in serum DBH activity (Table 1), presumably reflecting increased peripheral sympathetic nerve activity (*11*). Because increased fighting persisted in the stressed rats 4 weeks after the cessation of stress (at which time the serum DBH activity had returned to control values) (Table 1), the effect of prolonged immobilization stress on sympathetic nerve activity seems to be independent of its effect on fighting behavior. The increased fighting behavior may be related to increased hypothalamic catecholamine synthesis. The hypothalamic activity of tyrosine hydroxylase (Table 1) remained increased in immobilized rats 4 weeks after cessation of the stress. The activity of tyrosine hydroxylase was not altered in the brainstem or in the remainder of the brain in either group of experimental animals. The stressed animals exhibited no change in jump thresholds; thus, it appears unlikely that increased sensitivity to electric shock (defined by jump thresholds) was responsible for the observed increased fighting behavior.

The increase in hypothalamic tyrosine hydroxylase presumably is indicative of increased catecholamine synthesis. Previous reports have demonstrated increased conversion of [^{14}C]-tyrosine to NE in brain after short-term exposure to exercise and cold (*16*) and to electroshock (*17*). However, because both reports indicated that NE content of whole brain is decreased after exposure to stress, it appears that catecholamine release from the nerves is more rapid than its synthesis. In our study, with repeated intervals of immobilization, no decrease in hypothalamic NE was found (*18*). In the adrenal medulla of rats subjected to short-term stress, the catecholamine content decreases (*10*). After prolonged, repeated immobilization, however, the NE content of adrenals is normal or even elevated and epinephrine amounts are not diminished, although increased catecholamine release still occurs (*10*). There is, however, a striking elevation in activity of tyrosine hydroxylase in the adrenal (*8*) that is associated with an increased rate of synthesis of catecholamines; thus, concentrations of NE are maintained in spite of enhanced release. In our study, similar changes appeared to occur in the hypothalamus; tyrosine hydroxylase activity was elevated after 4 weeks of repeated immobilization, with no significant decrease in catecholamine content.

When immobilization intervals were terminated, the tyrosine hydroxylase activity in the adrenal glands returned to normal after a 2-week period (half-life, approximately 3 days). In contrast, tyrosine hydroxylase activity in the hypothalamus was still elevated 4 weeks after immobilization intervals had been stopped and the increased attack behavior in response to shock also persisted after cessation of immobilization. The persistence of the increased tyrosine hydroxylase in the central nervous system, presumably indicative of enhanced catecholamine synthesis, and the increased fighting behavior long after the cessation of stress suggest a possible mechanism whereby long-term stress can result in persistently increased aggressive behavior.

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RECENT DEATHS

Edward N. Cook, 66, former professor of surgery, Graduate School of Medicine, Mayo Clinic; 26 July.

Myrtle C. Craig, 59; professor of education, Old Dominion University; 25 July.

Clifford Deutscher, 46; former assistant clinical professor of psychiatry, Albert Einstein College of Medicine; 14 April.

C. Dary Dunham, 61; former assistant clinical professor of medicine, College of Physicians and Surgeons, Columbia University; 12 April.

Clarence L. Eckel, 80; dean emeritus, College of Engineering, University of Colorado; 31 July.

Hallie G. Gantz, 62; president, Phillips University; 21 July.

Thomas Garvey, Jr., 69; associate professor of neurosurgery, New York University Medical Center; 5 April.

Charles S. Gwynne, 86; former professor of earth sciences, Iowa State University; 18 June.

Edwin S. Hammond, 78; former professor of mathematics, Bowdoin College; 22 March.

P. Arne Hansen, 69; professor of microbiology, University of Maryland; 2 June.

Richard E. Lee, 57; former assistant professor of clinical medicine, Cornell University Medical Center; 13 April.

Robert B. MacLeod, 65; professor of psychology, Cornell University; 19 June.

John N. McDonnell, 62; former president, Columbia University College of Pharmacy; 11 April.

William Menaker, 76; adjunct professor of psychology, New York University; 9 April.

David Perlman, 62; professor of chemistry, City College of New York; 6 April.

Parke H. Simer, 74; professor emeritus of anatomy, University of Illinois; 6 March.

James H. Taylor, 79; former chairman, mathematics department, George Washington University; 30 March.

Karl S. Woodcock, 76; professor emeritus of physics, Bates College; 24 March.

Conway Zirkle, 77; professor emeritus of botany, University of Pennsylvania; 28 March.