noticed in these columns. The observations secured during the year will, when worked up, afford an accurate knowledge of the times of the tides and of the turning of the tidal streams in the lower St. Lawrence. Many new observations of the tide-levels at different stations have also been obtained.

A METHOD for the preparation of amides from the corresponding aldehydes, which appears to be of general application, is described by Messrs. Pickard and Carter in the April number of the *Journal* of the Chemical Society. The aldehyde dissolved or suspended in water is shaken with a slight excess of ammonium persulphate and a certain quantity of lime, and after the reaction is over there is no difficulty in separating the amide in quantities amounting to 30 to 40 per cent. of the aldehyde taken. The method also lends itself to the preparation of alkyl-substituted amides, potassium persulphate being substituted for the ammonium salt and the alkylamine being present.

THE following species, among others, have been taken at Plymouth recently by the Marine Biological Association:—Mollusca: *Æolis aurantiaca, Gastrochaena modiolina.* Crustacea: *Achaeus Cranchii.* Polychæta: *Magelona papillicornis, Owenia fusiformis, Scalisetosus assimile.* Echinoderma: *Ophiocuida brachiata.* Hydrozoa: *Heterocordyle Conybeari, Syncoryne Loveni.* The pelagic fauna is increasing in richness and variety. The following have been taken:—Medusæ: *Amphicodon amphipleurus, Margelium octopunctatum.* Crustaceæ: *Podon intermedius;* large numbers of the nauplii and the *Cypris* stage of *Balanus.* Polychæta: post-larval stages of *Arenicola,* Trochospheres and later larvæ of Polynoids and Phyllodocids. Among the species breeding may be mentioned the following:—Crustacea: *Porcellana platycheles, Zantho rivulosus*; several species of *Portunus* and *Stenorhynchus phalangium.* Polychæta: *Myrianida pennigera, Polynoe scolopendrina.* Hydrozoa: *Hydrallmania falcata, Tubularia indivisa, Syncoryne Loveni, Garveia nutans, Diphasia rosacea, Sertularia argentea, Eudendrium ramosum.*

THE additions to the Zoological Society's Gardens during the past week include a Vulpine Phalanger (*Trichosurus vulpecula*) from Australia, presented by Mr. R. Kirkwood; a Patas Monkey (*Cercopithecus patas*) from West Africa, presented by Mr. H. E. Jung; a Common Coot (*Fulica atra*), European, presented by Mr. M. C. H. Hammond; two Picui Doves (*Columbula picui*) from South America, a Red-vented Bulbul (*Pycnonotus haemorrhous*) from India, presented by Mr. D. Seth-Smith; a Huanaco (*Lama huanacos*) from Bolivia, a Tawny Eagle (*Aquila naevioides*) from the Seychelles, a Nilotic Crocodile (*Crocodilus niloticus*) from Africa, four Menobranchs (*Necturus maculatus*) from North America, a West African Python (*Python sebae*) from West Africa, deposited; two Straw-necked Ibises (*Carphibis spinicollis*) from Australia, purchased; a Sykes Oriole (*Oriolus kundoo*), received in exchange.

OUR ASTRONOMICAL COLUMN.

RUTHERFURD MEASURES OF PLEIADES.—In the *Contributions from the Observatory of Columbia University,* No. 17, Mr. Harold Jacoby furnishes a revised discussion of the series of measures made by Rutherfurd of photographs of the Pleiades group dating from the years 1872 and 1874. The results of the first investigation were published in 1892, and are slightly modified in the present paper. Special reductions have been made to test the possibility of there being systematic errors arising from some form of optical distortion of the object-glass, and comparisons are given of heliometer and photographic measures. The final data are collected to form a catalogue of seventy-five stars in the cluster.

CATALOGUE OF SOUTHERN VARIABLE STARS.—Mr. Alexander W. Roberts has recently published in the *Astronomical Journal* (Nos. 491 492) a catalogue of the positions, magnitudes and elements of variable stars south of −30° declination, reduced from observations made at the Lovedale Observatory with a 3¼-inch telescope during the years 1891–1899. In connection with the elements a new departure has been made by considering the epoch of a variable as the first maximum passage during 1900, all the stars being uniformly treated on this plan, except that Algol-variables are reckoned from the first *minimum* passage.

The author finds that the short-period variables have a mean variation of 1 magnitude, while the variation of the long-period class amounts to about 4·0 magnitudes. Reference is made to the possible connection of distinctive colours to the various types of variables.

The catalogue gives particulars of ninety-three variables, copious notes being included in explanation of individual stars.

ON A SOLAR CALORIMETER DEPENDING ON THE RATE OF GENERATION OF STEAM.

THIS instrument was shortly described in a note[1] which was communicated to the Royal Society of Edinburgh in July, 1882, and it has been fully described and figured in a paper[2] read before the Philosophical Society of Cambridge in December, 1900. In this paper the results obtained in Egypt in 1882 are detailed and discussed.

My object in designing the instrument and in taking it to Egypt was to find out for myself the amount of heat which can be actually collected from the sun's rays at or near the sea-level under favourable conditions. In such circumstances this amount must fall on land and sea alike, and it is the energy of this radiation which maintains the terrestrial economy.

The instrument measures the sun's heat in the same way as the calorific value of other fuels is commonly measured, namely, by the quantity of boiling water which a given quantity of it can transform into steam of the same temperature in a given time. The quantity of the sun's radiation used is measured by the capacity of the reflector which collects it. The reflector concentrates it on the boiler, which is a silver tube with blackened surface, placed in the focus of the reflector. Some radiation is necessarily lost at the reflector and some at the surface of the boiler, because perfect reflectors and perfect absorbers do not exist; but, when the distillation has been started and is in full running, the whole of the heat which penetrates the boiler is used in transforming water into steam, which is retransformed into water in the condenser and measured in the receiver. A portion of the heat of condensation is utilised in raising the feed water to the boiling temperature before entering the boiler.

The details of construction and the dimensions are fully set forth in the paper printed in the *Proceedings* of the Cambridge Philosophical Society. It will be sufficient here to give a brief summary. Fig. 1 shows a general view of the calorimeter mounted equatorially on a tripod. Fig. 2 shows the calorimeter in section. The sun's rays are collected by the reflector $B_1 B_2 B_3 B_4$, which consists of three conical mirrors, $B_1 B_4$, $B_2 B_3$ and $B_3 B_4$, so constructed that rays of light, parallel to the axis of the instrument O P, falling upon these mirrors are all reflected upon the length A B of the axis. A B is the *focal line* of the reflector. The mirrors are carried by arms, as shown, which are attached to the central tube C K. This tube, which is twelve inches long and has a diameter of two inches, is the condenser. It is connected by an india-rubber tube with the glass funnel Z, through which it is filled and by means of which the height of the water in the upper and narrower tube C A can be regulated. The portion A B of this tube is the boiler. It is of silver, blackened outside, and has a circumference of 37 millimetres. When the instrument is pointed to the sun all the rays which strike the mirrors are reflected upon this surface, which has an area of 18·8 square centimetres. The effective collecting area of the reflector is 904 square centimetres, so that the rays are concentrated 48 fold. The glass funnel Z is set so that the level of the water inside the calorimeter stands somewhere between E and F. F G H is a glass tube or dome which performs the functions of a water-gauge, a steam space and a means of watching the distilling operation with a view to being perfectly assured that there is no priming. The tube G L in the

[1] *Proceedings* of the Royal Society of Edinburgh, 1882, xi. 827.

[2] On a solar calorimeter used in Egypt at the total solar eclipse in 1882. By J. Y. Buchanan, F.R.S. *Proceedings* of the Cambridge Philosophical Society (1900), xi. pp. 37, 74.