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The Hypothalamus and Heat Regulation.

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Isenschmid and Schnitzler¹ localized the chief central mechanism for the control of body temperature in the hypothalamus by demonstrating that a hypothalamic rabbit heat regulated, whereas, a mid-brain preparation did not. Would extirpation of the hypothalamus alone without injury to other parts of the brain-stem render the animal incapable of heat regulating? In a few isolated cases in high mid-brain preparations, typical panting and vaso-dilation was readily elicited and persisted at relatively low rectal temperatures²; however, subsequent preparations were made in which this response could not be obtained under any condition. It therefore seemed probable to us that the "heat regulating center" was really in the cephalic mid-brain and was consistently spared functionally only by a transection passed ahead of the hypothalamus and rarely by a section passing nearer to it caudally. By the lateral approach (elevation of the temporal pole) the hypothalamus has been successfully sectioned free from its cephalic, dorsal, and caudal connections with the brain stem with no resultant hemorrhage, and without disturbing the blood supply to adjacent brain tissue.

The hypothalamus was sectioned free from its connection on one side (unilateral removal) without disturbing bilateral heat regulation so far as could be determined grossly. An incomplete section which crossed the mid-line to involve the opposite half of the stem, impaired the power of the animal to maintain body temperature. Thus a cat with approximately a three-quarter section maintained a rectal temperature of 36°C. housed in an unheated cage. However, when put in the ice box its rectal temperature fell slowly in spite of the presence of shivering. This condition supervened 3 months postoperative in the same state as the first week after operation. The animal panted typically and vigorously when heated.

When the whole of the hypothalamus was sectioned free (or macerated) with the caudal level of the section ranging through the middle level of the mammillary bodies or slightly ahead, the ability to

¹ Isenschmid, R., and Schnitzler, W., *Arch. f. Exp. Path. u. Pharm.*, 1914, **76**, 202.

² Keller, A. D., *Am. J. Physiol.*, 1930, **93**, 665.

maintain a constant body temperature was completely lost and shivering could not be elicited. Such an animal exhibits a remarkable release from control of the heat loss mechanism. Continuous polypnea and cutaneous vasodilation supervened. The respiratory rate varied with the activity of the animal, decreasing below 100 as a rule during sleep and ranging around 150 per minute (without the mouth being open) after activity. A mere pressing of the tail elicited typical panting (mouth open and tongue out) with a rate over 180. Such preparations have been maintained for 2 weeks without any change in this picture, suggesting that we are probably dealing with a true release phenomenon, since the picture supervenes as soon as the animal recovers from anesthesia.

These observations indicate that the chief central mechanism controlling heat production is located in the hypothalamus, and that extirpation of this region releases the heat loss mechanism, located elsewhere, from coordinated control.

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Effect of Carbon Arc Irradiation on the Goitre Producing Substance in Plants.*

BRUCE WEBSTER. (Introduced by J. H. Musser.)
(With the technical assistance of Catherine Bender.)

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The occurrence of a seasonal and annual variation in the goitre-producing power of cabbage and other plants has been previously reported.¹ At that time it was suggested that sunlight might be a factor in bringing about the synthesis of some substance in the cabbage responsible for the production of goitre. Freshly harvested cabbage, from a source which had previously been known to produce active goitrogenic plants, was finely divided, spread in layers from 1 to 2 cm. thick, and irradiated with a carbon arc for 20 minutes at a distance of 50 cm. The maximum intensity of the arc used was between 3500 and 4000 A. U. The cabbage was then fed to normal rabbits in quantities equivalent to 60 calories per kilo per day. The experiment was controlled by feeding hashed, unirra-

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¹ Webster, B., Marine, D., and Cipra, A., *J. Exp. Med.*, 1931, **53**, 81.