There is no question but that the apparatus and method originated by Watson form a great advance in the study of color vision. They lead in the direction of that accuracy and exactness of method employed in the physical sciences. The preliminary work so far accomplished with them has suggested a large number of difficult and delicate problems which press for solution.

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L. EDINGER. *The Relations of Comparative Anatomy to Comparative Psychology*. *Journal of Comparative Neurology and Psychology*, 18: 1908, 437-457.

In his interesting discussion of the relation of comparative anatomy to comparative psychology, Edinger gives some stimulating suggestions for work in both these fields. He insists that they are closely related and should be investigated simultaneously,—the anatomy of the brain and the behavior of the living animal. He describes the brain as consisting of two parts, the palæencephalon and the neëncephalon. The former is the oldest part of the central nervous system, appears in all animals from cyclostomes to man and is constant in type in all of them. The neëncephalon, on the other hand, develops above fishes and from small beginnings increases to form the largest part of the brain in man, the cerebrum.

The palæencephalon is by its structure suited to receive sense impressions from the outside world and to convey them to places whence groups of motor ganglion cells send out nerves to muscles. It includes special regulatory mechanisms among which the cerebellum is the most important. Not only all activities which are commonly designated as reflex, but also all instincts, the author asserts, are localized in the palæencephalon. No part of it can be absent without a corresponding function becoming lost, and all parts develop in size according to the demands which the activities of the animal make upon them. A knowledge of the degree of development is of the highest importance for sense psychology and will always give information as to the possible activities of the animal.

Fishes possess only the palæencephalon and it is therefore important that their activities should be thoroughly studied. They are able to establish simple new relations between sense impressions and movement

combinations, but not to form associations or to construct memory images out of several components. Among the reptiles, however, where the neëncephalon makes its appearance, the author states that "the animals are no longer always dependent on the sense impression of the moment, but that earlier impressions influence them. Further, they associate certain sense impressions which lie within the realm of the olfactory and oral senses, and turn them to account; they learn more readily than the fishes and amphibians; occasionally they foresee; and they exhibit individual differences. There can be no doubt that all of these facts are referable to the appearance of a cortex in the neëncephalon." In the birds the palæencephalon is enlarged and reaches a high state of perfection, but the cortex is also more highly developed than in reptiles. The inference from this structure that the instinctive actions must be of much greater variety and perfection, and also the capacity for forming associations must be much greater than in reptiles seems to be justified in the author's opinion, so far as trustworthy studies of behavior have gone. Further observation of birds and reptiles must determine "what activities of the lower vertebrates are palæencephalic and what are neëncephalic" and whether neëncephalic reflexes and instincts exist.

The author refers only briefly to the tasks of the anatomist in connection with mammalian psychology. In spite of extensive studies recently of the mammalian cortex he asserts that we know "surprisingly little as soon as one enquires how much our knowledge tells us about the functions." He urges that anatomical study and psychological observation be united first in the simpler field among those animals which possess only a very simple neëncephalon.

The objection might be made that what the author has described as the field of comparative psychology is really rather that of physiology. He does, it is true, rather sharply separate the simple activities and the instincts of animals from other psychic phenomena, but he states that this is a question of method chiefly. By associating them with the palæencephalon alone, he establishes a foundation upon which to build the comparison between degree of development of various parts of the entire brain and the possession of psychic qualities.

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