

*BATRACHIANS AND REPTILES IN THE CAMBRIDGE NATURAL HISTORY.*¹

IN the preface to this welcome volume the author reminds his readers of the words of Linnæus, "Amphibiologi omnium paucissimi sunt nullique veri." What progress has been accomplished by the "Amphibiologi"—herpetologists we now term them—in dealing with the "pessima tetraque animalia" during the 150 years which have elapsed since this statement of the great naturalist cannot be better realised than by a perusal of the excellent contribution supplied by Dr. Gadow for the eighth volume of the "Cambridge Natural History."

This work is not only of the highest interest in bringing together in a small compass and in a charming style the essence of a most voluminous literature; it derives special value from the authority of its writer as an anatomist and observer of the Batrachians and Reptiles both in their native haunts and in the vivarium.

Not content with giving us the benefit of his wide experience in the departments to which he has devoted so much study, Dr. Gadow has also suggested various reforms in the general classification, thus raising the work far above the usual standard of this kind of semi-popular treatises.

The following table will show the classification adopted, and which, on the whole, reflects so well the state of our present knowledge. The author explains in the preface that the principal groups are called subclasses in order to emphasise their taxonomic importance in comparison with the main groups of birds and mammals:—

	Subclass	Order	Suborder
Amphibia	Stegocephali	Lepospondyli	{ Branchiosauri Aistopodes
		Temnospondyli	
		Stereospondyli	
	Lissamphibia	Apoda	{ Aglossa Phaneroglossa
		Urodela	
	Anura		
	Proreptilia		
	Prosauria	Microsauri	{ Protorosauri Rhyngocephali
		Prosauri	
	Theromorpha	Pareiasauri	{ Cryptodira Pleurodira Trionychoidea
		Theriodontia	
		Anomodontia	
		Placodontia	
	Chelonia	Atheca	
		Thecophora	
Reptilia	Dinosauria	Sauropoda	{ Stegosauri Ornithopodi
		Theropoda	
		Orthopoda	
	Crocodylia	Ceratopsia	
		Pseudosuchia	
		Parasuchia	
	Plesiosauria	Eusuchia	
		Nothosauri	
	Ichthyosauria	Plesiosauri	
		Ichthyosauri	
Pterosauria	Pterosauri	{ Pterodactyli Pteranodontes	
Pythonomorpha	Dolichosauri		
	Mosasauri		
Sauria	Lacertilia	{ Geckones Lacertæ Chamæleontes	
			Ophidia

The boldest attempt at innovation in taxonomy

¹ Amphibia and Reptiles. By Hans Gadow. "The Cambridge Natural History," Vol. viii. Pp. xiii + 668; 181 woodcuts. (London: Macmillan and Co., Ltd.) Price 17s. net.

consists in the removal from the class Batrachia or Amphibia, as generally understood, to that of Reptilia, not only of the Microsauria, but of a number of other members of Cope's Stegocephalia. But this change is not one that is likely to commend itself. We all know how, in the light of recent palæontological discovery, most of the supposed distinctive features of the two classes in question have faded away, as instanced by Prof. Seeley's proposal to unite the Stegocephalia with the Reptiles, and Prof. Credner's establishment of the group Eotetrapoda for the reception of the earlier Batrachians and Reptiles. However, one thing appears certain to me: the Stegocephalia, as defined by Cope, form one compact group, distinguished from both Batrachians proper and Reptiles by the presence of additional dermal bones in the skull—the occipital (dermo-occipital) and the so-called "epiotic," which I regard as the homologue of the post-temporal of Fishes—and, further, in all cases where the pectoral arch is known, by their conforming to the type of the Crossopterygian and early Ganoid Fishes in the possession of the element termed cleithrum by Gegenbaur (clavicle of ordinary Teleosts) in addition to the clavicle proper. These highly important features, connecting the Crossopterygians with the Stegocephalians, are relegated to the background by Dr. Gadow, who prefers to establish the turning-point where to part the Reptilian phylum from the Batrachian upon the constitution of the elements of the vertebral column, Batrachians being defined as *acentrous*, *pseudocentrous* or *notocentrous*, that is to say, in which the author's "dorsal arcualia" are reduced or absent, Reptiles as *gastrocentrous*, the centra of the vertebræ being formed by pairs of "interventralia," while the "basiventralia" (intercentra of Cope) are reduced, persisting either as wedgebones or as intervertebral pads, or absent. This is the application of the views set forth by the author in his well-known paper published in the *Philosophical Transactions* for 1896; but it must be admitted that, so far as the Stegocephalia are concerned, the ideal distinction between interdorsalia and interventralia cannot be practically applied, owing to the types which connect *Eryops*, now proposed to be placed with the Reptiles together with the Embolomeri and Microsauria, and *Archegosaurus*, associated with the Labyrinthodonts. Whatever measure of truth Dr. Gadow's theory of the evolution of the vertebral column may contain, it is very doubtful whether any students of the fossil remains will be able to agree with him in regarding the composition of the tripartite vertebræ of these genera as due to "superficial resemblance." "After all," the author adds (p. 285), "we feel certain that Reptiles have arisen from Stegocephalous Amphibia, and it is in the Lower Permian, exactly where the debatable creatures lived side by side with the Stegocephali, undoubtedly likewise temnospondylous, that the change from Amphibia into Reptiles seems to have taken place."

It is highly probable that the Stegocephalians will be found to have been derived from the Crossopterygians and to lead, on the one hand, to the Batrachians through the Branchiosauria, and, on the other hand, to the Reptiles through the Microsauria. Perhaps the best means of getting over the difficulty with which we are confronted would be to raise the Stegocephalians to the rank of a class, which is quite capable of exact definition. But there is certainly no sufficient justification at present for the proposal to unite *Eryops* and the *Embolomeri* (*Proreptilia* of Gadow) with the Reptiles rather than with the Batrachians.

I would add that if Dr. Gadow thus repudiates the classification of Cope, it is contrary to the rules of nomenclature to make use in the sense he does of the name *Stegocephali*.

On the other hand, I hail with satisfaction the

systematic position given to the Apoda or Cæcilians (which name should not have been spelt Cœcilians).

In the division of the Anura or Ecaudata an attempt is made at reducing the number of families, but it is

P. 153. The tympanum is often very distinct in *Discoglossus*.

P. 161. The map does not show the eastern extension to South-western Asia of the *Pelobatidae*, nor is it correct as to the distribution of the *Pelobatidae* and *Discoglossidae* in Eastern Asia and North America (cf. pp. 153, 162, 164, 165).

P. 167. The common toad occurs in Norway as far as 65° lat., as correctly stated on p. 177; but this is not shown on the map.

P. 189. The pupil is horizontal in *Diaglena* (as the name implies) and *Pternohyla*.

P. 198. The curious *Hyla goeldii* is from the Serra dos Orgãos, not from Pará.

P. 288. "Deeply amphiœolous vertebræ" is not true of all "Prosauria" (cf. *Hyperodapedon* and *Sauranodon*, the latter with proœolous vertebræ).

P. 332 (map). Testudinidæ, Cinosternidæ and Chelydridæ occur in Ecuador.

P. 499. The shell of the egg of *Lacerta viridis* and *L. agilis* is not hard like Geckos', but parchment-like, as described on p. 555, whilst that of *L. vivipara* is a mere membrane.

P. 500. The Scincidæ are represented by several species in New Zealand.

P. 501. Chameleons exist on the Seychelles (*Chamaeleon sechellensis*) and Mauritius.

P. 514. The Pygopodidæ cannot be described as leading a usually subterranean life, any more than our common slow-worm.

P. 529. The map showing the distribution of Anguidæ and Iguanidæ is not quite correct, since the former are



FIG. 1.—Australian tree-frog (*Hyla caerulea*).

difficult to see what is to be gained by this reduction in a manner for which the author himself pleads guilty of inconsistency; a reproach which would apply likewise to some changes in the classification of the Lacertilia.

In accordance with what I believe to be the duty of a reviewer, however more disposed he may feel to praise than to criticise, a certain prominence should be given to the pointing out of small errors, such as necessarily creep in all books of some extent, in order to prevent their propagation, especially in the case of a work which is certain to enjoy a wide circulation. I have, therefore, here noted a few which I have come across.

P. 11. The number of caudal vertebræ varies much in our species of newts. It might mislead the student in search of additional characters by which to distinguish *Triton palmatus* from *T. taeniatus* to read that the latter has about a dozen vertebræ more than the former.

P. 30. *Pelobates* cannot be described as a "very aquatic" genus. On the same page, *Amphodius* should have been mentioned as the best example of a frog with toothed parasphenoid.

P. 45. There is no difference in the nature of the external gills of *Protopterus* and *Lepidosiren*.

P. 95. On the map showing the distribution of the Urodela, the range of these Batrachians should be extended to Ireland, Southern Norway, Syria, Northern Persia and Peru. The habitat of *Plethodon platensis*, mentioned on p. 94, is not marked on the map.

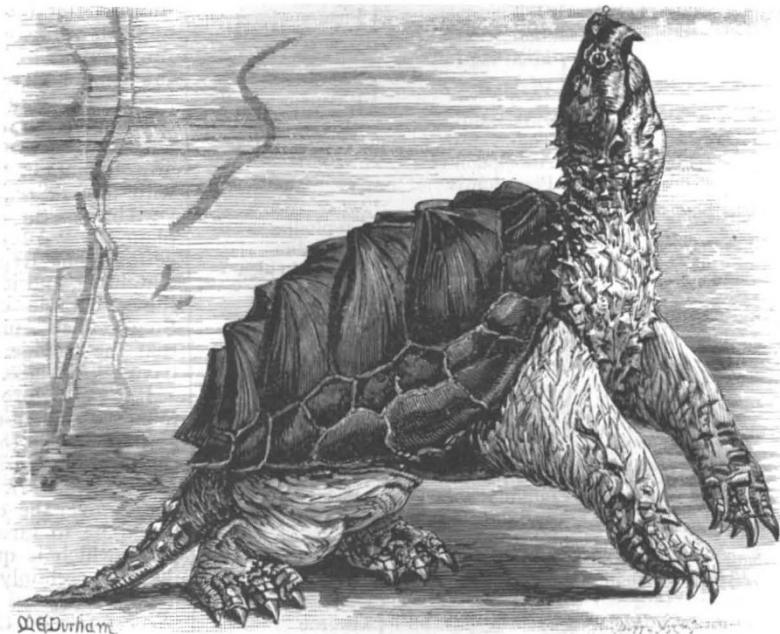


FIG. 2.—"Alligator turtle" (*Macrolemmys temminckii*).

represented in South-eastern China (*Ophisaurus harti*) and the latter extend to the South-eastern United States (*Anolis*, *Sceloporus*, *Phrynosoma*), as stated in the text.

P. 558. The Faraglione Rock near Capri is not blackish.

P. 565. The Amphisbænidae are represented on the map as occurring all over Africa; but none are known from north of 12° lat. N. except the Mediterranean forms confined to the Atlas and the territory between it and the sea.

P. 644. The range of the *Crotalinae* extends to Celebes (*Lachesis wagleri*).

In matters of nomenclature, some inconsistency is displayed in the termination of the names of orders and suborders, and the use of the term "Sauria" for a group embracing lizards and snakes is unjustifiable.

The illustrations are for the greater part original, and many are actually taken from living specimens. So great a training is required to depict properly the attitudes of any class of animals, and especially the often mysterious-looking creatures which form the subject of the book under review, that only artists who have made a speciality of it can be expected to furnish nearly faultless work, which even then may be spoilt to a certain extent, so far as technical details are concerned, through the intervention of the engraver if, as in the present case, his services have also to be enlisted. It will, therefore, not be unnatural if an expert may find fault with a few of the illustrations in this book. For instance, Fig. 23 represents a difference between the heads of the male and female crested newt which does not really exist; Fig. 31 shows *Bombinator igneus* with the eyes much too far apart, Fig. 91 a *Trionyx* with azygous frontal bone, and Fig. 103 a ventral view of the hand of *Ptychozoon* with the inner finger longer than the outer, which is just the reverse of nature. But all the figures are marked by a freshness which makes up for any shortcomings, and many may be pronounced as exceptionally good.

In concluding the review I would express the opinion that by this handsome volume a very important addition to science has been made; that the beautiful illustrations, together with the clear and charming accounts of the life-histories which it contains, will do much to popularise the study of a rather neglected section of zoology; and that lovers of Reptiles, of which there are more than one generally thinks, will feel that the new knowledge imparted to them emanates from one who is thoroughly in sympathy with their enthusiasm. G. A. BOULENGER.

THE FORTHCOMING MEETING OF THE BRITISH ASSOCIATION.

IN the two articles which have already appeared (May 23 and July 18) upon the meeting of the British Association, to be held at Glasgow on September 11-18, the general arrangements made for the scientific and social pleasures of the members have been described. It is now possible to give an epitome of the programme of the meeting and a forecast of the work of the sections. The sections do not meet on September 11 and September 19, but on all intervening days.

Epitome of Programme.

Wednesday, September 11.—President's address in St. Andrew's Hall.

Thursday, September 12.—Conference of delegates of corresponding societies; inauguration of new anatomical buildings at the University, and the opening of the museum in connection therewith; reception and conversation in the City Chambers, by invitation of the Lord Provost and Corporation of Glasgow.

Friday, September 13.—Garden party at Overtoun, Dumbartonshire, by invitation of the Lord and Lady Overtoun; lecture in St. Andrew's Hall, by Prof. W. Ramsay, F.R.S., subject: inert constituents of the

atmosphere; smoking concert in Berkeley Hall of St. Andrew's Halls.

Saturday, September 14.—Excursions; lecture to artisans in St. Andrew's Halls, by Mr. H. J. Mackinder, subject: the movements of men by land and sea.

Sunday, September 15.—Official sermon in the Cathedral, by the Rev. Pearson M'Adam Muir.

Monday, September 16.—Garden party in the Botanic Gardens and Queen Margaret College, Glasgow, by invitation of the Lord Blythswood, president of the Glasgow Philosophical Society, and Lady Blythswood; lecture in St. Andrew's Hall, by Mr. Francis Darwin, F.R.S., subject: movements of plants.

Tuesday, September 17.—Special visits to public works; conference of delegates of corresponding societies; conversazione in the Exhibition Buildings, by invitation of the president, the chairman and the executive council of the Glasgow International Exhibition Association, 1901.

Wednesday, September 18.—Concluding general meeting; excursion to Paisley and luncheon in the Town Hall, by invitation of Sir Thomas Glen Coats, Bart.; reception and conversazione in the galleries of the Royal Scottish Society of Painters in Water Colours, 153, Sauchiehall Street, by invitation of the president (Sir Francis Powell, P.R.W.S.) and the council; "at home" in the Art Club, by invitation of the president (Mr. J. E. Christie) and the committee of the Glasgow Art Club; reception and conversazione in the Glasgow School of Art, by invitation of the chairman (Mr. James Fleming) and the governors; reception and conversazione in the galleries of the Royal Glasgow Institute of the Fine Arts, by invitation of the president (Sir John Stirling-Maxwell, Bart., M.P.) and the council of the Institute; annual inspection and dinner of the Clyde Navigation Trustees, to which a selected number (probably thirty) of members of the British Association will be invited; dinner by the Faculty of Physicians and Surgeons to a selected number of the medical members of the British Association.

By kind permission of the owners, a large number of shipbuilding yards, public works, &c., in Glasgow and district will be available to the inspection of members during the meeting. Details as to days and times are given in a special handbook and guide that is being prepared by the local committee.

In addition to the information given in NATURE of July 18 with regard to the sectional meetings, the following provisional programmes of sections have been received.

The president's address to Section B (Chemistry) will be on the position of British chemistry at the dawn of the twentieth century. In this address Prof. Percy Frankland, F.R.S., will direct attention to the factors which have been instrumental in promoting the growing activity in original investigation during the past twenty years. He will also point out the disadvantages at the present time incidental to university education, and will indicate some of the more important reforms which are required in the immediate future. Other papers which have been arranged for this Section are, bridged rings, by Prof. Perkin; the present position of electrochemical industries in this country and abroad, by Dr. Shields; the chemical exhibits at the Glasgow Exhibition, by Dr. Lewkowsch; and ocean salt deposits, by Dr. E. F. Armstrong. The last paper may possibly be read at a joint meeting of Sections B and C. Prof. Letts will read papers on the chemical changes which occur during the contact of sewage with "bacteria beds" and on the assimilation of ammonia by the seaweed *Ulva latissima*.

In addition to Mr. J. Horne's presidential address, on recent advances in Scottish geology, to Section C (Geology), the following papers, among others, will be