used to the absolute exclusion of the other. The epoch, however, to which the present speculations relate is that in which he had not reached the present symmetric development of his intellect and of his bodily organs, and the inquiry is, Which mode of communication was earliest adapted to his simple wants and informed intelligence? With the voice he could imitate distinctively but few sounds of nature, while with gesture he could exhibit actions, motions, positions, forms, dimensions, directions, and distances, with their derivations and analogues. It would seem from this unequal division of capacity that oral speech remained rudimentary long after gesture had become an efficient mode of communication. With due allowance for all purely imitative sounds, and for the spontaneous action of vocal organs under excitement, it appears that the connection between ideas and words is only to be explained by a compact between speaker and hearer which supposes the existence of a prior mode of communication. This was probably by gesture. At least we may accept it as a clue leading out of the labyrinth of philological confusion, and regulating the immemorial quest of man's primitive speech.

SCIENTIFIC SERIALS

Verhandlungen des naturhistorischen Vereines der Preussischen Rheinlande und Westfalens, 1881. Zweite Hälfte.—We note here the following:—On some Anthozoa of the Devonian, by Prof. Schlüter.—The Stromatopora of the Rhenish Devonian, by Herr Bargatsky.—Geological sketch of a journey through Palestine and the Lebanon region, by Prof. von Rath.—On the building art of birds, reduced to its true value, by Prof Landois.—The beetle genus *Bruchus*, Linn., and especially *Bruchus pisorum*, Linn., by Herr Cornelius.—On new finds of saurian tracks in the Wealden Sandstone of the Bückeberg, by Herr Grabbe.—The Royal Mercury Works at Idria, by Herr Fabricius.—The zinc ore deposits of Wiesloch, by Herr von Decken.—Bone-remains from the Schipka Cave in Moravia, by Prof. Schaaffhausen.—Removal of an iron fragment from the eyeball with an electromagnet, by Dr. Samuelsohn.—Skulls from Kirchheim, by Prof. Schaaffhausen.—Influence of the use of transportable pneumatic apparatus on the circulation of a healthy man, by Prof. Finkler.—On a colossal femur of the horse, found in January, 1880, when removing part of a bank of the Wupper at Elberfeld, by Prof. Schaaffhausen.—On so-called cosmic dust from Dresden, by Prof. von Lasaulx.—New apparatus for continuous application of weak galvanic currents, by Prof. Finkelnberg.—On the earthquake of Ischia, March 4, 1881, by Prof. von Rath.—On eruptive gneiss in Saxony and Bavaria, by Dr. Lehmann.—Nerve-stretching; three cases, by Prof. Doutrelepont.

SOCIETIES AND ACADEMIES

LONDON

Aëronautical Society, July 17.—A paper, upon the action of the pectoral muscle in the flight of a bird, was read by Mr. Fred. W. Brearey. He said that it behoved all experimenters in flight to reduce their theories into a demonstrable form. It had often been stated for instance that the power exerted by a bird in its flight had been greatly exaggerated, but no one had hitherto proved his assertion. It was capable however of satisfactory proof by demonstrating artificially the action of the pectoral muscle, by the aid of which weight became an accessory to power. When the bird committed itself to the air the upward pressure in the wings stretched the elastic ligament, which formed part of the muscle, to such an extent as to allow of the bird gliding upon the air without any exertion. The weight of the bird was the measure of this elasticity. It was said by some that at least the bird must possess the power by the downward stroke of the wing to raise its own weight. But Mr. Brearey said that this was not an absolute necessity, because the reaction of this elastic ligament aided the force of the down stroke. He proceeded to verify his assertion by the action of a model, with wings of four feet spread, under which he had attached an elastic cord passing under the body of the model. Upon committal to the air this just allowed of the wings being expanded, so that the model would glide downwards. He then detached the cord and wound up his power, calling attention to the fact that he had wound the india-rubber strands thirty-two times. He showed however that although this was sufficient to create a vigorous flapping of the wing when held in the hand, yet when committed to the air it had not the power to give one downward stroke, and therefore it could only glide as before. Holding it again with the cord attached and the power wound up the same number of times, he showed that it was unable to flap the wing, because the two forces were exactly held in equilibrium. There was a third factor wanted before it could fly—and that was weight. The model being liberated, flight was well sustained, and upon being set free several times without being wound up any further, it appeared able to fly with a very weak power. The same thing was observable with another model, composed entirely of a loose surface thrown into a wave action—his own invention. Mr. Brearey remarked that this economy in flight can only be obtained by something of the nature of wing action, and must be wholly wanting in any apparatus actuated by the screw.

EDINBURGH

Royal Society, July 17.—Prof. Balfour, vice-president, in the chair.—Prof. Heddle read a paper on the sequence of rocks in the North-West Highlands, a point on which there had been and still was a great deal of controversy. The author had examined eighteen sections in the region around and to the north of Loch Maree, and had convinced himself that Murchison and Geikie were in the main correct. The succession of the rocks was found to be as follows:—Torridon Conglomerates, Lower Quartzite, Dolomite Series, "Logan" Rock, Upper Quartzite, Upper Gneiss. The dolomite does not extend so far west as the quartzite and Logan Rock, and is of no great lateral extent, but it stretches as a thin strip of shallow water deposit from end to end of the whole district.—Prof. Tait communicated a paper by Mr. Wm. Peddie on the rotation of plane of polarisation by quartz and its relation to wave-length. The spectrum of a ray of light which has been transmitted through the polariser, a piece of quartz, and the analyser, exhibits one or more absorption bands (the number depending upon the thickness of the quartz), which move along the spectrum as the analyser is rotated. By direct comparison of this spectrum with the ordinary solar spectrum in juxtaposition, the rotation for any Fraunhofer line can be estimated with considerable accuracy. The rotations were expressed in terms of the inverse even powers of the wave-lengths as far as the sixth.—Mr. W. W. J. Nicol, in a paper on the condition of ammonium salts when dissolved in water, explained the abnormal expansion of solutions of ammonium chloride and other ammonium salts by the partial dissociation on solution in water—an explanation suggested by the well-known fact that such salts become acid on boiling. This view of the matter seemed further to explain other anomalies in the behaviour of ammonium chloride solution—such for example as its surface tension investigated by Quincke, and its coefficient of absorption for carbon dioxide as determined by Mackenzie.—Mr. J. Y. Buchanan described a new form of solar calorimeter which he had used in Upper Egypt at the time of the last eclipse. The sun's rays were concentrated by suitable reflectors upon a glass tube, two inches long, which formed the upper end of a Liebig's condenser, and was mounted equatorially so as to follow the sun's motion. The heat was measured by the amount of water distilled in a given time. The results obtained were very satisfactory, agreeing with the results given by other methods.—Prof. Crum Brown read a continuation of the paper by Messrs. Laurie and Burton, on the heats of combination of the metals with the halogens, estimated from electromotive force observations. Their result for the heat of combination of zinc with iodine in the presence of water differed by barely 2 per cent. from Andrews' value. Other results did not agree so well; but this was hardly surprising where so many factors entered into the experiments. The most accurate method was no doubt to let a chlorine, iodine, or bromine cell with given poles run down in a calorimeter and estimate the heat so given out.—Professor Brown also communicated a long paper by Mr. W. L. Goodwin, on the nature of solution, in which the author made a careful investigation into the solution of chlorine in various liquids at different temperatures. Experiment showed that there was in many cases a temperature of maximum solubility, a fact which Mr. Goodwin explained as due to the formation at lower temperatures of a chlorine hydrate whose rate of increase of solubility with increase of temperature quite masked the simultaneous decrease of solubility of the gas until a temperature was approached at which the chlorine hydrate could no longer exist.—The second part of the description of new and little-known phanerogamous plants from Socotra, by Prof. Bayley Balfour, was received as read.—The chairman, in bringing to a close the hundredth session of the Society, gave a brief review of the session's work.

BERLIN

Physiological Society, July 14.—Prof. Du Bois Reymond in the chair.—Dr. Friedländer spoke *à propos* of a paper by Dr. Baginski at the last meeting, on the cells of the stomach-wall, and presented some microscopical preparations. Dr. Brösicke gave a summary report on the results of his investigation of normal bone-tissue. With a very favourable preparation, a bone 200 years old, he could explain the nature of the "bone-corpuscles" observed in fresh bones, for he was in a position to inject them from the Haversian canals with a coloured mass. Thereby was proved the existence of lacunæ, which, by their outrunning parts, communicate with the Haversian canals. The entire bone-traversing system of cavities, lacunæ, their outrunners, and the canals, are inclosed in a proper skin, the limiting membrane, which Dr. Brösicke was able to isolate and investigate chemically. The limiting membrane hereupon showed reactions, which essentially distinguish it from the intercellular substance, and which entirely agree with the reactions of horn-tissue; it was therefore named the "Keratin-layer." The contents of the lacunæ are very different in different stages of development of the bone. In the embryo, the lacunæ are quite filled with protoplasm; later, the protoplasm retires from the intercellular substance, and a distinct interval between the latter and the protoplasm-cell can be observed; at this stage, probably, arises the "keratin-layer." At a further stage of development, the contents of the lacunæ are transformed into fat, the cells of which abundantly fill the cavities. The fat cells then fall asunder into detritus, which is gradually dissolved, so that the lacunæ remain empty, or, as the author supposes, filled with a gas, probably carbonic acid. The proper lime-containing bone-substance consists of fibres of the nature of connective tissue, which are bedded in lines in different directions, make up the layers of bone-material, and are held together by a structureless lime-containing cement-substance. This structure of the lime containing bone-tissue has been described before, and Dr. Brösicke has merely been able to confirm former data; but what is specially to be noted as new, among the results of the inquiry, is the demonstration of a limiting membrane clothing the entire system of cavities, and its keratin-like character.

VIENNA

Imperial Academy of Sciences, July 6.—W. Biedermann, on the morphological changes of the lingual glands of the frog by stimulation of the glandular nerves.—H. Hammerl, on rainbows formed by liquids of different index of refraction.—F. Streintz, experimental researches on galvanic polarisation (first part).—R. Prescher, on the mucous organs of Marchantieæ.—G. Schmidt, on the internal pressure and energy of superheated steam.—S. Mayer, studies on the histology and physiology of the vascular system (preliminary communication).—T. V. Tanowsky, on the nitro-derivates of azobenzene-parasulphonic acid.—T. Kajaba, a contribution to the theory of polar planimeters used in practice.—F. Kreuter, a sealed packet with the inscription "On a new process of preservation of railway-sleepers."—T. Holletschek, on the orbit of the planet Ate (111).—G. Vortmann, on a new method for the direct determination of chlorine besides bromine and iodine.—Zd. H. Skraup, synthetical experiments on the chinoline series (part 4).—Zd. H. Skraup and G. Vortmann, on the derivates of dipyridyl.

PARIS

Academy of Sciences, July 24.—M. Jamin in the chair.—The following papers were read:—New researches on the propagation of explosive phenomena in gases, by MM. Berthelot and Vieille. They study the behaviour of a great variety of mixtures, and find a very fair agreement between the theoretical velocity and that observed. The velocity of translation of the gaseous molecules, keeping all the kinetic energy which corresponds to the heat liberated, may be considered as a limit representing the maximum velocity of propagation. This velocity is diminished by contact of gases and other foreign bodies, also when the gas inflamed at first is too small and too quickly cooled by radiation, also when the elementary velocity of the chemical reaction is too weak (as with carbonic oxide).—Separation of gallium, by M. Lecoq de Boisbaudran. This relates to separation with cobalt, nickel, and thallium.—Dilator sympathetic nerves of vessels of the mouth and the lips, by MM. Dastre and Morat.—Theory of the diurnal motion of the axis of the earth, by M. Folie. He finds a diurnal precession and nutation which are far from insignificant and may become sensible to observation for circumpolars, even supposing the earth solid in the interior.—M. Faye made some remarks on Tom. I. of the Annals of the Observatory of Rio de Janeiro, sent by the Emperor of Brazil.—Observations of solar spots and faculæ, at the Royal Observatory of the Roman College, during the first half year of 1882, by M. Tacchini. The spots showed a secondary minimum in January, both in frequency and in size. There was increase till April, then rapid diminution. On no day were spots absent. The maximum will probably occur this year. The faculæ were pretty numerous from the first.—Latitudes of groups of solar spots in 1881, by M. Ricco (see Notes).—On the orbit of Japhet, by Mr. A. Hall.—Rapid solution of the problem of Kepler, by M. Zenger.—On the chemical work produced by the battery, by M. Tommasi.—The chromic acid couple as used by Favre (positive electrode platina) produces an exterior chemical work equal to about 65 calories. Substituting for the platina, carbon or spongy platina, one may get 20 calories more (*i.e.* about 85 calories).—On the variation of friction produced by voltaic polarisation, by M. Krouchkoll. He has found that polarisation by oxygen increases the friction, while polarisation by hydrogen diminishes. He describes his apparatus.—On the amplitude of telephonic vibrations, by M. Salet. On the iron plate of a Bell telephone were fixed two small glass discs giving Newton's rings. On speaking loudly to the telephone at 5m. or 6m. distance, the rings lose distinctness and disappear. To estimate the displacement by a continuous sound, a disc with slits was rotated before the instrument; with a certain velocity the rings return; and on then blowing through the disc, the sound proves to be in unison with that of the telephone. The amplitude of vibration of the telephone plate was estimated at two to three ten-thousandths of a millimetre.—Researches on the use of crusher-manometers, &c. (continued), by MM. Sarrau and Vieille. With the same density of charge, the maximum pressure of picrate of potash and dynamite are shown to differ considerably, though with one piston they had nearly the same crushing force.—Reproduction of calcite and of witherite, by MM. Miron and Bruneau.—On the vaporisation of metals in vacuo, by M. Demarçay. This was effected at comparatively low temperatures; the volatility of cadmium was proved at 160°, zinc at 184°, antimony and bismuth at 292°, lead and tin at 360°. The deposits in 24 to 48 hours were weighable (5 to 15 mgr.).—On the determination of astringent matters in wine, by M. Girard. He employs catgut, utilising its tendency to combine with those matters.—Law of congelation of benzenic substances in neutral substances, by M. Raoult. Acetones, aldehydes, ethers, hydrocarbons, and their derivatives, dissolved in a given weight of benzine in quantities proportional to their molecular weights, all lower the freezing-point of this liquid the same number of degrees.—Means of artificially conferring immunity against symptomatic or bacterian charbon, with attenuated virus, by MM. Arloing, Cornevin, and Thomas.—On Lieberkuehnia, a multinucleate rhizopod of fresh water, by M. Maupas.—On the fossil flora of Tong-King coal, by M. Zeiller.—New researches (physiological and therapeutical) on globularine, by MM. Heckel, Mourson, and Schlagdenhauffen. Globularetine is the purgative principle, and in a leaf-decoction the action is greater, on account of associated mannite.

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