

because it is too large to bury. This is in a Wendish district, where prehistoric customs are more obstinately kept up than in purely German parts. Nothing could more perfectly illustrate the early animistic belief in the ghost turning to ghostly use the phantoms of objects laid for it in the grave. Thus we have, parallel with the rude material life of the Stone Age, traces of a corresponding intellectual rudeness, belonging to ages when men had not learnt to distinguish dreams from events, or to realise the meaning of death.

The problem of the order in which the races of men were formed and attained such culture as they have is obscure and perplexed enough, but it has some illuminating facts. The method by which an anthropologist judges of the centre of civilisation of a race is much the same as that of the botanist who looks for the district where a widespread cultivated plant is found wild, as the potato is in Chile, which accordingly he takes to be at or near the centre of distribution; only he has to guard against the possibility of the wild plant being only a cultivated variety run wild. Let us now apply this method to the geography of the Negro race. The negro or negroid spread over the African continent have never risen high in civilisation, scarcely of themselves getting beyond the barbaric stage. But on the other hand they are never very low; they are tillers of the soil, herdsmen, iron-workers, and no negroid tribe has been found in a clearly primitive savage state. The Bushmen, belonging to an allied variety of man, are outcasts and savages by degradation. If however we look along the map of the world for the eastern branch of the black race, we find in the Andaman Islands and in New Guinea and other islands Negro types more or less assimilated to the African, but living at lower stages of culture such as are possible in the rank forest-lands of the equator. In these two districts are found the only well-authenticated accounts of tribes with no knowledge of any means of making fire. The Andamanese have not the fire-drill or any such fire-making instrument, but carry burning brands about with them, and if by any chance they lost their fire, they could kindle it anew at their volcanoes. In an outlying district of New Guinea, Mikluho-Maclay has found a Papuan tribe who only carry fire-brands, and do not know the fire-drill of other districts. This indicates very low culture, whether they are representatives of an originally fireless state, or whether by mere inertness they have disused and forgotten so useful an art as firemaking. In these regions is perhaps the Negro centre whence, rising to a somewhat higher level of culture, the western branch spread over Africa. Let us now look at the white men from this point of view. There may be remains of Stone Age Whites, but there are no certain remains of White savages of a low order. We may well doubt if there ever were any White savages; it is more likely that the White men were developed late in the race-history of the world from ancestors already far on in civilisation; in fact, that this civilisation with its improved supply of food, its better housing and clothing, its higher intellectuality, was one main factor in the development of the White type. Here, however, it must be remembered that there is not a White race in the sense in which there is a Carib race or an Andaman race. It includes several race-types, and even the same language, such as English or German, may be spoken by men as blond as Danes or as dark as Sicilians. The fair-haired Scandinavian type has something of the definiteness of a true race; but as one travels south there appear, not well-defined sub-races, but darkening gradations of bewildering complexity. The most reasonable attempt to solve this intricate problem is Prof. Huxley's view that the White race is made up of fair-whites of the Northern or Scandinavian type, and dark-whites who are the result of ages of mixture between the fair-whites and the darker nations, though it is perhaps hardly prudent to limit these

dark ancestors to one variety as he does. If now we cannot trace the White man down to the low level or primitive savagery, neither can we assign to him the great upward movement by which the barbarian passed into civilisation. It is not to the Aryan of Persia nor to the Semite of Syria that the art of writing belongs which brought on the new era of culture. The Egyptian whose hieroglyphics may be traced passing from picture into alphabet had his race-allies in people of North Africa, especially the Berbers of the north coast, people whom no elasticity of ethnological system would bring into the white race. Of the race-type of the old Babylonians, who shaped likewise rude pictures into wedge-phonetic signs, we know but little as yet; at any rate their speech was not Aryan, and the comparisons of Lenormant and Sayce have given some ground for connecting it with the Turanian language, belonging to a group of nations of whom one, the Chinese, had in remote antiquity worked out a civilisation of which the development of an imperfect phonetic writing formed part. If the great middle move in culture was made, not by any branch of the white race, but by races now represented by the Egyptian and the Chinese, it is not less clear that these nations came to the limit of their developing power. The white races had in remote antiquity risen high in barbaric culture when their contact with the darker nations who invented writing opened to them new intellectual paths. The Greeks found in the ancient Egyptian theology the gods of the four elements, but they transferred this thought from theology to philosophy, and developed from it the theory of elements and atoms which is the basis of modern chemistry. They found the Babylonians building terraced temples to the seven planets in the order of their periods, and this conception again they transferred from religion to science, founding on it the doctrine of planet-spheres which grew into mathematical astronomy. It may moderate our somewhat overweening estimate of our powers to remember that the white races cannot claim to be the original creators of literature and science, but from remote antiquity they began to show the combined power of acquiring and developing culture which has made them dominant among mankind.

(To be continued.)

PROFESSOR ARTHUR ROCHE

M. ARTHUR ROCHE, Professor of Mathematics and Astronomy at the Lycée of Montpellier, died at that town on April 18 last, in the sixty-third year of his age. M. Roche's name is most intimately associated with researches on the figures of planets and comets, and the cosmogonic theory of Laplace. In the report on the labours of Roche made to the Academy of Sciences last week by M. F. Tisserand, his memoirs were thus classified:—1. Various memoirs on the equilibrium of a homogeneous fluid mass subjected to certain conditions. These had special reference to the beautiful researches of mathematicians on the equilibrium of a homogeneous fluid mass, animated by a movement of rotation around its axis, the molecules of which are attracted according to the law of Newton. M. Roche proposed to determine the figure of equilibrium by taking into account a new force—the attraction exerted by a centre situated at a great distance. M. Roche worked out this idea with great success, applying it specially to the moon, to the satellites of Jupiter and Saturn, to comets, and generally to the evolution of the solar system. 2. Memoirs on the physical constitution of the terrestrial globe, in which he came to the conclusion that the density at the centre is nearly double the mean density. 3. Memoirs on the internal condition of the globe, in which M. Roche was led to pronounce against the complete fluidity of the interior. 4. Various memoirs on the figures of comets.

5. Essay on the constitution of the solar system, in which M. Roche attempted to develop the beautiful cosmogonic theory of Laplace, giving precision to certain points and modifying it in others. M. Roche was a Corresponding Member of the Academy of Sciences in the Section of Astronomy, and had been nominated as a candidate for the place vacant by the death of M. Liouville.

THE LATE MR. W. A. FORBES

MR. WILLIAM ALEXANDER FORBES, Fellow of St. John's College, Cambridge, Prosector to the Zoological Society of London, and Lecturer on Comparative Anatomy to Charing Cross Hospital, whose untimely death on the Niger we announced last week, was born at Cheltenham on June 24, 1855, the second son of Mr. J. S. Forbes, the well-known railway director. He was educated at Kensington School and Winchester College, which he entered at the early age of eleven. On leaving Winchester in 1872, Forbes passed a year at Aix-la-Chapelle studying German, and then became a student of the University of Edinburgh, where he pursued the regular medical course, paying special attention to zoology and botany, and commencing collections of insects and plants. In 1875 Forbes transferred his residence to London, and entered himself as a student of London University with the idea of taking a medical degree in the metropolis. Here he became quickly intimate with other zoologists, who were very soon attracted by the astounding general knowledge of zoology and the acute intelligence of one so young. By the advice of the late Prof. Garrod and other friends Mr. Forbes was induced in October, 1876, to leave London and to become an undergraduate of St. John's College, Cambridge, where he was subsequently elected Scholar, and took his B.A. degree with a First Class in the Natural Sciences Tripos in 1879. The post of Prosector to the Zoological Society of London having become vacant in October, 1879, by the lamented death of Prof. Garrod, Mr. Forbes was appointed (*omnium consensu*) to that office in the January following. Indeed he had been designated by Garrod on his deathbed as his most obvious and proper successor, and had been appointed his literary executor.

Mr. Forbes entered upon the duties of his office with characteristic energy, and during the three following sessions of the Zoological Society brought before the scientific meetings a series of most interesting and valuable communications derived from his studies of the animals that came under his examination. He had a happy knack of putting forward abstruse points of anatomy in an understandable form, and especially directed himself to the muscular structure and voice-organs of birds, in continuation of the researches of his predecessor Garrod on the same subjects. In the summer of 1880 Mr. Forbes made a short excursion to the forests of Pernambuco, Brazil, of which he published an account in the *Ibis* for 1881, and in the following year passed his holiday in the United States, in order to make the acquaintance of his American brethren in science and their collections. In July, 1882, he left England on what promised to be a splendid opportunity of visiting the eastern tropics with every advantage and without much risk. Detained at Shonga—a station some 400 miles up the Niger below Rebba—by the breaking down of his communications, Mr. Forbes fell a victim to dysentery on January 14 last, thus adding another name to the long list of martyrs of science in that deservedly dreaded climate.

Mr. Forbes's published works consist chiefly of papers in the *Proceedings of the Zoological Society* and the *Ibis*, altogether about sixty in number. He was editor of the memorial volume of collected scientific papers of his predecessor Garrod, and just before he left England in July last had finished the last sheets of an excellent memoir

on the anatomy of the petrels—since published in the "Zoology of the *Challenger Expedition*." This piece of work was originally undertaken by Garrod, but had been left almost uncommenced at the decease of the latter.

Of Forbes's private qualities as a most efficient and ready fellow-worker, a most charming companion and a most sincere friend, the writer is able to testify, not only from personal experience, but also from the universal regret expressed at the unhappy end of so promising a naturalist.

P. L. S.

RECENT INFLUENCE-MACHINES

SEVERAL modified types of influence-machine have recently been brought before the public, and as they are both cheaper and more efficient than the older forms of Töpler, Holtz, and Bertsch, will probably find general acceptance. Of the newer forms, those of Voss and of Wimshurst are illustrated in the accompanying cuts.

In the Voss machine, which may be regarded as a modified Töpler machine, there are two disks of varnished glass, one stationary, the other rotating in front of it on an axis which passes through a central hole through the fixed disk. A pair of pulleys with a strap provide the rapid movement necessary. At the back of the fixed disk are fixed two armatures or inductors of varnished paper,

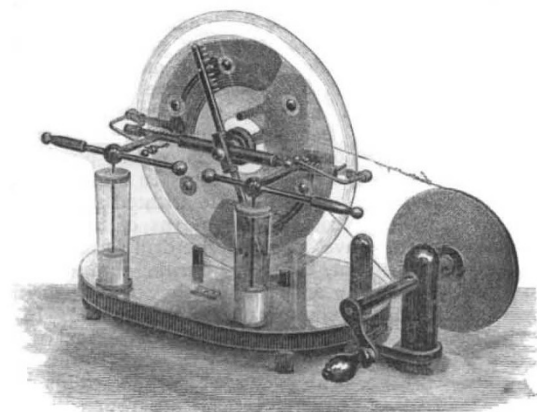


FIG. 1.—Voss's Influence-Machine.

with a narrower central band of tinfoil. These armatures are connected on the right and left respectively with two metal clamps which nip on to the edge of the disk and turn round in front of the front plate, each being provided at this part with a little metallic brush. Upon the front of the rotating plate are fastened six or eight metal buttons at equal intervals. These buttons are touched as they rotate by the metallic brushes. Nearly perpendicular, and in front of the front disk, is a brass rod, which need not be insulated, also furnished with spikes at each end, and with a little metallic brush to touch the buttons of the rotating plate. The action of the machine is as follows:—If a small charge of electricity—say a positive charge—be imparted to one armature—say that on the left—the buttons as they move past will be acted on inductively, and if, while thus under the inductive influence of the positive charge, they are momentarily touched by an uninsulated conductor, they will pass on electrified with a charge of the opposite sign. If the front plate rotates in the clockwise direction, each button as it moves through its highest position towards the right will thus acquire a small negative charge which will be given up on arriving at the right side, the projecting arm conveying the charge to the armature at the back. But as the button passes on downwards it will be influenced inductively by the armature behind it, and when touched by the lower end of the vertical conductor, will assume a positive electrification.