WE have received from Messrs. H. W. Cox, Ltd., their price list of induction coils and apparatus for producing X-rays. In it is to be found full particulars as to the prices and capabilities of the specialities of this firm.

THE current number of the *Journal* of the Society of Arts contains the first of the series of Cantor lectures, by Prof. Noel Hartley, F.R.S., on "The Thermo-Chemistry of the Bessemer Process."

THE additions to the Zoological Society's Gardens during the past week include two Vervet Monkeys (*Cercopithecus lalandii*) from Natal, presented by Mr. W. Champion; a Great Wallaroo (*Macropus robustus*) from South Australia, presented by Miss W. Jackson; two —— Hedgehogs (*Erinaceus*, sp. inc.) from North Africa, presented by Sir Harry Johnston, K.C.B.; a European Pond Tortoise (*Emys orbicularia*), European, presented by Mr. A. H. Cocks; an Algerian Tortoise (*Testudo ibera*) from Algeria, presented by Mr. G. H. Gude; a Sulphurous Snake (*Phrynonax sulphureus*), a Deadly Snake (*Lachesis atrox*), a Centipede from Trinidad, presented by Mr. R. R. Mole; a Lataste's Viper (*Vipera Latasti*) from Algeria, presented by Mr. Carl Hagenbeck; two Yellowish Finches (*Sycalis luteola*) from Brazil, presented by Mr. F. L'hoest; an Arabian Baboon (*Cynocephalus hamadryas*) from North Africa, a Grey Parrot (*Psittacus erithacus*) from West Africa, a Swainson's Lorikeet (*Trichoglossus novæ-hollandiæ*), two Pennant's Parrakeets (*Platycercus elegans*) from Australia, a Thick-necked Tree Boa (*Epicrates cenchris*), a Corais Snake (*Coluber corais*) from Trinidad, deposited; a Giraffe (*Giraffa camelopardalis*, ♂) from Senegal, eight Lateral White-eyes (*Zosterops lateralis*) from New Zealand, two Indian Tantalus (*Pseudotantalus leucocephalus*) from India, two Spotted Pigeons (*Columba maculosa*), a Burmeister's Cariama (*Chunga burmeisteri*) from Argentina, four Wandering Tree Ducks (*Dendrocygna arcuata*) from the East Indies, purchased; a Puma (*Felis concolor*), two Barbary Wild Sheep (*Ovis tragelaphus*), a Burrhel Wild Sheep (*Ovis burrhel*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

COMETARY NEWS.—In the *Astronomische Nachrichten* (Nos. 3501 and 3504) we find the ephemeris for both of Perrine's comets, namely March 19 and June 14. The former, which is situated in the northern part of Auriga and is visible for the greater part of the night, is gradually receding from the earth and becoming faint. Its ephemeris for the present week is :—

12*h*. *Paris M.T.*

1898.	R.A. h. m. s.	Decl. ° ′ ″	Br.
July 16 ...	5 28 46	+53 48 47	
17 ...	30 46 ...	44 17 ...	0·08
18 ...	32 44 ...	39 48	
19 ...	34 40 ...	35 21	
20 ...	36 33 ...	30 55	
21 ...	5 38 25 ...	+53 26 32 ...	0·08

Perrine's comet, discovered on June 14, is, however, rapidly increasing in brightness and is getting near the sun, rendering observation somewhat difficult towards the end of this month. Its ephemeris for the week, as calculated by Dr. Berberich, is—

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

1898.	R.A. (app.) h. m. s.	Decl. (app.) °	Br.
July 14 ...	6 8 45 ..	+44 38·7 ...	2·98
15 ...	13 7 ...	43 52·7	
16 ...	17 25 ...	43 5 6	
17 ...	21 40 ...	42 17·3 ...	3·36
18 ...	25 52 ...	41 27·8	
19 ...	30 0 ...	40 37·1	
20 ...	34 5 ...	39 45·4	
21 ..	6 38 7 ...	+38 52·3 ...	3·96

Wolf's comet, which is situated in Taurus, is gradually increasing in brightness and moving eastwards. This body will approach Mars very closely on July 19, their positions differing in R.A. and Declination by only 1·9m. and 0 0 respectively, as computed by Herr Thræn. Its ephemeris is as follows :—

1898.	R.A. h. m. s.	Decl. ° ′	Br.
July 14 ...	3 38 1 ...	19 51·8 ...	2·2
15 ...	40 56 ...	48·5	
16 ...	43 50 ...	44·8	
17 ...	46 44 ...	40·9	2·2
18 ...	49 37 ...	36·6	
19 ...	52 31 ...	32·1	
20 ...	55 23 ...	27·5	
21 ...	3 58 15 ...	+19 22·7 ...	2·3

Comet Giacobini, though moving rapidly northwards as regards declination, is becoming now a faint object, being one-half the brightness it was at the time of its discovery.

STARS HAVING PECULIAR SPECTRA.—In a recent *Harvard College Circular* (No. 32) Prof. Pickering publishes a list of stars the spectra of which are described as peculiar. Most of these have great southern declinations, so we give below a short list of the few that can be observed in these latitudes. The stars were all discovered by Mrs. Fleming in her regular examination of the Draper Memorial photographs.

Designation.	R.A. 1900. h. m.	Dec. 1900. ° ′	Magn.	Description.
−12 1500 ...	6 23·7 ...	−12 59 ...	7·7 ...	Type I. Hβ bright.
+ 5 1267 ...	6 25·2 ...	+ 5 57 ...	7·1 ...	,, ,, ,,
− 8 1467 ...	6 28·1 ...	− 8 48 ...	8·5 ...	Peculiar. Variable with small range.
+ 6 1309 ...	6 32·0 ...	+ 6 14 ...	6·5 ...	Type I. Hβ bright.
,, ,, ...	7 13·9 ...	−13 3 ...	,, ...	Type V. Gal. long. 195° 30′, lat. + 1° 11′.
−11 1941 ...	7 22·4 ...	−11 31 ..	8·9 ...	Peculiar. Variable.
− 4 3199 ...	11 59·6 ...	− 5 13 ...	8·7 ...	Type II. Variable.
− 8 5858 ...	22 16·5 ...	− 8 7 ...	8·5 ...	Type III. Hyd. lines bright? Variable.

Two other stars with great southerly declinations, A.G.C. 14145 and 14686, show spectra with bright and dark hydrogen lines. In the former Hβ and Hγ are variable. On June 2, 1893, they were bright and superposed on a broad dark band. On April 17, 1895, and March 17, 1896, these lines, like the other hydrogen lines, were dark. In the latter star the hydrogen lines were also variable. On May 20, 1892, Hβ, Hγ and Hδ were dark. On April 3, 1895, Hβ was bright, and on April 21, 1895, Hβ and Hγ were bright. Hζ and Hη were dark with the edge of greater wave-length apparently bright.

A careful study of the spectra of some of the bright southern stars has enabled Miss Cannon to increase the number of stars containing the additional hydrogen lines first seen in ζ Puppis. Thus in A.G.C. 17572, 3925, 4027, 4202 and 4544 are present and dark. In A.G.C. 8631 and 22763 the lines 4027, 4202 and 4544, and the bands 4633 and 4688 are present and bright. In the stars A.G.C. 10863, 22748 and 22843, the hydrogen lines 3925, 4027, 4202 and 4544 are present and dark, and the bands 4633 and 4688 are bright. In the last two mentioned stars, and also in A.G.C. 9311, 26 Canis Majoris, the band 4633 is described as being double.

THE CONSTANT OF ABERRATION AND STELLAR MAGNITUDES.—In determining the constant of aberration by stars of different magnitudes, using the well-known method of Talcott, Prof. Doberck finds (*Astr. Nachr.*, 3504) that the values decrease as the magnitudes decrease. Thus, using stars averaging 4·4 in magnitude, the value of the constant he obtained was 20″·639 ± 0″·075, with stars averaging 5·4 it was 20″·430 ± 0″·063, and with those of 6·4 magnitude the value was 20″·385 ± 0″·066. Prof. Doberck suggests that perhaps this fact may explain differences in the values obtained at different observatories, such differences being always in excess of their probable errors.

THE ECLIPSED AND UN-ECLIPSED SUN.—In the *Bulletin de la Société Astronomique de France* (for July), M. Deslandres gives an account of the methods he adopts in photographing the entire chromosphere of the sun. As this beautiful method has been previously published, we need only draw attention to the very fine phototypes which illustrate the magnificent results that he has so successfully obtained. *Knowledge* for the same month contains two reproductions from Prof. Campbell's negatives of the solar corona obtained in India this year.

Although these do not give us the details as seen by the unaided eye, or as photographed on a small scale, they serve to show the structure of the lower corona. It is difficult, however, for reproductions such as these to do justice to the original negatives, as much of the fine detail is lost in the process. Prof. Campbell, it will be remembered, was stationed at Jeur, and his chief instrument was a large photographic telescope of 5 inches aperture and 40 feet focal length, the instrument being fixed, and the photographic plate made to follow the sun.

THE PLANKTON OF LAKE MENDOTA.

THE natural history of small lakes has long offered a most promising field for research in an important department of biology, viz. the inter-relations of species of plants and animals in the struggle for existence, and the dependence of both upon the physical factors of their environment. As compared with the majority of land and sea areas, a small lake constitutes a relatively perfect "unit of environment," the different elements of which can be determined with an accuracy impossible in most other cases. It is on this account, we suppose, that the detailed study of lake plankton has rapidly gained so many votaries since the lines of quantitative investigation were laid down by Dr. Zacharias and his pupils. In America, especially, the investigation of lacustrine plankton has been taken up with zeal by a considerable army of workers, the vast network of lakes in the basin of the St. Lawrence and the upper reaches of the Mississippi providing unrivalled opportunities for the most diversified inquiries. The latest[1] contribution upon this subject is at least as interesting as its predecessors, and we propose here to give a short account of Prof. Birge's principal results.

Lake Mendota is a sheet of water 6 miles in length by 4 in width, of moderately uniform depth, varying from about 18 to 24 metres, and without any large affluent. During the winter the lake is usually frozen over for three or four months. In the present memoir Prof. Birge gives an account of the Crustacea of the plankton of this lake. He deals firstly with the seasonal and annual changes in the frequency of the Crustacean constituents of the fauna, and secondly with the horizontal and vertical distribution of the total Crustacean population and of the individual species. In each case he discusses the nature and influence of the various factors which operate in the production of the observed changes. Serial observations and collections were made during a period of two and a half years.

Neglecting isolated individuals, the Crustacean fauna of Lake Mendota consists of eight well-represented species, which may be grouped as (*a*) perennial and (*b*) periodic. The perennial group includes three species of Copepoda (*Diaptomus Oregonensis*, *Cyclops brevispinosus* and *C. Leuckartii*), and two species of Cladocera (*Daphnia hyalina* and *Chydorus sphæricus*). The periodic group consists entirely of Cladocera (viz. *Daphnia pulex*, *D. retrocurva*, and *Diaphanosoma brachyurum*).

Prof. Birge shows by an elaborate series of curves and figures that the Crustacean population undergoes a cycle of seasonal changes which is regularly repeated in successive years—three periods of increase alternating with three periods of decrease in the course of each year. The maxima occur in spring (May), midsummer (July), and autumn (September and October); the minima in winter (December to April), early summer (June or early July), and late summer (late July or August).

The spring maximum is by far the greatest, and is due mainly to the rapid and preponderating increase of *Cyclops brevispinosus*. The summer depression is due to a subsequent rapid decline in the numbers of this species. Renewed reproductive activity on the part of other perennial species leads to the midsummer maximum, which is succeeded by a slow decline, reaching a point of greatest depression towards the end of August. During this period of decline most of the periodic species are introduced, but their numbers do not, as a rule, compensate for the falling off in the number of the permanent species. In this respect Lake Mendota appears to be peculiar, for it often happens in other lakes that the periodic forms are the dominant members of the summer population. The September rise is caused chiefly by the multiplication of *Daphnia* of all species and of *Cyclops*. The rapidity of the subsequent decline to the winter minimum is dependent on a number of different conditions, such as the abundance of the periodic forms present, the rate of fall of temperature, storms, &c. It varies therefore in successive years. But while the absolute number of Crustacea present, and the rapidity of the seasonal changes themselves, vary considerably in successive years, it is undoubtedly an interesting fact, clearly established by Prof. Birge's researches, that the general character of the vicissitudes of the floating population of the lake is remarkably constant from year to year.

The principal factors which determine the numbers of Crustacea in different years are, according to Prof. Birge, (1) food supply, both quantity and quality, (2) temperature, and (3) competition. It would appear that of these factors, the temperature of the water exerts a greater control over the number of Crustacea than does the food, since the number of Crustacea falls off in autumn while food is still abundant. The influence of temperature is felt through its effects upon the reproductive powers of the Crustacea, increased warmth favouring rapid multiplication.

So far as the food supply of the Crustacea is concerned, Prof. Birge assures us that the actual quantity of microscopic plant-life in Lake Mendota is almost always in excess of the demands of the Crustacea. A scarcity of food is brought about by changes in the quality rather than in the quantity of the algæ present, since some forms are more available than others as food for particular species or stages of Copepods or Cladocera. For example, young Crustacea are quite unable to eat *Ceratium* on account of its large size and its hard shell; consequently the regular predominance of *Ceratium* in the late summer is one of the principal causes which brings about the annual decline in the number of Crustacea at this season of the year. The Cladoceran *Chydorus* remains scarce while diatoms or *Ceratium* are the predominant algæ, but abounds when the place of these algæ is taken by Schizophyceæ or *Anabæna*. In seasons when the inedible filaments of *Lyngbya* predominate, there is a marked reduction in the numbers of all Crustacea present, except *Diaptomus*, which manages to maintain its numbers by combining great locomotive powers with effective means of catching food.

Equally interesting is Prof. Birge's account of the vertical distribution of Crustacea in the lake at different seasons. In winter, corresponding with the homothermous condition of the water, the Crustacea are uniformly distributed; but in summer the formation of the "thermocline" (or boundary between the upper stratum of warm, and the lower stratum of cold water) leads to a distinct stratification of the lake into layers inhabited by different types. The layers undergo changes in thickness as the thermocline descends, and these changes affect the distribution of the Crustacea to a marked degree. Moreover the layer of cold water below the thermocline becomes largely exhausted of oxygen by the decomposition of dead plants and animals which sink into this stagnant zone; and it is on this account, rather than on account of the difference in temperature, that the layer below the thermocline becomes largely destitute of Crustacean life. Insect larvæ, however, such as *Corethra*, may nevertheless be found in considerable number below the thermocline, obviously because they can carry a stock of air in their breathing tubes.

Space will not admit of further references, but we have perhaps extracted enough from this excellent memoir to justify our opening remark that the careful study of lake plankton is well worth the expenditure of time and labour such as the author of the memoir before us has clearly devoted to it. W. G.

[1] "Plankton Studies on Lake Mendota. II. The Crustacea of the Plankton, July 1894–December 1896." By E. A. Birge, Ph.D., Sc.D., Professor of Zoology, University of Wisconsin. (*Trans. Wisconsin Acad. Sci.*, xi., 1897, pp. 274 to 448.)

DESTRUCTION OF THE FRENCH OBSERVATORY IN MADAGASCAR.

AN interesting account of the destruction of the French Observatory in Madagascar is contributed by M. E. Colin to a recent number of *Cosmos*.

In October 1895, after the rupture between the Governments of France and Madagascar, the colonists and missionaries of the former country were requested to leave Antanánarivo. The observatory of Ambohidempona, belonging to the French Catholic Mission, was entrusted to the care of the Prime Minister by the priest Mgr. Cazet, together with all the instruments. The two natives, who acted as computers, were instructed to continue the series of observations commenced in 1889. Matters went well and quietly for a time; but after about nine months had elapsed a rumour was circulated by an Indian, a British subject, to the effect that the French before leaving had