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ON THE PRODUCTION OF A FERTILIZATION MEMBRANE IN THE EGG OF THE SEA-URCHIN WITH THE BLOOD OF CERTAIN GEPHYREAN WORMS.

(A Preliminary Note.)

BY
JACQUES LOEB.

Certain theoretical considerations made it appear probable that those substances which cause the development of the egg must be found in liquids or cells of the body other than the sperm. A search in this direction revealed the fact that the blood serum of certain Gephyrean worms (*Dendrostoma* and *Sipunculus*) contains a substance which causes the membrane formation and starts the development in the unfertilized egg of the sea urchin.

It is surprising how little of the blood serum of the worm is required in order to produce this effect. As a rule one c.c. of the blood of *Dendrostoma* was diluted with from 50 to 200 c.c. of sea-water and then centrifuged. If from one to four drops of the clear liquid thus obtained was added to three or five c.c. of sea-water containing the eggs, from 10 to 90 per cent. of the eggs formed membranes. The reader will notice that the blood serum of the worm which caused the membrane formation was diluted 1,000 to 5,000 times with sea-water. In order to prevent the possibility of a contamination with sperm, the blood of female worms was used in most cases. In addition, in a number of experiments the serum was heated to a temperature of 60° C.

Not the eggs of every female showed the reaction, but, as a rule, only the eggs of females whose ovaries were at the acme of maturity.

The eggs which formed a membrane when treated with the serum of *Dendrostoma* segmented and formed tolerably good 16 or 32 cell stages. Very few, however, reached the blastula stage. If they were put for from 30 to 60 minutes into hypertonic seawater after the membrane formation, they developed into plutei, most of them in an entirely normal way.

The experiments indicate that the active substance of the serum of *Dendrostoma* is neither a fatty acid nor a hydrocarbon. It may be a protein, inasmuch as the efficiency of the serum is annihilated by heating it for a couple of minutes to the boiling point.

Heating of the serum to 50° to 80° C. apparently does not diminish its efficiency.

The blood serum of a number of other animals belonging to different groups of the animal kingdom was tried but thus far without success.