

WE have on our table several volumes published by learned societies, but limits of space will not permit us to do more than refer to them briefly. One of these volumes is the twenty-second (new series) of the *Proceedings* of the American Association of Arts and Sciences, and contains twenty-two papers read before the Association between April 1894 and May 1895; among them being papers on the North American Centrophili, by Mr. S. H. Scudder; nitro-paraffine salts, and bivalent carbon, by J. U. Nef; wave-lengths of electricity on iron wires, by Mr. C. E. St. John; the blastodermic vesicle of *Sus scrofa domestica*, by Mr. A. W. Weyssse; ternary mixtures, by Mr. W. D. Bancroft; a revision of the atomic weight of strontium, by Mr. T. W. Richards; and on the relation of hysteresis to temperature, by Messrs. F. A. Laws and H. E. Warren. Another volume to which we can only briefly refer is the *Atti d. Accademia d. Scienze Fisiche e Matematiche* of Naples (vol. ii second series). In this we find memoirs on Italian Hymenoptera, by Prof. A. Costa; on certain Abelian equations, by Prof. V. Thollame; comparison of Right Ascensions simultaneously determined at Capodimonte and Cordoba, by Prof. A. Nobile; earth-currents, by Prof. Palmieri; Italian fossil ichthyology, by Prof. F. Bassani; and several others. We have also received a volume of the *Journal of Conchology*, the first published under the direction of the Conchological Society; vol. xxvi. of the *Proceedings* of the Boston Society of Natural History (part iv. 1894-95); and a number of maps from the Geological Survey of Canada. One batch of these maps exhibits the principal auriferous creeks in the Cariboo mining district, British Columbia; a second bundle refers to the geology of Guysborough, Antigonish, and Pictou Counties, Nova Scotia; while a third contains a geological and topographical map of the southern part of the lake of the Woods and Rainy River, Ontario, Eastern Townships Map, Quebec, and a sheet showing the geological character of South-west Nova Scotia. Finally, we have to acknowledge the receipt of vol. v. part i. (second series) of the *Proceedings* of the California Academy of Sciences, a volume of nearly eight hundred pages filled with valuable papers on Californian natural history; and the second volume of "Beiträge zur Geophysik," edited by Prof. Dr. G. Gerland. In this volume we find a speculative paper on terrestrial magnetism, by Prof. A. Schmidt; a very long account and discussion of observations made with the horizontal pendulum at Strassburg, during 1892-94, by the late Dr. E. von Rebeur-Paschwitz; an extensive collection of observations of submarine earthquakes and eruptions, by Dr. E. Rudolph; and a critical study of the mean level of the solid crust of the earth, of the land and water areas, and of the relation between the land above sea-level and oceanic depressions, by Dr. H. Wagner.

OUR ASTRONOMICAL COLUMN.

ORBITS AND ORIGIN OF COMETS.—The investigations of Schiaparelli led to the conclusion that comets moving in parabolic orbits must have originally had a very small velocity with respect to the sun, and that, apart from planetary perturbations, the probability of elliptic orbits is very small. The latter fact is demonstrated in a somewhat different way by M. V. Wellmann (*Bulletin Astronomique*, vol. xii. p. 515), the absolute velocities of the sun and comets being introduced. This method leads to the conclusion that the formation of hyperbolas is much more probable than that of ellipses, and that ellipses of large dimensions are much less probable than smaller ones; further, the supposed parabolic orbits which have been calculated are probably nearly all hyperbolas.

In conformity with the nebular hypothesis, M. Wellmann regards the substance of which comets are formed as the debris of nebulous matter not attached to any system in the process of condensation, but in unstable equilibrium, and having nearly the same proper movement as neighbouring centres of condensation. Eventually assuming a hyperbolic orbit round a

neighbouring sun, the "cosmic cloud" passes off into space, and may become attached to our system *en route*.

M. Wellmann goes on to demonstrate that under the influence of a solar electrical repulsion, elliptic orbits will approach the parabolic form. Hence, in calculating the definitive orbits of comets, this repulsion should not be lost sight of; even neglecting planetary perturbations, a comet may not move rigorously in a conic section. In cases where calculation and observations are discordant, it is suggested that a reconciliation be attempted by supposing that the "constant of attraction" is itself variable, in consequence of the varying electrical repulsion. M. Wellmann also seems to be of opinion that this force of repulsion may be found sufficient to explain the inequalities in the movement of Mercury, which Leverrier ascribed to a possible intra-mercurial planet; the suggestion that the law of gravitation is not strictly true (*NATURE*, vol. li. p. 183), adds to the probability of this explanation.

COMET BROOKS, 1895.—Attention is drawn by Dr. Deichmüller to a striking similarity between the elements of Comet Brooks 1895 and those of the comet of 1652 (*Ast. Nach.*, 3322); this is shown by the following comparison, in which Kreutz's elements for Comet Brooks are adopted:—

Comet 1652.		Comet Brooks.	
T = 1652 Nov. 13		T = 1895 Oct. 21	
$\omega = 300^{\circ} 10' 6''$	} 1895	$\omega = 298^{\circ} 13' 0''$	} 1895
$\Omega = 91^{\circ} 33' 0''$		$\Omega = 83^{\circ} 9' 2''$	
$i = 79^{\circ} 27' 7''$		$i = 75^{\circ} 22' 8''$	
$q = 0.847$		$q = 0.839$	

The continued ephemeris for the comet, following Dr. Berberich, is as follows:—

Date	R.A.			Decl.
	h.	m.	s.	
Dec. 27 ...	3	18	39 ...	+68 45.1
28 ...	3	9	42 ...	68 34.2
29 ...	3	1	38 ...	68 22.1
30 ...	2	54	22 ...	68 9.2
31 ..	2	47	51 ...	+67 55.6

THE MOVEMENTS OF HORIZONTAL PENDULUMS.

THE movements of horizontal pendulums referred to in this note are those which have been observed in Japan and the Isle of Wight. In reports to the British Association on the earthquake and volcanic phenomena of Japan in the years 1883, 1884, 1885, 1887, 1888, 1892, 1893, and 1894, abstracts are given of work which has been carried out in that country in the investigation of earth tremors or pulsations, diurnal waves, and other earth movements. The Report for 1892 describes a pair of extremely light horizontal pendulums, the movements of which, with the aid of mirrors and lenses, were recorded on photographic plates and films, and gives some account of the analysis of the resulting records. The observations were continued during the following year, when it was observed that the direction of earthquake movement in many cases coincided with the direction in which strata had been folded to form mountain ranges bordering the Tokio plain. Another observation was that certain earthquakes had been preceded by an abnormal amount of tilting. During the last year, largely in consequence of the liberality of the Royal Society of London, I have been able to extend these observations, and records have been obtained from horizontal pendulums, each provided with photographic recording apparatus, from nineteen installations. The more important of these installations were as follows. At Tokio in my house, on a massive stone column. At a place 1000 feet distant, in an underground chamber, excavated in the alluvium on a concrete bed. At Kanagawa the observatory was in an artificial cave, driven at a depth of about 50 feet in soft tuff rock beneath its junction with overlying alluvium. At Yokohama two instruments were placed in a cave on the tuff rock, about two feet below its junction with the alluvium. At Kamakura two instruments were placed in a cave on hard tuff, which dips at an angle of 30° north-east.

These instruments were oriented so that their booms pointed north-west or north-east, or parallel and at right angles to the dip of the rocks. The localities mentioned are at distances from Tokio of twenty, twenty-three, and about thirty-three miles.