Table II.

Two platinum plates in acid and water, each exposing 1 square inch surface. The resistance of R+R′=100 Ohms in this Table; by experiment the potential of the two cells was found to be reduced 8 per cent., and was therefore very nearly 200 lbs. instead of two cells Daniell's.

Approximate potential in volts.	Time of electrification.	Throw of image by discharge of plates.	Current remaining after discharge.	Mean *minus* the current.	Ratio of capacity with different potentials.	Value in microfarads.
	seconds.					
0·2	10	19 20 19	1 }	18	1	175
,,	20	18 19 19	,, }			
0·4	10	45 46 46	3 }	43	1·2	210
,,	20	46 46	,, }			
0·8	10	175 170 170 165	11	159	2·2	385
1·0	10	230 228 226	18	210	2·33	408
*1·2	10	310 308 311	22	288	2·67	467
*1·4	10	373 380 382	30	350	2·77	484
*1·6	10	460 460 467 475	33	428	3·10	542
Condenser of 311 microfarads.						
0·2	...	32 32 32	0	32	1	311
0·4	...	63 64 63½	,,	63½	,,	,,
0·8	...	127 127	,,	127	,,	,,
1·0	...	159 159	,,	159	,,	,,
1·2	...	188 187 189	,,	188	,,	,,
1·4	...	220 220 221	,,	220	,,	,,
1·6	...	252 254 252 254	,,	253	,,	,,
1·8	...	284 283 284	,,	284	,,	,,
2·0	..	316 317 317	,,	317	,,	,,

* These readings are uncertain, being obliged to guess how much current remained after the image had swung out and back, its momentum lasting longer than with smaller deflections; the true reading would therefore be greater than those observed.

January 19, 1871.

General Sir EDWARD SABINE, K.C.B., President, in the Chair.

Prof. Alfred Newton was admitted into the Society.

The following communications were read :—

I. "On the Structure and Development of the Skull of the Common Frog (*Rana temporaria*)." By W. Kitchen Parker, F.R.S. Received October 10, 1870.

(Abstract.)

At the close of my last paper "On the Skull of the Common Fowl," I spoke of bringing before the Royal Society another, treating of that of

the osseous fish. I was working at the early conditions of the salmon's skull at the time.

I was, however, led to devote my attention to another and more instructive type early in the following year; for it was then (January 1869) that Professor Huxley was engaged in preparing his very important paper "On the Representation of the Malleus and Incus in the other Vertebrata" (see Zool. Proc. May 27, 1869).

In repeating some of his observations for my own instruction, it occurred to me to renew some researches I had been making from time to time on the frog and toad. The results were so interesting to us both, that it was agreed for me to work exhaustively at the development of the frog's skull before finishing the paper on that of the salmon. On this account Professor Huxley mentions in his paper (*op. cit.* p. 406) that he leaves the Amphibia out of his demonstration, and that they are to be worked out by me. The amount of metamorphosis demonstrable in the chick whilst enclosed in the egg suggested a much more definite series of changes in a low, slow-growing Amphibian type. I think that this has been fully borne out by what is shown in the present paper.

The first of the ten stages into which I have artificially divided my subject is the unhatched embryo, whilst its head and tail project only moderately beyond the yelk-mass. Another stage is obtained by taking young tadpoles on about the third day after they have escaped from their glairy envelope; a few days elapse between the second and third stages, but a much longer time between the third and fourth, for the fourth stage is the perfect tadpole, before the limbs appear and whilst it is essentially a fish with mixed *Chimæroid* and *Myxinoid* characters. Then the metamorphosing tadpole is followed until it is a complete and nimble frog, two stages of which are examined; and then old individuals are worked out, which give the culminating characters of the highest type of Amphibian.

The early stages were worked out principally from specimens hardened in a solution of chromic acid; and the rich umber-brown colour of these preparations made them especially fit for examination by reflected light.

Without going further into detail as to the mode of working my subject out, and without any lengthened account of the results obtained, I may state that the following conclusions have been arrived at; namely, that the skull of the adult is highly compound, being composed of:—

1st. Its own proper membranous sac;

2nd. Of a posterior part which is a continuation, in an unsegmented form, of the vertebral column;

3rd. Of laminæ which grow upwards from the first pair of facial arches, and which enclose the fore part of the membranous sac, just as the "investing mass" of the cranial part of the notochord invests the hinder part.

4th. The ear-sacs and the olfactory labyrinth become inextricably combined with the outer case of the brain. And

5th. The subcutaneous tissue of the scalp becomes ossified in certain

definite patches; these are the cranial roof-bones. Around the mouth there are cartilages like those of the Lamprey and the Chimæra; but these yield in interest to the proper facial bars, which are as follows, namely :—

First pair, the "trabeculæ."

Second pair, the mandibular arch.

Third pair, the hyoid arch.

And fourth to seventh pairs: these are the branchials.

These are all originally separate pairs of cartilaginous rods; and from these are developed all the complex structures of the mouth, palate, face, and throat. The pterygo-palatine arcade is merely a secondary connecting bar developed, after some time, between the first and second arches.

Meckel's cartilage arises as a segmentary bud from the lower part of the second, and the "stylo-cerato-hyal," as a similar secondary segment, from the third arch.

By far the greater part of the cranium (its anterior two-thirds) is developed by out-growing laminæ from the trabeculæ, which after a time become fused with the posterior or vertebral part of the skull.

When the tadpole is becoming a frog, the hyoid arch undergoes a truly wonderful amount of metamorphosis.

The upper part, answering to the hyomandibular of the fish (not to the whole of it, but to its upper half), becomes the "incus," and a detached segment becomes the "orbiculare," which wedges itself between the incus and the "stapes." The stapes is a "bung" cut out of the "ear-sac." The stylo-cerato-hyal is set free, rises higher and higher, and then articulates with the "opisthotic" region of the ear-sac; in the toad it coalesces therewith, as in the mammal. The lower part of the hyomandibular coalesces with the back of the pair of the mandibular arch; and the "symplectic" of the osseous fish appears whilst the tadpole is acquiring its limbs and its lungs, and then melts back again into the arch in front; it is represented, however, in the bull-frog, but not in the common species, by a distinct bone.

This very rough and imperfect abstract must serve at present to indicate what has been seen and worked out in this most instructive vertebrate.

II. "Method of measuring the Resistance of a Conductor or of a Battery, or of a Telegraph-Line influenced by unknown Earth-currents, from a single Deflection of a Galvanometer of unknown Resistance." By Henry Mance, Superintendent Mekran Coast and Persian Gulf Telegraph Department, Kurrachee. Communicated by Sir Wm. Thomson. Received January 12, 1871.

The resistance of each part of a circuit, such as that shown in fig. 1, being known, the influence exercised by the shunt A B, as well as the