against strontium relative to calcium in the formation of wheat grain.

The specific activity of strontium was highest in the grain, and next highest in the chaff and leaves. It was about one-fifth as high in the stems and one-tenth as high in the roots. It is natural to assume that the specific activity of strontium in the roots equals that of strontium taken up from the soil. However, soil contamination on the root samples might lower the specific activity by adding stable strontium. On the other hand, since the root sample was taken near the surface, it is possible that its strontium would have a higher specific activity than the average for strontium taken up from the soil. These errors are expected to be small and they tend to offset each other. It is thought that the specific activity of strontium in roots gives a fairly good estimate of that taken up from the soil. This value was used in Table 1 to calculate the percentages of Sr^{90} absorbed through the aboveground parts.

All exposed parts showed a major fraction of Sr^{90} deposited directly from the atmosphere. In the grain, over 90 percent of the Sr^{90} entered by deposition on exposed parts and less than 10 percent by way of the soil. Other data on fallout in Maryland (*3*) indicate that the soil level in March 1959 was about 80 μc of Sr^{90} per acre, and that fallout during April, May, and June was about 9, 3, and 3 μc/acre, respectively. Thus, fallout was about 15 μc/acre during the spring growing season and about 3 μc/acre during the time the wheat heads were exposed.

The retention of Sr^{90} fallout by wheat plants and grain may be estimated as follows. The average Sr^{90} content of the grain was 35 $\mu\mu$c/kg. Based on an estimated yield of 40 bu/acre, the Sr^{90} content of the grain averaged 0.038 μc/acre, of which more than 0.035 μc was direct deposition. Thus, the grain contained about 1 percent of the Sr^{90} deposited while the heads were exposed, and absorbed about 0.004 percent of that in the soil. Similarly, the whole crop contained 0.63 μc/acre, of which 0.49 μc was direct deposition. Thus, the whole crop retained about 3 percent of that deposited during the growing season, and took up about 0.2 percent of that in the soil (*4*).

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Single Unit Activity of Anterior Hypothalamus during Local Heating

Abstract. There are heat-sensitive units in the anterior hypothalamus which respond with an increase of discharge frequency to a rise in hypothalamic temperature of less than 1°C. The increase of unit discharge occurred in advance of the onset of polypnea, and the unit has little phasic response or after discharge, and shows little adaptation.

Hypothalamic involvement in the mechanism of body temperature regulation is now generally accepted. Numerous experiments have been done and most of them indicate that a thermally sensitive area is located in the anterior hypothalamus. By local radio-frequency heating of the ventral telencephalon, between the anterior commissure and the base of the brain, Magoun *et al.* (*1*) demonstrated a marked acceleration of respiratory rate and the appearance of sweat on the foot pads. Polypneic panting and cutaneous vasodilatation have also been induced in unanesthetized animals either by local electrical stimulation at 50 cy/sec (*2*) or by warm water circulation of the hypothalamus (*3*). With lesions in the anterior hypothalamus, animals do not react to a rise of environmental temperature (*4*). Electrophysiological approaches to the hypothalamic temperature-sensitive neurones have so far been rather limited. C. von Euler (*5*) recorded slow potential changes from the hypothalamus which correlated with the occurrence of heat polypnea and panting. In view of the above, an experiment was designed to record single neuron activity in the hypothalamus during local heating.

Cats were anesthetized with urethane in doses of 1.2 g/kg of body weight. (In some cases urethane itself induced polypnea for an hour or more.) Tungsten or steel electrodes, with exposed tips of about 1 μ, were inserted stereotaxically into the anterior hypothalamus. For radio-frequency heating, two thermodes, insulated except for 4 mm at the tip, were implanted in the brain substance to within 1 mm of the base of the skull at the level of the anterior commissure and 4 mm on either side of the mid-line. The frequency of the low-voltage heating current, applied to the hypothalamus through the two thermodes, was 3 Mcy/sec. The duration of stimulus was usually less than 3 min. Conductive warming with a water circulator (*3*) was also used.

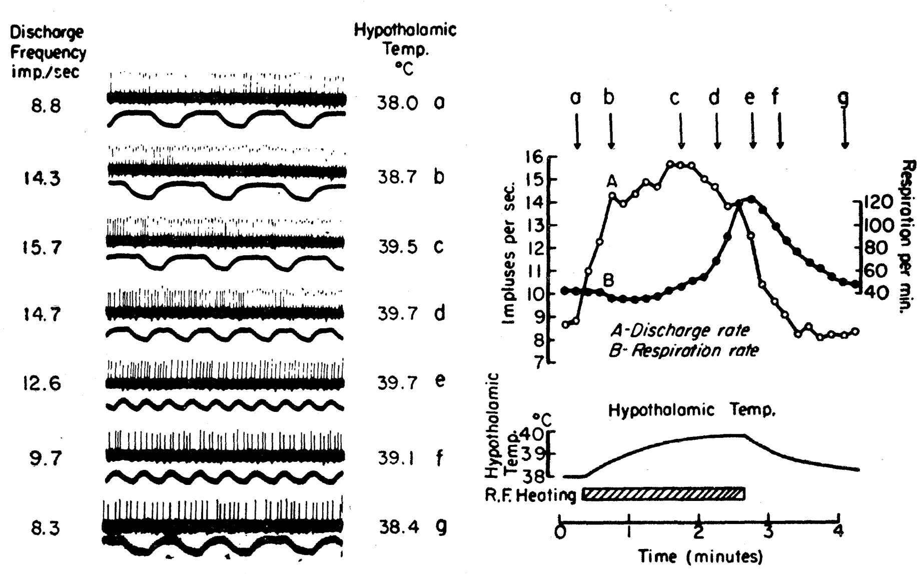

Fig. 1. Effect of local radio-frequency heating of the anterior hypothalamus on electric activity of single cell and respiration.

Rectal temperature was monitored throughout the experiment and was kept in the normal range by a heating pad placed beneath the animal. The hypothalamic temperature was measured with a thermocouple, or estimated indirectly from measurements of the thermode temperature. Respiratory movements were picked up by a thermopile placed in the tracheal cannula and recorded on the face of an oscilloscope simultaneously with the neuron discharge.

The frequency of spontaneous unit discharges in the anterior hypothalamus ranged from 3.7 to 27 per second. The discharge of a particular cell was rather stable, firing at an almost constant rate for several minutes. Some units changed their discharge interval with the rhythm of respiration. Numerous units which did not respond to local heating were found in the anterior hypothalamus. Regardless of an increase in respiration rate at hypothalamic temperatures of even more than 40°C, the discharge frequencies of these units remained fairly constant. The existence of a unit which does not respond with increased frequency to heating serves as a good control for heat-sensitive units. A few units have been found in the anterior hypothalamus which respond to local heating with a slight decrease in frequency. Occasionally the amplitude of the discharge decreased or increased with heating and returned to the normal 1 or 2 min after cessation of heating without any change in frequency. This change of amplitude is thought to be brought about by tissue movement with respect to the electrode.

Units which increase their discharge frequencies during local heating have so far been found stereotaxically in a region 13.5 to 15.5 mm rostral from the stereotaxic zero point, within 2 mm of the mid-line, and between 0.5 to 3 mm from the bottom of the brain tissue. The increase of frequency always occurred prior to the onset of polypnea, and even in an anesthetized cat an elevation of less than 1°C in the hypothalamic temperature was enough to increase significantly the discharge frequency. In an experiment in which the hypothalamic temperature was changed slowly by the circulation of warm water, the discharge frequency per second was 7.2, 15, and 21.2 at hypothalamic temperatures of 36.8°, 38°, and 38.7°C, respectively. The discharge rate remained fairly constant and showed little adaptation at a given hypothalamic temperature so long as the intensity of heating was moderate. These thermally sensitive units did not stop firing but showed a minor decrease in frequency when the hypothalamic temperature was lowered to 32°C. One unit, however, had a minimum frequency at 35.4°C, and increased its frequency with either cooling or heating.

The relation between hypothalamic temperature, unit discharge, and respiration is illustrated in Fig. 1. With radio-frequency heating the hypothalamic temperature went up gradually and the discharge began to increase in frequency. The discharge reached its maximum frequency 80 sec after the beginning of heating and maintained a fairly constant frequency at this level. Coincident with the fall of hypothalamic temperature, the frequency of discharge decreased without showing any afterdischarge. Close inspection of this figure, however, reveals that the frequency decreased a little while the hypothalamic temperature was still rising. Such a tendency of decrease is more conspicuous at higher hypothalamic temperatures, and in this type of response the frequency usually decreased markedly in the recovery phase after cessation of heating and then returned to the starting level. During the first minute or so of the heating period the respiration rate remained fairly constant or, more frequently, decreased slightly, as shown in Fig. 1.

In another series of experiments, rapid heating was employed, that is, the hypothalamic temperature was raised 6.5°C in 24 sec, from 38°C to 44.5°C, in an attempt to see whether any phasic response could be evoked. The discharge rate, 9.5 per second at normal temperature, decreased suddenly to 6 per second 3 seconds after the beginning of temperature elevation and then increased and reached the maximum frequency of 28 per second in 31 sec. Other units which showed no initial inhibition responded to a rapid heating with a minor increase in frequency.

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Authigenic Dolomite in Modern Carbonate Sediments along the Southern Coast of Florida

Abstract. Crystalline authigenic dolomite in shallow-water marine sediments from the margins of the North American continent is described for the first time. Dolomite is probably forming at the water-sediment interface in Florida Bay because of an interaction between organic material and hypersaline sea water.

Dolomite crystals occur in carbonate sediments now accumulating in shallow sea water along the southern coast of Florida (latitude, 25° 05′ 50″ N; longitude, 80° 53′ 58″ W). Examination of sediment cores shows that dolomite is most abundant near the sediment-water interface. These dolomite crystals are associated with calcareous shell fragments that have accumulated to form carbonate mud banks which overlie the consolidated Miami oolite of Pleistocene age. Along the western margin of Florida Bay, where dolomite appears to be concentrated, the unconsolidated mud is approximately 1.5 m thick. During periods of low water the mud is exposed to the atmosphere.

The dolomite crystals are characterstically euhedral rhombohedrons, ranging in size from less than 1 μ to approximately 60 μ; they commonly contain dark internal rhombohedrons that appear to be intergrowths of dolomite and dark material, possibly organic (Fig. 1). Clusters of interpenetrating rhombohedrons, in rare specimens, appear to be in the process of growth.

Unconsolidated carbonate sediment was leached with distilled water to remove all interstitial dissolved solids, filtered with Pasteur filter candles, passed wet through a screen with 62-μ openings, and suspended in a 2.5M solu-