other 5.5 ml of urine. Presence of urine retention complicates interpretation of the observation that the rats started to drink water before any micturition occurred in that polyuria could have preceded polydipsia. Adrenal hypertrophy was also noted.

A few experiments with possible bearing on the mechanisms of production of polydipsia were carried out. In view of the report that potassium depletion in rats leads to polyuria and polydipsia(2), the effects of levorphanol, levorphanol withdrawal, and levallorphan substitution on the sodium and potassium content of rats' brains were compared to controls. No difference was found in Na^+ and K^+ content of brains in the 4 groups, or any 2 of the 4 groups. Also no difference was found in sodium and potassium concentration of the plasmas. Polydipsia and polyuria found in levorphanol treated rats are more profound than those reported for the potassium depletion experiments(2).

An apparent contradiction in results exists between the diuretic effect of levorphanol noted here and reported in the literature(3). Could levorphanol have different effects in chronic experiments performed here as compared to the more acute experiments generally reported for antidiuretic experiments? Also, the doses of levorphanol in our experiments are rather large. Reports on morphine, a compound closely related to levorphanol, similarly point to an antidiuretic action for morphine(3). One early report does mention the occurrence of polydipsia and polyuria with morphine in rats(4). Further publications elucidating and extending the findings have not been found. Further studies using larger groups of animals on levorphanol are warranted since admittedly the number of animals used in the present report is small.

Conclusion. Chronic treatment of rats with levorphanol produced profound polydipsia and polyuria. These observations are of interest since levorphanol and its close relative, morphine, are known to produce antidiuretic responses on acute administration.

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Interaction of Methionine and Indoleacetic Acid in the Control of Abscission in *Nicotiana*. (24337)

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The role of indoleacetic acid (IAA) in retarding abscission in many species has been reported several times since Laibach(1) in 1933 first noted its effect by applying orchid pollen to an exposed petiole following removal of the blade of the leaf. An additional substance in control of abscission is indicated by experiments of several investigators. A substance produced by senescent leaves of several species has been shown to accelerate abscission in bean explants by Osborne(2). Van Overbeek, Blondeau, and Horne(3) reported that application of various maleimides (sulfhydryl blocking reagents) promotes leaf abscission in peach. Hotta and Ota(4) have reported other experiments with the abscission of bean cotyledons which indicate that iodoacetic acid also has an effect upon abscission presumably through effects on sulfhydryl groups. The striking effect of methionine (and some other amino acids) in accelerating floral abscission in tobacco has been reported earlier by the authors(5). This report of the effect of methionine as a specific entity in abscission makes a consideration of its intreaction with IAA in the overall control of abscission of spe

TABLE I. Effects of Indoleacetic Acid upon Abscission of Unfertilized Ovaries of Tobacco.

Conc. of IAA (ppm)	Avg time (hr) from anthesis to completion of abscission	
	Lizard's tail	Little Turkish
0	88	173
5	101	168
100	250 (⅕) No absc. (⅘)	No absc.
1000	No absc.	No absc.

cial interest. Experiments have been designed to investigate this interaction.

Methods. Two varieties of *Nicotiana tabacum* (Lizard's Tail and Little Turkish) were grown with uniform greenhouse conditions. Various concentrations of aqueous solutions of IAA, DL-methionine, and combinations of the two were added directly to the unfertilized ovaries of flowers that had reached anthesis, through a 5 cm length of 4 mm glass tubing that had been drawn to a fine point. From 0.15 ml to 0.2 ml of solution were added each 24-hour interval. Fertilization was prevented by covering the stigmas with a small foil cylinder. The results of such treatment upon abscission are tabulated in Tables I, II, and III where each value represents the average time for abscission of ten flowers on one plant.

Results. The abscission of unfertilized tobacco flowers is delayed or prevented by additions of IAA and accelerated by additions of methionine. When IAA and methionine are added simultaneously an interaction is found in which the effect of each is modified by that of the other substance. With a high concentration of IAA the methionine effect is prevented and in the absence of abscission parthenocarpic fruit development may take place. This finding suggests that when seeds are developing (high IAA concentration) abscission does not occur regardless of the relative availability of methyl groups.

TABLE II. Effects of Methionine upon the Abscission of Unfertilized Ovaries of Tobacco.

Conc. of methionine (M)	Avg time (hr) from anthesis to completion of abscission	
	Lizard's tail	Little Turkish
0	84	182
.001	70	119
.005	55	83
.01	26	33
.05	23	28
.1	20	26

Certain varietal differences are apparent. Natural abscission occurs more rapidly in Lizard's Tail than in Little Turkish and Little Turkish is more responsive to treatments with IAA and methionine alone and in combination. Presumably the varietal difference is the result of differences in endogenous IAA and methionine.

Discussion. That abscission occurs as a result of the dissolution of the pectic middle lamella has been known since Lee(6) first described it in 1911. Ordin, Cleland, and Bonner(7) as well as Byerrum and Sato(8) have shown that the methyl group of methionine is rapidly incorporated into the pectic materials of the middle lamella. The availability of a methyl donor (methionine) apparently facilitates the further esterification of pectic and pectinic acids and finally production of pectin. Since pectin is soluble in water, separation occurs. Additional evidence for such an interpretation of the experimental data is found in the report of microchemical tests conducted by Facey(9). She characterizes the pre-abscission changes as such a series of reactions, IAA may act as a regulator upon enzyme systems which control the esterification-deesterification reactions. High concentrations of IAA apparently favor the formation of pectic acid and/or its calcium salt.

TABLE III. Effects of Combinations of IAA and Methionine upon the Abscission of Unfertilized Ovaries of Tobacco.

Conc. of IAA (ppm)	Conc. of methionine (M)	Avg time (hr) from anthesis to completion of abscission	
		Lizard's tail	Little Turkish
0	.0	89	175
0	.01	24	31
5	.01	28	26
100	.01	120	163
1000	.01	150 (¼) No absc. (¾)	No absc.

Betaine and choline are 2 other methyl donors in living systems and their effects upon abscission were examined in a similar manner. The time for abscission to occur was not

changed by addition of choline. In one of 4 experiments betaine caused a significant acceleration of abscission but in the other experiments only a small effect was observed.

These results with betaine and choline additions are not unexpected since most enzyme systems are quite specific in their action. The slight effect of betaine can be explained by the greater molecular similarity of betaine to methionine. In addition, betaine, like methionine, occurs naturally in plants. Additional experiments concerning enzymes in abscission are needed to characterize an overall mechanism of the phenomenon of abscission.

Summary. Methionine (presumably as a methyl donor) accelerates floral abscission in tobacco. IAA retards abscission. When the two factors are added to developing ovaries in combination, in general the effect is one of diminishing the effect of either when added alone. However, high concentrations of IAA completely overcome the accelerating effect of methionine.

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Effects of Adrenalectomy and Aldosterone on Proximal and Distal Tubular Sodium Reabsorption.* (24338)

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Aldosterone is generally believed to be the most important of sodium regulating hormones, but its site of action is still controversial. Recently, Barger, Berlin, and Tulenko (1) demonstrated direct renal effect of aldosterone, but the precise renal site of action of the hormone has remained unknown. Our technic of stop-flow analysis(2,3) has been used to localize which site of sodium reabsorption is influenced by adrenalectomy and aldosterone.

Principle of stop flow analysis. By administration of an osmotic diuretic (mannitol) to the dog, very high rates of urine flow can be established. If during this period the ureter is clamped, intratubular pressure rises to equal net filtration pressure, at which point glomerular filtration ceases(2). During this period of stopped ureteral flow, the concentration of any substance in the intratubular fluid column will be changed along the nephron, depending upon how the individual segments handle this substance. The mannitol retards water reabsorption and provides a menstruum against which electrolyte concentrations may be changed. Upon release of occlusion, these concentration patterns are obtained in approximately 0.5 ml serial urine samples which segment this pattern into an ordered array, best pictured on a graph if concentration of each sample is plotted against accumulative urine volume. An elevation in p-aminohippurate (PAH) concentration in the pattern signals a proximal position, and a depression in the sodium pattern delineates a distal area (2,3).

Methods. Five experiments were performed on mongrel dogs weighing 11-20 kg, adrenalec-

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