

Lepidopleurus cimicoides (Monterosato, 1879) and *Lepidochitona furtiva* (Monterosato, 1879): two new reports for the Polyplacophora (Mollusca) fauna of the Aegean Sea

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Abstract

This study was carried out along the Turkish Aegean coast in the years 2000-2003. From samples taken from various depths (3-220 m) and biotopes, a total of 129 individuals belonging to 10 Polyplacophoran species were determined: *Lepidopleurus cimicoides* (Monterosato, 1879), *Lepidopleurus bedullii* (Dell'Angelo & Palazzi, 1986), *Hanleya hanleyi* (Bean in Thorpe, 1844), *Callochiton septemvalvis* (Montagu, 1803), *Lepidochitona cinerea* (Linnaeus, 1767), *Lepidochitona furtiva* (Monterosato, 1879), *Lepidochitona monterosatoi* Kaas & van Belle, 1981, *Chiton olivaceus* Spengler, 1797, *Chiton corallinus* (Risso, 1826) and *Acanthochitona fascicularis* (Linnaeus, 1767). Of these, *Lepidopleurus cimicoides* and *Lepidochitona furtiva* are reported for the first time from the Aegean Sea and *Hanleya hanleyi* from the Aegean coast of Turkey. Distinctive and ecological characteristics of *Lepidopleurus cimicoides* and *Lepidochitona furtiva* are considered in this study. Data about the occurrence of the other Polyplacophoran species in the studied area are also reported.

Riassunto

Questo lavoro riporta i risultati di ricerche effettuate lungo la costa egea della Turchia negli anni 2000-2003. Dallo studio di campioni prelevati a varie profondità (3-220 m) e da vari biotopi, risulta un totale di 129 esemplari, appartenenti a 10 specie di Polyplacophora: *Lepidopleurus cimicoides* (Monterosato, 1879), *Lepidopleurus bedullii* (Dell'Angelo & Palazzi, 1986), *Hanleya hanleyi* (Bean in Thorpe, 1844), *Callochiton septemvalvis* (Montagu, 1803), *Lepidochitona cinerea* (Linnaeus, 1767), *Lepidochitona furtiva* (Monterosato, 1879), *Lepidochitona monterosatoi* Kaas & van Belle, 1981, *Chiton olivaceus* Spengler, 1797, *Chiton corallinus* (Risso, 1826) e *Acanthochitona fascicularis* (Linnaeus, 1767). Di queste specie, *Lepidopleurus cimicoides* e *Lepidochitona furtiva* vengono segnalate per la prima volta per il Mar Egeo, ed *Hanleya hanleyi* per le coste egee della Turchia. In questo studio vengono prese in considerazione i caratteri distintivi e quelli ecologici di *Lepidopleurus cimicoides* e *Lepidochitona furtiva*. Per le altre specie vengono riportati i dati di distribuzione nell'area studiata.

Key Words

Mollusca, Polyplacophora, Aegean Sea, Turkey.

Introduction

The Aegean Sea is a transition zone between the Black Sea and the Mediterranean, which forms a favorable ecosystem for several different taxa due to the geographical and topographical characters of the coastline and the sea bottom. However, only less than half of the nearly 2000 molluscan species inhabiting the Mediterranean has been reported from the Aegean Sea. This fact probably stems from the relatively less research conducted along the Aegean Sea coast, when compared to the rest of the Mediterranean. Pioneering information on the Polyplacophoran fauna of the Aegean Sea are based on studies of Deshayes (1832) and Forbes (1844). However, detailed researches were mostly carried out within the last three decades, i.e. Kattoulas *et al.* (1973); Kaas & Van Belle (1987); Strack (1988, 1990); Zenetos & van Aartsen (1995); Öztürk *et al.* (2000) and Koukouras & Karachle (2005), where a total of 16 Polyplacophoran species was recorded from the Aegean Sea, out of 32 species known to inhabit the Mediterranean Sea (Dell'Angelo & Smriglio, 1999 and Koukouras & Karachle, 2005).

This study aims to present two Polyplacophoran spe-

cies new to Aegean Sea fauna, which were collected from various depths off the Turkish coasts.

Material and Methods

Samplings were conducted along the Turkish Aegean Sea coast between 2000 and 2003 on board the R/V K. Piri Reis, R/V Egesüf and R/V Hippocampus at various localities. The material examined was obtained using dredge and beam trawl from algae, *Posidonia oceanica* (L.) Delile, 1813, sand, mud and coralligenous biotopes at depths ranging between 3 and 220 m. Skin dives were carried out at stations no. 11 and 14. The material was washed through a sieve with 0.5 mm mesh size and fixed in 4% formalin. Specimens were sorted under a stereomicroscope in the laboratory. During the sorting process, representatives of Polyplacophora were observed in 25 sampling stations (Fig. 1 and Tab. 1), and these Polyplacophora specimens were studied within the framework of a project supported by TUBITAK (The Scientific and Technical Research Council of Turkey, project code TBAG 2343 (103T154). The materials collected were deposited in the ESMF museum (Ege University, Turkey).

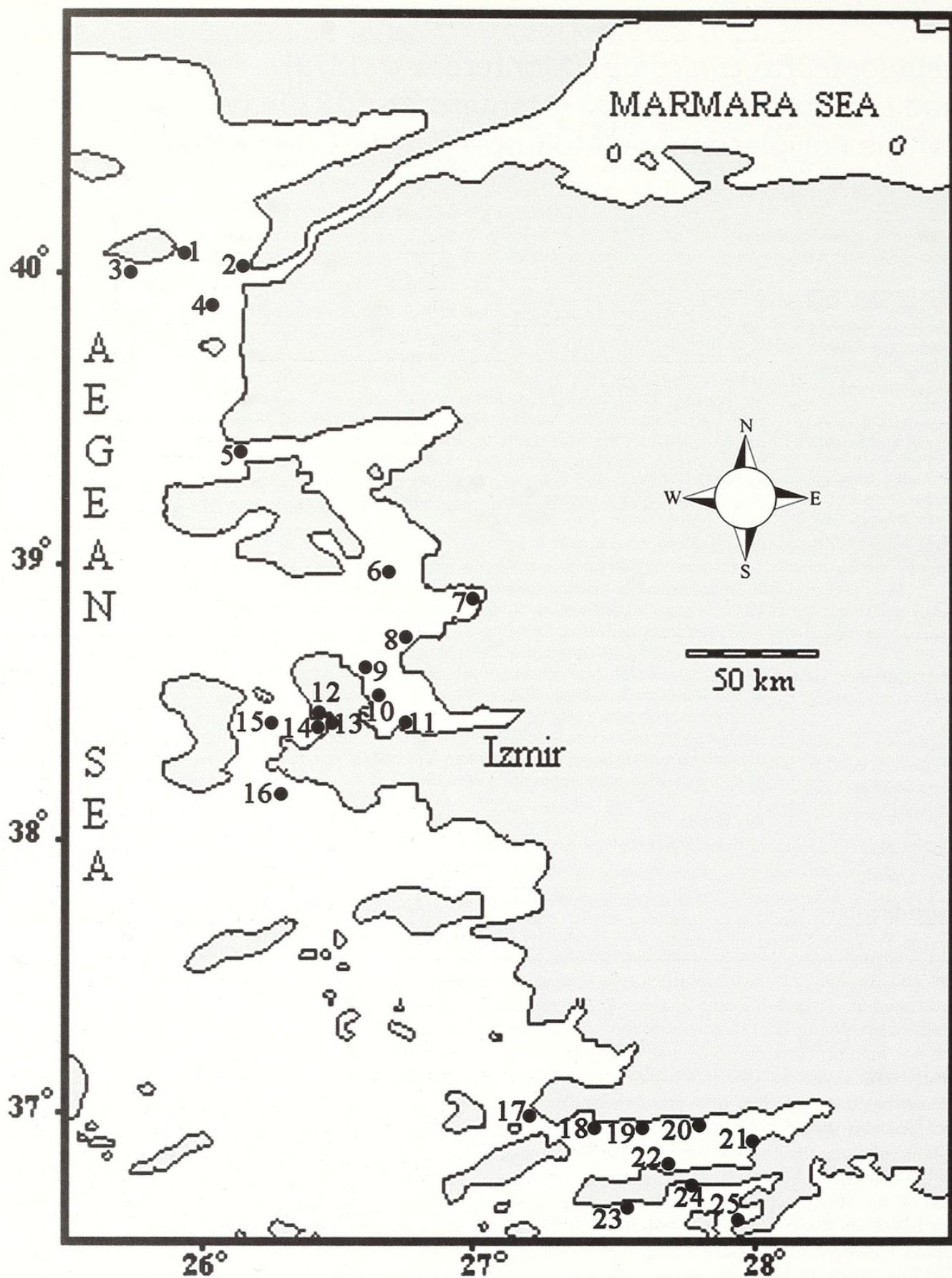


Fig. 1. Map of the studied area with location of the stations where Polyplacophora species were sampled.

Fig. 1. Mappa dell'area studiata ed ubicazione delle stazioni dalle quali sono state raccolte specie di Polyplacophora.

Results

The examination of the material collected from 25 sampling stations at depths ranging 3 to 113 m revealed the

presence of 129 specimens belonging to 10 species (Tab. 2). Apart from *Lepidopleurus cimicoides* (Monterosato, 1879) and *Lepidochitona furtiva* (Monterosato, 1879), which are new records for the Aegean Sea, all the spe-

St.	Date	Coordinates (N)	Coordinates (E)	Biotores	Depth (m)
1	13.08.2000	40° 10' 00" N	25° 59' 15" E	Sand	29
2	13.08.2000	40° 04' 45" N	25° 10' 50" E	Sand	29
3	13.08.2000	40° 05' 45" N	25° 50' 45" E	<i>P. oceanica</i>	27
4	13.08.2000	39° 58' 50" N	26° 03' 25" E	Muddy sand	30
5	20.07.2000	39 27' 10" N	26° 07' 00" E	Sand	70-90
6	28.07.2000	39° 00' 10" N	26° 44' 28" E	Sand	50
7	22.11.2002	38° 53' 28" N	26° 58' 34" E	Mud	50
8	06.10.2001	38° 40' 43" N	26° 44' 14" E	<i>P. oceanica</i>	3
9	01.09. 2003	38° 32' 15" N	26° 39' 44" E	Muddy sand	38
10	a) 18.03.2000 b) 17.06.2001	38° 29' 44" N	26° 39' 13" E	<i>P. oceanica</i>	9-16
11	20.07.2001	38° 22' 07" N	26° 46' 25" E	<i>P. oceanica</i>	3
12	13. 09. 2000	38° 25' 20" N	26° 30' 24" E	<i>P. oceanica</i>	11-35
13	13.09.2000	38° 24' 22" N	26° 29' 19" E	Mud + Sand + <i>P. oceanica</i>	38
14	22.02.2001	38° 23' 56" N	26° 27' 26" E	<i>P. oceanica</i>	6
15	14.09.2000	38° 20' 48" N	26° 14' 15" E	Muddy sand	54
16	14. 09.2000	38° 09' 30" N	26° 17' 40" E	Sand	113
17	17.09.2000	36° 56' 45" N	27° 16' 32" E	Algae+sand	31
18	18.09.2000	36° 59' 00" N	27° 32' 35" E	Mud	47
19	18.09.2000	36° 59' 50" N	27° 42' 20" E	<i>P. oceanica</i>	5-10
20	18.09.2000	36° 59' 30" N	27° 47' 56" E	Coralligenous sand	64
21	19.09.2000	36° 48' 30" N	28° 03' 00" E	<i>P. oceanica</i>	17-25
22	20.09.2000	36° 47' 58" N	27° 41' 25" E	Algae	51
23	20.09.2000	36° 39' 50" N	27° 32' 30" E	Muddy sand	86
24	21.09.2000	36° 45' 08" N	27° 47' 00" E	Algae + <i>P. oceanica</i> + Sand	26
25	21.09.2000	36° 40' 03" N	28° 00' 15" E	Algae	40

Tab. 1. Coordinates, depths, sampling dates and biotope characterization of stations.

Tab. 1. Coordinate, profondità, data di campionamento e caratteristiche del biotopo delle stazioni campionate.

cies obtained were previously recorded from the area. In addition, *Hanleya hanleyi* (Bean in Thorpe, 1844), which was reported earlier from the Greek coasts by Strack (1990), is a new record for the Turkish Polyplacophoran fauna.

Lepidopleurus cimicoides (Monterosato, 1879)
Fig. 2

Chiton cimicoides Monterosato, 1879: 23 (nomen novum pro *Chiton minimus* Monterosato, 1878)
Lepidopleurus intermedius Salvini-Plawén, 1968:251, Pl. 6-8, figs. 44-57

Material

In table 2

Distribution

Observed at depths ranging between 29 and 113 m at various biotopes. Distributed in the Eastern Atlantic Ocean (W Sahara), different localities in the Western Mediterranean, Sicily and central part of the Adriatic Sea (Dell’Angelo & Smriglio, 1999). The species is here reported for the first time from the Eastern Mediterranean.

Lepidochitona furtiva (Monterosato, 1869)
Fig. 3

Chiton furtivus Monterosato, 1879: 19-20 (type locality: Palermo, Sicily, 20-30 m)

Material

St. 8, 1 specimen, *P. oceanica*, 3 m.

Species	Specimens	Biotores	Depth (m)	Stations (see fig. 1)
LEPIDOPLEURIDAE				
<i>Lepidopleurus cimicoides</i> (Monterosato, 1879)	6	Algae	51	22
	14	Sand	29-113	2, 5, 16
	3	Sand+algae	31	17
	13	Muddy sand	38-86	4, 9, 15, 23
	2	Mud	47-54	7, 15, 18
	2	Mud + Sand + <i>P. oceanica</i>	38	13
	2	Algae + <i>P. oceanica</i> + Sand	26	24
<i>Lepidopleurus bedullii</i> (Dell'Angelo & Palazzi, 1986)	1	<i>P. oceanica</i>	16	10 a
HANLEYIDAE				
<i>Hanleya hanleyi</i> (Bean in Thorpe, 1844)	1	Coralligenous sand	64	20
	1	Mud	50	7
ISCHNOCHITONIDAE				
<i>Callochiton septemvalvis</i> (Montagu, 1803)	5	<i>P. oceanica</i>	27	3
<i>Lepidochitona cinerea</i> (Linnaeus, 1767)	15	<i>P. oceanica</i>	3-9	10 b, 11, 14
<i>Lepidochitona furtiva</i> (Monterosato, 1879)	1	<i>P. oceanica</i>	3	8
<i>Lepidochitona monterosatoi</i> Kaas & Van Belle, 1981	13	<i>P. oceanica</i>	17-25	19, 21
CHITONIDAE				
<i>Chiton olivaceus</i> Spengler, 1797	5	Sand + algae	31	17
	21	<i>P. oceanica</i>	11-35	12, 19, 21
<i>Chiton corallinus</i> (Risso, 1826)	2	Muddy sand	86	23
	1	<i>P. oceanica</i>	11-35	12
ACANTHOCHITONIDAE				
<i>Acanthochitona fascicularis</i> (Linnaeus, 1767)	4	Algae	40	25
	2	Coralligenous sand	2	20
	2	Mud + Algae	31	17
	13	<i>P. oceanica</i>	11-35	12, 21, 24

Tab. 2. Polyplacophora species, number of specimens and distribution in the biotopes, depths and sampled stations.

Tab. 2. Elenco delle specie di Polyplacophora, numero di esemplari, distribuzione nei biotopi, profondità a stazioni di reperimento.

Distribution

The species generally inhabits *P. oceanica* meadows, at depths of 1-40 m. Reported from the Western and Central Mediterranean (Dell'Angelo & Smriglio, 1999; Caccia *et al.*, 2004). The species is here reported for the first time from the Eastern Mediterranean.

Discussion

The Mediterranean Polyplacophoran species occur in different biotopes, within a large depth range from 0 to 1000 m (Dell'Angelo & Smriglio, 1999). Since the material of this study was obtained from relatively deep localities – except for a few sampling stations – and the

Characters	<i>L. cimicoides</i> (Present study)	<i>L. cancellatus</i> (in Dell'Angelo & Smriglio, 1999)
Sculpture of tegmentum	Granules separate, 1 st plate and post mucronal of 8 th plate areas and lateral parts of intermediate plates quinconce, forming longitudinal stripes at the central area of intermediate plates	Granules joined, forming radial stripes on the 1 st , post mucronal area of 8 th plate and the lateral parts of intermediate plates, and longitudinal stripes at the central area of intermediate plates
Shape of apical area of intermediate plates	(See fig. 2, e)	Middle part of the apical area swollen, extending more or less parallel to posterior edges
Blade of incinate plate	Tricuspidate (Fig. 2 f)	Monocuspidate

Tab. 3. Some distinguishing characteristics between *Lepidopleurus cimicoides* and *L. cancellatus*.

Tab. 3. Alcuni caratteri distintivi tra *Lepidopleurus cimicoides* e *L. cancellatus*.

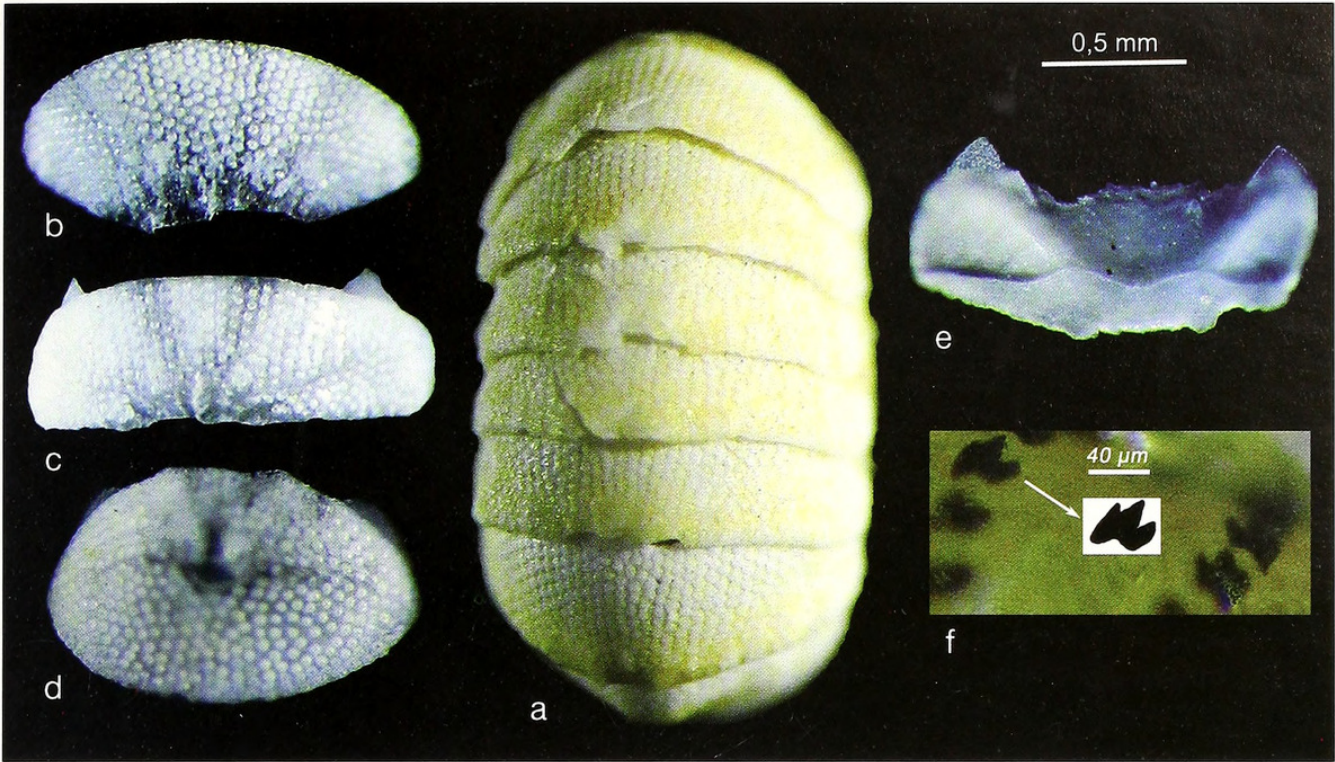


Fig. 2. *Lepidochitona cimicoides*: **a.** Dorsal view of a specimen, **b, c, d.** Dorsal view of I, IV and VIII plates, **e.** Ventral view of plate IV, **f.** Tricuspidate blade of the uncinata plate (the radula's second lateral teeth).

Fig. 2. *Lepidochitona cimicoides*: **a.** Vista dorsale di un esemplare, **b, c, d.** Vista dorsale delle piastre I, IV e VIII, **e.** Vista ventrale della piastra IV, **f.** Lamina tricuspidata della placca uncinata (secondo dente radulare laterale).

shallow water and hard bottom substrate samplings are insufficient, some species that were previously reported by Strack (1988, 1990); Tringali & Villa (1990); Öztürk *et al.* (2000) and Koukouras & Karachle (2005) from the Greek and Turkish coasts of the Aegean Sea could not be sampled. However, the two species, *L. cimicoides* and *L. furtiva*, are included for the first time to the Aegean Sea Polyplacophoran fauna.

Lepidopleurus cimicoides is a small sized species; the specimens examined in this study had lengths ranging between 1.8 and 3.1 mm. Due to their similar size and morphologies, this species was sometimes misidentified as *L. cancellatus* in earlier studies, which is a very rare species in the Mediterranean Sea (Dell'Angelo, pers. comm.). The distinguishing characters between these two species were given in detail by Dell'Angelo & Smriglio (1999:37), where the blade of the uncinata plate (second lateral teeth of the radula) is tricuspidate in *L. cimicoides* (Fig. 2 f) and monocuspidate in *L. cancellatus*. The location of the tegmentum granules and the general shape of the apical area of the intermediate plates are other distinctive features between these two species (Tab. 3).

Only a single specimen of *L. furtiva* was encountered in this study. Although a live specimen of the species has not been observed in the Aegean Sea until now, an intermediate plate of this species was found along the Datca coast (southern Aegean Sea, Turkey) (Dell'Angelo pers. comm.) and an illustration was given by Dell'Angelo & Smriglio (1999:152). The tegmentum of *L. furtiva* is completely smooth (although in Fig. 3 it seems to be granulated because of colour spots). Only weak radial stripes exists on the tegmentum, which are especially more distinct on the lateral areas of the inter-

mediate plates. Dell'Angelo & Forli (1996:43,45) reported that the shape of the valves in this species presents some similarities with the valves of the fossil Pliocene *Lepidochitona verrucosa* Dell'Angelo & Forli, 1996. *L. furtiva* lives between the leaves of *P. oceanica*, a few centimetres above the roots (Strack, 1988).



Fig. 3. *L. furtiva* (3.6 × 1.9 mm).

Fig. 3. *L. furtiva* (3,6 × 1,9 mm).

H. hanleyi was previously reported from the Aegean Sea by Strack (1990), and is now added to the Turkish Polyplacophoran fauna. The two juvenile specimens determined in this study had lengths of 2.5 and 1.7 mm. This species generally occurs at depths between 50-100 m, in coralligenous biotopes and muddy detritus. In summarizing the results we noticed that out of the 18 Polyplacophoran species occurring in the Aegean Sea some prefer a distinct type of habitat in shallow waters, i.e. *L. caprearum*, *L. cinerea* and *L. furtiva*, while species like *L. cimicoides*, *L. africanus* and *C. corallinus* show a much wider range.

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