of the glass. I hope he will excuse me if I point out that in this he hardly does me justice; for, although words in the above sense are to be found on p. 18, they occur only towards the end of the preliminary treatment of the subject, attention is at once called to the objections to the method, and they are followed by a full account (with references to diagrams) of the method of adjusting the supplies of air and gas so as to produce flames *within which* lead-glass may be sufficiently heated without reduction.

I have ventured to trespass on your space to this extent, because, for various reasons, I have come to the conclusion that lead-glass is distinctly the best glass for beginners to work with, and therefore I am anxious to correct the widespread and mistaken idea that its manipulation is very difficult, and requires special appliances. W. A. SHENSTONE

Clifton, December 28

Pyrometers and Fusion-Points

I READ with much interest the letter from Naples of Dr. H. J. Johnston-Lavis, and beg to offer a few suggestions in answer to his inquiries. I have done much work with pyrometers, and for my purposes have used Siemens's water pyrometer with satisfaction.

It occurs to me, however, that the pyrometer most suitable for the volcanic lava investigations proposed by Dr. Johnston-Lavis would be either Siemens's electrical pyrometer, or the one recently introduced by Messrs. Murries and Co., 45, West Nile Street, Glasgow. It would seem that, with the latter, observations can be readily taken at a considerable distance from the pyrometer, so that the pyrometer stem might possibly be lowered into the crater, and readings of the internal temperatures taken at various depths, and possibly of the contained lava also.

With regard to the fusing points of various substances, reference may be made to the recent careful researches on this subject of Dr. Thomas Carnelley and Prof. W. C. Williams.

THOS. ANDREWS

Wortley Iron Works, near Sheffield, January 4, 1887.

Electricity and Clocks

THE exact combination about which Mr. Wilson inquires is already in existence: it can be seen at 2, Garfield Buildings, Gray's Inn Road, in the Jensen electric bell factory. The arrangement used by Mr. Jensen—and it seems to me preferable to that suggested by Mr. Gardner—is to cause the hammer of the small clock to make electric contact in the circuit of the distant large bell as it rises in preparation for striking the blow upon its own small bell. With a rubbing contact the action is perfectly certain. SILVANUS P. THOMPSON

City and Guilds Technical College, Finsbury

Barnard's Comet

ON December 25, about 6h., with a binocular field-glass, power about 4, I noticed a third tail to this comet between the other two. It was extremely faint, but 6° long, reaching to 11 Aquilæ. The principal tail was reduced to 10° in length, and was far more conspicuous than this shorter, though much broader, tail. The shortest tail, though actually much brighter than this latter, was very indistinct with these field-glasses, being best seen with the telescope, power 20, whereas the middle tail was not distinctly visible therewith, although it showed an evident dark space immediately preceding the principal tail. With the naked eye I could see the long tail only. The head was about as bright as δ Aquilæ. T. W. BACKHOUSE

Sunderland, December 29, 1886

Meteor

I HAVE just seen a very beautiful meteor about the size of Sirius. The local time was within a minute or two of half-past 10. It started out between Pollux and the star-cluster in Cancer, and fell rather slowly in the direction of Regulus, going out before it reached that star. It had a trail, which vanished with it. The sky had just cleared after a thunderstorm.

Sidmouth, December 28 J. M. H.

Red Sunsets and New Zealand Eruptions

NEW ZEALAND eruptions have not the projectile force to cause red sunsets. Singularly, the very same current of ideas expressed by Prof. Newcomb in NATURE, vol. xxxiv. p. 340, occurred to the writer, when in Australian waters the June previous, on the deck of the P. and O. steamer *Ballaarat*, off the Great Bight, on noticing a peculiarly red northerly sunset. The newspapers at King George's Sound were full of accounts of the magnitude of the eruption of Tarawera, and it must be the fine dust from New Zealand that has passed overhead.

The atmosphere of Australia, it may be mentioned, is one of the clearest, "exceptionally free," as Prof. Newcomb puts it, "from vapours or other attenuated matter," and in which volcanic dust would tell immediately.

This suggestion disappeared at once on getting to the actual site of the New Zealand eruption, only six weeks after it had occurred, and on seeing the limited area covered with mud—a mere nothing compared with the vast stretch of country in the North Island passed through. As there was not a trace of its effects till within eight miles of the foot of Tarawera, it was simply ridiculous to suppose that any of the dust had invaded the higher atmosphere.

Besides this, the boundary of the cloud of atmospheric disturbance was distinctly seen, and the altitude placed by none of the spectators to be above 12,000 feet.

The explosion at Tarawera appears to have been merely one of superheated steam. It was different in the case of Krakatão, where the initial force had much more of the character of an explosion of nitroglycerine than of high-pressure steam, as the matter was stated to have been projected at least 40,000 feet into the air.

The magnitude of the New Zealand eruption could only be felt after getting well within the diameter of sixteen miles on which the mud fell, plastering hill and dale, evenly, of a dull gray, eighteen inches thick. Exterior to this it possessed none, and the distant results evidently were infinitesimal.

The writer also saw the "green sun" from the south of India, where it lasted for days, and has no doubt that this phenomenon was due to the dust from Krakatão, such an appearance having never been even faintly approached, before or since, from ordinary natural causes, and more impressive, because unaccounted for, than a total eclipse of the sun.

India, November 26, 1886 A. T. FRASER

THEODOR VON OPPOLZER

THEODOR VON OPPOLZER, one of the most eminent of modern astronomers, died at Vienna on December 26, 1886. He was the only son of Johannes von Oppolzer, the famous pathologist of Vienna, and was born on October 26, 1841. In accordance with the wish of his father, he studied medicine, and took his doctor's degree in 1863. From early youth he had shown great interest in astronomy, and, soon after taking his degree, he caused an observatory to be built at his own expense, and resolved to devote himself wholly to his favourite science. In 1866 he began to lecture at the University of Vienna, on theoretical astronomy, and he was soon promoted to the position of full Professor in his department. In 1870 he was asked by his Government to take charge of the operations for determining the length of a degree in Austria, and to this task he applied himself with so much energy that all the necessary observations were by and by completed, although his results have not yet been published.

Oppolzer distinguished himself in all departments of astronomical science. One of the most important of his writings was his "Lehrbuch zur Bahnbestimmung der Kometen und Planeten," a work which has already become classical. He had hoped to place the theory of the moon on a new basis, but his labours in connection with this subject were not finished at the time of his death. On his death-bed he corrected the last proof-sheets of his "Canon der Finsternisse," in which he calculates all the eclipses of the sun and moon which have taken place, or which have yet to take place, between the years B.C. 1500 and A.D. 2000.

His services to science were recognised by all the great learned Societies, and he was a Foreign Member of the Royal Astronomical Society of London. He was a man of a singularly noble personal character, and his death is deeply regretted by a wide circle of friends.

THE COLONIAL AND INDIAN EXHIBITION

CANADA.—This section of the Exhibition will be remembered chiefly for its agricultural machinery in motion, its fur, and agricultural trophies, and its large collection of furniture. The collection of fruits in the agricultural trophy has probably never before been equalled either in number, variety, or perfection of preservation, the colours of the several fruits being extremely well preserved in various solutions, such as dilute sulphurous acid for the lighter coloured fruits or salicylic acid for the darker ones. Besides these, however, there were numerous exhibits which, though less imposing to the general visitor, were of considerable interest, such, for instance, as the collection of timbers, and manufactures therefrom, photographs of American timber-trees, &c. The enormous sizes of many of the American Coniferæ were well illustrated by magnificent planks of such woods as the Douglas fir (*Pseudotsuga Douglasii*), some sixteen feet high and about ten feet in diameter, large slabs of hemlock spruce (*Tsuga canadensis*), also enormous logs of black walnut (*Juglans nigra*), and many others. Perhaps the most compact and interesting collection of timbers, however, was that from New Brunswick, where the woods were arranged so as to form a kind of design, the lower or basal portion being formed of trunks of trees, with their barks remaining, about three feet high, over this were arranged sections of the wood in frames composed of the young branches with the bark on; and above these, again, panels of the same wood as shown below, cut longitudinally and with a cross section at the base, both polished to show the grain or figure, and on the panel of each wood was painted a very good representation of a spray or branch of the plant itself. Each specimen was properly named, so that the whole thing was very complete. The series of photographs before alluded to are correct representations of the tree flora, each photograph being framed with the wood of the tree illustrated. The general use of the bark and wood of the cedar of British Columbia (*Thuja gigantea*), for useful and ornamental articles, was well shown in the exhibits of mats, native head-dresses, masks cut from the solid wood and grotesquely painted, spoons, whistles.

Fiji.—Though the space occupied by these islands was but small, the exhibits were of an interesting character, including a fine set of native timbers, for the most part scientifically named, and including some large blocks of Fijian sandalwood (*Santalum yasi*), roots of the kava (*Piper methysticum*), which is generally used in the Society and South Sea Islands in the preparation of an intoxicating beverage by chewing the root, ejecting the saliva into large bowls, and then fermenting it; or by pounding the root between two stones, then putting it into a bowl, pouring water upon it, kneading it, and afterwards straining it. The taste is said to be like that of soap-suds, but a liking for it is easily acquired, and it is said to quench the thirst better than any other beverage. A spirit prepared from it in Germany was sold in the Exhibition under the name of yagona or kava schnaps. This spirit, which is something of the nature of a liqueur, is described as having medicinal properties, and is recommended for its remarkable soothing and stimulant effects, restoring faded energies and exhausted nerve-power. Cocoa-nut fibre and oil of course form large staples of produce in Fiji, and were fully represented in the Exhibition, as well as dilo nuts and oil (*Calophyllum inophyllum*). Some excellent samples of sugar, grown and manufactured in the islands, and tea, also grown and prepared in Fiji, as well as many other products, were shown in quantity. Great credit is due to the Executive Commissioner, the Hon. J. E. Mason, for making the resources of his colony known by the distribution of small samples, during the period the Exhibition was open, to any one having a real interest in their development.

Victoria.—Besides the splendid collection of water-colour drawings of Australian plants exhibited on the north side of the Court, the fine series of Victorian woods, the golden arch, and the native encampments, all of which attracted a considerable amount of attention, the products of the genus *Eucalyptus* in the shape of oils and resins, exhibited by Mr. Joseph Bosisto, M.P., and President of the Commission, were amongst the most interesting and important. Samples of the oil of *Eucalyptus amygdalina*, rectified and non-rectified, were shown. This is the best quality of eucalyptus oil, and the oil for the preparation of which Mr. Bosisto's firm has become noted. A sample of the essential oil of eucalyptus of commerce was also shown, and described as being obtained from the allied varieties of *E. amygdalina*, but not from the true species. So many varieties of this species are known that it is difficult for bushmen who collect the leaves to distinguish those of the true species from its congeners, forming, as they often do, a compact jungle or bush growing in close proximity to each other. The oil is rubefacient, antiseptic, disinfectant, and a deodorant of great power. The essential oil of *Eucalyptus globulus*, the blue gum-tree of Victoria, having tonic, stimulant, and antiseptic properties, as well as those of *E. oleosa*, *E. dumosa*, *E. citriodora*, *E. goniocalyx*, *E. obliqua*, &c., were also shown. A sample of eucalyptol from *E. amygdalina* and *E. globulus* is described in the Catalogue as "a homologue of camphor, and appears to be two steps higher in the series. Its vapour, mixed with air, is agreeable when inhaled, and is employed as a therapeutic agent in bronchial and diphtheritic affections." Amongst resins were those of the red gum of Victoria (*E. rostrata*), described as a thoroughly soluble and delicate mucilaginous astringent, and *E. resinifera*, Australian kino. Fine samples of the resin of the Australian grass-tree (*Xanthorrhœa hastilis*) were also shown. This is obtainable in large quantities; it is of a deep amber colour, soluble in spirit, and is used for staining wood to imitate cedar and oak, and is also used in this country in French polish to deepen the colour of light mahogany and other woods.

New South Wales.—Minerals, wools, timber, and furniture made of the timber, were the principal objects exhibited. None of the woods called for any special remark except, perhaps, a small collection either known or considered to be adapted for wood-engraving, and these specimens were of little or no value in themselves, being badly selected, and in many cases much split or cracked. The collection was more valuable as giving a clue to the source of the woods considered suitable for engraving purposes than for any qualities of their own. Among the woods so exhibited were *Backhousia myrtifolia*, *Hymenosporum flavum*, *Xanthoxylum brachyanthum*, *Acacia Cunninghami*, *Duboisia myoporoides*, *Dysoxylon Fraserianum*, *Gmelina Leichhardtii*, *Hemicyclia australasica*, *Weinmannia rubifolia*, *Eugenia myrtifolia*, *Pentaceras australis*, and others. Amongst fibres and fibrous barks was the bark of the small-leaved nettle-tree (*Laportea photiniphylla*), also a fishing-net, cordage, and a dilly bag made from the fibre by the aborigines of the northern coast districts. The collection from New Guinea exhibited in this Court was of considerable interest. The utilisation of the bony seed shells of *Pangium edule* for decorating the skin drums is one not seen by us before. The seeds produce a rattling sound when shaken similar to those of *Thevetia nereifolia*, which are used for like purposes in British Guiana.