

The Cymothoidae (Crustacea, Isopoda), parasites on marine fishes, from Algerian fauna

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RÉSUMÉ. Study of the cymothoid parasites of marine fish from Algeria, particularly in the Béjaïa and Jijel gulfs, allowed us to identify nine species (*Anilocra frontalis*, *A. physodes*, *Nerocila bivittata*, *N. orbigny*, *N. maculata*, *Ceratothoa parallela*, *C. oestroides*, *C. oxyrrhynchaena*, *C. italica*). Eight have been recorded previously, but *Ceratothoa italica* is a new record for the region. New hosts for *Anilocra frontalis*, *Nerocila maculata* (host until now unidentified in Algeria) and *Nerocila orbigny* are reported. For each parasite collected, the host fish, geographic distribution, parasitic specificity and prevalence are given. An up-to-date check-list of the fourteen species now reported from Algeria is given.

KEY WORDS : Cymothoidae, Crustacea, parasitic isopods, Algeria.

Les Cymothoidae (Crustacea, Isopoda), parasites de poissons marins, de la faune Algérienne

RÉSUMÉ. Le présent travail constitue une mise au point sur les Cymothoidae ectoparasites de poissons de la côte algérienne. Pour l'instant, neuf espèces ont été inventoriées par les auteurs : *Anilocra frontalis*, *A. physodes*, *Nerocila bivittata*, *N. orbigny*, *N. maculata*, *Ceratothoa parallela*, *C. oestroides*, *C. oxyrrhynchaena*, *C. italica*. Parmi celles-ci, *Ceratothoa italica* est nouvelle pour la faune algérienne. Toutes ces espèces sont signalées pour la première fois dans le golfe de Béjaïa et dans le golfe de Jijel. Des hôtes nouveaux pour *N. orbigny* et *A. frontalis*, ainsi que le poisson hôte de *N. maculata* jusqu'à présent inconnu en Algérie, ont été identifiés. Pour chacune des espèces, le(s) poisson(s) hôte(s), la distribution géographique, la spécificité parasitaire et les prévalences sont précisés. Une liste récapitulative des quatorze espèces actuellement signalées en Algérie est enfin établie.

MOTS CLES : Cymothoidae, Crustacea, isopodes parasites, Algérie.

INTRODUCTION

Crustacean ectoparasites on marine fish are diverse. Many species of fish are infected by cymothoids (Crustacea, Isopoda, Cymothoidae). They are blood-feeding; several species settle in the buccal cavity of fish, others live in the gill chamber or on the body surface including the fins. Their life cycle involves only one host (Holoxenic cycle).

According to TRILLES (1986), 46 species of Cymothoidae have been reported in Africa (12 Anilocrinae and 34 Cymothoinae). The cymothoid fauna of diverse localities along the Algerian coasts have been incompletely studied, several of them around a century ago : LUCAS, 1849

(Algiers, Annaba : ex-Bône, Oran, Algeria); SCHIOEDTE & MEINERT, 1881 (Annaba); SCHIOEDTE & MEINERT, 1883 (Oran); CARUS, 1885 (Algiers, Annaba, Oran); GOURRET, 1891 (Algeria); MONOD, 1924 a-b (Oran).

More recent studies are those of TRILLES (1972; Algeria, Oran, Bou-Ismaïl : ex-Castiglione), TRILLES (1975; Algeria, Bou-Ismaïl, Skikda : ex-Philippeville, Annaba), DOLLFUS & TRILLES (1976; Algeria, Algiers, Bou-Ismaïl, Bou-Haroun), TRILLES (1977; Algiers), TRILLES (1979; Bou-Ismaïl) and TRILLES (1986; Algeria).

The cymothoid fauna of the areas that we have now prospected, the gulf of Béjaïa and the gulf of Jijel as well as the Tamehah lagoon and the Soummam Oued, have not until now been studied.

MATERIALS AND METHODS

Fish samples were obtained from the gulf of Béjaïa and the gulf of Jijel, as well as the Tamelaht lagoon and the Oued Soummam (East Algeria; near Tunisia) (Fig. 1), between April and September 2005. Fish were captured using diverse fishing techniques : at sea by using trawl, trammel, palangre or harpoon, and in the Soummam Oued and the Tamelaht lagoon by carelet or monofila-

ment. Parasites were collected from fish and immediately preserved in 70% alcohol. Data on collecting period, sampling area, name and size of host as well as the location of fish capture, were noted. Prevalence (P) was calculated. The geographical distribution and host species were also specified. Finally, we compiled a check-list of all cymothoids reported to the present time from the Algerian coasts.

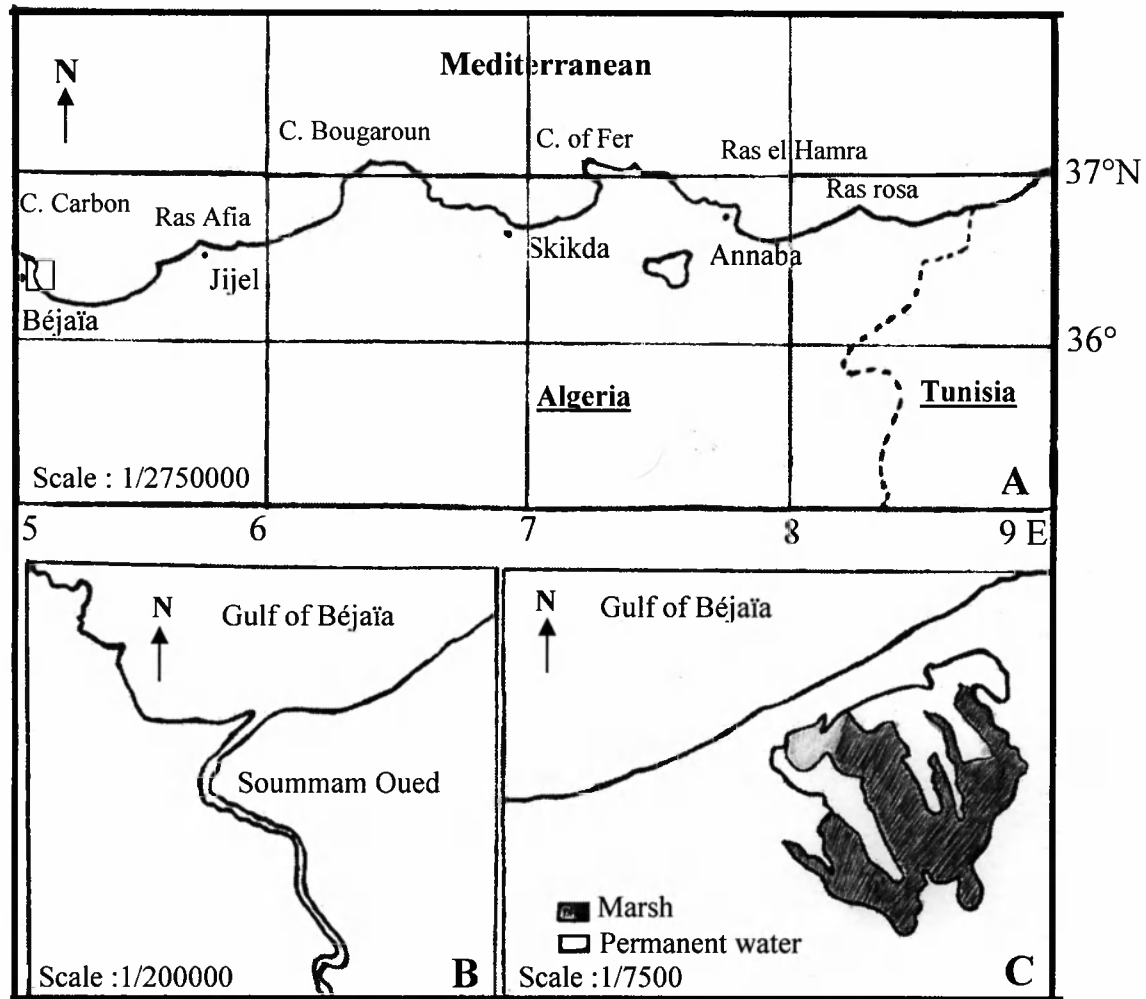


Fig. 1. – Location of the study
A : Situation of the gulf of Béjaïa (between the Cape Carbon and Ras Afia) and the gulf of Jijel (between Ras Afia and the Cape Bourgaroun); **B**, **C** : Situation of the Soummam Oued and the Tamelaht Lagoon.

TABLE 1
 Parasitological index of the Cymothoidae collected

Parasites/hosts species	NFE	LS	NFI	P	PC
<i>Anilocra physodes</i>					
<i>Spondliosoma cantharus</i>	3	[20-26]	1	33.33	GJ
<i>Anilocra frontalis</i>					
<i>Mullus barbatus</i>	82	[10-23]	9	10.98	GB
<i>Umbrina canariensis</i>	4	[19-25]	1	25	GB
<i>Pagellus acarne</i>	44	[14-24]	1	2.27	GB
<i>Diplodus annularis</i>	24	[10-17]	2	8.33	GB

TABLE 1
Parasitological index of the Cymothoidae collected

Parasites/hosts species	NFE	LS	NFI	P	PC
<i>Lithognathus mormyrus</i>	25	[14-22]	1	4	GB
<i>Solea vulgaris</i>	21	[12-21]	1	4.76	GB
<i>Lithognathus mormyrus</i>	7	[14-19]	1	14.28	GJ
<i>Crenilabrus pavo</i>	7	[16-20]	2	28.57	GJ
<i>Nerocila bivittata</i>					
<i>Crenilabrus pavo</i>	9	[16-25]	1	11.11	GB
<i>Nerocila orbignyi</i>					
<i>Mugil cephalus</i>	55	[15-36]	1	1.81	GB (SO)
<i>Crenilabrus pavo</i>	9	[16-25]	2	22.22	GB
<i>Crenilabrus pavo</i>	7	[16-20]	2	28.57	GJ
<i>Trigla lyra</i>	9	[19-26]	1	11.11	GB
<i>Nerocila maculata</i>					
<i>Pagellus acarne</i>	44	[14-24]	2	4.54	GB
<i>Ceratothoa italica</i>					
<i>Diplodus annularis</i>	24	[10-17]	1	4.17	GB
<i>Ceratothoa oestroides</i>					
<i>Boops boops</i>	140	[10-25]	11	7.9	GB
<i>Spicara smaris</i>	25	[11-17]	3	12	GB
<i>Pagellus acarne</i>	44	[14-24]	2	4.54	GB
<i>Trachurus trachurus</i>	109	[11-26]	1	0.92	GB
<i>Ceratothoa oxyrrhynchaena</i>					
<i>Spicara smaris</i>	25	[11-17]	2	8	GB
<i>Boops boops</i>	140	[10-25]	5	3.75	GB
<i>Ceratothoa parallela</i>					
<i>Boops boops</i>	140	[10-25]	12	8.60	GB
<i>Trachurus trachurus</i>	109	[11-26]	3	2.75	GB
<i>Spicara smaris</i>	25	[11-17]	1	4	GB

NFE = Number of fish examined; LS = Range of fish size (cm); NFI = Number of fish infected; P = Prevalence (%); PC = Place of collection; GB = Gulf of Béjaïa; GJ = Gulf of Jijel; SO = Soummam Oued.

RESULTS AND DISCUSSION

Cymothoidae now collected by the authors.

ANILOCRINAE

Anilocra Leach, 1814

Anilocra frontalis Milne Edward, 1840

Anilocra frontalis (Table 1) was collected from the body of *Umbrina canariensis* (P = 25%), *Mullus barbatus* (P = 10.98%), *Pagellus acarne* (P = 2.27%), *Diplodus annularis* (P = 8.33%), *Lithognathus mormyrus* (P = 4% in the gulf of Béjaïa; P = 14.28% in the gulf of Jijel), *Solea vulgaris* (P = 4.76%) and *Crenilabrus pavo* (P = 28.57% in the gulf of Jijel). This is the first record of the species in the gulfs of Béjaïa and Jijel.

The distribution of this species is wide: North Sea, Atlantic, Mediterranean and Adriatic (TRILLES, 1994), in Tunisia (TRILLES & RAIBAUT, 1971), in Morocco (TRILLES, 1975) and more recently in Turkey (ÖKTENER & TRILLES, 2004).

In Algeria, *A. frontalis* has been previously recorded (TRILLES, 1986, 1994) from Oran (MILNE EDWARD, 1840; LUCAS, 1849; CARUS, 1885), Mers-el-Kébir (LUCAS, 1849; CARUS, 1885), Algeria (TRILLES, 1975), Bou-Ismaïl

(TRILLES, 1975; TRILLES, 1979), Algiers (DOLLFUS & TRILLES, 1976).

This species, characterized by a euryxenic or stenoxenic specificity according to the prospected area, was found on several host species, especially Labridae (*Labrus maculatus*, *L. vetula*, *L. bergylta*, *L. merula*, *Crenilabrus melops*, *C. cinereus*, *C. ocellatus*) but sometimes on other fish (*Gadus* sp., *Merlangius pollachius*, *Blennius pholis*, *Cottus bubalis*, *Gobius flavescens*, *G. paganellus*, *G. minutus*, *Onos mustela*, *Spinachia vulgaris*, *Boops boops*, *Boops salpa* and *Spondyliosoma cantharus* (TRILLES, 1994). In Algeria, it has been previously collected from *Diplodus annularis*, *Oblada melanura*, *Gobius paganellus* and an unidentified Labridae (DOLLFUS & TRILLES, 1976). Our results are, therefore, in agreement with those from other Mediterranean areas. In Algeria, *Anilocra frontalis* is probably a euryxenic species.

Anilocra physodes (L., 1758)

Anilocra physodes (Table 1) was collected only from the body of *Spondyliosoma cantharus* (P = 33.33%) in the gulf of Jijel. It has been broadly reported from different parts of the Mediterranean, the Adriatic, the Black Sea and the Egean Sea (TRILLES, 1975). In the southern and eastern Mediterranean, this species was found in Egypt (TRILLES, 1975), Tunisia (TRILLES & RAIBAUT, 1971; 1973; CHARFI-CHEIKHROUHA et al., 2000), Morocco

(TRILLES, 1975), Turkey (ÖKTENER & TRILLES, 2004) and Lebanon (BARICHE & TRILLES, 2005).

In Algeria, it was previously reported (TRILLES, 1986; 1994) from Algiers (LUCAS, 1849; CARUS, 1885; FAIN-MAUREL, 1966; TRILLES, 1975; DOLLFUS & TRILLES, 1976), in the gulf of Skikda (ex-Philippeville) and from Bou-Ismaïl (TRILLES, 1975). *A. physodes* is recorded for the first time in the Gulf of Jijel.

This euryxenic species has a wide host range, with, however, a certain preference for the Sparidae and the Maenidae (TRILLES, 1975). In Tunisia, it was recently found on *Lithognathus mormyrus*, *Sciaena umbra* and *Uranoscopus scaber* (CHARFI-CHEIKHROUHA et al., 2000). In Lebanon, BARICHE & TRILLES (2005) collected this species from *Boops boops* and *Lithognathus mormyrus* but also, for the first time, from *Pagrus caeruleostictus* and *Pagellus acarne*. In Algeria, it was previously reported on *Maena vulgaris* (CARUS, 1885), *Spicara*, *Boops*, *Pagellus* and other Sparidae (FAIN-MAUREL, 1966), *Diplodus fasciatus*, *Spondyliosoma cantharus*, *Scorpaena porcus*, *Zeus faber* (TRILLES, 1975). From Castiglione, DOLLFUS & TRILLES (1976) reported this species on *Smaris chryselis* and *Spondyliosoma cantharus*. At the level of the zone prospected in our study, the specificity of this species may be narrower than in other areas and oioxenic.

Nerocila Leach, 1818

Nerocila bivittata (Risso, 1816)

Nerocila bivittata (Table 1) was collected from the caudal fin of *Crenilabrus pavo* (P = 11.11%) in the gulf of Béjaïa. In the Mediterranean, it was reported by TRILLES (1968; 1977). Along the Tunisian coasts, it has been identified by TRILLES & RAIBAUT (1973) and CHARFI-CHEIKHROUHA et al. (2000). This species was recently found in Turkey (ÖKTENER & TRILLES, 2004) and in Lebanon (BARICHE & TRILLES, 2005).

It has been mentioned from Algeria by several authors (TRILLES, 1986; 1994): Algeria (GOURRET, 1891; DOLLFUS & TRILLES, 1976), Annaba (LUCAS, 1849; SCHIOEDTE & MEINERT, 1881; CARUS, 1885), Oran (LUCAS, 1849; CARUS, 1885), Algiers (CARUS, 1885; TRILLES, 1977) and Bou-Ismaïl (TRILLES, 1975). *N. bivittata* is noted for the first time in the gulf of Béjaïa.

In the Mediterranean, this species is chiefly parasitic on fish belonging to the family Labridae (TRILLES, 1994; CHARFI-CHEIKHROUHA et al., 2000), but has sometimes been collected from hosts from other families: Scorpaenidae (*S. scrofa*, *S. porcus*) (TRILLES, 1975), Sciaenidae (*Sciaena umbra*), Mullidae (*Mullus surmuletus*), Gobiidae (*Gobius geniporus*), Serranidae (*Serranus scriba*) (CHARFI-CHEIKHROUHA et al., 2000), Sparidae, Gobiidae and Sciaenidae (ÖKTENER & TRILLES, 2004), Triglidae and Sparidae (BARICHE & TRILLES, 2005). *Nerocila bivittata* is a stenoxenic species with a preference for Labridae, but that specificity may change with locality, becoming euryxenic in some areas.

Our results confirm the preferential occurrence of this species on Labridae with perhaps stenoxenic specificity in Algeria.

Nerocila orbigny (Guérin-Mèneville, 1832)

Nerocila orbigny was collected (Table 1) from the caudal fin of *Mugil cephalus* (P = 1.81%) in the gulf of Béjaïa and the Soummam Oued, from the head of *Trigla lyra* (male; P = 11.11%) in the Gulf of Béjaïa, and from the caudal fin of *Crenilabrus pavo* in the gulf of Béjaïa (P = 22.22%) and in the gulf of Jijel (P = 28.57%).

This species has already been recorded in the Mediterranean (TRILLES, 1977; TRILLES, 1994), along the Turkish coasts (ÖKTENER & TRILLES, 2004), from Morocco (DOLLFUS & TRILLES, 1976) and Tunisia (TRILLES & RAIBAUT, 1973; CHARFI-CHEIKHROUHA et al., 2000). In Algeria, it was previously reported only from Annaba by LUCAS (1849). It is identified for the first time in the gulfs of Béjaïa and Jijel.

This species settles preferentially on the Mugilidae (TRILLES, 1994; ÖKTENER & TRILLES, 2004). In Africa, particularly in Tunisia, it has been collected from *Mugil cephalus*, *Mugil auratus*, *Mugil capito* and *Mugil labrosus* (TRILLES & RAIBAUT, 1973), *Liza ramada*, *Liza saliens*, *Liza auratus*, *Chelon labrosus* (CHARFI-CHEIKHROUHA et al., 2000). However, this euryxenic species has also been reported from several other fish (TRILLES, 1994; ÖKTENER & TRILLES, 2004), on *Alosa fallax nilotica* (TRILLES & RAIBAUT, 1973), *Batrachus didactylus*, *Solea senegalensis* (DOLLFUS & TRILLES, 1976), *Dicentrarchus labrax*, *Solea solea*, *Serranus scriba*, and *Diplodus annularis* (CHARFI-CHEIKHROUHA et al., 2000).

Our results are, therefore, in agreement with the previously known characteristics of this euryxenic species. However, the prevalence values observed suggest that in Algeria the preference of *N. orbigny* for the mugilids is not as marked.

Nerocila maculata (Milne Edward, 1840)

Nerocila maculata (Table 1) was collected from the pelvic fin and from the operculum of *Pagellus acarne* (P = 4.54%) from the gulf of Béjaïa. TRILLES (1986; 1994) recorded this species from the Mediterranean to the Atlantic coasts of Southern Europe. It has been identified in Algeria from Annaba by LUCAS (1849), CARUS (1885) and TRILLES (1975). This species is recorded for the first time in the gulf of Béjaïa.

Along the French coasts, it has been collected on *Gadus capelanus* (TRILLES, 1968), and from Morocco on *Gadus capelanus* and *Raja alba* (DOLLFUS & TRILLES, 1976).

In Algeria, until now, the identity of the host fish was unknown (TRILLES, 1986). Our results are not in agreement with the previous data from other areas; a change in specificity is perhaps possible according to the prospected localities.

CERATOTHOINAE

Ceratothoa Dana, 1852

Ceratothoa italica Schioedte and Meinert, 1883

Ceratothoa italica (Table 1) was found in the buccal cavity of *Diplodus annularis* (P = 4.17%), in the gulf of Béjaïa. This is the first record of *Ceratothoa italica* from the Algerian coast.

This ectoparasite is relatively uncommon; it is known in the Mediterranean and in the Adriatic (TRILLES, 1968; TRILLES et al., 1989). It has been reported from Tunisia and the north-western Atlantic coasts of Africa, Mauritania and western Morocco (TRILLES, 1972; 1986); recently, this species was collected in Turkey (ÖKTENER & TRILLES, 2004) and in Lebanon (BARICHE & TRILLES, 2005).

C. italica has been collected from several species of Sparidae: *Pagellus mormyrus*, *Pagellus erythrinus*, *Oblada melanura*, *Cantharus lineatus*, and *Sargus sp.* (TRILLES, 1994; HORTON, 2000). In Turkey, ÖKTENER & TRILLES (2004) found this species on *Dicentrarchus labrax* and *Spicara maena*, while BARICHE & TRILLES (2005) found it only on *Dicentrarchus labrax* in Lebanon. Therefore, the specificity of this species varies, being euryxenic, stenoxenic or oïoxenic according to the prospected areas.

Diplodus annularis is a new host for *C. italica* and its specificity may be oïoxenic in the gulf of Béjaïa.

Ceratothoa oestroides (Risso, 1826)

Ceratothoa oestroides (Table 1) was collected from the mouth of *Trachurus trachurus* (P = 0.92%), *Pagellus acarne* (P = 4.54%), *Spicara smaris* (P = 12%) and *Boops boops* (P = 7.9%) from the gulf of Béjaïa.

This species has already been reported from the Mediterranean, the Adriatic and the northwestern Atlantic coasts of Africa (TRILLES, 1994; HORTON, 2000). It has been collected particularly in Tunisia (TRILLES & RAIBAUT, 1971; CHARFI-CHEIKHROUHA et al., 2000), Morocco and Algeria (TRILLES, 1972); recently, it was reported from Turkey (ÖKTENER & TRILLES, 2004) and Lebanon (BARICHE & TRILLES, 2005). Ours is the first record of its collection in the gulf of Béjaïa.

TRILLES (1986) notes a preference of this species for the Sparidae and Maenidae. In Tunisia, it has been collected on *Boops boops*, *Diplodus annularis* and *Trachurus trachurus* (TRILLES & RAIBAUT, 1971), in Turkey on *Spicara maena* and *Sardina pilchardus* (ÖKTENER & TRILLES, 2004) and from Lebanon on *Sparus aurata* (BARICHE & TRILLES, 2005). According to TRILLES (1994), *C. oestroides* is ubiquitous and euryxenic; it can be found infesting several other fish species: *Physis mediterranea*, *Mullus barbatus*, and *Abudefduf saxatilis*. It has also been collected from cultured *Dicentrarchus labrax* and *Sparus aurata* (ŠARUŠIĆ, 1999). CHARFI-CHEIKHROUHA et al. (2000) report *C. oestroides* from nine species belonging to six families of fish: Sparidae, Carangidae, Clupeidae, Maenidae, Scorpaenidae and Mugilidae.

Therefore, our results are in agreement with previous data. However, *Pagellus acarne* is a new host record for *C. oestroides*.

Ceratothoa oxyrrhynchaena Koelbel, 1878

Ceratothoa oxyrrhynchaena (Table 1) was collected from the buccal cavity of *Spicara smaris* (P = 8%) and *Boops boops* (P = 3.75%) from the gulf of Béjaïa.

The distribution of this parasite is very extended (TRILLES, 1986; 1994): Sea of Japan, Indian Ocean, Mediterranean, Adriatic and Atlantic. In Africa, it has been identified in Tunisia (TRILLES & RAIBAUT, 1971), Mauritania and the Suez gulf (TRILLES, 1972). In Algeria, especially from Algiers, it has been reported by TRILLES (1972). This species is recorded for the first time in the gulf of Béjaïa.

The distributions of *C. oxyrrhynchaena* and *C. oestroides* are similar, although the first species is distinctly less common (TRILLES, 1968; 1994). *Ceratothoa oxyrrhynchaena* has been collected mainly on Maenidae and Sparidae (TRILLES, 1968). In Tunisia, this parasite has been reported from the buccal cavity of Maenidae (TRILLES & RAIBAUT, 1971), on *Zeus faber* (TRILLES, 1972), *Raja asterias*, *Raja clavata*, *Scyliorhinus stellaris* and *Torpedo marmorata* (CAPAPE & PANTOUSTIER, 1976). In Lebanon, it has been recently collected on *Lithognathus mormyrus* (BARICHE & TRILLES, 2005). Therefore, our results are in agreement with those of TRILLES (1968), TRILLES & RAIBAUT (1971) and BARICHE & TRILLES (2005).

Ceratothoa parallela (Otto, 1828)

Ceratothoa parallela (Table 1) was collected from the buccal cavity of *Boops boops* (P = 8.60%), of *Spicara smaris* (P = 4%) and of *Trachurus trachurus* (P = 2.75%). It is reported for the first time in the gulf of Béjaïa.

This species has already been collected in the Mediterranean, Adriatic and in the Northeastern Atlantic (TRILLES, 1986; 1994). In Africa, it has been collected in Tunisia (CAPAPE & PANTOUSTIER, 1976; CHARFI-CHEIKHROUHA et al., 2000), Algeria (LUCAS, 1849; SCHIOEDTE & MEINERT, 1883; CARUS, 1885; DOLLFUS & TRILLES, 1976) and more specifically from Oran and Algiers (TRILLES, 1972). It has been recently found in Turkey (ÖKTENER & TRILLES, 2004).

Several authors reported this species in the buccal cavity of *Boops boops* (TRILLES, 1968; 1994; CHARFI-CHEIKHROUHA et al., 2000; ÖKTENER & TRILLES, 2004; respectively from the French, Tunisian and Turkish coasts). *C. parallela* was also occasionally found on other species of fish: *Raja asterias*, *Raja clavata* (CAPAPE & PANTOUSTIER, 1976; TRILLES, 1994), *Sparus sp.*, *Dentex vulgaris*, *Boops salpa*, *Esocis belonis*, *Spicara chryselis*, *S. maurii*, *S. alcedo*, *Trigla corax*, *Mullus sp.*, *Gadus capelanus*, *Merluccius merluccius* (TRILLES, 1994), cultured *Sparus aurata* (PAPAPANAGIOTOU & TRILLES, 2001) and *Diplodus annularis* (CHARFI-CHEIKHROUHA et al., 2000).

In Algeria, especially in the gulf of Béjaïa, our results are in agreement with the previous data: *Ceratothoa parallela* is a euryxenic species, chiefly parasitic on *Boops boops* and more rarely on *Spicara smaris* and *Trachurus trachurus*.

General list of the Cymothoidae reported to date from Algeria : species, hosts, locations and authors

Cymothoids	Hosts	Locations	Authors
Anilocrinae			
<i>Anilocra physodes</i> (L., 1758)	–	Algiers	LUCAS, 1849
	<i>Moena vulgaris</i>	Algiers	CARUS, 1885
	<i>Box</i>	Algiers	FAIN-MAUREL, 1966
	<i>Pagellus</i>		
	Other Sparidae		
	<i>Diplodus fasciatus</i>	Skikda (ex-Phillipeville)	TRILLES, 1975
	<i>Spondyliosoma cantharus</i>		
	<i>Scorpaena porcus</i>	Bou-Ismaïl (ex- Castiglione)	TRILLES, 1975
	<i>Zeus faber</i>		
	<i>Spondyliosoma cantharus</i>	Gulf of Jijel	Present study
<i>Anilocra frontalis</i> Milne Edwards, 1840	–	Oran	MILNE EDWARDS, 1840 LUCAS, 1849 CARUS, 1885 GERSTAEKER, 1901
	–	Mers-el-Kébir	LUCAS, 1849
	<i>Crenilabrus quinquemaculatus</i>	Bou-Ismaïl (ex- Castiglione)	TRILLES, 1975
	<i>Crenilabrus roissali</i>		
	<i>Labrus viridis</i>	Algeria	TRILLES, 1975
	–	Oran	
	<i>Oblada melanura</i>	Algeria	DOLLFUS & TRILLES, 1976
	<i>Labrus bergylta</i>		
	<i>Diplodus annularis</i>		
	<i>Gobius paganellus</i>		
	<i>Crenilabrus sp.</i>		
	<i>Labrus</i>	Bou-Ismaïl (ex- Castiglione)	TRILLES, 1979
	<i>Labrus merula</i>		
	<i>Crenilabrus ocellatus</i>		
	<i>Mullus barbatus</i>	Gulf of Béjaïa	Present study
	<i>Umbrina canariensis</i>		
	<i>Sciaena aquila</i>		
	<i>Pagellus acarne</i>		
	<i>Lithognathus mormyrus</i>		
	<i>Solea vulgaris</i>		
	<i>Diplodus annularis</i>		
	<i>Crenilabrus pavo</i>	Gulf of Jijel	Present study
	<i>Lithognathus mormyrus</i>		
<i>Nerocila orbigny</i> (Guérin-Méneville, 1832)	–	Annaba (ex Bône)	LUCAS, 1849
	<i>Mugil cephalus</i>	Gulf of Béjaïa (Soummam Oued)	Present study
	<i>Crenilabrus pavo</i>	Gulf of Béjaïa	Present study
	<i>Crenilabrus pavo</i>	Gulf of Jijel	Present study
	<i>Trygla lyra</i>	Gulf of Béjaïa	Present study
<i>Nerocila maculata</i> (Milne Edwards, 1840)	–	Annaba (ex- Bône)	LUCAS, 1849 CARUS, 1885 TRILLES, 1975
	<i>Pagellus acarne</i>	Gulf of Béjaïa	Present study
<i>Nerocila bivittata</i> (Risso, 1816)	–	Algeria	GOURRET, 1891
	–	Annaba (ex- Bône)	LUCAS, 1849 SCHIOEDTE & MEINERT, 1881 CARUS, 1885
	–	Oran	LUCAS, 1849 CARUS, 1885
	–	Algiers	CARUS, 1885
	<i>Crenilabrus melops</i>	Bou-Ismaïl (ex- Castiglione)	TRILLES, 1975
	<i>Crenilabrus pavo</i>		
	<i>Crenilabrus pavo</i>	Gulf of Béjaïa	Present study
Ceratothoinae			
<i>Ceratothoa italica</i> Schioedte & Meinert, 1883	<i>Diplodus annularis</i>	Gulf of Béjaïa	Present study
<i>Ceratothoa oestroides</i> (Risso, 1826)	Diverse fish species	Annaba (ex- Bône) Fort Génois	LUCAS, 1849
	–	Algiers	CARUS, 1885
	–	Bou-Ismaïl (ex- Castiglione)	TRILLES (1972; 1979)

General list of the Cymothoidae reported to date from Algeria : species, hosts, locations and authors

Cymothoids	Hosts	Locations	Authors
	–	Bou-Haroun	DOLLFUS & TRILLES, 1976
	<i>Boops boops</i>	Gulf of Béjaïa	Present study
	<i>Spicara smaris</i>		
	<i>Pagellus acarne</i>		
	<i>Trachurus trachurus</i>		
<i>Ceratothoa parallela</i> (Otto, 1828)	–	Algeria	LUCAS, 1849
	–	Oran	LUCAS, 1849
			SCHIOEDTE & MEINERT, 1881
			CARUS, 1885
			TRILLES, 1972
	–	Algiers	TRILLES, 1972
	<i>Boops boops</i>	Gulf of Béjaïa	Present study
	<i>Trachurus trachurus</i>		
	<i>Spicara smaris</i>		
<i>Ceratothoa collaris</i> Schioedte & Meinert, 1883	–	Oran	LUCAS, 1849
			SCHIOEDTE & MEINERT, 1883
			CARUS, 1885
	<i>Dentex filosus</i>	Oran	MONOD, 1924 a-b
	<i>Pagellus sp.</i>		
	<i>Pagellus erythrinus</i>	Oran	TRILLES, 1972
	<i>Pagellus acarne</i>		
<i>Ceratothoa oxyrrhynchaena</i> Koelbel, 1878	<i>Zeus faber</i>	Algiers	TRILLES, 1972
	<i>Spicara smaris</i>	Gulf of Béjaïa	Present study
	<i>Boops boops</i>		
<i>Emetha audouini</i> (Milne Edwards, 1840)	–	Algeria	TRILLES, 1972
Livonecinae			
<i>Idusa dieuzeidei</i> Dollfus, 1950	<i>Symphurus nigrescens</i>	Algeria	DOLLFUS, 1950
			DOLLFUS & TRILLES, 1976
<i>Livoneca pomatomi</i> (Gaillat Airoldi, 1940)	<i>Boops boops</i>	Algiers	DOLLFUS & TRILLES, 1976
	<i>Boops boops</i>	Bou-Haroun	DOLLFUS & TRILLES, 1976
<i>Livoneca simuata</i> Koelbel, 1878	<i>Gobius</i>	Bou-Haroun	DOLLFUS & TRILLES, 1976
	<i>Boops boops</i>	Algiers	DOLLFUS & TRILLES, 1976

Now, 14 Cymothoidae have been reported from Algeria, the majority being widely distributed in the Mediterranean; however, *Ceratothoa collaris* appears to be limited to the Northern and Northwestern coasts of Africa while *C. oxyrrhynchaena* is cosmopolitan. We report nine species, *Anilocra frontalis*, *A. physodes*, *Nerocila bivittata*, *N. orbignyi*, *N. maculata*, *Ceratothoa parallela*, *C. oestroides*, *C. oxyrrhynchaena*, *C. italica*, for the first time in the Gulfs of Béjaïa and Jijel. *Ceratothoa italica* is new for the Algerian fauna.

We have identified the host fish for all the cymothoids that we have collected. For some parasites (*A. frontalis*, *N. bivittata*, *C. oestroides*, *C. oxyrrhynchaena* and *C. parallela*), our results are in agreement with the characteristics of specificity known for these species. For others (*A. physodes*, *N. orbignyi*, *N. maculata* and *C. italica*), our data seem to indicate possible variation of the specificity according to the prospected area. It is particularly obvious for *N. maculata*; host of this species, previously unknown in Algeria, is now identified and differs from those previously reported from other Mediterranean zones.

Prevalences are rather weak and correspond to a low general infestation rate, varying, however, according to the host species. Therefore, our results are quite similar to some data about Tunisia. Infestation rates are, moreover, even weaker in the Tamelaht lagoon and the Soummam Oued.

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REFERENCES

- BARICHE M & TRILLES JP (2005). Preliminary check-list of Cymothoids (Crustacea, Isopoda) from Lebanon, parasiting on marine fishes. *Zoology in the Middle East*, 34 : 5-12.
- CAPAPE C & PANTOUSTIER G (1976). Liste commentée des Isopodes parasites de sélaciens des côtes tunisiennes. I. Côtes septentrionales, de Tabarka à Bizerte. *Archs. Isnt. Pasteur Tunis*, n° 3 : 197-210.
- CARUS JY (1885). *Prodromus faunae mediterraneae sive Descriptio Animalium maris Mediterranei incolarum quam comparata silva rarum quatenus innotuit adiectis locis et nominibus vulgaribus eorumque auctoribus in commodum zoologorum*. Schweizerbart, Stuttgart, I : 1- 525.
- CHARFI-CHEIKHROUHA F, ZGHIDI W, OULD YARBA L & TRILLES JP (2000). Les Cymothoidae (Isopodes parasites de poissons) des côtes tunisiennes : écologie et indices parasitologiques. *Syst. Parasitol.*, 46 : 146-150.
- DOLLFUS RP (1950). Nouveau cymothoïdien, *Idusa dieuzeidei* n. sp., dans la cavité branchiale de *Symphurus nigrescens* Rafinesque, 1810 (poisson pleuronectiforme). *Bull. Stn. Agric. Pêche Castiglione*, n. sér., n° 2 : 121- 129, pl. I-III.

- DOLLFUS RP & TRILLES JP (1976). A propos de la collection RP Dollfus, mise au point sur les Cymothoïdiens jusqu'à présent récoltés sur des Téléostéens du Maroc et de l'Algérie. Bull. Mus. natn. Hist. nat., Paris, 3^e sér., n° 390, Zool. 272 : 821-830.
- FAIN-MAUREL MA (1966). Contribution à l'histologie et à la caryologie de quelques Isopodes. Spermogénèse et infrastructures du spermatozoïde des Oniscidés et des Cymothoïdés. Thèse Paris : 1-188, pls A. J. et pls I-X, parue dans : Anns Sci. nat., 12^e sér., 8.
- GERSTAECKER A (1901). Isopoda. In : Die Klassen und Ordnungen der Arthropoden Wissenschaftlich dargestellt in Wort und Bild, BRONN HG (ed), Fünfter Band. II. Abteilung. Crustacea (Zweit Hälfte : Malacostraca) : 2-278, pl. I-XXIV.
- GOURRET P (1891). Les Lemodipodes et les Isopodes de Golfe de Marseille. Anns Mus. Hist. nat. Marseille, zool., 4 (1) : 1-44, pls 1-11.
- HORTON T (2000). *Ceratothoa steindachneri* (Isopoda : Cymothoïdés) new to British waters with a key to north-east Atlantic and Mediterranean Ceratothoa. J. Mar. Biol. Ass. U.K., 80 : 1041-1052.
- LUCAS H (1849). Histoire naturelle des animaux articulés. In : Exploration scientifique de l'Algérie pendant les années 1840, 1841, 1842. Sc. physiques : Zoologie I : 1-403 (Atlas).
- MILNE EDWARD H (1840). Histoire Naturelle des Crustacés comprenant l'anatomie, la physiologie et la classification de ces animaux. III. Librairie Encyclopédique de Roret, Paris.
- MONOD T (1924a). Isopoda In : Parasitologia Mauritanica. Bull. Com. Etud. Hist. scient. Afr. occid. Fr. Fasc. I, II, Isopoda : 67-84 (428-445).
- MONOD T (1924b). Note sur la morphologie et la distribution géographique de *Meinertia collaris* Schioedte et Meinert. Bull. Soc. Zool. Fr., 49 : 31-34.
- ÖKTENER A & TRILLES JP (2004). Report on Cymothoids (Crustacea, Isopoda) collected from marine fishes in Turkey. Acta Adriat., 45 (2) : 145-154.
- PAPAPANAGIOTOU EP & TRILLES JP (2001). Cymothoid parasite *Ceratothoa parallela* inflicts great losses on cultured gilt-head seabram *Sparus aurata* in Greece. Dis. Aquat. Org., 45 : 237-239.
- ŠARUŠIĆ G (1999). Preliminary report of infestation by isopod *Ceratothoa oestroides* (Risso, 1826), in marine cultured fish. Bull. Eur. Assoc. Fish Pathologists, 19 : 110-112.
- SCHIOEDTE JC & MEINERT F (1881). Symbolae ad monographiam Cymothoarum Crustaceorum Isopodum familiae. II. Anilocridae. Naturhist. Tidsskr., ser. III, 13 : 1-166, pl. I-X (Cym. VIII- XVII).
- SCHIOEDTE JC & MEINERT F (1883). Symbolae ad monographiam Cymothoarum Crustaceorum Isopodum familiae. III. Saophridae. IV. Ceratothoïnae. Naturhist. Tidsskr., ser. III, 13 : 281-378, pl. XI-XVI (Cym. XVIII- XXIII).
- TRILLES JP (1968). Recherches sur les Isopodes Cymothoïdés des côtes Françaises. Thesis, Univ. Montpellier, France, N° enregistrement CNRS AO 2305. Vol. 1 : Bionomie et parasitisme, Vol. 2 : Bionomie générale et sexualité, 793 pp. Deuxième thèse, Systématique et faunistique, 181 pp.
- TRILLES JP (1972). Les Cymothoïdés (Isopoda, Flabellifera) du Muséum national d'histoire naturelle de Paris. Etude critique accompagnée de précision en particulier la répartition géographique et l'écologie des différentes espèces représentées. I. Les Ceratothoïnae Schioedte et Meinert, 1883. Bull. Mus. natn. Hist. nat., Paris, 3^e sér., n° 91, Zool. 70 : 1231- 1268.
- TRILLES JP (1975). Les Cymothoïdés (Isopoda, Flabellifera) des collections du Muséum national d'histoire naturelle de Paris. III Les cymothoïdés Schioedte et Meinert, 1884. Genre *Cymothoa* Fabricius, 1787. Bull. Mus. natn. Hist. nat., Paris, 3^e sér., n° 378, Zool. 225 : 977-993.
- TRILLES JP (1977). Les Cymothoïdés (Isopoda, Flabellifera : parasites de poissons) du Rijksmuseum Van Natuurlijke Historie de Leiden. Méditerranée et Atlantique. Zoöl. Meded., Leiden, 52 (2) : 7-17.
- TRILLES JP (1979). Les Cymothoïdés (Isopoda, Flabellifera : parasites de poissons) du Rijksmuseum Van Natuurlijke Historie de Leiden. II. Afrique, Amérique et Régions Indo-Ouest-Pacifiques. Zoöl. Meded., Leiden, 54 (17) : 245-275.
- TRILLES JP (1986). Les Cymothoïdés (Crustacea, Isopoda, Flabellifera) d'Afrique. Bull. Mus. natn. Hist. nat., Paris, 4^e sér., 8, section A. n° 3 : 617-636.
- TRILLES JP (1994). Les Cymothoïdés (Crustacea, Isopoda) du monde (Prodrome pour une faune). Studia Marina, 21/22 (1-2) : 1-288.
- TRILLES JP & RAIBAUT A (1971). Aegidae et Cymothoïdés parasites de poissons de mer Tunisiennes : premiers résultats. Bull. Inst. océanogr. Pêche, Salammbô, 2 (1) : 71-86.
- TRILLES JP & RAIBAUT A (1973). Sur les Cymothoïdés (Isopoda, Flabellifera) parasites de poissons marins de Tunisie (2^e note). Bull. Mus. natn. Hist. nat., Paris, 3^e sér., n° 144, Zool. 88 : 273-281.
- TRILLES JP, RADUJKOVIC BM & ROMESTAND B (1989). Parasite des poissons marins du Monténégro : Isopodes. Acta Adriat., 30 : 279-306.

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