

	Cornea.	Sclerotic.	Lens.	Ciliary Muscle.	Elastic ligament.	
					Posterior.	Anterior.
<i>Rhea americana</i> .....	vertical $\frac{3}{2}$ in.	vertical $1\frac{1}{2}$ in.	lateral $\frac{1}{3}\frac{7}{2}$ in.	in. $\frac{1}{8}$	in. $\frac{3}{16}$	in. $\frac{3}{16}$
	lateral $\frac{3}{2}$	lateral $1\frac{1}{2}\frac{4}{5}$				
		ant.-post. $1\frac{1}{2}\frac{7}{10}$	ant.-post. $\frac{1}{2}\frac{1}{2}$	fibres long.		
<i>Phœnicopterus antiquorum</i>	vertical $\frac{1}{2}$	lateral $\frac{3}{2}$	lateral $\frac{5}{8}$	$\frac{1}{16}$	$\frac{3}{16}$	$\frac{3}{16}$
	lateral $\frac{1}{4}$ more	ant.-post. $\frac{1}{2}\frac{5}{8}$	ant.-post. $\frac{3}{2}$	gradually diminishing.		
<i>Aptenodytes Humboldtii</i>	$\frac{1}{2}$	lateral $\frac{1}{6}\frac{4}{5}$	lateral $\frac{3}{2}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$
		ant.-post. $\frac{1}{2}\frac{2}{5}$	ant.-post. $\frac{5}{8}$	gradually diminishing.		

The Society then adjourned over the Whitsuntide Recess to Thursday, May 30.

May 30, 1872.

GEORGE BIDDELL AIRY, C.B., President, in the Chair.

THE BAKERIAN LECTURE was delivered by WILLIAM KITCHEN PARKER, F.R.S., “On the Structure and Development of the Skull of the Salmon (*Salmo salar*, L.).” The following is an Abstract.

A few years ago Mr. Waterhouse Hawkins put into my hands some newly hatched salmon and also three of the first summer. Seeing their fitness for embryological research and the interest attaching to the formation of an osseous fish, I applied to my friends Messrs. Frank Buckland and Henry Lee, and these gentlemen most liberally supplied me with a large number of unhatched embryos and of the “fry” of this large fish.

My last subject, the frog, being fairly out of hand, I set myself last summer to this newer and more easy task,—more easy by far, for the translucency of the young salmon contrasts most favourably with the obscurity of the embryo frog.

I found that the two types at the time of hatching did not start fairly, but that the salmon had hastened to finish its *fourth stage* before emerging from the egg; this, however, is partly in consequence of the difference of the envelope in which the embryos are contained; for in the salmon this is a leathery “chorion,” and in the frog a mere gelatinous bleb.

Moreover, it soon became apparent that these two “Ichthyopsidans” are

in nowise near akin to each other. In the very first stage, where there is an essential agreement, in one important particular they greatly disagree; for the embryo of the salmon has two arches in front of its mouth, while the tadpole has but one; there is also an additional gill-arch in the osseous fish.

In the earliest stage of the salmon worked out by me I found a much more distinct condition of the parts than in frogs at the same stage; the differentiation of the latter is obscure as compared with the fish, and this not merely because of the quantity of *pigmentum nigrum* in the tissues of the former.

Then, in addition to other causes of obscurity, the mouth of the tadpole is strangely modified in harmony with its "suctorial" character and affinities (showing a remarkable affinity to the mouth of a lamprey), so that a whole system of cartilages has to be eliminated from the lips before the mouth (proper) can be understood. The labial system is slightly and slowly developed in the salmon, and its mouth is thus much more in harmony with that of the embryo reptile or bird than with that of the tadpole.

After the simple stage is passed, the development of the facial arches is very different in the two types,—as different, indeed, as in any two possible examples that could be given in the whole vertebrate group.

The facial arches behind the mouth now undergo segmentation; first the hyoid, and then the mandibular. The hyoid is cloven from top to bottom, and also has a single distal piece separated off.

At this stage we get an explanation of what is seen in certain rays, where the hyoid suspensorium is permanently double; and also ascertain that this second postoral arch, which retains the anterior piece in relation to the skull as the great "hyomandibular" pier, does not need the *saw* of the transcendentalist to put it into proper relation to its surroundings. Nature's invisible *wedge* has done what was needed, and the supposed *double rib* turns out to be *half* a visceral arch. On the whole, this second stage is extremely "Plagiostomous," for the details of which I must refer to the main paper.

While in the egg the head of the embryo is flattened, and so twisted that one of the eyes (it may be the left or the right) looks upwards towards the "chorion," the other having a *visceral* direction.

The facial bars, at first having all a simple sigmoid form, rapidly change towards the time of hatching, and, when the head gets free, the cerebral vesicles speedily swell, taking on the form so familiar to the embryologist; and the head now gains the "mesocephalic flexure."

After this an approach is made to the Teleostean type of structure; but this is not done at a stride. The intermediate condition is thoroughly "Ganoid," and, happily, comes in to explain the related structures of the *older* and *newer* "Orders." I am not aware that any stage of the heart or of the intestines shows either the many valves of the "aortic bulb" or the intestinal spiral valve: this must be seen to; yet if these never show

themselves in the "fry" of the osseous fish, their absence does not affect the general skeletal morphology.

The salmon amongst fishes, like the fowl amongst birds, never attains to the greatest degree of special class-modification; it remains *subtypical*, with a dentigerous maxillary, a ductus pneumaticus, a very *chondrosteus* state of the skull, and a very heterocercal tail.

Yet, from an ichthyological point of view, this fish is an immense height above the Sharks and Rays, and is far in advance, as a fish, of the whole group of "Ganoids."

The results of the *gradational* study of the fish-forms by the zoologist, and of their *secular* study by the palæontologist, are both in harmony with morphological facts. Although the light obtained is but as the first streak of dawn, yet it is a pleasant light, and quite sufficient to show each kind of worker where and how to renew his own special toil.

I cannot close this brief abstract without remarking that my researches in these, the highest types of animals, seem to me to be in perfect accordance with the results obtained by long study of the very lowest, the Rhizopods—namely, that they both yield increasing evidence in favour of the doctrine of Evolution.

Researches of this kind show what the life-processes can accomplish in the history of one individual animal, and also that the morphological steps and stages are not arbitrary, but take place in a manner in accordance with all that has of late been revealed to us of the gradation of types in the ages that are past.

The following communications were read :—

- I. "On Ammonia in the Urine in Health and Disease." By C. MEYMOTT TIDY, M.B., Joint Lecturer on Chemistry and Medical Jurisprudence at the London Hospital; and W. BATHURST WOODMAN, M.D., Joint Lecturer on Physiology, and Assistant Physician to the London Hospital. Communicated by T. BLIZARD CURLING, President of the Royal Medical and Chirurgical Society. Received April 16, 1872.

(Abstract.)

The authors refer to the researches of Andrews, Clark, Neubauer and Vogel, and others on the presence of ammonia as a constant constituent of healthy urine, Neubauer regarding 10·8 grains per diem as the average normal excretion. After numerous experiments, the authors regard this quantity as excessive, and suggest some reasons for this discrepancy.

The method adopted by the authors is as follows :—

The freshly passed urine is to be first diluted with a given bulk of distilled water, sufficient to destroy all apparent colour, a known quantity of the urine being taken in each case. To these is to be added an excess