

THURSDAY, APRIL 10, 1913.

*THE HERITABLE RESULTS OF CHANGED NURTURE.*

*Das Problem der Vererbung "erworbener Eigenschaften."* By R. Semon. Pp. viii+203. (Leipzig: Wilhelm Engelmann, 1912.) Price 3.20 marks.

RETURNING to the much-discussed question of the transmission of acquired characters, Prof. Richard Semon goes over the whole ground. Conclusions—both affirmative and negative—have been based on certain sets of data, but all the facts must be faced if we are to form a sound judgment. This is indeed what many biologists have tried to do. The first chapter, which is historical, includes the commendable suggestion that it is time to stop using inexact terms like "Lamarckism," so often taken as synonymous with the theory of the transmission of acquired modifications. In the second chapter the author formulates the question at issue: A stimulus sets up an excitation in a parental body; the residual effect of this excitation is a change in the reaction-capacity (an "Engramm"); can we say that in favourable circumstances there results a change in the hereditary potency of the germ-cells, and of such a nature that the offspring show a change in the same direction as that exhibited in the parent?

Prof. Semon begins his survey of the evidence by considering language, acquired knowledge, and training; and while he does not claim to prove anything, he refers to cases which suggest that individual experience must count somehow. Why is it, for instance, that a young buzzard, taken from the nest, treats an adder quite differently from a grass-snake? Has experience not counted at all in the evolution of this inborn power of discrimination? The fourth chapter brings together numerous interesting cases which suggest the inheritance of engramms. Young acacias with an "inherited disposition" to a certain rhythm of sleeping and waking will, as it were, try to give expression to this in quite unnatural conditions of illumination and darkness. Braus has shown that if the fore-limb be removed from the larva of a Bombinator, the operculum still shows the thin area, usually with a small hole, through which the limb would press out if it were there. Is this not a reminiscence of a previously established "mechanomorphosis"? The degeneration of the eyes of cave animals, considered in detail and in connection with Kammerer's experiments on Proteus, point to a hereditary accumulation of the structural results of disuse and darkness. In

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regard to this and similar cases it appears to us to remain a question of interpretation. Which reading of the facts presents least difficulty?

Prof. Semon does not think that we should give up expecting a specific hereditary result of often-repeated injuries, and he refers, for instance, to Kammerer's experiment on the Ascidian, *Ciona intestinalis*, the siphons of which were cut off over and over again. In consequence of the stimulus, the length of the regenerated siphons was excessive, and the uninjured offspring had also excessively elongated siphons. We must, of course, hear more about this interesting case. The sixth chapter marshals the positive evidence which goes to show that parents much modified by peculiarities of nurture may have offspring changed in the same direction, although the peculiar nurture is no longer operative. The evidence includes recent observations on the acclimatisation of plants, Woltereck's experiments on the helmet of *Daphnia*, and Kammerer's striking work on salamanders and the nurse-frog.

The question then arises: How are the germ-cells affected? Prof. Tower was led by his well-known experiments on potato-beetles to the view that the environmental factors operated on the germ-cells without any induction from the unchanged soma of the parent. But Prof. Semon points out that an adult beetle could not be expected to show much external change, and argues that there is no escape from a theory of somatic induction, the various possible modes of which are carefully and acutely discussed. The author concludes that long-continued functional modifications may by somatic induction exert a specific effect on the germ-cells, and that certain environmental stimuli may also affect the germ-cells by somatic induction. The results depend on three variables: the nature, strength, and duration of the excitations, the general constitution of the organism, and the state of the germ-cells—susceptible or otherwise—at the time. Prof. Semon's latest presentation of the case for the heritability of somatogenic changes is a valuable contribution to ætiology, and one that must be reckoned with by all biologists. The book is written with force and clearness and in admirable scientific temper.

J. A. T.

*THE WORK OF G. VON REICHENBACH.*  
*Deutsches Museum Lebensbeschreibungen und Urkunden. Georg von Reichenbach.* By Walther v. Dyck. Pp. iii+140+viiii plates. (Munich: Deutsches Museum, 1912.)

DURING the last eight or nine years an extremely instructive and valuable collection illustrating the various sections of science and

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