hormone is largely precipitated from sheep pituitary extracts at 2.0 M concentration of ammonium sulfate and the thyrotropic hormone at 2.4 M. Evans and his collaborators[5] have been able to obtain a thyrotropic fraction from anterior beef pituitary† by ammonium sulfate precipitation between 0.3 and 0.5 saturation. Further purification yielded a thyrotropic preparation containing 10% of interstitial cell-stimulating hormone.

Summary. The view of the identity of the interstitial cell-stimulating and thyrotropic pituitary factors could not be substantiated by the results obtained on further chemical fractionation of such preparations.

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Spontaneous and Reflex Emotional Responses Differentiated by Lesions in the Diencephalon.

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The diencephalic areas have been invoked as important subcortical centers having to do with the emotions.[1, 2, 3] The emotional reactions of animals with hypothalamic lesions have not been differentiated as spontaneous and reflex phenomena. The former appear without provocation and vary somewhat between different subjects. The reflex emotions occur only after stimulation of one or another sensory modality. The monkey is an excellent animal for study of spontaneous emotionality. He threatens, grimaces, wiggles his ears, undergoes pilo-erection, and vocalizes either in anger or in fear. When approached he may attempt to run away or permits his anger to carry him into definite aggressions. Occasionally, in blind rage, he dashes himself against the mesh of the cage as if he meant to rend it apart. Cats show a good deal less of spontaneous emotional display than do monkeys.

† It is generally accepted that anterior beef and hog pituitaries contain more thyrotropic hormone than sheep pituitary.

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1 Grinker, Roy R., *Psychosomatic Med.*, 1939, **1**, 19.

2 Ingram, W. R., *Psychosomatic Med.*, 1939, **1**, 48.

3 Kabat, H., Anson, B. H., Magoun, H. W., and Ranson, S. W., *Am. J. Physiol.*, 1935, **112**, 214.

Material and Method. Monkeys and cats were used in this study. In all instances, the diencephalic lesions were placed under more or less direct vision by following the stump of one optic nerve to the chiasmal region.

Observations. 1. Total destruction of the hypothalamus.

Such a lesion invariably results in stupor in which there are no spontaneous emotional demonstrations. The stupor is frequently associated with cataleptic phenomena. When the animal is painfully stimulated, there is a prompt reflex display of emotions. The threshold to such reactions is elevated but the responses are certain. One cat responded to pressure over bony prominences, with baring of claws, opening of the jaws, an awesome rumbling in his throat, and a battery of sneezes. A similar preparation in a monkey could be aroused by stimulation to adequate shows of emotions including grimacing and defense movements of all extremities.

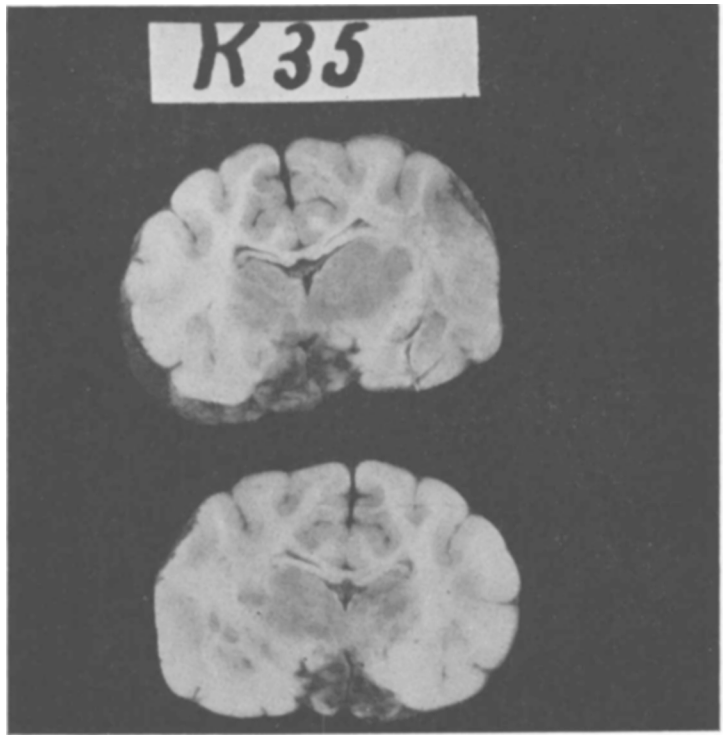

FIG. 1.
Total destruction of the hypothalamus in a cat. Microscopically, the lesion extends into the ventro-median area of the thalamus.

2. Total destruction of the hypothalamus along with involvement of the ventro-median portion of the thalamus.

Cats, so prepared, respond to painful stimulation hardly at all. One animal (Fig. 1), with only slight extension of the lesion into the ventro-median thalamus, responded with mere retraction of the lower lip and increase in the depth of respiration. A monkey could be roused to only slight defense movements of the limbs.

3. Unilateral destruction of the hypothalamus. This procedure results in an over-reactive animal who is conscious and ambulatory. There is a tendency to circle to the side of the lesion. One cat was constantly caterwauling. When baffled by anything in his way, he responded by baring his claws, snapping and spitting.

4. Unilateral destruction of the ventro-median portion of the thalamus. This procedure resulted in a spontaneously irritable and aggressively dangerous tabby which snapped and snarled and made wild swipes with bared claws at the examiner. This animal also was ambulatory and tended to circle to the side of the lesions.

Discussion. From these observations it would seem that where the hypothalamus is not functioning, there can be no spontaneous emotional display and stupor supervenes. This has been suggested previously by Ranson.[4] In such preparations, however, the thalamus is intact and is able to mediate pain stimuli along customary reflex arcs. This analogy may be carried over to stuporous human beings. The latter may be roused by painful stimulation to demonstrations of affect without actually regaining consciousness. One might postulate that in mild stupor the hypothalamus is not functioning, whereas the thalamus is physiologically intact. As the stupor deepens into coma, thalamic function is impaired and reflex emotional reactions may be no longer elicited. Anatomic correlates with this study indicate that the ventro-median nuclei of the thalamus play an important rôle in the elaboration of reflex emotional responses. Partial lesions of the hypothalamus or the ventral portion of the thalamus seem to produce an unusual lability of the subject's emotional display.

[4] Ranson, S. W., *Harvey Lectures*, 1936-37, p. 92.