rediscovery, which have been prepared by Herr Mahn on his suggestion. They appear in the *Vierteljahrsschrift der astronomischen Gesellschaft*, 12 Jahrgang, 2 Heft. Encke's period, 70·7 years, would bring the comet to perihelion again in 1883, but Mr. W. E. Plummer, now of the University Observatory at Oxford, some years since stated that a period of 69·2 years would better agree with normal places which he had very carefully prepared. The comet may therefore visit us in 1881, or possibly much earlier with the unknown effect of perturbation. The sweeping-ephemerides are arranged upon a plan conveniently indicating the line in which the comet should be sought at a particular date. It is a case where the "orbit-sweeper," suggested by Sir George Airy, and advocated by Prof. Winnecke, would, if provided with an object-glass of sufficient optical capacity, render much assistance.

THE COMPANION OF SIRIUS.—In the *Comptes Rendus* of the French Academy of Sciences, August 13, M. Flammarion has a graphical representation of the orbit assigned by Dr. Auwers, to the perturbing companion of Sirius and of the observed course of the small star discovered by Mr. Alvan Clark, with the view to illustrate the increasing differences between theory and observation. Allusion was made to this subject in NATURE (vol. xiii. p. 428), where the differences of Dr. Auwer's ephemeris, 1872-75, were given. The latest measures of the Clark-companion at Washington, show for 1877·21, position ($c - o$), $+6°·9$, distance $-0''·88$.

Prof. Asaph Hall found no other star in the vicinity of Sirius nearer than one of the thirteenth magnitude, which was measured on February 28, 1877; position 114°·9, distance 72″·09; probably the star seen by Mr. Marth at Malta in January, 1865. An examination of the vicinity with the great refractor was made at the request of M. Tempel, of Florence, who had suspected the existence of several small stars near Sirius.

SATELLITE OF MARS.—One of the newly-discovered satellites of Mars was observed by M. M. Henry at the Observatory of Paris, on August 27.

At 12h. 9m. mean time, position 249° 56′, distance 85″·2, the satellite was very faint, and only observable when the planet was screened from view.

BIOLOGICAL NOTES

THE DEVELOPMENT OF THE NERVES IN VERTEBRATES.—Mr. Balfour's discovery that the spinal nerves of sharks and rays are developed as outgrowths from the central nervous system has been followed by a similar revelation with regard to birds. Mr. (now Dr.) A. M. Marshall (of Cambridge) has given an account of investigations respecting the origin of nerves in the fowl (*Journ. Anat.*, April, 1877), describing a longitudinal ridge arising on the summit of the neural canal, and giving off paired processes, the rudiments of the posterior roots of the spinal nerves. Hensen has made analogous observations on the spinal nerves of the rabbit. The anterior roots arise later, distinct from one another, as processes from the spinal cord. Mr. Balfour has endeavoured to solve the difficult question of the relations of the cranial to spinal nerves. He finds as yet no traces in the brain of anything comparable to anterior roots of nerves; all the nerves are posterior roots. The fifth, or trigeminal, arises from the dorsal summit of the hind-brain very early, just like a dorsal root of a spinal nerve. This nerve also, instead of being a compound one, is at any rate in its origin perfectly simple. The auditory nerve and the facial arise by one common root. The glossopharyngeal and vagus have a series of distinct roots. In an adult Scyllium twelve separate strands have been counted in the vagus nerve. This number, and their origin like so many separate spinal nerves, opens up interesting questions in regard to the primitive segmentation of the head and the loss or condensation of segments in the evolution of the vertebrates. Dr. Marshall's observations on the cranial nerves of the chick, so far as they go, correspond to Mr. Balfour's. It appears that there is no definite indication of a limit between head and trunk afforded by the central nervous cord, by the outgrowths from it, or by the mode of development of the nerves. It is open for consideration whether the absence of anterior roots to the cranial nerves may not furnish such a limit; this would be very convenient for morphology.

INSECT AID IN FERTILISATION OF FLOWERS.—Mr. Thomas Meehan, of Philadelphia, continues to bring forward cases to show that many flowers are not so dependent on insect fertilisation as has been imagined. Recently (*Proc.* Acad. Nat. Sciences, Philadelphia, 1877, p. 128) he has instanced the common mignonette, which usually does not seed when forced in greenhouses in winter. It has been asserted that this is due to the absence of suitable insects to produce fertilisation. But last winter Mr. Meehan's specimens took to producing seed in abundance, two to six perfect seeds in every capsule. This showed that some other circumstance had come into play which affected the reproductive organs, insect aid having been as much absent as in other cases.

INSECTIVOROUS PLANTS.—Dr. C. Cramer, of Zürich, publishes, under the title "Ueber die Insectenfressenden Pflanzen," a useful epitome of all that has at present been recorded respecting the singular phenomenon of "Insectivorous Plants." In a series of papers in *Flora*, on the Mechanics of the Movements of these plants, A. Batalin calls attention to a hitherto neglected paper of Oudemans, published (in Dutch) in 1859, in which he describes the greater part of the phenomena of irritation in Venus's fly-trap (*Dionæa muscipula*), agreeing in almost every point with the description subsequently given by Darwin and others.

SPONTANEOUS MOVEMENTS IN PLANTS.—M. E. Rodier, of Bordeaux, has described a singular series of automatic or spontaneous movements in a well-known water-plant, *Ceratophyllum demersum*. They consist of a rhythmical motion caused by a curvature of the axis extending over six hours, which is neutralised in the course of the next twelve hours, and followed by a curvature in the opposite direction extending over four hours, which is again neutralised in four hours, the whole cycle thus extending over a period of twenty-six hours. The movement appears to be entirely unaffected by light.

DISCOVERY OF OXYGEN IN THE SUN BY PHOTOGRAPHY, AND A NEW THEORY OF THE SOLAR SPECTRUM[1]

I PROPOSE in this preliminary paper to indicate the means by which I have discovered oxygen and probably nitrogen in the sun, and also to present a new view of the constitution of the solar spectrum.

Oxygen discloses itself by bright lines or bands in the solar spectrum and does not give dark absorption lines like the metals. We must therefore change our theory of the solar spectrum, and no longer regard it merely as a continuous spectrum with certain rays absorbed by a layer of ignited metallic vapours, but as having also bright lines and bands superposed on the background of continuous spectrum. Such a conception not only opens the way to the discovery of others of the non-metals, sulphur, phosphorus, selenium, chlorine, bromine, iodine, fluorine, carbon, &c., but also may account for some of the so-called dark lines, by regarding them as intervals between bright lines.

It must be distinctly understood that in speaking of the solar spectrum here, I do not mean the spectrum of any

[1] Paper by Prof. Henry Draper, M.D. Read before the American Philosophical Society, July 20, 1877. We are indebted to Dr. Draper's kindness for the plate and illustrations which accompany this paper.