cession of the placental mammals, said the first thing that the record suggested was the rapidity with which the most divergent groups made their appearance. Of course, there was no real basis for an assumption of a coeval creation, so to speak. It might be fairly held, on zoological grounds, that we ought not to separate man and monkeys, but retain them as one of the twelve groups under the ordinary title of primates. He adopted the division of the placental into twelve groups, not from any rigid belief as to their separate equivalences, but because they were not only sufficiently distinctive for all practical purposes, and also formed on the whole perhaps the finest expression of grouping which science could at present afford. After dwelling at great length upon the succession of the various groups, he stated that as regarded the highest of all, the placental series, he would only say that, as he understood the doctrine, the strictest demand of the development theory did not require, as was too commonly supposed, a lineal descent as between bimana and quadrumana; but it was certainly held that either of these groups, as we now knew them, might have been separately evolved from more generalised primatal types, the intermediary terms being possibly connected by a long antecedent and far more generalised common progenitor. In that connection the most advanced evolutionist must candidly own that the assumedly missing tertiary primatals constituted a great and very natural bar to the complete and popular acceptance of the theory of descent by natural selection. On the other hand, the scientific naturalist, whilst admitting these serious deficiencies, threw into the opposite scale a multitude of considerations, the collective value of which seemed to him to outweigh all the data thrown into the anti-continuity side of the balance. For himself, in conclusion, he said that his necessarily limited application of those data was amply sufficient to enforce upon him the provisional acceptance of any theory of continuity. To his mind, its clear application irresistibly implied that nature, to use an old phrase, was but a series of harmonies—wheel within wheel, there being probably but one wheel differing only from all the wheels of whose limits it was not possible for them to conceive. However, in the contemplation of the phenomena presented to them within that wheel—or that realm of "orderly mystery," as the president had called it—there was ample room and verge for the display of the highest physiological attributes with which man was endowed.

Department of Ethnology and Anthropology

The report *On the Heat Generated in the Blood in the Process of Arterialisation*, by Dr. Arthur Gamgee, was taken as read.

New Physiological Researches on the Effects of Carbonic Acid.—Dr. B. W. Richardson. The author explained that the observations he had made were new in that they related to the direct action of carbonic acid on animal and vegetable fluids, and they were interesting, equally to the zoologist and botanist as to the anatomist. The author first demonstrated the result of subjecting a vegetable alkaline infusion to the action of carbonic acid under pressure. The result was a thick fluid substance which resembled the fluid which exudes as gums from some trees. When the fluid was gently dried it became a semi-solid substance, which yielded elastic fibres. This observation had led the author to study the effect of carbonic acid on albumen, serum of blood, blood itself, bronchial secretion, and other organic fluids. When the serum of blood was thus treated with carbonic acid under pressure and general warmth, 96° F., the collodial part was separated; but when the blood, with the fibre removed from it, was treated, there was no direct separation, the blood corpuscles seeming for a time to engage the gas by condensation of it. But blood containing fibrine, and held fluid by tribasic phosphate of soda, was at once coagulated by the acid. The bronchial secretion is thickened by carbonic acid, and a tenacious fluid is obtained, resembling the secretion which occurs in asthma and bronchitis, while secretions on serous surfaces are thickened and rendered adhesive. After details of many other facts, Dr. Richardson concluded by showing what bearing this subject had of a practical kind. In the first place, the research had relation to the question of elasticity of organic substances; and, secondly, on the direct action of carbonic acid in the production of vegetable juices. But the greatest interest concentrated on the relation of the research to some of the diseases of the animal body. Thus in instances where the temperature of the body is raised and the production of carbonic acid is excessive, the blood on the right side of the heart has its fibrine often precipitated, and in many other cases fibrinous or albuminous exuded fluids are solidified, as is the case in croup. The author, in the course of his paper, explained how rapidly blood charged with carbonic acid absorbed oxygen when exposed to that gas, and he held that carbonic acid in the venous blood was as essential to the process of respiration as was the oxygen in the pulmonary organs.

SCIENTIFIC SERIALS

Journal of the Chemical Society, October, 1870.—The first paper in this number is by Dr. Divers, "On the Precipitation of Solutions of Ammonium Carbonate, Sodium Carbonate, and Ammonium Carbamate by Calcium Chloride." These results obtained by Dr. Divers are the following:—Calcic carbamate is soluble, and the presence of ammonia retards its transformation into carbonate. When carbonic anhydride is passed into an ammoniacal solution of calcic chloride, the carbamate is first formed, and is gradually precipitated as carbamate. This paper is followed by nearly two pages of Addenda et Corrigenda to the author's previous memoir.—"On the Manipulation of Gold and Silver Bullion," by Charles Tookey, Assayer in the Japanese Imperial Mint, formerly in the Royal Mint, Hong Kong. In this paper the author gives descriptions of two of the processes that he has adopted. Instead of boiling the cornets in separate parting flasks, he uses a series of perforated platinum tubes, supported in a porcelain plate. A number of cornets are, by this means, simultaneously submitted to the action of the nitric acid. Secondly, in order to clean the buttons, they are placed with the lower side uppermost on a platinum plate with depressed perforated cavities, which is plunged into hot dilute hydrochloric acid, afterwards into hot water acidulated with hydrochloric acid, and lastly into pure water. The plate is then drained by placing it on porous paper and dried over a gas flame.—"On some new Bromine Derivatives of Coumarin," by W. H. Perkin, F.R.S. On adding coumarin to bromine in the presence of carbonic disulphide, allowing the solution to evaporate, and crystallising the residue from alcohol, dibromide of coumarin $C_9H_6O_2Br_2$ is obtained. When coumarin and bromine in carbonic disulphide are digested at 140°, bromo-coumarine $C_9H_5BrO_2$ and dibromo-coumarin $C_9H_4BrO_2$ are produced, and are separated by crystallisation from alcohol, in which the latter is the less soluble. Dibromo-coumarin fuses at 174°, and distils nearly unchanged. It crystallises from alcohol in small needles. Bromo-coumarin fuses at 110°, and crystallises from alcohol in transparent prisms, often beautifully curved. When heated with solution of potassic hydrate both the bromo-compounds dissolve, producing crystalline salts, probably containing the bromo-coumaric acids.—"On Organic Matter in Water," by Mr. C. Heisch. The author has observed that certain waters which are known to be contaminated with sewage matters, give rise to the formation of a microscopical fungus when a small quantity of sugar has been added, and the mixture exposed to light for a few days at the temperature of 60°-70° F. Six drops of sewage from which the solid matter had settled, were mixed with 10,000 grains of West Middlesex and New River water; to 6 oz. of the mixture 10 grains of pure sugar were added, and 10 grains were also added to 6 oz. of the water without sewage; these solutions, and some of the mixture of water and sewage, were placed at a window. The water containing the sewage and sugar became turbid in 24 hours, the other liquids remaining clear. On examining the turbid water with an $\frac{1}{8}$ inch object glass, it was found to be filled with small spherical cells, with, in most cases, a very bright nucleus, which group themselves in bunches like grapes; they then spread into strings, with walls surrounding and connecting the cells; the original cell walls afterwards break, leaving tubular threads branched together. After several days, an odour of butyric acid is perceived. One drop of fresh urine in 10,000 grains of water produced similar effects; though without the addition of the sugar, the water might be kept for weeks without becoming turbid. Filtration through Swedish paper, or boiling for half an hour, does not prevent the growth of the fungus. The water no longer exhibits this property, however, after passage through a good bed of animal charcoal, that is, if the charcoal is frequently exposed to the air. If the filtration is continuous, the filtrate soon becomes as bad as the original water.—"On the Methods for the Determination of Carbon in Steel," by Mr. W. D. Herman. The author has obtained very concordant results by burning the iron or steel in a current of oxygen, the iron is converted into ferric oxide and the carbonic anhydride collected in

potash bulbs and weighed. Some results obtained by four different methods of estimating the carbon in iron and steel are given at the conclusion of the paper.—"On the Determination of Phosphoric Acid," by Mr. W. C. Williams. The author suggests a modification of the process for separating phosphoric acid from the alkaline earths originally proposed by Reigsig.

SOCIETIES AND ACADEMIES

BRISTOL

Observing Astronomical Society.—Report of observations made during the period from Aug. 7 to Oct. 6, 1870, inclusive.

Solar Phenomena.—Mr. Thomas G. E. Elger writes:—The magnificent display of solar spots observed in August was repeated, though in a rather less striking manner, during September. Between the 7th and 12th the spots were small, few in number, and mainly confined to the S. hemisphere; on the 11th only three moderately-sized groups were visible. The immense group observed last month, and which was near the centre of the disc on August 30, was due at the E. limb about the 17th, but owing to unfavourable weather and absence from home, I did not notice it till the 24th, when it measured 2′ 45″ × 1′ 50″ without including the outlying penumbra which followed it; its length on the 25th was 3′ 0″. The penumbra of this group presented some remarkable features. It contained four large umbræ and many smaller ones; on the preceding side it was thickly studded with minute dots of every shade from black to light brown. When examined with a power of 180 at 3h on the 25th, the entire group was evidently undergoing rapid and violent changes, the striation of the penumbra and the dark "spurs" and serrated edges of the umbra clearly indicating the cyclonic nature of the forces involved. The above group was preceded by a very long and narrow V-shaped spot, which occupied nearly the same position as a large spot observed in August. Several other groups were observed during the month, which presented interesting details, but they were generally smaller than the August groups. The appearances exhibited by the large group described above, and indeed by most spots of a similar class observed this year, seem altogether opposed to the "deep excavation" theory of sun spots.—Mr. T. W. Backhouse, of Sunderland, reports "a very fine group of spots passed the sun's centre in the northern zone on September 21; on Sept. 23, at 21h 15m, it contained two very long penumbræ, which were not widely separated; the *f* one was 74,000 miles long, and the *p* one 92,000! On the 25th, at 19h 45m, it was only 66,000 miles long, and the *f* penumbra was divided into two. Another very fine group, also in the N. zone, passed the sun's centre on the 24th. The dimensions in miles of its chief spot were as follows:—

Date.	Time.	Penumbra. Length.	Penumbra. Width.	Umbra. Length	Umbra. Width.
Sept. 21	5h 15m	——	47,000	26,000	11,000
,,	21h 25m	abt. 72,000	50,000	31,500	——
22	3h 25m	50,000	——	29,500	——
23	21h 25m	63,000	——	——	——
25	21h 30m	abt. 70,000	——	——	——

On the 23rd, at 4h 40m, I found it was divided into four, apparently by a violent current in the middle from *p* to *f*".—Mr. William T. Dunning, of Bristol, observed the large spot visible on September 21; with his 4-inch metallic reflector he could very distinctly see a black nucleus in the S part of the umbra. It did not appear to be actually enclosed within the umbra, but was situated on the margin of the penumbra.—Mr. E. B. Knobel, of Burton-on-Trent, says that on Sept. 25 the large group near the centre of the disc measured 2′ 54″ by 1′ 44″; on the 26th the two largest groups were equal in length to 2′ 44″ and 2′ 36″ respectively. They were distinctly visible to the naked eye.—The Rev. S. J. Johnson, of Crediton, writes that on September 21, at 4h 30m, a power of 70 on a 2¼-inch *O. G.* showed penumbræ on, at least, 26 spots visible on the sun. On September 20 "seven spots were very large indeed, and arranged in five groups, each scattered over a large surface."—Mr. Albert P. Holden, of London, referring to the large spot, says that on September 20, "when entering on the solar disc it appeared as an elongated spot with a bright arm stretching over half the umbra till it joined a projection on the N. side. It was followed by a large broken group of broken masses of various dimensions. On the 23rd, at 8 A.M., the chief spot had enlarged considerably, while the broken ones following it had very much decreased. The great spot was very nearly divided into two by a very broad arm springing from the N.; the W. portion of the umbra being again subdivided by a similar arm on the S. side. This last was on one side broken up very peculiarly, so that it presented the appearance as if a handful of bright straw had been thrown carelessly upon it. The eastern portion of the umbra was crossed by a very bright curved streak, which was so bright and so clearly distinct right up to its edges as to appear more like a carved piece of silver. On the 24th, at 8 A.M., the broken mass before referred to as following the chief spot had almost disappeared, with the exception of one small spot and a small amount of penumbra. The great spot was also a little smaller and quite divided by the broad arm. A large crack appeared in this latter. Each of the two portions of the original spot were also divided by luminous bridges across them. On the 28th the appearance of the umbra was much the same, although the penumbra was entirely changed and a great narrow branch had projected S. to an immense distance. This great arm was dotted here and there with a few patches of umbra. The broken mass which had followed the great spot at its first appearance was now entirely dissipated. On the 29th the two portions of the original spot were widely separated and much contracted, and two spots to the S. which had hitherto been of very small size much increased in dimensions. The rotation of the solar orb then carried the spot out of sight. The principal fact impressed upon the mind by these observations is that a spot becomes dissipated in consequence of its continual division and subdivision by the projection of luminous bridges across its various portions.

DIARY

THURSDAY, NOVEMBER 10.

LONDON INSTITUTION, at 7.30.—Acoustics of the Orchestra: Dr. W. H. Stone.

LONDON MATHEMATICAL SOCIETY, at 8.—Annual General Meeting. Recent Researches on Quartic and Quintic Surfaces: By Prof. Cayley.—The Retiring President's Address.

FRIDAY, NOVEMBER 11.

ASTRONOMICAL SOCIETY, at 8.

MONDAY, NOVEMBER 14.

LONDON INSTITUTION, at 4.—Chemical Action: Prof. Odling.

TUESDAY, NOVEMBER 15.

ANTHROPOLOGICAL SOCIETY, at 8.—Observations on the Condition of the Blood-Corpuscles in Certain Races: Dr. R. H. Bakewell.—Tribal Affinities among the Aborigines of Australia: Mr. C. Staniland Wake.—Description of Australian Aborigines and Half-Castes, with Exhibition of Skulls: Dr. Robert Peel.

ZOOLOGICAL SOCIETY, at 9.—On the Form and Structure of the Manatee (*Manatus Americanus*): Dr. J. Murie.—Observations on the Salmonidæ in Tasmania: Mr. Morton Allport.—On the Anatomy of *Ailurus fulgens*: Prof. Flower.

STATISTICAL SOCIETY, at 7.45.—On the Claims of Science to Public Recognition and Support, with Special Reference to the so-called "Social Sciences": Dr. Guy, F.R.S.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.

THURSDAY, NOVEMBER 17.

LINNEAN SOCIETY, at 8.—On the *Passifloreæ*: Dr. M. T. Masters.—On the White-beaked Bottle-nose: Dr. James Murie.

CHEMICAL SOCIETY, at 8.—Mineralogical Notices: Prof. N. Story Maskelyne and Dr. Walter Flight.

LONDON INSTITUTION, at 8 30.—Acoustics of the Orchestra; Wind Instruments: Dr. W. H. Stone.

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