

mean decrease of the temperature gradient per 100 metres of the lower 2 kilometres were obtained (1) above the land with a captive balloon and light wind; (2) above the land with a moderate westerly wind, with kites; and (3) above the sea (January 14-20), weather rainy, with kites; but the results are not strictly comparable, owing to differences of time of day:—

Metres	100-500	500-1000	1000-1500
Balloon ...	0° 77' C.	... 0° 57'	... —
Kite (land) ...	0° 87'	... 0° 72'	... 0° 44' (< 1500 M)
Kite (sea) ...	0° 91'	... 0° 59'	... 0° 71'

Further kite observations over sea gave for 1500-2000 m., 0° 34'; 2000-2500 m., 0° 50'; 2500-3000 m., 0° 46'. At about 1000 m. the gradient shows a sudden decrease, probably due to the formation of cumulus clouds. The observations of wind direction for the period September-May show that the upper air-current has easterly components up to the greatest heights attained (10-15 km.). The average altitude of the west monsoon was 5.4 km. The upper easterly, as well as the lower westerly, winds were sometimes affected by strong northerly or southerly components. It is mentioned that diagrams of a registering balloon sent up on May 19, during the passage of the earth through the tail of Halley's comet, showed no other noteworthy feature than an inversion of temperature between 6 and 7 km.; the balloon burst at about 7 km.

THE various methods of finding the height of an airship are discussed by Captain Paul Renard in the *Revue scientifique* for September 17. Of the several methods of observing the height from the airship itself, Captain Renard considers that the use of the barometer affords the only practicable one. Of the methods of observing the height from the ground the large majority involve simultaneous measurement of several angles, and this is, in general, impracticable. Captain Renard considers that the best methods are by observation with a telemeter, coupled with a determination of the altitude, or by two simultaneous observations of the altitude at the instant the airship is in the vertical plane joining the two observers.

THE *Builder* for October 29 contains an illustrated article descriptive of the fine building now being erected in London for the Y.M.C.A. This building occupies an island site of some 33,000 square feet, bounded by Great Russell Street, Bedford Avenue, Tottenham Court Road, and Caroline Street. Reinforced concrete plays an important part, and has been employed for the solution of various structural problems of considerable magnitude. The building is not one of the reinforced concrete skeleton class merely sheathed in masonry, but rather is a combination of masonry with reinforced concrete, the latter material taking the duties hitherto very generally assigned to structural steel-work in modern architecture. Thus we find reinforced concrete columns, beams, and wall lintels forming the backbone of masonry features, and bearing a large proportion of the loads to be supported, yet without involving any noticeable departure from the familiar aspect of masonry. In some important respects reinforced concrete is exclusively adopted, as in floor, roof, gallery stairway, and swimming-bath construction, and in the form of exceptionally large girders. The details of the reinforced concrete work were prepared by Messrs. L. G. Mouchel and Partners, in accordance with the Hennebique system.

An article by Mr. Fullerton L. Waldo on recent progress in the construction of the Panama Canal appears in the *Engineering Magazine* for October. Rapid progress

has been made in the great lock-works and the huge dam that is rising at Gatun. The three lock flights divide the vertical distance to the 85-foot level between them, whereas the locks of the Pacific division have lifts of 33½ feet and 54½ feet respectively. The usable dimensions of the locks are 1000 feet by 110 feet, giving ample margin for even the new White Star liners, the overall dimensions of which are 890 feet in length and 92 feet in width. It is calculated that the lock-stair at Gatun will require about 1½ hours for the transit; the Pacific locks will detain the vessels for about the same length of time. The total passage across the Isthmus will take about 10 to 12 hours. The train takes about 2½ hours, so that passengers will probably prefer this method of transit. About 15 minutes are required to fill the lock chamber, but in case of need for haste the process can be completed in about half this time. The available water supply will allow of 48 lockages per day, which might mean an average of something like 80,000,000 tons of traffic annually as compared with 21,000,000 tons in the case of the Suez Canal and the 40,000,000 tons of the Sault Ste. Marie.

WE have received the first five numbers of a leaflet entitled *Hygieia*, which is published by the Bureau of the International Congress of Hygiene, which is to be held in Dresden in 1911. It contains notices with regard to the congress and brief abstracts of papers dealing with subjects appertaining to hygiene, e.g. sugar as a food-stuff, taverns as hospitals, cleansing of towns, &c.

MESSRS. NEWTON AND CO., Fleet Street, London, have issued a supplementary list of lantern-slides for the present session. Among many others, we notice numerous astronomical slides dealing with Halley's comet, the moon, and Greenwich Observatory; a set of slides showing Sicily and Messina after the earthquake; sets to illustrate eight lectures on India, drawn up by Mr. H. J. Mackinder for the Visual Instruction Committee; and slides showing aerial experiments and aeroplanes.

THE Penny Science Lectures at the Royal Victoria Hall, Waterloo Road, S.E., during November include:—November 8, "Early Men in Britain," W. Lower Carter, and November 22, "Liquid Air," Dr. R. Whittan Gray.

MR. H. K. LEWIS, of Gower Street, London, has published a catalogue of new books and new editions added to his well-known medical and scientific circulating library during July, August, and September of this year.

#### OUR ASTRONOMICAL COLUMN.

FIREBALL OF OCTOBER 23.—Mr. W. F. Denning writes:—"The fireball of Sunday, October 23, 8h. 12m., was observed at Kenley (Surrey), Ilford (Essex), and in Wales, as well as at other places. It appears to have passed over the sea N.E. of the mouth of the Thames at heights of 84 to 40 miles. The length of the luminous course was about 75 miles, and the velocity 19 miles per second. Radiant near  $\alpha$  Arietis.

"The observation of the meteor from stations in Wales is interesting, and it is probable that the object was seen from a great many towns in England, for it appeared at a time when many people would be out of doors. The sky was, it is true, cloudy at some places and veiled the brilliant light of the meteor, but it was a very fine one, and gave several flashes as it slowly sailed along the E.N.E. as seen from the neighbourhood of London. It is important that if any further observations of an exact character were made they should be published, so that the flight of the object may be investigated accurately."

THE MOTION OF MOLECULES IN THE TAIL OF HALLEY'S COMET.—In a recent note in these columns (September 29, p. 404) attention was directed to some results published

by Prof. Lowell in which he showed that particles repelled by light-pressure along the tail of Halley's comet travelled with accelerating velocities. An important addition to these results is now published in No. 48 of the Lowell Observatory Bulletins. By comparing the images shown on direct photographs with those shown on contemporaneous objective-prism spectrograms, taken under conditions which permit the comparison, Prof. Lowell has adduced evidence that the gaseous molecules of the tail were repelled by light-pressure.

A series of spectrograms, taken during April and May, shows that the constituents of the tail varied considerably from one date to another. But the evidence indicates that on May 23 about 70 per cent. of the radiations represented on the spectrograms was due to emission, the remaining 30 per cent. being taken up by the continuous spectrum. That is to say, that the knots previously measured, on the direct photographs for May 23, were composed chiefly of gaseous molecules. As these knots showed, by their accelerating velocities, the action of a repulsive force exerted from the sun, it follows that light-pressure is competent to repel gaseous molecules.

Confirmation of this important result is derived from a similar comparative study of the direct and spectral images of the tail of Morehouse's comet. The spectroscopic evidence in that case indicated that practically all the light recorded on the plates was emitted by gaseous particles, yet the direct photographs afforded evidence of the action of light-pressure.

**THE DARK BAND SURROUNDING THE POLAR CAPS OF MARS.**—Readers of these columns will remember the discussion raised by M. Antoniadi's contention that the dark band seen circling the polar cap on Mars is simply a contrast effect. In support of this contention M. Antoniadi stated (see NATURE, December 23, 1909, vol. lxxxii., p. 227) that photographs of the planet, taken in America, did not show the dark band, although at the same time they showed that the cap was not brighter than the continental areas, and therefore irradiation could not be adduced as the reason for the absence of the band. Prof. Lowell, in a note appearing in No. 4448 of the *Astronomische Nachrichten*, emphatically states that the photographs do show that the polar cap is brighter than the "continents," and actually irradiates in consequence beyond the confines of the disc. Further, the screen through which the photographs were taken was such that the relative brightness of the caps would be considerably modified.

**THE SPECTRUM OF NOVA SAGITTARII No. 2.**—The nova recently announced by Mrs. Fleming appears on sixteen photographs taken at Arequipa between March 21 and June 10; the magnitude varied from 7.8 to 8.6 between those dates. The spectrum is quite faint, but shows the hydrogen lines, H $\beta$ , H $\gamma$ , H $\delta$ , H $\epsilon$ , H $\zeta$ , and H $\eta$  bright; a trace of H $\gamma$  as a dark line is seen on the less refrangible edge of the bright H $\gamma$  line.

The star does not appear on seventeen photographs taken between July 23, 1889, and October 7, 1909, although stars down to magnitude 12.0 are shown on the majority of the plates; one plate shows the fifteenth magnitude or fainter.

A visual observation by Mr. Leon Campbell, using the Harvard 24-inch reflector on October 3, showed the magnitude of the nova to be 10.5.

Prof. Millosevich, on October 15, determined the position, reduced to 1910.0, as 17h. 54m. 26.28s.,  $-27^{\circ} 32' 52.1''$ , and the magnitude as 10.4 (*Astronomische Nachrichten*, No. 4448).

**A NEW VARIABLE STAR OR A NOVA, 97.1910 CYGNI.**—In No. 4448 of the *Astronomische Nachrichten* Mr. Hinks records the discovery of what appears to be a new star, or an unrecorded variable, on plates taken by him on August 7, 10, and 12, 1909. The position of the object is R.A. = 19h. 49m. 55.01s., dec. =  $+36^{\circ} 46' 57.4''$  (1909), and the approximate magnitudes on the dates named were 10.4, 10.2, and 10.5 respectively.

Plates taken on August 17, 19, and 26 show no trace of an object in this position, although those of August 17 and 26 show stars down to magnitude 12.5; nor could the star be found visually on September 19 and

26, when it should have been visible if brighter than mag. 13.0.

Mr. Hinks publishes a chart of the region around the object, and asks for any available information as to its appearance on photographs which may have been taken elsewhere.

**NEW VARIABLE STARS IN HARVARD MAP, No. 52.**—In Circular No. 162 of the Harvard College Observatory Prof. Pickering announces the discovery, by Miss Cannon, of twenty-two new variable stars on No. 52 of the Harvard maps. The region of the plate is 18h.  $-60^{\circ}$ , and altogether thirty-five variables were found. Some of the new variables have ranges of three or four magnitudes, one, D.M.  $-57^{\circ} 8613$ , varying from 7.6 to 10.0; this is of the Algol type, and has a spectrum of the fifth class.

### ANTHROPOLOGY AT THE BRITISH ASSOCIATION.

THE Anthropological Section at the Sheffield meeting was presided over by Mr. W. Crooke, whose works dealing with the ethnology of India are well known and highly valued by all anthropologists. His address has already appeared in NATURE (September 29) and need not be alluded to here, except to refer to the tribute that was paid to the work of Dr. Tylor, who has so lately resigned his professorship at Oxford, and who presided over the department (as it then was) of anthropology at the last Sheffield meeting, held thirty-one years ago.

A feature of the section's work was the joint discussion with Section L (Education) on the measurement of intelligence in school children, to which Dr. Spearman, Dr. Lipmann, Dr. Myers, and Messrs. Burt, Brown, and Gray contributed. A report of this discussion will be given in the account of the proceedings in Section L.

Beyond this the work of the section ran on the usual lines, the number of archaeological papers being again a prominent feature. The section, as usual, had the advantage of hearing reports on their work by members of the British Schools of Archaeology at Athens, Rome, and in Egypt, and also from gentlemen who have been excavating and exploring in the British Isles.

In the following summary the papers are broadly grouped together under the various subjects with which they dealt.

#### Archaeology.

Mr. T. Ashby described the excavations which have taken place at Caerwent, the site of Venta Silurum. These have consisted of the uncovering of several more houses, and of the excavation of the central insula to the north of the city, which contains the Forum and Basilica. This latter had no apses, and from its S. aisle at each end were entrances into the streets. The Forum was surrounded by an ambulatory and shops. Numerous skeletons were found in another part of the city, but were not contemporary, being obviously of post-Roman date. Closely akin to this paper was Prof. Bosanquet's account of the excavations at Caersws, undertaken by the Liverpool committee for excavation and research in Wales and the Marches.

Mr. H. D. Acland presented a paper on some prehistoric monuments in the Scilly Isles, which consisted of a description of two groups of menhirs. Several of those of one group have a constant orientation differing  $4^{\circ}$  from a normal bearing. A group of intersecting banks was also described, which have a similar variation as the menhirs.

The excavation of a broch at Cogle, Watten, Caithness, was described by Mr. Alexander Sutherland. The building had been overgrown with vegetation, and five successive layers of ashes and pavement were found. Among the Neolithic remains were several stone pestles, discovered in the lowest stratum; these were of a basalt-like stone and were originally of oval or oblong shape, but had been worn down by constant pounding until some of them had become circular. The broch was 30 feet in diameter.

The Rev. Dr. Irving read a paper on the prehistoric horse, found some little time ago at Bishop's Stortford. Careful comparisons have been made with other skeletons, and the conclusion seems warranted that it represents a late Pleistocene race, which has survived into Neolithic, Bronze, or the Early Iron period, the age of the deposit being