

4-1941

## Nutrition Of The Wax Moth Larvae. Vitamin Requirement. I. Requirement For Vitamin B

Mykola H. Haydak  
*University of Minnesota*

Follow this and additional works at: <https://digitalcommons.morris.umn.edu/jmas>



Part of the [Biology Commons](#), and the [Entomology Commons](#)

---

### Recommended Citation

Haydak, M. H. (1941). Nutrition Of The Wax Moth Larvae. Vitamin Requirement. I. Requirement For Vitamin B. *Journal of the Minnesota Academy of Science*, Vol. 9 No.1, 27-29.  
Retrieved from <https://digitalcommons.morris.umn.edu/jmas/vol9/iss1/6>

This Article is brought to you for free and open access by the Journals at University of Minnesota Morris Digital Well. It has been accepted for inclusion in Journal of the Minnesota Academy of Science by an authorized editor of University of Minnesota Morris Digital Well. For more information, please contact [skulann@morris.umn.edu](mailto:skulann@morris.umn.edu).

vite contributions of information from those who have had experiences with unusual species of trees and shrubs. At the same time, we shall share at intervals the accumulated information with those who are interested.

1 1 1

## A WOODLAND TRAGEDY

OTTO T. WALTER  
*Macalester College*

### ABSTRACT

This is a brief description of a dental anomaly in the skull of a woodchuck—*Marmota monax*. Normally the upper and lower incisor teeth form an effective chisel-like cutting edge in all rodents, enabling them to secure their food by gnawing. Statements similar to the following have continued to appear in the literature on rodent dentition: "Since these teeth grow throughout life, if they are not worn away by gnawing, they become too long and the animal can not feed." The incisor teeth of the skull in question are deflected so that gnawing was impossible. The exposed parts of the two lower incisors are nearly seven times longer than normal. The upper incisors form a complete ring; the left one is recurved upward on the side of the left maxilla; the right one is curved into the mouth cavity and up through the maxilla into the nasal cavity. Nevertheless, this animal did not meet death through starvation. On the contrary, it appeared to be well nourished at the time of death. The real test of the survival value of these teeth came in an unequal and, for the woodchuck, unsuccessful encounter with a dog.

1 1 1

## NUTRITION OF THE WAX MOTH LARVAE. VITAMIN REQUIREMENT. I. REQUIREMENT FOR VITAMIN B<sub>1</sub>\*

MYKOLA H. HAYDAK  
*University of Minnesota* \*\*

All evidence available at present indicates that vitamin B<sub>1</sub> is necessary for the growth and development of insects (Migicovsky, 1937; Fröbrich, 1939; Offhaus, 1939). There is no study on the vita-

\* Paper No. 1900 Scientific Journal Series, Minnesota Agricultural Experiment Station, St. Paul.

\*\* The writer wishes to express his sincere appreciation to Professors M. C. Tanquary and W. A. Riley for their interest in the experiment and for valuable suggestions and corrections during the preparation of the manuscript.

min requirement of the wax moth larvae except that by Rubinstein and Shekun (1939). The latter investigators found that "purification of the wax and autoclaving the yeast in a strongly alkaline solution at 130° C. during a lapse of time which is sufficient to destroy both the vitamins B<sub>1</sub> and B<sub>2</sub> (riboflavin) does not impair the normal development of the insect." They stated, however, that "this does not imply that vitamins B<sub>1</sub> and B<sub>2</sub> have no influence whatsoever. Since our experiments were not carried out in sterile conditions, the possibility remains open as to the production of these vitamins by some microorganisms."

Rubinstein and Shekun used a medium containing one part of yeast and two parts of wax. It has been established (Dickman, 1933) that "numerous bacteria inhabit the digestive tracts of wax moth larvae. Experiments indicated that active substances, probably esterases, are produced by these microorganisms which cause marked changes in beeswax *in vitro*, and which must play an intermediate part at least in the digestion of wax by the larvae." It is possible that these bacteria were responsible for the results obtained by Rubinstein and Shekun.

Haydak (1936) found that normal wax moths can be reared on a diet which does not contain wax. Thirty-five generations of healthy wax moths have been reared on this food in a constant temperature chamber (Haydak, 1940). *Method:* A modified synthetic diet was used in the present experiment. The dry part of the diet consisted of: vitamin free casein 40, agar 2, dried yeast 20, salt (Hawk-Oser) 4, fat (cottonseed oil) 4, dextrine 30. The liquid part contained equal volumes of invert sugar (Nulomoline brand) and glycerine.

These two components were mixed in such proportion that for each gram of the dry part of the diet one cubic centimeter of the liquid part was added. Small vials were filled to about half their volumes with the mixture and plugged with cotton. The filled vials were placed in a constant temperature chamber for a day or two to allow the liquid to penetrate the dry constituents of food.

A larva approximately one day old was introduced into each of these containers and the growth was followed by weekly measurement of the length of the larvae without taking the latter from the vials. The yeast incorporated in diets II and III was autoclaved for eight hours under 15 pounds pressure. A drop of thiamin chloride solution equal to about 130 I.U. of vitamin B<sub>1</sub> was added to 10 grams of dry mixture in diet III.

When the larvae started to grow, cotton plugs were exchanged for corks protected with fine wire cloth to prevent the larvae from chewing their way out of the vials. The corks had small holes plugged with cotton to allow for ventilation. The vials with larvae were kept in a constant temperature chamber with the temperature adjusted to 32° C. and 75% of relative humidity.

*Results and discussion.* The results of the experiment are presented in the following table:

Diet	Average length of larvae in mm.			Length of Development Days from the time larva hatched to adult emerged
	1 week	2 weeks	3 weeks	
I Dried yeast untreated...	7	13	24	67
II Autoclaved yeast .....	3	3	..	All dead
III Autoclaved-yeast and thiamin chloride .....	4	11	26	47

The results show that an addition of vitamin B<sub>1</sub> supplied a necessary factor for the life and development of the wax moth larvae. The difference in the length of the development between diet I and III is possibly due to the fact that the former contained approximately 50 I.U. of vitamin B<sub>1</sub> while the latter about 130 I.U. of vitamin B<sub>1</sub> in the same amount of the diet. This question is being investigated.

*Summary.* Wax moths have been reared from eggs to the adult stage on a synthetic diet described in the paper. When autoclaved yeast was substituted for untreated dry yeast, the larvae failed to grow and all died. When such diet was supplemented with thiamin chloride the development was normal.

#### LITERATURE CITED

- Dickman, A., 1933. Studies on the wax moth *Galleria mellonella*, with particular reference to the digestion of wax by the larvae. Jour. Cell. & Comp. Physiol. 3:223-46.
- Fröbrich, G., 1939. Untersuchungen über Vitaminbedarf und Wachstumsfaktoren bei Insekten Ztschr. Vergl. Physiol. 27:335-83.
- Haydak, M. H., 1936. Is wax a necessary constituent of the diet of wax moth larvae? Ann. Ent. Soc. Amer. 29:581-88.
- Haydak, M. H., 1940. The length of development of the greater wax moth. Sci. 91:525.
- Migicovsky, B. B., 1937. The feasibility of the use of *Tribolium confusum* Duval for the assay of vitamin B. Master's Thesis, University of Minnesota.
- Offhaus, K., 1939. Der Einfluss von wachstumsfördernden Faktoren auf die Insektenentwicklung unter besonderer Berücksichtigung der Phyto-Hormone. Ztschr. Vergl. Physiol. 27:384-428.
- Rubinstein, D. and Shekun, I., 1939. Nicotinic acid requirement of insects: a biological test for nicotinic acid. Nature (London) 143:1064-5.

## VITAMIN B FRACTIONS AND BLOOD FORMATION

GEORGE M. HIGGINS  
*The Mayo Clinic*

#### ABSTRACT

Considerable emphasis has been given of late to the possible rôle that one or more of the fractions of vitamin B may play in the