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Occurrence of Mercury in *Macrobrachium lanchesteri* (de Man) (Crustacea, Decapoda) in Thailand

Saroj Suckcharoen

Department of Environmental Science, University of Helsinki, SF-00710, Helsinki 71, Finland

Macrobrachium lanchesteri is one of the most common freshwater shrimps occurring in Thailand, Malaysia, Singapore, and in some other countries of the Indopacific region (HOLTHUIS and ROSA 1965). It occurs also in ricefields and has the ability to reproduce in stagnant freshwater (JOHNSON 1968). The shrimp forms an important source of protein for the local inhabitants of many southeast Asian countries, and therefore it has a great potential for development in aquaculture (GUERRERO et al. 1975, GUERRERO and GUERRERO 1976). In addition, it must be emphasized that M. lanchesteri is an important prey species for many freshwater fish and aquatic organisms. Therefore, a study into the mercury levels in M. lanchesteri from various localities in Thailand may reveal why mercury pollution has been observed in the predatory fish, Ophicephalus striatus Bloch, caught near the Thai Asashi Caustic Soda Co. Ltd. (TACSCO) (SUCKCHAROEN et al. 1978, SUCKCHAROEN and LODENIUS 1979).

MATERIALS AND METHODS

53 samples of M. lanchesteri (each sample consisting of 5 - 10 individuals) were collected from many sites in the following localities:

1) From a watercourse lying near Suksawad Road in front of the TACSCO factory. The watercourse is connected with the Tha Kwien and Song Pri Nong canals at about equal distance of 500 m north and south of the factory, respectively. The canals joined and then entered the Chao Phraya River which passes behind the factory. The samples were collected during November and December 1978.

2) From a marshland behind the Kobe Battery Mill at a distance of about 2.5 km from the TACSCO factory. The samples were collected in December 1977 and during November and December 1978.

3) From a channel near the Dah Yang Chemical Co. Ltd. in Samut Prakarn Province but at some distance from the

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TACSCO factory. The samples were collected in March 1978.

4) From a canal in Bangkhen District, 30 km north of Bangkok where there exists no nearby industry. The samples were collected in December 1977.

The mercury content in the samples collected in 1977 was determined by neutron activation analysis as described by HÄSÄNEN (1970) and the remaining samples by flameless atomic absorption spectrophotometry (Coleman MAS-50), using the digestion technique as described by KIVALO et al. (1974) and calibrated at intervals by neutron activation analysis.

RESULTS AND DISCUSSION

The results of the analyses are shown in Table 1. The mean mercury concentrations of M. lanchesteri from the TACSCO area, the battery mill, the chemical factory, and from the non-industrialized area were 0.08, 0.02, 0.02, and 0.007 ppm, respectively. Thus, the mean mercury concentration from the TACSCO area was 4-11 times greater than that from other areas.

TABLE 1

Mercury content (ppm, fresh weight) in M. lanchesteri from different localities in Thailand.

Study area	N	X	Range
TACSCO (1978)	11	0.08	0.06 - 0.12
BATTERY MILL (1978)	6	0.03	0.02 - 0.04
" " (1977)	9	0.004	0.002 - 0.006
CHEMICAL FACTORY (1978)	14	0.02	0.006 - 0.04
CONTROL (1977)	13	0.007	0.001 - 0.02

Although M. lanchesteri is a herbivorous species, it should be noted that its mercury concentration was about the same as that of M. rosenbergii (mean 0.07, range 0.02-0.15), which is a carnivorous species, observed in the Chao Phraya River by MENASVETA and SAWANGWONG (1977). However, the observed mercury concentrations of M. lanchesteri from the TACSCO area were found to be higher when compared with M. rosenbergii (range $<$ 0.01-0.05) from the Ayuthaya area which is about 60 km north of Bangkok (HUSCHENBETH and HARMS 1975). This

indicates that the degree of mercury pollution is rather high in the TACSCO area and low in that part of the Chao Phraya River near Bangkok.

Near the battery mill there existed a difference in the mercury concentrations of M. lanchesteri between the years 1977 and 1978. In 1977 a mean mercury concentration of 0.004 ppm was measured as compared with the mean of 0.03 ppm in 1978. This increase may be explained by the fact that a big flood occurred in Thailand a few months before the sampling date in 1978. Possibly, this flood transferred shrimps with high mercury content from the TACSCO area to the collecting area near the battery mill.

The mercury levels observed during the present investigation represent no risk to human health, but the high mercury content in M. lanchesteri from the TACSCO area may be partly responsible for the biological increase of mercury in O. striatus and thus may exert an indirect influence upon public health (Figure 1).

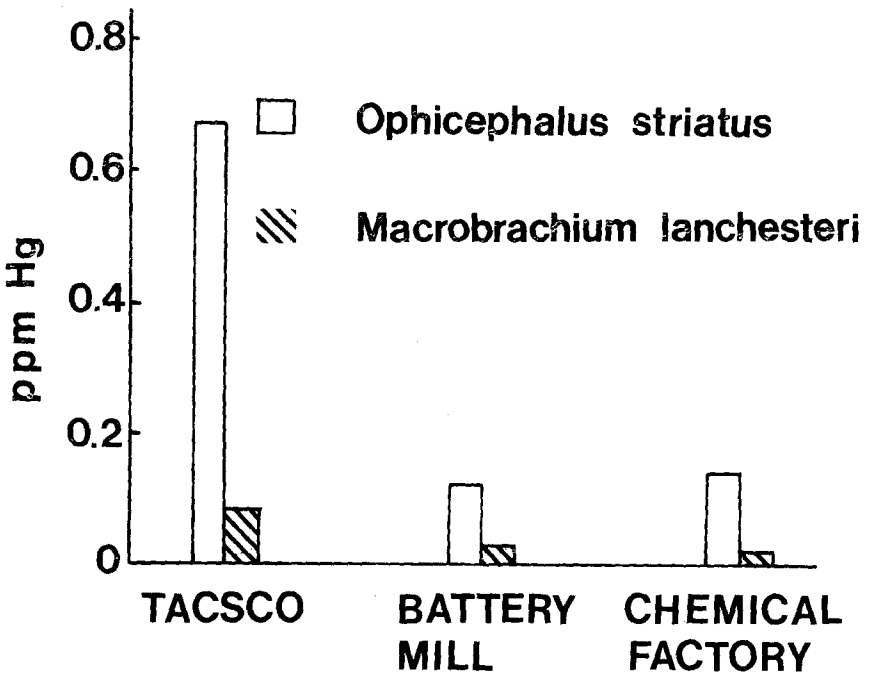

FIGURE 1. Comparison of mercury content (wet weight) in O. striatus and M. lanchesteri from different localities in Thailand. Data for the fish after SUCKCHAROEN and LODENIUS (1979).

In view of the potential value of M. lanchesteri as a source of protein for the rural population of Thailand and the plans for widened aquaculture, it is essential that the Thai waters be protected against increased mercury pollution. It should be noted that mercury at concentrations higher than 0.4 ppm for $HgCl_2$ and 0.125 ppm for MeHgCl may be lethal and behavioural disturbances in some shrimps species have been noted with concentrations as low as 0.05 ppm (RAY and TRIPP 1976 , BARTHALMUS 1977).

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