Raven (*Corvus corax*), European, presented by Mr. H. W. Mansell; two Yellow-bellied Liothrix (*Liothrix luteus*) from India, two Grey-headed Love-Birds (*Agapornis cana*) from Madagascar, two Passerine Parrots (*Psittacula passerina*) from South America, a Yellow-rumped Seed-eater (*Crithagra chrysopyga*), a Black bellied Weaver Bird (*Euplectes afer*), a Grenadier Weaver Bird (*Euplectes oryx*), a Crimson-eared Waxbill (*Estrelda phœnicotis*), two Orange-cheeked Waxbills (*Estrelda melpoda*) from West Africa, a Superb Tanager (*Calliste fastuosa*) from Brazil, a Parrot Finch (*Erythrura psittacea*) from New Caledonia, two Red-crested Finches (*Coryphospingus cristatus*) from South America, five Amadavade Finches (*Estrelda amadava*) from India, two Chestnut-eared Finches (*Amadina castanotis*) from Australia, three Bar-crested Finches (*Munia nisora*) from Java, a Black-headed Finch (*Munia malacca*) from India, two Banded Grass Finches (*Poephila cincta*) from Queensland, two Lazuline Finches (*Guiraca parellina*) from Central America, a Red-tailed Finch (*Estrelda ruficauda*) from New South Wales, five Indian Silverbills (*Munia malabarica*) from India, presented by Mr. A. J. Aitchinson; a Common Wombat (*Phascolomys mitchelli*) from Australia, an American Siskin (*Chrysomitris tristis*) from North America, three Amphiumas (*Amphiuma means*) from North America, a Black Iguana (*Metopoceros cornutus*) from the West Indies, deposited; a Garden Dormouse (*Myoxus quercinus*), European, received in exchange; two Wapiti Deer (*Cervus canadensis*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

WOLF'S COMET.—The following is a continuation of the ephemeris of Wolf's comet as computed by Herr Thraen (*Astr. Nach.*, 3506):—

12*h*. *Berlin M.T.*

1898.	R.A.	Decl.	Br.
	h. m. s.		
August 12 ...	4 58 8 ..	+16 27·9 ...	2·4
13 ...	5 0 41 ...	17·1	
14 ...	3 14 ...	6·0 ...	2·5
15 ...	5 45 ...	15 54·7	
16 ...	8 15 ...	43·3 ...	2·5
17 ..	10 44 ...	31·6	
18 ...	5 13 12 ...	+15 19·6 ...	2·5

The comet is moving in the constellation of Taurus, lying some distance to the west of Aldebaran.

DR. GILL ON SIR JOHN HERSCHEL.—We have received a reprint (from the *Cape Times*, June 24) of an address which was delivered by Dr. Gill at the prize distribution, Diocesan College, Feldhausen, on June 23 last. On this occasion Dr. Gill uncovered a portrait of Sir John Herschel, which had been presented to the school by Mr. Gordon. The same generous donor has promised also a yearly Herschel prize. In his address, Dr. Gill, after referring to the earlier life of Sir John Herschel, and pointing out how he re-examined, with instruments made by himself, the whole of the nebulæ, star clusters, and double stars which had been discovered by his father, and finished this review of the northern hemisphere, mentions how Herschel began a similar study in the southern hemisphere. "Towards the end of 1833, being then forty years of age, he sailed for the Cape, and after a voyage of sixty-three days arrived in Table Bay on January 15, 1834. He selected the house and grounds of Feldhausen for his residence, and on February 22 began the work of observation which he concluded in 1838. On his return to England he spent nine years in the arrangement, the reduction, and the publication of these Cape observations, which were printed in one splendid volume at the expense of the Duke of Northumberland." In a later part of the address Dr. Gill refers to Herschel as "the prose poet of science; his popular scientific works are models of clearness, and his presidential addresses teem with passages of surpassing beauty. His life was a pure and blameless one from first to last, full of the noblest effort and the noblest aim from the time when as a young Cambridge graduate he registered a vow 'to try to leave the world wiser than he found it'—a vow that his life amply fulfilled."

THE PARIS OBSERVATORY.—On February 8 of this year M. Lœwy presented his report of the Paris Observatory for the year 1897 to the Council of the Observatory. Perhaps the most important fact which he communicated was the reorganisation of the meridian work. Up to the present time the greater part of the *personnel* of the meridian instruments has been employed in the revisions of the zones of Lalande, a piece of work that has been pursued steadily since the year 1854; in this, no less than 600,000 observations of stars of Lalande have been made. As this great enterprise is now nearly completed, M. Lœwy points out that other problems can now be attacked, and consequently a different organisation for meridian studies becomes necessary. The three meridian instruments, according to the new scheme, are each used by two astronomers, who make, reduce, discuss and publish the observations in their own names. The meridian circle *du jardin* has been used for the absolute determination of latitude and its variations, the large meridian instrument for absolute determinations of declinations of fundamental stars, while the instruments of Gambey have been employed for filling up gaps in the observations of the stars of Lalande.

During the year 1897 as many as 16,824 meridian observations were made, together with 333 planetary observations. The large equatorial coudé has been devoted to obtaining photographs of the moon which were required to make the series complete. The present report contains a beautiful heliogravure cliché of the moon relative to a phase which presents the greatest photographic difficulties. It was obtained immediately after the sun had set, the moon then having a very low altitude and being only 4 days 6·4 hours old. The equatorials in the east and west towers have been used, as formerly, for observations of comets, minor planets, double stars, nebulæ and occultations. The photographic chart of the heavens seems to be progressing, although the year was not very suitable for such work. The catalogue, we are told, is practically finished, with the exception of some isolated clichés. In the spectroscopic research department M. Deslandres has been continuing his interesting investigations. With the large reflector of 1·20 metres and a spectroscope of three prisms he has secured 47 negatives, which will furnish the velocities in the line of sight of the star studied, and in the laboratory he has been experimenting on the question of the relationship between coronal and kathodic rays.

The report contains, further, the work of the bureau of computations, observatory and personal publications, &c.; but even a brief account of these would render this note too long.

THE FRENCH ASTRONOMICAL SOCIETY.—The *Bulletin* of this Society for the current month is devoted nearly wholly to reproductions of some lunar charts obtained by Messrs. Lœwy and Puiseux at the Paris Observatory, and numerous accounts of the nearly total eclipse of the moon which took place on the 3rd of last month. In the former, four of these most excellent lunar pictures are reproduced, and the description which accompanies them points out the most curious objects in special relation to a better understanding of the order and succession of physical forces which have been at work on our satellite. In the observations of the lunar eclipse we are presented with some excellent reproductions from photographs of the phenomenon at different stages.

THE ELECTRICAL RESISTANCE AND MICRO-STRUCTURE OF ALLOYS.

IN a note in NATURE for June 18, 1896, on "The Electrical Resistance of Alloys," Lord Rayleigh suggested that the entirely different behaviour of pure metals and of alloys with respect to the resistance which they offer to the passage through them of an electrical current, might be partly due to thermo-electric effects.

Profs. Dewar and Fleming have shown that the resistance of a pure metal tends to disappear as absolute zero is approached, and quite recently Prof. Dewar has pointed out that the resistance of platinum in boiling hydrogen is reduced nearly to $\frac{1}{11}$th of its resistance when in boiling oxygen. So far as they have been examined, alloys show no such diminution in their

electrical resistance, and the following extract from Lord Rayleigh's note gives his suggested explanation on the supposition that the metals in an alloy are arranged in laminæ, and that the current flows across the laminæ.

"According to the discovery of Peltier, when an electric current flows from one metal to another there is a development or absorption of heat at the junction. The temperature disturbance thus arising increases until the conduction of heat through the laminæ balances the Peltier effect at the junctions, and it gives rise to a thermo-electromotive force opposing the passage of the current. Inasmuch as the difference of temperature at the alternate junctions is itself proportional to the current, so is also the reverse electromotive force thereby called into play. Now a reverse electromotive force proportional to current is indistinguishable experimentally from a *resistance;* so that the combination of laminated conductors exhibits a false resistance, having (so far as is known) nothing in common with the real resistance of the metals."

The structure of eutectic alloys seems to have a special bearing on this question, and seems to afford strong support to the view suggested by Lord Rayleigh. Guthrie pointed out in 1884 that the particular alloy of two metals possessing the lowest freezing point of any alloy of the two that can be made, and which he called the eutectic, is analogous to a cryohydrate, the cryohydrates being regarded as eutectics of ice and the particular salts employed.

FIG. 1.—Silver-lead eutectic, × 100. Oblique illumination.

As Prof. Roberts-Austen in his valuable Cantor Lectures on Alloys (delivered March–April 1897) has pointed out, the analogy between cryohydrates, eutectic alloys and the pearlite of steels is now completely established. The elaborate microscopical investigations of steel and of eutectic alloys made by Osmond, Charpy, Stead and others, together with the work of Ponsot on the cryohydrates, reveal the presence in each case of two different constituents arranged in microscopic laminæ. In the case of the cryohydrates the two constituents are ice and the salt, in eutectic alloys they are the constituent metals, and in the pearlite of steels they consist of alternate layers of pure iron and iron carbide.

In connection with an investigation of the micro-structure of silver-lead alloys the writer has had occasion to examine the eutectic of these two metals, an alloy containing about 2·8 per cent. of silver, and the accompanying photographs of this convey an excellent idea of the structure of eutectic alloys in general.

Fig. 1 shows the appearance presented by a polished surface of a section of this alloy after etching for several hours with acetic acid at the ordinary temperature. The lead has partially dissolved, exposing the silver in bright plates, the edges of which, a good deal bent over and distorted by the action of the stream of wash water, are presented to the observer. A section cut at right angles to the one figured, which is cut parallel to the cooling surface, presents a similar appearance.

By acting on a portion of this alloy with the vapour of hot acetic acid for several weeks the lead was wholly dissolved, and the bright plates were separated and examined. They proved to be pure silver. They are translucent, the light transmitted through them being violet or greyish violet. Some of these plates were mounted in balsam, and Fig. 2 is reproduced from a photograph of one such preparation taken with a $\frac{1}{12}$" oil immersion objective. Measurements of a number of plates which happened to be lying on edge showed that their thickness was less than $\frac{1}{6000}$ of an inch, but accurate measurements in this way are not possible owing to the "black and white dot" effect well known to microscopists.

As will be seen from the figure, the plates exhibit distinct cleavage at angles of 60° or 120° to their longer axes. Some of them are seen to be crossed by a series of faint markings at these angles, markings bearing a very curious resemblance to those obtained by Commander Hartmann by subjecting metallic plates to compressional or torsional strain (Hartmann: "Distribution des déformations dans les métaux soumis a des efforts," Figs. 21 and 173, pp. 25 and 175). It is difficult to avoid the conclusion that they have a similar origin, the strain in this case being probably due to the shrinkage of the alloy on solidification or on subsequent cooling. A distinct folding or crumpling of the plate can be seen in the photograph, showing that in spite of their pronounced directions of cleavage the plates are not excessively brittle.

The bearing of this structure of an alloy on Lord Rayleigh's remarks will be readily understood. The greater number of alloys which have been subjected to tests of their electrical resistance are *partially* made up of the eutectic of their constituents, the remainder of the alloy consisting of one of the two metals or of a compound of the two. It is not conceivable that the work done in rolling and wire-drawing, though it may cause some splitting up of the plates in the eutectic, should entirely destroy this laminated structure; and its existence would almost certainly give rise to the thermo-electric effects which may be the cause of the abnormal resistance of many alloys compared with that of the metals of which they are composed.

SAVILLE SHAW.

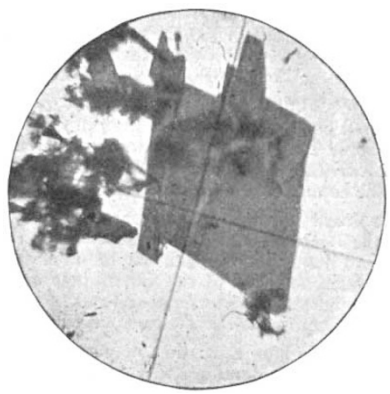

FIG. 2.—Eutectic silver plate, ×

THE BOARD OF EDUCATION BILL.

THE following are the clauses of the Bill introduced by the Duke of Devonshire in the House of Lords last week, and having for its object the establishment of a Board of Education for England and Wales.

I.—(1) There shall be established a Board of Education charged with the superintendence of matters relating to education in England and Wales.

(2) The Board shall consist of the Lord President of the Council, Her Majesty's Principal Secretaries of State, the First Commissioner of Her Majesty's Treasury, the Chancellor of Her Majesty's Exchequer, and one other person appointed by Her Majesty the Queen and holding office during Her Majesty's pleasure, and it shall be lawful for Her Majesty to appoint a