ANATOMY

Rat Brains Cannot Explain Man's Cerebral Functions

Rat's Cerebral Cortex is Primitive, Developed Mainly From Olfactory Centers; Man's Involves Other Senses

RATS, which have served in laboratories to test drugs, vitamins and other substances, can not help the neurologists to solve the old problem of where in the human brain vision and touch and other complicated functions are localized.

Prof. C. Judson Herrick, University of Chicago anatomist, so concluded in a paper read on his behalf before the National Academy of Sciences. The reason is that the cerebral cortex of rats is made on a different plan from the human brain.

"Cerebral cortex is the gray matter of the brain that carries on the complicated associational processes," Dr. Herrick's summary explained. "Fishes and frogs have no well formed cortex and reptiles have a perfect, though small and simple cortex, whose forerunners can be found in fishes and frogs. This true cortex of reptiles was developed from reflex centers for smell. It is not a part of the primitive brain, but was slowly developed when in the course of evolution land animals had to use their wits more than fishes do.

"The first cortex was an olfactory cortex, concerned with associations of odors with other sensory experiences. In lower mammals, like opossums and rats, about half the cortex is also olfactory, but the rest is concerned with associations of other senses. As we pass up the scale toward man, the olfactory cortex gets no bigger, but the non-olfactory cortex gets enormously larger and more complicated. We wonder why this is.

"The fact is, we cannot locate the source of an odor by smell alone, but vision and touch are our localizing senses. The primitive olfactory cortex, accordingly, could be of no use in finding food and avoiding enemies except when working in cooperation with the senses of sight and touch. Its chief function is probably to activate and facilitate the action of the visual and other parts of the cerebral cortex in which each sense has a separate location or center.

"The olfactory cortex acts as a whole; the rest of the cortex does not. If in low mammals, like rats, the non-olfactory cortex is seriously damaged or almost wholly destroyed, the olfactory cortex still is able to facilitate those simple learning processes that can be carried on by the more primitive subcortical parts of the brain-stem. But in man, where the olfactory cortex is only a very small fraction of the whole cortex, severe cortical injury causes more serious disturbance of associational processes. This is because the kinds of learning that we can do are functions of our larger non-olfactory cortex, not merely of the more primitive brain-stem.

"Experiments on learning by rats deprived of part of their cortex show that the loss of most of the non-olfactory cortex does not seriously interfere with learning simple tricks, but it does impair their ability to solve more complicated problems. Most human problems are of still more complicated sorts that cannot be done by the stem part of the brain, not even with the help of general activation or facilitation by the olfactory cortex.

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From Page 319

am engaged in working out the laws according to which atoms and molecules distribute themselves over surfaces forming single layers of atoms. These laws are of importance in understanding many simple phenomena such as those of lubrication and of the spreading of oil films on water.

The forces that hold atoms or molecules on the surfaces of solids or liquids are just as varied in their nature as those forces which determine the chemical and physical properties of substances in bulk. In other words we must recognize that the chemistry and physics of surface phenomena are subjects almost as broad and as complex as the whole field of chemistry and physics. It has too often been thought that a single equation such as a so-called "adsorption iso-