7. When the external organs arrive at this final form before the organs of reproduction are matured, these changes are known as metamorphoses; when, on the contrary, the organs of reproduction are functionally perfect before the external organs, or when the creature has the power of budding, then the phenomenon is known as alternation of generations.

8. Thus, then, it appears probable that these remarkable phenomena may have arisen from the simple circumstance that certain animals leave the egg at a very early stage of development, and that the external forces acting on the young are different from those which affect the mature animal.

JOHN LUBBOCK

(To be continued.)

ON AN IMPROVED FORM OF OZONE GENERATOR

A SHORT description of an improved form of ozone generator, exhibited at the last meeting of the Chemical Society, may perhaps be interesting to the readers of NATURE.

Probably no apparatus hitherto introduced, for the production of ozone by electric induction, has in its working

given universal satisfaction. The original form of "Siemens' tube" has many disadvantages, amongst which the chief are, the extremely fragile nature of the two glass tubes, especially when sealed together by the blowpipe, and the fact that if the apparatus be worked for any length of time it becomes heated, thereby causing a diminution in the quantity of ozone obtained. The arrangement of a number of glass plates coated on alternate sides with tin foil, and enclosed in a box, known as "Beane's" instrument, possesses—especially if used as it is intended it should be with a large and powerful coil—this latter disadvantage to a considerable extent. Sir Benjamin Brodie, during his researches upon ozone, used a modification of "Siemens' tube," which in a great degree overcame this difficulty. Two glass tubes closed at one end, and of such diameter that one was capable of sliding within the other, were fixed together in that way, the junction being effected either by the blowpipe or by means of paraffin, thus leaving a small annular space between them through which the oxygen or other gas to be ozonised could circulate; tin foil coatings were dispensed with altogether, the inner tube being filled with water, and the whole apparatus stood in a vessel of water, wires in connection with an induction coil being placed in the interior tube, and also in the outer vessel: this water could be kept cool by ice, and thus any heat produced

New Ozone Generator.

during the time it was in use was successfully neutralised. Such an apparatus works exceedingly well but requires delicate handling, and is not perhaps very well adapted for having other pieces of apparatus attached to it.

This new instrument is an improved modification of the above, but permits of a continuous stream of water of any required temperature being maintained through it; and further, the annular space which in the case of glass tubes is often very irregular, causing thereby an unequal electrical discharge, is made as true as possible, and the result is a more uniform conversion of the gas into ozone. The apparatus as at present made will be better understood by the following description referring to the accompanying diagram:—A A is a piece of glass tube of a little more than one inch in diameter, and of as uniform a bore as can be obtained. On each end of this tube is placed a brass cap, bored with two holes, and coated internally with shellac; in the interior of this glass tube and of a diameter scarcely less than that of the tube itself, but not quite so long, is placed a thin hollow brass box, B B, with its surface made as true as possible by turning in a lathe; this brass box is placed concentrically with the outer tube and is completely coated on its exterior surface with tin, the tin being acted upon to the smallest extent by the ozone. This hollow box communicates with the exterior of the apparatus by means of the

tubes C C passing through the centre of the caps. It is intended that a current of water shall be kept circulating through the interior of this box, the water being brought into direct contact with its sides by means of a small spiral placed within it, the box being of a slightly less diameter than the glass tube, a small annular space will remain between the two, and through this space the gas to be ozonised is passed by means of the tubes D D; the box itself is made one of the electrified surfaces, and a strip of tin foil G, fixed to the outside of the glass tube, forms the other; two binding screws, E and F, serve to make the necessary connections with an induction coil.

The production of ozone by this apparatus is exceedingly regular and constant. No quantitative estimations with iodide of potassium and sulphurous acid have as yet been made with regard to the amount of ozone obtained, but an approximate experiment upon the quantity of indigo bleached in a given time, seems to indicate that this amount is quite equal to, if not rather in excess of, that obtained when the ordinary apparatus is used. This instrument possesses also some minor advantages; it is not so easily broken, other pieces of apparatus are very readily attached to it, and at the same time its cost is less. There appears to be no reason why larger forms should not be manufactured upon the same principle. These instruments are made by Messrs. Tisley and Spiller of Brompton.

THOS. WILLS