show a transformation of cortisone to 17-ketosteroids that is much greater than normal, while the base-line excretion tends to be in the low-normal or below-normal range. The latter finding is in accord with the observations of Miller and Mason (*15*) and Lundbaeck (*16*). At the same time, base-line levels of corticosteroid excretion, although variable, tend to lie within the normal range (*17*).

The present findings suggest a possible altered steroid metabolism in diabetes mellitus. Their significance may be clarified by studies now in progress. A more detailed report of this study will be submitted for publication elsewhere.

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8 September 1955

Effect of Reserpine on Adrenocortical Function in Unanesthetized Dogs

Reserpine produces tranquility in agitated patients (*1*), and depressed hypothalamic function has been suggested as the mechanism of this action. Because the hypothalamus is involved in the regulation of ACTH secretion from the adenohypophysis (*2*), an assessment of adrenocortical function following reserpine administration is indicated. Gaunt and coworkers (*3*) have demonstrated adrenocortical hypertrophy in rats following reserpine administration—a finding suggesting stimulation of ACTH secretion rather than suppression. The present study (*4*) was undertaken to determine the effect of reserpine on adrenocortical function in dogs; we employed a direct and specific method for evaluating the secretory activity of the adrenal cortex.

Table 1. Effect of intravenous reserpine on adrenal 17-hydroxycorticosteroid secretion in unanesthetized dogs. Output values for right adrenal gland only. When zero output is indicated, steroid concentration was below the sensitivity of the analytic method (0.1 to 0.2 μg).

Dog No.	Dose of reserpine		Minutes prior to injection			Adrenal 17-hydroxycorticosteroid output (μg/min) Minutes after injection								
	mg	mg/kg	10–20	5–10	0–5	0–5	5–10	10–20	20–30	30–45	45–60	60–90	90–120	120–180
1	5	0.12	1.3	0.4	0.5	1.0	0.0	0.0	1.3	17.5				
2	5	0.18		0.0	0.0	0.0	0.0	0.0	0.0	0.4	15.5			27.4
3	5	0.21	0.0		0.0	0.0	0.0	0.0	0.0	5.2	20.0	2.6	18.1	29.4
4	5	0.31	0.0	0.2	0.1	0.1		1.6	19.0	17.8	6.4	13.0		15.4
5	5	0.33	1.1	0.5	0.8	0.4	7.8	12.2	8.5		15.1	24.7	12.0	

In each of five male mongrel dogs, the right lumboadrenal vein was cannulated according to a technique described by Hume and Nelson (*5*). After a recovery period of 48 hours, samples of adrenal venous blood were collected from the resting, unanesthetized animals. Each dog was then given 5 mg of reserpine (Serpasil, Ciba) intravenously, and samples of adrenal venous blood were collected at intervals thereafter. All blood samples were analyzed for 17-hydroxycorticosteroid content (*6*). The animals became drowsy soon after the reserpine injection and remained so during the 3-hour period of blood sampling.

The results are presented in Table 1. Following reserpine administration, a marked increase in adrenal corticoid secretion was observed in all cases. In four dogs, the response was delayed, with highest values occurring between ½ and 3 hours after drug injection. The maximal corticoid values following reserpine administration are similar in magnitude to those obtained following the intravenous injection of large doses of ACTH, though comparatively much delayed. While it may be assumed that the increase in adrenal steroid secretion following reserpine injection is mediated by ACTH secreted from the adenohypophysis, the mechanism underlying the delay in response remains obscure. This study indicates that reserpine, in the doses used, is a potent stimulus to adrenal cortical secretion in unanesthetized dogs. It should be emphasized that these results represent an acute response to a large dose of reserpine. They do not necessarily imply that any comparable adrenal response occurs to smaller oral doses used in clinical practice.

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9 September 1955

Note on Murphy's and Rhine's Comments

In recent issues of *Science* there have appeared comments by Murphy (*1*) and by Rhine (*2*), criticizing our report of "A methodological refinement in the study of 'ESP,' and negative findings" (*3*). We feel that these comments call for a brief rejoinder.

Both Murphy and Rhine seem inclined to dismiss our findings on the basis of the fact that our study "did not even pretend to replicate any previous research" (*2*) in the field of extrasensory perception. We can but point out that methodological improvement is generally considered a scientific desideratum and that the comparison of results obtained by one methodology with those obtained by another is a common scientific procedure.

Both critics object, also, to the nature of the targets employed in our study. In an effort to forestall such objections, we communicated in some detail with Rhine, as he has stated (*2*), before we actually undertook our experiment. We were particularly concerned with the question of the form of the targets and called it especially to Rhine's attention. Rhine's only misgivings on this point had to do with the issue of the "stacking error" (*2*; compare with Rhine, *4*), an issue that happens to have no relevance for our experimental design. Although he now makes an assertion to the contrary (*2*), Rhine did not at that time object to "the curious device of making

all the targets (or stimuli) to be identified by the subject *of one kind"* (*2*; italics in original) nor did he express any of the reservations indicated by Murphy (*1*). We are thus somewhat surprised to be confronted now by criticisms on this score. Although it is true that we employed targets of an unusual nature, it is also true that they were (i) virtually demanded by the experimental paradigm, and (ii) presented to the subjects with fair warning. We feel that they were entirely legitimate.

Rhine and Murphy offer further criticisms of our procedure; we feel, however, that these criticisms are adequately met in the original report, and we will not attempt to deal with them here. We cannot close, however, without pointing out that Murphy's own comments substantiate our distrust of "random numbers." His remarks also, unfortunately, perpetuate the fallacy that patterning in a target is of no consequence, provided that a large number of calls is made; and they call for support on the study of Schmeidler and Murphy (*5*), which is subject to many of the same qualifications (*6*) that apply to Schmeidler's later investigation (*7*).

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12 September 1955

Fluorescent Thorium Mineral

It has been generally accepted that thorium cannot be a major constituent of any mineral that fluoresces under ultraviolet radiation. In fact, this element is looked upon as a quencher of the fluorescence of uranium salts. Current literature generally recommends the sodium fluoride bead test as a means of distinguishing between radioactive uranium and thorium minerals, and it has been accepted that appreciable amounts of thorium in a mineral will quench any fluorescence of the bead that is produced by uranium. Minerals such as monazite that contain 1 percent uranium and 7 percent thorium will not yield fluorescent beads when the whole mineral grain is used. It has been found that these generally accepted premises are unreliable.

An unusual mineral from Montana has been brought to my attention (*1*). Under the short-wave ultraviolet light, this mineral fluoresces with a bright green color similar to that of uranophane. Under the microscope, it is evident that the fluorescence comes from the interior of the translucent grains and is distributed more or less uniformly. It is not caused by any surface coating.

In the hand specimen, the mineral is of a liver-brown color with a glassy to resinous luster; streak is a pale tan; hardness is about 5.5 (Moh); specific gravity is 4.534; fracture is splintery conchoidal; it is nonmagnetic and infusible before the blowpipe; it is slowly attacked by boiling concentrated sulfuric or hydrochloric acids, leaving a small white residue.

Microscopically, the mineral is transparent, uniaxial positive with moderate birefringence; the indices of refraction are 1.690 and 1.716.

A spectrographic analysis yielded the following results (*2*): thorium, high (10 to 100 percent); zirconium, medium (1 to 10 percent); silicon, low to medium; iron, low to medium; manganese, low (0.1 to 1 percent); and hafnium, low. There were traces of phosphorus, nickel, beryllium, germanium, and aluminum. The presence of a small amount (less than 1 percent) of uranium was noted. No traces of tantalum or niobium were found.

A radiological assay performed on a Ken Research Monitor indicated a thorium oxide content of 65 ± 2 percent. An independent chemical analysis (*2*) showed a thorium oxide content of 64.54 percent. Chemical analysis demonstrated a uranium oxide content of only 0.81 percent.

In view of the very high thorium content of this mineral and its very low relative uranium content, it is noteworthy that grains of the mineral give a strong positive reaction to the sodium fluoride bead test. If a small grain of the mineral is added to a molten bead of sodium fluoride, the bead emits a strong yellow-green fluorescence under both short- and long-wave ultraviolet. Although it is unusual that a mineral containing 65 percent thorium should yield a fluorescent bead, it is very peculiar that the addition of a minute amount of thorium from any other source immediately extinguishes the fluorescence. To make this unusual fact absolutely clear, I shall review the procedure.

A bit of chemically pure sodium fluoride is melted in a loop of platinum wire. The resultant bead is not fluorescent. A small grain of the mineral is then placed on the bead and the whole is reheated to fusion, whereupon the mineral dissolves completely with a slight effervescence. When it is allowed to cool, this bead fluoresces bright yellow-green under ultraviolet. If one then adds a small speck of monazite, thorite, or chemically pure thorium nitrate to this fluorescent bead and reheats to fusion, the resulting bead is not fluorescent. However, repeated additions of grains of the mineral to a fluorescent bead do not diminish the initial fluorescence.

X-ray diffraction patterns of the mineral are similar to those of thorite; although the optical and physical properties described here do not precisely correspond with those of the latter mineral, the specimen is tentatively ascribed to the thorite family.

Mineralogists and chemists should not consider that a highly radioactive mineral which fluoresces under ultraviolet is necessarily high in uranium content. Furthermore, the generally accepted sodium fluoride bead test cannot be relied on to distinguish between thorium and uranium minerals.

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Notes

1. The specimen was furnished by H. Wilson Cain, Thorium Metals Corporation, New York.
2. The analysis was performed by Ledoux and Company, Teaneck, N.J.

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I hope that my children, at least, if not I myself, will see the day when ignorance of the primary laws and facts of science will be looked upon as a defect only second to ignorance of the primary laws of religion and morality.—CHARLES KINGSLEY (1819–1875).