

DETERMINATION OF HEAVY METAL IN A SIMPLE ASCIDIAN PHALLUSIA NIGRA BY ATOMIC ABSORPTION SPECTROSCOPY

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Article Received on 03/01/2016

Article Revised on 24/02/2016

Article Accepted on 15/03/2016

ABSTRACT

The present study aims at analysing the heavy metals in the marine simple ascidian *Phallusia nigra*. Accumulation of heavy metals like copper, cadmium, lead, arsenic, zinc and mercury were determined. Analysis of the heavy metal in the selected animal sample was performed by atomic absorption spectrophotometer (AAS). Measurements were made using a hollow electron discharge lamp (EDL) for copper, cadmium, lead, arsenic, zinc and mercury at wavelengths of 220.62 nm, 228.80 nm, 283.31 nm, 193.70 nm, 240 nm and 253.7 nm respectively. This study confirms that the risk of heavy metals contamination in the ascidian appears low.

KEYWORDS: Atomic absorption spectroscopy, *Phallusia nigra*, heavy metal.

INTRODUCTION

Ascidians are marine sedentary organisms and they belong to biofouling community. They are found in piers, pilings, harbour installations, materials used in aquaculture operations etc. *Phallusia nigra* is a simple ascidian belonging to the family Asciidiidae. Ascidians are consumed as food in many parts of the world and there are coastal aqua farms in Japan as well as Thailand for the culture of ascidians. *Microcosmus sulcatus*, *Styela plicata* and *Polycarpa pomaria* are taken as food in the Mediterranean.^[1] *Halocynthia roretzi* in Japan, is even cultured in the North of Honsyu^[2] for human consumption and *Pyura chilensis* is popular in South America^[3] as a food source. Margalino and Destefano found that the flesh of *Microcosmus sulcatus* is almost as digestible as whole egg and the protein content higher.^[4] Previous studies show that the animal possesses antipyretic^[5], analgesic^[6], anaesthetic^[7] wound healing^[8] and antimicrobial activities.^[9-13] No reports are available for the determination of heavy metal in a simple ascidian *Phallusia nigra*. The objective of this work is to investigate the magnitude of heavy metals contamination in the animal under study by Atomic Absorption Spectroscopy.

MATERIALS AND METHODS

Collection and identification

Phallusia nigra (Fig.1) was collected from Green Gate area (8°48'N and 78°11'E) of Thoothukudi Port, Tamil Nadu by SCUBA diving and identified using Key to identification of Indian ascidians.^[14] A voucher specimen (AS 2083) was deposited in the Museum of the Department of Zoology, A.P.C. Mahalaxmi College for Women, Tuticorin 628002, Tamilnadu, India.



Fig. 1: *Phallusia nigra* Sav.

Preparation of extract

The whole animal was dried in shade and homogenized to get a coarse powder. The powder was successively extracted with various solvents such as petroleum ether (40°-60° C), benzene, chloroform, ethanol, methanol and water.

Standard preparation

The selected metals were copper, cadmium, lead, arsenic, zinc and mercury. For each of the selected metals a standard linear calibration curve of various concentrations ranging from 0.5000 ppm, 1.0000 ppm and 1.5000 ppm (three points) were analysed by AAS and used as the stock solutions in a quartz flask.

Atomic Absorption Spectrophotometer - Instrumentation

Analysis of the heavy metal in the selected animal sample was performed by Varian model AA 240 FS atomic absorption spectrophotometer (AAS). Measurements were made using a hollow electron discharge lamp (EDL) for copper, cadmium, lead, arsenic, zinc and mercury at wavelengths of 220.62 nm,

228.80 nm, 283.31 nm, 193.70 nm, 240 nm and 253.7 nm respectively. Analysis was performed by testing samples at three different concentrations 0.5000 ppm, 1.0000 ppm and 1.5000 ppm to ensure that the method has wide adaptability and good accuracy.

Table 1. Contamination levels of heavy metals in Phallusia nigra.

Copper	Cadmium	Lead	Arsenic	zinc	Mercury	MDL ^a
ND	ND	ND	ND	ND	ND	0.01mg/kg

ND: Not detected; MDL: Minimum detection limit; ^an=3.

Atomic absorption spectrometry detection was carried out on positive ionisation mode because this mode gave sharp and sensitive signals. It was optimised by using a standard linear calibration curve for various concentrations ranging from 0.5000 ppm, 1.0000 ppm and 1.5000 ppm (three points). The calibration curves were constructed by plotting the response against the concentration. A linear relationship was obtained for each compound. The heavy metals (cadmium, lead, arsenic, and mercury) were analysed at their particular wavelength and the ion with the uppermost intensity was selected as the basic ion. The study revealed that no resultant spectral peaks of Cd, Pb, As and Hg in *Phallusia nigra* was observed (Table 1).

CONCLUSION

It can be concluded that no heavy metals were found in the simple ascidian *Phallusia nigra*. Hence it is advisable to take this kind of ascidians in our regular diet.

ACKNOWLEDGEMENT

The authors express their sincere gratitude to University Grants Commission, New Delhi for Financial assistance and our Secretary Tmt. C. Subbulakshmi and our Principal Dr. R. Vasuki for providing facilities to carry out the work.

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