sive gold-mines imperfectly, and chiefly by the help of the women, to whom falls the chief share of providing for the wants of the community, but who, after marriage, enjoy great freedom, although the young girls are kept under strict supervision.—On the human bones found in France in caverns belonging to the Quaternary age, by M. Cartailhac. Of such finds, none can be referred to the early period of the Saint Acheul, or Chelles deposits, the oldest belonging apparently to the Mousterian age, while the most abundant human remains are found in the comparatively recent beds of Solutré and La Madelaine. The former of these are remarkable for the enormous number of horse-bones accumulated about the stone hearths and in the kitchen-middens of this station. According to Dr. Cartailhac, 40,000 skeletons might be reconstructed from these equine remains, which seem to have been exposed to the action of fire, the greater number of the bones having been broken for the extraction of the marrow, whence he assumes that the horse must have reached its maximum development and served in the place of all other game at the period of the Solutré deposits. The writer compares together the human and other remains found in various Mediterranean and inland caves, with the special object of ascertaining how far the condition and mode of deposition of the skeletons can throw light on the vexed question whether the great preponderance of fractured over whole bones in these primæval graves indicates the practice of cannibalism, or whether it may not be dependent on the observance of special modes of burial, involving the burning or dismemberment of the body after death.—The facial angle proposed by Cuvier and Geoffroy Saint-Hilaire for comparative anatomical determinations and for measuring facial differences in the living subject, by Dr. Collignon. The writer, who considers at length the merits of the various angles proposed by Camper and others, concludes by showing the superiority, for practical purposes, of adopting Cuvier's facial angle, measured by Topinard's goniometer for determining the median angle.

SOCIETIES AND ACADEMIES

PARIS

Academy of Sciences, October 26.—M. Jurien de la Gravière, President, in the chair.—On the unequal flow of gases, by M. Haton de la Goupillière. In continuation of his recent communication on this subject the author here deals with the reverse problem of a receptacle originally filled with compressed air discharging itself freely into the atmosphere.—On the intensity of the magnetic field in dynamo-electric machines, by Marcel Deprez. Assuming that the most important element of a dynamo-electric machine, whether employed as a generator or receiver, is the magnetic field, the author deals with the influence of the deviation of the magnetic pieces, and shows that, contrary to the opinion of certain electricians, the intensity of the field decreases far less rapidly than the distance of the magnetic pieces increases. The influence of the dimensions perpendicular to the lines of force is also considered.—Researches on the decomposition of the bicarbonate of ammonia by water, and on the diffusion of its components through the atmosphere, by MM. Berthelot and André. From the experiments here described, the authors are led to the conclusion that it is the diffusion of the carbonic acid that determines the decomposition by water of the bicarbonate of ammonia, and consequently the transport of the ammonia itself. These results are of the greatest importance even for the purely physical study of the circulation of gases between the ground, the waters, and atmospheric air, apart altogether from the phenomena of vegetation.—Note accompanying the presentation of his work entitled "An Introduction to the Study of the Human Races," by M. de Quatrefages. This is the first volume of the "Bibliothèque d'Ethnologie," edited jointly by the author and M. Hamy. It contains a summary of the views expounded in greater or less detail in his other writings, while dealing more fully with a number of other matters, which he had hitherto merely indicated, or else entirely neglected for lack of the fresh data and discoveries which now enable him to discuss them seriously. One of the most important is the question of prehistoric man, and he now shows that even in Quaternary times the human race had already spread over the whole earth to the remotest extremities of the Old and New World. This ubiquity of Quaternary man already suggested the existence of the species in the previous epoch, and direct proofs of this fact have recently been multiplied to such an extent that the presence of man in Europe during Tertiary times may now be regarded as placed beyond reasonable doubt, although his presence in America is not yet established. The results yielded by palæontology, geology, and even history point to the extreme north of Asia as the cradle of the human race and the centre of dispersion, which had already begun in Tertiary times. Here also were differentiated the three fundamental types, to which all races may still be reduced, as well as the three linguistic types diffused throughout the globe. It is further shown that hypsistenocephaly is the main feature distinguishing the American from the European primitive race, and that the man of Canstadt, hitherto regarded as the oldest Quaternary type, in reality dates back to the Tertiary epoch.—Note on the meteorite which fell on January 27, 1886, at Nammianthul, in the Presidency of Madras, by M. Daubrée. This meteorite, a specimen of which has been received from Mr. Medlicott, of the Indian Geological Survey, presents the ordinary characters of the group of small sporadic asters.—Experiments on the transmission of force by means of a series of dynamo-electric machines coupled together, by M. Hippolyte Fontaine. These important experiments (carried out with seven Gramme machines, under the inspection of the Commissioners, MM. Bertrand, Becquerel, Cornu, Maurice Lévy, Marcel Deprez, and Mascart) show that it is possible to transmit an effective force of fifty horse-power through a resistance of 100 ohms at a loss of less than 50 per cent.—On algebraic surfaces capable of a double infinity of birational transformations, by M. E. Picard. In supplement to his previous communication on algebraic surfaces, the author here shows that, for all surfaces capable of a double infinity of birational transformation, the co-ordinates of any given point are expressed by the uniform (Abelian) functions of two parameters.—On the transformation of surfaces in themselves, by M. H. Poincaré. It is shown in connection with M. Picard's theorem that, in certain cases, the Abelian functions may degenerate into triply periodical, elliptical, or even rational functions.—Extension of Riemann-Roch's theorem to algebraic surfaces, by MM. Noether.—On the recomposition of white light by means of the colours of the spectrum, by M. Stroumbo. A process is described by means of which the recomposition of white light is effected, taking as the starting-point the very colours of the spectrum, and utilising, as in Newton's experiment with the disk, the persistence of the images on the retina.—Note on the principal showers of shooting-stars and the aurora borealis, by M. Ch. V. Zenger. A careful study of M. Rubenson's great Catalogue of the Auroras from 1800 to 1877 has unexpectedly revealed the fact that August 10 and November 14 show a great frequency of these lights, thus coinciding with the periods of the shooting-stars and suggesting a connection between these two orders of phenomena.—Influence of the amplitude of the lunar oscillation in declination on the shiftings of the northern trade-winds, by M. A. Poincaré. A study of the tables for 1880-83 shows certain relations between these phenomena, which, however, differ greatly according to the seasons.—On the phenomena associated with the heating and cooling of molten steel, by M. Osmond. It is shown that, as the quantity of carbon is increased, the temperature of transformation of the iron is lowered, and that of recalescence raised, so that both coincide in the hard steel.—Saturation of normal arsenic acid by the water of baryta, by Ch. Blarez.—On the function of the semicircular canals of the inner ear, by M. Yves Delage. The chief function of this apparatus, as already recognised by Goltz, Flourens, and others, is shown to be distinct from that of the auditory sense, and connected rather with the rotatory movements of the head, either alone or with the body.—On Syndesmis, a new type of Turbellariæ described by W. A. Sillimann, by M. Ph. François. This organism is shown to be, not an ectoparasite of the large green nematoid, as supposed by Sillimann, but a true endoparasite of *Strg. lividus*.—On two Synascidians new to the French sea-board (*Diazona hebridica*, Forbes and Goodsir, and *Distaplia rosea*, Della Valle), by M. A. Giard.—Organisation of *Lepidomenia hystrix*, a new type of Solenogaster, by MM. Marion and Kowalevsky.—On the Gephyrians belonging to the family of the Priapulidæ collected by the Cape Horn Mission, by M. Jules de Guerne. The discovery of these organisms is a remarkable instance of the presence in the southern seas of forms almost identical with those of the Arctic Ocean.—The simple epidermis of plants considered as a reservoir of water, by M. J. Vesque.—Remarks on *Poroxylon stephanense*, by MM. C. Eg. Bertrand and R. Renault.—On

the taxonomic importance of the petiole, by M. Louis Petit.—On the reproductive organs of vegetable hybrids, by M. Léon Guignard.—On the relations of geodesy and geology: a reply to the observations of M. Faye, by M. A. de Lapparent.

BERLIN

Meteorological Society, October 5.—Dr. Brix, in the name of the Telegraph Administration, handed over to the Society a paper containing the results of observations respecting earth-currents instituted through the medium of German telegraph lines, and giving a brief history of these investigations.—Dr. Assmann spoke of the thunderstorms of the summer of 1886.

Physical Society, October 22.—Prof. von Helmholtz in the chair.—Prof. Börnstein communicated the results of his investigations into the thunderstorms of July 1884. The days from July 13 to 17 were very prolific in thunderstorms, and respecting them the speaker had collected and elaborated observations from more than 200 stations in Germany. For twenty-four separate thunderstorms, drawings were made of the "isobronts," isobars, and isothermals, from which it appeared that a fall in the barometer always preceded the outburst of the storm; that with the occurrence of the sinking of the barometer the atmospheric pressure rose very steeply and then relapsed gradually to its former level; and that the temperature, which was very high before the storm, declined rapidly with the outbreak of the storm. Local observations had formerly led to the same result. The "isobronts," or the lines uniting the places where the first peal of thunder was simultaneously heard, had in general a north-south direction. The "isobronts" made the passage from west to east with an average swiftness of from 38 to 39 kilometres an hour. The "isobronts" were attracted by the mountains, so that the part in whose west-east direction a mountain was situated approached it sooner, and, after the passage of the "isobront," delayed there longer than did the remaining part. Rivers retarded the progress of thunderstorms, and small thunderstorms often terminated at large rivers without crossing them. This relation of thunderstorms to mountains and rivers might be explained on the assumption that the storms were caused by ascending air-currents. When such an ascending air-current approached a mountain, then the mountain hindered the horizontal air from flowing in at the anterior side of the ascending current. The air flowing in at the posterior side, on the other hand, thereby obtained the preponderance, and urged the phenomenon with all the greater force to the mountain. The reverse occurred after the thunderstorm had surmounted the mountain. The horizontal currents in front then obtained the preponderance, and delayed the progress of the storm. The influence of the rivers found its explanation in the fact that the air above the water was considerably cooler than the air above the land, whereby a descending air-current was continuously maintained, operating in opposition to the ascending current of the thunderstorm, to the possible degree even of annulling it. The speaker had been able artificially to produce an imitation of all these processes by causing, in accordance with the directions of Dr. Vettin, visible currents to ascend in a glass box filled with tobacco smoke, by means of local depressions of temperature, by setting these currents in constant motion, and making them strike against obstructions (corresponding with the mountains), as also on descending currents which were likewise artificially created. In the discussion which followed the above address, Dr. Vettin laid stress on the fact that precisely at the moment when the barometer mounted steeply from its lowest position, the thunder followed the lightning most rapidly, and discussed how, in accordance with his conception of the nature of thunderstorms, by the curving round of the ascending air-current, a whirling movement round a horizontal axis came into shape, whereby, as determined by its situation and its extent, were produced thunderstorms, sleet, and hail.—Prof. von Helmholtz described the formation of a thunderstorm observed by him in Rigi-Kaltbad. From a free point of prospect, allowing a survey of the plain as far as the Jura, he observed how the lower warm and moist layer of air was distinguished by a sharp horizontal boundary of somewhat long strips of cloud from the upper dry and cooler air. The cloud-masses resembling the stripe-shaped cirri diffused themselves and formed a coherent level boundary-layer between the two air-masses. He next noticed, at different spots, balls of cloud arise above the boundary-layer, evidently as the effects of ascending air-currents. The different cloud-heaps then rose higher and grew into larger cloud-masses within which different electric sparks leapt from one spot to another. It was only subsequently that he saw the lightning fly downward to the earth. At last a heavy rain rendered the lower air-mass, bounded by the horizontal cloud-basis occupying a position nearly at a level with the height of the stand-point, which had hitherto been clear, opaque. The phenomenon had developed itself under weather in which the wind was at rest, and could be followed very precisely into its details.—Prof. Schwalbe reported on an investigation of Herr Meissner, who, in the Strasburg Laboratory, had determined the warmth effect on the wetting of powdery bodies. In the way of powder were used amorphous silicic acid, glass, emery, carbon; as fluids, distilled water, benzol, and amyl alcohol. In all cases an increase of temperature was observed.

BOOKS AND PAMPHLETS RECEIVED

La France en Indo-Chine: Bouinais and Paulus (Challamel, Paris).—Zeitschrift für Wissenschaftliche Zoologie, October 1886 (Engelmann, Leipzig).—Huddersfield Technical School Calendar for 1886-87 (Broadbent, Huddersfield).—Student's Hand-Book of Historical Geology: A. J. Jukes-Browne (Bell and Sons).—Units and Physical Constants, 2nd edition: J. D. Everett (Macmillan and Co.).—Principles and Practice of Canal and River Engineering, 3rd edition: D. Stevenson (Black, Edinburgh).—Monthly Weather Report, June 1886.—Quarterly Weather Report, January to March 1886.—Report of the United States Commission of Fish and Fisheries, Part 11, for 1883 (Washington).—Phantasms of the Living, 2 vo's.: Gurney, *Myers, and Podmore* (Trübner and Co.).—*Den Norske Nordhaus Expedition, 1876-78*, XV. Zoologi; Crustacea, II.: G. O. Sars (Grondahl, Christiania).—Bulletin of the U.S. National Museum, No. 30: J. B. Marcou (Washington).—Proceedings of the Society for Psychical Research, October (Trübner and Co.).—Scientific Prevention of Consumption: G. W. Hambleton (Churchill).

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