phenomena of memory as a plausible explanation. Stimuli from without and from within the organism leave a record on the brain-cells which give the form to consciousness, when the latter invades them, along the guiding lines of associations. Why should not the germ-plasma be capable of a similar record of stimuli which is expressed in the recapitulatory growth of the embryo? He thought that the evidence pointed to such a process. These stimuli affected the soma and the germ-plasma simultaneously in accordance with the doctrine of Diplogenesis, but that the soma only records results in each tissue which are appropriate to the functions of the same, while the germ-plasma and brain-cells may record them all. The certainty of record in both cases he supposed to depend on the frequency and strength of the impression, as is known to be the case with the memory of the mental organism. Hence mutilations or single impressions are rarely recorded, while those due to the constant and habitual movements are recorded, and form the physical basis of growth and of evloution of type.

He further remarked that the belief that natural selection originates structure cannot be entertained, as paleontological evidence shows that evolution has proceeded by very gradual additions and subtractions of character, which required long periods to become of any value in the struggle for existence, sometimes an entire geological period being occupied in the elaboration of a character to structural usefulness.

Finally he referred to the physical mechanism of mental phenomena, and stated that some physiologists require a completed machine for the performance of special mental functions. The speaker called attention to the fact that the fundamental sensations do not even require a nervous system for their expression. Thus Protozoa appear to experience the sensations of hunger, temperature and the muscular sense of resistance. Hence it is as true of the physical basis of mental as of other functions that the function produces the structure, while structure merely specializes or perfects function.

ORGANIC SELECTION.

In certain recent publications* 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 modifications) which they may chance to have, and also allow farther variations in the same direction. In any given series of generations, the individuals of which survive through their susceptibility to modifi-

* H. F. Osborn, Proc. N. Y. Acad. of Sci., meeting of March 9 and April 13, 1896, reported in SCIENCE, April 3 and November 27, 1896. C. Lloyd Morgan, 'Habit and Instinct,' October, 1896, pp. 307 ff., also printed earlier in 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 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 paper. While feeling that this cooperation gives greater weight to the communication, at the same time I am alone responsible for the publication of it.

cation, 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 these. 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 generation, under this 'screening' influence of modification; for the mean of the congenital variations will be shifted in the direction of the adaptive modification, seeing that under the operation of natural selection upon each preceding generation variations which are not coincident tend to be eliminated.*

Furthermore, it has recently been shown that, independently of physical heredity, there is among the 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. Professor Lloyd Morgan,† 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.*

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.†

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.‡

7. *Orthoplastic Influences* (Baldwin): all agencies of accommodation (*e. g.*, organic plasticity, imitation, intelligence, etc.), con-

* This aspect of the subject has been especially emphasized in my own exposition, *American Naturalist*, June, 1896, pp. 147 ff.

† Introduction to Comp. Psych., pp. 170, 210, 'Habit and Instinct,' pp. 183, 342.

* 'Mental Development in the Child and the Race,' 1st ed., January, 1895, p. 364, SCIENCE, August 23, 1895.

† Professor 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.

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

sidered 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.*

J. Mark Baldwin.

Princeton University,
March 13, 1897.

WHAT IS A TYPE IN NATURAL HISTORY?

All naturalists concede that type specimens constitute the most important material in a museum of natural history. The true appreciation of this fact, however, is of recent date, and is shown in the numerous lately published catalogues of types possessed by different museums. The greater number of these publications have appeared in England and America. This just valuation of type material in recent years has come about through the work of specialists in their efforts to monograph groups of organisms. In those branches of natural history where original descriptions are usually accompanied by figures, the value of type material is not so apparent as where no figures are given, but in all branches of this science except bacteriology, it is upon the type material that the entities of natural history and its taxonomy rest. It is therefore of the greatest importance to learn the whereabouts of types. The object of this article, however, is not to point out the great scientific value of type specimens, but to determine what constitutes a type and what kinds of types exist.

There is considerable diversity of opinion as to what is meant by a type. One writer states that "By a type is meant the original specimen to which any generic or specific name was first assigned."*

The late Dr. G. Brown Goode writes that

> By a type is meant a specimen which has been used by the author of a systematic paper as the basis of detailed study, and as the foundation of a specific name. In cases where a considerable number of specimens has been used, it is desirable to separate one or more as being the *primary types*, while the other specimens, which may have been used in the same study for the purpose of comparison, may be regarded as *collateral types*.†

A mammalogist further states that "The word 'type' itself, when first introduced, was meant to refer to the particular specimen (in the singular) originally described, but it was soon naturally applied to any individual of the original series, if more than one specimen was examined by the describer."‡

These citations clearly show that a type is not always restricted to a single specimen selected by an author, but also applies to several, or even to all the specimens contained in the original lot. Moreover, the word type has been applied to specimens sent out by the author of a species, but not

* Professor 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 process 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 the *American Naturalist*, July, 1896, pp. 552 ff.

*T. McKenny Hughes, Catalogue of the Type Fossils in the Woodwardian Museum, Cambridge, 1891; prepared by Henry Woods.

†Circular letter of July 1st, 1893, to Curators in the U. S. National Museum.

‡Suggestions for the more definite use of the word 'type' and its compounds, as denoting specimens of a greater or less degree of authenticity, by Oldfield Thomas. Proc. Zool. Soc. London, 1893, pp. 241–2.