laboratories for chemistry, physics and astronomy.

A MOVEMENT has been started at Raleigh, N. C., for the establishment by the State of a textile school. A committee has been appointed to correspond with all mill-owners, newspapers and Legislators. In the Georgia Legislature a bill is pending for the appropriation of $10,000 for the establishment of a textile school.

ON the recommendation of the governing board of the Sheffield Scientific School of Yale University, it has been decided to establish the degree of Master of Science, to be conferred on graduates of two years' standing or upwards, who have taken a first degree in science and who pursue successfully a higher course of study in science under the direction of the governing board.

DR LAFAYETTE B. MENDEL has been promoted to an assistant professorship of physiological chemistry in Yale University.

DR. GEORGE T. KEMP has been appointed professor of physiology in the University of Illinois.

THE director o Sibley College, Cornell University, has been authorized to establish a full professorship of railway machine design and locomotive construction. At present this work is carried on in existing departments.

PROFESSOR OSCAR LOEW, who has been for four years professor of agricultural chemistry in the University of Tokio, has returned to Munich. He will be succeeded by Dr. Bieler, now assistant in the laboratory of agricultural chemistry at Halle.

A CROOM ROBERTSON fellowship with an endowment of £8,000 has been created in the University of Aberdeen, with which Robertson was connected before being called to the Grote chair of philosophy of mind and logic in University College, London.

A CHAIR of geography has been established in the University of Würzburg.

THE Technical Institute in Munich has been given by the government 175,000 Marks for enlarging the electro-technical laboratory, 150,000 Marks for the erection of a laboratory for the agricultural station and 170,000 Marks for enlarging other buildings.

THE newly established medical school for women in St. Petersburg opens with 165 students.

THE Russian government has appropriated 400,000 roubles for the construction of a chemical laboratory at the Polytechnic Institute at Riga.

DISCUSSION AND CORRESPONDENCE.

DETERMINATE VARIATION AND ORGANIC SELECTION.

A FEW remarks may be allowed on the subject discussed in the reports of the papers of Professors Osborn and Poulton, on 'Organic Selection' in the issue of October 15th. I venture to make these comments now, although the more extended publication of the articles of the authors may remove my *causas scribendi*. Yet such preliminary reports have their main utility, to my mind, in arousing comments which may be of service to the authors.

I may throw my remarks into heads for the sake of clearness.

1. Professor Osborn's use of the phrase 'determinate variation' I find ambiguous, and the ambiguity is the more serious since it seems to me to prejudice the main contention involved in the advocacy of 'Organic Selection.' The ambiguity is this: He seems to use *determinate variation* as synonymous with *determinate evolution*. (See his discussion, SCIENCE, Oct. 15, pp. 583–4, especially p. 584, column 1, and paragraph 2 of column 2.) He says that *determinate variation* is generally accepted, and attributes that view to Professor Lloyd Morgan and myself. But it is only *determinate evolution* that I, for my part, am able to subscribe to; and I think the same is true of Professor Morgan.

'Determinate evolution' means a consistent and uniform direction of progress in evolution, *however that progress may be secured, and whatever the causes and processes at work.* Admitting 'determinate evolution,' the question, therefore, as to the causes which 'determine' the evolution is still open, and various answers have been given to it. The Neo-Lamarckians say

'use-inheritance' (as Eimer, who calls the determination secured by this means *Orthogenesis*); Weismann says, 'germinal selection; I have suggested 'Organic Selection' (the resulting determination of evolution being called by me 'Orthoplasy'); others say, 'determinate variation' (continued in the same direction for successive generations); Professor Osborn says, 'determinate variation' with 'organic selection.' *Determinate variation*, then, in the proper meaning of that term, is only *one way of accounting for determinate evolution;* and to my mind, it is not the true way; at any rate it is not at all involved in the theory of 'organic selection' as I have advocated it.

Let us look more closely at 'determinate variation.' Supposing that by variation we mean 'congenital variation,' then we may ask: When are variations determinate? When for any reason they are distributed about a mean different from that required by the law of probability or chance. The problem of determinate variations is purely one of *distribution*; and is to be investigated for each generation, quite apart from its holding for a number of successive generations (and so giving 'determinate evolution').

Further, the possible determinateness of variation is to be distinguished carefully from the *extent* or *width* of variation. By 'extent' of variation is meant the limits of distribution of cases about their own mean; while relative determinateness means the distribution of cases about a mean established in the earlier generation. The question of determinate variation is: *Has any influence worked to make the mean of variation of the new generation different from that which should be expected from the characters of their parents,* whatever the extent of variation.*

*I expressly avoid saying what this mean is, *i. e.*, what the contribution of each parent is to the average individual of their offspring; but the work of Galton goes far to establish it. Much more investigation is needed on this point of making out what is indeterminate variation; how insecure, therefore, the claim that variations are determinate! The drift of recent statistical studies goes, however (as far as I am familiar with them), directly to show that in their distribution—considered apart from their extent— variations follow the probability curve.

2. As I have said in a recent article* the assumption of the paleontologists (Osborn, *loc. cit.*, pp. 584–5) that because certain fossils show determinate progress—*determinate evolution*, therefore there must have been *determinate variation*, seems to me defective logic. It is one possibility among others, certainly, but only one. And as I held in the same article, instead of being necessary as a support for organic selection, the latter comes as a new resource to diminish the probability that the variations have really been determinate in these cases. They may be cases of orthoplasy involving organic selection working as an aid to natural selection upon 'coincident' variations which are yet not determinate but fortuitous in the strict sense.

3. Without going into the question, I may yet point out that the position taken by Professer Poulton in the matter of the relation of natural to organic selection is, as he says, that advocated by me (with some of the same arguments); but it may be recalled that I gave natural selection still further emphasis by making the 'functional selection from overproduced movements,' whereby motor accommodations are secured, itself a case of natural selection broadly understood. I have recently drawn up a table showing the various sorts of 'selection' under the distinction of 'means' and (immediate) 'result,' finding some twelve sorts of selection. I venture to reprint this table here, with the remarks which accompany it in my book on 'Social and Ethical Interpretations in Mental Development' (Macmillan, 1897), hoping that it may be discussed. The terms in the table which relate to social evolution are fully explained in the book; they are not so essential to the topic now before us.

The table and the remarks upon it (*loc. cit.*, Appendix B), slightly revised, are as follows:

"The various sorts of 'Selection' which it seems well to distinguish in different connections may be thrown together in the following table, the corresponding sections of the book (as far as there are such sections) being in each case given in brackets in the table beside the description:

* *The Psychological Review*, July, 1897, p. 397.

SELECTION.*

Sort.	Means.	Result.
1, 2. Natural Selection { I. Darwin, Wallace, Spencer) [40]. II. (Eimer) [40].	1. Struggle for Existence (Darwin, Wallace).	1. 'Survival of the Fittest' Individuals (Spencer).
	2. Inherent Weakness, without Struggle.	2. Destruction of Unfit Individuals.
3. Germinal Selection (Weismann).	3. Struggle of Germinal Elements.	3. Survival of Fittest Germinal Elements.
4. Intra-Selection (Roux, Weismann, Delage).	4. Struggle of Parts (Roux).	4. Survival of Fittest Organs.
5. Functional Selection (Baldwin).	5. Overproduction of Movements (Bain, Spencer, Baldwin).	5. Survival of Fittest Functions.
6. Organic Selection (Baldwin, Osborn, Lloyd Morgan) [Appendix A].	6. Accommodation (Baldwin); Individual Adaptation (Osborn); Modification (Lloyd Morgan).	6. Survival of Accommodating Individuals.
7. Artificial Selection (Darwin).	7. Choice for Planting and for Mating together.	7. Reproduction of Desirable Individuals.
8. Personal Selection† [40].	8. Choice.	8. Employment and Survival of Socially Available Individuals.
9. Sexual Selection (Darwin) [40].	9. Conscious Selection by Courting, etc.	9. Reproduction of Attractive Individuals.
10. Social Selection† [40, 120].	10. Social Competition of Individuals and Groups with Natural Selection (Malthus, Darwin).	10. Survival of Socially Fittest Individuals and Groups.
11. Social Suppression† [38 ff].	11. Suppression of Socially Unfittest (by Law, Custom, etc.).	11. Survival of Socially Fit.
12. { Imitative Selection†[40, 121, 307]. Social Generalization† [121, 310 ff]	12. Imitative Propagation from mind to mind with Social Heredity.	12. Survival of Ideas in Society.

"Certain remarks may be added, to which I give numbers corresponding to those topics in the table to which they respectively relate:

"4, 5, 6. By a singular coincidence M. Delage uses the phrase 'Selection organique' (*Struct. du Protoplasma*, etc., p. 732)to describe Roux's 'Struggle of the Parts.' Seeing that Weismann's 'Intra-Selection (4) was directly applied by him to his interpretation of Roux's 'Struggle,' Delage's phrase is not likely to have currency as a substitute for Intra-Selection. As 'Functional Selection' (5) is a special means of motor accommodation, it is additional, and in a sense subordinate, to Intra-Selection, since it has a *functional* reference.

"7, 8, 9. I do not give a separate heading to Professor Lloyd Morgan's phrase 'Conscious Selection,' since it will be seen that, as he uses it, *i. e.*, in broad antithesis to 'Natural Selection,' it really includes all those special forms of selection in which *a state of consciousness plays the selecting role** (7, 8, 9, 11, 12); it may become ambiguous in reference to cases where *natural selection operates on mental and social variations* (5, 6, 10); and even when applicable, as in 'Sexual Selection' (9),† with respect to the 'means' of the selection, it is still ambiguous with respect to the 'results' of the selection. This last ambiguity, which is brought out in the table (8, 9),‡ makes it desirable to confine the phrase 'Conscious Selection' (if used at all) to cases which result in continuance of what is de-

* I am indebted to Professor Lloyd Morgan for several suggestions utilized in the Table.

† Suggested in this work.

* This, indeed, is still liable to the question as to *whose is the state of consciousness*, giving the difference (both in means and result) seen between 'Artificial' (7) and 'Sexual' (9) selection. It is strange that Professor Morgan makes no allusion (?) to Romanes' earlier suggested term 'Psychological Selection.'

† Lloyd Morgan, *Habit and Instinct*, pp. 219, 271.

‡ The bird 'selects' (sexually) for the sake of the experience, and it is a secondary result that she is also thus 'selected' for mating with the male and so for continuing his attractive characters with her own characters in the offspring.

sirable for consciousness or thought. I have suggested 'Personal Selection (8) for the selection *of* individual persons *by* personal choice, analogous to 'Sexual Selection' (9) in the animal world. Furthermore, Darwin's 'Artificial Selection' should be used, as he used it, with reference only to securing results by induced mating.

"10, 11, 12. In all sorts of so-called 'selection,' *considered as factors in progress from generation to generation, in which the laws of natural selection and physical reproduction do not operate together*, I think it is extremely desirable that we discard the word 'selection' *in toto*, and give to each case a name which shall apply to it alone. The cases of the preservation of individuals and groups by reason of their social endowments do illustrate natural selection with physical reproduction, so I propose 'Social Selection' (10) for that. But in the instances in which either physical heredity is not operative (12), or in which it is not the only means of transmission (11), we cannot secure clearness without new terms; for these two cases I have suggested 'Social Suppression' (11), and 'Social Generalization' (12). The phrase 'Imitative Selection' is given in the table alternately for the latter (12), seeing that the discussions of the topic usually employ the term 'Selection' and use (wrongly) the 'Natural Selection' analogy. Selection may be used also when there is no reference to race-progress (and so no danger of the misuse of the biological analogy); since it then means presumably the 'conscious choice' of psychology and of pre-Darwinian theory."*

J. MARK BALDWIN.

PRINCETON, October 20, 1897.

AMPHIBIA VS. BATRACHIA.

I HAVE been much interested in reading the communications of Dr. Gill and Dr. Baur on the above subject, and having developed certain convictions thereon I beg leave to state them. Before proceeding to do this I wish to express my appreciation of the reasonableness of the condition of doubt in which Dr. Wilder finds himself.

Formerly I employed the term *Batrachia*. Later I became inclined to regard *Amphibia* as having superior claims, principally because it has been used and insisted on by many careful writers. I trust that my present views rest upon a better foundation.

In Dr. Baur's communication of July 20th his conclusion is summed up in the following words:

"Three years later Latreille used the Latin names *Reptilia* and *Amphibia* for de Blainville's classes *Reptiles* and *Amphibiens*, and these names ought to be used."

However, it appears to me that he has failed to tell us why they ought to be used; that is, he has not stated the principles which make it obligatory on us to use them. He has only given us an excellent history of the case and his conclusion. We have definite laws governing the formation and use of generic and specific names, but the only law cited by Dr. Baur which applies to appellatives of higher rank is that which deprives of binding authority all vernacular names, even though they may seem to imply the Latin forms. This rule, which most naturalists will endorse, materially clears the ground in the present case. Chéloniens, Ophidiens, Batraciens, and Amphibiens stand on the same footing as Schildkröten, Schlangen, Toads, and Turtles.

It might be supposed that Dr. Baur relies on the law of priority to sustain him, since he is so careful, and properly so, to give the dates of proposal of each of the names employed; but the fact that he rejects *Ranæ* as a name for the frogs, etc., makes it evident that he demands something more. Dr. Gill says that we must be guided by the law of priority in the selection of names.

One thing is very certain, and that is that we cannot rigidly enforce, with respect to the appellatives of higher rank, the same rules that apply to genera. Common usage must and does determine much in the case of the former terms. The law of priority and a desire to

* It may be well to add that this table is not intended to be altogether exhaustive from the biological standpoint. For example, Professor Minot's 'Post-Selection' and Romanes' 'Physiological Selection' do not fall readily into the scheme. Nor are the different headings in all cases exclusive of one another, *e.g.*, Darwin really included both the cases (I. and II.) of Natural Selection under the single phrase; and justly so, seeing that they illustrate a single principle.