

"The Kójak tunnel fortunately escaped serious damage, though it is interesting to hear that the water-supply from some springs which issue inside the tunnel and which now escapes in a regular drain from the western (or Chaman side) of the tunnel, was considerably increased after the earthquake shocks.

"The block-house which defends that entrance to the tunnel received some slight damage in the shape of cracks which have appeared in the solid masonry.

"The effects of the earthquake shocks are visible almost all along the made banks on which the permanent way is laid between the tunnel and Sanzal station. In their case the earthquake acted most beneficially, inasmuch as the artificially built-up material of these banks was well shaken down, and, though the latter had sunk here and there and cracks have appeared in places, their settling down and consolidating was equal to a season's rain, as the engineer of that section reports.

"The real interest of the earthquake, however, centred in the damage done between Sanzal station and Old Chaman.

"The line of railway descends to New Chaman from the Kójak tunnel in several great curves and in zigzag fashion. Sanzal station is situated near the upper margin of a great and rapidly descending glaciis, which slopes down from the Kójak range to the great plain in which New Chaman is situated.

"About half a mile west of Sanzal station there is a path which runs from the Khwája Amran peak (8864 feet) in a north-northeast direction along this glaciis. It appears that at the immediate foot of the Kójak range a great number of springs rise, close to which of course there is always a certain amount of grazing to be found, and thus this line of springs has been connected by a regular path, made by flocks passing along these patches of pasture-land. The water escaping from these springs has furrowed and denuded the glaciis into an infinite number of small channels. Another feature is that the path with its springs and patches of grazing grounds all lie as it were in a natural depression, running parallel with the range of the Kójak itself, whilst immediately to the westward of it the ground of the glaciis rises somewhat, before finally descending to the plains. This is well marked near Old Chaman, the foot of which is built on this rising ground.

"About seven to eight miles south of Old Chaman this insignificant rise of ground becomes an auxiliary range of hills, which runs west and parallel with the Kójak range towards the Khwája Amran peak itself.

"I expect to have further opportunities of geologically examining this ground when the weather will permit in the spring; until then I will only state my belief that the present path which connects the springs described indicates, as near as can be, the existence of an old fault-line. At the present time I have no further proof for it than this, that as far as I have been able to ascertain during this hurried visit, the line of path is, roughly speaking, also a geological boundary between the slaty formation of the Kójak and a grey earthy limestone, the latter of which is very probably of upper cretaceous or lower eocene age; this boundary being here suspiciously abnormal in appearance. The springs which rise along it tend further to the opinion that they appear along a line of dislocation, which view is further strengthened by the fact that in the neighbourhood of the springs not only a kind of travertine is visible, but a curious breccia, consisting of debris of both the limestone and the slates of the Kójak and cemented by calcareous rock, is *in situ* and in strong force all along the line of path, but not off it, which breccia I now look upon as a fault-rock. The glaciis itself is chiefly made up of recent deposits, fans from the range above, but I hope to discover a

more exposed section further south, where the structure of this dislocation, if it is one, will be clearly demonstrated. Finally, but not least, the fault seems to be proved by the earthquake itself, which has originated in a further, though slight, dislocation along a line which exactly and absolutely coincides with the present path connecting the numerous springs.

"In my theory explanatory of this earthquake, I therefore start with the assumption that an old line of fault exists, which runs more or less parallel with the Kójak range itself. In a mountain range entirely formed by flexures, which chiefly correspond to the strike of the range itself, such faults usually exist on a large scale. The lateral pressure which caused the folding of the strata in such cases frequently results in one or several systems of dislocations, as we may observe in numerous instances within folded mountain ranges. . . ."

"From the foregoing it would appear that the process of contracting and folding, with resultant dislocations, of this area in Balúchistán, is still proceeding. At some previous date in the history of the Khwája Amran Mountain range this process of compression, as it must have been, has led to the formation of the line of fault conjectured in these notes; the process, from whatever cause, is still active, and the tension having become too great has further resulted in a slight increase to the amount of dislocation already in existence. The two areas adjoining the fissure have moved about eight inches vertically and a couple or more feet horizontally from each other, which sudden establishment of a temporary equilibrium in this tension is no doubt quite sufficient to account for the vibration of the ground to a considerable distance, which vibration is commonly called an earthquake.

"I need scarcely say that there is no indication of any kind which would point to the existence of volcanic activity at, or anywhere near, the area affected by this earthquake; I mention this only, because it was also in this case, as in other instances elsewhere, the popular theory advanced by many of those who personally experienced the alarming symptoms of this perfectly natural phenomenon."

SCIENCE IN THE MAGAZINES.

OF the August magazines the strongest in articles of scientific interest is the *Fortnightly Review*. Under the somewhat misleading title "The Wanderings of the North Pole" Sir Robert Ball contributes a rather diffuse article descriptive of the variations of latitude; adopting Mr. Chandler's conclusion that the earth's instantaneous axis of rotation revolves about that of maximum moment of inertia, with a radius of thirty feet, measured at the earth's surface, in a period of 427 days. This result is expressed by Sir Robert Ball in the following language:—

In that palæocrystic ocean which Arctic travellers have described, where the masses of ice lie heaped together in the wildest confusion, lies this point which is the object of so much speculation. Let us think of this tract, or a portion of it, to be levelled to a plain, and at a particular centre let a circle be drawn, the radius of which is about thirty feet; it is in the circumference of this circle that the Pole of the earth is constantly to be found. In fact, if at different times, month after month and year after year, the position of the Pole was ascertained as the extremity of that tube from which an eye placed at the centre of the earth would be able to see the Pole of the heavens, and if the successive positions of this Pole were marked by pegs driven into the ground, then the several positions in which the Pole would be found must necessarily trace out the circumference of the circle that has been thus described. The period in which each revolution of the Pole around the circle takes place is about 427 days; the result, therefore, of these investigations shows, when the observations are accurate, that the North Pole of the earth is not, as has been so long supposed, a fixed point,

but that it revolves around in the earth, accomplishing each revolution in about two months more than the period that the earth requires for the performance of each revolution around the sun.

"What use has a serpent for its tongue?" is a question asked by Ruskin of 'scientific people,' "since it neither works it to talk with nor hiss with, nor, as far as I know, to lick with, and, least of all, to sting with, and yet, to the people who do not know the creatures, this little vibrating forked thread, flicked out of its mouth and back again as quick as lightning, is the most striking part of the beast." Mr. W. H. Hudson furnishes an answer to the question. He remarks: "So far from being silent on the subject, as Ruskin imagined, the 'scientific people' have found out or invented a variety of uses for the serpent's tongue. By turns it has been spoken of as an insect-catching organ, a decoy, a tactile organ, and, in some mysterious way, an organ of intelligence. And, after all, it is none of these things, and the way is still open for fresh speculation." Mr. Hudson puts forward the idea that the snake uses its tongue to concentrate the attention of an intended victim upon its head while its body is being trailed forward to effect the capture. We quote from his article:—

In most cases the movement probably would be detected but for the tongue, which attracts the eye by its eccentric motions, its sudden successive appearances and disappearances; watching the tongue, the long, sinuous body slowly gliding over the intervening space would not be observed; only the statuesque raised head and neck would be visible, and these would appear not to move. The snake's action in such a case would resemble the photographer's trick to make a restive child sit still, while its picture is being taken, by directing its attention to some curious object, or by causing a pocket-handkerchief to flutter above the camera.

Snakes have been observed to steal upon their victims in this quiet, subtle manner; the victim, bird or lizard, has been observed to continue motionless in a watchful attitude, as if ready to dart away, but still attentively regarding the gradually approaching head and flickering tongue; and, in the end, by a sudden, quick-darting motion on the part of the snake, the capture has been effected. . . .

It is not here maintained that the tongue is everything, nor that it is the principal agent in fascination, but only that it is an necessary part of the creature, and of the creature's strangeness, which is able to produce so great and wonderful an effect. The long, limbless body, lithely and mysteriously gliding on the surface; the glittering scales and curious mottlings, bright or lurid; the statuesque, arrowy head, sharp-cut and immovable; the round lidless eyes, fixed and brilliant; and the long, bifurcated tongue, shining black or crimson, with its fantastic flickering play before the close-shut, lipless mouth—that is the serpent, and probably no single detail in the fateful creature's appearance could be omitted and the effect of its presence on other animals be the same.

In an article on "The Limits of Animal Intelligence," Prof. C. Lloyd Morgan gives an interesting account of some experiments and observations he has recently made on young chicks, with a view of determining the difference between intelligence and instinct. He expresses the distinction between the two as follows:—

Intelligence is the faculty by which, through experience and association, activities are adapted to, or, more strictly, moulded by, new circumstances; while reason is the faculty which has its inception in the true grasping of relationships as such. Intelligence is ever on the watch for fortunate variations of activity and happy hits of motor response; it feels that they are suitable, though it knows not how and why, and controls future activities in their direction. It proceeds by trial and error, and selects the successes from among the failures. Reason explains the suitability; it shows wherein lies the success or the error, and adapts conduct through a clear perception of the relationships involved. Individual experience, association, and imitation are the main factors of intelligence; explanation and intentional adaptation are the goal of reason.

Incidentally I have expressed my opinion that, in the activities of the higher animals, marvellously intelligent as they often

are, there is no evidence of that true perception of relationships which is essential to reason. But this is merely an opinion, and not a settled conviction. I shall not be the least ashamed of myself if I change this view before the close of the present year. And the distinction between intelligence and reason will remain precisely the same if animals are proved to be rational beings the day after to-morrow. For the distinction holds good between human intelligence and human reason, just as much as between animal intelligence and the possible reason of animals. It is no line of division which separates animals from men; but a distinction between faculties, one of which, at least (and perhaps both, though this I doubt), is common to animals and men.

The *New Review* contains an article by Prof. Ludwig Büchner on "The Brain of Women." It is well known that the average size of the female brain is considerably less than that of the male. Further, up to the present nothing has been found to justify the assumption that there is anything in the inner formation of the brain to make good its deficiency in size as compared to the male. This Prof. Büchner holds to be due to differences of development.

If we consider that for thousands of years woman, by reason of her subordinate social position, has received a different education from her male partner, and that her training has led her in quite another direction to his; that her horizon has been a more limited one, and moreover that every encouragement has been given to the play of her emotions at the expense of the activity of her intellect; and finally that this state of affairs has lasted from generation to generation, through mother to daughter, then, I say, that from a physiological standpoint there should be no cause for surprise that as a result woman should differ from man, that her brain should be inferior to his, or at any rate should have developed on different lines, or, as we have been saying, that the fore part of her brain should be found to be proportionately less and the hind part proportionately greater than that of man.

Mr. Thomas J. Mays writes in the *Century* on "Breathing Movements as a Cure." The evidence he offers indicates that "proper development and expansion of the lungs by means of well-regulated breathing must be regarded as of the greatest value in the prevention and in the treatment of pulmonary consumption."

"Fin de Siècle Medicine" is the title of an article by Dr. A. Simons Eccles in the *National Review*. After animadverting upon "the deficiency of muscular activity as a fruitful source of maladies resulting from the want of combustion and elimination of material used up or vitiated by the disproportionate action of other organs and tissues," Dr. Eccles describes the investigations that have recently been carried out in France and Russia as to the action of certain organic liquids in curing or modifying disease. Writing on "Electricity and Life" in the *Humanitarian*, Mr. H. Newman Lawrence comes to the following conclusions:—

(1) All the thousand and one changes which take place in the structure of the living body, be they due to the never-ceasing and involuntary process of metabolism, or to the exercise of function, or to the effort of will, partake of the nature of chemical change.

(2) All chemical changes are accompanied by electrical manifestations.

(3) Without chemical change and interchange, life does not appear to exist.

(4) Therefore, life is always accompanied by the generation of electricity.

Electrical energy, however, is not the immediate source of the vitality of the body.

Mr. C. T. Buckland contributes an excellent anecdotal article on "Leopards" to *Longman's Magazine*. Hitherto the beast has occupied only a comparatively small space in the popular literature of natural history, and this fact makes Mr. Buckland's experiences doubly interesting. Under the title "Birds of a Feather," Mr. F. A. Fulcher describes in the *Sunday Magazine* the flocking and

migration of birds. Dr. J. G. McPherson gives a popular description in *Good Words* of Mr. John Aitken's fog-counter and the results that have been obtained with it. Finally, Miss Agnes Giberne expatiates upon celestial photography and spectroscopy in the *Monthly Packet*. The article is in continuation of an easily-worded series she is contributing under the title of "Sun-rays and Star-beams."

MARIÉ-DAVY.

DR. G. H. MARIÉ-DAVY, who died at Clamecy on July 16, distinguished himself in various branches of physical science. Astronomy, electricity, general physics, and meteorology, all occupied his attention from time to time, and to all of these branches of knowledge he made important contributions. Born at Clamecy in 1820, Marié-Davy entered the Higher Grade Normal School in 1840. Five years later he was appointed to the Chair of Physics at the Montpellier Faculty of Sciences, and also to the Professorship of Medicine. In 1862 Marié-Davy began his connection with the Paris Observatory. At first he had charge of the terrestrial magnetism service, but in 1863 he became the head of the international meteorological department that he had organised. While occupying this position he published a large number of meteorological memoirs and initiated the periodic distribution of reports and bulletins. He devoted himself chiefly to the study of the atmosphere and its changes, with special reference to the bearing of such matters upon agriculture and hygiene. In 1857 Marié-Davy invented a mercurous sulphate battery which was adopted by the French telegraph authorities, and also by some of the services in other countries. About this time he contributed numerous papers on statical, dynamical, and physiological electricity to various scientific societies and journals. During the revolution of 1870 he left the Paris Observatory and accepted a Professorship at the Polytechnic School—a post that he retained until the return of the Government to Paris. In 1887 he was nominated honorary director of Montsouris Observatory. Marié-Davy was a doctor of medicine and a doctor of physical and mathematical science. Among other honours he was a corresponding member of the Bureau des Longitudes, and an honorary president of the Société d'Hygiène. He was made a Chevalier of the Legion of Honour in 1877, and possessed the Brazilian Order of the Rose, as well as a number of other orders and dignities. The many and varied researches carried on by him, alone and in collaboration with other workers, testify to his greatness. He had a keen sense of right, and dared to give his opinion even when his material welfare was likely to be injuriously affected by so doing. A life so rich in results and void of dissimulation is one well worthy of being imitated.

NOTES.

M. PASTEUR has been elected an honorary member of the Vienna Academy of Sciences.

ON August 4, at about 6.45 in the evening, a distinct earthquake tremor was felt in Leicester and the neighbourhood. The wave passed from about south-west to north-east, and produced the maximum effect in Charnwood Forest. It is reported that the shaking lasted for about five seconds, during which a loud rumbling noise was heard.

A REUTER'S telegram from Vienna reports that a disastrous cloudburst occurred in Middle Styria on August 5. A number of houses were wrecked and several persons lost their lives. Two railway bridges were thrown down on the Grazkoeflach

Railway. At about half-past ten in the morning of August 8 two shocks of earthquake were felt in the Mur Valley. The tremors travelled from north to south.

A SINGULAR occurrence has recently been reported from Gamlingay, Cambridgeshire. What appeared to be a dense cloud was observed, but to the astonishment of the villagers the cloud suddenly broke up and showered myriads of ants and flies upon them. So numerous were the insects that they almost covered the ground like a carpet.

THE southern counties are suffering from a plague of wasps. Judging from the correspondence in the newspapers, the insect has been unusually abundant, and has done a large amount of damage in certain districts. At Heathfield, Sussex, more than a thousand nests have been destroyed this summer, and the work of destruction is still going on.

A GOLD medal of the value of 1000 Italian lire is offered by the Royal Academy of Science of the Institute of Bologna, to the author of the best memoir describing a new and efficacious system, or a new apparatus, for preventing or extinguishing fires. The memoir may be written in Italian, Latin, or French, and must be sent in before May 7, 1894.

THE Report of the Postal and Telegraph Conference held in Brisbane in March last has just reached us. At one of the meetings Sir Charles Todd strongly urged the desirability of adopting a uniform method of reckoning time, and after a short discussion the following resolution was passed:—"That it is desirable in the public interests that the hour zone system should be adopted in a modified form, so that there should be one time throughout Australia, viz. that of the 135th meridian or nine hours east of Greenwich."

MR. EDWIN E. HOWELL describes in *Science* a meteorite observed to fall on May 26, 1893. The meteorite entered the ground to a depth of about three feet at an angle of 58° with the horizon. It is an aërolite of very pronounced chondritic structure, and has the usual black glazed appearance. The weight of the mass is 22½ pounds, and dimensions 6 × 7 × 9½ inches. Mr. Howell proposes to give it the name of Beaver Creek, from the stream by the banks of which it fell.

THE *Reale Accademia dei Lincei* has issued a circular in which is given a list of the published papers of the late Prof. E. Betti. In honour of his memory it has been decided to collect and publish the whole of his scientific works, with an account of his life, written by the president of the Academy, Prof. F. Brioschi. In order that the collection may be as complete as possible, the circular asks all who have any unpublished letters of the famous geometrician, or a knowledge of works not included in the list, to communicate with Signore V. Cerruti, R. Accademia dei Lincei, Roma.

THE Society for Promoting Agricultural Science in Vienna will hold an international exhibition between April 20 and June 10, 1894. The exhibition will include specimens of economical food for the people, army supplies, appliances for saving life, means of transport, and sport in all its branches. This exhibition is being promoted by the Archduke Francis Ferdinand. Detailed information on the subject can be obtained from the Consul-General for Austria-Hungary, 11, Queen Victoria Street.

THE Board of Agriculture have been authorised by the Treasury to make arrangements, by way of experiment, for the transmission by telegraph of the weather forecasts, issued each afternoon by the Meteorological Council, to the telegraph offices in the rural districts of two typical counties, for exhibition in the office windows. The experiment will extend over the months of