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SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. MCKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

New York City: Grand Central Terminal
Lancaster, Pa. Garrison, N. Y.
Annual Subscription, \$6.00 Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

BASIC PATENTS IN NATURE¹

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At a time when the very word "adaptation" is anathema to many scientists it may seem reactionary to choose an even more anthropomorphic term such as "basic patents" to stand for the same idea. Nevertheless, as I shall try to show later, each one of us is able to carry on the business of life solely by means of our capital stock of Nature's patents, inherited from ancestors that have somehow gradually invented or come upon them in the long rise from fish to man. By basic patents I mean not only the things invented but the principles of construction and operation, of which Nature is the sole and rightful patentee; albeit many of her patents have been stolen from her by that Promethean rebel, *Homo sapiens*, who maintains to date a fairly successful revolt against her armies of other organisms that are perpetually waging war against him.

Here, however, we come at once into the midst of

things. What are some of the reasons for this perpetual struggle and warfare which is the *vis à tergo* of evolution? The specific properties and reactions of water, carbonic acid, the atmosphere, and so forth, which collectively constitute the fitness of the environment for the support of life, appear to emerge from the interaction of still more elementary principles, such as the following: Nature is almost infinitely repetitious but variable. Her experiments are extended in time and her forces vary in intensity, duration and extent. From the recurrent clash of her cosmic forces the terrestrial environment experiences many cycles of day and night, of high tide and low tide, of summer and winter and the shifting of the poles, cycles of climate, cycles of mountain building and base leveling, of submergence and emergence. To all these the struggling populations of living organisms must adjust themselves or be crowded out.

These variable forces do not, however, wholly cancel each other; they leave cumulative results scat-

¹ Address of the president of the New York Academy of Sciences, given on December 18, 1933.

Science

78 (2034)

Science **78** (2034), 10-588.

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Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. The title *Science* is a registered trademark of AAAS.

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