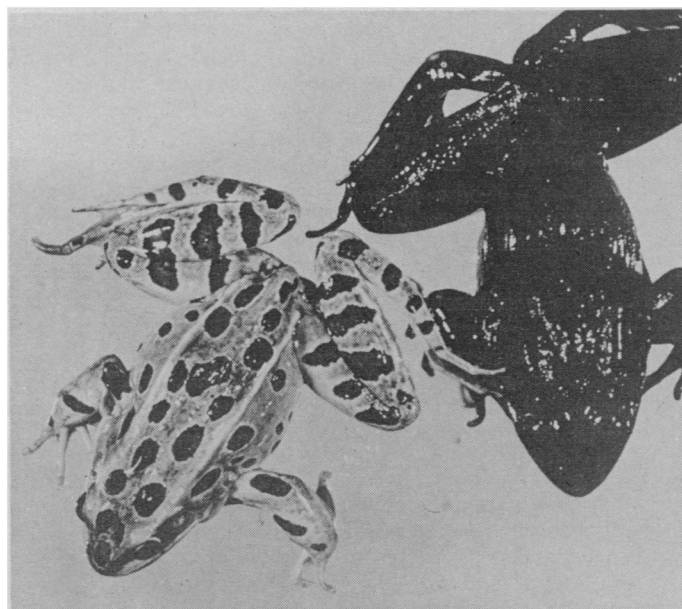


Pigment hormone may color behavior

The mysterious pituitary hormone previously believed to influence skin pigmentation may alter behavior as well

by Joan Lynn Arehart



Kastin

Black frog has a destroyed hypothalamus; other is normal.

Tucked away in the dark, intricate recesses of the middle of the human skull is a cluster of cells oozing pinpricks of chemicals. These cloistered cells have been dubbed the hypothalamus of the brain. An increasing body of research suggests that the hypothalamus serves as an executive switchboard for one or two dozen hormones that exert staggering effects on target tissues throughout the body.

Two or three years ago, a determined young endocrinologist at the Veterans Administration Hospital in New Orleans and at Tulane University—Abba Kastin

—finally convinced the doubting Thomases in his field that one of the chemicals released from the human hypothalamus is MIF, or MSH release-inhibiting factor. (MSH, or melanocyte-stimulating hormone, is one of a handful of pituitary hormones controlled by the hypothalamus.) Only one other hypothalamic factor to date has been definitely shown to be an inhibitor of a pituitary hormone. The other hypothalamic factors stimulate pituitary hormones. Today MIF has taken its place in general medical textbooks. But the intrepid Kastin and his collaborators, Curt Sandman, Lyle Miller, Marcos Velasco and Andrew Schally, are already more leaps ahead with work on MSH, the pituitary hormone itself.

In the past, researchers have shown that MSH can influence skin pigmentation in lower animals such as the frog. Kastin's group, in fact, has confirmed that by removing a frog's hypothalamus, the frog turns partially black. Thus investigators have naturally assumed that MSH might play some role in human skin pigmentation as well. For as Kastin points out, "Humans have just as much MSH content in their pituitary as the frog, maybe more." But no one has yet actually implicated MSH in human skin pigmentation under normal conditions. (There is evidence, though, that under certain rare conditions, such as tumors, MSH may cause skin darkening.) Now Kastin and his team report evidence for a perhaps still more dramatic job for MSH in higher animals and man. The slot is a behavioral one.

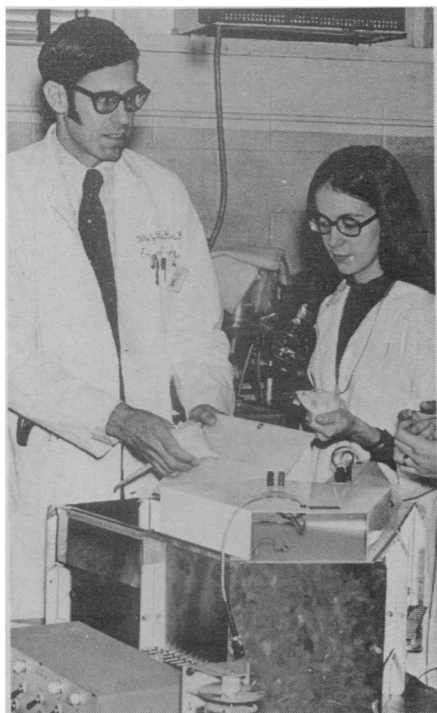
Only a few sex hormones and one pituitary hormone have so far been experimentally linked with specific behavioral phenomena. Although certainly, as John W. Money of Johns Hopkins, a world authority on hormones

and psychology, stresses, the body's hormones would be expected to strongly influence brain activity, and thence an organism's behavior. Prenatal deficiency of thyroid hormone, for example, can damage the fetal brain. In any event, the one pituitary hormone that has been experimentally tied to specific behavior is ACTH. And most intriguingly ACTH is not only structurally related to MSH; it has some MSH-like activity.

Actually David D. deWied and his collaborators at the University of Utrecht, the Netherlands, first got the idea that MSH might influence behavior. Kastin then picked up the torch. He has found that if one gives some rats an injection of MSH and other rats no MSH, then exposes both groups of animals to electrical shock, the rats given the MSH will avoid shock better. Kastin's group has likewise determined that human brain activity as reflected in electroencephalograms changes when patients are given injections of MSH. Actually they have detected some other kind of electrical activity in the brain as well when MSH subjects are concentrating on something. Kastin's team is now probing rat brains with electrodes in hopes of identifying those discrete brain junctures that MSH sparks.

Kastin and his co-workers have likewise established that MSH injections help human subjects see and recall better. When subjects were shown geometric forms and asked to reproduce them on paper from memory, they did better after receiving MSH injections.

Kastin cautions, though, that all this work is exceedingly preliminary, if not downright primitive. However titillating the implications, tests must be repeated with far better controls than those used so far. The loopholes of modern behavioral and hormonal study techniques



Saul M. Weiss, VA Hospital

Kastin and Beverly LeBlanc with rats and their behavioral maze.

must also be skeptically weighed before scientists draw any hard conclusions, he declares. For example, when the investigators put rats in one chamber, the rats were naturally curious about entering an adjoining chamber. But when they entered the secondary alcove, they were shocked. Several days later the rats were put in the first chamber again. The rodents treated with MSH were far more reluctant to enter the second chamber again than were the nontreated animals. "We believe the MSH rats adapted better," Kastin conjectures, "but a cynic of behavioral testing techniques might say that the MSH rats were more frightened in general."

Still other factors might influence MSH release, and its subsequent effects on behavior, Kastin notes. It is well established experimentally that the hypothalamic releasing factors and the pituitary hormones are influenced by feedback mechanisms that adjust future hormone release by past hormone release. For example, if an organism gets enough MSH for its particular needs of the moment, it may tell the hypothalamus, via the nervous system or bloodstream, to turn on the hypothalamic MIF, which will then turn off pituitary MSH. Feedbacks between pituitary hormone target organs and the hypothalamus, between the pituitary and the hypothalamus, and between the target organs and the hypothalamus have been demonstrated many times. In the past several months the Kastin team has also shown that MSH release from the pituitary also touches off a pituitary feedback to itself. In other words the amount of MSH in the pituitary influences how much MSH is released. This is the first time, he believes, that such a mini-feedback has been established for pituitary hormones.

Aside from feedback controls, environmental stimuli might also impinge on MSH production, and in turn, on MSH effects on behavior. Light and darkness are an example. Kastin has discovered they can influence how much MSH is released from the pituitary.

Kastin also sees some possible therapeutic benefits emanating from his group's work on MIF and MSH. Parkinson's disease is common among older persons, causing them to shake and have trouble walking and talking. Some of the tranquilizers used to treat the condition in patients trigger MSH release into rats' blood, Kastin and his team have determined. Thus he believes that a natural over-production of MSH by the pituitary might somehow be implicated in Parkinson's disease, and that an injection of MIF might have curative value by turning off excessive MSH. "It is also possible," Kastin declares, "that MIF might be a culprit in the disease without affecting MSH." □

films OF THE WEEK

APARTHEID: 20th CENTURY SLAVERY. 16mm, b&w, sound, 27 min. Almost everywhere in the world today, racial discrimination is, at least in theory, disowned and decried. In South Africa, however, it has become a fact of law as well as a fact of everyday life. This legal discrimination is known as "apartheid," literally "separateness." Many of the minority of whites who control the Government believe that the situation is normal and that people are content. The film demonstrates the terribly oppressive conditions under which the blacks must live, virtual slaves in their own country. The history of the situation, as well as the present attitudes of other African nations, are explored. Audience: Intermediate through adult. Purchase \$130 or rental \$8 from Contemporary Films/McGraw-Hill, Dept. SN, 330 W. 42nd St., New York, N.Y. 10036.

FOOD CHAINS IN THE OCEAN. 16mm, color, sound, 9 min. Organisms that live in the ocean are dependent upon each other just as are the organisms that live on land. Both land and sea communities depend on green plants to make energy available for life. Food chains and food webs form as the energy requirements of living things are satisfied. Audience: elementary, junior and senior high. Purchase \$120 or rental \$8 from BFA Educational Media, Dept. SN, 2211 Michigan Ave., Santa Monica, Calif. 90404.

SPRUCE HOUSE. 16mm, b&w, sound, 29 min. The theory followed by Spruce House is that a patient's behavior is the result of responses by other people to past behavior.

Normal behavior must then be rewarded and neurotic behavior ignored if behavior modification is to take place. This is achieved through the application of operant conditioning theory whereby a token economy system rewards adequate behavior and these tokens are used, in turn, by patients to buy personal items and privileges. Audience: mental health, public health. Purchase \$165 or rental \$7.75 from Audio-Visual Center, Dept. SN, Indiana University, Bloomington, Ind. 47401.

WHAT DID YOU TAKE. 16mm, color, sound, 35 min. Stresses recognition and treatment of drug abuse emergencies, accurate identification of symptoms and immediate clinical procedures. Scenes of actual cases in the emergency room and adjoining physicians' offices of Beth Israel Medical Center in New York City. Viewers observe emergency treatment of patients in the major classes of drugs most commonly abused—opiates, depressants, stimulants and hallucinogens—while a commentary gives basic medical instruction and highlights important clinical details. Demonstrates to health professionals, most of whom are not equipped by training or experience, that successful management of drug overdoses can save most lives and avert additional organic and psychiatric complications. Audience: health professionals. Purchase \$315 from Knightsbridge Productions, Dept. SN, 630 9th Ave., New York, N.Y. 10036. New York state residents contact New York State Department of Health, Office of Medical Manpower, 84 Holland Ave., Albany, N.Y. 12208.

Listing is for readers' information of new 16mm and 8mm films on science, engineering, medicine and agriculture for professional, student and general audiences. For further information on purchase, rental or free loan, write to distributor.

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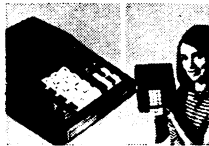
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