multiplication of brucellae in the presence of the previously collected autologous sera. When the pretreatment serum was used, no inhibition of multiplication occurred. However, when monocytes from the same harvest were cultivated in the serum that had been collected immediately after meprobamate treatment, intracellular multiplication was inhibited. Thus it would appear that exposure to meprobamate so alters the serum of treated animals that monocytes cultivated in the presence of this serum no longer allow unrestricted intracellular multiplication of *B. abortus*.

Certain effects of meprobamate on specific enzyme systems are known (*8*). One may therefore hope that the ability of this drug to cause changes in monocytes that lead to properties resembling those of cells from immune animals will permit a better analysis of biochemical changes responsible for so-called cellular immunity (*9*).

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Abscission and Abscisin

In a recent report in *Science* (*1*), the isolation of an abscission-accelerating compound, which the authors called abscisin, was described by Liu and Carns. We feel that, while the report holds some promise for interesting progress, it could be misinterpreted.

First, since the test that is used to assay for the abscission activity is a cotton seedling test which had not been previously reported in the literature, it would have been helpful had Liu and Carns presented more data to illustrate the results. The four values which are given show differences which would be considered very small in the conventional bean explant test, but of course the different plant material may account for the proportionally small differences.

In studying the developmental physiology of plants, when we find a substance with the ability to accentuate a given developmental or metabolic response, we cannot then assume that it serves to accentuate this response *in situ*. Before tentatively concluding that a promotive substance in a plant extract may be involved in a developmental process, we must do more than simply show that it is present. Some correlation of its occurrence with the developmental event is rudimentary to such an implication.

Liu and Carns have extracted something from the brown shells of cotton fruits after maturation and the completion of commercial harvesting. Does the presence of an abscission-promoting substance in this material implicate it in the development of the abscission processes, which would have occurred weeks or even months earlier?

A rather complicated purification procedure is described for the cotton extract. It would have been helpful if, along with this, data had been presented to show that the fractions which were discarded during the purification were without appreciable activity in the abscission test. It is possible that the unused fractions as well as the burs themselves after extraction did in fact include compounds which may be correlated with the abscission process.

A great variety of naturally occurring substances can directly promote abscission, including such classes of compounds as sugars, auxins, amino acids, and unsaturated hydrocarbons. Extraction and purification of any of these substances would surely not warrant the coinage of a new hormonal term and its addition to the literature of plant physiology. To illustrate the great variety of types of compounds which can stimulate abscission, we have assembled the data shown in Table 1. The assay used is the bean petiole explant test, and in each case untreated controls reached 50-percent abscission in approximately 100 hours. These data point up the fact that the abscission process is a complicated product of metabolism, and that under some circumstances it can be promoted by many different types of substances. For comparison, data for some extracts from abscissing and nonabscissing bean leaves are included, in which a tentative correlation with the abscission process can be seen.

Table 1. Promotion of abscission by some widely differing types of substances. The data show the hastening of 50-percent abscission in the bean petiole explant test. The experiments were carried on in light, except for the sucrose experiments, which were in darkness.

Substance	Promotion of abscission (hr)	Reference
Sucrose ($3\times10^{-2}M$)	50	(*2*)
Alanine ($5\times10^{-3}M$)	70	(*3*)
Formaldehyde ($5\times10^{-4}M$)	69	(*3*)
Ethylene (0.01%)	65	(*4*)
Napthaleneacetic acid ($10^{-5}M$)	69	(*5*)
Extract from		
Green leaves*	0	(*4*)
Senescent leaves*	76	(*4*)

* Acetone extracts of bean leaves consisted of dilutions, with water, to ten times the original fresh weight of the tissue extracted.

The concept of control of abscission by hormonal systems other than the auxins is certainly an interesting one, but as yet evidence has not been provided for the existence of other hormones in the sense of chemical messengers controlling the development of abscission.

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We find it necessary to take issue with Leopold and Rubinstein on a number of points, and further, we wish to present what we believe to be justification for submitting the information on the isolation of abscisin in the form in which it was published.

In such a report there is not space to discuss in detail the many techniques employed. For instance, it seems to us implicit in purification work that discarded fractions are carefully screened for activity before being so-considered. Further, it should not be necessary to state that the accelerated abscission reported was highly reliable and repro-

ducible, or that large absolute differences are not required or necessarily desirable in the explant test. The cotton explant test we selected has been in use for several years (*1*), and the details were published in the proceedings of the 4th International Conference on Plant Growth Regulation (*2*).

A cursory survey of the literature clearly indicates that the specificity of explant tests for abscission activity varies greatly. It is correlated with size of explant, method and site of application of test substances, and other factors often peculiar to individual laboratories. With the techniques we used, in either beans or cotton, only a very few substances were found capable of accelerating abscission when applied to the petiole segment of the explant. Other compounds, including carbohydrates, various types of organic acids, a great many inorganic and organic substances, and toxic materials in general, delay abscission or are without effect. These results, collected over a period of 12 years, led to the conclusion that evidence for the acceleration of abscission in many instances is the result of secondary interactions rather than of a direct promotion. The cotton explant test was selected as the bioassay in part because of its specificity with respect to abscission-accelerating substances.

Evidence for the presence of an abscission accelerator in cotton fruit and for its probable role in abscission was presented at the 9th International Botanical Congress (*3*) and at various cotton defoliation and physiology conferences, with key references given in the bibliography of the report in question. To summarize these findings, the accelerator can be obtained by diffusion or extraction and can be identified either by its abscission-accelerating activity or by its inhibition of an indoleacetic acid–induced growth response. Peak production is correlated with the onset of fruit drop in cotton. Varieties with a higher percentage of fruit drop have been found to contain greater quantities of the accelerator than those with characteristically lower fruit drop. The presence of the accelerator in diffusates is indicative of its ability to move from the fruit (site of origin) to the abscission zone (site of action). Finally, the active factor is found to be concentrated in the fruit walls (the tissue which later makes up the bulk of the dried burs). Burs were selected as the material for extraction because of the need for a ready source of plant material and because preliminary tests demonstrated a similarity in the abscission and growth-inhibition responses in burs.

Thus, we agree with Addicott that ample correlative evidence exists to warrant the suggestion that this or similar substances play an active part in the abscission process. That abscisin is identical with the substance active in young fruit has not, of course, been established.

In the final analysis, the important fact is that abscisin is the first highly active compound isolated from a natural source which accelerates abscission.

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Responses of Retinal Ganglion Cells to Exponentially Increasing Light Stimuli

Abstract. Action potentials of ganglion cells were recorded extracellularly from opened cat eyes. It was found that inhibition, as judged by discharge frequency, may depend upon rate of change of light intensity. Apparently the balance between excitatory and inhibitory inputs at the ganglion cell level depends upon rate of change of illumination. Visual purple bleaching or sensory adaptation taking place during the stimulation does not explain the results.

A wealth of data concerning the discharge pattern of the vertebrate retinal ganglion cells has been obtained by use of square-wave stimuli of different intensities, durations, colors, and retinal distributions. In the present work stimuli of exponentially increasing intensity were used. We felt that a study of the discharge pattern in response to stimuli of known intensity variation with time might add to our knowledge about the transmission properties of the retinal network. One well-known characteristic of ganglion cell responses to a square wave of light is the decrease in rate of discharge that sometimes occurs during the stimulation. This inhibition by light may be noted as a complete cessation of firing as long as the stimulus lasts, or it may be observed as a temporary decrease in discharge frequency below the rate that prevailed before the stimulus was applied. The experiments reported here show that in some instances the degree of inhibition, as judged by discharge frequency of the ganglion cell, is determined not only by the level of intensity as such, but is also strongly dependent upon rate of change from one level of illumination to another.

Cats decerebrated under ether narcosis were used. Action potentials were recorded extracellularly from the opened eye with glass-insulated platinum electrodes (*1*). A lamp with a tungsten ribbon filament provided diffuse, even illumination of the eye. The light intensities were measured at the surface of the eye and, therefore, serve only as a rough estimate of the retinal illumination. In each experiment the eye was first adapted to a certain steady illumination (adapting light). The light intensity was then increased exponentially to a new steady level by rotating a neutral density filter in the beam ("ramp" stimuli). Square waves were also employed. They started from the same adapting level and reached the same maximum intensity as the ramp stimuli. The total rise time of the square waves varied from 50 to 75 msec.

Figure 1 (top) shows the response to an exponential "ramp" where the total rise time is slightly more than 2 seconds. The discharge frequency of the cell decreases well below the prestimulus level during the fastest portion of the ramp, only to increase again shortly after the maximum intensity has been reached. The inhibition that occurs when a step function is applied is much less pronounced (Fig. 1, bottom).

Figure 2 illustrates the same experiment in a more quantitative manner. On three records (the two shown in Fig. 1 and a third similar one) the number of spikes within each successive 200- or 100-msec period were counted, starting 5 seconds before onset of stimulus. Then the cumulative sum of impulses was plotted against time; the continuous lines at the bottom indicate