

metamorphoses of a peculiar kind, and of a different character from those of insects. Mr. Thompson's views are founded upon some circumstances which he has observed in certain animals of the genus *Zoea* of Bosc, and which have been recorded by Professor Slabber, and which have led Mr. Thompson to believe that, of these animals, some were the young of the *Cancer Pagurus*, or common crab, and others the young of the *Astacus Pagurus*, or common lobster; and these views are supposed by him to be corroborated by the annual peregrinations of the land crabs to the sea-side, for the purpose of depositing their eggs, rendered necessary by the aquatic habits and conformation of the young. The author proceeds to examine at length the arguments on which Mr. Thompson has founded these opinions, and adduces his reasons for concluding that they are erroneous, and that no exception occurs to the general law of development in the Crustacea, namely, that they undergo no change of form sufficiently marked to warrant the application to them of the term *metamorphosis*.

"Memoranda relating to a Theory of Sound." By Paul Cooper, Esq. Communicated by J. G. Children, Esq., Sec. R.S.

The author, expressing his dissatisfaction with the commonly received theory of the propagation of sonorous undulations by an elastic medium, advances the hypothesis that each particle of an elastic body, after receiving an impulse in a particular direction, and communicating that impulse to the adjoining particle, instead of being thereby brought to a state of rest, is carried back by its elasticity with a velocity which continues its motion beyond the point from which it originally set out, and is thrown into continual vibration, in a manner analogous to the motion of a pendulum. He endeavours, on the principle of a continual transfer of the state of each particle to the adjacent particles, to explain the phenomena of continued sound arising from a prolonged succession of vibrations.

"A Theory of the Tides, including a Theory of the Formation and Propagation of Waves." By the same.

The author applies the principle announced in his paper on the Theory of Sound, namely, that of a continual transfer of state between the adjacent atoms of a medium, to the case of oscillating columns of fluid, constituting waves and tides.

"On the influence of the Respiratory Organs in regulating the Quantity of Blood within the Heart." By James Wardrop, Esq. Communicated by the Hon. Captain De Roos, R.N., F.R.S.

The author observes that the act of inspiration tends not only to favour the passage of the blood into the venæ cavæ, but also to detain it in the pulmonary vessels,—in consequence of the expansion of the lungs allowing of its more ready ingress into the pulmonary arteries, and impeding its exit by the veins—and thus retards its return to the heart. On the other hand, the collapse both of the lungs and of the parietes of the chest, during expiration, assists the transmission of arterial blood from the lungs into the left cavities of the heart, and

promotes its passage into the aorta. Thus he considers inspiration as an auxiliary to the venous, and expiration to the arterial, circulation; the first acting like a sucking, and the latter like a forcing pump, in aiding the power of the heart. On this principle he explains the influence exerted on the circulation and on the action of the heart by various modes of respiration, whether voluntary or involuntary, in different circumstances. Laughter, crying, weeping, sobbing and sighing, &c., he considers as efforts made with a view to effect certain alterations in the quantity of blood in the lungs and heart, when the circulation has been disturbed by mental emotions.

“Experimental Researches in Electricity.” Tenth Series. By Michael Faraday, Esq., F.R.S. D.C.L., &c. &c.

This paper relates altogether to the practical construction and use of the voltaic battery. Guided by the principles developed in former series, the author concluded that in voltaic instruments in which the copper surrounded the zinc, there was no occasion for insulation of the contiguous coppers, provided they did not come into metallic contact; and therefore in the construction of some new instruments he interposed paper only between the coppers instead of the usual insulating plate of porcelain or glass. The battery thus constructed is essentially the same with Dr. Hare’s; and the author recommends even his form of trough for the purpose of putting the acid on to, and moving it from the plates. By attending to certain points described, as many as 40 pairs of plates could be packed into a space not more than 15 inches in length, and thus a very portable, and, at the same time, powerful and convenient trough might be obtained.

In comparing this form of trough with others, the author used acids of constant strength, took note of their quantity, allowed them to act in the troughs until the power of the apparatus had nearly ceased, estimated the quantity of effect by his volta-electrometer, and then estimated the quantity of zinc in the battery employed in producing the effect by the results of an analysis of a given portion of the exhausted charge. In this way it was easy to tell how much zinc was dissolved from any one plate, or from all the plates, and to compare it with the quantity of water decomposed in the volta-electrometer. Thus, with a perfect battery of 40 pairs of plates, an equivalent of water decomposed in the volta-electrometer would be the result of the solution of an equivalent of zinc from each zinc plate, or forty equivalents in the whole; but with a battery not so perfect, a greater proportion of zinc would be dissolved by the acid in the cells.

When the new battery was thus compared with that of the ordinary form, it was found to have greatly the advantage. Thus, with 40 pairs of plates, the former lost 2·21 equivalents at each plate, and the latter 3·54. With 20 pairs of plates, the former lost 3·7 per plate, and the latter 5·5. With 10 pairs of plates, the former lost 6·76 per plate, and the latter 15·5. The author refers to two difficulties still existing in the construction of the battery, but considers its value so great as to deserve receiving that degree of attention, by the application of which these difficulties may be removed.