Hyperglycemia in the Fresh Water Field Crab (*Oziotelphusa senex senex*) Produced by a Pesticide (BHC)

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Benzene hexachloride (1,2,3,4,5,6-hexachlorocyclohexane) (BHC) produced a significant increase in the hemolymph sugar level of intact crabs. *Oziotelphusa senex senex*, apparantly by triggering release of the hyperglycemic hormone (HGH).

BHC and its degradation products have been accumulating in the environment for many years and aquatic organisms are being chronically exposed to these compounds. But relatively little attention has been directed towards determining the effects of BHC on physiological and biochemical parameters in aquatic organisms.

The chemical nature, mode and site of action of crustacean hyperglycemic hormone (HGH) are well known [1–5]. In view of the fact that organochlorides induce repetitive discharges in crustacean neurons [6], it is conceivable that BHC could produce secretion of HGH from the neurosecretory cells that synthesize it. This investigation was undertaken to determine, 1) whether a sublethal dose of BHC can indeed produce an increase in the hemolymph sugar level of the crab *Oziotelphusa senex senex* and 2) if BHC does have such an effect whether it might involve stimulation of the release of HGH.

Adult, healthy, male inter molt (stage C_4) specimen of *Oziotelphusa senex senex*, collected from Tirupati were used. The BHC was first dissolved in ethanol, and diluted with distilled water, so that the final concentration was 10 µg/50 µl of 0.1% ethanol. Control crabs received 50 µl of 0.1% ethanol alone. All blood samples were removed at the same time of the day to obviate any possible variations due to circadian rythmicity in hemolymph sugar level [7]. Hemolymph sugar was determined 2 h after injection using the anthrone reagent [8]. Student's *t*-test was used in the calculation of probability values.

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. BHC 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.

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
BHC-injected crabs	15.49 ± 1.07
Eyestalkless crabs (24 h post-ablation)	6.50 ± 0.73
BHC-injected-eyestalkless crabs	6.53 ± 0.94

[a] mg of glucose. 100 ml^{-1} of hemolymph.
[b] Values are mean ± S.E. of 8 individuals.

BHC could have produced a rise in hemolymph sugar level in the intact crabs in several different ways, such as by triggering release of HGH, by mimicking the action of this hormone or even by directly stimulating glycogenolysis. However, because BHC was not able to produce an increase in the hemolymph sugar level in eyestalkless crabs, it seems most likely that BHC exerted its effect by triggering release of HGH from the sinus glands in the eyestalks. This also supports the hypothesis, that the sinus glands in the eyestalks of this crab are the main release site for HGH.

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