Hyperglycemia in Freshwater Field Crab *(Oziotelphusa senex senex)* Produced by Pesticides

K. S. Jagannatha Rao

Department of Zoology, S. V. University, Tirupati – 517502, India

Z. Naturforsch. **40c**, 592–593 (1985);
received February 25, 1985

Hyperglycemia, *Oziotelphusa senex senex*, Hyperglycemic Hormone, DDT, Dieldrin

DDT and Dieldrin produced a significant increase in the hemolymph sugar level of intact crab of *Oziotelphusa senex senex* apparently by triggering the release of hyperglycemic hormone (HGH).

Introduction

The chemical nature, mode and site of action of crustacean hyperglycemic hormone (HGH) are well-known [1–3]. In view of the fact that organochlorides induce repetitive discharges in crustacean neurons [4], it is conceivable that DDT, Dieldrin could produce secretion of HGH from the neurosecretory cells that synthesize HGH. These investigations are undertaken to determine (a) whether a sublethal dose of DDT and Dieldrin can indeed produce an increase in hemolymph sugar level of crab and (b) if DDT and Dieldrin does have such an effect whether it might involve in stimulation of the release of HGH.

Materials and Methods

Adult, healthy, male intermolt (stage C_4) specimens of *Oziotelphusa senex senex*, were used. The sublethal concentration of DDT (10 μgm) and Dieldrin (20 μgm) were first dissolved in ethanol and diluted with distilled water, so that the final concentration was 10 μgm/50 ul, 20 μgm/50 ul of 0.1% ethanol, respectively, for DDT and Dieldrin. All blood samples were removed at the same time of the day to obviate any possible variations due to circadian rhythmicity in hemolymph sugar level [5]. Hemolymph sugar was determined 2 h after injection using the anthrone reagent [6]. Student "t" test was used in the calculation of probability values.

Reprint requests to K. S. Jagannatha Rao.

Verlag der Zeitschrift für Naturforschung, D-7400 Tübingen
0341–0382/85/0700–0592 $ 01.30/0

Results and Discussions

The results obtained with untreated intact crabs and crabs that received various experimental treatments are presented in Table I. The hemolymph sugar in eyestalkless crabs was significantly ($P < 0.001$) less (– 27.2%) than in intact crabs. Both DDT and Dieldrin significantly ($P < 0.001$) increased the hemolymph sugar in intact crabs but not in eyestalkless crabs. Injection of ethanol did not yield any significant change in normal as well as in eyestalkless crabs. Between DDT and Dieldrin, DDT is found to be more glucogenic than Dieldrin.

Table I. Changes in the hemolymph sugar level[a] of *Oziotelphusa senex senex*, after various treatments.

Groups of crabs tested	Sugar level
Intact crabs	8.93 ± 0.93[b]
Ethanol injected crabs	9.02 ± 0.97
DDT-injected intact crabs	15.49 ± 1.07
Dieldrin-injected intact crabs	12.34 ± 1.01
Eyestalkless crabs (24 h post-ablation)	6.50 ± 0.73
DDT-injected eyestalkless crabs	6.53 ± 0.99
Dieldrin-injected eyestalkless crabs	6.55 ± 0.99

[a] = mg Glucose equivalent 100 ml^{-1} of hemolymph.
[b] = Values are mean ± SE of 8 individuals.

The above pesticides could have produced a rise in hemolymph sugar level in the intact crab in multiple ways (a) by triggering the release of HGH (b) mimicking the action of HGH (c) direct stimulation of glucogenolysis. However, because DDT and Dieldrin were not able to produce an increase in hemolymph sugar level in eyestalkless crabs, it seems most likely that DDT and Dieldrin exerted its effects by triggering release of HGH from sinus gland. This also supports the hypothesis, that the sinus glands in the eyestalk of this crab are the main site of HGH.

Acknowledgement

The author wishes to thank Prof. K. S. Swami for suggestions and CSIR for financial assistance.

[1] L. H. Kleinholz, F. Kimball, and M. McGarvey, Gen. Comp. Endocrinol. **8,** 75–81 (1967).
[2] R. Keller and E. M. Andrew, Gen. Comp. Endocrinol. **20,** 572–578 (1973).
[3] M. Telford, Comp. Biochem. Physiol. **51,** 69–73 (1975).
[4] J. W. Welsh and H. T. Gordon, J. Cell. Comp. Physiol. **30,** 147–149 (1947).
[5] J. M. Dean and F. J. Vernberg, Comp. Biochem. Physiol. **14,** 29–34 (1965).
[6] N. V. Carrol, R. W. Longley, and R. H. Roe, J. Biol. Chem. **220,** 583–593 (1956).

Verantwortlich für den Inhalt: A. KLEMM
Satz und Druck: Allgäuer Zeitungsverlag GmbH, Kempten