

# ORGANOCHLORINE CONTAMINANTS IN TWO SPECIES OF SEAGULLS FROM CHAFARINAS ISLANDS, WESTERN MEDITERRANEAN (SPAIN)



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## INTRODUCTION AND OBJECTIVES

Organochlorine compounds, such as PCBs and DDTs, are contaminants ubiquitous in the environment, despite their restriction or ban established in the Stockholm convention. The study of their presence along the trophic chain becomes necessary in order to improve the knowledge about their chemical fate and behaviour in the ecosystems, with special attention to those of special fragility. Recent studies [1] in breeding-birds areas of special protection have reported unexpected high levels of some organochlorines compounds (e.g. PCBs and DDTs), reinforcing the necessity of further investigations towards a better knowledge of the potential threat and effects of organochlorine contamination on individuals and/or populations in ecologically sensitive areas which are refuges for threatened wildlife species.

Chafarinas Islands are a group of three Spanish islands in western Mediterranean off the north coast of Morocco (see Figure 1), with high protection status at National and International levels (National Game Reserve and Special Protection Area, respectively). This is an important site for breeding seabirds, including the world's second largest *Larus audouinii* colony. Despite the difficulty and particularity of the management of this natural area, enhanced by the location and vicinity of Chafarinas Islands to Morocco and their military land-use, natural conservation and research programs are carried out. Their results are of great importance for the future of fragile and protected/endangered species with high ecological value, such as *Larus audouinii*.

The present work studies the presence of organochlorine compounds in the *L. audouinii* communities in the Chafarinas Islands. The yellow-legged gull *L. michahellis*, also present in these Islands, has been included in the study for comparative purposes.

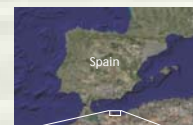


Figure 1. Sampling area: Chafarinas Islands

## MATERIALS AND METHODS

Blood samples were taken from adults of 2 seagulls species (Figure 2) during the breeding season of 2007 in Chafarinas islands. Plasma was isolated and analyzed for DDTs (p,p'-DDT, p,p'-DDE, p,p'-DDD) and the *ortho* PCB congeners #28, #52, #95, #101, #149, #123, #118, #114, #153, #132, #105, #138, #183, #167, #156, #157, #180, #170, #189, #194. The method briefly consisted on a liquid-liquid extraction with n-hexane followed by purification with sulphuric acid, as shown in Figure 3.

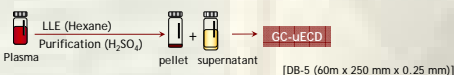


Figure 3. Scheme of the analytical procedure

Identification of the *ortho* PCBs and DDTs was carried out using a Hewlett Packard 6890 HRGC equipped with a 63Ni  $\mu$ -electron capture detector. A DB-5 fused silica capillary column (60m x 250 $\mu$ m and 0.25 $\mu$ m) was used. The carrier gas was nitrogen at a head pressure of 192.2 Kpa. Detector and injector temperatures were 300°C and 270°C, respectively. Quantification was performed with a seven-level calibration curve obtained from external standards.

Mean values comparison was performed with the U Mann-Whitney test.



Figure 2. The seagull species studied

## RESULTS AND DISCUSSION

Organochlorine concentrations (PCBs and DDTs) are displayed in Table 1. Mean values were at low ng/g levels and within the range of blood data reported in the literature for other larid species from North Europe [2,3], where mean values ranged from 27.5 to 212.1 (ng/g wet weight) for total PCBs. Mean concentrations were slightly higher in *L. audouinii* than in *L. michahellis*, but concentrations range was broader in *L. michahellis*. Higher levels in *L. audouinii* eggs than in *L. michahellis* has been previously described in the same area of the Western Mediterranean [4,5] as well as in the North Eastern Mediterranean [6].

Statistical analysis revealed significant differences in PCB concentrations between *Larus audouinii* and *Larus michahellis* ( $P < 0.013$ ), as shown in Figure 4. As far as gender is concerned, male gulls shown significant differences in PCB concentrations ( $P = 0.03$ ). On the contrary, no significant differences were obtained for PCB contamination in female gulls ( $P = 0.11$ ). Differences in both diet and migration patterns of both species could explain the results obtained. *L. audouinii* is a fish-eating bird and usually migrates to Africa from July to October, after the breeding period, while *L. michahellis*, an scavenging bird, remains within the Chafarinas Islands.

Table 1. Total PCB and DDT concentrations in plasma of *L. audouinii* and *L. michahellis* (ng/g, ww)

	<i>L. audouinii</i>				<i>L. michahellis</i>			
	Mean	Median	Min.	Max.	Mean	Median	Min.	Max.
PCBs	86.1	77.6	13.5	164.1	51.1	51.1	5.1	336.9
DDTs	39.0	35.6	4.5	71.9	34.9	34.9	2.6	365.6

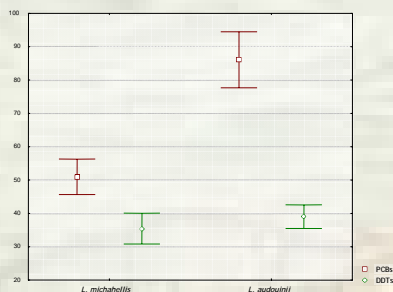


Figure 4. Contamination mean values for PCBs and DDTs in both gulls species

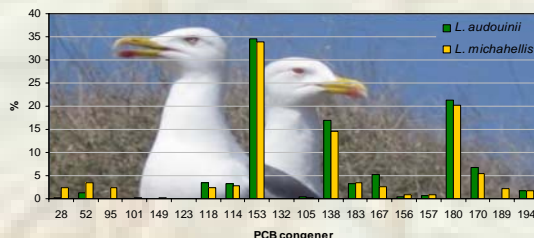


Figure 5. PCB congener profile in *L. audouinii* and *L. michahellis*

PCB profiles (Figure 5) are quite similar for both species, where #153, #180 and #138 were the most abundant congeners, contributing to more than 70% of the total concentration. Similar results have been previously observed in eggs in 1995 in the Ebro Delta area[4], where #153 represented the 25%, #180 slightly more than 20%, and #138 constituted about 15%. A completely different profile in *L. audouinii* eggs from Chafarinas Islands in 1988 has been reported[5]. The most abundant congener were #138 (9.9%), followed by #153 (8.9%) and #180 (6.1%).

Concerning DDT contamination, no significant differences were observed, nor between species neither for gender. p,p'-DDE was the most abundant species among DDTs. In all the samples the ratio [DDE]/[DDT] was >1 indicating the absence of a recent usage of this pesticide.

## REFERENCES

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