I-IV3

OBSERVATIONS SUR L'AVIFAUNE MIGRATRICE DANS LES SPORADES DU NORD

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Des observations effectuées au cours du printemps(1984,1986)et de l'automne(1984,1985)dans 9 iles et ilots,les plus distantes du continent, des Sporades du Nord ont permis de recueillir une série d'informations inédites sur les especes migrant,sur les iles et les biotopes fréquentés*.On a relevé 81 especes migrant au printemps -avec la présence de 4 rapaces- et 32 en automne -avec la présence de 11 rapaces.

Liste des especes observées
(P:printemps, A:automne, ±:sédentaires ou a migration localisée)

	AL	PE	SK	KP	YO	PI
1.Puffinus puffinus	±	±	±			
2.Calonectris diomedea	±	±	±	±	±	±
3.Hydrobates pelagicus	P	P	P			
4.Pelecanus onocrotalus						A
5.Phalacrocorax aristotelis	±	±	±	±	±	±
6.Plegadis falcinellus						
7.Egretta garzetta				P		
8.Neophron percnopterus				P	A	A
9.Gyps fulvus						A
10.Hieraetus fasciatus				P	P	A
11.Circaetus gallicus	P					
12.Buteo buteo	±	±	±	±	±	±
13.Pernis apivorus	P			P		
14.Accipiter nisus	±	±	±	±	±	±/A
15.Accipiter gentilis				P		
16.Circus sp.				P	P	
17.Circus aeroginosus				P		
18.Falco peregrinus	±			±		±/A
19.Falco eleonorae	±	±	±	±	±	±/A
20.Falco tinnunculus	±	±	±	±	±	±/A
21.Falco naumanni					P	
22.Falco vespertinus				P		
23.Pandion haliaetus						A
24.Columba livia	±	±	±	±	±	±
25.Larus minutus					P	
26.Streptopelia turtur	P/A	P/A	P/A	P/A	P/A	P/A
27.Cuculus canorus	P				P	P
28.Burhinus oedicnemus				P		
29.Alcedo anthis	P				P	
30.Caprimulgus europaeus	P			P	P	
31.Merops apiaster	P			P	P	
32.Upupa epops	P	P	P	P	P	P
33.Galerida cristata	P			P		
34.Calandrella cinerea	P				P	P
35.Ptyonoprogne rupestris				P	±	±
36.Delichon urbica	P	P		P		A/P
37.Hirundo rustica	P	P	P			
38.Hirundo daurica	P					
39.Apus melba	P	P	P	P	P	P
40.Apus apus	P	P	P	P	P	P
41.Motacilla cinerea			P	P		
42.Motacilla flava feldeg			P	P	P	
43.Motacilla alba alba	P			P	P	A
44.Alauda arvensis				P		
45. Anthus pratensis			P	P		P/A
46. Anthus trivialis			P/A	P/A	P/A	
47. Anthus spinoletta				P/A		
48. Anthus campestris	P		P/A		P/A	
49. Lanius collurio	P					
50. Lanius senator	P				P	P
51. Oriolus oriolus	P/A			A	A	
52. Troglodytes troglodytes	A					P
53. Sylvia melanocephala	±	±	±	±	±	±
54. Sylvia cantillans	P	P		P	P	
55. Sylvia hortensis			P	P	P	P
56. Sylvia rueppeli	P			P		P
57. Sylvia communis		P		P	P	P/A
58. Sylvia atricapilla	P/A	P		P	P	P/A
59. Sylvia borin	P	P		P	P	P
60. Hippolais pallida					P	P
61. Hippolais icterina				P	P	P
62. Hippolais olivetum					P	
63. Regulus regulus	P					P
64. Regulus ignicapillis	P					P
65. Ficedula albicollis						P
66. Muscicapa striata	P	P				
67. Phylloscopus collybita		P	P	P	P	P
68. Phylloscopus bonelli				P	P	P
69. Saxicola rubertra				P		
70. Oenanthe oenanthe	P	P	P	P	P	A
71. Saxicola torquata				P		
72. Oenanthe hispanica	P	P		P	P	
73. Phoenicurus ochruros	P		P	P	P	
74. Phoenicurus phoenicurus	P	P		P	P	
75. Monticola solitarius	P	P		P	P	
76. Erithacus rubecula	P	P	P	P	P	P/A
77. Luscinia megarhynchos	P		P	P	P	
78. Turdus torquatus						A
79. Turdus merula	±	±	P/A		A/P	P/A
80. Turdus philomelos				A		P
81. Parus ater	P				P	A
82. Parus major	P	P		P	P	P/A
83. Parus coeruleus					P	
84. Parus lugubris					P	
85. Sitta neumayer		P		P	P	
86. Fringilla coelebs	P/A			P	P	
87. Serinus serinus	A	A		A	P/A	A
88. Prunella modularis	A	A		P/A		
89. Carduelis chloris	P/A	P/A	P		P	P
90. Carduelis carduelis	P	P			P	
91. Emberiza cirlus	P	P			P	
92. Emberiza hortulana			P			
93. Emberiza caesia				P	P	
94. Emberiza calandra	P	P			P	
95. Acanthis cannabina				P	P	P
96. Corvus corone cornix	±	±		±	±	±
97. Corvus corax	±	±	±	±	±	±

AL:Athinissos - PE:Peristera - SK:Skantzoura - KP:Kyra-Panaghia - YO:Youra - PI:Piperi

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Ilots:Dyo Adelfia:(±):Nos 1,2,5,19,24,53,(P):85,(A):87 - Korakas: (±):2,5,14,19,20,23,53,97,(P):6,26,45,54,67,69,70,(A):26 - Psathoura:(±):5,19,53,(P):37,(A):89.

I-IV4

THE IN VIVO EFFECTS OF PESTICIDES ON AMPHIBIAN ESTERASE ISOZYMES

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Non-specific esterases represent a complex major hydrolytic enzyme system catalysing the hydrolysis of carboxylic ester bonds. Esterase isozymes have been characterized according to their inhibitor and substrate specificities. An extended classification of esterase isozymes according to inhibition by diisopropylfluorophosphate (DFP), eserine sulfate and parahydroxymercuribenzoate (PHMB) has been reported (1). These esterase inhibitors also represent environmental pollutants. In a previous study of frog liver esterases by polyacrylamide gel electrophoresis (PAGE) several isozymes were resolved, characterized as carboxylesterases and cholinesterases both inhibited by DFP (2).

In the present study 25 male and female specimens of Mertensiella luschani luschani ni were collected from Castellorizo an island of south eastern Aegean Sea. This species is a protected one in Greece. Tissues were homogenized with 0.1 M Tris-HCl buffer pH 7.2, extracts were electrophoresed and gels stained for esterase activity in the presence and absence of inhibitors according to Haritos & Salamastrakis (3). Isoelectric focusing (I.F.) on gel slabs (pH 3.5-9.5) was performed according to Veini et al. (4) and Sephadex G-200 gel filtration according to Haritos & Rosemeyer (5).

Liver had the highest overall esterase activity as seen by the number of the bands and their staining intensities (Fig. 1). Four groups of esterase bands were distinguished according to their electrophoretic mobilities, phenotypic variation, tissue distribution and substrate and inhibitor specificities. Isozymes of groups II and III were observed only in the digestive system while groups I and IV were present in all tissues examined. No sex-specific esterases were observed. Esterase isozyme IV has an apparent molecular weight of 245.000 while for the rest of the isozymes the molecular weight was 75.000. By preincubating the gels in 0.1 mM DFP, 0.1 mM eserine sulphate and 1 mM PHMB all esterases were characterized as carboxylesterases. DFP inhibited all bands while eserine and PHMB inhibited only partially the bands of group III. All esterases showed comparable heat lability with complete inactivation at 50°C in 15 min. The staining intensity of the bands was inversely related to the length of

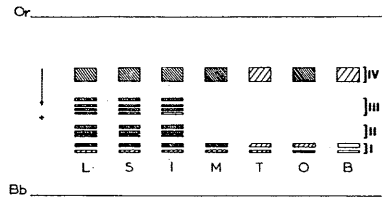

Fig. 1. Electrophoretic patterns of soluble nonspecific esterases in Mertensiella luschani luschani. L, liver; S, stomach; I, intestine; M, muscle; T, testis; O, ovaries; B, brain. Or, origin and Bb, bromophenol blue band. Latin numerals stand for the four groups of esterase isozymes. a-Naphthyl acetate was used as substrate.

the organic acid moiety of the alpha-naphthyl esters with only group II bands staining with alpha-naphthyl caprate (C10). The isoelectric points of the esterases ranged from 4.60 to 5.65.

In order to assess the effect of DFP in liver and brain, pairs of Mertensiella luschani luschani were put in 100 mı or 1 mM and 0.1 mM of this inhibitor for 20 min. All bands were reduced in intensity in liver while complete inhibition was observed in brain for both concentrations (Fig. 2). In 40 min at 1 mM the animals were dying and no esterase bands could be detected in liver extracts (results not shown).

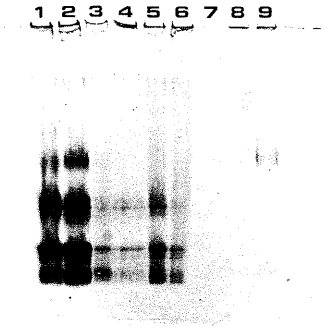

Fig. 2. The in vivo effect of DFP in Mertensiella luschani luschani liver and brain. Lanes 1-6, liver; lanes 7-9 brain. In lanes 1,2,9 tissue extracts of control animals. In lanes 3,4,7 exposed to 1 mM DFP and in lanes 5,6,8 to 0.1 mM DFP.

The evidence from this study suggests that the toxicity of organophosphates in amphibians could be directly related to the irreversible inhibition of serine esterase isozymes (carboxylesterases) in at least two of their tissues. Moreover none of the several esterase isozymes revealed by PAGE or I.F. was found to be resistant to the in vitro and in vivo deactivation by DFP. This is in agreement to a similar study for frog esterases (2) while this is not the case for fish (1,3) or avian (4) esterases. Although further experiments are needed for the determination of the environmental impact of commonly used organophosphate pesticides on amphibia, this vertebrate class should be considered particularly vulnerable.

References.

1. Haritos A.A., Salamastrakis S.S. and Veini M., Proc. VIIth ICSEM/IOC/UNEP Workshop Mar. Pol. Mediter., Lucern 1984 (in press).
2. Holmes R.S., Masters L.J. and Webb E.L., 1968, Comp. Biochem. Physiol. 837-852.
3. Haritos A.A. and Salamastrakis S.S., 1982, Comp. Biochem. Physiol. 72B, 477-480.
4. Veini M., Tsitsiloni O.E., Martini S.M. and Haritos A.A., 1986, Comp. Biochem. Physiol. (in press).
5. Haritos A.A. and Rosemeyer M.A., 1985, Biochem. Biophys. Acta 830, 113-119.

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