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Full Length Research Paper

A taxonomic approach of monogeneas in three species of teleosts fish

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A spatial distribution study of parasite populations of gills from 540 specimens belonging to *Pagellus* genus: *Pagellus acarne, Pagellus erythrinus* and *Pagellus bogaraveo* (Sparidae) was realized from the eastern Algeria coastline. A preliminary description allows the distinguishing of eight parasite species belonging to two subclasses: Monopisthocotylea and Polyopisthocotylea. Rates of parasite species and parasitic indices of host species were calculated. The study findings show that the parasitic populations vary depending on the site and the host species within the same genus.

Key words: Parasitism, monogenean, *Pagellus erythrinus, Pagellus acarne, Pagellus bogaraveo*, Algerian coastline.

INTRODUCTION

According to some authors, the parasitology today, represents an essential part of ecology and evolutionary biology for which it offers the best models, by the renewal of these approaches and its methodology (Combes, 1995; Holmes, 1996; Barbault, 1997). The parasites, by their diversity (taxonomic, ecological, genetics, etc) and also by their impact on the biology and the regulation of the hosts populations, in addition to maintaining their genetic diversity, contribute in a significant manner to the evolution and thus to the diversity of living things (Combes, 1995; Blondel, 1995). It is important to mention that in addition to their impact on host demographics populations, parasites also influence the ecosystem processes that are diverse as competition, migration and speciation of the hosts.

The present study is based on the taxonomic approach of monogeneas in three species of teleosts fish: *Pagellus erythrinus, Pagellus acarne and Pagellus bogaraveo* at the eastern Algerian coastline and the parasitism was evaluated by the calculation of parasitic indices.

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MATERIALS AND METHODS

A total of 540 fishes of the *Pagellus* genus: *P. erythrinus, P. acarne* and *P. bogaraveo* (60 individuals per species per site) were examined for monogeneans. Fishes were collected from three areas: the littoral of El Kala, the gulf of Annaba and the gulf of Skikda (eastern Algeria coastline), during the year, 2007 (Figure 1).

The fish caught are brought back alive to the laboratory, where they are identified according to criteria established by Fischer et al. (1987), measured, weighed and dissected. The gills were examined for monogeneans. These parasites were fixed in ethanol (95%, and then mounted (in Eukitt). The monogeneans are classified according to Palombi (1949), Maillard and Noisy (1979), Oliver (1987), Radujkovic and Euzet (1989). Ecological terms pre-valence (P%), mean intensity (I) and abundance (A) were used in accordance with Bush et al. (1997).

RESULTS

Diversity and distribution of monogeneans

The observation of morphology and anatomy criteria of collected parasites from the three host species reveals the presence of eight monogenean species: four Monopisthocotylea *(Lamellodiscus drummondi, Lamellodiscus erythrini, Lamellodiscus obeliae* and *Lamellodiscus*

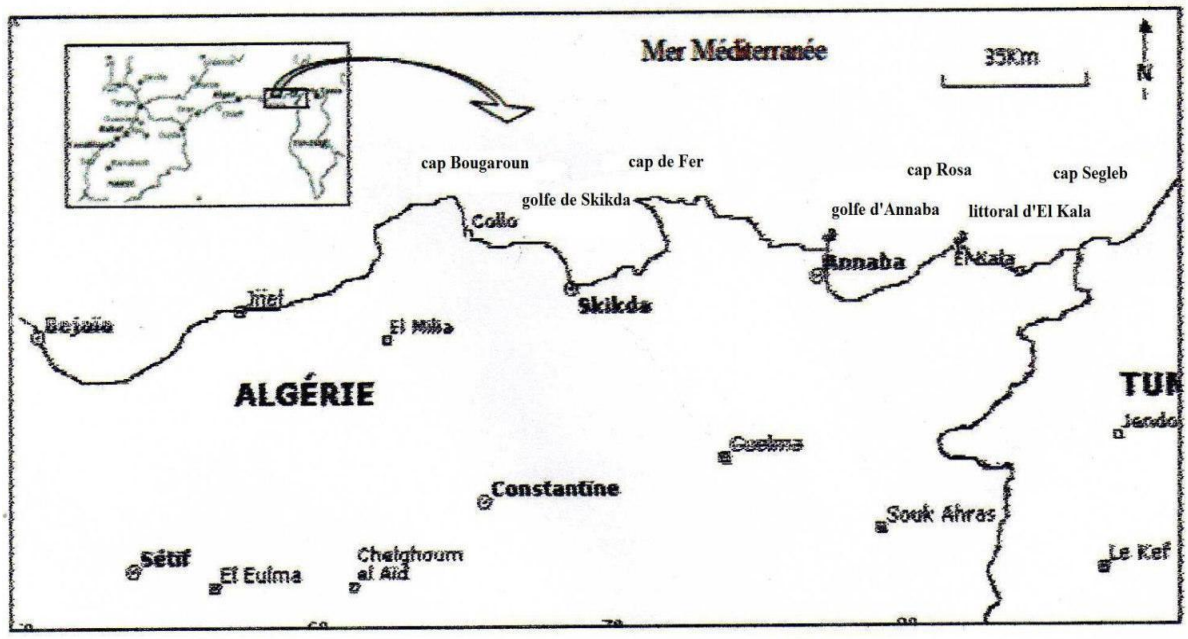

Figure 1. Location of the study.

Table 1. Distribution of parasite species recorded in the three host species.

Subclasses		Annaba			Skikda			El Kala		
	species	*P. e*	*P. a*	*P. b*	*P. e*	*P. a*	*P. b*	*P. e*	*P. a*	*P. b*
Polyopisthocotylea	*M. erythrini*	+	-	-	+	-	-	+	-	-
	M. salpae	-	+	-	-	+	-	-	+	-
	A. acarne	-	+	-	-	+	-	-	-	-
	C. chrysophryi	-	+	+	-	+	-	-	+	+
Monopisthocotylea	*L. erythrini*	+	-	-	+	-	-	+	-	-
	L. drummondi	-	+	-	-	+	-	-	+	-
	L. virgula	-	+	+	-	+	+	-	+	-
	L. obeliae	-	-	+	-	-	+	-	-	+

(+): present, (-): absent, *P. e*: *Pagellus erythrinus, P. a*: *Pagellus acarne*, *P. b*: *Pagellus bogaraveo.*

virgula) and four Polyopisthocotylea (*Atrispinum acarne, Choricotyle chrysophryi, Microcotyle erythrini* and *Microcotyle salpae*). *P. acarne* and *P. bogaraveo* host respectively, five and three monogenean species, while *P. erythryni* shelters only two parasite species (Table 1). The species of the genus *Lamellodiscus* were present in the three host species in all sites. The polyopisthocotylea *Microcotyle erythrini and Microcotyle salpae* were found in the three study sites, respectively, in *P. erythrinus* and *P. acarne*; while *Choricotyle chrysophryi* is present in *P. acarne* in three sites but in *P. bogaraveo* in the littoral of El Kala and the gulf of Annaba. Finally, *Atrispinum acarne* is present only in *P. acarne* in the gulf of Skikda and Annaba (Table 1).

Enumeration of identified monogeneans

Examination of gills from 540 fishes of the genus *Pagellus* caught in the eastern Algerian coast, allowed us to harvest 2 839 parasites in 229 infected fishes.

The Monopisthocotylea represent more than 94% of the whole of collected monogeneans and they are distributed according to following rates: *L. drummondi* (53.80%), *L. virgula* (39.31%), *L. erythrini* (4.17%) and *L. obeliae* (2.72%) (Figure 2).

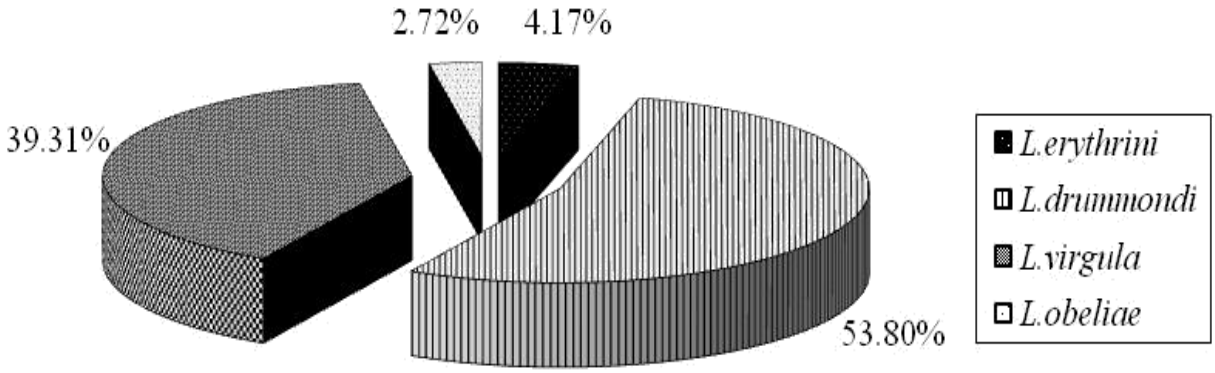

Figure 2. Percentage rate of Monopisthocotylea parasites.

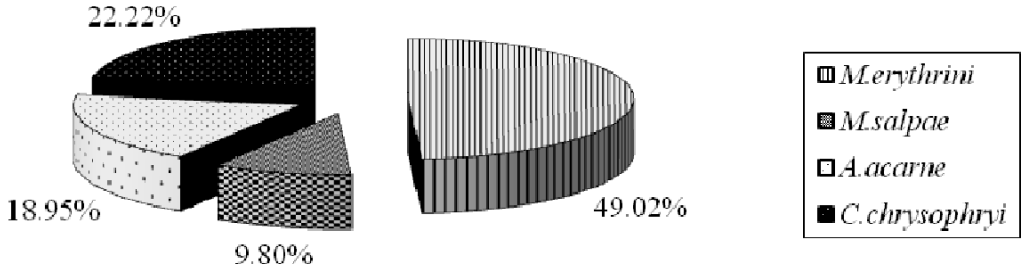

Figure 3. Percentage rate of Polyopisthocotylea parasites.

Table 2. Distribution of parasitic indices of Monopisthocotylea.

	Examined hosts	Infested hosts	Number of parasites	P%	I	A	Locality
P. erythrinus	60	8	14	13.33	1.75	0.23	Annaba
	60	24	87	40	3.62	1.45	Skikda
	60	8	11	13.33	1.37	0.18	El Kala
P. acarne	60	34	474	56.66	13.94	7.9	Annaba
	60	50	1576	83.33	31.52	26.26	Skikda
	60	40	430	66.66	10.75	7.16	El Kala
P. bogaraveo	60	7	42	11.66	6	0.7	Annaba
	60	8	12	13.33	1.5	0.2	Skikda
	60	20	40	33.33	2	0.66	El Kala

P% = Prevalence, I = mean Intensity, A = abundance.

The Polyopisthocotylea represents less than 6% of the populations of monogeneans and they are strongly represented by *M. erythrini* (49.02%) (Figure 3).

Distribution of parasitic indices

In the three sites, *P. acarne* is the most infested host species by monopisthocotylea and exhibits the highest values of the 3 indices (Table 2), the maximum being recorded in the gulf of Skikda.

In the Gulf of Skikda, the Polyopisthocotylea show the highest value of prevalence and abundance in *P. acarne* (35% and 0.55) and *P. erythrinus* shows the lowest (30% and 0.7). However, *P. acarne* of the coast of El Kala and *P. erythrinus* of the gulf of Skikda, had more than two

Table 3. Distribution of parasitic indices of polyopisthocotylea.

	Examined hosts	Infested hosts	Number of parasites	P%	I	A	Locality
	60	10	17	16.66	1.7	0.28	Annaba
Pagellus erythrinus	60	18	41	30	2.27	0.7	Skikda
	60	10	17	16.66	1.7	0.28	El Kala
	60	11	12	18.33	1.1	0.2	Annaba
Pagellus acarne	60	21	33	35	1.57	0.55	Skikda
	60	13	30	21.66	2.31	0.5	El Kala
	60	1	1	1.66	1	0.016	Annaba
Pagellus bogaraveo	60	0	0	0	0	0	Skikda
	60	2	2	3.33	1	0.03	El Kala

P% = Prevalence, I = mean Intensity, A = abundance.

polyopisthocotylea per fish infested (Table 3).

DISCUSSION

The data from this study show that the distribution of parasites varies according to the host species and the site. The host specie which shelters most parasites is *P. acarne* and the one that hosts the least is *P. bogaraveo*; the greatest parasitic diversity is found in the gulfs of Skikda and Annaba. In recent decades, there has been a growing interest to determine the richness of a community by examining a sample of the community (Bunge and Fitz, 1993; Colwell and Coddington, 1994; Walther et al., 1995; Walther and Morand, 1998; Dove, 2000). Studies of determinants of parasite richness reports that several factors can affect directly or indirectly specific richness, including: experimentation factors (effort of individuals examined hosts) (Walther et al*.,* 1995), factors related to the host and with its social behavior (traits of life, size, habitat and behavior) (Morand et al*.,* 1999) and factors related to the phylogeny of hosts and parasites (Bush et al*.,* 1997; Poulin, 1995, Guegan and Morand, 1996; Sasal et al*.,* 1997).

The lack of the monogenean *A. acarne* in the littoral of El Kala shows that the parasitofaune of studied fish is somewhat more diversified in the gulfs of Skikda and Annaba. These results suggest that each site shows particular characteristics in relation to an anthropisation more relatively in the two gulfs compared to the littoral of El Kala (Belabed et al., 2008).

According to Zharikova (2000), each zone, with specific ecological conditions presents specific parasites specie groups in their composition and abundance. Some authors report that, pollution of the waters could be the main cause of these phenomena, not only leading to an increase in the number of parasites but also a decrease of parasitic diversity (Sulgostowska et al., 1987; Cone et al., 1993; Barker et al., 1996); this confirms the values recorded in the gulf of Skikda in this study.

The data are supported by the observations of Euzet and Oliver (1967), Oliver (1972) and Desdevisses (2001) which report that the parasite species *L. erythrini; L. obeliae; L. virgula* and *L. drummondi* have respectively, *P. erythrinus, P. bogaraveo* and *P. acarne* as exclusive hosts.

M. erythrini have an oixenous character because the localization of this parasite on *P. erythrinus* is confirmed by the observations of Marc (1963) at Sète and Ktari (1971) in Tunis; but the presence of the latter is, however, signaled in *P. acarne* and *Boops boops* in Genoa (Parona and Perugia, 1890).

M. salpae in the whole of the distribution area, seems not to parasitize only *P. acarne* but also other Sparidae: *Diplodus annularis* (Parona and Perugia, 1890), *Diplodus vulgaris* (Noisy, 1978) and *B. boops* (Yamaguti, 1963).

Our results show that the specificity of *A. acarne* is an oixenous type; this strict specificity is also reported by Radujkovic and Euzet (1989) in the Bay of Boka Korski (Adriatic), Mollaret (2000) in France and Maillard and Noisy (1979) in the gulf of Lion, who signalled the presence of this parasite on the gills of *P. acarne*.

In regards to *Choricotyle chrysophryi*, its presence in the gulf of Annaba and the littoral of El Kala on the gills of *P. bogaraveo*, is confirmed by Yamaguti (1963) who reported its presence in this specie; however its presence on the gills of *P. acarne* has been reported in France (Mollaret, 2000).

The identified monogenean parasites in this study could have a narrow specificity that extends from oixe-nous to euryxenous character (Lymbery, 1989). However, Norton and Carpenter (1998) reported that the parasitic specificity vary in space and time depending on the area and period, the same host species are not always accom-

panied by the same parasite communities.

Conclusion

Although these fish belong to the same genus, each fish species has a characteristic parasitofauna and particular levels of infestation. Specimens of the *P. acarne* fished in the gulfs of Annaba and Skikda exhibits the most diverse parasitic population. Furthermore, we have discovered a clear predominance of *L. drummondi*. Assessment of parasitic indices reveals that the highest prevalence and parasitic loads are found in *P. acarne* in all areas.

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