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Lipid Profile in the Y-organ of Fresh Water Crab Barytelphusa Guerini

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Abstract: *Crustaceans are important constituents of aquatic ecosystems and used as food throughout the world. They are used as bio monitors and bio indicators. The Y-organs of crustaceans are classical non-neural endocrine glands. They are paired and lobulated structures and are located ventrolaterally to the eye sockets. The Y-organs of crustaceans secrete ecdysteroids (moulting homone) which play a crucial role in the moulting and growth of crustaceans. Lipids are a major source of energy in marine invertebrates are involved in several essential processes for their growth, molting and reproduction. The lipid is mobilized from the hepatopancreas to meet the energy demands of all those processes resulting in ecdysis .*

Key Words- *Barytelphusa guerini, Y-organ, Lipids, Lipid profile, TLC.*

Introduction

The crustaceans occupy diverse ecological niches and regulate neuroendocrine signaling cascades and physiology in response to environmental and internal cues .They are used as food throughout the world and therefore important to human economy . Some planktonic crustaceans such as Copepods, water fleas etc are major links in food chains .

The crustaceans are used as biomonitors and bioindicators in various aquatic systems . Using these organisms, interpretation of data from bioindicator studies and the development of ecotoxological end points can be made (Le Blanc , 2007). .

The Y-organs of crustaceans are classical non-neural endocrine glands. They are paired and lobulated structures and are located ventrolaterally to the eyesockets. The histological characteristics of these glands are similar to the prothoracic glands. The Y-organs of crustaceans secrete ecdysteroids (moulting homone) which play a crucial role in the moulting and growth of crustaceans and also shows structural changes during the course of the moult cycle.These glands are the source of alpha-ecdysone , which is converted to beta ecdysone ,the moulting hormone (Gabe, 1953 ; Reddy and Ramamurthy,1999) .

The Y-organ is paired gland in crustaceans that secrete a class of steroid hormones (ecdysteroids) that regulate growth, moulting and development.The glandular secretion has been assumed to be solely the the ecdysteroid .Ecdysone is a polyhydroxylated derivative of cholesterol (Watson *et al* ., 1989) .

Lipids are a major source of energy in marine invertebrates including shrimp, *Penaeus monodo,* they are involved in several essential processes for their growth, moulting and reproduction Lipid droplets accumulate in specific tissues serving as energy stores (Yepiz-Plascensia *et al* .,2000) .

Lipids play an important role as a source of energy and essential fatty acids and thus determining the optimal amount of dietary lipid for maximum growth *Penaceus japonicus* (Kanazawa *et al.,* 1977) .

One of the major concerns in crustacean nutrition is lipid nutrition,which shows that , dietary lipid imbalance severely reduces the growth rate ,moulting frequency and survivals. Studies on lipid requirements showed that the lipid requirements of different crustaceans are species specific.In Penaeid prawn, *Litopenaeus vannamei* lipids consists of varying classes and constituents,which includes phospholipids,fatty acids sterols and caretenoids (Gonzalez-Felix *et al*., 2002) .
To know the various types of lipids present in the Y-organ ,a lipid profile is determined in male *Barytelphusa guerini* using TLC method (Thin layer chromatography) .

Material and Method

The animals were maintained in the laboratory under the laboratory conditions.

To determine the different types of lipids present in the Y-organ , a lipid profile is observed in male *Barytelphusa guerini* by using TLC .

Seperation of lipids

The lipids are separated by Thin layer chromatography (TLC) by using silica gel plate and petroleum ether , diethylether and acetic acid in the ratio of 80: 20:1 as solvent system (Stahl , 1958) .

Standard – The fish oil extracted from liver is used as a standard . The standard chromatogram shows seven types of lipid molecules viz cholesterol ester , unidentified layer of lipids , triglycerides , free fatty acids , free cholesterol , diglycerides , phospholipids and monoglycerides .

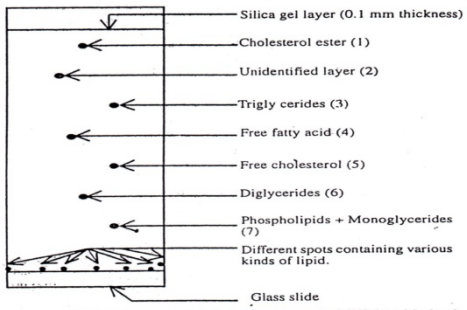
The R_f values of these lipids is shown in the tabular form .

Standard R_f – values

Components	Standard R_f values
Phospholipids	0.00
Monoglycerides	0.01
Sterol	0.09
1.2, Diglycerides	0.06
1.3, Diglycerides	0.11
Fatty acids	0.20
Free fatty acids	0.29
Triglycerides	0.71
Fatty acids methyl esters	0.74
Cholesterol esters	0.80
Hydrocarbon	0.97

Source – D. L. David (2009)

Fig - 1



Silica-gel plate showing the appearance of different kinds of lipids (standard values) at some constant particular spots on the thin silica gel layer.

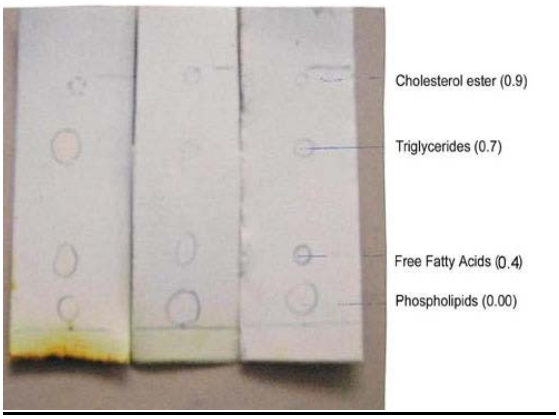
(Source - Naren Kumar Dutta, 2005)

Results -

Fig-3a LEGEND FOR FIGURE

Lipid profile of male Y-organ showing cholesterol ester, triglycerides, fatty acids and phospholipids

Fig - 3



The R_f-values in the lipid profile of the Y-organ of male compared with standard R_f-values –

Components	Standard R_f values	R_f values of males
Phospholipids	0.00	0.00
Monoglycerides	0.01	_
Sterol	0.09	_
1.2, Diglycerides	0.06	_
1.3, Diglycerides	0.11	_
Fatty acids	0.20	_
Free fatty acids	0.29	0.3
Triglycerides	0.71	0.7
Fatty acids methyl esters	0.74	_
Cholesterol esters	0.80	0.9
Hydrocarbon	0.97	_

The results of the lipid profile of the Y-organ in males and females animals shows four different types of lipids on the chromatogram i.e, phospholipids , free fatty acids , triglycerides and cholesterol esters. The R_f –values of lipids in males is compared with standard chromatogram .

Discussion

Lipid serve not only as vital energy stores but also crucial constituents of cellular and subcellular membranes .). Studies indicate that aspects of lipid metabolism may be under endocrine control in crustaceans. This occurs as the lipid is mobilized

from the hepatopancreas to meet the energy demands of all those processes resulting in ecdysis . The lipids are transported from one tissue or organ to another and may play specific roles for the transport of absorbed lipids from the gut epithelium in to the hemolymph (Coutteau *et al* ., 1997).

The lipids in the diet of crustacean, *Penaeus vannamei* are digested and absorbed through the digestive tract and transported to appropriate cells for storage or utilization . The main lipid storage organ in crustacean is hepatopancreas . Lipids are mobilized to and from this organ through lipoproteins that bind and carry these hydrophobic molecules in the aqueous hemolymph environment (Yepiz – Plascencia *et al* ., 2000 ; Yepiz – Plascencia *et al* ., 2002).

The lipid profile of hepatopancreas of *Mytilus edulis*,shows triglycerides, diglycerides ,monoglcerides, free fatty acids and phospholipids .In Carcinus maenas the lipid profile of hepatopancreas shows trigycerides, diglycerides, monoglyceri- des ,free fatty acids, phospholipids and sterol as the major lipids (Capuzzo and Leavitt,1988) .

In the present study the lipid profile of the Y-organ of *Barytelphusa guerini* is determined which ,shows phospholipids, free fatty acids, triglycerides, and cholesterol as the major lipids seen on the chromatogram. .

Conclusion –

Lipids are the major energy reserves utilized during the moulting process.The thin layer chromatographic separation of lipids shows a chromatogram with lipid profile consists of phospholipids,free fatty acids,triglycerides and cholesterol esters in *Barytelphusa guerini*.

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