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Two new species of the genus *Styraconyx* (Tardigrada : Heterotardigrada)

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Abstract : Two new species : *Styraconyx sardiniae* and *S. tyrrhenus* (Tardigrada : Halechiniscidae) were found in organogenous debris and posidonian meadows samples. These samples dredged from the Orosei Gulf (Sardinia, Tyrrhenian Sea), came from depth of -20, -80 m and they were very rich in meiofauna.

Résumé : Deux nouvelles espèces des tardigrades marines : *Styraconyx sardiniae* et *S. tyrrhenus* (Tardigrada : Heterotardigrada) ont été trouvées dans le golfe de Orosei (Sardaigne) à la profondeur de -20, -80m. Les échantillons ont été dragués sur différents substrats et ils ont révélé une grande richesse et une grande variété de la méiofaune.

INTRODUCTION

The benthic population of the Orosei Gulf (Sardinia) 40° 20'30" N, 9° 40' 15" E in the Tyrrhenian Sea, was the subject of a dredging survey carried out in September 1985. Sixty samples were collected from different substrata at depths ranging from -20 to -80 m. The sample analysis revealed a very rich meiofauna both in specimens and species of different groups. Tardigradofauna was represented by the following species : *Archechiniscus minutus* Grimaldi de Zio & D'Addabbo Gallo, 1987, *Batillipes littoralis* Renaud-Debyser, 1959, *Chrysoarctus flabellatus* D'Addabbo Gallo *et al.*, 1986, *Florarctus hulingsi* Renaud-Mornant, 1976, *Halechiniscus greveni* Renaud-Mornant & Deroux, 1976, *Orzeliscus belopus* Du Bois-Reymond Marcus, 1952, *Raiarctus variabilis* D'Addabbo Gallo *et al.*, 1986, *Styraconyx craticulus* (Pollock, 1983), *S. qivitoq* and *S. nanoqsunguak* Kristensen & Higgins, 1984, *S. testudo* D'Addabbo Gallo *et al.*, 1984, *S. kristenseni* Renaud-Mornant, 1981, *Tholoarctus natans* Kristensen & Renaud-Mornant, 1983, *Parastygarctus sterreri* Renaud-Mornant, 1970.

The different substrata were : pure sand, coastal organogenous debris, coralligenous debris, mud and Posidonian meadows.

An analysis of species distribution is in progress, and more detailed results will be reported.

MATERIAL AND METHODS

Samples were collected in September 1985 from Orosei Gulf (Sardinia). From each sample a sub-sample of 500 cc was separated and washed in fresh-water and filtered through a 64 μm mesh sieve or treated with Ludox AM. Permanent slides of tardigrades were prepared using polyvinyl-lactophenol and examined by phase contrast and interference contrast microscopy.

Subfamily Styraconyxinae Kristensen and Renaud Mornant, 1983

Diagnosis : Halechiniscidae with peduncles present either on all digits or only on first and fourth ones. Heart-shaped proximal pads sometimes present at the base of second and third digits. Crescent-shaped claws with one, two or no accessory points according to the genera. Complete set of cephalic cirri always present. Secondary clavae sometimes absent. Primary clavae and fourth papillae similar. Cuticle variable. Cuticular plates absent.

Genus type *Styraconyx* Thulin, 1942

Diagnosis : Crescent-shaped claws with two accessory points included in the claw sheath. External digits always with peduncles ; internal ones with proximal pads and peduncles present or absent. Paired seminal receptacles present.
Species type *Styraconyx haploceros* Thulin, 1942.

Styraconyx sardiniae new species (Fig. 1-6 ; Table 1)

Diagnosis : *Styraconyx* with subterminal mouth, surrounded by a large cuticular ring which sometimes appears as two parts (one dorsal and one ventral). Primary clavae and lateral cirri located on a common cirrophore. Lateral cirri unsegmented ; the other cephalic cirri formed by two parts. Secondary lenticular-shaped clavae present. All digits with peduncles : the external digits have hook-shaped peduncles, the internal ones have rod-shaped peduncles ; internal digits with heart-shaped proximal pads. Claws with two accessory points, one dorsal and one internal, all included in very large claw sheaths. Spines present on all legs ; fourth leg sense organs (P4) formed by a subspherical papilla with terminal spine. Seminal receptacles present, and duct openings located upon female gonopore. Cuticle completely punctuated.

Holotype : Adult female (Fig. 1) (slide 55, 10bS of the Authors' personal collection), is 137 μm long with a maximum width of 57 μm. The dorsal cuticle is thicker than the ventral one and the pillars in the dorsal region are more evident than in the ventral one ; pillars are also found on the legs and cirrophores.

The buccal canal (20 μm) has a strengthening ventral bar. The stylets (21 μm) are very large ; stylet sheaths are present ; stylet supports (9 μm) have a median apophysis for muscle attachment. The mouth opening is subterminal on an indistinct mouth cone and is surrounded by a large cuticular annular fold. The latter

sometimes appears to be formed by a ventral and a dorsal lip. The pharyngeal bulb (20 μm) (Fig. 2) has three distinct articulated placoides (8 μm and 11 μm) : the ventral one is longer than the two dorsal-lateral ones (Fig. 2B, 3 & 4B).

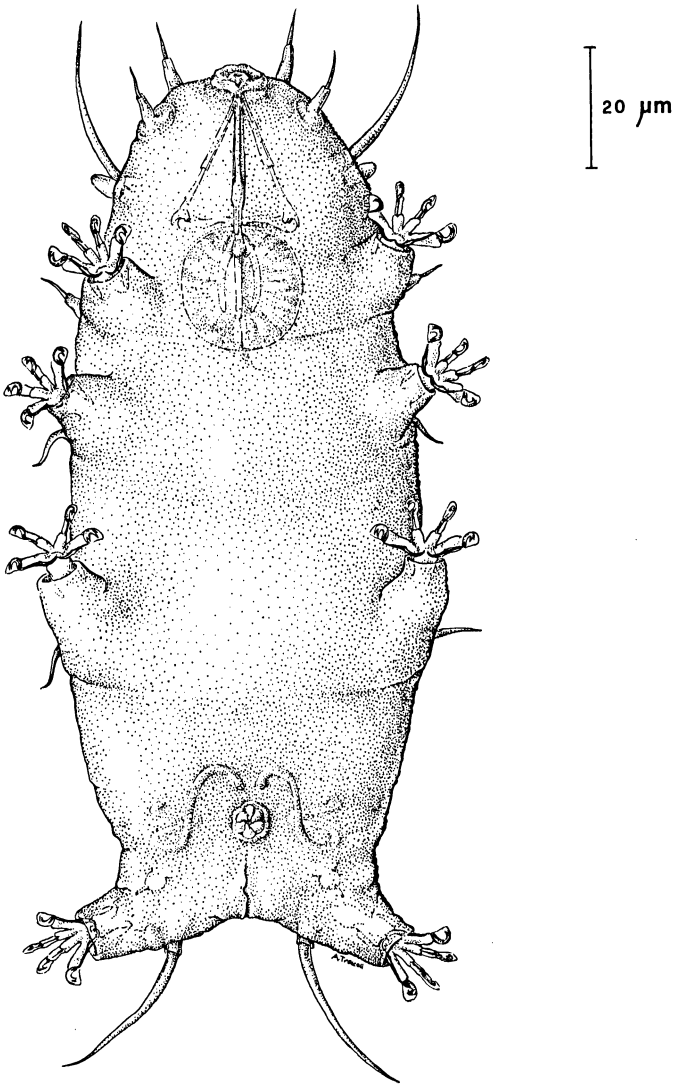

Fig. 1 - *Styraconyx sardiniae* adult female, ventral view.

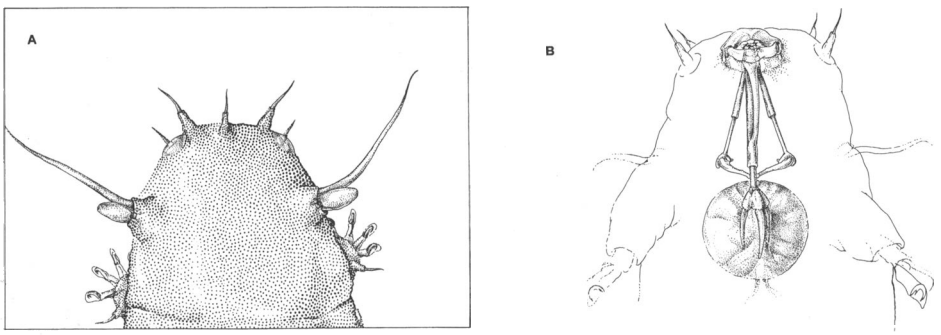

Fig. 2 - *Styraconyx sardiniae* adult female. A: head dorsal view; B: mouth opening and pharyngeal apparatus.

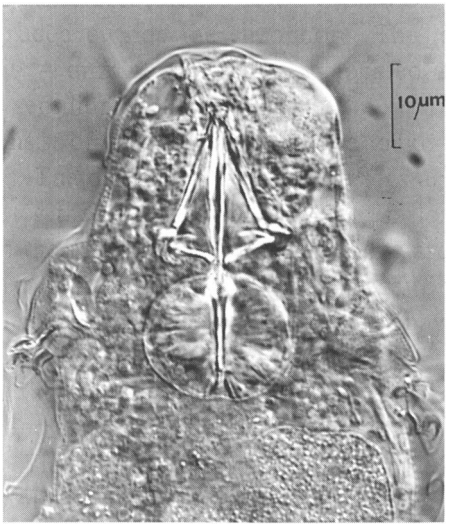

Fig. 3 - *Styraconyx sardiniae* adult female, pharyngeal apparatus.

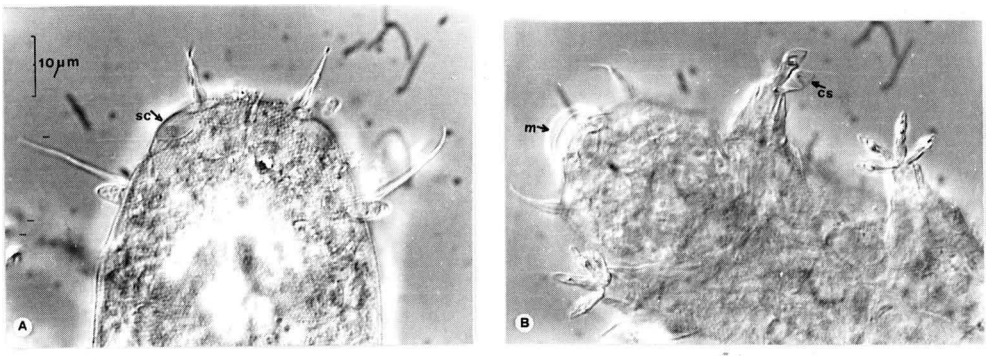

Fig. 4 - *Styraconyx sardiniae* adult female. A: head dorsal view, secondary clavae (sc); B: mouth opening (m), digits with claw sheaths (cs).

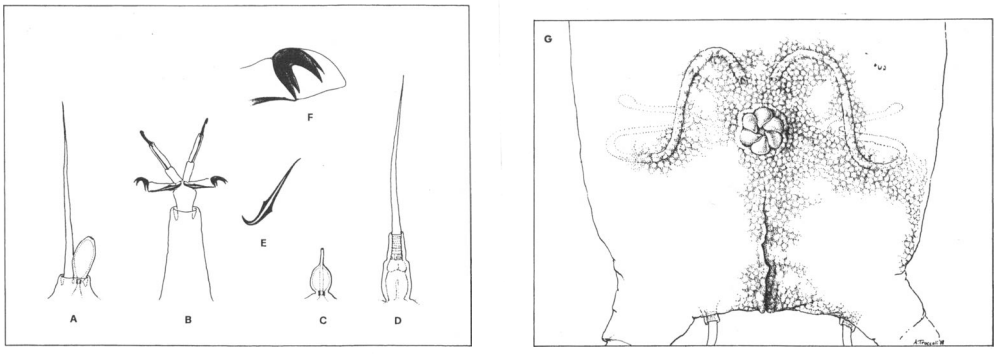

Fig. 5 - *Styraconyx sardiniae* adult female. A: lateral cirrus and primary clava; B: leg: C: sense organ of the fourth leg; D: Cirrus E; E: peduncle of an external digit, F: claw; G: genital region.

The anus, located posteriorly, is between the fourth pair of legs (Fig. 5 & 6C).

A complete set of cephalic sense organs is present (Fig. 1, 2 & 4A). Dorsal medial cirrus is very short (5 μm). The internal cirri (14 μm) are located on the front edge and are made up of a bottle-shaped scapus (6 μm) and a short flagellum (6 μm). The external ventrally located cirri are made up of a stout scapus (5 μm) and a flagellum (4 μm). The medial, internal and external cirri lack cirrophores. Primary clavae (8 μm long and 3 μm wide) and lateral cirri (25 μm) arise from a common cirrophore (5.5 μm). Their position is dorso-lateral; both primary clavae and lateral cirri are surrounded basally by the thin membrane of the cirrophore. The entire clava is free without a surrounding membrane and has a large terminal pore. An annular Van der Land's body is inside its base (Fig. 2A, 4A & 5A). The secondary clavae (6 x 3 μm) are lenticular-shaped and dorsal to the external cirri; their cuticle is smooth (Fig. 2A & 4A). Eye spots were not observed.

The first leg sense organs are made up of two parts, scapus (4 μm) and flagellum (3 μm) with a diffractive structure between them. The second (8 μm) and the third (9 μm) leg spines are unsegmented, both slightly wider at the base and dorsally curved. The sense organs of the fourth leg consist of a papilla (3 x 3 μm) and a spine which begins inside the base of the papilla and protrudes (3 μm). The spine has a basal diffractive structure. The papilla has a short cirrophore (Fig. 4C).

Cirrus E (Fig. 5D & 6B) is partially contained within a bell-shaped cirrophore (10 μm); it consists of scapus and flagellum. The scapus consists of a stout proximal part (4 μm) and a distal accordion plated part (4 μm) which can change its length and can be protruded outside the cirrophore. The long flagellum (26 μm) ends in a very fine point. A diffractive structure is located at the scapus base. Cirrus E is innervated by a sensillum.

The leg appears to consist of coxa, femur, tibia and tarsus, with coxal spines. The tarsus ends in four digits. The digits of the first three legs are shorter than those of the fourth. On the first leg the internal digits are 7,6 μm long and the external digits are 8.2 μm long. On the fourth leg the internal digits are 11.7 μm long and the external digits are 8.8 μm long. All digits have peduncles (5.8 μm) which reach the base of the claws. The external hook-shaped peduncles have two proximal lateral processes at one third of the way along the peduncle. The internal digits have proximal pads and very thin simple rod-shaped peduncles, that go from the pads to the claw bases. The crescent-shaped claws have two accessory points: one dorsal and one internal. The claw sheath is larger than the claw which is completely contained in it (Fig. 4B, 5B-E-F & 6D).

The gonopore consists of six rosette cells. Two seminal receptacles are present and each consists of a large ventral vesicle and a S-shaped genital duct whose opening is anterior to the gonopore (Fig. 5G & 6A-C).

Anus and gonopore are located on a very finely punctuated area and gonopore is slightly protruded (Fig. 6A).

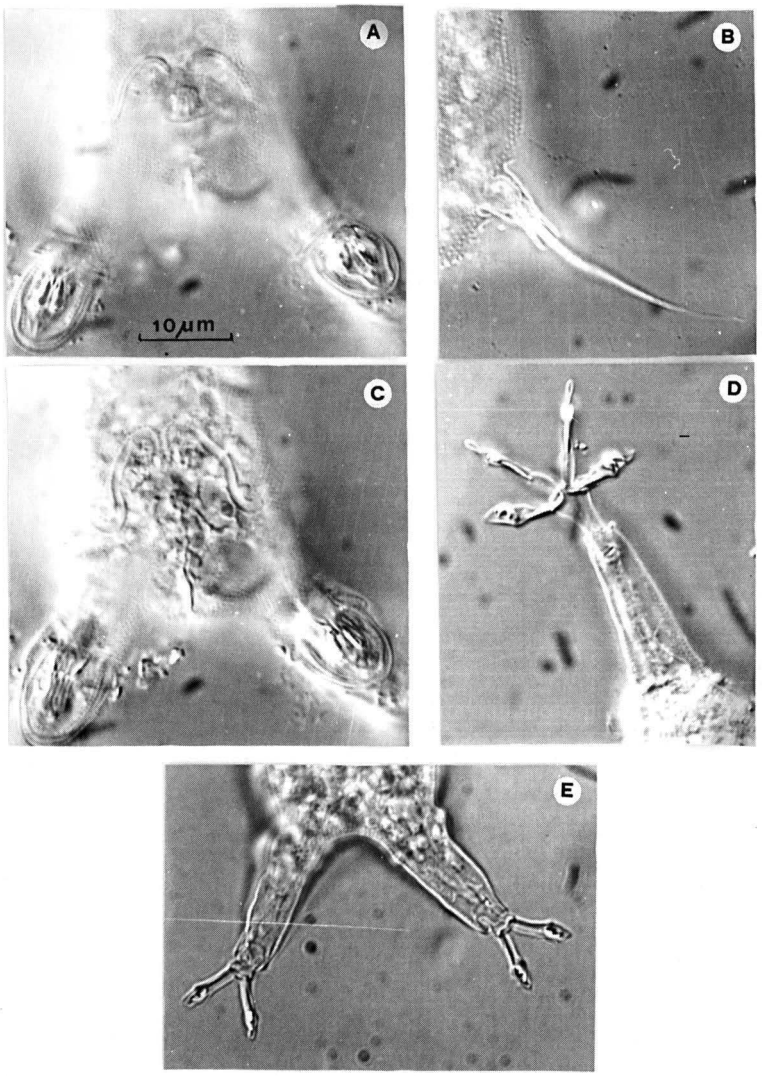

Fig. 6 - *Styraconyx sardiniae*. A : adult female gonopore and seminal receptacle ducts ; B : cirrus E ; C : seminal receptacle ducts and anus ; D : fourth leg of adult female ; E : fourth leg of first stage larva.

TABLE 1

Styraconyx sardiniae : measurements (in µm) of larvae and adults

	first stage				second stage				adult females				
	range	mean	♂	n°	range	mean	♂	n°	holotype	range	mean	♂	n°
L	61-84	75.3	8.7	6	56-143	110	21.9	28	137	103-185	137	18.3	49
W	24-30	28	3.2	6	20-64	40	9.6	28	57	28-71	49	12	49
pb W	11-16	12.6	3.6	3	13-28	16	3.4	13	20	13-21	17	2.6	20
st	13-15	13.6	1.2	3	15-18	16.5	0.9	9	21	14-24	18	3	19
su	4-8	5.6	2	3	4-6	5.3	0.7	9	9	5-8	6.5	0.8	19
m C	5-9	6.3	1.8	5	3-7	5	1.6	19	5	3-9	6	1.6	25
i C	9-11	9.3	0.8	6	5-12	9	1.5	27	14	7-14	10	1.5	48
e C	8-11	9.3	1.3	6	7-11	9	1.3	22	11	6-16	9	1.7	47
l C	12-22	16.2	4.2	5	13-22	17	3	28	25	12-25	20	2.8	46
I Cl	4-7	5	1	6	2-8	6	1.4	28	8	4-9	6.5	1	49
II Cl W	-	2	-	1	2-4	2.6	0.6	19	3	1-4	2.8	0.7	30
II Cl	-	5	-	1	5-9	5.7	1.3	19	6	3-13	6.5	1.8	30
Pl	4-7	5.3	1	6	4-9	5.5	1.2	26	7	4-9	6	1	47
P2	3-5	4.5	0.8	6	4.8	5.4	1.3	25	8	4-10	6.5	1.3	47
P3	4-7	4.8	1.2	6	4-9	6	1.5	25	9	4-11	7	1.8	45
P4	4-7	6.3	1.3	6	3-8	5.3	0.9	26	6	4-10	6.5	1.2	43
C E	14-25	17	4.6	5	10-23	17	3.6	25	34	18-39	25.5	5.2	44
A-G	-	-	-	-	-	-	-	-	2	2-6	3	1	34

Post-embryonal development (Table 1)

The post-embryonal development consists of three stages: the first-stage larva, 83 μm long, has only two digits with peduncles and claws with two accessory points. The two digits, which correspond to the internal ones of the adult (Kristensen & Higgins 1984) with peduncles in contact with the base of the claw (Fig. 6E). On the fourth leg the digits are 7 μm long (uncus 3 μm long) while the digits of the first three legs are 5 μm long (uncus 1.5 μm long). All cephalic cirri and first leg sense organs (P1) are made up of scapus and flagellum. The primary clavae (5 μm) and the lateral cirri (18 μm) arise from a small cirrophore (2 μm); the clavae are open at their distal ends; Van der Land's body is present within the base of the primary clava. Lateral cirri are unsegmented. The cirri E have the scapus inserted in the cirrophore (4 μm) as in the adult.

Anus and gonopore are not present.

The second-stage larva, 79 μm long and 26 μm wide, has four digits; claws of external digits are simple and those of internal digits have accessory points. Peduncles are as in adults. The primary clavae and lateral unsegmented cirri are without common cirrophore. The first leg sense organs are located dorsally and posteriorly on the leg, while the second and third spines are dorsally and medially located on the leg. The sense organ of the fourth pair of legs is a papilla directly inserted on the leg. The anus is present; gonopore is absent.

The third-stage larva, 106 μm long and 33 μm wide, has four digits all with three pointed claws; the primary clavae and lateral unsegmentated cirri are inserted on a common cirrophore. The third-stage larvae are similar to the adult but lack mature gonads and gonopore.

No males were found.

DISCUSSION

Styraconyx sardiniae shows evident affinities with other species of the genus *Styraconyx*. It has peduncles on all digits: the peduncles of the external digits are hook-shaped and stronger than in *S. kristenseni* and *S. sargassi* Thulin, 1942 (Du Bois-Reymond Marcus, 1952; Renaud-Mornant, 1981 and Kristensen & Higgins, 1984). Claws are short and strong as in *S. hallasi* (Kristensen, 1977) and their accessory points are as in *S. nanoqsunguak* and in *S. hallasi* (Kristensen & Higgins, 1984). The whole claw is completely covered by the sheath as in *S. qivitoq*.

Clavae and lateral cirri are not enveloped by a common membrane. This membrane is limited to the proximal part and surrounds only the base as in *S. qivitoq, S. nanoqsunguak* and *S. kristenseni*.

Lateral cirri are unsegmented as in *S. craticulus* and *S. haploceros*.

As in *S. nanoqsunguak*, there are buccal papillae. Secondary clavae and cirri E structures are as in *S. qivitoq*.

S. sardiniae differs from all the other species of the genus by an important taxonomic character (Kristensen & Renaud-Mornant, 1983; Kristensen & Higgins,

1984), that is, the morphology of genital duct opening of the seminal receptacles. These openings are located on the gonopore. Genital duct length varies according to the maturity of females.

The postembryonal development is similar to that of *S. nanoqsunguak* and *S. qivitoq* but differs in that it has only three stages.

Styraconyx tyrrhenus new species (Fig. 7-9 ; Table 2)

Diagnosis : *Styraconyx* with terminal mouth, no buccal papillae, eyespot absent. Primary clavae and lateral cirri situated on a common extended cirrophore which envelops the two sense organs. Lateral cirri not segmented. Secondary lenticular-shaped clavae present. Peduncles present on all digits ; the external ones are sinuous with two lateral expansions while the internal ones are rod-shaped ; internal digits with heart-shaped proximal pads. Claws with two accessory points, all included in the claw sheath. Spines on all legs. The fourth pair sense organs formed by ovoidal papilla with spine. Seminal receptacles present with genital ducts converging into one opening on the gonopore. Dorsal cuticle punctuated.

Holotype : Adult female (Fig. 7) is 135 µm long and 38 µm wide (slide 10 EbS of the Authors' personal collection).

The dorsal cuticle shows evident pillars whereas the ventral cuticle is smooth. The protruding mouth is subterminal and ventrally located. The pharyngeal bulb is roundish (18 µm in diameter) with three distinct placoides. The stylet supports are exactly orthogonal to the buccal canal, the strengthening bar is absent. A complete set of cephalic sense organs is present. Dorsal medial cirrus is short (4 µm) and does not extend beyond the front edge of the head ; the external cirri are ventrally located on a short robust cirrophore and are made up of scapus (6 µm) and flagellum (5 µm) ; internal cirri are dorsal and located near the front edge of the head and they consist of scapus (5.5 µm) and flagellum (7 µm) and arise from a cirrophore. The primary clavae (8.5 µm long and 3 µm wide) and lateral unsegmented cirri (28 µm) are inserted on a common cirrophore (3 µm) ; their position is dorsal-lateral. Clavae and lateral cirri are partially surrounded by a common membrane which is the extension of the cirrophore. This membrane extends at least half way along the length of the clavae. The primary clavae have a terminal pore and a Van der Land's body at their base, on the cirrophore (Fig. 8A). The secondary clavae (6.5 x 2 µm) are lenticular-shaped and they are located dorsally to the external cirri.

The first leg sense organ (P1) is made up of scapus (3 µm) and flagellum (5 µm) with an intermedial structure similar to a Van der Land's body. Second (P2) (11.5 µm) and third leg spines (P3) (14 µm) are unsegmented and stout. The fourth leg sense organ (P4) consists of ovoidal papilla (3 µm) and a tube-like spine (6 µm). The spine is 3 µm inside and 3 µm outside the papilla ; at the base of the spine

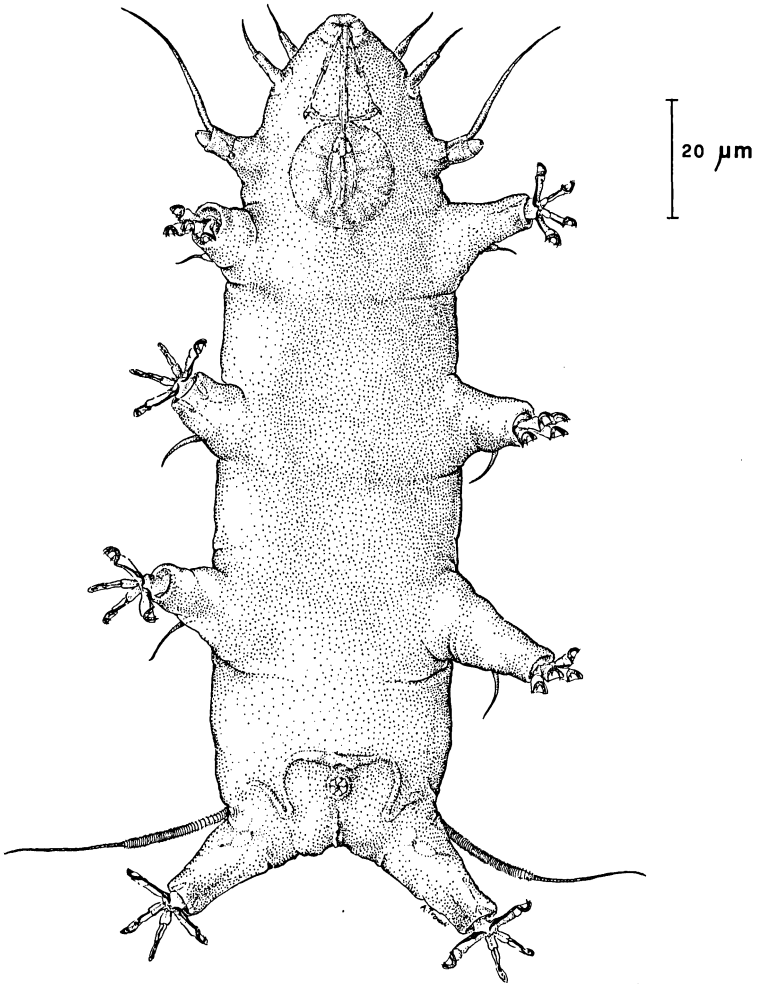

Fig. 7 - *Styraconyx tyrrhenus* adult female, ventral view.

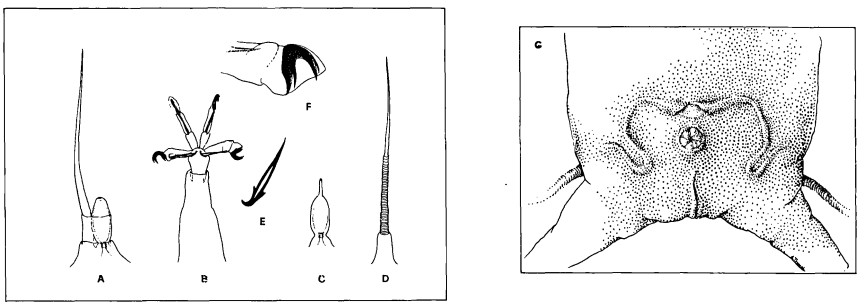

Fig. 8 - *Styraconyx tyrrhenus* adult female. A: lateral cirrus and primary clava; B: leg; C: sense organ of the fourth leg; D: Cirrus E; E: peduncle of an external digit; F: claw; G: genital region.

there is a diffractive structure. The papilla arises from an indistinct cirrophore (Fig. 8C). The leg spines are coxal.

The other somatic sense organ, that is cirrus E, arises from a frustum of cone-shaped cirrophore (4 μm) and consists of an accordion plated scapus (17 μm) followed by a flagellum (21 μm) (Fig. 8D).

The leg consists of coxa, femur, tibia and tarsus which has four digits. All digits are provided with peduncles (Fig. 8B & 9C). The internal ones are simple, strong and extend from pads to the bases of the claws; the external ones are sinuous with two lateral processes located at least 1/3 of the way along the length of the peduncle; they are hollow in their distal portion (Fig. 8E). Digits, peduncles and claws of the first three pairs of legs are shorter than the fourth ones. The claws have a strong uncus and a short dorsal accessory point. The thin internal accessory point is as long as the basal one. The moderately well developed claw sheath covers the uncus almost completely and only the top of the primary point is free, even when the claw is retracted (Fig. 8F).

The protruded rosette-shaped gonopore is formed by six cuticular folds. Two seminal receptacles are present; the two ducts converge and come to the surface through a single opening above the gonopore but very close to it (Fig. 8G & 9A-B).

Paratypes: 6 adult females, 1 first stage larvae and 2 second stage larvae from the type locality. The larval stages do not show peculiarities: the first stage has two fingers and lacks anus and gonopore, the second stage has anus and four fingers as the adults, but lacks gonopore.

DISCUSSION

Styraconyx tyrrhenus has all digits with peduncles as *S. sargassi, S. haploceros, S. craticulus* and *S. sardiniae* (Kristensen & Higgins, 1984). External peduncles have a wide hollow terminal portion as in *S. nanoqsunguak*, however they are longer and slimmer and reach the base of the claw. Furthermore, the hollow distal portion extends at least 2/3 of the way along the total length; internal peduncles are shorter and slimmer than in *S. sardiniae.*

Both accessory points of the claws are reduced as in *S. qivitoq*, but claw sheath is not as large as in *S. qivitoq* and therefore, the top of the primary point is exposed.

Clavae and lateral cirri are enveloped by a common cuticular plica arising from the terminal part of the cirrophore as in *S. craticulus* (Pollock, 1983).

Lateral cirri are unsegmented as in *S. craticulus, S. haploceros* (Kristensen & Higgins, 1984) and *S. sardiniae*.

Cirrus E has an accordion-plated scapus as in *S. nanoqsunguak, S. sardiniae* and *S. qivitoq* which is as long as in *S. qivitoq*.

Secondary clavae are reduced and are therefore not easily distinguishable as in *S. craticulus* and *S. sargassi.*

Genital duct openings of seminal receptacles are located anterior to the gonopore as in *S. sardiniae*, but are different from those of all the other *Styraconyx* species since they have only a single common opening.

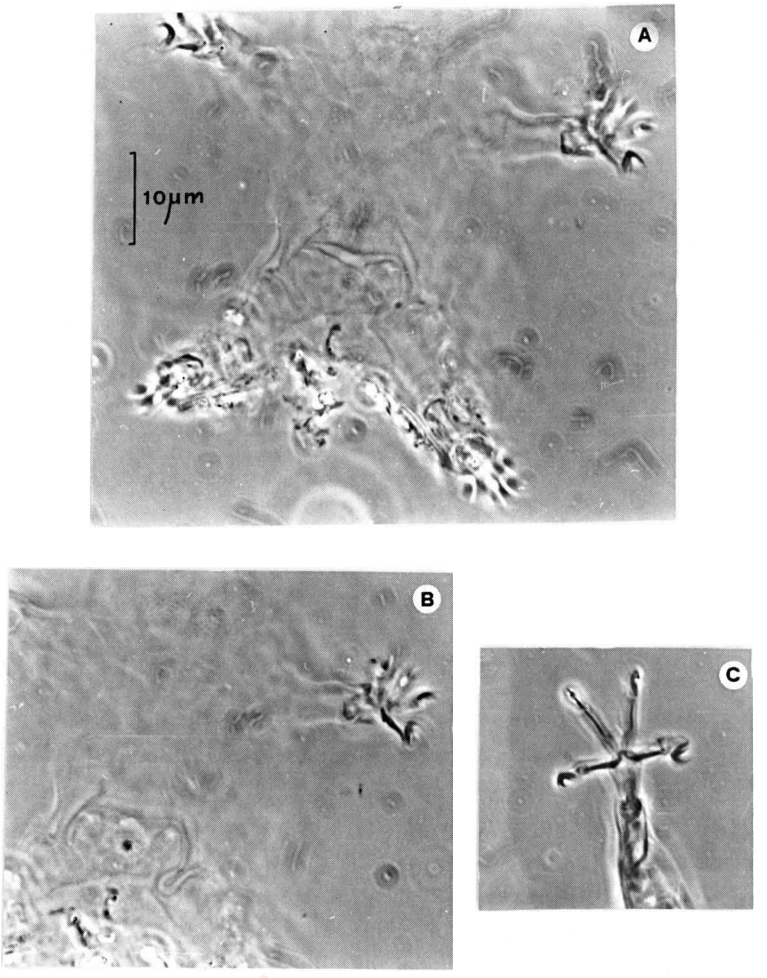

Fig. 9 - *Styraconyx tyrrhenus* adult female. A, B: ventral view seminal receptacle ducts and gonopore; C: fourth leg.

TABLE 2

Styraconyx tyrrhenus: measurements (in μm) of adults and larvae

	holotype	range	mean	♂	n°	first stage	second stage
L	135	104-125	113.8	7.9	6	66	115
W	38	26-56	40.2	11.4	6	21	33
pb	-	12-13	14.3	2.6	3	12	14
st	-	-	10	-	1	-	10
m C	-	8-11	9	1.4	3	-	-
i C	12	10-15	12.1	1.6	6	12	12
e C	11	9-15	10.3	2.2	6	7	10
l C	28	18-26	22.1	2.4	6	15	21
I Cl	8	7-9	7.6	0.7	6	5	8
P1	8	5-8	6.6	1.2	5	4	-
P2	11	5-10	8	1.6	6	5	-
P3	14	7-10	8.5	1.1	4	5	-
P4	6	5-8	6.5	1.1	4	5	7
C E	38	19-31	22.3	4.1	6	20	15
A-G	5	4-8	6	2	2	-	-

Abbréviations

L	= total length	IC	= lateral cirri
W	= total width	ICl	= primary clavae
pb	= pharyngeal bulb	IIClW	= secondary clavae width
pbW	= pharyngeal bulb width	IICl	= secondary clavae
st	= stylet	Pl-4	= sense organs of leg
mC	= medial cirrus	P2-3	= spines of leg
iC	= internal cirri	CE	= cirri E
eC	= external cirri	A-G	= distance anus and gonopore

CONCLUSION

The presence of four peduncles on all digits which is a plesiomorphic characteristic (Renaud-Mornant, 1984) allows us to include *S. sardiniae* and *S. tyrrhenus* in the ancestral group of *S. sargassi.*

Therefore, the general morphology of claws permits us to state that *S. sardiniae, S. tyrrhenus* are closely related to the species *S. hallasi, S. qivitoq, S. nanoqsunguak* and *S. testudo,* because of their thinner and shorter accessory points.

We have found many specimens of *S. craticulus* and *S. kristenseni* belonging to the *S. sargassi* group. They have claws with accessory points which are slightly thicker than those of the *S. hallasi* group, but their accessory points are always less thick than the main uncus, according to the original description of the species (Renaud-Mornant, 1981 ; Pollock, 1983).

The claws of *S. testudo* have small accessory points, and peduncles only on the external digits. The epicuticle is clearly separated from the cuticle, and has the shape of a dorsal carapace. This carapace helps the animal to remain suspended in water, as does the bell-shaped epicuticle of *Tholoarctus natans.* For these reasons, *S. testudo* may be considered the species of the genus from which the evolutionary line was derived with the sequence: *S. testudo* - *Tholoarctus natans* - *Lepoarctus coniferus* - *Pleocola limnoriae.*

This is further confirmed by the presence in *S. testudo* of ovoid-shaped primary clavae and the existence of males with simple claws on the external digits (D'Addabbo Gallo *et al.*, 1984).

S. sardiniae and *S. tyrrhenus* further contribute to our knowledge of marine tardigrades, not only because they are new species, but above all, because the study of these animals leads to the identification of some characteristics of diagnostic value. In the genus *Styraconyx*, the number of peduncles (2 or 4) and their form are of special importance, as is the opening point for the genital ducts (Kristensen & Renaud-Mornant, 1983).

There are some species in which the existence of both peduncles and genital duct openings has not been described because the observers were unable to detect them. For this reason, *S. paulae* (Robotti, 1971) cannot be used as a basis of comparison in the discussion of the different species of the genus *Styraconyx*, since neither its genital ducts, nor its peduncles and secondary clavae have ever been described in the literature.

The authors therefore suggest the following modifications to the Kristensen and Higgins (1984) key:

1 - Primary clavae spine-like with a small terminal vesicle; lateral cirri short ..... *S. paulae*
Primary clavae of different shape 2
2 - Four peduncles present on each foot, primary clavae dome-shaped or surrounded by an enveloping membrane or narrowly elongate 3
Two peduncles present on external digits, primary clavae round to elongate-oval or spine-like 7
3 - All cuticular sense organs reduced except for large flat secondary clavae ..... *S. haploceros*
All cuticular sense organs well developed except for indistinct secondary clavae 4
4 - Lateral cirri and primary clavae with common membrane 5
Lateral cirri and primary clavae without common membrane or, when present, never extending beyond base 6
5 - Common membrane extending almost to tip of primary clavae, cuticle with grid-like pattern ..... *S. craticulus*

Common membrane extending at least half way along the length of the clava ; seminal receptacles ducts converging in a single opening above the gonopore ..... *S. tyrrhenus*

6 - Primary clavae with an extra membrane, leaving only tip free ; lateral cirri elongate ..... *S. sargassi*
Seminal receptacles duct openings located above the gonopore ..... *S. sardiniae*

7 - Primary clavae ovoid or irregular 8
Primary clavae lanceolate ; dorsal cuticle with 18 - 21 ridges ..... *S. nanoqsunguak*

8 - Claws 3-pointed with well-developed accessory and secondary hooks ; primary clavae irregular with idented mesial margin ..... *S. kristenseni*
Claws 3-pointed with reduced accessory and secondary hooks ; primary clavae ovoid with even margin 9

9 - Peduncles not attached to base of claw ; primary hooks not entirely enclosed by claw sheath ..... *S. hallasi*
Peduncles attached to base of claws ; claw sheath covering entire claw 10

10 - Cuticle telescopic at trunk division ..... *S. qivitoq*
Epicuticle separated from cuticle and having the shape of a dorsal carapace ..... *S. testudo*

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