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HIGHER LEVELS OF INTEGRATION¹

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TRANSMISSION

OF the several integrating mechanisms which convert a cell population into a multicellular individual, that of transmission is mainly responsible for the differences between "higher" and "lower" organisms. As it has improved, so has adaptive amplification, the ability of an individual to respond to environmental events, including those related to other individuals. This paper will be concerned, consequently, with the evolution of transmissive mechanisms and with the unit-whole relations which they serve—between cells in the organism and between organisms in the social group.

Protoplasm, subjected to an adequate stimulus, enters a new and often specific state; it gives its characteristic response—a muscle twitches, a gland secretes. But the response is not restricted to the stimulated region: the urchin egg starts to lift its membrane where the sperm enters, but this continues to rise around the whole egg; the end portion of a muscle fiber, far from the point of nerve entry, participates in the general shortening. Something, some form of excitation, must be propagated or communicated from the originally excited region to neighboring ones; and this is the essence of transmission. This universal capacity of protoplasm to hand on excita-

¹ From an address at the University of Chicago Fiftieth Anniversary Celebration. The complete paper will appear in *Biological Symposia*, Vol. 8.

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