

## LETTERS TO THE EDITOR.

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## Organic Selection.

IN certain recent publications,<sup>1</sup> an hypothesis has been presented, which seems in some degree to mediate between the two rival theories of heredity. The point of view taken in these publications is briefly this:—Assuming the operation of natural selection as currently held, and assuming also that individual organisms through adaptation acquire modifications or new characters, then the latter will exercise a directive influence on the former quite independently of any direct inheritance of acquired characters. For organisms which survive through adaptive modification will hand on to the next generation any "coincident variations" (*i.e.* congenital variations in the same direction as adaptive modification) which they may chance to have, and also allow further variations in the same direction. In any given series of generations, the individuals of which survive through their susceptibility to modification, there will be a gradual and cumulative development of coincident variations under the action of natural selection. The adaptive modification acts, in short, as a screen to perpetuate and develop congenital variations and correlated groups of them. Time is thus given to the species to develop by coincident variation characters indistinguishable from those which were due to acquired modification, and the evolution of the race will proceed in the lines marked out by private and individual adaptations. It will appear as if the modifications were directly inherited, whereas in reality they have acted as the fostering nurses of congenital variations.

It follows also that the likelihood of the occurrence of coincident variations will be greatly increased with each succeeding generation, under this "screening" influence of modifications; for the mean of the congenital variations will be shifted in the direction of the adaptive modifications, seeing that under the operation of natural selection upon the preceding generation, variations which are not coincident tend to be eliminated.<sup>2</sup>

Furthermore, it has recently been shown that, independently of physical heredity, there is among the higher animals a process by which there is secured a continuity of social environment, so that those organisms which are born into a social community, such as the animal family, accommodate themselves to the ways and habits of that community. Prof. Lloyd Morgan,<sup>3</sup> following Weismann and Hudson, has employed the term "tradition" for the handing on of that which has been acquired by preceding generations; and I have used the phrase "social heredity" for the accommodation of the individuals of each generation to the social environment, whereby the continuity of tradition is secured.<sup>4</sup>

It appears desirable that some definite scheme of terminology should be suggested to facilitate the discussion of these problems of organic and mental evolution; and I therefore venture to submit the following:—

(1) Variation: to be restricted to "blastogenic" or congenital variation.

(2) Accommodation: functional adaptation of the individual organism to its environment. This term is widely used in this sense by psychologists, and in an analogous sense by physiologists.<sup>5</sup>

<sup>1</sup> H. F. Osborn, *Proc. N.Y. Acad. of Sci.*, meeting of March 9 and April 13, 1896; also *Science*, November 27, 1896. C. Lloyd Morgan, "Habit and Instinct," October 1896, pp. 307 ff.; also *Science*, November 20, 1896. J. Mark Baldwin, discussion before N.Y. Acad. of Sci. meeting of January 31, reported in full in *Science*, March 20, 1896; also *Amer. Naturalist*, June and July 1896. The following brief statement has been prepared in consultation with both Principal Morgan and Professor Osborn. I may express indebtedness to both of them for certain suggestions which they allow me to use, and which I incorporate verbally in the text. Among them is the suggestion that "Organic Selection" should be the title of this letter. While feeling that this co-operation gives greater weight to the communication, at the same time I am alone responsible for the publication of it as it here stands.

<sup>2</sup> This aspect of the subject has been especially emphasised in my own exposition (*Amer. Naturalist*, June 1896, pp. 447 ff.).

<sup>3</sup> Introduction to "Comp. Psych.," pp. 170, 210; "Habit and Instinct," pp. 183, 342.

<sup>4</sup> "Mental Development in the Child and the Race," 1st ed., January 1895, p. 364; *Science*, August 23, 1895.

<sup>5</sup> Prof. Osborn suggests that "individual adaptation" suffices for this; but that phrase does not mark well the distinction between "accommodation" and "modification." "Adaptation" is used currently in a loose general sense.

(3) Modification (Lloyd Morgan): change of structure or function due to accommodation. To embrace "ontogenic variations" (Osborn), *i.e.* changes arising from all causes during ontogeny.

(4) Coincident Variations (Lloyd Morgan): variations which coincide with, or are similar in direction to, modifications.

(5) Organic Selection (Baldwin): the perpetuation and development of congenital coincident variations in consequence of accommodation.

(6) Orthoplasy (Baldwin): the directive or determining influence of organic selection in evolution.<sup>1</sup>

(7) Orthoplastic Influences (Baldwin): all agencies of accommodation (*e.g.* organic plasticity, imitation, intelligence, &c.), considered as directing the course of evolution through organic selection.

(8) Tradition (Lloyd Morgan): the handing on from generation to generation (independently of physical heredity) of acquired habits.

(9) Social Heredity (Baldwin): the process by which the individuals of each generation acquire the matter of tradition, and grow into the habits and usages of their kind.<sup>2</sup>

Princeton University, March 13.

J. MARK BALDWIN.

## Unfelt Earthquakes.

THE Icelandic earthquakes, on several occasions mentioned in NATURE—*e.g.* November 5, 1896—have been recorded also by the horizontal pendulum (system v. Rebeur) of Strassburg. I give the dates in Greenwich M.T.

1896.	h.	m.	s.	End	h.	m.	s.
Aug. 26.	Begin	11	22	9 p.m.	Aug. 27	0	58 37 a.m.
	Max.	11	22	37 "	until	0	13 47 "
"	27.	Begin	10	50 18 a.m.	End	11	50 18 "
	Max.	11	1	32 "	{ Succeeded by }	12	39 38 p.m.
					{ a series of }		
					{ tremors until }		
"	31.	Begin	8	17 50 "	End	11	38 2 a.m.
	Max.	8	29	56 "	"	9	42 12 "
Sept.	5.	Small disturbance at				12	50 0 p.m.
"	6.	Begin	0	31 34 "	"	0	41 4 a.m.
		Tremors succeeded Sept. 6 and 12.					
"	12.	Begin	8	17 54 "	End	10	41 6 "
	Deduct max.	8	39	38 "	to	10	34 22 "
"	13.	Begin	5	28 56 "	End	6	3 16 "

The whole of September was very troubled; small perturbations were observed on the 7th, 8th, 14th, 16th, 19th; greater ones on the 22nd, 24th, 25th. The time of the perturbations above agrees very well with the disturbances of the Paris and Edinburgh pendulums.

Prof. Milne (NATURE, February 25), asks for information about some earthquakes observed in February 1897, in the Isle of Wight, in Italy, &c. They disturbed very much the new pendulum of Strassburg, system Ehlert, as described in *Beiträge zur Geophysik*, vol. iii. 209 (Leipzig, Engelmann). The system consists of three horizontal pendulums, smaller than Rebeur's, but much heavier, in one box, each set up 120° from the other, and directed the first from E. towards W., the second from N.W. towards S.E., the third from S.W. towards N.E. The movements are topographically recorded, and very much enlarged.

The disturbance of February 7 was unusually large. It commenced on the first pendulum (E. to W.) at 7h. 49m. 50s. a.m., and ended at 8h. 46m. 19s. a.m.; after-shocks were felt until 9h. 41m. 39s. a.m. The perturbation showed two maximum-periods, each divided into two parts. The second pendulum (N.W. to S.E.) was disturbed from 7h. 45m. 25s. a.m.; maximum, 8h. 2m. 8s. until 8h. 24m. 28s.; end, 8h. 40m. 20s.; after-shocks from 9h. 26m. until 9h. 54m.

Eimer's "orthogenesis" might be adopted, were it possible to free it from association with his hypothesis of "orthogenic" or "determinate" variation and use inheritance. The view which I wish to characterise is in some degree a substitute for these hypotheses.

<sup>2</sup> Prof. Lloyd Morgan thinks this term unnecessary. It has the advantage, however, of falling in with the popular use of the phrases "social heritage" and "social inheritance." On the other hand, tradition seems quite inadequate; as generally used, it signifies that which is handed on, the material; while in the case of animals, we have to deal mainly with the processes of acquisition. "Social heredity" also calls attention to the linking of one generation to another. However, I think there is room for both terms. For further justification of the terms "social heredity" and "organic selection," I may refer to *Amer. Naturalist*, July 1896, pp. 552 ff.