

balloon the temperature of the gas was uniform, although there was a difference of 25° C. between this and the gas temperature at the top. It is calculated that in still air as much as 80 per cent. of the total heat loss from the upper surface of the model might be due to radiation from the fabric. For obtaining the minimum heating effect on an airship in sunlight the use of aluminium-coated fabric is recommended, since this also affords good protection against actinic light.

IN view of the successful round voyage of the naval airship R34, great interest is attached to a fully illustrated account of this vessel which appears in *Engineering* for July 18. The vessel has a length of 645 ft. over all, and a maximum diameter of 78 ft. 9 in. Its gas capacity is about 2,000,000 cub. ft., giving a gross lift of 60 tons under standard conditions. The disposable lift is just under 30 tons. The hull is of fine stream-line form, and is constructed of main transverse frames spaced 10 metres apart, and built in the form of a polygon with thirteen sides. The frames are joined at each angle of the polygon by longitudinal girders, and there are intermediate frames in each space, both transversely and longitudinally. The exterior polygon of twenty-six sides thus formed has the outer cover stretched over it. The girders are constructed of duralumin. There are eighteen gas-bags, composed of high quality single-ply cotton fabric, lined with rubber on the inner surface. On this surface goldbeaters' skins are stretched and secured with rubber solution, and the whole is then varnished over. Each gas-bag has an automatic relief valve. There are five cars, one for navigational purposes, and all the others contain engines. The five engines are of 270 h.p. each, and give a speed of 55 knots in still air. The photographic illustrations of the ship under construction and in flight are particularly interesting, and give very clear views of the details of construction.

MESSRS. HODDER AND STOUGHTON have in the press the New Teaching Series, which has been arranged to meet new demands in education as to method and curriculum. The subjects of the volumes in hand include:—Chemistry from the Industrial Viewpoint, Applied Botany, Industrial Geology, Geography of Commerce and Industry, Chemistry and Bacteriology of Agriculture, Everyday Mathematics, Mathematics of Engineering, Foundations of Engineering, Mathematics of Business and Commerce, and Industrial History.

MESSRS. H. K. LEWIS AND CO., LTD., have removed their publishing, wholesale, and advertisement departments to 28 Gower Place, W.C.1. The change not only provides larger and more convenient accommodation for publishing work, but the space vacated in the old premises affords much needed additional room for the library and bookselling business. A new and convenient reading-room is to be added to the library over the present library room.

MESSRS. LONGMANS ask us to say, in correction of an announcement in last week's *NATURE*, that though the edition on large paper of "A Naturalist's Sketch Book," by A. Thorburn, which they will publish in the autumn, will be limited to 105 copies, the ordinary edition of the book will not be limited in number.

THE offices of the Imperial Mineral Resources Bureau have been moved from 14 Great Smith Street to 2 Queen Anne's Gate Buildings, Westminster, S.W.1.

OUR ASTRONOMICAL COLUMN.

A BRIGHT METEOR.—A large meteor with unusually slow motion was observed at Bristol on July 20, 11.2 G.M.T.; it had a double nucleus, and passed over 42° of the sky in 12 seconds. The observed path was from $37^{\circ}+47^{\circ}$ to $4^{\circ}+15\frac{1}{2}^{\circ}$. The meteor was of a red colour, like Mars, and probably from a radiant in Leo at about $155^{\circ}+25^{\circ}$. It is curious that the great fireball seen in America on July 20, 1860, had a radiant point in the same region of the sky, and may be assumed to have been derived from the same cometary system. Further observations of the meteor of July 20 last would be valuable, and Mr. W. F. Denning, 44 Egerton Road, Bristol, will be glad to receive any.

THE LIGHT OF THE AURORA AND THE AURORAL LINE.—Observation of the brightness of the background of the sky by various observers has shown that it must be due to some other cause than the diffused light of the stars themselves, and the suggestion has been made that this is the effect of the existence of a permanent aurora. In the *Astrophysical Journal* for May Prof. Slipher publishes an account of some spectrographic observations which have a direct bearing on the point. He says that during three and a half years something like one hundred spectrograms were made of the night sky, and every one of them recorded the chief auroral line, so that during this period of time auroral illumination of the sky was found to be present on every night that an exposure was made for detecting it. Incidentally, Prof. Slipher made a determination of the wave-length of the green auroral line, which he finds to be longer than the generally accepted value, $\lambda 5571$. Prof. Frost, in an editorial note, corroborates the fact from inspection of one of the spectrograms that the green line falls at a point of greater wave-length than the solar line $\lambda 5573$, and it appears that the wave-length of the auroral line is substantially $\lambda 5578.05$.

THE SPIRAL NEBULÆ.—A reprint from the *Journal of the Washington Academy of Sciences* for April 19 gives an abstract of a lecture delivered by Prof. H. D. Curtis, of the Lick Observatory, on certain modern theories of the spiral nebulæ. The author forms the opinion that these nebulæ are 'island universes, and not part of our galactic system, a line of argument adduced to show this being as follows:—The spiral nebulæ have large radial velocities shown by the spectroscope, their average speed being nearly five hundred miles a second, but by repeating photographs taken about thirteen years ago and comparing them with the earlier ones, Prof. Curtis finds no evidence of proper motion or motion at right angles to the line of sight which it is to be expected these objects should have, since their space velocity is high. The conclusion to be drawn is that the cross-motion does not show because the nebulæ are very remote, so remote that they must be far outside the generally accepted limits of the bun-shaped figure known as our stellar system. An argument in favour of the island universe theory, drawn from the appearance of Novæ, may be repeated. The brighter Novæ of the past have almost invariably been located in or close to our Milky Way, and therefore have evidently been part of our stellar system. In the course of a few years a dozen Novæ have been found in spiral nebulæ, all very faint, and the life-history of these has been essentially the same as that of the brighter Novæ. There is thus a presumption, though not a very rigid proof, that the phenomena of the spirals are similar to those of our galaxy, and therefore that they themselves are galaxies.