gether for several hours upon a water-bath benzaldehyde and hypophosphorous acid in an atmosphere of carbon dioxide. Crystals of the new compound soon commence to separate, and rapidly permeate the whole liquid. On draining and washing, they are found to consist of colourless radiating groups of lamellæ. They are not very soluble in water, but dissolve more readily in organic solvents, best in methyl alcohol. The aqueous solution is strongly acid, decomposing carbonates readily, and forming crystalline salts with bases. Curiously, though, it exerts no reducing action upon solutions of copper sulphate or silver salts.

In order to obtain the acid of the first type,

it is best to employ an excess of hypophosphorous acid. In this case, instead of crystals of the acid of the second type separating, the whole forms a homogeneous liquid which remains unprecipitated by water. It contains the acid of the first type, and this latter is best isolated by precipitating the lead salt by the addition of lead acetate and decomposing the salt, suspended in water, by means of sulphuretted hydrogen. On concentration of the filtered solution, a syrup is obtained which eventually yields deliquescent crystals of the pure acid. The solution of this acid does not reduce copper sulphate, but readily precipitates metallic silver from silver nitrate. Many similar compounds with other aldehydes have also been prepared, and found to present analogous properties more or less modified by the specific nature of the particular aldehyde employed.

THE additions to the Zoological Society's Gardens during the past week include two Ruddy-headed Geese (*Bernicla rubridiceps* ♂♂) from the Falkland Islands, presented by Mr. F. E. Blaauw, C.M.Z.S.; a Smooth Snake (*Coronella levis*), British, presented by Mr. W. H. B. Pain; two great Eagle Owls (*Bubo maximus*), European, deposited; six Eyed Lizards (*Lacerta ocellata*), two Four-lined Snakes (*Coluber quadrimaculatus*), a Back-marked Snake (*Rhinechis scalaris*), South European, purchased; a Burrhel Wild Sheep (*Ovis burrhel* ♂), a Japanese Deer (*Cervus sikha* ♀), a Bennett's Wallaby (*Halmaturus bennetti* ♀), two Night Herons (*Nycticorax griseus*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

A CAUSE OF LUNAR LIBRATION.—A paper by Mr. S. E. Peal, "On a Possible Cause for Lunar Libration other than an Ellipsoidal Figure, and on Lunar Snow Mountains," has recently been published by Messrs. Dulau and Co. It is shown that evidence of several kinds points to the existence of a vast shoal, or submerged continent, some 1500 miles long by 400 across along the prime meridian. This is presumed to be of greater specific gravity than the refrigerated *maria* east and west of it, and to have been at one time situated in the southern hemisphere. The difference of attraction upon the shoal and the surrounding *maria* is shown to be sufficient both to cause and maintain libration. Since libration began, the shoal has placed itself geocentrically, in which case the south pole must have been drawn forward about 30°. The possibilities of the case seem to be as follows. The moon formerly had a physical constitution the same as that of the earth at the present time. The lunar ocean beds were then steadily subsiding, the lines of upheaval and weakness being on the continents, and causing a series of *quasi*-volcanic orifices. Whilst tidal friction was reducing the velocity of rotation, polar snow-caps were formed, and the atmosphere became rarer. The extension of the snow-cap to the equator was for ages prevented by the incidence of solar heat. This struggle between steadily-increasing refrigeration and solar heat should therefore be evidenced by the existence of an irregular belt about the (then) equator. Such a belt is found in the circular *maria* Smythii, Crisium, Serenitatis Imbrium, and part of Oceanus Procellarum. If the axis of rotation be

shifted about 30°, so that the south pole occurs near Nach or Maginus, all these irregular *maria* form a chain of seas along the equator, which may represent the belt of solar influence referred to. Eventually these *maria* were refrigerated, and the meridional shoal, acting as a fixed tide during libration, caused the change in the direction of the axis of rotation, which shifted the belt of seas from their equatorial position to that at present occupied by them.

DOUBLE-STAR OBSERVATIONS.—In *Astronomische Nachrichten*, Nos. 3047 and 3048, Mr. S. W. Burnham gives the results of his double-star observations made in 1890 with the 36-inch equatorial of the Lick Observatory. The stars which have been re-observed are mainly those which cannot easily be measured on account of their being beyond the reach of any but the most powerful telescopes. Mr. Burnham also notes that his purpose has not been to find as many pairs as possible without reference to their character, but to make several measurements of interesting ones. The present catalogue of new stars contains 70 pairs, of which 39 have distances less than 1", with an average distance of 0".45.

The following naked-eye stars are included in the list of new binaries:—B.A.C. 230, 48 Cephei (H), 5 Camelopardus, τ Herculis, Ceti 199, 34 Persei, ν Geminorum, 24 Aquarii, 95 Piscium, B.A.C. 1142, 36 Geminorum, ψ^1 Aquarii, χ Persei, Tauri 148, 65 Geminorum; and the following pairs, previously known, have been found to be more closely double:—H 1981, S 409, Σ 809, O Σ (app.) 77, Σ 2476, O Σ 425, Σ 12 (app. II.).

OBSERVATIONS OF THE ZODIACAL COUNTER-GLOW.—An account of observations of the zodiacal counter-glow, or *Gegenschein*, made at Mount Hamilton from 1888 to 1891, is contributed to the *Astronomical Journal*, No. 243, by Mr. E. E. Barnard. The changes of form previously noted have been confirmed. In the fall of the year the *Gegenschein* appears large and roundish. It afterwards becomes elongated, and connected with the zodiacal light by a narrow zodiacal band. The observations prove that the *Gegenschein* does not lie in the ecliptic, although very nearly so. Neither is it exactly 180° from the sun. The mean of sixteen observations assign the following longitude and latitude to the phenomenon:—

$$\odot - \lambda = 180^\circ 6'; \beta = + 1^\circ 3'.$$

THE OBSERVATORY OF YALE UNIVERSITY.—The Report for the year 1890-91 of the Observatory of Yale University contains a report from Dr. Elkin, from which we make the following extracts:—

"In observational work with the heliometer I have been engaged almost wholly in the continuation of the series on the parallaxes of the first magnitude stars in the northern hemisphere. The scheme originally laid out has now been completed, and furnishes for each of the ten stars three (for Arcturus five) independent results.

"The triangulation of the comparison stars for Victoria according to the plan drawn up by Dr. Gill has been carried out by Mr. F. L. Chase, who secured some 450 measures of these stars during the months of June to October 1890. Mr. Chase has also reduced the observations as far as it was advisable for us to do so here, and the results have been communicated to Dr. Gill, along with the reduced results of our observations of Victoria and Sappho in 1889. Since February 1891, Mr. Chase has been engaged in a triangulation of the principal stars in *Coma Berenices*, and up to date about one-half of the proposed measures have been obtained.

"It is proposed during the ensuing season to devote the heliometer to a series of measures on the satellites of Jupiter for the determination of their orbits and the mass of the planet, comparing them *inter se*, as has been done with such success by Hermann Struve at Pulkova with those of Saturn."

THE RECENT EPIDEMIC OF INFLUENZA.

THE mortality in London from influenza shows a steady decline week by week; and, although the number of deaths is still in excess of the average, there are good reasons for hoping that the epidemic will shortly disappear from our midst. The severity of the recent visitation, as compared with that which prevailed last year, is clearly shown by the accompanying diagram, in which the effects of the two epidemics are displayed side by side. The weekly mortality from influenza alone is represented by the thick curve, the number of deaths

from diseases of the respiratory system by the lighter curve, and the average number of deaths from disorders of the latter class by a dotted line. The average mortality from influenza is too small to permit of any curve being drawn upon the scale shown in the diagram.

Taking into consideration, firstly, the mortality from influenza alone, we find that not only was the duration of last year's epidemic far less than that of the present year, but that the number of deaths in the earlier period was very much smaller than in the latter. The epidemic of 1890 set in with great severity and suddenness at the beginning of January. During the week ending December 28, 1889, there were no deaths in

the epidemic prevailed with more or less severity, it appears that the total number of deaths in London was 442, giving an average of 74 per week.

The visitation of the present year may be said to have commenced at the beginning of May. During the whole of April there were a few deaths from influenza, the numbers in the four weeks embraced by the Registrar-General's returns being respectively 7, 3, 9, and 10. By the week ending May 2, however, the number had risen to 37, and from this time onward the disease continued to spread with alarming rapidity, the numbers in the three successive weeks being 148, 266, and a maximum during the week ending May 23 of 319. In the two

London from this disease, and in the following week only 4. In the week ending January 11, 1890, however, the number had risen to 67, while in the course of the ensuing seven days a maximum of 127 was reached. The mortality then declined steadily, the numbers in the four succeeding weeks being respectively, 105, 75, 38, and 30. As a serious epidemic the visitation may then be regarded as having spent itself, and in preparing the diagram I have not considered it advisable to include any period in which the weekly number of deaths fell below 25. It may, however, be remarked that, for three weeks subsequent to that shown by the curve, the mortality exceeded 20, while in the four succeeding weeks it ranged between 10 and 17. Taking as a whole the period of six weeks in which

following weeks the mortality again exceeded 300, after which it declined steadily to 249, 182, 117, and 56, while in the last period shown by the diagram the number had fallen to 40. Taking the period as a whole, it appears that during the eleven weeks ending July 11 the total number of deaths in London from influenza, irrespective of cases in which it was known to have been present in the course of other diseases, was 2027, giving an average of 184 per week, or about two and a half times as much as the average mortality in 1890. In no fewer than seven weeks out of the eleven the number of deaths exceeded the maximum attained during the epidemic of last year.

From an examination of the statistics given in a valuable

paper read before the Scottish Meteorological Society on March 31, 1890, by Sir Arthur Mitchell and Dr. Buchan (an abstract of which appeared in *NATURE*, vol. xli. p. 596), it is quite evident that the recent epidemic of influenza has been the most severe we have had in London since the first publication of weekly records of mortality some forty-five years ago. As the figures are of great interest, we make no apology for reproducing the brief table given in that paper, showing the number of deaths which occurred in the five principal epidemics experienced since the year 1847. It will be observed that the number given for last year is considerably in excess of that quoted above, the period selected by the authors of the paper comprising the whole of the three months January to March. In the month last mentioned, the epidemic was certainly not of any great severity, but as the figures do not clash in any way with the general argument, I have not thought it advisable to alter the results. An addition has, however, been made to the table, by including the figures of mortality reached during the epidemic of the present year.

	Deaths.
December 1847 to April 1848	1631
March to May 1851	258
January to March 1855	130
November 1857 to January 1858	123
January to March 1890	545
May to July 1891	2027

It will be seen from the table that the mortality recently experienced has been far greater than at any other period during the forty-five years, the nearest approach to so severe an epidemic being in 1847-48, when the deaths amounted to about 400 less. Taking into consideration the fact that the population of London 45 years ago was very much smaller than it is now, it may at the first blush appear that, as regards severity, there was not very much to choose between the two visitations. It must not be forgotten, however, that in the earlier period the ravages of the disease extended over five months, while in the latter they were confined to about two and a half.

A very striking feature in the disease to which the somewhat misleading name of influenza has been given, is its peculiarly weakening effect upon the lungs and bronchial tubes; and as the epidemic is invariably attended by a high mortality from respiratory diseases, I have included in the diagram a series of curves showing the number of deaths from these attendant disorders. As regards the epidemic of 1890, it may at once be confessed that the curve is somewhat misleading. During the last few days of 1889 and the opening of the following year a sharp touch of anticyclonic cold was experienced over England; and in the metropolis this was accompanied, as is so commonly the case, by thick fog. Under such circumstances a high mortality from respiratory diseases followed as a matter of course, so that when we examine the curve we find that, at the time when the epidemic of influenza was only just appearing, the deaths from lung disorders were at their maximum. After the first week in January, however, the weather became unusually mild for the time of year, a long period of south-westerly winds setting in, with abnormally high temperatures. There can be little doubt, in fact, that at the time the influenza epidemic of 1890 was raging the effects of temperature and weather were so strong as to obliterate the influences of the miasmatic disorder upon diseases of the respiratory system. This year, however, the meteorological element may almost be eliminated from account, for, although cold winds were very frequent in May and the early part of June, the severity of the weather was not such as to lead to any material increase of mortality from the class of diseases in question. The spread of influenza was, however, soon followed by a serious rise in the death-rate, and in the course of the fortnight ending June 6 the mortality from respiratory complaints amounted to more than twice the average, the large excess being due chiefly to deaths from pneumonia and bronchitis. The subsequent decline of influenza was accompanied, as will be seen from the curve, by a corresponding decline of fatalities from respiratory diseases, but it was not until the last week of the period that the deaths fell short of the average. Taking the eleven weeks as a whole, it appears that the total mortality from respiratory disorders amounted to 5138, or about 75 per cent. more than the average. During the epidemic of 1890 the actual number was far larger, but in the winter months the average is also very much higher, and as a matter of fact the excess above the normal only amounted last year to 26 per cent.

NO. 1134, VOL. 44]

The influence of the weather upon the two epidemics seems to have been exerted in entirely opposite directions. During the epidemic of 1890 temperature was, as we have already seen, for the most part very high for the time of year, and the prevalence of a strong current of south-westerly winds in January doubtless aided in the dispersal of the miasmatic germs. The weather was, in fact, as favourable as could have been desired, and the ravages of the epidemic, severe though they were, were doubtless much milder than they would have been had the winter been cold and foggy. The recent epidemic has not had so many foes to contend with, for in the earlier stages of its career the weather was not only cold for the time of year but also calm and quiet. The germ was therefore able to settle in our midst without serious opposition, and the ungenial nature of the atmosphere has doubtless been responsible for much of the lung and bronchial disease which has followed in its train. Deluded by the knowledge that the spring season was upon us, and forgetful of the fact that it had come in an unkindly guise, many a weakly convalescent has been emboldened to venture out into the chilly air, and has contracted a serious cold, from which in too many cases he has been unable to recover. FREDK. J. BRODIE.

THE MUSEUMS ASSOCIATION.

THE Museums Association held its second annual meeting in Cambridge on July 7, 8, and 9, under the presidency of Mr. John Willis Clark, Superintendent of the Museum of Zoology and Comparative Anatomy, Cambridge, and Registry of the University.

The following representatives of Museums (outside Cambridge) and associates were present:—The Rev. H. H. Higgins, Mr. R. Paden (Liverpool); Mr. R. Cameron, Mr. J. M. E. Bowley (Sunderland); Mr. G. B. Rothera, Mr. J. W. Carr (Nottingham); Mr. Councillor P. Burt, Mr. J. Paton (Glasgow); Mr. T. W. Shore (Southampton); Lieut.-Colonel Turner, Mr. J. Tym (Stockport); Alderman W. H. Brittain, Mr. E. Howarth (Sheffield); Mr. Joseph Clarke, Mr. G. N. Maynard (Saffron Walden); Mr. J. Storrie (Cardiff); Mr. Butler Wood (Bradford); Mr. C. Madeley (Warrington); Mr. I. Lyon, Mr. J. J. Ogle (Bootle); Mr. W. E. Hoyle (Owens College, Manchester); Mr. H. M. Platnauer (York); Mr. F. W. Rudler, Mr. F. A. Bather, Mr. A. Smith Woodward.

The proceedings were opened by the Rev. H. H. Higgins (Past-President), who introduced the President, Mr. J. Willis Clark. The President then read his address, and gave a short and very interesting account of the early history of Cambridge and of the foundation of a few of the older Colleges. On the 8th and 9th the following papers and reports were read and discussed:—

- "On some old Museums," by Prof. A. Newton, F.R.S.
 - "On the desirability of exhibiting in Museums, unmounted skins of birds," by the Rev. H. H. Higgins.
 - "On difficulties incidental to Museum demonstrations," by F. W. Rudler.
 - "On the Dresden Museum cases," by Dr. A. B. Meyer.
 - "On the registration and cataloguing of Specimens," by W. E. Hoyle.
 - "Some recent Museum legislation," by E. Howarth.
 - "On the arrangement of Rock Collections," by H. M. Platnauer.
 - "Fossil Crinoidea in the British Museum" (an attempt to put into practice modern ideas of Museum arrangement), by F. A. Bather.
 - "On Tables and Chairs," by F. A. Bather.
- The Report of the Committee appointed to consider the question of securing the aid of specialists.
- The Report of the Committee appointed to consider the question of labelling in Museums.

The meeting was eminently pleasant and successful, thanks to the untiring energy and exertions of the President and of Mr. S. F. Harmer (Fellow of King's College), the Local Secretary and Treasurer. Under their guidance several colleges, libraries, and laboratories were visited. Prof. Middleton conducted a party over the Fitzwilliam Museum, and, through the kindness of Prof. Newton, a few of the members visited the Pepysian Library.