

fact, since the occurrence of mammals allied to those of the European Lower Eocene is quite capable of explanation by their survival to a later period in South America.

One of the new Patagonian forms, to which Dr. Ameghino applies the name *Prothylacinus*, is stated to be an animal of the general conformation of the Thylacine, having apparently the same number of teeth, although the upper incisors are unknown. The main distinction of the fossil genus is, indeed, said to consist merely in the circumstance that the lower premolars are more widely separated from one another; the molars of the two forms being described as absolutely identical in character. The fossil likewise exhibits the marsupial inflection of the angle of the lower jaw. The absence of the upper incisors in the specimens of *Prothylacinus* is fortunately compensated in another genus described under the uncouth name of *Protoprovierra*. Here we find that the number of teeth is exactly the same as in the Thylacine, there being four upper and three lower incisors, a canine, three premolars, and four molars on each side of the skull. This dentition agrees numerically with that of the Tasmanian Devil; with the exception that there is an additional premolar in each jaw. These fossils also exhibit the inflection of the angle of the mandible, and the presence of unossified vacuities in the palate, which we have seen to be marsupial features.

As might have been expected to be the case, Dr. Ameghino also states that there appears to be a complete passage from these marsupial forms to others belonging to that group of primitive carnivores known as Creodonts, of which the European Upper Eocene *Hyænodon* and *Pterodon* are well-known examples. Now, if we are to trust these descriptions (and there appears every reason why we should), we must admit that *Prothylacinus* and *Protoprovierra* are veritable marsupials of an Australian type. Then comes the question, How are we to explain the occurrence of such closely allied forms in areas so remote from one another as Patagonia and Australia?

It had long ago been urged that the occurrence of carnivorous marsupials in South America and Australia and nowhere else (at the present time) indicated a former connection between those two areas. To this, however, Mr. Wallace ("Distribution of Animals," vol. i. p. 399) objected that the American opossums (*Didelphyidae*) were not an Australian type, and that they occurred in the Tertiaries of Europe; and hence he argued that both the American and Australian marsupials probably took their origin from the presumed marsupials of the European Jurassic rocks. This explanation, on Mr. Wallace's own showing, will not, however, hold good for the close resemblance stated to exist between the American *Prothylacinus* and the Tasmanian Thylacine, since it is quite impossible to believe that two such similar forms could have maintained their likeness in such remote regions after having diverged from a common European ancestor as far back as the Jurassic period.

It has, however, been long known that there are certain very remarkable relationships between the fauna and flora of all the great southern continents. For instance, among mammals, the rodent family *Octodontidae* is peculiar to South (including Central) America and Ethiopian Africa. Then, again, among fishes, the family of the *Chromidae* is confined to the rivers of South America and Africa, with one outlying genus in India; while the true mud-fishes (*Lepidosiren* and *Protopterus*) are solely South American and Ethiopian, the third representative of the same family being the Baramunda (*Neoceratodus*) of Queensland. Again, the connection between the flora of Africa and that of Western Australia is so intimate as to have induced Mr. Wallace (*op. cit.*, p. 287) to express his belief that there must have been some kind of land connection, although not necessarily a continuous one, between these two widely distant areas.

The connection between the fauna of India and that of Ethiopian Africa is now too well known to stand in need of comment. The matter does not, however, end here; for if we go back to the Mesozoic epoch there are equally striking evidences of the connection between the faunas and floras of the southern continents. For instance, the extinct saurian genus *Mesosternum*, which appears to have been allied to the Plesiosaurs of the Lias, is known from early Secondary strata in Brazil and South Africa, and nowhere else. Then, again, the remarkable Anomodont reptiles (*Dicynodon*, &c.) of South Africa are closely connected with those of India; while the respective alliances between the Labyrinthodont amphibians and the Mesozoic floras of South Africa, India, and Australia are too well known to need more than mention.

It appears, then, that, altogether apart from the new discovery, the common factors connecting the faunas and floras of the four great southern prolongations of the continental land of the globe undoubtedly point, not only to a more or less intimate connection between these several areas, but also to their more or less partial isolation from the more northern lands.

Reverting to the new discovery, it may be observed that our comparatively intimate acquaintance with the Tertiary faunas of Europe and North America renders it in the highest degree improbable that marsupials of an Australian type lived during that time in either of those areas. It is, however, quite possible that they may turn up at any time in Tertiary formations in Africa, while there is nothing to show that they may not also have existed in peninsular India. Indeed, if we put aside as improbable any connection by way of the Pacific between South America and Australia, it seems impossible to give any explanation of the occurrence of allied marsupials in Patagonia and Australia without the assumption that their ancestors existed in some part of the great area lying between eastern South America and Western Australia.

R. LYDEKKER.

PHOTOGRAPHY IN COLOURS.

THE *Comptes rendus* for February 2, 1891, contained a brief note on colour photography, describing the method employed by M. G. Lippmann, who had been able to produce photographically the image of the spectrum with all its colours. A summary of this note was given in NATURE at the time (see vol. xlviii., p. 360).

M. G. Lippmann, who has been continuing his researches, has communicated further results, which appear in the *Comptes rendus* for April 25 (No. 17, vol. cxiv.). These results show that we are not far off the solution of a question which has been the aim of all the latest photographic researches. The following is a translation of the note in question:—

In the first communication which I had the honour to make to the Academy on this subject, I stated that the sensitive films that I then employed failed in sensitiveness and isochromatism, and that these defects were the chief obstacle to the general application of the method that I had suggested. Since then I have succeeded in improving the sensitive film, and, although much still remains to be done, the new results are sufficiently encouraging to permit me to place them before the Academy.

On the albumen-bromide of silver films rendered orthochromatic by azalin and cyanin, I have obtained very brilliant photographs of spectra. All the colours appear at once, even the red, without the interposition of coloured screens, and after an exposure varying from five to thirty seconds.

On two of these *clichés* it has been remarked that the colours seen by transmission are very plainly complementary to those that are seen by reflection.

The theory shows that the complex colours that adorn natural objects ought to be photographed just the same as the simple colours of a spectrum. There was no necessity to verify the fact experimentally. The four *clichés* that I have the honour of submitting to the Academy represent faithfully some objects sufficiently diverse, a stained glass window of four colours, red, green, blue, yellow; a group of draperies; a plate of oranges, surmounted by a red poppy; a many-coloured parrot. These showed that the shape is represented simultaneously with the colours.

The draperies and the bird required from five to ten minutes' exposure to the electric light or the sun. The other objects were obtained after many hours of exposure to a diffuse light. The green of the foliage, the grey of the stone of a building, are perfectly produced on another *cliché*; the blue of the sky, on the contrary, was represented as indigo. It remains, then, to perfect the orthochromatism of the plate, and to increase considerably its sensibility.

NOTES.

THE Royal Society's *soirée* is being held as we go to press. We hope to give next week some account of the principal objects exhibited.

THE Bureau des Longitudes is sending an expedition to Senegambia to observe the total solar eclipse of April 1893.

THE first session of the Institution of Mining and Metallurgy is to be held in the theatre of the Geological Museum, Jermyn Street, on Wednesday, May 18, when the President, Mr. George Seymour, will deliver the inaugural address. There will be an inaugural supper at the Criterion.

AT the Royal Academy dinner Sir John Lubbock responded for science. He said that no class derived more benefit and enjoyment from works of art than men of science. Sir John referred also to the growing importance of art in relation to the material prosperity of the country. Our merchants and manufacturers, he said, could no longer rely entirely on excellence of material and solidity of workmanship, but had to look to artistic charm and beauty of design.

AT the annual meeting of the Royal Institution on May 2, the following gentlemen were elected officers for the ensuing year: the Duke of Northumberland, President; Sir James Crichton-Browne, Treasurer; Sir Frederick Bramwell, Secretary.

It is reported from Melbourne that Sir Thomas Elder has decided not to send out another exploring expedition into Central Australia at present. He attributes the failure of his recent expedition, under Mr. Lindsay, to the severity of the season, the drought having been unusually trying.

ON May 7 the members of the Geologists' Association will make an excursion to Walthamstow, Mr. J. Walter Gregory acting as director. The object of the excursionists will be to examine sections on the Tottenham and Forest Gate Railway. The best section is about half a mile from St. James's Street, and shows the lower terraces of the Lea Valley gravels resting on a very eroded surface of London Clay. Masses of the London Clay stand up, which were probably once islets. The alterations in the position of the bed of the Lea are well shown by this cutting.

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ON Tuesday next (May 10) Mr. Frederick E. Ives will begin a course of two lectures at the Royal Institution on photography in the colours of nature.

AT the meeting of the Franklin Institute, Philadelphia, on March 16, Mr. John Carbutt made some remarks on the results achieved by Mr. Frederick E. Ives in the field of colour photography, which, in his judgment, so far as practical results were concerned, were far in advance of anything that had as yet been accomplished elsewhere. Mr. Carbutt urged that it was eminently fitting for the Institute to recognize the value of the work of one of its own members, and moved that the subject of Mr. Ives's investigations and results in the field of colour photography should be referred to the committee on science and the arts for investigation and appropriate recognition. The motion was carried.

SIR JAMES CRICHTON-BROWNE delivered the annual oration at the 118th anniversary meeting of the Medical Society of London, held on Monday evening. He chose as his subject "Sex in Education." He showed that the female brain is lighter than that of the male, not only absolutely, but relatively to the respective statures and weights of the two sexes; that the specific gravity of parts of the female brain is less than that of corresponding parts of the male brain; and that the blood supply, which in the male is directed more towards the portions which are concerned in volition, cognition, and the *ideo-motor* processes, is in the female more directed towards portions which are mainly concerned in the discharge of sensory functions. Sir James urged the necessity of such structural differences being taken into account in the conduct of education; and, while disclaiming any intention of bringing a wholesale indictment against high schools for girls, he nevertheless held that some of their methods were capable of leading to great evils, especially when not controlled by a judicious and sympathetic mistress. He pointed out the difficulty of obtaining trustworthy information as to either the methods of many schools or their effects, more especially as the pupils themselves were often hostile to the inquiry; but he referred to one school at which he had been permitted to ascertain the facts, and in which he found that, out of 187 girls belonging to the upper and middle classes, well-fed and clad and cared for, and ranging from ten to seventeen years of age, as many as 137 complained of headaches, which in 65 instances occurred occasionally, in 48 frequently, and in 24 habitually. He cited the authority of Sir Richard Owen for the position that children have no business with headaches, and that something must be wrong in the school in which they frequently suffer from them. An account was given of the *modus operandi* of excessive brain work as a factor in the production of ill-health, and statistics were quoted to show the special liability of the female organism to disease at the period of life which the educator has seized on for his own. He attached great importance to loss of appetite, especially morning appetite, as a result of overstrain, and as one which was calculated to be itself the fruitful parent of other evils; and he strongly condemned the recent decision of the University of St. Andrews to open its classes in arts, science, and theology to women as well as to men, thus, as he declared, taking not a retrograde step, but a downhill step towards confusion and disaster. "What was decided amongst the prehistoric protozoa cannot be annulled by Act of Parliament; and the essential difference between male and female cannot be obliterated at a sweep of the pen by any *Senatus Academicus*."

THE weather during the past week has been unsettled generally, and showers of cold rain, hail, or sleet have occurred