Pavlov Reports New Theories on Brain

Psychology

The part of the brain lying immediately below the two cerebral hemispheres is the most important part of the nervous system in maintaining the relation of the individual to the outer world, Prof. I. P. Pavlov, famous Russian physiologist, told the International Congress of Psychology which has just closed its sessions at New Haven.

Prof. Pavlov, who is now 80 years old, is still eagerly carrying forward his quest for knowledge as to how the brain works. Describing the latest discoveries from his Leningrad laboratory, he stressed the close and strategic connection between the hemispheres of the brain which form the switchboard for the most complex conditioned, or learned, reflexes, and the sub-cortical part of the brain lying immediately beneath the hemispheres, which is the center for the most complex unlearned reflexes such as those dealing with food, sex, and self-defense.

"On the basis of the most recent experiments, I find it justifiable to separate the reflexes of these two centers from the rest of the nervous activity under the special name of the highest nervous activity," the physiologist stated.

The study of the mutual relation of these two highest parts of the brain must become one of the most important problems of the highest nervous activity, he declared.

"First of all," he explained, "the cortical conditioned reflexes are formed by means of the sub-cortical centers. A certain degree of excitability of these centers is the essential condition for the formation of the connection between cortical cells and sub-cortical centers. For instance, if an animal is already fed before an experiment, it is difficult or even impossible to form the conditioned reflexes on food."

Prof. Pavlov's experiments lead him to the conclusion that the strength and real significance of the activity of the brain hemispheres rests upon the activity of the centers just below the hemispheres. And, on the other hand, the hemispheres serve as regulators of the centers below.

The cells of the brain hemispheres are continually protected against over-stimulation, he pointed out. If a stimulus from without exceeds the maximum limit, inhibition sets in to prevent the brain cells from so intense a stimulation. The same sort of inhibition acts as a guard if the sub-cortical centers become over-excited and attempt to send in too intense messages of hunger, for instance, to the highest brain centers.

Referring to the inhibition resulting from too intense excitation in the sub-cortical center, Prof. Pavlov explained that "this fact is obviously a vital one, as it distorts the actual normal relations and furthermore gives a satisfactory explanation of hysteria."

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Science's Mass Attack on Tuberculosis—*Continued*

pernicious influences emanating from the infected area, but as these increase and his resistance weakens, he fails to react as at first and the rising and falling of his temperature becomes more extreme. We may hope that eventually the chemists will find something that will break down the waste poison of the tuberculosis bacilli into glucose or other harmless substances.

Out of these researches there may arise a new conception of life itself. It may prove that sugar is the basic life material. Heretofore fats and proteins have been considered the most characteristic substances that enter into living matter. Sugar seemed to enter into the composition of living things somewhat incidentally.

But these researches upon tuberculosis show that even the various strains of tuberculosis germs have their own, radically different sugars. The avian bacillus yields a sugar chemically and physiologically unlike that in the human or bovine sort. Recent research upon the sugars contained in the germs causing pneumonia, the pneumococci, shows that each germ of this group has its own sort of sweet.

So there is beginning to be built a new theory of the chemical nature of life, founded on sugar specificity. Even the green leaf of the growing plant in which the sunlight builds carbohydrates may have its secrets unlocked by a continuation of the investigations that the tuberculosis work has pioneered.

It is already obvious that the new tactics for the investigation of disease, while at first focussed upon the tuberculosis problem, will throw light upon other diseases and, in fact, upon the fundamental processes of human physiology. For the three grand classes of components found in these laboratory-raised bacteria, that is, fats, sugars and proteins, are the same as constitute our bodies and our food. But how these three kinds of compounds combine in the body is still a mystery. The chemist has isolated and determined the composition and construction of all the common fats, sugars and proteins. Some of them he even can make synthetically in his laboratory. He can figure out closely just how much of these various ingredients of the food are needed for a particular day's work. He can tell, for instance, just how many more foot-pounds a man can lift by adding an ounce of glucose to his ration. The chemist can trace the molecules of glucose through the blood stream till it gets to the muscle where it is needed. But there he loses track of it. He is still much in the dark as to how the protein in the muscle fiber seizes on to the sugar and gets energy out of it and what part is played by the phosphorized fatty acids present. If he can find out how these three substances are hitched up in normal life, he would most likely be able to find out how they hitched up wrongly in disease and finally how to correct the blunder.

Two major outposts have been taken, but the battle has not yet been won. Among the scientific organizations joining with the National Tuberculosis Association in the attack are: U. S. Public Health Service; U. S. Bureau of Animal Industry; National Research Council; American Sanitorium Association; Henry Phipps Institute, Philadelphia; Edward L. Trudeau Foundation, Saranac Lake; Rockefeller Institute for Medical Research, New York; University of California; University of Cincinnati; University of Chicago; Cornell University Medical School; the Johns Hopkins University; University of Nebraska; University of Pennsylvania; Vanderbilt University; University of Wisconsin; Yale University; H. K. Mulford Company; Parke, Davis and Company.

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