It is clear from the data in Table 1 that, depending on the time, the carbon source and its concentration, the expression of flocculence may be variable in heterozygotes. The probability of scoring flocculent as dominant over nonflocculent increases with time of incubation and carbohydrate concentration. It seems unlikely that the results are due to selection of a mutation from heterozygosity to homozygosity (for nonflocculence), since the cultures were originally isolated on glucose-containing agar, have been maintained on glucose stock agar, and yet segregate regularly for flocculence and nonflocculence. It seems reasonable to conclude that the difference in results cited in the opening paragraph is due, in part at least, to the different experimental conditions employed,[2] as well as to possible genetic differences in the stocks used. The data in the present paper are a good example of an environmental effect on dominance relationships in heterozygotes.

References

1. POMPER, S., and BURKHOLDER, P. R. *Proc. Natl. Acad. Sci. U. S.*, **35**, 456 (1949).
2. ROMAN, H., HAWTHORNE, D. C., and DOUGLAS, H. C. *Ibid.*, **37**, 79 (1951).
3. THORNE, R. S. W. *Compt. rend. Lab. Carlsberg, ser. physiol.*, **25**, 101 (1951).
4. POMPER, S. *Proc. Soc. Am. Bacteriol.*, 42 (1952).
5. BURKHOLDER, P. R. and GILES, N. H., JR. *Am. J. Botany*, **34**, 345 (1947).
6. POMPER, S. *J. Bacteriol.*, **63**, 707 (1952).

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[2] We have confirmed with our stocks the findings of Roman *et al.* (*2*) that heterozygotes grow flocculently in Difco yeast nitrogen base medium with 1% glucose. The physiological basis of flocculence may become more apparent when the factor determining its expression or lack of expression in these media is resolved.

Food Intake and Hepatic Vitamin A in Castrated Mice

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The fact that castration is accompanied by significant increases in liver vitamin A stores (*1–3*) has been adequately confirmed. It is not known, however, whether this effect is due to increased ingestion of food by the experimental animal. This question has arisen repeatedly in studies of this nature, and an investigation of the problem is long overdue.

It is apparent that determinations of the food intake and body weight of the animals are essential, especially in work involving vitamin A. An integral part of the problem is an analysis of the laboratory diet for vitamin A content to ascertain whether changes in food intake might account for proportional differences in hepatic levels of the vitamin.

Fifty-nine C_{57} mice were divided into intact and castrated groups, and placed on an *ad lib* diet of Purina fox chow, which was ground to form a coarse powder and distributed in weighed feeding cups. The food intake of pairs of mice from each group was determined for 4 days; these animals were then returned to the respective series, and other pairs were placed in the feeding boxes. These determinations were made throughout the period of study. The vitamin A content of 4 samples of each batch of diet was determined during this time.

Body weight was recorded for each animal immediately prior to autopsy, at which time liver samples were analyzed for vitamin A content by the antimony trichloride method, using a Klett-Summerson colorimeter.

The content of vitamin A of each batch of diet was relatively consistent, with extremes of 1.5–1.8 IU/g; the average of all batches was 1.6 IU/g.

Even under very carefully controlled conditions, the measurement of food intake per animal per day is unsatisfactory. The general average, however, was remarkably consistent and showed no striking differences between the two groups; it is obvious, furthermore, that a significant influence of food intake on the recorded levels of vitamin A (Table 1) could be achieved only by relatively enormous differences in the amount of diet ingested. Body weight averages confirm the lack of differential food intake as a determining factor in the results of this study.

TABLE 1

No. animals		Age in days	Food intake (g/mouse /day)		Body wt (g)		Vitamin A (IU/g)	
I*	C*		I	C	I	C	I	C
12	8	80	1.8	2.0	23.3	18.2	367	914
11	8	120	2.6	2.8	21.5	21.1	846	1173
12	8	180	3.1	3.5	26.8	23.7	459	1180

* I = intact; C = castrated.

Table 1 illustrates clearly the marked increase in liver stores of the vitamin in castrated mice. It is patently inconceivable that a threefold change in vitamin A content is due to a difference of .2–.4 g diet/mouse/day. That these values are not peculiar to the period studied is amply demonstrated in the results of long-term experiments to be published shortly.

The factors responsible for the increased levels of hepatic vitamin A in castrated rats and mice are unknown. Differences in absorption, utilization, and destruction of the vitamin, although of doubtful significance because of the relatively small amount ingested, require systematic study. Similarly, shifting of the minute stores from other parts of the body to the liver could not account for the marked changes reported. All these factors, however, must receive intensive investigation.

The suggestion that food intake may have a significant influence on the vitamin A stores of castrated animals is repeatedly advanced, despite observations which argue against this possibility (*4–6*). The vitamin A content of the diet was not determined in these studies, however, and further convincing proof was not available. The present paper furnishes these data and, with measurements of food intake, body weight, and liver vitamin A, substantiates the belief that the amount of diet consumed has no effect on the body stores of the vitamin in the castrated mice studied.

References

1. BULT, A. R., and SORGDRAGER, C. J. *Acta Brevia Neerl.*, **8**, 114 (1938).
2. TRUSCOTT, B. L. *Anat. Record*, **106**, 126 (1950).
3. RUSH, B. F., and TRUSCOTT, B. L. *Endocrinology*, **49**, 961 (1951).
4. GOERNER, A. *J. Biol. Chem.*, **122**, 529 (1938).
5. TANG, Y. Z. *Anat. Record*, **80**, 13 (1941).
6. PALMER, L. S., *et al. Minn. Agr. Expt. Sta. Tech. Bull.* **176**, 5 (1946).

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Comments and Communications

Uncommitted Researchers

IN RE Benson's letter (SCIENCE, 116, 233 [1952]): Most men who go in for science teaching and/or research have had their education given to them and have taken to science for their own diversion. The true scientist is only concerned with following his vocation to the best of his ability within the limits of his capacities. He is not properly concerned with hours of work, wages, fame, or fortune. For him an adequate salary is one that provides decent living without frills or furbelows. No true scientist wants more, for possessions distract him from doing his beloved work. He is content with an Austin instead of a Packard; with a table model TV set instead of a console; with factory- rather than tailor-made suits; with dollar rather than hand-painted neckties, etc., etc. To boil it down, he is primarily interested in what he can do for science, not in what science can do for him. The breed, unfortunately, is dying out.

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Pollen Counts and the Hay Fever Problem

THE transport of particulate matter by the atmosphere and, in particular, the dispersion of such matter through large volumes of air are—and have been—subjects of extended research. Much of the study to date has been devoted to problems attending the disposal of waste gases and vapors from industrial smokestacks, where there is essentially a point source of continuous emission of smoke and where the rate of emission is independent of atmospheric conditions. Such a situation has been analyzed by Sutton (*1*) for very small particles, 1 μ or less in diameter. The theory is far from complete, however, as evidenced by the recent efforts of Hewson *et al.* (*2*) to introduce a new approach to the subject.

In respect to airborne pollens, the problem of atmospheric transport and dispersion is still further complicated by the following considerations: (1) The emission of the pollen grains into the atmosphere depends directly on a complex of atmospheric conditions, including (*a*) low-level turbulence and gustiness to shake the pollen grains loose and to transport them upward into the air stream; (*b*) temperature and humidity suitable for ripening and drying the pollen grains. (2) The sources of pollen grains are spread more or less randomly over the landscape. (3) The pollen grains are in the 15–20 μ diameter range of sizes, the dispersion of which has been very little studied.

This means that there is at present no theory applicable directly to the problem of transport of hay fever pollens. It is possible, however, to speculate on the nature of the processes whereby pollens become airborne, and on the results of research on the dispersion of smaller particles. By this means one may crudely visualize the pollen distribution process.

To a sufficient approximation, the terminal velocity of fall of a ragweed pollen grain is about 2 ft/min with respect to its air environment. If one assumes that a strong gust strikes the natural pollen source and lifts the pollen grains to some height, *h*, above the ground, the distance to which the pollen grains will be carried may be estimated by the use of reasonable assumptions about the average vertical air speed along the path. This fails to give information as to the dispersion, or lateral spread, of the cloud of pollen grains initially involved. As emphasized by Cramer (*2*), this spread is related to accelerations of the air stream which, in turn, produce accelerations of the particles forming the cloud and cause them to separate in some kind of stepwise process.

Although Sutton's theory gives an approximate solution for the dispersion of suspended particles of the order of 1 μ or less in diameter, it is clear that the larger the particle considered, the slower will be the rate of dispersion and the more rapid will be the rate of sedimentation. Since rate of dispersion is a function of acceleration, it will bear some proportionality to force/mass, where mass is proportional to D^3 and force is proportional to D^2. Thus rate of dispersion is related inversely to D, the diameter of the pollen grains.

Standard methods of measuring the "pollen count"