dispersion would not weaken the phenomenon to such an extent as perhaps to render it impossible to see anything at all.

The second method, to which he is inclined to give the preference, consists in attaching to the eye-piece of a good telescope a spectroscope which shall form a real spectrum, well defined and sufficiently extended. A diaphragm is provided with a fine moveable slit, adjusted so as to permit the passage only of the Fraunhofer line C and the line D_3. This slit acts like the slit of a second spectroscope of high dispersive power.

The advantage of this construction consists in intercepting all the solar rays excepting those which correspond to the lines which it is desired to study, or those in their immediate vicinity. The extraneous solar light is thereby arrested, and by dispersing this isolated beam by means of a second powerful spectroscope, Prof. Blaserna believes that we must ultimately succeed in seeing the protuberances on the full solar disc.

The importance of such a fact for spectroscopy induced him to associate himself with Professors Cacciatore and Tacchini, for the purpose of putting it to the test; but the means at their disposal were too slender, and neither did nor could yield any result. For this reason he believes that it will be useful to explain the method, in the hope that some other spectrocopist, and perhaps Donati himself, may follow it out with better means and greater success.

SCIENTIFIC SERIALS

Journal of Anatomy and Physiology, vol. vi., part 2, May. A large portion of this number of the Journal is occupied by a series of papers on Myology, by Prof. Humphry; among them by far the most important is one in which the writer indicates a general plan on which the muscles of vertebrate animals are arranged. Prof. Humphry's scheme is simply this:—The locomotory system of a vertebrate animal consists fundamentally of a successional series of alternating skeletal and muscular planes, having generally a transverse direction between the axial line and the circumference. The skeletal planes, "sclerotomes," are represented in the high vertebrate classes by the vertebral processes, ribs, limb and hyoid girdles, tendons of the dorsal muscles, Poupart's ligament, tendinous inscriptions on the rectus abdominis, &c. The muscular planes, "myotomes," are made up of muscular fibres, the general arrangement of which is in an antero-posterior direction. The muscles of the trunk may be grouped under two heads, the dorsal muscles and the ventral muscles, the latter being disposed in three layers. The muscles of the limbs are derivatives from the middle stratum of the ventral muscle with a funnel-shaped investment derived from the external stratum. Prof. Humphry's other papers are on the arrangement of the muscles of the Lepidosiren, the Ceratodus, the smooth dog-fish, and the glass-snake.—Prof. Turner furnishes a description of this sternum of the sperm whale. Hitherto in the specimens of the cetacean that have been examined the sternum was incompletely ossified, so that the present communication fills up a gap in our knowledge.—Dr. Hollis, in a paper entitled "Tissue Metabolism, or the artificial induction of Structural Changes in Living Animals," describes some experiments made with mechanical and chemical irritants on the now nervous, now vascular tissues of Actinia. The results point to nothing beyond what has been before observed, a swelling and softening of the tissues, with a proliferation of the nuclear elements. Dr. Hollis also furnishes a short paper "On the Homology of a Mandibular Palp in certain Insects," and a note "On the Growth of the Masticatory Organs of Isopod Crustaceans."—Dr. Garrod, in a paper "On Sphygmography," points out the objections to the ordinary "knife-edge" sphygmograph, and describes a new instrument by Bregnet, in which these defects are remedied by a rack-work plan of construction. He further points out most clearly and forcibly the direction in which this apparatus is most useful as a means of observation, both to the physiologist and physician.—Dr. Braxton Hicks brings forward some most valuable evidence against the idea of a placental sinus system into which the fœtal silli protrude, and almost proves that normally no blood exists among the silli.—Prof. Traquair describes the caudal fin of the tailless trout of Islay.—Mr. Stirling notes Trichiniasis in a rat caught in the neighbourhood of a dissecting-room. Several anatomical anomalies occurring in the human subject are recorded in this journal. Mr. Bradley provides some notes on myological peculiarities.—Mr. Champneys describes a communication between the external Ilian and Portal veins.—Dr. Watson mentions a case of the termination of the thoracic duct at the junction of the *Right* subclavian and internal jugular veins; and Mr. Galton reports from Vienna the case of a man possessing two supernumerary teeth behind the upper median incisors. The number concludes with the usual review of books and the reports on the progress of anatomy by Prof. Turner, and on physiology by Drs. Rutherford, Brunton, and Ferrier.

Journal of the Chemical Society, May.—This number opens with the proceeding at the anniversary meeting of the Chemical Society, and also the address of the president on that occasion. Dr. Frankland in his address reviewed the present condition of chemical research in this country, as exemplified by the number of original papers received and read before the society, pointing out that during the past year only 22 papers have been received from the members, the number of whom has reached 656, 32 of these being foreign members; whilst, on the other hand, the German Chemical Society, which numbers 528 native members, has received during the same period the results of no less than 238 original researches. Dr. Frankland mentioned one fact which he believed to be one of the principal causes of this comparative lethargy on the part of English chemists. It is that our Universities and examining bodies do not recognise original research, but are content to accept book knowledge to a great extent; and that, on the other hand, in Germany a candidate for a scientific degree has to submit a memoir or dissertation on some original investigation before he is admitted to examination. The only original communication in this number of the journal is by Dr. Debus, on "The action of sodium amalgam on alcoholic solution of ethylic oxalate." In the year 1864 Friedlander, experimenting on this subject, obtained a substance which he named glycolinic acid, to which he assigned the formula $C_2H_4O_4$, that is isomeric with glyoxylic acid. Dr. Debus has now carefully repeated Friedlander's experiments, but has not succeeded in obtaining this body, but instead of this the sodium salt of glycolic acid. Several attempts were made under varying conditions, but all failed to produce the first-named body, sodium glycollate being obtained. As one of the by-products of the reaction in question, Dr. Debus has isolated tartaric acid. It is probably formed by the action of a molecule of hydrogen on one of oxalic ether, which would yield ethylic glyoxalate and alcohol; and it will then be seen that one molecule of hydrogen, combining directly with two molecules of ethylic glyoxalate, would yield ethylic tartrate. The abstracts of foreign papers contain many of great value, several of which have already been noticed in these pages.

Verhandlungen der k. k. geologischen Reichsanstalt, No. 9, 1872. There is not much of special interest for English geologists in this number of the Proceedings. Amongst the papers are the following:—"On the movements which the sedimentary formations of France have undergone," by M. Delesse; in which the author's studies lead him to the conclusion that the sedimentary strata that are buried in the earth's crust, are always in a more or less soft condition; and "A Contribution to Richthofen's theory of the Loess," by D. Stur. The literary notices and reviews which complete the number are unusually full.

PROF. E. D. COPE contributes to the *American Naturalist* for July an exceedingly interesting account of the Wyandotte Cave and its Fauna, to which we shall probably take an opportunity of again referring. Another important article in the same number is by Dr. H. Hagen on Mimicry in the Colours of Insects. Dr. Hagen distinguishes three different kinds of colours as present in insects—viz., colours produced by interference of light, colours of the epidermis, and colours of the hypodermis. The colours produced by the interference of light are only optical phenomena. The epidermal colours belong to the pigment deposited in the cells of the chitinised external skin or epidermis, and are mostly metallic blue, green, bronze, golden, silver, black, brown, and rarely red; they are persistent and never change, either during life or after death.

SOCIETIES AND ACADEMIES

PHILADELPHIA

American Philosophical Society, December 15, 1871.—A sum of money was appropriated for the planting and preservation of a grove of oaks in Fairmount Park, to be called the Michaux Grove, in accordance with the will of the botanist Michaux.—Prof. E. D. Cope read a paper "On the Pythonomorpha of the Cretaceous Strata of Kansas." This embraced a synopsis of the

species of the order known from all parts of the world, by which it appeared that America was its home, only four species having been described from Europe. He said that the *Danubiosaurus* of Bunzel had no relationship to the group. The American species were forty-two, distributed as follows: viz., New Jersey Greensand, 15; Rotten Limestone of Alabama, 7; Chalk of Kansas, 17; other localities, 3. The Kansas species were referred to *Clidastes* 3 sp., *Edestosaurus* 4 sp., *Holcodus* 4 sp., *Liodon* 6 sp. Of these *Edestosaurus tortor* and *E. stenops; Holcodus coryphaeus* and *H. tectulus;* and *Liodon curtirostris, L. lætispinus, L. glamiferus, and L. crassartus* were described as new.

January 5.—Hon. Eli K. Price read a paper "On some Phases of Modern Philosophy," in which he combated the views of the heterogenists and of the evolutionists. In the latter part of the subject he opposed the views of Darwin, asserting that the variations seen among domesticated animals had no parallel among those in a state of nature, and the fact of their ready hybridisation is an indication of their specific unity. He quoted Prof. Wyville Thomson to the effect that no transition from species to species had ever been observed in palæontological history; and asserted that the variations observed among animals on which the developmentalists relied in evidence of their theory were few and abnormal, and utterly insufficient for the use made of them; that the origin of man from apes was not supported by evidence; lastly, that the theories of evolution are highly injurious to faith and morals, and thus to Christian civilisation.

Janaury 19.—Mr. Benj. Smith Lyman read a paper on "The Oil-bearing Region of the Punjaub," accompanied by a topographical map. He pointed out the tertiary age of the oil-bearing strata.—Prof. Cope read a paper on a new Dinosaurian from the cretaceous strata of Kansas, which was named *Cynocercus incisus*. The vertebral articular faces were deeply excavated above and below, so as to give them a transverse character.—Prof. H. Hartshorne read a paper on "Organic Physics." It explained that the expression "organic physics" is as well justified as "organic chemistry" and "animal mechanics," for vital force is clearly correlated with other physical forces, as heat, light, &c., but the correlation is not identity. Advocates of the continuity theory have endeavoured to make it appear to be identity, but they will not succeed; because the effects of heat, light, electricity, magnetism, and gravitation are known, and they always tend (in the absence of life) to an opposite kind of change to that which occurs under life force; namely, they form of C, H, N, S, P, &c., compounds of few equivalents and stable equilibrium; while under life force the same elements are made to produce compounds of many atoms or equivalents, and of unstable equilibrium. The first are mainly crystalloids, the second always colloids. The directness of this opposition is especially demonstrated by the result of death (arrest of life force), which is attended by the resolution of the complex, unstable, colloidal, organic substances into more simple, stable crystalloids and gases. Eliminating all the functions of living beings otherwise explicable, we must restrict the term "vital action," or "action of life force" to the conversion of inorganic into organic material, with type-formation or organic construction as its result. It is supposable, at least, though not proven, that the assumption of particular forms under given circumstances is (analogous to crystallisation) the property of the bioplasm; *i.e.*, given the matter, the form results as its property or attribute. But chemists have never succeeded in making organisable matter by synthesis; nor is it likely that they ever will. All complex organic substances made in the laboratory (as urea, by Wöhler; fatty acids, &c., by Berthelot; and even, if made, crystallisable neurin) are post-organic (a term first used by the author), *i.e.*, results of the downward or retrograde metamorphosis; produced, not by life force, as such, but by the composition or balance between life force and the other forces. They are not germinal or formative, but formed and effete materials (Beale's terms). The question of the possibility of abiogenesis is not yet finally decided. Crosse gave it momentum with his galvanised acarus; Pouchet and Pasteur have long debated it; Owen, Bennett, Clark, and a few others have of late years reasserted it; Bastian (NATURE 1870) makes an elaborate experimental defence of it. We note concerning it as follows:—(*a*) The manipulation (to avoid introducing minute visible forms) requires an almost or quite impracticable delicacy throughout. (*b*) When heat is used, we have always the alternative, to conclude that certain minute organisms, germs or spores, can resist a higher temperature than was supposed, or to conclude that, taking for granted that the heat employed must have killed all germs, new life afterwards sprang up, without parentage. All experience makes the former much more probable. George Pouchet's experiments with rotifers tend this way. Jeffries Wyman found that, although four hours' boiling would not, five hours would put an end to all manifestations of life. Franklin's experiments (and Calvert's) gave similar results against abiogenesis. Supposing (although Huxley does not) that Bastian could not have mistaken "Brownian" molecular movements for evidence of life, we yet observe that if life sprang up in Bastian's apparatus, it was such life as can exist without air or oxygen; altogether unlike, therefore, ordinary world-life. The assertion of Pasteur is justified, that the *onus probandi* lies with abiogenesists, since there is no experience of any living form more than $\frac{1}{1000}$ of an inch in diameter springing into life out of inorganic matter; it is therefore vastly improbable (needing most cogent evidence to prove), that any form less than $\frac{1}{1000}$ of an inch in size can be made to spring into life from inorganic matter. While abiogenesis is unproved, we hold to the conclusion that vital force is not the mere outcome or resultant of any or all of the other cosmic forces. How does it differ? Of the organic cell, or "physiological unit," the most constant determinable acts or changes are incretion and excretion; atomic or molecular motion, definite in results, is an essential of life. Must not the motion itself be peculiar? More definitely, we find that while in the condensation of matter in the (nebular theoretical) formation of the sun and planets there was integration of matter with dissipation of force, such as heat (H. Spencer), life action involves integration of matter with accumulation of force (stored up physical force in the plant, of Barker; "bottled sunshine," of some one else). This is a striking contrast. Sexual union is closely analogous to chemical union; instead of combustion, it makes construction by detaining products. Again, we notice the analogy between the spiral phyllotaxis of plants (opposite leaves a double spiral), (whorls two or more, and bilateral symmetry of vertebrates and articulates and some molluscs, and radial symmetry of radiates and cœlenterates corresponding) and the spiral helix of the electro-magnet. As the opposite chemical and polar elements of the battery are to the current of the helix, so (may be) the polarities of the sperm cell and germ cell to the spiral phyllotaxis of plants and symmetrical (usually double) organotaxis (a new term) of animals. A close (but reversed) analogy exists between heat force and vital force. A spark of fire may "light," and so burn successively, an indefinite amount of combustible matter. A spark of life may animate an indefinite amount, successively, of organisable matter. The former, combustion, reduces complex substances which are unstable to more stable compounds. The latter, life, elevates simple substances to more complex states, but with constant transmutation of their forms. Such analogies are as yet crude, and do not solve the mystery of life. But the facts on which they rest justify and encourage the physical investigation of vital actions, including their study under physics—organic physics. Such a view of life is in no manner antagonistic to theism or to "teleology," any more than is the now familiar reduction of digestion, circulation, absorption, &c., to the category of chemical or physical phenomena. All such analytical inquiries are moreover, legitimate so long as they are accurate, whether they point to biogenesis or abiogenesis, to the origin of types by interrupted appearances or by evolution.—A discussion on E. K. Price's paper, read January 5th, took place, in which Prof. Hartshorne, Prof. Lesley, Mr. Price, and Prof. Cope took part. Prof. Hartshorne supported the opposition to abiogenesis expressed in the paper, on the ground of insufficiency of evidence in its favour, but believed in the evolution of species. Prof. Lesley objected to the insufficiency of Mr. Price's reasoning against the labours of experts in biological science; and stated that the more attention he paid to the subject the better satisfied he became that man was descended from apes. Prof. Cope stated that Mr. Price's paper was in error as to the facts. That (1) variability of specific type was even more common in nature than under domestication, examples from many so-called "protean" genera being cited. (2) That some wild species did produce fertile hybrids. (3) That transitions between species, both at the present time and in past geological periods, were common, but were concealed by a universal *petitio principii* involved in the practice of naturalists. This consisted in uniting distinct forms or species under the head of one species as soon as the intervening connections were formed. (4) That the known cases of transition were numerous, not few; and that common induction required that we should believe of the un-

known that which we see in the known, when other circumstances are identical.

Feb. 2.—Prof. Geo. B. Wood communicated further results of his experiments with salts of potassa on vegetation, and especially on grain and fruits. He stated that in a field of grain devoted to the experiment, in which the soil had been previously exhausted by bad culture, one half was enriched by farm-yard manure, the other with the same with wood ashes added. The effects of the latter were especially marked, and much greater than with the former. The most striking results were attained by the use of the ashes of the poke, *Phytolacca decandra*.—Prof. Cope read a paper on the "Families of Fossil Fishes of the Cretaceous Strata of Kansas." The greater part of these were shown to be *Physostomous Actinopteri*, of three families, viz., the *Saurodontidæ*, the *Pachyrhizodontidæ*, and the *Stratodontidæ*. Of the first, four genera and ten species were described, some of them (*Portheus* sp.) among the most formidable of marine fishes. The peculiarities of the succession of teeth in *Portheus* and *Saurocephalus* respectively were pointed out. Of *Pachyrizodontidæ*, one genus and four species were described; and of *Stratodontidæ*, three genera and seven species. *Stratodus* was a form provided with multitudes of minute shovel-headed teeth.

PARIS

Academy of Sciences, Sept. 9.—M. Faye, President.—The first paper was by M. P. Duchartre, on the bulb of *Lilium Thomsonianum*, &c. The author finds that this Indian plant seldom flowers in Europe, and traces this to the facility with which it propagates itself by means of off-shoots from the bulb. If it is prevented from doing this it flowers well.—A letter from P. Secchi followed on "Observations on the Variation of the Solar Diameter; Observations of the Protuberances and of the Chromosphere; Observations on the Shooting Stars and of the Aurora Borealis observed at Rome on the 10th of August." Father Secchi finds variations of the solar diameter equal to 3. 4, and even 5 seconds of arc (error of observation less than 0."5 arc). There were minimum epochs in July, the beginning of September, the middle of November, and the beginning of March and April, when the mean diameter was 32′ 1″ 5‴; and maxima in the middle of August, the middle of September, and during the whole of October and December, and the beginning of February when the mean diameter was 32′ 4″ 5‴. The maxima of diameter correspond to the minima of spots and protuberances. The next memoir was by M. Max Marie "On the Elementary Theory of double integrals and their periods" (continuation). A note from M. A. Potier "On the causes of Elliptical Polarisation by reflexion on transparent bodies."—A note from M. Th. Gaffield "On the results produced by insulation on various kinds of glass," was then presented by M. Cheyreul.—"On the lines of Summit and of Thalweg" an answer to the observations of M. Boussinesq by M. C. Jordan.—A note was then read on the induction currents developed in the machine of M. Gramme, by M. J. M. Gaugain.—"On Lithurate of Magnesium, a new species of urinary concretion from the ox," was an extract from a note from M. G. Roster.—The empirical formula for the body in question is $C_{30}\ H_{36}\ N_2\ Mg\ O_{17}$, it is soluble in boiling water, from which it crystallises on cooling.—A note on the Nutoscope, by M. Ch. V. Zenger, was presented by M. Yvon Villarceau. This was a description of an instrument for illustrating the nature of nutation.—Next followed a note from M. Tarry on the Constitution of the stream of August meteorites.—M. Dumas then communicated some observations on the *Phylloxera vastatrix*.

Sept. 16.—M. Faye, President.—The President read a note relative to a communication from M. Hirn on the conditions of equilibrium in, and the probable nature of the Saturnian rings.—General Morin then read a note on Major General Mayevski's "Treatise on Projectiles." M. Morin states that M. Mayevski, in his eleventh chapter, devoted to the consideration of the penetration of solid bodies and armour plates by projectiles, arrives at the same conclusions as were obtained by the Metz Commission, and by Capt. Noble, R.A., in England.—"Observations on the nature of the various parts of flowers," by M. A. Trécul, followed.—A letter from P. Secchi on the appearance of a meteor in the neighbourhood of Rome, and on stellar spectra, was then read. The latter portion of the letter was an explanation of the Rev. Father's views on stellar types, which he explained were not the same as those of Mr. Rutherfurd, as had been supposed by Messrs. Lockyer and Schellen.—M. le Dr. Netter then read a paper on the treatment of cholera by the administration of enormous quantities of aqueous drinks in successive doses.—Then followed the concluding portion of M. Marie's paper on the "Theory of double integrals and their periods."—Notes were received from M. Pigeon, on cholera; M. Charles, on aërial navigation; M. Bouvard, on the Postulatum of Euclid; M. Hervier, on *Phylloxera*; M. Quattari, requesting the Academy to examine his aërial telegraphic apparatus; and M. Le Comte L. Hugo presented the Academy with an engraving entitled, "The sphere is an equidomoid, or a demonstration of the pre-eminence of polygonal figures," which was submitted to the examination of M. Ossian Bonnet.—M. Yvon Villarceau presented a note by M. Prosper Henry, describing the discovery of a new planetoid 125 at the Paris Observatory. Observations on the above by MM. Ludinard, Tisserand, Paul Henry, and Prosper Henry followed.—An extract from a Report by Dr. Oudemans on the total eclipse of 12th December, 1871, observed in the Dutch East Indies, was also read.—A paper, by M. Ch. V. Zenger, "On the rapidity of transmission of light in simple bodies, and on their crystalline form," followed.—"On the changes of phase produced by metallic reflexion," note by M. A. Potier, was next read; and then an extract from a paper by M. Plateau on the measurement of physical sensations, and on the law which connects the intensity of these sensations to the intensity of the exciting cause, was followed by a posthumous note of M. H. Magnan's, *à propos* of two notes by M. Cayron on the cretaceous formation of La Calape and Corbières.—M. Louis Faucon sent some observations on *Phylloxera*, made by himself and M. Gaston Bazille; and another note on the same subject and on vine disease was received from M. F. E. Guérin-Méneville, who believes that every observation tends to prove that the *Phylloxera vastatrix* is only a secondary agent in producing the vine disease now so destructive.—M. Yvon Villarceau then presented a note from M. Fron on the atmospheric movements which accompanied the auroræ of September 2 and 6, 1872.—M. Georges sent a note relative to the employment of calcic disulphite to the cure of vines tainted with oidium, which was sent to the Phylloxera Commission.

BOOKS RECEIVED.

ENGLISH.—Cardiff Naturalists' Society Report and Transactions. Vol. III., 1870-71, part 1.—Cholera and Efforts towards Framing an Equilibrium Theory of Health and Disease (Thacker and Co., Calcutta).

FOREIGN.—Tableau de l'Astronomie: Ed. Mailly (T. Hayez, Brussels).—De l'Astronomie dans l'Académie Royale de Belgique: E. Mailly (T. Hayez).—(Through Williams and Norgate.)—Lehrbruch der Zoologie: Dr. Otto W. Thomé.—Der Mensch und die Seele: E. Reich.—Etudes sur les Appendiculaires du detroit de Messine: H. Fol.

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NOTICE

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