other hand, Gregory and van Overbeek (*4*), van Overbeek and Gregory (*5*), and van Overbeek, Gordon, and Gregory (*6*) showed that the leaves of red-flowered hibiscus cuttings could be replaced by a treatment with sucrose and nitrogen, insofar as the number of roots formed was concerned.

In the present study it was found that leaves were not essential for the rooting of leafless cuttings when light-green or silver-colored lemons were attached. It appears, therefore, that immature lemon fruits can supply the same factors as are ordinarily supplied by the leaves. Sugars (*7, 8*) and nitrogen (*9*) are present in both green and yellow lemons. Whether these factors become less available for mobilization to the base of the cutting as the fruit matures or whether other factors for rooting are concerned requires further investigation.

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## The Stimulation *in Vitro* of Phospholipid Synthesis in Thyroid Tissue by Thyrotrophic Hormone


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The tissue slice technique has proved a most useful tool in investigations of the metabolism of the thyroid gland. Studies in Chaikoff's laboratories (*1, 2*) showed the ability of surviving thyroid slices to synthesize diiodotyrosine and thyroxine from inorganic iodine. With the same technique, the inhibition of thyroxine and diiodotyrosine synthesis by large amounts of iodide (*3*) and the effects of goitrogens (*4*) on the organic binding of iodine were demonstrated.

The present results appeared during the course of a study (*5*) of the possible correlation between phosphorus and iodine metabolism in a similar system of thyroid slices. A striking stimulation of the rate of incorporation of phosphorus into the phospholipids of thyroid tissue was found when thyroid slices were incubated in a medium containing radioactive orthophosphate in the presence of the thyroid-stimulating hormone (thyrotrophin, TSH) of the anterior pituitary gland. No such effect was observed in either the trichloracetic acid soluble or insoluble fractions.

Beef thyroid[1] was used. The procedure of slicing and incubation was as previously described (*1*). A total of 300 mg of tissue slices was incubated in 3.00 ml of Krebs-Ringer bicarbonate medium at pH 7.4, 37° C, under 95% oxygen and 5% $CO_2$ for a 3-hr period. Approximately 1 μc $P^{32}$ as orthophosphate[2] was used in each beaker. Thyrotrophin,[3] dissolved in the buffered medium, was used in the concentrations noted in Table 1. The analytical procedure used will appear elsewhere (*5*).

The data of Table 1 demonstrate the marked stimulation of thyrotrophin (TSH) on the incorporation of radioactive orthophosphate into the lipid fraction of surviving thyroid slices. An amount of TSH as low as 0.3 J.S.[4] units produced phospholipid synthesis of the order of 181% that of controls. The maximum stimulation observed was 254% of the control, using 6–8 units of TSH (1 mg) in the bath. These findings suggest that this system may well be at least as sensitive as that of Borell and Holmgren (*6*) in the assay of pituitary thyrotrophin.

Dialysis of the protein hormone against 50 volumes of distilled water did not decrease its activity in promoting the incorporation of $P^{32}$ into the lipid fraction. This would seem to rule out any effect from small molecule contaminants such as choline. A further test of this possibility showed that 1 mg choline/3 ml medium had no effect.

The specificity of this action is shown by a study with liver and kidney slices using 3 times as much TSH as was used with thyroid tissue. There was no evidence of any increase in $P^{32}$ incorporation in the


[1] Grateful acknowledgment is made to Don Sherman, of the Alpha Beta Meat Packing Company, Wintersburg, Calif., who made available the beef thyroids used in this study.

[2] The radiophosphorus used in this investigation was supplied by Oak Ridge National Laboratory on authorization from the Isotopes Division, U. S. Atomic Energy Commission.

[3] Grateful acknowledgment is made to Wayne Donaldson, of Parke-Davis & Co., for the thyrotrophin used in this study.


[4] Junkmann-Schoeller.

TABLE 1

EFFECT OF THYROTROPHIN (TSH)* ON UPTAKE OF RADIOPHOSPHATE BY PHOSPHOLIPIDS OF BEEF THYROID SLICES

| Expt. No. | S-3-125 | S-5-23 | S-3-125† | S-3-119 | S-3-115 | S-3-115 | S-3-115 |
|---|---|---|---|---|---|---|---|
| Mg TSH in medium | 0.01 | 0.038 | 0.1 | 1.0 | 5 | 10 | 15 |
| % increase $P^{32}$ over control | 105 ± 11 | 181 ± 16‡ | 180 ± 11 | 254 ± 12 | 217 ± 9.9 | 208 ± 9.6 | 210 ± 8.4 |

* In all studies Parke-Davis TSH Rx 099802, estimated to contain 6–8 u/mg, was used.
† Thyrotrophin treated by dialysis against 50 vol distilled water for 48 hr.
‡ $\sigma$ for $n = 4$; in all other studies $n = 2$.

liver and kidney lipids, whereas in the same study the thyroid lipids were 184% of the control. The USP Reference standard for TSH gave similar results.

A more complete report and discussion of the mechanism of the thyrotrophic hormone effect on phosphorus metabolism of the thyroid will be presented elsewhere.

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## A "Fly Factor" in Attractant Studies


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The importance of species odors in integrating the group behavior of social insects and in the mating of insects generally has long been recognized. That similar factors may play a role in the formation of other insect aggregations is less widely known, although some evidence for such mechanisms has been reported, as, for example, for caterpillars of *Pieris brassicae* by Fabre (*1*) and for the cockroach by Ledoux (*2*).

During field tests of the possible usefulness of attractant baits as a supplement to other methods of housefly control, it became apparent that the flies themselves must produce or bear some substance attractive to others of the species (*Musca domestica* L.). In these experiments, 15 g aliquots of a stock prepared by boiling 100 g white corn meal in 100 ml water were used extensively as nonattractant, nonrepellent control baits and as a vehicle for the various substances that were to be tested as attractants. The baits were exposed in the vicinity of a dairy barn which was supporting an estimated population of about 50,000 flies, and it was observed regularly that fly counts on the control baits increased with increasing exposure time (Table 1).

The possibility that this phenomenon was associated merely with the drying of the mush or its exposure to air was eliminated by placing in the test position paired mush baits, one of which was protected from contact with flies by a screen cover. After 30 min, the screen was removed and periodic counts were made of the flies visiting each dish. Results are shown in Table 2.

TABLE 2

ATTRACTION OF FLIES TO SCREENED AND UNSCREENED BAITS

| Time after removal of screen (min) | No. pairs tested | Total no. flies on baits | |
|---|---|---|---|
| | | Previously unscreened | Previously screened |
| 5 | 4 | 24 | 2 |
| 10 | 4 | 39 | 7 |
| 15 | 3 | 28 | 6 |
| 20 | 2 | 18 | 8 |
| 25 | 2 | 25 | 13 |

The further possibility that the position of the dish or memory on the part of the flies could be concerned was ruled out by experiments of the following type. Three baits in Petri dishes were placed in a row in the test position. The two outer dishes, one of which was screened, contained identical mush baits; the center dish held an attractant (Diamalt). After the dishes had been in place for 20 min, a picture was taken which showed numerous flies on the Diamalt, a moderate number on the uncovered mush, and none of course on the mush that was screened. Immediately thereafter, the screen was removed, the positions of the mush baits exchanged, and all flies driven off. A second photograph, 4 min later, recorded essentially the same distribution of insects as the first; i.e., the mush that had been screened initially was still free of

TABLE 1

FLY COUNTS ON MUSH CONTROL BAITS

| Exposure time (min) | Date of test | | | | | | | | | | Total flies |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 9/21 | 9/21 | 9/21 | 9/25 | 9/25 | 9/27 | 9/27 | 10/5 | 10/5 | 10/17 | |
| 5 | 0 | 0 | 0 | 1 | 1 | 0 | 3 | 2 | 3 | 0 | 10 |
| 10 | 1 | 0 | 0 | 1 | 4 | 4 | 3 | 4 | 7 | 0 | 24 |
| 15 | 2 | 1 | 3 | 7 | 5 | 2 | 2 | 8 | 13 | 0 | 43 |
| 20 | 1 | 2 | 4 | 4 | 8 | 4 | 2 | 7 | 1 | 4 | 37 |
| 25 | 1 | 9 | 10 | 4 | 22 | 2 | 5 | 10 | 10 | 6 | 79 |
| 30 | 7 | 4 | 2 | 7 | 17 | 3 | 5 | 15 | 11 | 8 | 79 |
| 35 | 4 | 11 | 0 | 5 | 28 | 7 | 9 | 7 | 21 | 7 | 99 |
| 40 | 12 | 6 | 5 | 10 | 27 | 11 | 7 | 10 | 33 | 18 | 139 |
| 45 | 9 | 14 | 9 | 6 | 26 | 18 | 4 | 11 | 31 | 23 | 151 |
| 50 | 17 | 15 | 10 | 10 | 38 | 16 | 7 | 8 | 29 | 16 | 166 |