behavioral sciences

From our reporter at the meeting of the American Psychosomatic Society in Boston

Social and sexual influences on testosterone

In male rhesus monkeys testosterone levels correlate with social dominance and aggressive behavior. It is unclear, though, whether higher testosterone levels cause increased aggression and dominance or whether social influences (such as dominance) cause an increase in testosterone secretion.

Work at the Yerkes Regional Primate Center in Atlanta, Ga., indicates that social variables do influence testosterone production and associated behaviors. Robert H. Rose, Thomas P. Gordon and Irwin S. Bernstein of Boston University School of Medicine measured baseline plasma testosterone levels in four adult male rhesus monkeys. Each animal then spent two weeks as the only male in a compound with 13 females. A two-week recovery period was then followed by a brief (15-minute to two-hour) stay with a well established group of 30 adult males.

When housed with the females, the experimental males quickly achieved a dominant status and were sexually active. Plasma testosterone increased an average of 183 percent over baseline levels. This fell to normal after two weeks in their own cages. During the short stay with the male group, the experimental animals were attacked and forced to assume a defeated and submissive position. Testosterone fell by 80 percent. These levels remained low for up to 60 days but rose again after reintroduction into the female society, and reassumption of a dominant role.

"These studies," said Rose, "document the importance of sexual and social stimuli in the regulation of testosterone secretion."

Effects of isolation on rat pups

Work with rhesus monkeys has shown that early isolation produces lasting physiological and behavioral effects. Hoyle Leigh of Yale University School of Medicine and Myron A. Hofer of Montefiore Hospital in New York report similar effects in white rats. They removed all pups except one from litters and observed effects on the mother and the remaining pup. When this isolation occurred before 10 days of age the singleton died. When the separation was done after 12 days of age the lone pup survived but mother-pup behavior was different from that of control groups with normal sized litters. Development of the experimental pup was slowed and the mother treated the singleton as if it were younger than a full litter of the same age. Mother-pup contact and interactions were doubled and the mother was more frequently in the nursing position. The heart rate of the pups during activity was increased, even though they weighed less. Leigh concludes that the early experience may have produced physiological and behavioral changes in the animals.

William T. McKinney of the University of Wisconsin School of Medicine has been doing similar work with isolated monkeys (SN: 5/22/71, p. 356). His findings, he says, agree with Leigh's. At next month's meeting of the American Psychiatric Association McKinney will report on successful use of chemotherapy in treating some of the effects of early isolation.

biological sciences

From our reporter at the FASEB meeting in Atlantic City

Cyclic AMP and psoriasis

Cyclic AMP is the messenger chemical that mediates the action of most, if not all, of the body's hormones from within the target cell. For the body's processes to run smoothly, proper levels of both hormones and cyclic AMP are required.

Four dermatologists at the University of Michigan Medical School have found that the common skin disease psoriasis is associated with a deficiency of cyclic AMP. In psoriasis epidermal cells grow too fast, fail to develop properly and fall off in large white scales. John J. Voorhees, E. A. Duell, L. J. Base and J. A. Powell demonstrated that cyclic AMP is present in the epidermis and regulates the rate of mitosis, or multiplication, of cells. They discovered that cyclic AMP levels in psoriasis lesions are significantly lower than in healthy skin.

Psoriasis afflicts some 6 million Americans. The Voorhees group is now trying to find out if the cyclic AMP deficiency causes psoriasis and to develop a medication to increase cyclic AMP levels in psoriasis lesions.

Pinning down cellular structure

The endoplasmic reticulum, or membrane network, within the liver cells is the site of a wide variety of important enzymes, including those that synthesize phospholipids and steroids. Defining the composition and structure of this membrane would therefore be an important step toward understanding the mechanism for many body functions.

Norman D. Hinman and Alvah H. Phillips of the University of Connecticut have found that a single unique protein is the major component of these membranes. They report that the protein has an average hydrophobicity (a measure of its lack of affinity for water) much higher than that of most proteins of similar shape, and it is positively charged, which would allow it to interact with negatively charged phospholipids. They found its molecular weight to be 52,000 and also determined the average distance between molecules of the protein in the membrane.

What degrades RNA

When a given type of RNA is no longer needed by the cell, lysosomes, intracellular structures containing enzymes, break it down into components from which DNA can make new RNA.

Anthony Yannarell and Nathan Aronson of Pennsylvania State University have found that the plasma membranes—the semipermeable "skin" of a cell—of rat liver can also degrade or break down RNA. There are four enzymatic activities involved, they report, with each enzyme breaking off a specific part of the complex RNA molecules. The biochemists believe RNA degradation is a normal function of rat liver plasma membranes.

The physiological significance of the discovery remains to be elucidated. There are two possibilities. One is that the plasma membranes help lysosomes in the job of intracellular degradation of RNA, or the degradation system may be a defense mechanism to protect the cell from foreign RNA.