SCIENCE:

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The distribution of honors at the French Electrical Exhibition is very gratifying to the pride of the American people, as the American exhibitors have relatively carried off a large share of the prizes.

Edison has maintained the prestige of his country, and asserted the integrity and value of his wonderful series of electrical inventions, by *alone* receiving a "diploma of honor" for the electric light. This high mark of distinction he shared in other departments with the United States Signal Office, the Smithsonian Institution, the United States Patent Office, and Messrs. Graham & Bell.

Gold medals were awarded to the Anglo-American and Brush Electric Light Companies, the United States Electric Lighting Company, Elisha Gray and Taintor. Silver medals to Bailey & Puskas, Conolly Brothers & MacTighe, Dolbear, Eccard, Electric Purifier Company, Hubbard Pond Indicator Company, Western Electric Manufacturing Company, Western Electric Light Company and the Electro-Dynamic Company. Bronze medals to Messrs. Chavat, Cumming and Dion, the Hoosac Tunnel Company, the Trinitro Glycerine Works, Partz, Photo-Relievo Company, Whitehouse, Mills & Williams.

That Mr. Edison, with the whole world competing, and with every system represented, should receive from such a critical committee this special recognition and honor, as the inventor of the most perfect system of electrical illumination, appears to decide this point in a decisive manner. The practical application of this system on a scale which will astonish the world, is near at hand. The immense dynamo machines designed for use to illuminate a district in New York City with Mr. Edison's perfected lamps have been placed in position, and the mass of details connected with placing wires and fittings are nearing completion. Soon the word will be given that all is ready, and Mr. Edison will probably enjoy a triumph to which all his previous successes will be insignificant.

Mr. Edison must experience some regret that he was unable to be present at Paris, and in person receive the congratulations which would have been showered upon him, but we understand that he was most worthily represented by Mr. Charles Batcheler and Mr. Otto Moses, whose courtesy and indefatigable exertions have been fully recognized in some of our Parisian exchanges.

AN instrument was lately described in a French journal, which was invented for the purpose of detecting oleomargarine as against pure butter.

This instrument discriminated between the specific gravities of the two substances. Shortly after the announcement of the making of this instrument, a report was spread in the daily papers, that the slight difference of density between oleomargarine and butter, was insufficient for this purpose.

A correspondent writes as follows on this subject: "The report that no difference of density is of any use in distinguishing oleomargarine from butter, is very easily disposed of, as the density of oleomargarine is 0.915 and the density of butter is 0.925. One will float at 15 C. in alcohol $53\frac{3}{4}$ per cent., and the other in alcohol $59\frac{1}{4}$ per cent. I mean by floating that the butter or oleomargarine will neither rise nor sink, when placed in the alcohol. If placed in the middle it will neither go to the top nor bottom, except very slowly. Of course there are persons who cannot distinguish between 0.915 and 0.925 specific gravities, and who cannot make an observation at a fixed temperature, but it is unreasonable to expect that any process can be satisfactory to such persons."

SCIENTIFIC ASSOCIATIONS IN WASHINGTON.

The three societies at the metropolis, the Philosophical, the Anthropological, and the Biological, all reorganized in October under very favorable auspices. A short account of their proceedings is given below:

PHILOSOPHICAL SOCIETY OF WASHINGTON.—Three papers were read, one on Geology, by G. K. Gilbert, which our correspondent did not hear; a communication on Fog-signals, by Prof. Johnson, of the Light-house Board, and a paper on the Best Methods of Calculating the Solar Parallax, by Professor Harkness, of the National Observatory. Mr. Johnson's remarks were an account of investigations made the last summer upon the refractions of sound, in pursuance of the experiments set on foot by Professor Henry. The inquiries were prosecuted mainly in Newport harbor and its vicinity. The facts set forth were of great interest to scientific men and of great practical value to the mariner. Professor Harkness, who is a very ready speaker, gave the Society an explanation of the various methods employed in calculating the distance of the sun and the planets, inclining to prefer the transit observations as yielding the best

results. Professor Harkness has great hopes of shotography as an auxiliary in this direction.

THE ANTHROPOLOGICAL SOCIETY.—Four papers were read in October, all of them mythological and all of permanent value, to wit: the Buffalo Woman: an Omaha Myth, by the Rev. Owen Dorsey; Myths of the Wintuns, by Major J. W. Powell; the Stone God of the Putepemni, by the Rev. S. D. Hurman; and the Dangers of Symbolic Interpretations, by Col. Gerrick Mallery. It is impossible to give an abstract of a myth. We can only say that Major Powell years ago conceived the idea of studying myths by the Baconian method. He told the writer of this sketch, "there are books and books on mythology, but very few myths. I will collect a volume of well authenticated myths, from which mythologic philosophy can be deduced." The Major has himself gathered a great number, and Messrs. Dorsey and Hurman were for many years missionaries among the Dakotas, speaking their language with the greatest freedom. Our readers will be pained to hear that Major Powell has been confined for several weeks by an acute attack of iritis. Colonel Mallery's paper was a thoughtful treatment of the subject of symbolism, neatly considered in its threefold aspect of signs, emblems, and symbols. The North American Indians north of Mexico had not arrived at that psychologic stage wherein true symbolism manifests itself.

THE BIOLOGICAL SOCIETY OF WASHINGTON.—The opening meeting of the Biological occurred on the evening when the city was all excitement over the reception of our French and German guests. The session of Friday, October 28th, however, was one of considerable interest. Professor Lester F. Ward exhibited an example from the petrified forests of Wyoming, mimicking the paw of an animal, which elicited a discussion as to the formation of agates and other minerals of that character.

Mr. Henry Elliot's communication on the biology of the Sea-Otter was very instructive. Little is known of the habit of this animal, the stuffed specimens in the museums conveying a very poor notion of its form. It is supposed to breed on the great beds of kelp which float in the northern seas, having one pup at a birth. Its fur is a hundred times more valuable than all other fur products combined. The hunting is especially dangerous and requires great skill.

Professor Thomas Taylor exhibited and described a freezing microtome, in which the cooling effect of a current of water from salt and ice is used to produce the hardening. The extreme cheapness, simplicity, and practicability of this apparatus will enable the microscopist to dispense with the more costly and difficult methods hitherto used for obtaining thin sections of tissues and for examining the brain and other soft parts of the body in a rigid condition.

THE EVOLUTION OF FLYING ANIMALS.

By CHARLES MORRIS.

There are some questions in Biological science which it will be difficult, if not impossible, to settle by an appeal to facts, and in the investigation of which we are obliged to employ a degree of speculation. Thus we have abundant reason to believe that birds are direct derivatives from reptiles. We know, in fact, that these animals resemble each other in such essential particulars as to justify the grouping of them together in a single vertebrate section, the Sauropsidæ of Huxley. We can even trace, by aid of the palæontological record, some of the steps by which birds arose from their reptilian progenitors. And yet no definite hypothesis has been advanced as to how the scales of the reptile became the feathers of the bird, how the quadrupedal habit of the one became the bipedal habit of the other, or how the walking changed to the flying method of locomotion.

These questions we cannot now, and perhaps may never be able to, answer with the argument of facts. But if some probable mode by which such variations may have arisen can be suggested, the speculation will hardly be an empty one. All the great theories of science have simply the force of highly probable speculations, based on known facts; and lesser theories, if given the same basis, may prove equally desirable.

One of the most striking features in animal life is its tendency to spread outwards, functionally, in every possible direction, so as to occupy each field of nature in every advantageous manner. One-half of the animal world seeks to feed on the other half, while this second half seeks to escape being fed upon. This is one of the main elements of natural selection. Every change in organization that proves an advantage to the carnivorous animal in assailing his prey, is apt to be retained. Every change that aids his prey in escaping is likewise retained. Through this cause there have been continual variations, since every favorable change in the one class would prove injurious to the other class, unless met by an equal counter change.

In this long continued process of adaptation to circumstances, every advantage offered by water and land to their animal inhabitants, in overcoming their prey, or in escaping from their enemies, has been long since adopted, and an immense variety of animal forms has arisen in consequence. But the air also presents favorable conditions both for escape and pursuit, and the adaptation of animals to aerial flight is so obviously advantageous, that it must have arisen as soon as the developing organization of animal life, and the occurrence of the necessary terrestrial conditions, rendered it possible.

In considering the problem of how flight originated, it will be desirable to take up successively the three questions above given. First, how did scales become feathers? The three higher classes of vertebrate animals have each its peculiar dermal covering. The Reptile has its bony plates, or its scales, the Mammal its hairs, and the Bird its feathers. Scales, hairs, and feathers are alike in origin, and are but specialized forms of a similar epithelial outgrowth. Yet these three classes of animals seldom invade each other's province. No reptile has a hairy or feathery coating. If mammals and birds were evolved from reptilian progenitors, the change of scales into hairs and feathers forms one of the processes of this evolution, and should be explicable under the natural selection hypothesis.

Certainly reptiles never became feathered through the Lamarckian process. No effort to fly, however vigorous, could have converted the scale of the reptile into the feather of the bird. It would be useless for flight until it had become almost a perfect feather, and therefore there could be no moulding influence upon its intermediate stages. The rudimentary feather must have arisen under the pressure of some other influence, and its adaptation to flight must have been a secondary resultant.

If we ask, what is the rudimentary feather, we seem to find it in the hair. In the larger land birds, as the Ostrich, the feathers on some parts of the body are indistinguishable from hairs; and in the tails of flying-squirrels the hairs spread out in a manner that seems preliminary to a development into the feathery condition. We may begin by asking, then, through what process of natural selection did the scale develop into the hair?

In seeking to solve this problem we first ask, what advantage has the hair over the scale as a dermal covering? The only positive answer we can make to this is, that it has greater warmth. It enables the haired animals to endure degrees of cold which would be fatal to the scaled animals. This difference in covering has a marked effect on the lives of the two classes of animals. Through the wide possibilities of increase in length and thickness of their hairy coat, mammals can endure the