cycle of gonadal activity, a refractory period during which an increase in daily photoperiod does not evoke gonadal development. Apparently short daily photoperiods, or long dark periods, are necessary to terminate this refractory period (*14, 15*). However, once the refractory period has ended, our hypothesis suggests, apparently contrary to those cited above (*1, 2*), that the daily dark period per se has no positive function, although the effect of a carry-over period may be exerted during the dark period. Possibly the differences are semantic; we feel, however, that our hypothesis is basically different and represents a more logical rationalization of the available data. Like Hammond (*13*), we feel that the assignment of an active role to the dark period is an unnecessary assumption; however, our alternative hypothesis is somewhat different.

Although analogies (*1, 2*) with photoperiodisms of plants, in which there are essential dark-dependent reactions (*16*), are attractive, extreme caution must be exercised since it is quite possible that the effect of darkness in the avian photoperiodic mechanism may be only that of cessation of a process, or processes, requiring light. Our hypothesis is proposed as one possible rationalization of the available information on the mechanism of avian photoperiodism. We feel that its tentative acceptance is favored by the Law of Parsimony as the simplest apparent rationalization.

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## A Simplified Method for Measuring Emotional Defecation in the Rat


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Hall's (*1*) unwieldy open field test has been established as the yardstick for measuring the intensity of emotionality in the rat (*2, 3*). Some important observations on the defecation of rats in simpler situations seem to have been overlooked. For example, it had been established that the defecation of rats placed in a strange enclosure decreased from trial to trial, until practically all defecation ceased (*4, 5*). This factor, in conjunction with other investigations, led Hall to the realization that defecation was an index of emotionality in all unfamiliar situations.

It seemed to the present writer that if strangeness were the decisive factor in producing emotional defecation, then, Hall's open field test was not necessary to determine emotionality. Any simple unfamiliar situation should do as well. A review of the literature and correspondence with C. S. Hall indicated that no investigator seems to have related a simple, strange situation with the open field.

The present report discloses a procedure whereby savings in laboratory space, money, and time may be made by substituting a simple, strange situation for the 8 ft of apparatus needed for the open field test.

Ten adult male rats were used as subjects. Each was randomly introduced into one of three situations. Following this, a regular sequence was observed. If a rat was placed in the open field first, for example, he would next be placed in a familiar situation. The familiar situation consisted of a standard $7 \times 7 \times 10$ cage placed on top of the rat's community cage. Following exposure here the rat would then be placed in the simple, unfamiliar situation. This situation was another standard cage placed in an unfamiliar room—a laboratory storage room in which no rats had been kept.

Each rat had one 5-min trial a day for 10 days in each of the 3 situations. The field and cages were cleaned immediately after any trial in which urination or defecation occurred.

The statistical sign test (*6*) was employed to compare emotional defecation in the 3 situations. In comparing emotional defecation in the open field test and in the familiar situation, the sign test was significant at the 1% level of confidence. In comparing emotional defecation in the strange situation and in the familiar situation, the sign test was significant at the 5% level of confidence. Such levels of confidence indicated that emotional defecation in both the open field test and the strange situation was significantly different from emotional defecation in the familiar situation. No differences in emotional defecation were found in a sign test comparison of defecation in the open field and in the strange situation.

These findings suggest that a clean, relatively odorfree, standard rat cage, placed in a strange situation, will elicit emotional defecation in a manner similar to that of Hall's open field test. If such is the case the open field test does not need to be used to measure emotionality in rats. The rather large amount of space the open field requires, the expense involved in purchasing material with which to build it, and the time taken to construct it, can all be put to other uses in the laboratory. A clean standard cage placed in an unfamiliar room should do as well.

This technique has value in several important areas of inquiry in the field of emotionality. The fact that far less floor space is taken up by a standard rat cage than by Hall's 8 ft of apparatus makes it possible to house more rats in the laboratory. This consideration is of importance in studying the inheritance of differences in emotion. When many selectively bred filial generations of rats are required, laboratory space will be at a premium. The strange situation test of emotionality demands little space. Also, in investigating the intercorrelations between emotionality and other responses such as fighting, delay in starting in a runway, and running in an activity wheel, it is customary to determine the emotionality of one rat at a time in the open field. Most laboratories can give space to only one open field test. However, by placing many standard cages in strange situations the emotional defecation of several rats may be simultaneously determined. This will result in a substantial saving in the experimenter's time. A large number of the most emotional rats and the least emotional rats can be selected in a matter of days instead of weeks.


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## Stimulation of the Reticuloendothelial System with Choline[1]


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The reticuloendothelial system (RES) has several vital known roles and probably has several other still unknown functions. Among the known actions of the RES is its role in the production of antibodies, phagocytosis of negatively charged colloids, effect on intermediary metabolism of some lipids, and protective action against radiation effect.

Various methods including whole body radiation (*1*) and cortisone (*2*) have been shown to depress the RES. However, because of the vital functions of the RES, the development of a factor which can excite this system to hyperfunction was considered most important. With the exception of various so-called anti-reticulocytotoxic sera, whose action still remains in doubt, and histamine, no practical means has been at hand to stimulate the RES. The requirements of such an activator include lack of toxicity as well as side effects. These criteria exclude vital dyes such as trypan blue. Such substances induce a hyperfunctional state by first producing RES damage (*3*).


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[2] This work was done during the tenure of an established investigatorship of the American Heart Association.

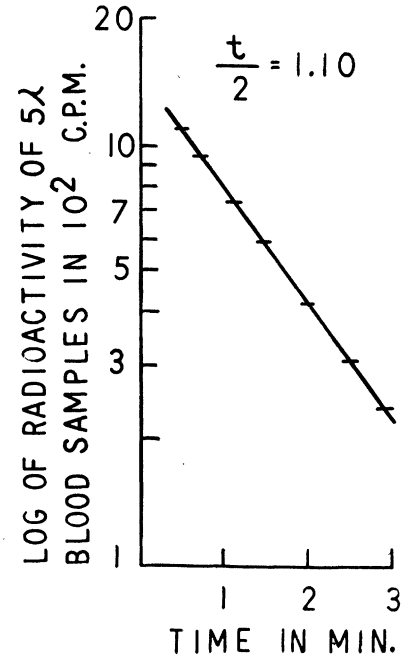


FIG. 1. Disappearance velocity of colloidal $CrP^{32}O_4$ from the circulation of a mouse. The $t/2$ value is the time wherein 50% of the radioactivity has left the vascular bed.

It had been pointed out in *in vitro* experiments by Chevremont (*4*) that of many substances tested, choline was the only compound that stimulated histiocyte formation in tissue culture. Later, Smulders (*5*) indicated that by injecting choline he could find an increased number of athrocytes in the liver in frogs by using histological techniques. As part of the search in this laboratory for a physiologic RES activator, choline was used to determine whether or not it activated the RES in mammals.

Both histologic and radioautographic studies in this laboratory (*6*) demonstrate that chromium phosphate is exclusively picked up by the RE cells. Using the rate of phagocytosis of negatively charged colloidal $CrP^{32}O_4$ as an indicator (*7–9*), experiments with intramuscularly injected choline were performed. It could be demonstrated that choline caused an RE hyperfunction of the order of 100% compared to saline injected controls.

Phagocytic velocity in each mouse was measured by plotting the radioactivity of each of 7 consecutively drawn 5 lambda blood samples against time (Fig. 1). As can be seen, the disappearance velocity is an exponential function. From this curve, the biological half-life $(t/2)'$ of the colloid in the vascular bed can be calculated. Hence, the $t/2$ value is that time wherein 50% of the $CrP^{32}O_4$ disappears from the blood.

Five series of 10 DBA, 90-day-old mice obtained from Rockland Farms were injected with 0.2 mg of