

in a large open glass with salt water, in which they appeared unusually lively. I kept them thus, changing the water at intervals, until the 29th May, when we reached the English Channel. I then packed them up, as before, in a box, and carried them from Portsmouth to Cornwall, and thence to Dublin, which I did not reach until the 14th June; here they again got fresh supplies of sea water at intervals. One of them died during a temporary absence between the 30th June and 7th July; and on the 11th July the survivor was again committed to its prison, and was taken to Cornwall and thence to London, where it was delivered alive to Mr. G. B. Sowerby on the 23rd July.

“This animal had thus travelled, during a period of six months, over a vast extent of the surface of the globe, and had for a considerable portion of that time been unavoidably deprived of its native element.”—W. H. B.

At the request of the Chairman, Mr. Heming exhibited a *Swift*, *Cypselus Apus*, Ill., preserved in spirit, and showing a considerable dilatation at the base of the lower jaw and upper part of the throat. White has observed that “*Swifts*, when wantonly and cruelly shot while they have young, discover a lump of insects in their mouths, which they pouch and hold under their tongue;” but from this notice it would scarcely have been anticipated that so large a collection was made as was found in the present instance. The dilatation had a rounded appearance; distended the skin so as to show distinctly and widely separated the insertion of each of the small feathers at this part; and measured in length 11 lines, and in depth 6. On opening the pouch it proved to be simple, and unconnected except with the cavity of the mouth.

Mr. Heming also exhibited a drawing taken from the recent bird.

Dr. Marshall Hall showed some experiments in the decapitated *Turtle*. Irritation of the nostrils, *larynx*, and spinal marrow induced acts of inspiration; that of the fins and tail induced movements of the other parts respectively.

But the principal object of Dr. Hall was to show that irritation of the nerves themselves equally induced movements of the limbs, &c. When either the sentient or the motory branch of the lateral spinal nerves was stimulated, motions were induced in all the limbs. Dr. Hall stated that a movement of inspiration and of deglutition was caused in the *Donkey* by irritation of the eighth pair of nerves. It has been already stated that irritation of the nostrils, or the branches of the fifth pair of nerves, induced inspiratory acts in the *Turtle*. From these and other facts, Dr. Hall is induced to consider the functions of these two nerves as similar. He further observed that both are nerves of secretion, and that both are muscular nerves—if the minor portion of the fifth be included—as well as exciters of respiration; the fifth differs chiefly in being sentient, being dis-

tributed to external as well as internal surfaces. With the fifth and eighth, Dr. Hall associates other spinal nerves. He considers respiration as a part of a general function of the nervous system, which presides over the *larynx*, *pharynx*, sphincters, ejaculators, &c., to which he has given the name of reflex, from its consisting of impressions carried to and from the *medulla oblongata* and *medulla spinalis*. Some illustrations of this function were given by Dr. Hall at the Meeting of the Committee of Science and Correspondence on November 27, 1832, (Proceedings, Part ii. p. 190,) and further illustrations of it have formed the subject of a Paper by him, which has since been published in the 'Philosophical Transactions'. The experiments shown on the present occasion demonstrate the existence of a series of physiological facts at variance with the law laid down by M. Müller in his Paper entitled "Nouvelles Expériences sur l'effet que produit l'Irritation mécanique et galvanique sur les racines des nerfs spinaux; par Jean Müller, Professeur à l'Université de Bonn," and published in the 'Annales des Sciences Naturelles,' tom. xxiii. (1831), p. 95, viz. "Il suit encore qu'il y a des nerfs qui n'ont point de force *motrice* ou *tonique*, qui ne peuvent jamais occasionner des mouvemens par eux-mêmes, qu'ils soient irrités par l'action galvanique ou mécanique, et qui ne conduisent le courant galvanique que passivement, comme toutes les parties molles humides; qu'il y a en revanche des *nerfs moteurs* ou *toniques* (*nervi motorii seu tonici*) qui montrent à chaque irritation médiate ou immédiate leur force tonique, *qui agit toujours dans la direction des branches des nerfs et qui n'agit jamais en arrière.*" In Dr. Hall's experiments the influence first pursued a backward course to the spinal marrow, being afterwards reflected upon the muscles.

Dr. Hall next observed, in regard to respiration, that, whilst Sir Charles Bell is contending that it is involuntary, and Mr. Mayo that it is voluntary, the old doctrine of its being mixed, or partaking of both properties, is the true one. He founded this view upon the following facts:

1. If the *cerebrum* be removed, respiration continues as an involuntary function through the agency of the eighth pair of nerves;
2. If the eighth pair be divided, respiration equally continues, but as an act of volition; but
3. If the *cerebrum* be first removed, and the eighth pair be then divided, respiration ceases on the instant. Volition is first removed with the *cerebrum*; the influence of the eighth pair is then removed by its division. The two sources of the mixed or double function being both cut off, the function ceases.

Dr. Hall explains and reconciles in this manner the difficult and apparently contradictory facts,—that the *medulla oblongata* alone, above the origin of the eighth pair of nerves, or the eighth pair of nerves themselves, may be divided, without arresting the respiration; but that the *medulla oblongata* cannot be divided at the origin of these nerves without arresting the respiration instantly. In the

first case the agency of volition is alone removed, and the respiration continues through the influence of the eighth pair; in the second, that of the eighth pair is removed, and the respiration continues as a function of volition; but in the third, both influences are destroyed at once, and with them the mixed or double function.

The same mixed or double character belongs to the other parts of the reflex function, as that of the *larynx*, the sphincters, the ejaculators. All the organs of the reflex function are also alike impressed through the medium of the mental affections or passions.

The course of the influence which constitutes the reflex function must be divided into the incident, or that into the *medulla*, and the reflected, or that from the *medulla*. The nerves which conduct the incident impression have, hitherto, received no designation; the others constitute a part of the system of muscular nerves. To the former class belong nerves which doubtless supply the *larynx* with its impressibility by carbonic acid, &c., &c., and hitherto undescribed, untraced; to the latter, the superior and inferior laryngeals: to the former belong the fifth, in the nostrils, in the face,—the eighth in the lungs, &c.; to the latter the respiratory nerves: to the former, nerves hitherto undescribed of the sphincters, ejaculators, &c.; to the latter, the muscular nerves supplying these parts.

The whole constitutes the subject of an investigation in which Dr. Hall has been for some time engaged,



Hall, Marshall. 1834. "Notes of Experiments on the Nerves in a Decapitated Turtle." *Proceedings of the Zoological Society of London* 2, 92–94.

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