

Here then was the cup or calyx of a definite Vorticellan form, changing into (?) an absolutely different Infusorian, viz. *Amphileptus anser*!

Now I simply reported the fact to the Liverpool Microscopical Society, with no attempt at inference; but two years after I was able to explain the mystery, for, finding in the same pond both *V. convallaria* and *A. anser*, I carefully watched their movements, and saw the *Amphileptus* seize and struggle with a calyx of *convallaria*, and absolutely become encysted upon it, with the results that I had reported two years before.

And there can be no doubt but this is the key to the cases that come to us again and again of minute forms suddenly changing into forms wholly unlike. It is happily amongst the virtues of the man of science to "rejoice in the truth," even though it be found at his expense; and true workers, earnest seekers for Nature's methods, in the obscurest fields of her action, will not murmur that this source of danger to younger microscopists has been pointed out, or recalled to them.

And now I bid you as your President farewell. It has been all pleasure to me to serve you. It has enlarged my friendships and my interests; and although my work has linked me with the Society for many years, I have derived much profit from this more organic union with it; and it is a source of encouragement to me, and will, I am sure, be to you, that, after having done with simple pleasure what I could, I am to be succeeded in this place of honour by so distinguished a student of the phenomena of minute life as Dr. Hudson. I can but wish him as happy a tenure of office as mine has been.

SCIENTIFIC SERIALS.

American Journal of Mathematics, vol. x. No. 2 (Baltimore, January 1888).—In the opening paper (pp. 99-130), entitled "Soluble Quintic Equations with Commensurable Coefficients," G. P. Young develops at some length the application of his general method, described in vol. vi., to the solution of twenty quintic equations, such as $x^5 - 10x^3 - 20x^2 - 1505x - 7412 = 0$.—Mr. D. Barcroft discusses (pp. 131-40) forms of non-singular quintic curves. The subject is profusely illustrated by drawings of 47 curves on twelve large pages (interpolated between pp. 140 and 141).—F. Morley (pp. 141-48) writes on critic centres in cubics.—The expression of syzygies among perpetuants by means of partitions, by Captain P. A. MacMahon, R.A. (pp. 149-68), is a very interesting addition to the author's previous papers on the subject.—The number concludes with three short papers: "Démonstration directe de la formule Jacobienne de la transformation cubique," by the Abbé Faà de Bruno; note on geometric inferences from algebraic symmetry, by F. Morley; and "Surfaces telles que l'origine se projette sur chaque normale au milieu des centres de courbure principaux" (pp. 175-86), by P. Appell.

Rivista Scientifico-Industriale, January 31.—On chemical valency, by Prof. Fr. Mangini. The probable cause of valency, that is, the varying proportions with which the atoms of the simple bodies combine with hydrogen, or its equivalent chlorine, to form molecules, is here attributed to the varying degrees of motion assumed to be pre-existent and inherent in the atoms themselves. A numerical coincidence is pointed out between the acoustic, luminous, and chemical phenomena, seven being the number of the chief musical notes, of the chief colours in the spectrum, and, as is now generally admitted, of the chemical valencies. It is further to be noted that the temperature required to produce the spectral lines varies with the valencies of the different elements. Thus, a much higher temperature is required for the polyvalent than for the monovalent alkalines, and in all these phenomena a connection is seen to exist between the heat required to show the spectral lines and the quantivalence of the atoms. Another nexus is found between the allotropic state and the number of vibrations needed to produce the spectroscopic phenomena. This highly suggestive paper will be continued in a future number of the *Rivista*.

Bulletins de la Société d'Anthropologie de Paris, tome x. fasc. 3 (Paris, 1887).—On the various methods of measuring the thorax, by Dr. E. Maurel. The writer, in enumerating the various instruments in use for this purpose, gives the preference to those designed by MM. Woillez, Niely, and Fourmentin, by which a graphic representation of the dimensions of the chest is obtained; although he claims to have improved upon their

design in an instrument to which he has given the name stethograph.—On a Breton amulet, called "Kistin Spagn," by M. Bonnemère. Under this name the people of Locmariaque treasure a seed, probably a cashew nut, or, according to some, the seed of the mahogany-tree, which is brought home by Breton sailors. The nut is carefully scraped and boiled in new milk, when it is supposed to be a sovereign remedy against intestinal disorders. By some of the peasant women, however, the nut is pierced and worn on a chain, with their keys, scissors, &c., as an amulet. Singularly enough, it is found that even in Paris these nuts are believed to be specifics against various diseases, more especially the gout, three or four when carried in the trousers pocket being regarded as capable of warding off this malady.—On calves born with so-called bull-dog heads, by M. Dareste. Animals of this description were at one time characterized in South America as constituting a distinct race, but the gradual diminution in their numbers since the cattle of the pampas have acquired a marketable value leads to the inference that they are being killed when first dropped, in order to eliminate deformed animals from the herds, and this opinion of the deformity of the so-called "natos-calves" is confirmed by the presence of other abnormalities in all the animals of this description which have been examined in Europe.—On the colour of the hair and eyes in Limagne, near the Monts-de-Dôme, by Dr. Pommerol. These observations refer to 200 individuals, and appear to indicate that, taken generally, one-fourth of the population have light hair, and three-fourths dark hair, while light and dark eyes are equally frequent.—On the worship of Taranis in popular traditions of Auvergne, by Dr. Pommerol. The writer believes that under this name we have the Gallic representative of the supreme god of the heavens, and wielder of thunder and storms; and that the custom still prevalent in France of building an uncut stone into the gable or roof-top of a house, or hammering into the newly finished walls an irregularly formed metal, wooden, or stone cross, or mallet, to keep bad luck from the building, is a survival of the ancient usage of averting evil by the help of emblems connected with the worship of the supreme gods, as Baal's stone, Jupiter's thunderbolt, or Thor's hammer.—Circumcision in its social and religious significance, by M. Lafargue. The fact that this rite was practised among the Egyptians long before its adoption by the Hebrews has led to the inference that its practice was due to hygienic considerations only. But the author believes that we have here merely one of the numerous forms of mutilations submitted to by primæval men with a view of propitiating their deities, and of which we have such varied and striking evidence among different peoples, as the Assyrians and Aztecs, as well as among the black races; while survivals of similar faith in the efficacy of voluntarily inflicted suffering and mutilation are to be traced in the mythology of the Greeks and Romans.—On the influence of their surrounding medium on the peoples of Central Asia, by M. de Ujfalvy. Referring to the services recently rendered to science by Richtshofen in unravelling the tissue of misconceptions in regard to the geognosy of Central Asia, due to the theories of Humboldt, Klaproth, and others, the writer considers the influence which the soil and their surroundings have had on the inhabitants of the four distinct zones into which the first-named of these savants has subdivided the Asiatic continent. Thus, while the central zone, by the general levelling of the surface through the chemical disintegration of the rocks, and the absence of streams to enrich the soil, compels men to follow a nomadic, or pastoral, rather than a settled life, the peripheral zone abounds in rich and fertile lands, yielding abundant opportunities for the exercise of human industry, and a corresponding advance in mental and social development. The intermediate zones correspond ethnographically with the transitional character of their geognostic features. Next to the extraordinary influence of the varied configurations of Asia on the destinies of its inhabitants, M. de Ujfalvy points out the importance of loess formations as factors in determining the spread and establishment of civilization. This part of the subject is treated at great length, and deserves the careful attention of the palæologist no less than the student of ethnography, seeing that the loess constitutes an important agent in the preservation of the animal and industrial remains of prehistoric ages.—On the nervous system, considered from a physico-chemical point of view, by Dr. Fauvelle. Here the nervous system of man is regarded as a physical apparatus, presenting certain analogies with an electric pile.—Anthropology and philology, with reference to the

Philippines, by M. O. Beauregard. This is a lengthy treatise on the products, language, sociology, and history of the islands, based chiefly on Spanish authorities.—Report, by M. Topinard, of the excavation of the Neolithic grotto of Feigneux (Oise), in which was found a skull that had been trepanned both before and after death. These finds were specially rich, including four skulls which bore traces of having been compressed; and, considered generally, this deposit may be regarded as a pendant to that of Orrouy.—(1) On a burial ground of the Stone Age at Crécy-en-Brie; (2) on cut flints in the alluvial sand below Paris; and (3) on a prehistoric work-place at Fontenay-aux-Roses, by M. Thiéullen. The writer draws attention to the frequency with which the larger debris of cut flints are found near water, and always in localities favourable to the existence of prehistoric man, while from the character of the great ossuaries, in which, as at Crécy-en-Brie, the remains of men and women of all ages, and children, are found, he believes we may assume that the men of the period lived in family rather than in tribal association.—A study of the brain of Bertillon, by MM. Chudzinski and Manouvrier. A *résumé* of the results of this carefully conducted cerebral analysis, which are here given in detail, shows generally, *inter alia*, a large development of the anterior portion of the brain in all directions; a relatively inferior development in point of size in the temporal lobes, and in the cerebellum; and great ramification in the fossæ.

THE *Investia* of the Russian Geographical Society (xxiii. part 5) contains, besides Dr. Bunge's preliminary report about his expedition to the New Siberia Islands, a lecture on the problems of scientific geography by Dr. Petri, who was appointed in October last Professor of Geography and Anthropology at the St. Petersburg University; a paper by M. Rovinsky on the beliefs of the Montenegrins; M. Nikolsky's sketch of fishing on Lake Aral, a valuable contribution to the knowledge of the fishes inhabiting Lake Aral, and especially the lower Amu-daria, their habits, and the modes of fishing; and notes by General Stebnitsky on recent pendulum observations, on M. Boguslavsky's work on the Volga, and on W. J. Havenga's map of Sumatra.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, February 2.—“On Tidal Currents in the Open Ocean.” By J. V. Buchanan, F.R.S.

This paper gives details of some current observations which I made in the open ocean north of the Canary Islands in October 1883 in the course of the surveying expedition preliminary to the laying of a telegraph cable between these islands and the mainland of Spain. This expedition consisted of two steamers, the *Dacia* and the *International*, belonging to the India-rubber, Gutta-percha, and Telegraph Works Company (Limited), of Silvertown. The chief scientific results gained during it were the confirmation of the view—which was suggested by the density and temperature of the bottom water observed in this part of the Atlantic during the cruise of the *Challenger*—that the overflow of warm concentrated sea-water from the Mediterranean at the bottom of the Straits of Gibraltar was the cause of the abnormally high density and temperature of the bottom water in this part of the ocean, and the preparation of a complete survey of the bed of the ocean in this district. During the progress of the work several very remarkable “oceanic shoals” were discovered and surveyed, notably the “Coral Patch” in lat. $34^{\circ} 57' N.$, long. $11^{\circ} 57' W.$, with a depth of 400 to 500 fathoms, and the “Dacia Bank,” in lat. $31^{\circ} 9' N.$, long. $13^{\circ} 34' W.$, with a minimum depth of 49 fathoms. In sounding over both of these banks conclusive evidence was obtained of the existence of actual vertical precipices in some positions on their flanks; and from the very great average steepness all round, it is rendered in every way probable that, if they were laid dry, they would form mountain peaks as precipitous and inaccessible as any to be found on land. The dredging on the Coral Patch showed it to consist of deep-sea corals, principally *Lophobolia prolifera*, growing with the utmost luxuriance and attached to dead stems of the same species, already getting coated with peroxide of manganese.

For the purposes of the survey of the “Dacia Bank” a buoy was anchored on its edge, and on the afternoon of October 21 I

spent some hours in a boat made fast to it, and observed the current in strength and direction. The following is a summary of the results:—

Hour p.m. ...	...	2.15	...	2.40	...	3.30	...	4.6
Direction (true) ...	...	N. 11° E.	...	N. 41° E.	...	N. 56° E.	...	N. 101° E.
Rate (knots per hour) ...	...	0.47	...	0.30	...	0.25	...	0.30

It will be seen from these observations that in two hours the current had shifted its direction through 90° , and had passed through a minimum velocity of 0.26 per hour without there having been any period of “slack water.” The observations are too few in number to make it worth while submitting them to analysis; but a little study of them will show that they indicate a current which is the resultant of a continuous current and a periodic one. A constant current running south-east by east, combined with a tidal current running north-north-west and south-south-east, the maximum velocity of which, in either direction, is twice that of the permanent current, would give a resultant agreeing fairly with that observed.

No measurements were made of the under current, but, by sinking a tow-net made fast to a sounding-line, it was seen to be running at a depth of 75 fathoms in the same direction as the surface current and apparently with much the same velocity. In the channels between the Canary Islands, where even on the shallowest ridges there is over 1000 fathoms of water, the tidal current reaches to the very bottom, and its scouring action is shown by the nature of the bottom. To seaward, in 1800 or 2000 fathoms, the bottom is a fine Globigerina ooze, which gets coarser and sandier as the water shoals in the channels, till on the summit ridge there is generally no loose deposit at all, and the bottom is rock or coral coated with black oxide of manganese. Round the western end of Teneriffe the tide runs violently, causing rips and overfalls. Much rocky ground is met with in the North Atlantic in depths of 1300 and 1400 fathoms, especially on the ridge which appears to extend through the whole length of that ocean. It is not unlikely that the summit edge of this ridge may be swept clean through the greater part of its length, and it must be remembered that the removal of sediment from one part of the ocean bottom means its deposit in greater abundance in others, especially in hollows in the neighbourhood of the ridge. Hence a sounding in “ooze” or “mud” in one position furnishes no argument against the trustworthiness of another sounding in the vicinity and in equally deep water on “rock” or “hard ground.”

It is evident, then, that the power of shoals to transform the tidal wave into tidal currents furnishes a natural agency which tends to limit the indefinite shoaling of the water by the continual deposition of loose sediment. On the other hand, these currents, in sweeping clean the rocky eminences at the bottom of the ocean, prepare a lodging-place for deep-sea corals, and assist in bringing food to them when settled, thus enabling them to build up their pillar-like banks, of which a very fine example is furnished by the “Coral Patch” above referred to. There can be little doubt that it is reducing more or less rapidly the depth of the water above it. The “Dacia Bank” and the “Seine Bank” are examples where limiting conditions, probably of temperature, appear to have been reached. The water may be too warm for the deep-sea species; and not warm enough for the tropical, *par excellence*, reef-building species.

A remarkable cluster of banks resembling those above described occurs off the Brazilian coast, between the Agulhas reef and the islands of Trinidad and Martin Vaz. Some of them are named, as the Jaseur, the Montague, and the Victoria banks; with from 25 to 30 fathoms, and completely surrounded by deep water. Further north is the dangerous Rocas, lying close to the route of steamers from North America and Europe to South American ports. Further south, again, are two suggestive soundings, one of 19 fathoms, in lat. $32^{\circ} 40' S.$, long. $47^{\circ} 0' W.$, marked “Nelson, 1859,” and the other of 72 fathoms, in lat. $37^{\circ} 50' S.$, long. $49^{\circ} 50' W.$, marked “Sutlej, 1863,” in the chart. Seamen are not usually mistaken as to whether they have or have not found bottom in depths such as 19 or 72 fathoms, and there is little doubt that careful search would reveal the existence of shoals in these localities. But the search must be diligent and methodical, always following the lead of the soundings as they shoal. The careful and detailed study of these oceanic shoals or embryo islands is of great importance for oceanographical science, and it would not be easy to find more interesting work for the marine surveyor.