

weights and measurements in animals under ordinary conditions established by a long series of observations. It had been Dr. Barker's good fortune to visit the Wistar Institute several times and to see the kind and amount of work that is going on there in connection with the remarkable colony of white rats which Dr. Donaldson and his associates have under their control. Dr. Barker had no conception before his visit of the large amount of detailed work which is being done. They are preparing a series of "reference tables" recording the weights and measurements of the body of the rat as a whole, and of its various parts so that when published we shall have a set of values for the white rat, comparable more or less to the tabular data used by insurance companies for the height and weight of human beings at different ages. While variability is, of course, an ear-mark of all biological data, still, a record of the data as determined for the strain of rats at the Wistar Institute, grown under usual conditions, should prove valuable as indicating what may be expected in general, though another strain may show a plus or a minus variation.

The results reported this morning are exceedingly interesting from the standpoint of growth. We must not, however, give to them any importance that they do not possess and Dr. Barker said he felt sure that Dr. Donaldson would want the members to realize actually what the importance of the research is. Thus when speaking of the influence of gonadectomy, it was pointed out that it had no effect upon the brain *as recorded in weights and measurements*. That is an exceedingly important point in itself, but we must not understand the result to mean that gonadectomy has no influence upon the *functions of the brain*. It does mean apparently that the weights and measurement of the brain are unaltered as a whole, or in the different parts tested, but everybody knows that gonadectomy is followed by exceedingly important changes in the functions of the brain.

Dr. Donaldson said he quite agreed with Dr. Barker in his remarks and should of course like to be judged by what he said rather than by what he did not say, in connection with these matters.

#### THE RELATION OF STRUCTURE AND FUNCTION IN THE NERVOUS SYSTEM (WITH DEMONSTRATION OF SPECIMENS)

By Stewart Paton, M.D., of Princeton, N. J.

1. Neurofibrillation as an index of the incidence of function.
2. The process of medullation, in contrast with neurofibrillation, is only remotely related to the functional activity of the nerves. Criticism of views of Flechsig school.
3. Histologic conditions which are indicative of the presence of reflex activity.
4. Possibilities existing for the correlation of structure and function in the nervous system.

Dr. James J. Putnam, of Boston, said he was deeply interested in Dr. Paton's observations, and more so that he had had an opportunity to talk over this subject with him a little and knew that Dr. Paton had been interested, as he himself had been, in the various vitalistic theories of growth and structure with reference to which Bergson has written so in-

telligently. Although it is true that structure does exercise an influence on function, it is important, Dr. Putnam thought, to recognize that, in general terms, the obverse relationship is still more significant. He presumed that Dr. Paton would not wish to assert that everything we know, learn and think, as human beings, and our love of justice, honor, and truth are really nothing but the expression of structure, defined, in its turn, as the expression of a chemical process, taken in the usual meaning of that term. In education, for example, where thought precedes effort and effort precedes the establishment of habits of new cerebral mechanism, it would seem that something which is properly definable as function antedates and causes structure, and it can hardly be doubted that the development of the nervous system has taken place on such lines as this, at least in part. How can we make efforts if these efforts are nothing but predetermined expressions of something which we call in a general way structural? Then Dr. Putnam wished to know how one determines that fact. We see in the first place a mass of protoplasmic substance and the heart gradually beginning to beat and finally the nervous system and nervous functions developing. Is there any way, except through inspection of our own processes and our own effort, in which we can determine whether or not the function or the structure had the precedence? What is the force which leads to the elaboration of the nervous system on these interesting lines, which makes it so well adapted for our purposes? Of course when we say that it is all the outcome of rhythmical chemical arrangements we do not assert any final cause. In that connection Dr. Putnam called attention to an interesting research carried on by Professor Henderson, of the Harvard Medical School, in regard to the preparedness of the structure of the earth, chemically and physically, for the organisms of a higher sort. Dr. Putnam said he could not give the exact details of the research, but that they showed in a very striking way that even the earth's crust existed apparently as the result of forces which foreshadowed the coming into existence of forms of life which had not as yet shown themselves. It seemed to him rather serious to conclude that we are really nothing but what Loeb long since made us out to be, namely, the outcome and the expression of chemical processes regarded in the ordinary sense. One conclusion or the other must be true. Either structure is more important than function as a cause of organized beings, or else function is more important than structure. From our own observation of ourselves, of our own thoughts and wills, we have a right to conclude that function usually precedes structure.

Dr. Sidney I. Schwab, of St. Louis, said he would like to ask Dr. Paton how he can compare the methods of observation he employs for determining structure with the cruder method of determining observations on the nervous system. May there not be in that an explanation of the difference in time of development?

Dr. Philip Coombs Knapp, of Boston, said he thought Dr. Putnam's criticism of Dr. Paton's conclusions was really another manifestation of the eternal contest between the doctrines of freedom of the will and necessity. The scientific standpoint, of course, has been for a long time that there was a pretty absolute determinism in the functions of the human brain. That is a doctrine which is antagonistic to many minds and which has been contested from the earliest days to the present time. One simple illustration that structure must necessarily precede function can be brought out from this fact. We are conscious of our functions. We are

by no means conscious of the structure. The absolute necessity of the structure preceding function is shown by the fact that unless we have a proper visual apparatus we remain blind and never can see. But Dr. Knapp thought that anyone who had experience in teaching ought fully to realize that it is not the vague transcendental desire to know which accomplishes the acquisition of knowledge, but rather the ability of the student to grasp the idea and to develop his knowledge. Experience in teaching shows that, in spite of the best-developed schemes of instruction, in spite of every desire on the part of the pupil to learn, in spite of every effort of the teacher, a certain percentage of the pupils, by reason probably of a defect of structure, are going to remain hopelessly stupid against which the teacher comes to regard himself, like the gods, as powerless.

Dr. Paton, in closing, said that he had tried to be brief and that in doing so one always runs the danger of becoming dogmatic. He certainly did not intend to bring up the question of education here. He had guinea-pigs in mind and so far as guinea-pigs are concerned his statements were true. He hoped his hearers would not take what he had said dogmatically as applied to the human being and that they would think of him only as an enthusiast in regard to the guinea-pig. He had hoped that somebody would be induced to take up investigating these early reactions in relation to the secretion of the glands which he had indicated. It might be possible to show that definite changes could be brought about in the nervous system by excess of secretion of the thyroid or the thymus.

### VENTRICULAR HEMORRHAGE

By Alfred Gordon, M.D., of Philadelphia, Pa.

Twelve cases with hemorrhage in the lateral ventricles have been observed by the author. The onset of the condition, the course and the character of termination were strikingly identical in the entire series. Duration of the comatose state. Suggestions as to management of such cases.

Dr. Philip Coombs Knapp, of Boston, said he had seen a number of cases of intraventricular hemorrhage, most of them, however, of the secondary variety. He could hardly agree with the symptomatology Dr. Gordon had given. The ordinary symptomatology of the case differed very little from that of an ordinary case of hemorrhage, excepting that the coma has been a little more sudden in onset, perhaps, and distinctly more profound. In practically every case there have been distinct signs of hemiplegia, as we ordinarily detect them in a person who is comatose. The one striking feature, however, in all the cases of ventricular hemorrhage Dr. Knapp had seen had been a distinct rigidity on both sides, not a contracture, attended with various twitchings. In no case has there been generalized convulsions. The twitchings have been irregular, not of the clonic variety. In a number of cases confirmed by autopsy he has felt that the rigidity and twitching of the limbs were so characteristic as to warrant the diagnosis of intraventricular hemorrhage. In no case has he seen generalized convulsions and in every case the signs of hemiplegia have been very distinctly marked.

Dr. Alfred Reginald Allen, Philadelphia, said that at Dr. Spiller's in-