slight decline of 10° or 15°. The shape of the wings is not flat but slightly curved. The experiments recorded in his book, "Der Vogelflug," show that the curved form has decided advantages both as regards the amount and the direction of the resistance. The wing surface is 15 square metres. It is not safe to take a larger surface before having learnt to manage a smaller one. He takes a sharp run of four or five steps against the wind, jumps into the air, and slides down over a distance of about 250 metres. By shifting his centre of gravity relatively

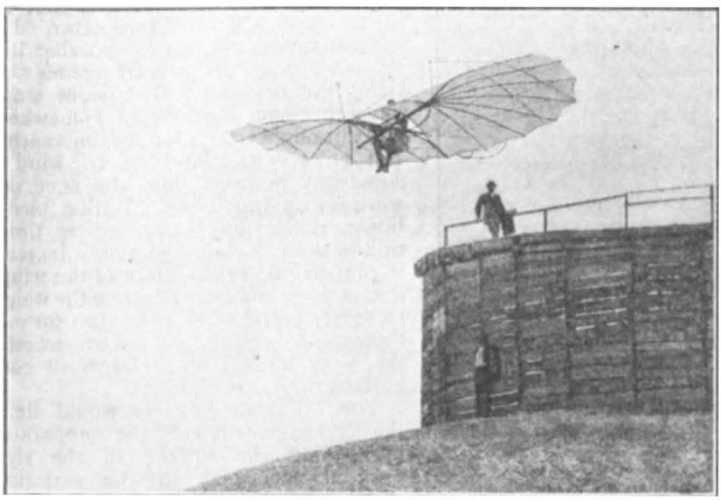

FIG. 3.

to the centre of resistance he can give the wing surface any inclination, and thereby can, to a certain extent, either slide down quicker, or slacken the movement, or alter the direction. If the wind is not too strong, and the surface of the apparatus not too large, I think there is very little danger in this kind of practice. If it is taken up by a great many people, improvements of the apparatus are sure to follow, and the art of keeping one's balance in the air will be developed. Perhaps this is the road to flying. At any rate it must be fine sport.

C. RUNGE.

NOTES.

THE funeral of the late Prof. Tyndall took place on Saturday, in the parish churchyard at Haslemere. It was the desire of Mrs. Tyndall that the assemblage upon that sad occasion should not be large, so the mourners were chiefly Tyndall's close friends. Among them were the following men of science:—Prof. Huxley, Sir Joseph Hooker, Sir James Crichton Browne, Lord Rayleigh (representing the Royal Institution), Sir John Lubbock, Prof. Michael Foster (representing the Royal Society), Prof. Rücker (representing the Royal College of Science), Prof. Williamson, the Hon. Rollo Russell, Mr. Alex Siemens (representing Sir William Siemens), Dr. Buzzard, and Dr. Atkinson. These mourners are eminent in many different branches of science; and it is hardly too much to say that their presence not only marked the regard in which Tyndall is held in our best scientific institutions, but also testified to the grief of all students of natural knowledge at the loss of one of the pioneers of the scientific movement in England.

A SPECIAL general meeting of the members of the Royal Institution will be held on Friday, December 15, to pass a vote of sympathy and condolence with Mrs. Tyndall on the occasion of the death of Dr. Tyndall, who was Honorary Professor of Philosophy of that Institution.

THE death is announced at Paris of the biologist Dr. Chabry, known for his work in experimental teratology.

THE Muséum d'Histoire Naturelle lost its able conchologist, M. Paul Fischer, on the 29th ult. He was born at Paris in 1835, and entered the palæontological laboratory of the Museum in 1861, remaining there until his death. The list of his contributions to the literature of science contains no less than three hundred titles, among which may be mentioned his "Histoire des Mollusques du Mexique," and the "Manuel di Conchyliologie," written in collaboration with M. Crosse.

THE friends of Dr. Julius Hann, of Vienna, will be glad to learn that he has received from the Emperor the rare decoration for science and art (*Ehrenzeichen für Wissenschaft und Kunst*). This corresponds to the Order Pour le Mérite in Prussia, but is bestowed very charily, the total number of holders of it being only about a dozen. The actual decoration received by Dr. Hann had been set free by the death of Prof. J. Stefan, the physicist.

PROF. RIGGENBACH has been elected a Correspondent of the Paris Academy, in the place of the late Dr. Colladon.

DR. J. RUSSELL REYNOLDS, F.R.S., has been elected President of the Royal College of Physicians, in the place of the late Sir Andrew Clark.

THE eleventh International Medical Congress will be held in Rome, from March 29 to April 5, 1894.

A REUTER'S telegram from Berne announces that the Federal Council has decided to introduce the time of Central Europe into the Swiss postal telegraph, railway, and steamship services on June 1, 1894.

A PRIZE of 3000 liras is offered by the R. Istituto Veneto di scienze lettere ed arti, for the most important innovation in Venetian pisciculture. The research for which the prize will be awarded may relate to the artificial hatching of the eggs of any important species of marine fish, the introduction of new species, improvements in methods of ostriculture, or the production of better kinds of fish.

FOR some time negotiations have been in progress for the purchase of the Little Barrier Island, with a view to setting it apart as a home for New Zealand fauna. We are glad to learn that the island has now been obtained from its owner, and that there is nothing to prevent the scheme being carried into effect.

THE *Kew Bulletin* (Appendix i. 1894) contains a list of seeds of hardy herbaceous plants and of trees and shrubs available for exchange with colonial, Indian, and foreign Botanic Gardens, as well as with regular correspondents of Kew. No application for seeds can be entertained after the end of next March, except from remote colonial possessions.

THE Director of the Botanic Garden of Rio de Janeiro has prepared and issued a list of plants cultivated there, and offered in exchange. A descriptive catalogue will shortly be published containing a description of each separate species in the Garden.

THE weather during the past week has been very unsettled over the whole of the British Isles, owing to the approach of several large depressions from the Atlantic. On the 6th a large disturbance passed eastwards to the north of Scotland, causing south-westerly gales in the north and west, and during the night of Thursday, the 7th, another deep depression advanced from the south-westward, attended by serious gales in all parts, but of great severity in Scotland and in Scandinavia. The barometer at Stornoway fell to the exceptionally low reading of 27·97 inches during the afternoon of the 8th, giving a difference in the pressure of nearly an inch and a half between the extreme north and south of our islands. Further disturbances arrived from the westward both on Sunday and Tuesday, again causing gales from the south-east and south. The storm on the latter day was chiefly restricted to the southern parts of England and the northern parts of France, and has not been exceeded in violence by any that has visited our southern counties this season. Several places reported force 11 of the Beaufort wind scale. Much rainfall and some sleet accompanied these various disturbances; in the north of Scotland 1·2 inch of rain was measured on the morning of the 9th, and the Meteorological Office Reports for the week ended the 9th inst. show that in that district the rainfall greatly exceeded the average, the total amount being 2·6 inches, while in most of the English districts the fall was less than the average.

IT is now known that the earthquake which affected Tashkend on November 5, was also felt in other parts of Russian Turkestan. At Samarkand it was felt one minute later than at Tashkend—that is, at 8h. 23½m. a.m., and pretty strong oscillations of the soil lasted for about 1½ minutes. Crockery was shattered, and the water in the ponds and irrigation canals was set in motion. At Marghelan the strongest shock took place at 9h. 35m., and lasted for about five seconds; it was followed by a feebler one about three minutes later.

ON November 5, the magnetic instruments at Potsdam were disturbed in a manner which showed that a distinct earthquake had reached the observatory. The supposition that such a cause produced the movements of the needles was afterwards confirmed by the record of the seismometer of the geological laboratory of the Faculty of Sciences at Grenoble. From the magnetic curves at Potsdam it appears that the wave reached the observatory at 5h. 4m. 50s. a.m. (Potsdam mean time), and produced the greatest effect at 5h. 8m. 55s., a vibration also being recorded at 5h. 7m. 15s.. According to *Comptes Rendus* of November 6, the shock was first felt at Grenoble at 4h. 50m. 35s. (Potsdam time), hence the time taken to travel a distance of about 956 kilometres was 8m. 15s. The rate at which the wave was propagated was therefore about 1·94 kilometre per second. It is estimated that the time can be read off from the magnetograph curves with an accuracy of ten seconds.

A FEW months ago the President of the Alpine Club invited the co-operation of the Government of India in obtaining a record of observations on the movements of glaciers in the Himalayan Range, to supplement a similar record maintained of the movements of glaciers in Europe. Believing that such a record would prove of importance to geological and meteorological science, the Government have communicated with officials and others who are stationed in or near the snows, or who may visit from time to time the glacial regions of the Himalayas. Copies of the Alpine Club's memorandum of instruction in glacier observation have been forwarded to the Foreign and Military Departments of the Government of India, the Governments of the Punjab, North-Western Provinces, and Oudh and Bengal, the Meteorological Reporter, and the Director of the Geological Survey, for distribution to such officers as may be in a position to supply the requisite information. The energetic action of the Indian Government in the matter deserves high praise, and it will doubtless result in some interesting data being obtained.

A COPY of the splendid volume published in honour of M. Pasteur's jubilee has been sent to us. It opens with a brief account of the formation of the memorial committee; this is followed by a reprint of the address delivered by M. C. Dupuy at the jubilee celebration, and of the numerous addresses and telegrams received from all parts of the world. The volume also includes five beautiful plates, three of which represent medals struck in M. Pasteur's honour, one the investigator himself in his laboratory, and one is a fac-simile of the address presented by the Stockholm School of Medicine. This testimony of the esteem in which Pasteur is held brings to our mind the words, "Wisdom raineth down skill and knowledge of understanding, and exalteth them to honour that hold her fast."

AT the Adelaide meeting of the Australasian Association for the Advancement of Science, a lecture was given by Mr. C. W. de Vis, on the "Diprotodon and its Times." Popular interest has lately been aroused in this subject owing to an important discovery of fossil marsupial bones at Lake Mulligan. Mr. de Vis pointed out the mistake of the current idea that the Diprotodon was a gigantic kangaroo, any great resemblance between the two being confined to the teeth. In general build, Diprotodon was more like a wombat, but the bones of the thigh were even longer in proportion to those of the lower leg than is the case in the wombat, hence it might be concluded that the Diprotodon was less capable of rapid motion than the wombat. The spongy texture of the bones of the skeleton indicates that it frequented lakes and marshes. There were two species of Diprotodon found in Central Australia—*D. australis*, Owen (circa 6 feet high and 10 feet long), and *D. minor*, Huxley (circa 5 feet high and 8 feet long). The arid central plains of the present had been occupied in Diprotodon times by vast extents of luxuriant forest and richly vegetated districts, well-watered by wide rivers. The marsupials were even then the dominant type of life in Australia; lizards were also numerous, and some were of unusually large proportions, *e.g.* Megalania, an extinct "guana," 18 to 20 feet in length. Extinct forms of alligators and turtles infested the waters, and amongst the fishes was the still existing Ceratodus. The remains of a varied bird fauna have been well preserved in the same deposits. This fauna included some ancestral forms connecting, on the one hand, the wingless birds of New Zealand with the Australian emus, and, on the other hand, the Australian birds with the New Zealand Apteryx. Mr. de Vis was inclined to attribute the disappearance of so many of these ancient forms of life from Australia quite as much to senile decay as to altered climatic influences.

THE slow ascensional movement of Scandinavia, evidenced by the displacement of tide marks, the peculiarities of Scandinavian lake fauna, and other geographical and geological phenomena, is subjected to mathematical investigation by M. A. Badonrean, who, in the *Comptes Rendus* of last week, treats the subject from the point of view of thermal expansion. At the time of the last glacial epoch, the Scandinavian ice-sheet covered the greater portion of the peninsula, as well as Finland and the Baltic, the area of this sheet being about 1500 km. in diameter. Where the soil touched and partly liquefied the mass of ice, its temperature must have been 0° C. At the present time, the mean temperature of the soil over the area of the ancient ice-sheet is 3° C. Taking the coefficient of expansion of the rocks as eight-millionths, the elevation of the centre of the ice-cap is calculated at 229 m., and the isoanabatics, or lines of equal

elevation, should be parallel to the contour. De Geer's map of these isoanabatics, traced in 1890, satisfies these conditions, allowance being made for the want of homogeneity in the rocky mass, and the want of fixity of its borders.

AN interesting account of a fine series of glacial potholes on Cooper's Island, Little Harbour, Cohasset, U.S., is given by Mr. William O. Crosby, in a paper on the "Geology of the Boston Basin" (Occasional Papers of the Boston Society of Natural History, IV.). It is shown that the potholes were formed by *moulins*, or glacier mills, and Mr. Crosby discusses a question raised in these columns a short time ago, viz. why, as the ice-sheet moves continuously forward, carrying the crevasses and *moulins* with it, the potholes escape elongation in the direction of the movement? The true explanation of many glacial potholes is found in the fact, that a crevasse closes as it is carried forward by the general movement of the ice, a new one subsequently being formed just where in relation to the land at the margin of the glacier the former one existed. This explanation, however, is not applicable to the Cohasset potholes, and in place of it Mr. Crosby makes the suggestion that a *moulin* may remain approximately stationary, while the ice moves on, through the backward erosion and melting of its up-stream side; and that when a pothole is formed at the bottom of a *moulin*, it is not the direct impact of the water upon the face of the ledge that does the work, nor do the stones carried down by the water wear the ledges appreciably by their direct fall, but the pothole is due to their subsequent movement, and especially their rotation, by the water. This rotation implies an antecedent depression or hollow to hold the stones, and thus the conditions are seen to be essentially the same as for ordinary river potholes. Since the rotation of stones in a pre-existing hollow appears to be an essential condition of glacial as of other potholes, and the *moulin* simply supplies the power, it would seem to make little or no difference whether the water plunges into the up-stream side, the middle, or the down-stream side of the hollow. The pothole is made where the hollow exists, and during the progress of a *moulin* across the hollow, there would not, apparently, be any marked tendency to elongate it. In the case of a linear group of potholes on the ice-slope of a ledge, concludes Mr. Crosby, it is reasonable to suppose that the upper one, which on Cooper's Island is always the smallest and most indefinite, marks the shifting position of the *moulin*, and that the others were formed by the subglacial flow of water from the bottom of the *moulin*.

IT has been supposed, says Mr. A. J. Jukes-Browne, in the *Geological Magazine* for December, that the total amounts of silica existing in the chalk with flints and the chalk without flints respectively, are very nearly equal; and this supposition favours the theory that flints have been formed by some process of segregation after the consolidation of the chalk containing them. It is generally conceded that the silica from which such flints were made was a soluble form like that of sponge spicules, diatoms, or radiolaria; hence by chemical analyses, aided by microscopical discrimination between crystalline and colloid siliceous particles, it is possible to determine whether flintless chalk always contains soluble silica, and whether chalk with flints contains little or none. Mr. Jukes-Browne has made this investigation, and he finds that there is no definite relation between the occurrence of flints and the absence or presence of soluble silica in the surrounding chalk. He thinks that chalk which is now destitute of any remains of siliceous spicules, has, since it became chalk, always been destitute of such spicules. These conclusions have a very important bearing upon the question of the formation of flints.

IN a recent number of the *Comptes Rendus*, M. A. Delebecque gives the results of some observations made last summer on water from various depths in inland lakes, which show that the amount of solid matter in solution increases with the depth. Thus in the lakes quoted below the amount of dissolved solid matter in grammes per litre was:—Annecy, surface 0·138, bottom (65 metres) 0·157; Aiguebelette, surface 0·114, bottom (71 metres) 0·1605; Nantua, surface 0·154, bottom (43 metres) 0·190; Saint-Point, surface 0·152, bottom (40 metres) 0·182; Remoray, surface 0·1605, bottom (27 metres) 0·205; Crozet, surface 0·0275, bottom (37 metres) 0·0368. The water samples were collected about 3 metres above the bottom, by means of Dr. H. R. Mill's water-bottle. M. Delebecque agrees with Dr. Duparc, of Geneva, that the small amount of dissolved matter in the surface water is due to its removal by the calcareous organisms which swarm in the upper layers.

THE *Philosophical Magazine* for December contains a paper, by Sidney J. Lochner, on the elongation produced in soft iron by magnetisation. The author undertook the investiga ion of this subject in order, if possible, to settle whether the experiments of Bidwell or Berget represented what really happens. In order to measure the elongation, what was essentially a Michelson's interferential refractometer was made use of, which was capable of measuring an elongation of a millionth of an inch. The bar of iron, whose elongation was to be measured, was placed inside a long magnetising coil, and carried at one end one of the mirrors of the refractometer. The expansion due to the heating effect of the coil being slow, while that due to magnetisation was rapid, the two could be distinguished. The author finds that, for a given magnetising field, different elongations are produced according to the manner in which the magnetising current is applied. Thus different elongations were produced in the cases where the current had been turned on suddenly, or had been applied gradually; and in the latter case it made a difference whether the current had reached its final value by increasing slowly, or by decreasing slowly from a higher value. Another peculiarity observed was that if the current be gradually increased from zero, at a certain point a maximum expansion is reached; after this a further increase of the current will produce a decrease in the elongation; if, however, instead of increasing the current when the maximum is reached, it is gradually decreased, it is possible to obtain a still greater elongation. The observations show that the expansion is a function of the ratio between the diameter and length of the bar, and that the elongation varies approximately directly as the square root of this ratio; also, the expansion varies directly as the permeability. The amount of current required to produce the maximum expansion also depends on the ratio between the diameter and length.

THE bacterial efficiency of porous cylinders in the filtration of water for domestic purposes is the subject of considerable discussion just now. Kirchner (*Zeitschrift f. Hygiene*, vol. xiv. p. 307) found in his experiments with water purposely infected with typhoid bacilli, that such filters were incapable of arresting these organisms. Large quantities of typhoid infected broth were added to the water before filtration, and the filtrate after 48 hours was found to contain very large numbers of typhoid bacilli. Dr. Schöfer, in a recent number of the *Centralblatt f. Bakteriologie*, vol. xiv. p. 685, gives the results of his investigations of porous cylinders as regards their retention of typhoid bacilli. In these experiments as small a quantity as possible of nutritive material was added with the typhoid organisms to the water, (previously sterilised), and even after 24 days the filtrate was found to be perfectly sterile, although the unfiltered water was freshly infected with typhoid bacilli no less than twelve times during the investigation. Very different results were,

however, obtained when broth was purposely added to the unfiltered water, an addition of as little as 5 c.c. to 600 c.c. of water so stimulating the growth of the typhoid organisms, that two days later they appeared in the filtrate; the numbers present, however, gradually decreased, but on again adding 5 c.c. of broth they rose on the following day from 9 to 6,139 per c.c. This large increase was due to the rapid multiplication of the few isolated bacilli still remaining in the pores of the filter in consequence of the supply of food material to the water in the shape of broth, for no fresh infection with typhoid organisms had taken place. Dr. Schöfer is of opinion that typhoid bacilli as present in water, under ordinary circumstances, are not supplied with the requisite conditions for their growth and multiplication, and are, therefore, incapable of growing through these porous filters, and so reaching the filtrate; but these conditions are, however, undoubtedly furnished when a sufficient supply of food material is contained in or added to the water, under which circumstances the cylinders are unable to retain them. These experiments not only explain the unsatisfactory results obtained by Kirchner, but indicate what precautions should be taken in the bacteriological investigation of such filters.

THE last two parts of the well-known "Notes from the Leyden Museum," forming parts 3 and 4 of vol. xv., were published in July and October. They contain numerous papers describing new or rare species of mammals, birds, reptiles, &c., added to the museum. Among the articles we notice one which is by F. E. Blaaum, the Secretary of the Zoological Society of Amsterdam, on a comparative list of the birds of Holland and England. Holland, although so much smaller than the United Kingdom, is the regular abode, at different seasons, of 221 species of birds, whilst the British Islands can only boast of 211. Dr. R. Horst continues his descriptions of earth-worms, giving a list of species found, for the most part by Dr. H. ten Kate, during his journey in the Malay Archipelago in 1891. A large number of the species belong to the genus Perichæta, of which no less than seven species are described as new, bringing the number of the species of this genus already found in the Malay Archipelago to thirty-three. The following note, by Dr. Jentink, will be interesting to others besides book collectors. In the Proceedings of the Zoological Society of London for 1880 (p. 489), Mr. F. H. Waterhouse gives the dates of the publication of the parts of Sir Andrew Smith's "Illustrations of the Zoology of South Africa," and states that as the copy he examined "did not contain plates 18 and 38 (Mammalia), he had examined three or four other copies, and as neither of these plates are to be found in any of these, he presumed they do not exist." Now, in the copy in the Leyden Museum's library, plate 38 is present, but plates 18 and 37 are wanting, and at the bottom of the page containing an index of the Mammalia, there is the following: "Plates 18 and 37 *not* published." Librarians will call to mind how often the collating of this fine work has perplexed them.

THE Royal Meteorological Institute of the Netherlands has recently issued its *Jaarboek* and *Onweders in Nederland* for the year 1892. The first work has been regularly published for forty-four years, and now contains hourly observations taken at four stations, in addition to those taken at specified hours at a number of other places. It also contains observations taken in Surinam (South America) and French and Upper Congo. The second work is the thirteenth of the series, and contains a discussion of each of the thunderstorms which have occurred during the year, with reference to the general weather conditions over Europe.

WE have received from Mr. John Elliot, the Meteorological Reporter to the Government of India, the daily weather charts of January, 1893, for the Indian sea and land areas.

MM. J. B. BAILLIÈRE ET FILS, Paris, have issued an ornithological bibliography containing announcements of five or six hundred works on ancient and modern birds.

HERR MORITZ, Berlin, has published Nos. 1–4 of his "Antiquariats-Katalog." The catalogues are of special interest to geographers and anthropologists, and they contain many rare works.

MESSRS. FRIEDLÄNDER AND SON, Berlin, have sent us Nos. 16–21 of their "Naturæ Novitates." These bibliographical lists contain works in every branch of science, and are invaluable to the scientific book-hunter.

ANOTHER catalogue, recently issued, is one containing the titles of works on geology offered for sale by Messrs. Dulau and Co.

THE first number of the *Psychological Review* will be published early in January, by Messrs. Macmillan and Co., London and New York. It will be edited by Profs. J. Mark Baldwin (Princeton) and J. McKeen Cattell (Columbia). The *Review* is intended to contribute to the advancement of psychology by publishing the results of original research, constructive and critical articles, &c., in connection with the subject.

THE *American Naturalist* for November contains several interesting articles. Mr. Howard Ayers writes on the genera of the Dipnoi Dipneumones, and Dr. J. Weir gives a number of examples of animal intelligence. A collection of molluscs from North-Western Louisiana is described by Mr. T. Wayland Vaughan, and Mr. H. C. Mercer compares the Trenton and Somme gravel specimens with ancient quarry refuse in America and Europe.

MESSRS. NEWTON and Co. have issued a new catalogue of optical lanterns, microscopes, and polariscopes for demonstrations in science. There are very few class experiments that do not admit of being projected upon a screen by means of the many good lanterns in the market, and certainly there is no better method of demonstrating scientific facts to a large audience. One of the finest lanterns made by Messrs. Newton is the triple rotating electric lantern designed by Sir David Salomons. We learn that the Royal Society has just ordered an instrument of this kind.

A GENERAL method of artificially preparing crystallised anhydrous silicates similar to the naturally occurring pyroxenes, is described by Dr. Hermann Traube in the current *Berichte*. It consists in precipitating the particular metallic silicate, which it is desired to obtain in anhydrous crystals, by the addition of a solution of sodium silicate to a solution of a salt of the metal. The amorphous hydrated silicate thus precipitated is heated to a high temperature with boric acid for some hours. When most of the boric acid has volatilised, the anhydrous metallic silicate is usually left in the form of good crystals. Ebelmen has already succeeded in artificially preparing the magnesium pyroxene $MgSiO_3$ by this method; and Dr. Traube now extends its application. When precipitated silicate of zinc, for instance, obtained by the addition of a solution of sodium silicate to one of zinc sulphate, is dried, and then heated with eight times its weight of fused boric acid, in a platinum crucible, for a few days, to the highest temperature of a porcelain manufacturer's furnace, a large proportion of the boric acid disappears by volatilisation, and upon extraction of the remaining portion from the cooled residue with water, beautiful little insoluble crystals of anhydrous silicate of zinc, $ZnSiO_3$, remain. When examined under the microscope these crystals are observed to be perfectly transparent prisms with domal terminations. Their optical characters indicate that they belong to the rhombic system of symmetry. This artificial silicate of zinc would thus

appear to be isomorphous with the naturally occurring magnesium silicate, enstatite, $MgSiO_3$. The method is also applicable to the synthesis of complex mixed silicates, and it is possible by means of it to reproduce almost any of the naturally occurring silicates of this class.

AT the last meeting of the Southern District Association of Gas Engineers and Managers, Dr. L. T. Thorne gave an account of further experiments with the new process for enriching coal gas by means of oxy-oil gas. Dr. Thorne has been enabled to carry out an exhaustive series of tests at Huddersfield, where the process is now in actual operation. His conclusions are summarised as follows: (1) The addition of oxygen to oil gas, preferably while the latter is still hot, not only increases the illuminating value of the oil gas when employed directly as illuminant, but also when it is used for purposes of enrichment. (2) Oxy-oil gas is a highly permanent gas, and when used as an enricher of coal gas actually increases the stability of that gas. (3) Enrichment of coal gas by oxy-oil gas would cost about one-third of a penny per candle per thousand cubic feet. Dr. Thorne concludes by expressing the opinion that the experimental results place oxy-oil gas at the head of the enriching processes yet known, and fully justify the favourable view of the process which was expressed in an earlier communication. With regard to the actual working of the Huddersfield plant, we learn from *London*, the organ of the London County Council, of November 30, that the Huddersfield Corporation have now used the new gas continuously for over two months, and have obtained a steady white flame, affording a better light, while enabling a saving to be effected at the rate of £10,700 per annum. They are now using 36,000 cubic feet of the new gas per day for enriching the ordinary product. They have been in the habit of enriching their ordinary gas, which is of about sixteen candle power, to the extent of four additional candles, by means of cannel coal. The cost per candle at Huddersfield, using Yorkshire cannel, has been about three-halfpence per cubic foot. With the new plant of the oxy-oil process the actual working cost is at present less than a halfpenny per candle per thousand cubic feet, and will eventually be still less by thirty per cent. or more, as crude petroleum is rapidly becoming cheaper. Moreover, the coke produced from cannel coal is so useless that the Huddersfield Corporation have been unable to dispose of it, even to give it away. Under the new process they find no difficulty in selling all the coke they can produce, for seven shillings and sixpence per ton. The saving due to enrichment amounts to £7,700 per annum, and the gain from sale of coke to £3,000, results which will have the practical effect of reducing the price of gas to the consumers at Huddersfield by at least threepence per thousand cubic feet, while supplying them with a more cheerful light which is stable even in winter.

NOTES from the Marine Biological Station, Plymouth.—There has been little that is novel to record lately, owing to the inability of our small boats to face the stormy seas. Last week several specimens of the Teleostean *Sciæna umbra* were brought in, and the Nemertine *Eupolia curta* (second capture) and the Crustacean *Gebia stellata* were taken in the Sound. The floating fauna is poor as a rule, but there is an increasing number of Annelid trochospheres, *Scyphonautes* and Opisthobranch veligers. There is a noteworthy scarcity of Medusæ. The Anthozoa *Alcyonium digitatum* and *Cereus pedunculatus* (= *Sagartia bellis*), and the Crustacea *Pandalus annulicornis*, *Crangon vulgaris*, and one-year-old *Carcinus mænas* have begun to breed.

THE additions to the Zoological Society's Gardens during the past week include a Pale-headed Parrakeet (*Platycercus pallidiceps*) from North-East Australia, presented by Mr. C. B. Lewis; two Common Crossbills (*Loxia curvirostra*), a Song Thrush (*Turdus musicus*) British, presented by Mr. H. C. Martin; two Alligators (*Alligator mississippiensis*) from the Mississippi, presented by Mr. Austin E. Harris; a Chacma Baboon (*Cynocephalus porcarius*, ♀) from South Africa, presented by Mrs. Rowland Tomson; two Leopards (*Felis pardus*) from India, deposited; thirteen Rufous Tinamous (*Rhynchotus rufescens*) from Brazil, purchased; a Japanese Deer (*Cervus sika*, ♀) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

NEW NOTATION FOR LINES IN SPECTRUM OF HYDROGEN.—The application of the photographic plate to that important instrument of physical astronomy, the spectroscope, has brought to our view, in addition to the four well-known lines of hydrogen in the visible part of the spectrum, another set of similar lines, the first of which, having a wave-length less than that of H_1, coincides with one component of H_1 of the broad double line in the solar spectrum which Fraunhofer termed H. The second component, written H_2 or K, is wanting in many stars of Vogel's class Ia; yet its coincidences with the line H_2 or K, where in this class another line in the region of H_1 makes its appearance, became established, so that no opportunity offered itself to make a special nomenclature for the two first lines above H*d* outside of the star's spectrum situated in the violet region. The other lines Huggins named with the Greek characters α, β, γ, &c. A new system of nomenclature, suggested by Prof. Vogel, in the *Astronomischen Nachrichten* (No. 3198), has many points in its favour. The four lines in the visible region, C, F, G, and *h*, retain their old signs of Hα, Hβ, Hγ, Hδ, but H or H_1 is here changed to Hϵ, and the α, β, γ lines of Huggins to Hζ, Hη, &c., thus making the nomenclature thoroughly consecutive. Prof. Vogel says that in future he shall adopt this new notation, and that Dr. Huggins has also agreed to the arrangement, viz. that the hydrogen lines should always have the element sign H coupled with a Greek letter as index, as shown in the following table, in which are given the new and old notations with the wave-lengths:—

Wave-lengths.	Notation.	
	New.	Old.
656·3$\mu\mu$	Hα	Hα or C
486·1	Hβ	Hβ or F
434·1	Hγ	Hγ (written often wrongly with G)
410·2	Hδ	Hδ or *h*
396·9	Hϵ	H or H_1
388·9	Hζ	α
383·6	Hη	β
379·8	Hθ	γ
377·1	Hι	δ
375·0	Hκ	ϵ
373·4	Hλ	ζ
372·2	Hμ	η
371·2	Hν	θ
370·4	Hξ	ι

THE SPECTRUM OF NOVA NORMÆ.—Prof. Pickering, in *Astronomischen Nachrichten*, No. 3198, gives some details about the discovery of the new star in Norma. The star was found by Mrs. Fleming on October 26 when, examining a photograph of the *spectra* of the stars in this constellation, the negative having been taken by Prof. S. J. Bailey at the Arequipa station on July 10, 1893. Comparing the spectrum with that obtained in the case of Nova Aurigæ, nearly the same dispersion having been employed, it seems that they are nearly identical—"about a dozen lines are visible in each, and are identical in wave-length." The line F, although bright in both stars, is more intense in Nova Normæ, and, further, is more intense than any other line, while G was generally strongest in Nova Aurigæ. With regard to the time of the outburst of this new star, photographs indicate that it must have occurred within the first ten days of July 1. A photograph taken June 21,