

# Neurobiology: On the research frontier

Scientists from three nations share 1970 Nobel Prize for studies of chemicals that carry messages between nerve cells

The sympathetic nervous system regulates a vast array of body processes, including behavior, sleep, blood pressure and rapid mobilization of energy. For work elucidating the chemistry of this system, three scientists will share the 1970 Nobel Prize in Medicine or Physiology and \$76,800. They are Dr. Julius Axelrod, 58, of the National Institute of Mental Health in Bethesda, Md., Dr. Ulf von Euler, 65, of the Karolinska Institute in Stockholm and Sir Bernard Katz, 59, of University College in London.

Dr. Axelrod, who learned of his Prize while on a visit to his dentist, believes that the decision of the Prize committee at Karolinska to honor research in neurobiology (see p. 337) will do much to further the field. "This is the wave of the future," he declared. "This is the beginning of recognition of this area of research. This is the frontier."

Dr. Axelrod and Dr. von Euler, who regularly keep abreast of each other's progress, though they have never worked together directly, won science's highest tribute for studies of the chemistry of noradrenaline, also called norepinephrine (SN: 10/3, p. 287), the chemical that transmits impulses in the sympathetic nervous system. Among the practical results of their studies is understanding of the action of psychotropic drugs, particularly the action of antidepressants on the brain.

**The initial contribution** came from Dr. von Euler, who first discovered noradrenaline. Citing the Swedish scientist as an "exceptionally productive man," Dr. Axelrod pointed out that Dr. von Euler also discovered prostaglandins, hormone-like substances with a score of physiological effects (SN: 10/10, p. 306). "There's another Nobel waiting for someone in that field," he predicts.

Building on the foundation built by Dr. von Euler, Dr. Axelrod began experiments in 1957 that led to an explanation of how noradrenaline is metabolized by the body. First he iden-

tified an enzyme called catechol-o-methyl transferase and showed that it inactivates noradrenaline. Then he described the mechanism by which noradrenaline is taken up by nerve cells.

Knowing these two things, scientists have been able to go on to examine the noradrenaline system in relation to mental illness. Persons with severe depression, for example, suffer a shortage of biologically available noradrenaline. Antidepressant drugs are designed to inhibit its uptake, leaving the chemical freely available for longer periods.

**The achievements** which earned the Prize for German-born Sir Bernard Katz complement those of Drs. Axelrod and von Euler. Focusing on another key neurotransmitter, a compound known as acetylcholine, he learned how this chemical is released from nerve endings at rest and when firing off an impulse. Sir Bernard, who has worked in England since fleeing the Nazis, demonstrated that a nerve at rest releases acetylcholine molecules in packets (rather than singly), a few at a time. When actually firing, the nerve discharges numbers of acetylcholine packets in rapid succession.

Dr. Axelrod, greeting the press in an open-necked brown checked shirt and lab coat the morning the Prize was announced, said winning a Nobel is something every scientist dreams of. "It is," he quipped, "probably what sends us into science in the first place." And, as happens frequently in science today, he took the occasion to plea for strong support of fundamental research. Noting the implications his and similar work has had in drug therapy of mental illness (it even contributed to the development of L-dopa for treatment of Parkinson's disease), he recounted that virtually all of his studies have been on animals, not man, and that his first paper in the field was initially rejected by a leading journal whose editorial board failed to comprehend its significance. He also urged support for young scientists who have to compete with top men for grants. □



Photos: ESS

*Axelrod: Prize is scientist's dream.*



*Katz: Explained acetylcholine action.*



*Von Euler: Discovered noradrenaline.*