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**Is the Effect of Thyroid and Thyroxin upon the Metabolic Rate
Specific for Vertebrates?**

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The author, while conducting experiments on insect metabolism, measured the metabolic rate of two species of insects under the influence of thyroid and thyroxin feeding. The forms used were the wasp, *Polistes pallipes*, and the roach, *Periplaneta australasiae*. Armour's desiccated thyroid was fed mixed with honey. Squibb's thyroxin crystals were also given in a honey mixture. Carbon dioxide output was measured per hour before and after feeding. In most cases of thyroid feeding results were not pronounced enough to be considered of consequence. In one case in which one wasp fed for approximately 4 minutes (a comparatively long time) the basal metabolic rate increased to more than twice normal for the first 2 hours following feeding. After the 4th hour the rate had again returned to normal. The very slight increases and decreases obtained with feeding desiccated thyroid to roaches were not consequential. It was assumed that proportionately a very great amount of desiccated thyroid gland was necessary to produce an increase in metabolism in these insects.

Thyroxin feeding, however, produced strongly positive results with the wasps. Each time it was fed and with each individual a very definite increase in the basal rate occurred. In one instance the rate was increased 6.5 times normal for the first hour after feeding, with a return to normal at the end of the third hour. Other records of an increase of 3 to 5 times the normal rate were not rare. With roaches the results were not so striking. In many cases no effects were noted but usually a slight rise in the rate occurred, which soon returned to normal. In no case was the increase as great as 1.5 times the normal rate. Possibly the wasps being more highly organized animals were more susceptible. Also proportionately more thyroxin was consumed by the wasps whose normal metabolic rate is much higher than that of the roach.

Adequate controls were run to make sure that the increase in rate was due to the glandular extract and not simply to nutritional properties. Thus it has been shown that thyroid gland and thyroxin will increase the basal metabolism of organisms other than those having thyroid glands. The effect, however, is of decidedly short

duration. It would be interesting to determine the threshold of dosage for an active form as *Polistes*. The above animals were kept in a dark constant temperature cage with uniform conditions of moisture, so that only the basal rate was obtained. In all probability the loss in weight in other forms after prolonged feeding of thyroid found by previous workers¹ was due to an increase in oxidation and consequently a decreased fat deposition in the larval state.

It should also be mentioned here that feeding Lugol's solution (5% I + 10% KI) did not produce any marked change in the rate.

Five wasps and two roaches were used in the thyroid-feeding experiments. Twenty-five normal readings were taken with the wasps and seven experimental ones. Four normals and two experimentals were taken with the roaches. The same insects were used as checks before and after thyroid feeding. Checks were also made by feeding honey syrup alone with no thyroid or thyroxin present.

Three wasps and four roaches were used in the thyroxin experiments. Nine normal tests and three experimental ones were made with the wasps; nine normals and three experimentals also with the roaches.

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Toxin-Antitoxin Reactions on the Surface of Collodion Particles.

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Because of its theoretical and practical significance the mechanism of the neutralization of toxins by antitoxins is one of the most extensively investigated problems of immunology. According to Arrhenius and Madsen the toxin-antitoxin neutralization may be a chemical reaction governed by the law of mass action. On the other hand Bordet thinks that it does not follow the quantitative laws of simple chemical reactions but is an adsorption phenomenon controlled by the electrical charge of the toxins and antitoxins.¹

¹ Kopec, S., *Biol. Bull.*, 1926, **50**, 339. Kunkel, B. W., *J. Exp. Z.*, 1918, **26**, 255. Terao, A., and Wakamori, N., *Japan Med. World*, 1924, **4**, 68.

¹ Wells, H. G., "The chemical aspect of immunity." Second edition. 1929. Bayne-Jones, S., chapter in "The Newer Knowledge of Bacteriology and Immunology" by Jordan, E. V., and Falk, I. S., 1928. Eisler, M., chapter in *Handb. path. Mikroorganismen* IV. 2 by Kolle, W., Kraus, R., and Uhlenhut, P., 1928.