as regards the shape of their tendons. Just along outside the muscles are dark lines more or less well finished, and resulting from the action of the muscles. *Ubi irritatio ibi affluxus.* I believe that it would not be unphilosophical to conclude that a powerful action in the development of the muscles is, in such a case, the cause of a greater combustion or oxidation in the neighbouring parts. In fact, on the head of a Cicada and on the abdomen of an Æschna we find similar patterns, in some way mostly representing the underlying muscles. In the Gomphina the fact is striking, and far more as the stronger species mostly possess a large dark pattern. There are some very small species which are almost entirely yellow; there are no small species entirely black.

Should the fact, with the explanation, be admitted, a step farther in the explanation of the different patterns would be made. I know very well that in the Odonata there are patterns which do not agree with my explanations, even some contrary to it; but if some certain facts be explained, there are perhaps more factors still unknown or unobserved. The explanation for certain facts would still be admissible, or at least not entirely objectionable.*

The patterns on the wings and elytra could not be the product of the action of muscles, but I believe it to be probable that the sudden rush of blood, or even air, by the accelerated circulation and respiration in the act of transformation may have the same effect. In this way some patterns, otherwise not explicable, could be understood. The eyespots in the caterpillars of some Papilionidæ have been ascertained by Leydig to be epidermal colours, and I believe that the various kinds of eyespots in the wings of the imago are also epidermal colours. If a stream of blood meets a small obstacle just in the centre, a funnel is formed; if this obstacle is a ring, and behind it another obstacle, we have two or more funnels, one in the other, and the section of them will be circular or elliptical according to the angle at which they reach the surfaces. Such patterns in the elytra and wings are formed or preformed at the time when the wing is a sac; sometimes before the transformation, and here is another circumstance which explains some patterns. The walls of the sac are suddenly augmented and strongly dilated in the transformation. Small patterns performed in the sac will also be altered and enlarged by the same process, and I know that many patterns of Lepidopterous wings are in such a way very easily explained All the waved lines of the wings and other marks belong here. and as the ribs or nervures seem to grow faster in transformation, the waved appearance would be explained In fact the greater part of the patterns seem to be produced by expansions or distraction of the pattern performed in the wing at some period before the transformation. H. HAGEN

SCIENTIFIC SERIALS

THE *Monthly Microscopical Journal* for October 1872, contains a continuation of Dr. Robert Braithwaite's papers on bog mosses, the present communication being confined to *Sphagnum neglectum* Angstr. Dr. J. J. Woodward contributes a reply to further remarks on Tolles' $\frac{1}{8}$th and Powell and Lealand's $\frac{1}{16}$th. This is succeeded by a communication "On the History, Histological Structure, and Affinities of *Nematophycus Logani* Curr. (*Prototaxites Logani* Dawson), an Alga of Devonian Age," by Wm. Carruthers, F.R.S., in which the author combats the theory advanced by Dr. Dawson, that the fossil in question is coniferous, and contends that it is cryptogamous, belonging to a gigantic alga, of the class *Chlorospermeæ*. Two plates accompany this very interesting and important communication —"On the active part of the Nerve Fibre, and on the probable nature of the Nerve Current," by Lionel S. Beale, F.R.S., is a further contribution to the researches for which Dr. Lionel Beale has earned a reputation.—"On the Regeneration Hypothesis," by Dr. Louis Elsberg, of New York. The fundamental proposition of this hypothesis is thus stated by its author: "The germ of every derivative living being contains plastitudes of its whole ancestry."—Dr. J. J. Woodward contributes some observations on the use of monochromatic sunlight, as an aid to high-power definition.—A short paper by Prof. Albert H. Tuttle, on one of our common monads is from a communication made to the microscopical section of the Boston Society of Natural History.

Bulletin de l'Académie Royale de Belgique, No. 8. This number contains a mathematical paper of some length, by M. P. Mansion, on singular solutions of differential equations of the first order; also a note by M. Dubois describing some researches on the camphors. He studied the action of pentasulphuret of phosphorus at a high temperature on monobromated camphor, and found that it gave cymol, accompanied with small quantities of hydrocarbons of the same homologous series, and an organic sulphhydrate soluble in alkalies. M. Alphonse Waters gives a sketch of some efforts that were made in Belgium in the middle of the 17th century towards the establishment of free trade.—A note by M. Schuermanns treats of the discovery of objects of amber in Belgium, the writer advising a special study of the circumstances which may have connected Belgium with the commercial route from Etruria to the country of amber, on the Baltic.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, Dec. 5.—"Colouring-matters derived from Aromatic Azodiamines." II. Safranine. By Drs. A. W. Hofmann, F.R.S., and A. Geyger.

Whilst we were engaged with the study of the blue colouring-matters produced by the action of aromatic monamines on azodiphenyldiamine, our attention became directed to a beautiful red tar-pigment, which has been known for some time by the commercial name of Safranine, being extensively used as a substitute for safflower in dyeing silk and cotton. Safranine has not as yet been minutely examined; but, as far as can be judged from the scanty information we possess regarding its production, it is scarcely doubtful whether this important dye must be looked upon as being the derivative of an azodiamine. The analyses of safranine thus promised to throw considerable light upon the nature of the compounds under examination.

Saframine occurs in commerce either as a solid body or *en pâte.* In the solid state it forms a yellowish-red powder, in which, together with considerable quantities of chalk and common salt, the chlorhydrate of a tinctorial base has been recognised. The pure dye may be easily separated from the crude safranine. It is only necessary to exhaust the commercial product with boiling water; on cooling, the filtrate deposits a slightly crystalline substance, which, after several recrystallisations from boiling water, leaves no residue on ignition. During these operations, however, the salt undergoes perceptible alteration; with every recrystallisation it becomes more soluble and less crystalline. These alterations depend upon the separation of chlorhydric acid from the salt. In fact the percentage of chlorine is found to diminish in the product of succesive crystallisations; thus the product of the third contained 8·48 per cent. that of the fourth crystallisation only 7·46 per cent. Addition of chlorhydric acid to the mother-liquors at once reproduces a crystalline precipitate. This instability of the chlorhydrate, and, in fact, as may even now be stated, of the salts of safranine in general, has very considerably impeded the study of this body, and often materially affected the accuracy of the analytical results. In order to obtain the normal salt, the boiling liquid during the last crystallisation had always to be acidified with chlorhydric acid.

"Synthesis of Aromatic Monamines by Intramolecular Atomic Interchange." By Dr. A. W. Hofmann, F.R.S.

In a paper submitted to the German Chemical Society about a year ago, we proved (Dr. Martius and myself) that the action

* So far as I know the literature relating to the phenomena of mimicry, all these related differences are often confused, and I believe that in separating them and following the views above given, many facts would be better understood, and this interesting subject more easily advanced.

Besides all the difficulties which oppose a clear and correct view, there is one more which I do not find mentioned, *i.e.* the so-called colour-blindness, and the different degrees of it. Prof. B. A. Gould in his excellent work, "Investigations on Anthropological Statistics of American Soldiers," has given attention to it in a very remarkable chapter. Persons who cannot distinguish ripe cherries upon the tree, or strawberries on the vine by their colour, are far more numerous than would be suspected. Serious misunderstandings, and even calamities, have been reported in the army, resulting from mistakes in the colour of green and red light by officers of the signal corps. He gives the statement that usually one in twenty, and in the soldiers examined one in fifty, was subjected to colour-blindness. But these numbers show only the extremes; and it is easy to believe that a much greater number are more or less affected with it. In fact, we have no means of measuring this physiological difference; if two persons call something green, and even compare the colour with certain known objects, there is no proof at all that they see just the same colour. I think that it would be prudent in describing cases of mimicry, especially when they are extraordinary, not to forget that even the best observer may be unaware of this infirmity, and in fact the best authorities on colour-blindness always state that the greater number of persons have no idea of their infirmity.