mode of development is very simple. After the first moulting the larva gets six more branched legs and loses many spines. It enters the *Amphion* stage, then moults, throws the branched legs off, gets branchial, and becomes a young *Sergestes*. Only after this last moulting the central eye, hitherto present, disappears.

And very similar to that of *Sergestes* is the development of *Leucifer*. Here the earliest *Zoëa* of a species from the Western Pacific has got at first no eyes, then sessile ones come out, and the animal then presents the form which Dana has called *Erichthina demissa*, and which Claus suspected to be not a Stomatopod but a Schizopod larva. After the second moulting this *Erichthina* gets stalked eyes and very long setæ on all its appendages, becoming a rather long, very delicate *Zoëa*. It now enters the *Amphion* stage, but never gets more than four pairs of pereiopods, and loses another pair of these when it moults for the youngest *Leucifer* stage, in which two pairs of pereiopods are absent.

The next question, after having found this out, was, of course, whether *Amphion*, *Sergestes*, and *Leucifer* leave the egg as a *Zoëa*, or whether there is a preceding *Nauplius* stage. My own impression is that in the two first-named genera this is not the case, as the youngest Zoëas which I caught had all the same size, and as none of them was without the large lateral stalked eyes. As for *Leucifer*, the question appears to me to be doubtful; for it is, from what I have seen, quite possible that my youngest *Zoëa*, which has only got a central eye, may be preceded by a *Nauplius*. Of course the simplest thing would be to get the eggs; but there is the difficulty, for *Amphion* is caught very rarely, and has never been obtained at any other time but between 8 and 12 P.M., when it is extremely difficult by lamplight to find out the youngest stages. *Sergestes* larvæ are commoner, appearing also in the daytime, and *Leucifer* is sometimes caught in abundance. I hope, therefore, that I shall succeed in completing my researches about this question, especially as far as the two latter genera are concerned.

H.M.S. 'Challenger,' Honolulu, Sandwich Islands,
July 30, 1875.

December 16, 1875.

Dr. J. DALTON HOOKER, C.B., President, in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

The following Papers were read:—

I. "On the Development of the Spinal Nerves in Elasmobranch Fishes." By F. M. Balfour, B.A., F.L.S., Fellow of Trinity College, Cambridge. Communicated by Dr. Michael Foster, F.R.S., Prælector in Physiology in Trinity College, Cambridge. Received October 5, 1875.

(Abstract.)

The author commences by stating that the observations recorded in his paper have been made upon the three following genera of Elasmobranchs —*Scyllium*, *Pristiurus*, and *Torpedo*.

The majority of his observations were made upon specimens procured for him through the agency of the Zoological Station at Naples; but he has also been supplied in a most liberal manner with *Scyllium* embryos by the Directors of the Brighton Aquarium, through the kindness of Mr. Henry Lee. He finds that *Torpedo* embryos are by far more suitable than any other genera he has employed for the investigation of the development of the nerves.

The author then gives a detailed account of his observations upon the development of the spinal nerves in all the genera above mentioned. The following are the chief results at which he has arrived.

The posterior and anterior roots of the spinal nerves arise as independent outgrowths from the involuted epiblast of the neural canal.

The outgrowths for the two roots are at first quite independent of each other, and only unite at a late period of development.

The posterior roots are the first to develop. An outgrowth arises on each side from the dorsal summit of the neural canal, which the author believes to be unbroken throughout its whole length. The outgrowths on the two sides are at first in contact with each other; and from each there springs a series of processes equal in number to the muscle-plates.

These processes are the rudiments of the posterior nerve-roots. They grow ventralwards in contact with the side of the spinal cord.

After the formation of the posterior rudiments, the original outgrowths from the spinal cord cease to be attached to it along its whole length, and remain in connexion with it at a series of points only, each of which corresponds to a posterior root.

The result of these changes is the formation of a series of nerve-roots, each attached to the dorsal summit of the neural canal, and all of them united together dorsally by a continuous commissure, which is the remnant of the primitive outgrowth from the summit of the neural canal.

Subsequently the points of attachment of the posterior roots travel down the sides of the spinal cord, and finally remain fixed at about one third of the distance from its dorsal summit. At the same time the nerve-rudiments undergo histological changes, by which each becomes divided into a root, a ganglion, and a nerve.

At a still later period the nerve given off from the ganglion unites with the anterior nerve-root.

The development of the anterior nerve-roots is far simpler than that of the posterior.

Some little time after the appearance of the posterior roots there spring, on each side, from the ventral corner of the spinal cord, a series of conical outgrowths. These correspond in number with the muscle-plates, and are the rudiments of the anterior roots of the spinal nerves.

These outgrowths are not vertically below the posterior roots, a feature which remains permanent in the adult.

The points of attachment of the anterior roots undergo no change of position like those of the posterior roots; and after they have attained a considerable size they unite with the latter.

The author has also observed that the posterior roots of some and probably of all the cranial nerves develop in the same way as the posterior roots of the spinal nerves, and points out the bearing of this upon the morphological relations between the spinal and cranial nerves.

The remainder of the paper consists of a series of speculations upon the bearing of the above-mentioned facts upon various physiological and morphological problems. These, for the most part, do not admit of being abstracted.

One point the author mentions is the probable homology of the commissure he has detected uniting the dorsal ends of the posterior nerve-roots with the commissure he has described in a previous paper ("A preliminary Account of the Development of the Elasmobranch Fishes," Quart. Journ. of Micros. Science, October 1874, plate 15. fig. 14), which at first unites all the branches of the vagus nerve, and which is subsequently represented by their common junction before uniting with the medulla oblongata.

II. "On the Structure and Development of the Skull in the Batrachia."—Part II. By W. K. Parker, F.R.S. Received October 28, 1875.

(Abstract.)

In the present communication I wish to correct, as much as possible, what now seems to be erroneous in my former account of the Batrachian skull (that of the frog, Phil. Trans. 1871), and also to describe and illustrate the stages in the skulls of three kinds of toads.

Happily for me, Professor Huxley took up this subject at the beginning of last year; and I had frequent opportunities of working, as well as for discussion, with him.

It was soon made plain to me that in my former account of the behaviour of the visceral arches I had been wrong in describing the hyoid arch of the *third stage* as composed of an upper and a lower piece.