tion of the variations in synaptic thresholds. In this preliminary stage of correlation, an interpretation of hallucinations as stimulatory phenomena, rather than as derangements owing to partial inhibition, offers no real difficulty, since synaptic inhibition could readily result in release from normal restraining influences with consequent stimulation.

A disturbance of adrenergic or related cerebral neurohumoral mechanisms appears to be implicated in the actions of the hallucinogens studied. The resulting imbalance in the reciprocal relationship (*1*) between adrenergic inhibition and cholinergic excitation in the most susceptible cerebral synapses might be an underlying mechanism in mental disturbance.

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Alkaloid Formation in Ergot Sclerotia

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In exploring the possibilities of producing ergot alkaloids by culturing *Claviceps purpurea,* it is desirable to know at what time in the life-cycle of the fungus the alkaloids normally make their appearance. To determine this fact, a plot of tetraploid Rosen rye (*1*) was inoculated on 5 and 6 June 1954 by spraying the flowers each day with a sugar-spore suspension (*2*). The spores were produced in shake cultures on a medium of 40-percent commercial sucrose in a potato broth prepared by boiling 400 g of sliced potatoes in sufficient water to produce 1 lit of broth when decanted (*3*). Spores produced in this manner are far superior in yield, percentage germination, and longevity in storage than spores produced in wheat cultures as previously described (*2*).

Samples were collected 8, 10, 12, 15, 17, 19, and 26 days after the inoculation of 6 June (Fig. 1 *A–G*). Each sample consisted of 200 or more heads cut at random from the plot. The heads were dried for 2 days at a temperature of 60° to 80° C. Many heads were dissected to secure all the sclerotia in each head. Figure 1 shows 10 representative sclerotia from each sample; the average weight of the sclerotia is given in the legend.

The "sclerotia" collected on the 8th day can hardly be called sclerotia. Most of them show only a little purple pigment, and this is usually at the base. A few have no purple pigment at all and these are often nothing more than the ovary of the rye flowers overgrown with mycelium. The surfaces of all "sclerotia" of this age, especially the upper surface of the older ones, are covered with conidia and conidiophores.

In most of the sclerotia collected on the 10th day (Fig. 1 *B*) the basal pigmented portion has enlarged so that it forms one-half or more of the whole structure. The upper, nearly nonpigmented portion is the asexual development, and it does not enlarge once the true sclerotium begins to grow. With rare exceptions, all sclerotia collected on the 12th day and after (samples *C* to *G*) are heavily pigmented.

The amount and nature of the alkaloids produced during the development of the fungus were determined. Dried, pulverized samples of *A* to *G* were extracted with ammoniacal alcohol. After removal of the alcohol, the alkaloids in the water layer were extracted at *p*H 8 into chloroform, then returned to aqueous maleic acid solution. The percentage of ergot alkaloids in these dried samples, determined colorimetrically by a modification of the Van Urk method (*4*) was as follows: *A* (0); *B* (0), *C* (0.005), *D*

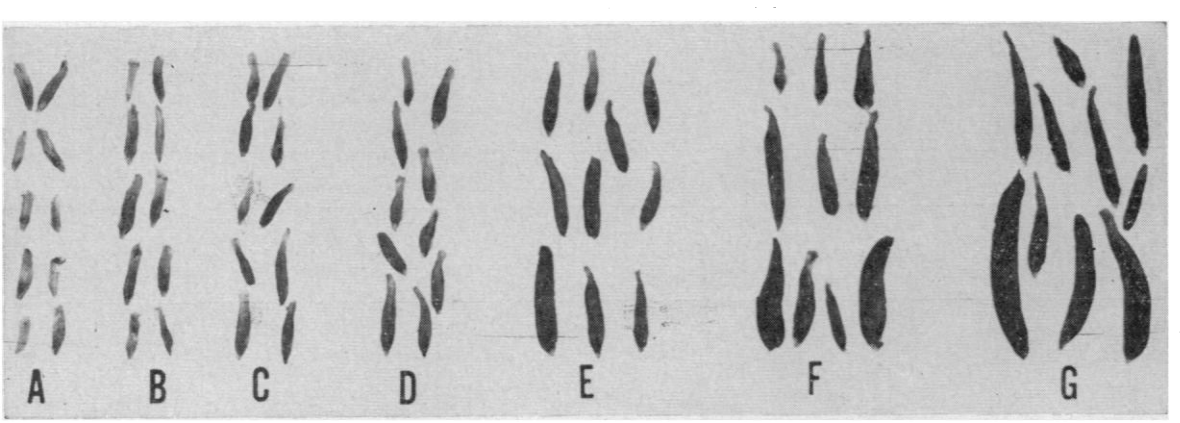

Fig. 1. Ergot sclerotia, natural size. The samples were collected on the following days after inoculation and have the average weights as noted: (*A*) 8th day, 4.9 mg per sclerotium; (*B*) 10th day, 6.2 mg; (*C*) 12th day, 7.3 mg; (*D*) 15th day, 10.2 mg; (*E*) 17th day, 23.2 mg; (*F*) 19th day, 38.0 mg; and (*G*) 26th day, 55.6 mg.

(0.013), *E* (0.05), *F* (0.14), and *G* (0.12). A visible absorption curve (400–800 mμ) of the blue reaction product that was formed from *C–G* was identical with that of authentic lysergic acid. Pharmacological assays by C. E. Powell (*5*) demonstrated an ergonovine type of activity in extracts of samples *C* to *G*. Papergrams in a butanol-acetic-water system (*6*) identified ergonovine as the major component in the extracts exhibiting a blue fluorescence under ultraviolet light.

From these results it is apparent that the ergot alkaloids are largely synthesized in the fungus during the later stages of sclerotial development. No lysergic acid could be detected in samples *A* and *B* before pigment and sclerotium formation. Traces of the alkaloids appeared 12 days after inoculation. The amount gradually increased to a maximum on the 19th day when the fungus was still increasing in weight.

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Anticortisol Action of Aldosterone

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Since the first description of the general-adaptation syndrome as the body's standard response to stress, much attention has been given to the role played by adrenocortical hormones in the pathogenesis of various diseases. There is no longer any doubt that an increase in the secretion of ACTH and glucocorticoids (for example, cortisol) is an essential prerequisite for the maintenance of homeostasis during stress. It has also been shown that many activities of these hormones are inhibited by simultaneous treatment with somatotrophin or mineralocorticoids (for example, desoxycorticosterone). The medical importance of a proper balance between gluco- and mineralocorticoids is most evident with regard to inflammation, because, in general, glucocorticoids suppress, while mineralocorticoids enhance, inflammatory responses to tissue injury. Consequently the former hormones have also been referred to as "antiphlogistic" and the latter as "prophlogistic" corticoids (*1–3*).

The greatest weakness of this theory was the lack of any direct proof that the adrenal gland actually secretes physiologically effective quantities of a mineralocorticoid comparable to desoxycorticosterone. This gap in our knowledge has now been filled by the discovery of "aldosterone," a highly active natural mineralocorticoid (*4*). Yet, the question still remained whether aldosterone is actually an antagonist of glucocorticoids.

Ninety-six female Sprague-Dawley rats, weighing 151 to 170 g (average 160 g), were bilaterally adrenalectomized and subdivided into four groups, as is indicated in Table 1. Throughout the observation period these rats were maintained exclusively on Purina Fox Chow and tap water, without special salt supplements.

Hormone treatment was initiated on the day of adrenalectomy. Cortisol was given in the form of Hydrocortone Acetate microcrystals (Merck) at the daily dose of 400 μg in 0.2 ml of aqueous suspension medium, subcutaneously in the chest region. Aldo-

Table 1. Anticortisol action of 20 μg/day of aldosterone in adrenalectomized rats.

Group	No. of rats	Treatment	Final body weight (g)	Weight gain (g)	Exudate (ml)	Thymus (mg)	Spleen (mg)	Mortality (%)
I	40	None	178 ± 7.3	+18	14 ± 3	603 ± 41	966 ± 206	87
II	40	Cortisol	132 ± 3.6	−28	3 ± 0.9	69 ± 8.3	490 ± 23	5
III	6	Aldosterone	172 ± 7	+12	12 ± 2.7	369 ± 46	934 ± 79	50
IV	10	Cortisol and aldosterone	155 ± 5.5	− 5	10 ± 1.2	105 ± 11	814 ± 113	0

Table 2. Anticortisol action of 50 μg/day of aldosterone in adrenalectomized rats.

Group	No. of rats	Treatment	Final body weight (g)	Weight gain (g)	Exudate (ml)	Thymus (mg)	Spleen (mg)	Mortality (%)
I	8	Cortisol	141 ± 5.6	−19	8 ± 1.6	146 ± 13.9	665 ± 48.3	0
II	9	Cortisol and cholesterol	137 ± 3.6	−23	9 ± 2.3	138 ± 22.8	690 ± 75.6	0
III	6	Cortisol and aldosterone	161 ± 3.3	+ 1	17 ± 1.0	191 ± 16.0	959 ± 98.3	0
IV	10	Cortisol and DCA	158 ± 2.1	− 2	13 ± 2.1	229 ± 18.0	978 ± 69.9	0