

form in organisms. But incontrovertibly there is a power which co-ordinates the action of these germinal points, for they are co-ordinated. You knew that. Any man who has stood face to face with the results of microscopical research in the last twenty years will, I think, be very slow to adopt any other than Aristotle's definition of life. Perfectly parallel with that definition is the one given here. Life is the co-ordinating power behind the movements of germinal matter. That definition having been defended by me at great length previously I shall now use our previous conclusions. From the point of view reached in thirteen lectures on Biology I must begin—and I can only begin to-day—a reply to Maudsley.

1. Germinal matter, or bioplasm, increases in quantity as living tissues grow.

I admit that. Once every living thing was but a single naked mass of bioplasm.

2. With the increase of quantity there is an increase of the force in the germinal matter.

I admit this also. Your naked, throbbing mass of bioplasm takes on a wall and divides and subdivides and weaves the walls of its cells into tendon and nerve and muscle, and coils these around each other, according to a predetermined plan. Finally, one-fifth of the bulk of the organism is made up of germinal matter. There are many bioplasts where there was one.

3. This increase is derived from the assimilation of inorganic matter.

Conceded. We know that the individual cell takes in nutrient matter from without, transforms it into living matter, and throws it off as formed matter. You remember that there are but three kinds of matter in living tissues—nutrient matter, living matter, and formed matter. The inorganic is changed into the germinal, the germinal throws off the formed, and, as your bioplast divides and sub-divides, no doubt the matter which it weaves into these various structures is derived from the inorganic world.

4. Maudsley asks how we know that the movements of germinal matter, which are sustained by inorganic matter, did not originate in inorganic matter. He says:

"Admitting that vital transforming matter is at first derived from vital structure, it is evident that the external force and matter transformed does, in turn, become transforming force—that is, vital. And if that takes place after the vital process *has once commenced*, is it, it may be asked, extravagant to suppose that a similar transformation might at some period have *commenced* the process and may ever be doing so? The fact that in growth and development life is continually increasing from a transformation of physical and chemical forces is, after all, in favor of the presumption that it may at first have so originated. And the advocate of this view may turn upon his opponent, and demand of him how he, with due regard to the axiom that force is not self-generative, and to the fact that living matter does increase from the size of a little cell to the magnitude of a human body, accounts for the continual production of transforming power? A definite quantity only could have been derived from the mother structure, and that must have been exhausted at an early period of growth. The obvious refuge of the vitalist is to the facts that it is impossible now to evolve life artificially out of any combination of physical and chemical forces, and that such a transformation is never witnessed save under the conditions of vitality."—("Body and Mind," Eng. ed., p. 169.)