The case of sixteen hours' work had been treated separately and gave different results.

Prof. Hill's final remark, about radiation from the eyes, might remain undiscussed, but for a possible misunderstanding which might arise from his statement that "The girls apparently had only to look at the yeast cells to set them dividing". Actually, a duration of two minutes with intermittent excitation had been necessary, which means a radiation dose presenting a considerable value on the mitogenetic scale (see my monograph). Radiation emitted by the cornea had been proved heretofore by different investigators of my laboratory in many hundreds of experiments.

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Pelvic Filaments of Lepidosiren

IN Mr. G. E. H. Foxon's opinion[1] the experiments which we made in Marajó are insufficient to prove that the function of the pelvic filaments of Lepidosiren is to emit oxygen, although he fully admits that our evidence proves that oxygen was given out by the filaments when the fish bearing them was placed in deoxygenated water. He considers that it is more probable that under natural conditions the filaments are concerned with the respiration of the parent.

Mr. Foxon's first argument is that the eggs are scattered at random in a single layer over the floor of the breeding burrow and that the smooth surface of the egg-shells makes it physically impossible for them to be piled up in a heap round which the parent could be coiled up. Dr. Carter, who saw the nests himself in Paraguay, states that they are made of dead leaves and grass, collected by the parent and taken into the burrow, and that among these plant materials the eggs are laid. He also states that the male which guards the nest is found coiled round the mass of leaves and eggs in an expansion at the end of the burrow. In Marajó, nests were brought to us each consisting of a mass of weed and plant debris within which the eggs were contained. The fishermen who brought our specimens informed us that the nests were taken from the end of the burrow, and we found that the eggs in them were alive and developing. Our evidence from the Amazonian region is thus in agreement with that of Dr. Carter from Paraguay.

Mr. Foxon's second argument is that repeated visits to the surface, which would have to be made if the male were in any way a means of supplying oxygen to the young, would be seriously detrimental to the welfare both of the male and of the offspring; to the former because the filaments might be bitten off by an enemy, to the latter because, in the absence of the male, enemies might enter the nest and devour eggs and young. He concludes therefore that the male remains in the nest and respires by means of the filaments. He regards the filaments as a means of diminishing the need of frequent absences of the male from the nest.

Mr. Foxon omits to discuss or even to mention the question whether there is enough oxygen in the water in the burrow to provide for the respiration of the male through the filaments, or even any oxygen at all, and the other essential question, that of the respiration of the larvæ. Carter and Beadle found from their experimental researches in Paraguay that there was scarcely ever a measurable amount of oxygen in the water at the bottom of the swamp at the season and in the region in which the nests of Lepidosiren were made, that the water in the nest-burrows would therefore contain scarcely any oxygen or none at all, unless a supply was obtained from the parent fish. In Marajó we made no special investigation of the oxygen content of the water at the bottom of the swamp where Lepidosiren nests were found. The few tests we made of water from the bottom of shallow swamp-pools gave from 0·39 to 0·95 c.c. oxygen per litre. On the other hand, we often used water which had been deoxygenated by enclosing a small fish in it to the exclusion of air, and the average amount of oxygen left at the death of the fish was 1·5 c.c. per litre. It is certain from all the evidence we have, that the water in the nest-burrow of Lepidosiren is much below this, if not actually zero.

Carter found that the larvæ kept their external gills for 45 days after hatching and therefore probably remained in the nest for that period. Additional oxygen could not be obtained from the water outside the burrow, and the only possible conclusion is that if the male did not visit the surface at frequent intervals to fill its lungs with air, both it and the larvæ would die of asphyxia in a much shorter period than 45 days, or even 45 hours.

The conditions in the experiments carried out by us in Marajó were essentially similar to the natural conditions to which the male Lepidosiren and the larvæ are subjected in the nest-burrow. The male in the burrow is free to visit the surface at the necessary intervals, while the male in our experiments could inspire at will. The male in our experiments gave off oxygen from its vascular filaments to deoxygenated water in a glass tube, the male in the nest-burrow with air in its lungs must necessarily give off oxygen to the water in the burrow, which contains less oxygen per litre than the water in our tubes.

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[1] NATURE, **133**, 732, May 20, 1933.

IN the last paragraph of their letter, Messrs. Cunningham and Reid state, "The male in the burrow is free to visit the surface at the necessary intervals . . ." This is what I deny. The male is not free to visit the surface but must remain on guard over the young. All who have collected Lepidosiren material agree that the male *guards* the offspring. Prof. Agar[1] has written: "The eggs are placed at the end of the burrow, and the male lies in the passage leading to it, ready to defend his home with his powerful teeth—as I proved unintentionally on my own person, by putting my hand into a burrow from which I thought that the male had been driven out. I quickly drew it out again with my little finger cut open." In the next sentence, Prof. Agar continues: "The devotion of the male lungfish is truly admirable, for he stays in the nest the whole time, from the moment the eggs are laid till the young are ready to leave the nest, a period of about seven weeks."