Two new marine flatworms (Platyhelminthes: Rhabditophora: Proseriata) of the genus *Otoplana* Du Plessis, 1889 from the upper Tuscany sandy shores (Italy)

GIANLUCA MEINI1,2

1Current address c/- Australian Museum, 6 College Street, Sydney NSW 2010, Australia
2Dipartimento di Biologia, Università di Pisa, Via Volta 6, 56126 Pisa, Italy. E-mail: gmeini@y7mail.com

**Abstract**

Two new otoplanid species, from the interstitial habitats of the North-Western Mediterranean sea coast, are described. The specimens show the typical morphological peculiarities of the subfamily Otoplaninae ("Turbellaria", Otoplanidae), but clearly differ from other species described in this group. *Ooplana labronica* sp. nov. is characterized by a body length of 1.2–1.5 mm, different features of the testes and vitellaries, the male sclerotic apparatus composed of a median aculeus (52–53 μm long) and 16 peculiar spines (19–44 μm long). This new species has the smallest number of spines (17) and the smaller body length, in comparison to all the species of the genus. *Ooplana falcataspina* sp. nov. is characterized by a body length of 2.3–2.4 mm, distinctive dimensions and arrangement of the vitellaries, the male sclerotic apparatus composed of a median aculeus (50–51 μm long) and 20–21 spines (22–44 μm long). This new species has a limited body length, and only the sexually mature specimens of the new species *O. labronica* exhibit a smaller size. They were collected below the low water mark on the sandy beaches at Calambrone and Marina di Vecchiano (Pisa, Ligurian Sea, Italy), respectively.

**Key words:** Mediterranean Sea, marine biodiversity, taxonomy, meiofauna, Otoplanidae, new species

**Introduction**

Despite recent work, especially by Ax (1956, 1959), Lanfranchi (1969, 1978) and Lanfranchi & Melai (2007, 2010), the free-living platyhelminth family Otoplanidae is still little known. The family, which now contains 40 genera with about 125 species worldwide (Tyler et al. 2006–2012), is the dominant mesopsammic taxon found interstitially in the surf zone of sandy beaches, where they move rapidly among the sand grains. This investigation presents two new species of "Turbellaria" from western Italian sea coasts, attributed to the subfamily Otoplaninae on the basis of a partially ciliate body, a ciliate creeping ventral body surface and above all a cylindrical pharynx lying ventrally in the posterior trunk region. *Ooplana labronica* sp. nov. and *Ooplana falcataspina* sp. nov. belong to the family Otoplanidae (Platyhelminthes, Rhabditophora, Proseriata), which represents a globally distributed, marine group characteristic of the ‘Otoplanen-Zone’ defined by Remane (1933). They are assigned to the genus *Otoplana* (Du Plessis 1889; Ax 1956) on the basis of the general arrangement of pharynx, testes, germovitellaria, sclerotic apparatus and, above all, the presence of the clearly distinguishable accessory male pore.

From the taxonomic literature (Lanfranchi & Melai 2007), eighteen species have been historically classified in the genus *Otoplana*, but most have now been assigned to other genera or are incompletely described. As already reported (Lanfranchi & Melai 2010), there are at present five accepted species in the genus *Otoplana*: *O. intermedia* Du Plessis (1889) (Ax 1956) collected in the Ligurian and Tyrrenhian Seas, *O. bosporana* Ax (1959) sampled in the Bosphorus (Black Sea), *O. truncaspina* Lanfranchi (1969) discovered at Monte Rosso al Mare (Ligurian Sea), *O. oxyspina* Lanfranchi and Melai (2007) collected at Caletta Beach (Ligurian Sea), and *O. proxima* Lanfranchi and Melai (2010) from Marina di Bibbona (Ligurian Sea). With the description of two new species presented in this article, the currently known number of confirmed species of the genus *Otoplana* is now seven (Table 1). All described species of *Otoplana* have been collected within the basin of the Mediterranean Sea.
TABLE 1. Main diagnostic characters of species of Otoplana.

<table>
<thead>
<tr>
<th>Species</th>
<th>Body length of sexually mature individuals</th>
<th>Male sclerotic apparatus</th>
<th>Length of spines</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>O. intermedia</em> Du Plessis, 1889</td>
<td>8 mm</td>
<td>24</td>
<td>80–90 μm</td>
</tr>
<tr>
<td><em>O. bosporana</em> Ax, 1959</td>
<td>2.5–3 mm</td>
<td>30–33</td>
<td>33–59 μm</td>
</tr>
<tr>
<td><em>O. truncaspina</em> Lanfranchi, 1969</td>
<td>4.5–5 mm</td>
<td>23</td>
<td>28–66 μm</td>
</tr>
<tr>
<td><em>O. oxispina</em> Lanfranchi &amp; Melai, 2007</td>
<td>3.3–4 mm</td>
<td>21</td>
<td>36–65 μm</td>
</tr>
<tr>
<td><em>O. proxima</em> Lanfranchi &amp; Melai, 2010</td>
<td>5 mm</td>
<td>23–24</td>
<td>42–70 μm</td>
</tr>
<tr>
<td><em>O. labronica</em> sp. nov. this paper</td>
<td>1.2–1.5 mm</td>
<td>17</td>
<td>19–53 μm</td>
</tr>
<tr>
<td><em>O. falcataespina</em> sp. nov. this paper</td>
<td>2.3–2.4 mm</td>
<td>21–22</td>
<td>22–51 μm</td>
</tr>
</tbody>
</table>

Material and methods

Specimens were collected by scooping up the upper layers of sediment, in September 2007, along the shore-line zone at Calambrone (Pisa, Ligurian Sea) where the surf breaks and the sediment is characterized by fine sand, and also in July 2009 at Marina di Vecchiano (Pisa, Ligurian Sea) where the surf-zone is characterized by medium-fine sand. Weather conditions were optimal with a calm sea, a light breeze, and a temperature of 24 °C during the first sampling, while for the second sampling the temperature was 29 °C, with rough seas. All the samples collected were transported to the laboratory in plastic containers. Each organism was first anaesthetized with a MgCl₂ 7 % aqueous solution, constituted of ⅓ of MgCl₂ 21% and ⅔ tap water. Numerous specimens were studied *in vivo* by applying slight pressure after they were covered with a coverslip (Lanfranchi 1978), in order to draw the body form with the aid of the camera lucida. Finally, by compressing the coverslip more forcefully, the sclerotic apparatus spines were examined.

Type material and additional material are stored in the collections of the Electron Microscopy Laboratory of the University of Pisa (Italy) (EMLC-UP). For histological procedures five specimens for each species were fixed in Stieve solution (Lanfranchi 1978). The sections were stained with Heidenhain’s haematoxylin, using eosin as a counterstain and examined under the compound microscope. Whole animals and the sclerotic apparatus spines were studied using a stereomicroscope Cambridge Instruments Model Z30E and two optical microscopes, Wild M20 and Zeiss Axiostar Plus. They were also photographed using a Nikon Coolpix 4500 - 4 mega pixels - zoom 4x - lens 7.85–32 mm, and the program Adobe PhotoShop CS2 was used to generate detailed representations of the body of the animals.

**Abbreviations in the figures:** amp, accessory male pore; ap, adhesive papillae; b, brain; ci, cephalic intestine; esv, external seminal vesicle; ge, germaries; i, intestine; M, “Medianstachel” or median aculeus; ph, pharynx; r, rhabdites; s, sclerotic apparatus; sd, spermiductus or deferent ductus; sta, statocyst; tb, “Tastborsten” or tactile bristles; te, testes; th, tactile hairs; vg, vesicula granulorum; vi, vitellaries; vs, vesicula seminalis.

Taxonomic accounts

**Phylum Platyhelminthes Claus, 1887**

**Class Rhabditophora Ehlers, 1984**

**Order Proseriata Meixner, 1938**

**Family Otoplanidae Hallez, 1892**

**Subfamily Otoplaninae Hallez, 1910**

576 · Zootaxa 3608 (7) © 2013 Magnolia Press
Genus *Otoplana* Du Plessis, 1889

*Otoplana labronica* sp. nov.
*Otoplana falcatuspina* sp. nov.

*Otoplana labronica* sp. nov.
(Figs 1–8)

**Holotype:** A sagittally-sectioned specimen (EMLC-UP 158) deposited in the Electron Microscopy Laboratory Collection of the Dipartimento di Biologia, Unità di Etologia (Università di Pisa).

**Type locality:** Italy, Tuscany, Ligurian Sea: loc. Calambrone (Pisa) (lat. 43°35’18’’ N, long. 10°17’38’’E). Surf-zone characterized by fine sand. Coll. September 2007.

**Additional material:** At least 20 specimens were studied *in vivo*, including drawings and photographs, all from the type locality. Paratype (EMLC-UP 158-A,B,C): three specimens from the type locality, sagittally sectioned. Two whole mounts (EMLC-UP 158-D,E) from the type locality.

**Description:** The length of sexually mature organisms varies from 1.2 to 1.5 mm. The body is fusiform, dorsally convex, ventrally flat, colourless and transparent (Figs 1, 2). The anterior end is characterized by a ‘Köpfchen’ (according to Ax 1956) or cephalic swelling with numerous tactile hairs (th) and followed by two lateral couples of ‘Tastborsten’ (Ax 1956) or tactile bristles (tb) retractable into the respective wide pockets (Figs 1, 2, 3). The rhabdoids, a variety of secretions in epidermal cells or in subepidermal glands, are present as true rhabdites (r) (Fig. 9), grouped to form longitudinal lines along the body, with the exception of the anterior end, where they are randomly spread. The ovoid brain (b), located at the back of the statocyst (sta), is irregular: it is provided with two-three pairs of lateral rounded protuberances, starting from the front side (Figs 1, 2, 3).

The testes (te), beginning fairly close to the brain, consist of two series of medium size follicles lying along the longitudinal body axis. They consist of 16–20 follicles per side, distributed in a single line per side (Figs 1, 2, 3).

Two irregular longitudinal rows of small vitellaries (vi) run externally to the testes from just before the testis follicles to the penis papilla opening, and show an uniform pattern of distribution (Figs 1, 2, 3). Two germaries (ge), clearly separated from each other, lie in front of the pharynx, posterior to the last testis follicles; they are globoïd, have medium–small dimensions and contain numerous egg cells (Fig. 1). The pharynx (ph) lies at ⅔ of body length, and exhibits the so-called bell-shaped organization (‘Glöckchen’) typical of the genus. The sacciform intestine (i) is a caecum at both ends and there is no anterior restricted protuberance as a cephalic intestine (Fig. 1). The accessory male pore (amp) is clearly visible laterally on the penis papilla. This important diagnostic feature of the genus can be observed (Figs 1, 4) only in living, semi-squashed specimens. The caudal end appears as a narrow plate provided with numerous adhesive papillae (ap). These bi-glandular structures are also present in the ventrolateral epidermis along the body length (Figs 1, 2, 4). In the postpharyngeal zone, the voluminous and sacciform *vesicula seminalis* (vs) is connected distally with a large *vesicula granulorum* (vg).

The male sclerotic apparatus (s) consists of a median aculeus and 16 spines of variable shape and length (Figs 5, 6, 7, 8):

- a "Medianstachel" (according to Ax, 1956) or median aculeus (M), almost straight, 52–53 μm long, centrally located in the sclerotized complex, with a large proximal end, blunt and rounded, and a distal extremity which is slender and narrow;
- 16 spines weakly curved with a pointed distal tip bent outward:
  - 2 pairs (a) of spines (group a), 39–44 μm long, placed on both sides of the median aculeus with a blunt proximal end and a straight body;
  - 6 couples of spines (group b) placed laterally on both sides of the previous two, to complete the composition of the crown of spines. Their length becomes progressively reduced starting from a maximum of 37 μm, to a minimum of 19 μm. The proximal end is narrow and blunt, with a straight body.

**Remarks.** *Otoplana labronica* sp. nov. exhibits a body length smaller than for previously described species within this genus: *O. intermedia* (8 mm), *O. proxima* (5 mm), *O. truncaspina* (4.5–5 mm), *O. oxispina* (3.3–4 mm), *O. bosporana* (2.5–3 mm).
FIGURE 1. Body form and organisation of *Otoplana labronica* sp. nov.

FIGURE 2. Photograph of *Otoplana labronica* sp. nov. *in vivo*.
FIGURES 3–4. Photographs of *Otoplana labronica* sp. nov., *in vivo*: anterior end (3) and posterior end (4).

FIGURES 5–6. Spines of male sclerotic apparatus of *Otoplana labronica* sp. nov.

The body of the new species reaches its maximum width in the central region, located just in front of the first half of the caudal region in which the germaries are situated. The latter are localized in a more posterior position than in the other described species. The organization of the cephalic zone and the distribution of the rhabdithes appear similar to those reported for the previously described species. However, with particular reference to the length, the thickness of the robust tactile bristles and the uneven distribution of the rhabdites on the anterior region, the new species shows a remarkable affinity with *O. bosporana*. The vitellaries disposition in a paired longitudinal row composed of small follicles irregularly distributed from the anterior end to the penis papilla opening is rather similar to that observed in *O. bosporana*.

The position of the testes as well as their arrangement are shared with all the species of the genus. The testes arrangement, size and distribution in regular series, are similar to that of *O. bosporana*, although the number of
follicles is slightly fewer. The intermediate dimension and irregular distribution of the testes in *O. truncaspina*, *O. intermedia* and *O. oxispina* are different to those present in the new species. The sacciform intestine is similar to that of all the other species in the genus, but the cephalic intestine is absent. The pharynx, the position of the paired germaries and of *vesicula seminalis, vesicula granulorum* and *penis papilla* coincide with the other species of the genus.

**FIGURES 7–8.** Reconstruction from camera-lucida drawings of the morphology (7) and spatial distribution (8) of the spines of the male sclerotic apparatus of *Otoplana labronica* sp. nov.

The spines of the male copulatory organ of the new species present a different organization compared to that of all the other species. These spines are arranged in eight pairs of different sizes and have a slightly different morphology at the distal end, with a pointed distal tips in some spines and others with blunt tips, all located around the median aculeus. The total number of spines (17) is smaller than that found in *O. bosporana* (30–33), *O. intermedia* (24), *O. proxima* (23–24), *O. truncaspina* (23) and *O. oxispina* (21). The median aculeus (M) is different in size and morphology from that found in *O. truncaspina*, which has an average length of 50 μm and a truncated form, and it has some similarities compared to that of *O. oxispina* (56 μm long) which is more tapered and with a wider proximal extremity. In *O. intermedia* and *O. proxima*, the median aculeus is absent, while in *O. bosporana* it is similar and longer (63 μm), but with a pointed distal end. In the new species *O. labronica*, near the median aculeus, there are two pairs of longer spines (39–44 μm). The lateral spines, on both sides of these two longer pairs, are gradually decreasing in length (37–19 μm) to encircle the crown of spines which constitutes the male sclerotic apparatus. Each of these lateral spines has a straight body, with pointed distal end slightly bent outward. An equivalent location and similar features are also present in *O. bosporana*. In this species, the spines of the sclerotic apparatus reach a major length (33–59 μm) and they do not have a consistent width. All these spines tend to increase their thickness moderately toward the distal end, which is markedly bent than the spines of *O. labronica*. On the basis of the data presented, we conclude that this new species differs from the species already described above, with regard to the body dimensions and, above all, the characteristics of the spines of the male copulatory organ. The new species has some similarities with *O. bosporana*, but it constitutes a new valid species of otoplanid.

**Etymology:** The name *labronica* refers to the type locality where this species is been collected. The site of
sampling is very close to the city of Livorno (Tuscany, Ligurian Sea, Italy), and _labronica_ means “coming from the city of Livorno”.

**Habitat:** Surf zone.

**Distribution:** Known only from type locality.

_Otoplanella falcataspina_ sp. nov.
(Figs 9–17)

**Holotype:** A sagittally-sectioned specimen (EMLC-UP 159) deposited in the Electron Microscopy Laboratory Collection of the Dipartimento di Biologia, Unità di Etologia (Università di Pisa).

**Type locality:** Italy, Tuscany, Ligurian Sea: loc. Marina di Vecchiano (Pisa), Parco Regionale di Migliarino, San Rossoore e Massaciuccoli (43°48’15”N, 10°15’42” E). Otoplanen-Zone characterized by medium-fine sand. Coll. July 2009.

**Addition material:** At least 25 specimens were studied in vivo, including drawings and photographs, all from the type locality. Paratype (EMLC-UP 159-A,B,C): three specimens from the type locality, sagittally sectioned. Two whole mounts (EMLC-UP 159-D,E) from the type locality.

**Description:** The sexually mature animals are 2.3–2.4 mm in body length (Figs 9, 10).

The anterior end is characterized by a cephalic elliptic swelling, provided with numerous tactile hairs (th) and two lateral couples of tactile bristles, retractable into the respective wide pockets (Figs 9, 10, 11). Behind the cephalic swelling the small statocyst is located at the front and at some distance from the ovoid brain, characterized by two lateral rounded protuberances. The rhabdites (r) (Fig. 9) are grouped into longitudinal lines along the body, with the exception of the anterior end, where they display a random and uneven distribution. The testes (te), situated behind the brain and anterior to the pharynx, consist of two rather close series of follicles arranged along the longitudinal axis, 14–15 per side, in a single line and of medium-large size (Figs 9, 10). Two globoid germaries (ge), at some distance from each other, are present in front of the pharynx, posterior to the last testis follicles. They are larger than the vitellaries, and contain numerous egg cells. Two rows of medium-small vitellaries (vi) are present on both sides, placed laterally to the testes. They begin in the area behind the brain and reach the penis papilla opening, maintaining a distribution in single rows (Fig. 9).

The pharynx (ph), located in the caudal half of the animal, shows the so-called "bell-shaped" organization typical of the genus. The saciform intestine (i) is a caecum at both extremities, rostrally possessing a tract, called cephalic intestine (ci) (Figs 9, 10). The caudal plate is narrow and provided with a few large adhesive papillae (ap) (Figs 9, 10, 12). In the post-pharyngeal zone, the saciform _vesicula seminalis_ (vs) is connected distally with a _vesicula granulum_ (vg). The external seminal vesicles (esv) and the accessory male pore (amp), typical of the genus, are clearly visible at the sides of the penis papilla (Figs 9, 10, 12, 13). The caudal end appears slightly rounded and provided with numerous adhesive papillae (ap) (Figs 9, 10, 12).

The male copulatory organ presents a sclerotic apparatus (s) with 20–21 spines of slightly variable shape and differing length, and a central aculeus (Figs 14, 15, 16, 17):

- a predominant median aculeus (M), 50–51 μm long, with a considerable thickness, pointed and blunt at the distal end, is situated in the center of the sclerotic complex;
- 1 pair (group a) of spines internally curved, 44 μm long, arranged on both sides of the median aculeus with a pointed distal extremity and a small sub-terminal cuneiform prominence on the concave side;
- 1 pair (group b), 41 μm long, external to the previous ones with a pointed outwardly bent tip. These spines are characterized by the absence of a cuneiform sub-terminal prominence on the concave side;
- 1 pair (group c), 37 μm long, placed at both sides of the previous pair (b), with a minimally developed cuneiform sub-terminal prominence and a pointed outwardly bent tip;
- 7 pairs (group d) of spines, with a decreasing length going towards the end of the spines crown, from a maximum of 35 μm to a minimum of 22 μm. They are placed laterally with respect to the previous ones, with a well-developed distal prominence characterized by a progressive enlargement of spines thickness and an outwardly bent pointed tip.
FIGURE 9. General organisation of *Otoplana falcaspina* sp. nov. (1) and superficial dorsal view with the general arrangement of the rhabdites in both new *Otoplana* species (2).
FIGURES 10–13. Photographs of Otoplana falcataspina sp. nov. in vivo: 10, living animal; 11, anterior end; 12, posterior end; 13, male copulatory organ region.

FIGURES 14–15. Spines of male sclerotic apparatus of Otoplana falcataspina sp. nov.
FIGURES 16–17. Tracing (16) and spatial distribution (17) of the spines of the male sclerotic apparatus of *Otoplana falcataspina* sp. nov.

**Remarks.** The new species *Otoplana falcataspina* has a smaller body size, in comparison to all the species of this genus previously described. Only the sexually mature specimens of *O. labronica* exhibit a smaller size (1.2–1.5 mm). The appearance of the cephalic swelling and the distribution of the rhabdites are reminiscent of that observed in the other species. The distribution of the tactile hairs and tactile bristles corresponds to that described in *O. bosporana, O. oxyspina, O. truncaspina, O. proxima* and *O. intermedia*. Indeed, the anterior tactile bristles are constituted by relatively conspicuous bristles, while the posterior ones are longer and more robust. The vitellaries path, arranged in a longitudinal row from the anterior end to the penis papilla opening on each side of the body, is similar to that observed in *O. bosporana, O. intermedia* and *O. truncaspina*, although in the new species the follicles have larger dimensions and are arranged in a single line. The localization of the testes is generally comparable to that observed in all species of the genus, but it is evident there is a greater resemblance with the pattern of *O. bosporana*, both in their extension and in their medium-large dimensions. In *O. intermedia, O. proxima* and *O. truncaspina*, the series of testes have an irregular composition and are formed by many follicles of medium-small size with a distribution not in a single line. Also *O. oxyspina* has an irregular distribution of the testes, but characterized by single follicles that alternate with follicles pairs ranging from small to medium size. Although a tract of cephalic intestine is not present, the sacciform intestine is similar to that of all the species of the genus.

The pharynx, the position of the germaries and of *vesicula seminalis, vesicula granulorum* and *penis papilla* coincide with the other species of the genus, with the exception of *O. oxyspina*, which shows the pharynx with a more central position in the organism (Lanfranchi & Melai 2007).

The spines of the male copulatory organ of the new species show a different organization compared to that of all the other species described in this genus. The total number of spines (21–22) observed in *O. falcataspina* is fewer than that of *O. bosporana* (30–33), *O. intermedia* (24), *O. proxima* (23–24) and *O. truncaspina* (23). Only *O. oxyspina* presents 21 spines, similar to the new species. The sclerotic apparatus is constituted by a pointed median aculeus, 50–51 μm long, encircled by 20–21 bristles, with variable shape and length (22–44 μm). The median aculeus (M) is different from that of *O. bosporana, O. truncaspina* and *O. oxyspina* because of the widest proximal extremity and the very robust body thickness, pointed and blunt on only one side of the distal end. On the contrary, *O. intermedia* and *O. proxima* lack a funnel-shaped aculeus. Worthy of note is the presence of two curved bristles (a), 44 μm long, on both sides of the median aculeus, only found in *O. oxyspina*, but with a well-developed sub-
terminal cuneiform prominence on the concave side and of smaller length (36 μm). In the new species, 20–21 spines decrease in length towards the margins of the crown from 44 to 22 μm, forming a crown starting from the sides of the central aculeus, very similar to that observed in *O. bosporana* where there are a number of spines ranging from 29 to 33 units (33–59 μm long), having a slightly hooked distal end. Therefore, the sclerotic apparatus shows a very similar pattern in these two species, but the specific characteristics of the spines differ from each other.

*Otoplana oxispina* has some similarities with the new species; however, it shows clear differences in spine length and the distinctiveness of their distal extremities. Indeed, it presents 20 longer spines (65–36 μm), slightly curved with pointed tips bent outward. The new species shows instead, an increase in spine thickness, but does not have a well-defined denticle or sub-terminal cuneiform prominence at the distal end. As far as body form, distribution, dimensions of testes and vitellaries, and pharynx position are concerned, it most closely resembles *O. bosporana*.

On the base of the data presented we conclude that *O. falcataspina* differs from the previously described species in body dimensions and, above all, the characteristics of the sclerotic apparatus.

**Etymology**: The name *falconispina* is based on the presence of sickle shaped spines in the sclerotic apparatus of the male copulatory organ.

**Habitat**: Surf zone.

**Distribution**: Known only from type locality.

**Discussion**

*Otoplana labronica* sp. nov. and *O. falcataspina* sp. nov. differ from the other species of the genus in their body dimensions, the different arrangement of the vitellaries, the location and number of the testes, and especially in the characteristics of the male sclerotic apparatus, and they appear more similar to *O. bosporana* collected in the Black Sea.

The discovery and identification of all the species of this genus just within the basin of the Mediterranean Sea is in part due to the limited interstitial collecting which has been undertaken in this habitat in other parts of the world, and in part to the overall complexity of the study and description of interstitial Platyhelminthes, which includes observations of organisms in vivo as well as of sections to appreciate the peculiarity of their complex reproductive system. All these reasons have so far jeopardized a detailed knowledge of their ecological role and contribution to marine biodiversity, which is undoubtedly significant. It seems likely that with additional collecting in this habitat in other parts of the world that the diversity of this genus will increase.

**Acknowledgements**

Dr. Pat Hutchings (Australian Museum) is warmly thanked for her valuable suggestions. Prof. Alberto Lanfranchi (Università di Pisa), who transmitted to me the passion for the study of these groups of interstitial marine invertebrates, and also taught me the basic knowledge necessary to carry out research in the field of taxonomy. I would also like to thank Hilary McDowell for her kindness, helpfulness and patience in helping me with my English.

**References**


Hallez, P. (1910) Un nouveau type d’Alloiooele (Bothriomolus constrictus n. g. n. sp.). Archive de Zoologie Expérimentale et Générale, 3, 611–664.