



Impact of Environmental Pollutants on Molluscs in an Urban Region

A Thesis

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(Invertebrates)**

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Abstract

The freshwater gastropods *Lanistes carinatus* was used as a good bioindicator for water pollution in Kafr El-Zayat district Egypt, during the period from March 2014 to February 2015. The selected animal was stated as the common distributed in the region during all p eriods of study. The residue levels of heavy metals, persistent organic pollutants (POP_s) and pesticides in water, sediment and tissues of *investigated snails* were determined seasonally in five regions near the industrial and agriculture contaminated sources as well as non-contaminated one. The present study is focused on the changes in the innate immune defenses of investigated *L. carinatus* using flow cytometry and light microscope which are accomplished by haemocytes and haemolymph factors. The pollution effects on some biochemical components of the *Lanistes carinatus* snails were assessed as biomarkers such as acetylcholinestrace (AChE), catalase (CAT), glutathione peroxidase (GP_x), lipid peroxidase (LPO), lactic dehydrogenase (LDH) and carbonyl protein. As well as, their effect on the immunosystem and genomic DNA. Also, this study present good knowledge of their biomarker changes, as well as their cellular, genetic and biochemical level, which reinforces the role of fresh water snails as Bioindicators of the aquatic environment.

CONTENTS

Title	Page
List of figures	iv
List of tables	viii
List of abbreviations	x
Chapter I. Introduction and aim of the work	1
Chapter II. Review of Literature	5
2.1. Ecological studies on freshwater snails	5
2.2. Physico-chemical parameters.	6
2.3. Relationship between pollution and aquatic organisms	7
2.3.1. Heavy metals.	7
2.3.2. Organic pollutants.	12
2.4. Biomarkers of aquatic organisms	20
2.4.1 Enzymatic Activity.	20
2.5. Immunotoxic effects of environmental pollutants	28
2.6. DNA adducts	30
Chapter III. Materials and Methods	35
3.1. Studied area	35
3.2. Collection of samples	35
3.2.1. Animals.	35
3.2.2. Water	38
3.2.3 Sediment	38
3.3. Chemicals.	38
3.4. Instruments.	39
3.5. Physico-chemical measurements.	40
3.6. Heavy metals Analysis.	40
3.6.1. Water	40
3.6.2. Sediment.	41
3.6.3. <i>L. carinatus</i> tissues.	41
3.7. Pesticide residues analysis.	41
3.7.1. Water.	41

Title	Page
3.7.2. Sediment samples.	42
3.7.3. <i>L. carinatus</i> tissues.	43
3.7.4. GC–MS analysis.	43
3.8. Methods of biochemical quantification.	44
3.8.1. Determination of acetylcholinesterase (AChE) Activity in ganglial glands of freshwater mollusca, <i>Lanistes carinatus</i>	44
3.8.2. Lipid peroxidase (LPO)	45
3.8.3. Catalase (CAT)	45
3.8.4. Glutathione peroxidase (GP _x)	46
3.8.5. Carbonyl protein (CP)	46
3.8.6. Lactatic dehydrogenase (LDH)	47
3.9. Immunological investigation.	47
3.9.1. Haemocytic morphology	47
3.9.2. Phagocytic activity.	47
3.9.3. Flow cytometry analysis	48
3.9.4. Hemograms	48
3.10. DNA adducts	48
3.10.1. DNA isolation	48
3.10.2. Polymerase chain reaction (PCR)	49
3.11. Statistical analysis.	50
Chapter IV. Results	52
4.1. Identification of the collected freshwater gastropods	52
4.2. Determination of the physico-chemical parameters	55
4.3. Determination of heavy metals in the ecosystem	57
4.4. Pesticides residues analysis	66
4.5. GC- Mass Spectro photometric Analysis	82
4.5.1. OCPs	82
4.5.2. PCB _s	84
4.6. Biochemical quantifications	90
4.6.1. Acetylcholinesterase (AChE) activity	90

Title	Page
4.6.2. Lipid peroxidase (LPO)	93
4.6.3. Catalase (CAT)	96
4.6.4. Glutathione peroxidase (GP _x)	96
4.6.5. Carbonyl protein (CP)	100
4.6.6. Lactic dehydrogenase (LDH)	100
4.7. Relationship between industrial effluent contaminants and biomarker responses	103
4.8. Immune disorder of <i>L. carinatus</i>	108
4.8.1. Morphological observation	108
4.8.2. Flow cytometry profile	111
4.8.3. Phagocytic activity	113
4.8.4. Total haemocytes count (THC)	113
4.8.5. Haemocyte percentages	114
4.9. Genomic DNA differential display PCR	121
Chapter V. Discussion	125
5.1. POPs Residue.	125
5.2. Biochemical quantifications	128
5.3. Immune disorder of Mollusca.	133
5.4. Genomic DNA differential display PCR.	138
Chapter VI. Summary and conclusion	141
Chapter VII. References	151
Chapter VIII. Arabic summary	-

LIST OF FIGURES

No	Title of Figure	Page
Figure (1):	Map showing the sites of collection	36
Figure (2):	Freshwater gastropods <i>Lanistes carinatus</i>	37
Figure (3):	Histogram illustrated the percentage of population density of collected freshwater gastropods from different localities in Kafr El-Zayat district.	53
Figure (4):	Freshwater mollusca collected from different localities in Kafr El-Zayat district.	54
Figure (5):	Heavy metals levels ($\mu\text{g/L}$) in water collected from different zones of Kafr El-Zayat district during (a) summer 2014 and (b) winter 2015.	59
Figure (6):	Heavy metals levels ($\mu\text{g/g}$) in sediment samples collected from different zones of Kafr El-Zayat district during (a) summer 2014 and (b) winter 2015.	62
Figure (7):	Heavy metals levels ($\mu\text{g/g}$) in mollusca's tissue samples collected from different zones of Kafr El-Zayat district during (a) summer 2014 and (b) winter 2015.	65
Figure (8):	Distribution of contaminant residues in water samples collected from Kafr El-Zayat region during summer 2014 as follows: (a) OCP _s ; (b) OP _s and (c) PCB _s , respectively.	69
Figure (9) :	Distribution of contaminant residues in water samples collected from Kafr El-Zayat region during winter 2015 as follows: (a) OCP _s ; (b) OP _s and (c) PCB _s , respectively.	70
Figure (10):	Distribution of contaminant residues in sediment samples collected from Kafr El-Zayat region during summer 2014 as follows: (a) OCP _s ; (b) OP _s and (c) PCB _s , respectively.	74
Figure (11):	Distribution of contaminant residues in sediment samples collected from Kafr El-Zayat region during winter 2015 as follows: (a) OCP _s ; (b) OP _s and (c) PCB _s , respectively	75
Figure (12):	Distribution of contaminant residues in tissue samples collected from Kafr El-Zayat region during summer 2014 as follows: (a) OCPs; (b) OP _s and (c) PCB _s , respectively	79
Figure (13):	Distribution of contaminant residues in tissue samples collected from Kafr El-Zayat region during winter 2015 as follow: (a) OCP, (b) OP and (c) PCB _s , respectively.	80
Figure (14):	GC-MS chromatogram of multistandards of (a) organochlorine pesticides, (b) some measured samples, (c) α -1, 2, 3, 4, 5, 6-hexachlorocyclohexane (BHC) and (d) α -1, 2, 3, 4, 5, 6-	85

No	Title of Figure	Page
	hexachlorocyclohexane (lindane), respectively.	
Figure (15):	GC-mass spectrum of (a) heptachlor pesticide, (b) 1,2,3,4,10,10"-hexachloro-1,4,4a,5,8,8a-hexahydro-1,4-endo-exo-5,8-dimethanonaphthalene, (c) 1-exo-hydroxychlordene epoxide, (d) chlordane pesticide and (e) methoxychlor pesticide, respectively.	86
Figure (16):	GC-mass spectrum of (a) 2,2, bis (p-chlorophenyl)-1,1-trichloroethane, (b) methoxychlor pesticide, (c) hexachloro epoxy octahydro-endo, endo-dimethanonaphthalene, (d) p,p'-dichlorodiphenyl dichloroethylene and (e) endosulfan, respectively.	87
Figure (17):	GC-MS chromatogram of (a) PCBs standards, (b) PCBs for some measured sample, (c) 2,2,4'-trichloro- 1, 1' biphenyl and (d) 3, 4, 4', 5-tetrachloro- 1, 1' biphenyl, respectively.	88
Figure (18):	GC-mass spectrum of (a) 2, 2', 3, 6- Tetrachloro- 1, 1' biphenyls, (b) 2, 3, 3', 4, 5- Pentachloro-1, 1' biphenyl, (c) 2, 3, 4, 4', 5, 6- Hexachloro-1, 1' biphenyls, (d) 2, 2', 3, 4', 5, 5'-Hexachloro-1, 1' and (e) 2, 2', 3, 3', 4, 5, 6- heptachloro-1,1-biphenyls, respectively.	89
Figure (19):	Activity of AChE ($\mu\text{mole/mg/min}$) in ganglial glands of freshwater mollusca, <i>L. carinatus</i> collected from Kafr El-Zayat region during 2014–2015.	92
Figure (20):	Activity of AChE as % of control in ganglial glands of freshwater mollusca, <i>L. carinatus</i> collected from Kafr El-Zayat region during 2014–2015	92
Figure (21):	Level of LPO (mmole/gm tissue) in digestive gland of freshwater mollusca, <i>L. carinatus</i> collected from Kafr El-Zayat region during 2014–2015.	95
Figure (22):	Level of LPO as % of control in digestive gland of freshwater mollusca, <i>L. carinatus</i> collected from Kafr El-Zayat region during 2014–2015.	95
Figure (23):	Activity of CAT (nmole/mg tissue) in whole body tissue of freshwater mollusca, <i>L. carinatus</i> collected from Kafr El-Zayat region during 2014–2015.	98
Figure (24):	Activity of CAT (nmole/mg tissue) in hemolymph of freshwater mollusca, <i>L. carinatus</i> collected from Kafr El-Zayat region during 2014–2015.	98
Figure (25):	Activity of GP _x (nmole/g tissue) in whole body tissue of freshwater mollusca, <i>L. carinatus</i> collected from Kafr El-Zayat region during 2014–2015.	99

No	Title of Figure	Page
Figure (26):	Carbonyl protein (CP) level (mmole/L) in whole body tissue of freshwater mollusca, <i>L. carinatus</i> collected from Kafr El-Zayat region during 2014 – 2015.	101
Figure (27):	Activity of LDH (U/L) in hemolymph of freshwater mollusca, <i>L. carinatus</i> collected from Kafr El-Zayat region during 2014– 2015.	102
Figure (28):	Bright field microscope of <i>L. carinatus</i> hemocyte (magnification: _1000) represent the control hemocytes , the present observation compatible with Ray <i>et al</i> , (2013).	109
Figure (29):	Bright field microscope image of <i>L. carinatus</i> haemocytes (magnification: _1000) shows abnormality in the cytoplasm and nuclei ,vacuolation (k), cell membrane disruption (m, r) , filopodia (j, m) , lamellipodia (h, i) and alteration in cell shape (i, j, k, l, o) , destruction in nuclei (l, r) in different hemocytes.	110
Figure (30):	Flow cytometry graphic of size (FSC, linear scale) vs. internal complexity (SSC, linear scale) of haemolymph showing three typical cell populations of an exposed freshwater mollusca	111
Figure (31):	Flow cytometry profile (a) density plot attributed to fluorescent channels FL-2. The plots exhibit (1a) unstained sample and (2a) stained sample, where (Q1) hyalinocytes; (Q2 and Q3) granulocytes and (Q4) blast-like cells (b) exhibits fluorescent intensity of haemocytes incubated with fluorescent yellow-green bead. (1b) unstained and (2b) stained sample of contaminated water	112
Figure (32):	The phagocytic rate of mollusca heamolymph of some contaminated sites showed cell's engulfation at fluorescent latex bead	112
Figure (33):	Alteration (a) blast like cells %; (b) haylinocytes %; (c) granulocytes % and (d) phagocytosis%. Vertical bars indicate standard error (n=3 replicates). Values with non-common superscripts are significantly different (LSD multiple range test, $P \leq 0.05$)	116
Figure (34):	Flow cytometry profile Column 1 exhibits density plots attributed to fluorescent channels FL-2 for contaminated sites during autumn season from a to f. The plots exhibit (Q1) hyalinocytes; (Q2 and Q3) granulocytes and (Q4) blast-like cells. Column 1 represents chromatograms among cell density as a percentage. [autumn]	117
Figure (35):	Flow cytometry profile Column 1 exhibits density plots attributed to fluorescent channels FL-2 for contaminated sites during spring season from a to f. The plots exhibit (Q1)	118

No	Title of Figure	Page
	hyalinocytes; (Q2 and Q3) granulocytes and (Q4) blast-like cells. Column 1 represents chromatograms among cell density as a percentage. [spring]	
Figure (36):	Flow cytometry profile Column 1 exhibits density plots attributed to fluorescent channels FL-2 for contaminated sites during summer season from a to f. The plots exhibit (Q1) hyalinocytes; (Q2 and Q3) granulocytes and (Q4) blast-like cells. Column 1 represents chromatograms among cell density as a percentage. [summer]	119
Figure (37):	Flow cytometry profile Column 1 exhibits density plots attributed to fluorescent channels FL-2 for contaminated sites during winter season from a to f. The plots exhibit (Q1) hyalinocytes; (Q2 and Q3) granulocytes and (Q4) blast-like cells. Column 1 represents chromatograms among cell density as a percentage. [winter]	120
Figure (38):	Unweighed pair group method with arithmetic average cluster analysis showing the diversity and relationship among freshwater mollusca collected from six from Kafr EL-Zayat district during (a) spring, (b) autumn, (c) summer and (d) winter seasons based on random amplification of RAPD- PCR profile.	123
Figure (39):	Agarose gel electrophoresis of polychain reaction (RAPD-PCR) products using primer; OPA-02 to amplify <i>Lanistes carinatus</i> : Lan (1) DNA ladder and samples from S1 to S6	124
Figure (40):	Unweighed pair group method with arithmetic average cluster analysis showing the diversity and relationship among freshwater mollusca collected from six from Kafr EL-Zayat district during (a) spring, (b) autumn, (c) summer and (d) winter seasons based on random amplification of RAPD- PCR profile.	124
Figure (41):	Agarose gel electrophoresis of polychain reaction (RAPD-PCR) products using primer; OPA-08 to amplify <i>Lanistes carinatus</i> : Lan (1) DNA ladder and samples from S1 to S6	124

LIST OF TABLES

No	Title of Table	Page
Table (1):	Location, morphometric and characteristics of the selected sites of Kafr El-Zayat region	36
Table (2):	Primer sequences and their G/C content used for RAPD-PCR	50
Table (3):	Water characters of collected samples from six exposed sites of Kafr El Zayat Province during 2014 - 2015	56
Table (4)	Heavy metals levels ($\mu\text{g/L}$) in water samples collected from different zones of Kafr El-Zayat district during 2014-2015	58
Table (5)	Heavy metals levels ($\mu\text{g/g}$) in sediment samples collected from different zones of Kafr El-Zayat district during 2014-2015	61
Table (6)	Heavy metals levels ($\mu\text{g/g}$) in mollusca's tissue samples collected from different zones of Kafr El-Zayat district during 2014-2015	64
Table (7):	Residue level of pesticides and polychlorinated biphenyls (PCB_s) (ppb) in water samples collected from different zones of Kafr El-Zayat district	67
Table (8):	Residue level of pesticides and polychlorinated biphenyls (PCB_s) (ppb) in sediment samples collected from different zones of Kafr El-Zayat district	72
Table (9)	Residue level of pesticides and polychlorinated biphenyls (PCB_s) (ppb) in mollusca's tissues samples collected from different zones of Kafr El-Zayat district	77
Table (10)	Recovery Percentage and limit of detection (LOD) of measured OCC_s , OP_s pesticides and PCB_s congeners among using QuChERs	81
Table (11)	Activity of AChE ($\mu\text{mole/mg/min}$) in ganglial glands of freshwater mollusca, <i>Lanistis carinatus</i> collected from Kafr El-Zayat region during 2014–2015.	91
Table (12)	Level of LPO (mmole/g tissue) in digestive gland of freshwater mollusca, <i>L. carinatus</i> collected from Kafr El-Zayat region during 2014–2015.	94
Table (13)	Activity of CAT (nmole/mg tissue) in whole body tissue of freshwater mollusca, <i>L. carinatus</i> collected from Kafr El-Zayat region during 2014–2015.	97
Table (14)	Activity of CAT (nmole/mg tissue) in haemolymph of freshwater mollusca, <i>L. carinatus</i> collected from Kafr El-Zayat region during 2014-2015.	97
Table (15)	Activity of GP_x (nmole/gm tissue) in whole body tissue of freshwater mollusca, <i>L. carinatus</i> collected from Kafr El-Zayat region during 2014–2015.	99

No	Title of Table	Page
Table (16)	Carbonyl protein (CP) level (mmole/L) in whole body tissue of freshwater mollusca, <i>L. carinatus</i> collected from Kafr El-Zayat region during 2014 – 2015	101
Table (17)	Activity of LDH (U/L) in haemolymph of freshwater mollusca, <i>L. carinatus</i> collected from Kafr El-Zayat region during 2014–2015.	102
Table (18)	Relationship between persistent organic pollutants and biomarker responses	104
Table (19)	Relationship between heavy metals levels and biomarker response.	107
Table (20)	Immunological parameters of collected mollusca, <i>L. carinatus</i> from contaminated zones of Kafr El-Zayat region.	115

LIST OF ABBREVIATIONS

Abbreviation	Nomenclature
%	Percent
ANOVA	Analysis of variance
bp	Base pair
b.p	Boiling point
BHC	Lindane (gamma-hexachlorocyclohexane)
CAPL	Central Agricultural Pesticides Laboratory
°C	Degree centigrade
cells/ml	Cells number per milliter
ROS	Reactive oxygen species
Chem.	Chemical
Cl [•]	Chlorine radical
cm	Centimetre
Co.	Company
DDD	Dichlorodiphenyl dichloroethane
DDE	Dichlorodiphenyl dichloroethylene
DDT	Dichlorodiphenyl trichloroethane
DNA	Deoxyribonucleic acid
DTNB	Dithionitrobenzoic acid
dS/m	Unit of electric conductivity
EDTA	Ethylenediaminetetra-acetic acid
EC	Electron capture
gm	Gram(s)
G/C content	Guanidine per cytosine percent
GC	Gas chromatography
GC-MS	Gas chromatographic mass spectroscopy
HCB	Hexachlorobenzene
HNO ₃	Nitric acid
hr	Hour(s)
H ₂ O ₂	Hydrogen peroxide
ICP	Inductive Coupled Plasma
<i>L.</i>	<i>Lanistis</i>
Lab.	Laboratory
Ltd	Limited
LSD (0.05)	Lethal significantly different at 0.05
N	Normality
No	Number

MgSO ₄	Magnesium sulfate
M	Molarity
mM	mmole
mM/gm	mmole per gram
mmole/L	Millimole per litre
ml	Milliliter
ml/min	Mille per minute
mg/L	Milligram per Litre
mM	Milimole
min	minute(s)
meq/L	Milli equivalent per litre
m/e	Mass per charge (electrons)
m/z	Mass per hertz
nm	Nanometer
nmole/mg	Nanomole per milligram
PCR	polymerase chain reaction
RAPD-PCR	Random amplified polymorphic DNA-PCR
pH	Power of hydrogen
PSA	Primary secondary amine
PBS-BSA	Phosphate buffered saline- bovine serum albumine
ppb	Part per billion
POP _s	Persistent organic pollutant
PCB _s	Polychlorinated biphenyls
QuChERS	Quick, Easy, Cheap, Effective, Rugged and Safe technique
rpm	Rota per minute
SE	Standard error
TCA	Trichloroacetic acid
μl	Microliter
μm	micrometre
U/gm	Unit per gram
μg/L	Microgram per litre
μmole/mg/min	Micromole per milligram per minutes
U/L	Unit per litre
v/v	Volume per volume
Xg	Unit of centrifuge cycles
W:V	Weight per volume