mistakable signs of hemodilution. Plasma volume increased from 2060 cc (Dec. 29) to 2480 cc (Dec. 31), serum water from 91.5 to 92.6%, serum protein decreased from 6.84 to 5.77%, and hematocrit from 40 to 35%. Serum sodium fell from 140.9 to 133.0 m Eq per liter. Likewise there was a fall in serum potassium and chloride. Sodium and chloride balances were positive on the first day of pitressin injections, and potassium balance was positive throughout. Nitrogen balance became less negative.

When pitressin in the same dosage was given as nasal spray on Dec. 31-Jan. 3, the result on the first day was not satisfactory because of improper administration of the drug, but the data on the subsequent 3 days indicated that the efficiency of intranasal administration was not definitely inferior to that of subcutaneous injection.

Summary. The data presented indicate that in diabetes insipidus the serum water and electrolyte concentrations are maintained normal by reason of the unlimited water exchange. Water restriction or sodium chloride ingestion tends to produce negative water balance, hemoconcentration, augmented sodium and chloride levels in the serum, and loss of potassium from the body. Such changes tend to decrease in extent with elapse of time in spite of continued water restriction and salt ingestion. Pitressin rapidly restores the water and electrolyte concentrations of the serum and probably of other body fluids to normal and this is accomplished on a much lower level of water exchange.

13006 P

Effect of Hibernation on Rate of Eruption and Dentin Apposition in the Ground Squirrel Incisor.

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No studies have been found on the relationship of hibernation to growing teeth. The purpose of this investigation was to determine the effect of hibernation on the rate of eruption and dentin apposition in the thirteen-lined ground squirrel. This animal was selected because of ready availability, ease of artificial induction of hibernation and continuous eruption and apposition of dentin of the incisor.

Material and Method. This report is based on 9 control and 26 experimental animals (of unknown ages) which were caught in the vicinity of Chicago, Illinois, during the summer of 1940. The animals were kept in the laboratory for 2 months on standard rat ration. Hibernation was induced in the experimental group by withholding food and water for 2 days and then placing the animals in a dark constant-temperature room kept at 2-5°C.

A transverse notch was made at the labio-gingival border. Its distance from the incisal edge was measured by caliper after various periods. These measurements calculated in mm per week were of the rate of attrition which is essentially the same as the rate of eruption.[1] Direct measurements of the rate of eruption were not made because in many experimental animals the distance between the gingiva and the notch was very small.

The rate of dentin apposition was determined by the alizarine red S method.[2] This dye is deposited in the dentin calcifying at the time of injection and can be seen as a sharp red line in the ground section of the tooth. An intraperitoneal injection of a 2% solution of alizarine red S (100 mg/kg) was given to each animal at the beginning and at the end of the experimental and control periods. The skulls of the sacrificed animals were split mid-sagitally and fixed in a 10% neutral formalin solution. Longitudinal ground sections were made of the upper incisors; the distance between the alizarine red S lines was measured by micrometer and the rate of dentin apposition calculated in microns per day.* In the animals which died before the second injection of alizarine red S was given, the measurements were made from the alizarine red S line to the pulpal border of the tooth.

These experiments were conducted during the months of October, November and December of 1940:

Experimental Group (2-5°C). The animals were injected with alizarine red S and after 2 days were weighed and placed in individually numbered cages without food or water. They were again weighed 2 days later, and placed in the room kept at 2-5°C. During this period the animals were observed and weighed at 2- to 5-day intervals and measurements on the rate of eruption were made after 6 to 16 days. After 12 to 59 days, the animals were returned to the

[1] Schour, I., and Steadman, S. R., *Anat. Rec.*, 1935, **63**, 325.

[2] Schour, I., Hoffman, M., Sarnat, B. G., and Engel, M. B., to be published.

* From the distance between the alizarine red S lines of the animals kept at 2-5°C, 76.8 u was subtracted to correct for the 4 days before and 2 days after when the animals were at room temperature. 6×12.8 u (average rate of dentin apposition per day in control animals) $= 76.8$ u.

laboratory (about 21°C), weighed and given food and water *ad libitum*. Two days later alizarine red S was injected for the second time, and 2 days post-injection the animals were sacrificed.

Control Group (21°C, average room temperature). These animals were given standard rat ration. The rate of eruption was dedetermined during a 14-day period. Alizarine red S was given at the beginning and the end of a 21-day period. The animals were sacrificed 2 days later.

Findings. The results of these experiments are summarized in Tables I and II.

Discussion. The average rate of eruption in control animals at room temperature was 0.8 and 1.1 mm per week in the upper and lower incisors respectively (Table II). In Table I, with one exception, it will be noted that the rate of eruption was markedly retarded. This suppression was approximately proportional to the percent of time the animals hibernated. In the group which hibernated from 0-20% of the time the rate of eruption of the lower incisors was 2.2 mm per week (twice the control). As yet no adequate explanation can be offered for this.

The average rate of dentin apposition in the 9 control animals at room temperature was 12.8 u per day (Table II). This is in marked contrast to the rate of dentin apposition in the animals kept at 2-5°C (Table I). In the group of 7 animals which hibernated 76-100% the rate was 1.5 u per day or 12% of the control. It is of interest to note that 3 of these animals were at 2-5°C for 59 days, whereas the remaining 4 animals were kept for only 21 days.

TABLE I.
Average Rate of Eruption and Dentin Apposition of Incisor at 2-5°C.

% Hibernation (days)*	Rate of eruption (mm per week)		Rate of dentin apposition (u per day)	Weight loss (g per day)	
	Upper	Lower		21°C†	2-5°C
76-100	0.1	0.1	1.5	10.0	1.4
21-75	0.2	1.0	2.5	9.1	2.7
0-20	0.4	2.2	6.6	8.5	5.8

*Approximate percentage of total period at 2-5°C in which animals were found in the state of hibernation.
†No food, no water, for 2 days.

TABLE II.
Average Rate of Eruption and Dentin Apposition of Incisor at 21°C. (Average Room Temperature).

Rate of Eruption (mm per week)	Upper	0.8
	Lower	1.1
Rate of dentin apposition (u per day)		12.8

The rate of apposition, however, was the same. In 6 animals which hibernated less (21-75%) the rate was increased to 2.5 u per day or 20% of the control. In 13 animals which hibernated between 0 and 20%, the rate was 6.6 u per day, or 52% of the control. This was the only group in which there were any mortalities; 11 of the 13 animals died. The foregoing demonstrates the marked suppression of the activity of the dentin-forming cells of animals kept at cold temperatures and hibernating for variable periods of time.

The daily weight loss was greatest in the animals which hibernated least. Conversely, those animals which hibernated most had the smallest weight loss (Table I). These findings are consistent with those of the rate of eruption and dentin apposition.

Summary. The rate of eruption and dentin apposition of the incisor in the thirteen-lined ground squirrel kept at 2-5°C is markedly retarded and, further, is retarded in approximate proportion to the number of days the animal hibernates.

13007 P

Renal Concentration Test Employing Use of Pituitary Extracts. Response of Normal Subjects.

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The various concentration tests for renal function in use today consist primarily of some form of water restriction sufficient to reduce urinary volume. The specific gravity of urine is thereby elevated a variable degree depending upon tubular function and the degree of water restriction. We have attempted to shorten or abolish the long period of water deprivation necessary in concentration tests by the use of the antidiuretic action of posterior pituitary extracts. The effectiveness of posterior pituitary extracts in raising the specific gravity of the urine has recently been shown in dogs by Paine and Nelson.[1] Comparison of a standard concentration test for renal function with the use of posterior pituitary extracts was obtained by submitting patients to three or more of the following 5 procedures: (1) A modified Fishberg concentration test with restriction

[1] Paine, W. G., and Nelson, E. D., PROC. SOC. EXP. BIOL. AND MED., 1939, **42**, 729.