*Linn. Soc. Trans.*, 1877); "On Some Structural Features of *Echinostrephus molare*, *Parasalenia gratiosa*, and *Stomopneustes variolaris*" (*Journ. Roy. Micros. Soc.*, 1880); "On a Supposed New Boring Annelid" (*ibid.*, 1881); "On a Hermaphrodite Trout, *Salmo fario*" (*Journ. Linn. Soc.*, 1891); "On a Hermaphrodite Mackerel, *Scomber scomber*" (*ibid.*, 1891); "On Some Points in the Anatomy of *Heloderma*" (*Proc. Zool. Soc.*, 1891); "On a Specimen of the True Teeth of *Ornithorhynchus*" (*Quart. Journ. Micros. Sci.*, 1891).

*Supplementary Certificate.*—Fullerian Professor of Physiology in the Royal Institution.

#### WILLIAM E. WILSON,

A gentleman who has devoted himself to astronomical research. In December 1870, he was engaged on the Total Solar Eclipse Expedition to Oran. In 1872 he built an astronomical observatory at Daramona and equipped it with a 12" reflector by Grubb. In 1881 he built a new observatory and equipped it with a 24" reflector by Grubb. In 1891 this was remounted and provided with electric control for stellar photography. Author of "A Method of recording the Transits of Stars by Photography" (*Roy. Astron. Soc.*, 1889); "A New Photographic Photometer for Determining the Magnitudes" (*ibid.*, 1892); "On the Radiation of Heat from Sun Spots" (*Proc. Roy. Soc.*, vol. iv.); "The Absorption of Heat in the Solar Atmosphere" (*Proc. Roy. Irish Acad.*, 1892), in conjunction with Prof. Rambaut; "Experimental Investigations on the Effective Radiation from the Sun" (*Phil. Trans.*, 1894), in conjunction with Mr. P. L. Gray; "On the Temperature of the Carbons in the Electric Arc" (*Proc. Roy. Soc.*, 1892), in conjunction with Mr. P. L. Gray.

*Supplementary Certificate.*—In addition to the qualifications already set forth the following may be mentioned:—(1) Mr. Wilson has undertaken to carry out Experiments on Solar Radiation for the Committee of the British Association; (2) he has written a paper entitled "The Thermal Radiation from Sun Spots" (*Monthly Notices R.A.S.*, vol. iv., No. 8); (3) he has also written on "The Effect of Pressure of the surrounding Gas on the Temperature of the Crater of the Electric Arc" (*Proc. Roy. Soc.*, vol. lviii.).

#### HORACE BOLINGBROKE WOODWARD,

F.G.S., Geologist on the Geological Survey of England and Wales. Hon. Mem. Norfolk Nat. Soc. and Yorksh. Phil. Soc. Awarded the Murchison Fund by the Council of the Geological Society in 1885. On the staff of the Geological Survey since 1867, and author of the following memoirs:—"Geology of East Somerset and Bristol Coalfields" (1876); "Geology of the Country around Norwich" (1881); "Geology of the Country around Fakenham, &c." (1884); and of parts of five other memoirs; also of parts of sixteen sheets of the map, and of nine sheets of sections. Author of "The Geology of England and Wales" (1876 and 1887); of two papers in *Quart. Journ. Geol. Soc.* (1876, 1886); nine papers, &c., in *Proc. Geol. Assoc.* (1875-1889); of two Presidential Addresses to the Norwich

Geol. Soc. (1879, 1880); of eleven other papers published by Norfolk and Somersetshire Societies (1874-1887); of nine papers in the *Geological Magazine*; of Reports on Coast Erosion (Brit. Assoc., 1885, 1889); and of Reports on Pliocene and Post Pliocene Beds to the British Sub-Committee of the International Geological Congress (1882, 1888).

*Supplementary Certificate.*—Since the above certificate was sent in, Mr. Woodward has been President of the Geologists' Association and of the Norfolk Naturalists' Society. He has also published various papers and memoirs, including the following:—"Formation of Landscape Marble" (*Geol. Mag.*, 1892); "Geological Zones" (*Proc. Geol. Assoc.*, 1892); "Oolitic Iron Ore in Raasay" (*Geol. Mag.*, 1893); "Memoir on the Lias of England" (Geological Survey, 1893).

#### WILLIAM PALMER WYNNE,

D.Sc. (Lond.), Assistant Professor of Chemistry in the Royal College of Science, South Kensington. Distinguished for his zeal and ability as an organic chemist. Author of "Action of Sulphuryl Chloride on Acetorthotoluidide and Acetoparathotoluidide, Mono-, Di-, and Tri-chlorotoluenesulphonic Acids," and "Note on the Constitution of Nevile and Winther's Orthotoluidenesulphonic Acid and of the Sulphonic Acids of Orthochlorotoluene and Orthobromotoluene" (*Trans. Chem. Soc.*, 1892). Joint Author with Prof. Japp of "Action of Aldehydes and Ammonia on Benzil" (*Trans. Chem. Soc.*, 1886). Joint Author with Prof. Armstrong of twenty-four papers in the *Proc. Chem. Soc.* from 1886-93 on Naphthalene and its Derivatives.

*Supplementary Certificate.*—Has submitted to the Chemical Society since 1893 papers on the Disulphonic Acids of Toluene and of Ortho- and Para-chlorotoluene (in conjunction with Mr. James Bruce); on the Six Dichlorotoluenes and their Sulphonic Acids (in conjunction with Mr. Alfred Greeves); and eleven communications on Naphthalene Derivatives (in conjunction with Dr. Armstrong). In their communications on Naphthalene (thirty-nine in all) made to the Chemical Society during the past ten years, Drs. Armstrong and Wynne have revised practically the whole of the Chemistry of Naphthalene in so far as relates to the formation of its Chlorinated and Sulphonated Derivatives, and, besides describing many new Derivatives, have placed beyond question the structure of the ten Di- and fourteen Tri-chloronaphthalenes to which respectively all other Di- and Tri-Derivatives may be referred.

#### ON LIPPMANN'S COLOUR PHOTOGRAPHY WITH OBLIQUELY INCIDENT LIGHT.

IN the discussion which followed Prof. Lippmann's splendidly interesting communication to the Royal Society (April 23), on colour photography, I suggested the possibility of applying his method to the Röntgen X-light; but at the same time remarked that it might be found impracticable on account of the smallness of the specular reflection of the X-light from polished surfaces, unless at obliquities little short of 90°. Lord Blythswood's experiments, communicated to the Royal Society on March 19, seemed to prove decisively something of true specular reflection of X-light, incident on a plane mirror of speculum metal at 45°. Experiments, which he has since made by means of a concave mirror of speculum metal, have demonstrated beyond all doubt that there is regular reflection at nearly normal incidence; but they have also proved that the amount of regularly reflected light is exceedingly small in proportion to diffuse light caused to emanate from the mirror, by the incidence of X-light upon it. Experiments by Joly, of Dublin, have, I believe, proved somewhat abundant specular reflection of the X-light, at incidences little short of 90°, on surfaces of bodies transparent to ordinary light. And the extremely small refractivity of the photographic gelatine film for X-light, will allow incidences little short of 90° upon the metal mirror, to be used instead of the normal incidences which Prof. Lippmann has hitherto used. But for very oblique incidences the mercury mirror, with its surface fitted to

the not rigorously plane surface of the photographic film, would be unsuitable; and the plan, which Lord Rayleigh described in the discussion, of forming the film on a solid metallic mirror, might be substituted for it.

All things considered, it seems not improbable that Lippmann's process may be applied successfully to X-rays at nearly grazing incidences on metallic mirrors, and possibly even on non-metallic mirrors.

Suppose now, for instance, the directions of the incident and reflected rays to be inclined to the mirror at angles of  $\cdot 1$  of a radian ( $5^{\circ} \cdot 7$ ). The distance between the planes of stratification in the photograph would be ten times that which would be produced by the same light at normal incidence. Thus if, for example, the wave-length of the particular X-light used is  $5 \times 10^{-6}$  cms. (or one-tenth of that of green light), the photograph would show tints of from green to violet when viewed normally, or at less or more oblique angles, by Lippmann's ordinary arrangements.

It is quite possible, however, that when we know something of the composition of Röntgen light, we may find such great differences of wave-lengths<sup>1</sup> in it, and so much difficulty to obtain approximately homogeneous X-light by sifting through metal plates (as we sift ordinary visible light by coloured glasses), or by other

may be normally, according to Prof. Lippmann's ordinary procedure, will be seen as a complete spectrum in concentric circles, with violet in the centre, and red, of wave-length  $7 \cdot 15 \times 10^{-6}$ , at the circle of  $56^{\circ}$  incidence; but, if viewed by an eye placed at the position of the source of the violet light which photographed it, it will, according to the principles explained by Dr. Lippmann in his paper, be seen of uniform violet light throughout its whole area.

KELVIN.

#### THE OBSERVATORY AT MONT MOUNIER.

THERE is no end to the generosity of M. Bischoffsheim. Not so very many years ago he endowed science with an observatory at Nice, and now again he has presented another, and this one is at the high altitude of over 8900 feet. The observatory is situated on the summit of Mont Mounier, one of the peaks in the Maritime Alps. The advisability of having it at this spot was suggested by M. Bischoffsheim himself.

It was not till early in 1893 that the plans were worked out, but the observatory was sufficiently finished in August of the same year, to allow observations of Venus to be made before the planet passed into its inferior conjunction.



Mont Mounier Observatory (altitude over 8900 feet).

means if other means can be found, that the experiment which I have suggested may fail on account of want of homogeneity of the incident light.

But here, suggested to me by thinking of oblique incidence for the photographic light, is an illustrative experiment which (with variations of detail to facilitate realisation) cannot fail if Prof. Lippmann will think it worth while to try it. Place a point source of homogeneous violet light (wave-length  $4 \times 10^{-5}$  cms.) so near to the centre of the mirror and sensitive film that rays shall be received at all angles of incidence from zero up to  $56^{\circ}$  (being the angle of which the secant is 1.788). The thickness of each stratum will vary in different parts of the photograph in simple proportion to the secant of the angle of incidence, and in the centre it will be equal to the half wave-length. It will therefore vary from  $2 \times 10^{-5}$  in the centre to  $3 \cdot 6 \times 10^{-5}$  at the circle of  $56^{\circ}$  incidence. This photograph, viewed or thrown on a screen as nearly as

<sup>1</sup> It is to be hoped however that, very soon, we shall have definite knowledge of wave-lengths of Röntgen X-light by diffraction fringes actually seen instead of estimates of their smallness from diffraction fringes not seen. I should explain that I am writing on the supposition which seems to me, after much correspondence with Sir George Stokes, to be exceedingly probable that Röntgen light is merely ordinary transverse-vibrational light of very short period. That its period is less than one-fifth that of green light seems well proved by the skilful experiments described by Perrin in *Comptes rendus*, January 27, 1896, p. 187; and by Sagnac, *Comptes rendus*, March 30, p. 783.

The buildings consist of a house for the astronomer and his assistant, the actual observatory, which has a revolving metallic dome (26 feet in diameter), and a wooden hut, used as workshop or dépôt. The house and actual observatory are united by a passage, which is indeed a necessary arrangement, on account of the very severe weather, and the snow, which sometimes lies thickly on the ground.

The observatory is a branch of the one at Nice, and at the time that important observations were being made at Nice, for the purpose of verifying M. Schiaparelli's discoveries on the rotation of the planet Venus, they were simultaneously being carried on at Mont Mounier by M. Perrotin, and with most successful results.

M. Bischoffsheim suggested that the observatory should be a meteorological station; it has therefore been furnished with Richard's recorders, and instruments for ascertaining the temperature, pressure, and other conditions of the air.

Nor is the observatory now isolated. For some weeks the house has been connected by telephone to Beuil, the nearest village with a telegraph office, a distance of five miles. This was also done at the expense of M. Bischoffsheim. It will therefore be possible to send daily reports to the central meteorological office of the observations made on Mont Mounier.