In the letter signed "O. S." last week (p. 525), under the heading "Remarkable Sunsets," the French term should be *pelure d'oignon* and not *velure*.

The additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus* ♂) from India, presented by Mrs. F. Mortimer; two Secretary Vultures (*Serpentarius reptilivorus*) from South Africa, presented by the Rev. G. H. R. Fisk, C.M.Z.S.; a Blue-and-Yellow Macaw (*Ara ararauna*) from South America, presented by Mr. H. W. Kingdom; two Common Peafowls (*Pavo cristatus* ♂ ♀) from India, presented by Mr. R. F. J. Cobbett Allen; a Common Viper (*Vipera berus*, black variety) from Hampshire, presented by Lord Londesborough, F.Z.S.; a Yaguarundi Cat (*Felis yaguarundi*) from South America, a Leuhdorf's Deer (*Cervus leuhdorfi* ♂) from Amoorland, two Jardine's Parrots (*Pæocephalus gulielmi*) from West Africa, three Rhinoceros Hornbills (*Buceros rhinoceros* ♂ ♀ ♀) from the Malay Peninsula, two Nepal Hornbills (*Aceros nepalensis* ♂ ♂), a Green Cochoa (*Cochoa viridis*), two Nepal Tree Pies (*Dendrocitta nepalensis*), a Gray-headed Thrush (*Turdus castanea*) from Nepal, three Bronze Fruit Pigeons (*Carpophaga ænea*), two White-breasted Gallinules (*Gallinula phœnicura*) from India, two White-backed Pigeons (*Columba leuconota*) from the Himalayas, seven Waxwings (*Ampelis garrulus*), two Proteus (*Proteus anguinus*), European, purchased; a Lucian's Parrakeet (*Palæornis luciani*) from China, a Geoffroy's Dove (*Peristera geoffroii* ♂) from Brazil, received in exchange.

OUR ASTRONOMICAL COLUMN

Comet 1884 *a*.—The comet notified by telegram from Mr. Ellery as having been discovered in the constellation Grus, appears to have been detected by Mr. Ross, a young amateur astronomer residing at Elsterwick, near Melbourne, on January 7. Observations were commenced at Melbourne on January 12, and were continued to February 4, when the comet had become very faint. The positions, as first communicated to the *Astronomische Nachrichten*, contained more than one obvious error, and generally (according to a comparison made by Dr. Kreutz with an orbit since received from Melbourne) appear to be strangely inaccurate, a circumstance that will probably have caused useless expenditure of time to computers. We subjoin the Melbourne orbit with one calculated by Mr. Hind from the observations on January 12 and 28 and February 4, as they are printed in *Astron. Nach.*, No. 2579:—

	Melbourne		Hind
Perihelion passage, 1883, Dec. 25·7838 Melb.M.T. ... Dec. 25·4998 G.M.T.			
	° ′ ″		° ′
Longitude of perihelion	125 15 55	...	124 14·4
,, ,, ascending node	265 12 15	...	265 56·5
Inclination	64 53 16	...	64 59·7
Log. perihelion distance... ...	9·502384	...	9·51838
Motion—Retrograde.			

It is to be remarked that Dr. Kreutz, calculating from the Melbourne orbit, does not reproduce the extreme positions stated to have been employed in its computation.

Variable Stars.—On comparing the late Prof. Julius Schmidt's determinations of the times of minima of *Algol* in 1883 with the formula given by Prof. Schönfeld in his second catalogue of variable stars, it will be found that, by a mean of the observations between August 14 and December 4, the formula gives the minimum too late by fifty-eight minutes. The mean annual errors for the period 1876–83 have shown irregularity, but the separate results within the same year differ considerably.

Mr. Baxendell has worked out new elements for R Arietis from his own observations 1859–81. He finds for—

		Days
Maximum ...	Epoch 1866, Sept. 1·3 +	186·71 E.
Minimum ...	Epoch 1870, Jan. 2·3 +	186·63 E.

The mean interval from maximum to minimum is 99·0 days, and from minimum to maximum 87·7 days.

The Observatory, Cincinnati.—The seventh part of the publications of this Observatory has appeared. Parts 4, 5, and 6 were devoted by Mr. Ormond Stone to the double-star measures made with the 11-inch refractor in the years 1877–80. In the new part are given the observations of comets in the years 1880–82, including numerous physical observations as well as observations for position. There is a comparison with theory of the phenomena in the tail of the great comet of 1882. In a number of plates are illustrated the telescopic and naked-eye appearance of the great comets of 1881 and 1882 and of the first comet of the latter year.

Mr. H. C. Wilson is in temporary charge of the Cincinnati Observatory, Mr. Ormond Stone having been appointed Professor of Astronomy in the University of Virginia, and Director of the Leander McCormick Observatory.

The "Astronomische Gesellschaft."—The fourth part of the eighteenth volume of the *Transactions* of this Society is issued. It contains the proceedings at the meeting held in Vienna in September last and the usual critical notices of recent astronomical publications; also reports on the progress of the zone-observations from thirteen observatories. It was decided to hold the next meeting at Geneva in 1885; Prof. Auwers was chosen president for the second time, with Prof. Gyldén as vice-president, and Profs. Schönfeld and Seeliger (now at Munich) as secretaries.

PHYSICAL NOTES

The transition-resistance supposed by Poggendorff to exist in electrolytic cells between the surface of the electrode and that of the electrolyte in contact with it has lately been investigated with great care by Prof. J. Gordon Macgregor in solutions of very pure zinc sulphate, using electrodes of amalgamated zinc. The conclusion arrived at was that such a transition-resistance, if it exists at all, is less than 0·0125 of an ohm.

In another paper which appears in the *Transactions of the Royal Society of Canada* Prof. Macgregor describes an ingenious arrangement devised by him for measuring on Wheatstone's bridge the resistances of electrolytes. He employs alternate currents produced by a rotating commutator inserted in the circuit of two Daniell's cells; and in order to use with this arrangement an ordinary mirror-galvanometer, he recommutes the currents in the galvanometer circuit by means of a second commutator rotating on the same axle as the first.

The annual *conversazioni* of the Société de Physique, of Paris, will be held this year on April 15 and 17 respectively, the former being limited strictly to the members of the Society. These meetings will, by the invitation of Admiral Mouchez, be held in the Observatoire.

A note on Hall's effect was recently read at a meeting of the Physical Society of London by Prof. S. P. Thompson and Mr. C. C. Starling. They find that when a large sheet of foil is used, and placed symmetrically in a concentrated field between pointed magnetic poles, so that the junctions and connections are quite outside the influence of the field, Hall's effect is not produced. They find, however, an alteration in the equipotential lines of the current in the strip where it is magnetised, and have traced this effect to a change in the resistance. Strips of gold and tin show a decrease, strips of iron a slight increase of resistance when subjected to a strong magnetic field.

Another paper on Hall's effect appears in the current number of the *Journal de Physique* from the pen of M. Leduc. In this article M. Leduc draws a diagram of the equipotential lines, as, according to his ideas, they will be found to lie between the two "parasitical" electrodes. It does not appear whether he has verified his views by actual determinations of the position of the lines of equal potential.

Rowland's famous experiment demonstrating the magnetic action of electric convection has been called in question by Dr. E. Lecher of Vienna. In Rowland's original experiment the electrified rotating disk was horizontal, and the magnetic needle, protected from electrostatic influences by being inclosed in a metallic case, was held over the disk at a point near the circumference. Dr. Lecher, in attempting to repeat the experiment, placed the rotating disk in a vertical plane, its axis being horizontal; the magnet needle was placed parallel to the plane of the disk and in the axis of its rotation in fact relatively as the coil and needle of a Gaugain galvanometer. Disks of brass and of *papier-maché* covered with graphite were used, and charged

from a Holtz machine to potentials of about 5000 volts as measured on an absolute electrometer. The velocity of rotation was about 200 revolutions per second. The astatised needle was protected within a metal case, and was observed in the usual way by a mirror. No deflection was observed either when the disk was still or when it rotated. Dr. Lecher intends to repeat Rowland's experiment with the original horizontal disposition of the disk.

DR. LECHER has also made another experiment of great interest. A ray of light was divided, as in many experiments on interference, into two parts, which, after passing through two parallel glass troughs, were caused to reunite, giving the usual interference-bands. The troughs contained strong solutions of nitrate of silver. By means of electrodes of silver an electric current of 6 amperes strength was carried in opposite directions along the troughs so that in one trough the current flowed *with* the light, and in the other against it. But in no case was any displacement of the fringes observed. Dr. Lecher concludes that the velocity of light is not influenced by a current flowing through the medium.

DR. LECHER has made a third and still more interesting experiment, attended, however, like the preceding, with a negative result. This was an attempt to prove whether Faraday's famous experiment of rotating the plane of polarisation by an electric current could be inverted. He has attempted to generate currents by rotating the plane of polarisation of light. The arrangement was as follows :—A ray of plane-polarised light was sent through the interior of two powerful helices of wire situated at some distance from one another. Through the first of these a powerful alternate current was sent, which impressed upon the ray a rapid oscillation of its plane of polarisation. The second helix was connected to a sensitive receiving telephone in the hope that sounds might therein be heard, as would be the case if the rapid rotations in the plane of polarisation of the ray were capable of setting up currents in the surrounding wire. Absolutely nothing was, however, heard.

BACTERIA

A VERY distinguished audience assembled at the Parkes Museum on Thursday evening, March 27, to witness Mr. Watson Cheyne's demonstration of pathogenic micro-organisms. The chair was taken by Sir Joseph Lister, Bart. After stating that the great group commonly called Bacteria might most conveniently be subdivided into four classes—(1) Micrococci (round bodies), (2) Bacteria (small oval or rod-shaped bodies), (3) Bacilli (large rod-shaped bodies), and (4) Spirochætæ and Spirilla (rods spirally twisted), and dwelling on the great variety as well as importance of the various parts played by this great group in the economy of nature, Mr. Watson Cheyne demonstrated numerous micro-photographs taken by Dr. Robert Koch, as well as some drawings by means of a limelight apparatus. He observed that great differences existed among the various bacteria in their behaviour towards the human body : some could be injected without causing any injury, others could not grow in the living body, but could develop in dead portions of tissue and the secretions of wounds, giving rise to poisonous products. The true pathogenic organisms were able to attack the living body and multiply in it; they included the organisms which found entrance through some wound, giving rise to the traumatic infective diseases, and others which could obtain entrance without observable wound. Further, certain organisms, such as the *B. anthracis*, were capable of growing outside the body in dead organic substance, while others, such as the *B. tuberculosis*, were apparently only capable of development in the living organism or under artificial conditions which reproduced to some degree those existing in the tissues of warm-blooded animals, though capable of long retaining their vitality in the dry state. With regard to the traumatic infective diseases, he thought that the most absolute proof had been furnished that the bacteria found in them, and nothing else, were the causes of these diseases. To establish such a proposition it was necessary that an organism of a definite form and with definite characteristics should always be found in the blood or in the affected part. The blood or the affected part when inoculated into another animal of the same species must produce the same disease. When the blood or the affected part was inoculated on a suitable soil outside the body, the micro-organisms grew, and must be indefinitely propagated on similar soil. When in this manner the organisms had been separated from the remains of the materials in which they were embedded, their inoculation in an animal must produce again the same disease, the same organisms being found in the diseased parts. These conditions had now been fulfilled with regard to anthrax, septicæmia of the mouse, erysipelas, tuberculosis, glanders, and acute pneumonia. With regard to typhoid fever, relapsing fever, cholera, and ague, the evidence was very strong, but not conclusive. Mr. Watson Cheyne concluded by dwelling on the importance of surrounding circumstances, chiefly those summed up in the phrase unhygienic conditions, as concomitant causes of disease by preparing the blood for the attacks of these micro-organisms.

The chairman, Sir Joseph Lister, dwelt upon the important fact that the organisms which produced particular diseases were only able to develop under very special conditions, instancing the bacillus which caused septicæmia in the house mouse, but which was unable to produce any deleterious effect on the field mouse. He thought this fact, which showed that the very slight difference in the blood of these two animals was sufficient to alter the conditions favourable to the development of the bacteria, might prove of very great interest, as it was possible to conceive that by the administration of some medicines, sufficient alteration might be produced in the blood of the human system to kill off or to prevent the development of any special bacteria on the first appearance of the symptoms of the disease in the patient. Sir Joseph Lister concluded by referring at some length to the importance of Pasteur's researches on modified virus.

Prof. Humphry paid an eloquent tribute to the great work which Sir Joseph Lister had already achieved, and looked forward with a large hope to the future of medicine.

THE STABILITY OF SHIPS

PROFESSOR ELGAR has recently made two important contributions to this important question; the first was read before the Royal Society on March 13 last. The main object of the paper was to exhibit the manner in which the stability of a ship varies with changes of load and draught of water such as merchant steamers are liable to. None of the properties possessed by a ship is more vital to her safety and efficiency than that of stability. At the same time none is dependent for its existence and amount upon so many or such diverse and variable circumstances as it. The stability of a ship, both as regards moment and range, is affected not only by the position of her centre of gravity, which largely depends upon stowage, but also by draught of water. If the centre of gravity be kept fixed in position at various draughts of water, the stability will still vary very considerably with the draught, and often in a manner that contains elements of danger.

The usual practice in investigating a ship's stability is to calculate a curve of metacentres, and one or more curves of stability at certain fixed draughts of water and with given positions of centre of gravity. The curve of metacentres gives the height at all draughts of water above which the centre of gravity cannot be raised without making the ship unstable when upright, and causing her to lie over more or less to one side. The ordinates of the curve of stability represent the lengths of the righting arms, which, multiplied by the weight of the ship, give the righting moments at all angles of inclination from the upright. The stability of numerous vessels, both of the Royal Navy and mercantile marine, have been investigated in this manner for certain draughts of water, and a great amount of information obtained respecting the variation of stability with inclination at such draughts, and the angle at which the stability vanishes in many classes of ships. The peculiar dangers attaching to low freeboard, especially when associated with a high centre of gravity, have been fully discussed and made known.

Curves of stability have been chiefly constructed for deep and moderate draughts; the character of the stability which is often to be found associated with very light draught, appears to have hitherto escaped attention. As a matter of fact, light draught is often as unfavourable to stability as low freeboard, and in some cases more so. The general opinions that have till recently prevailed upon the subject appear to have been based upon a vague impression that so long as a vessel has a high side out of water, and any metacentric height, she will have great righting moments at large angles of inclination and a large range of stability. It was shown at the *Daphne* inquiry, held by Sir E. J. Reed in