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ABSTRACT. – The genus *Longibrachium* Paxton, 1986 (Polychaeta, Onuphidae), represented by the species *L. atlanticum* (Day 1973), is reported for the first time in the Mediterranean Sea. Morphologic differences with Atlantic specimens and the biogeographic implications of this record are discussed.

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RÉSUMÉ. – Le genre *Longibrachium* Paxton, 1986 (Polychaeta, Onuphidae), représenté par l'espèce *L. atlanticum* (Day 1973), a été observé pour la première fois en mer Méditerranée. Les différences morphologiques avec les spécimens de l'Atlantique et les implications biogéographiques de cette découverte sont discutées.

INTRODUCTION

Among Onuphidae, the genus *Longibrachium* (Paxton 1986a) is represented worldwide by three species, the distribution of which is scattered, punctiform and at very low densities. *Longibrachium* is closely related to the genera *Ramphobrachium* Ehlers, 1887 and *Brevibrachium* Paxton, 1986a, all sharing a number of prolonged modified anterior parapodia (3-5) without presetal lobes and carrying extensile spiny hooks. These three genera were included by Paxton (1986a) in the *Ramphobrachium* complex. Among allied genera, *Longibrachium* shows several plesiomorphic features, together with apomorphic character states (Paxton 1986a).

In the course of an investigation of soft-bottom macrobenthic communities in the Gulf of Gioia Tauro (Calabria, Italy), one specimen of *Longibrachium atlanticum* (Day 1973) (Onuphidae) was collected. This is the first record of the genus *Longibrachium* in the Mediterranean Sea. Until now, *L. atlanticum* was previously known from North American Atlantic coast (Day 1973 ; Paxton 1986b) and, putatively, from the Gulf of Mexico (Gathof 1984). It has always been collected in soft bottoms, ranging from coarse to fine sands.

METHODS

The sampling area was located in the Gulf of Gioia Tauro, along the Tyrrhenian coast of Calabria (Italy) ; terrigenous inputs are carried by three small rivers, which discharge untreated urban sewage (Fig. 1). Samples were collected in September 1989 with a Charcot dredge and sieved through a 1 mm screen ; the retained fauna was fixed with 10 % neutralized formaldehyde. Macrobenthic organisms were sorted and preserved in 70 % ethanol. Drawings of preserved animals were realized by means of a camera lucida.

TAXONOMIC ACCOUNTS

Longibrachium atlanticum (Day, 1973) Fig. 2-3

Ramphobrachium atlanticum Day, 1973, 55, fig. 8a-h ; Gardiner 1976, 195, fig. 25h-i (same record) ; Gathof 1984, 39-13, fig. 39-10a-i. *Longibrachium atlanticum* Paxton 1986a, 43, fig. 26a-e : Paxton 1986b, 80.

Material examined

A single specimen of *Longibrachium atlanticum* was collected in the soft-bottom between 15 and 18 m depth off the Budello River outlet (38°,25'N ; 15°,53'E) (Fig. 1). The specimen is deposited in the Bioservice's collection (BIO 3).

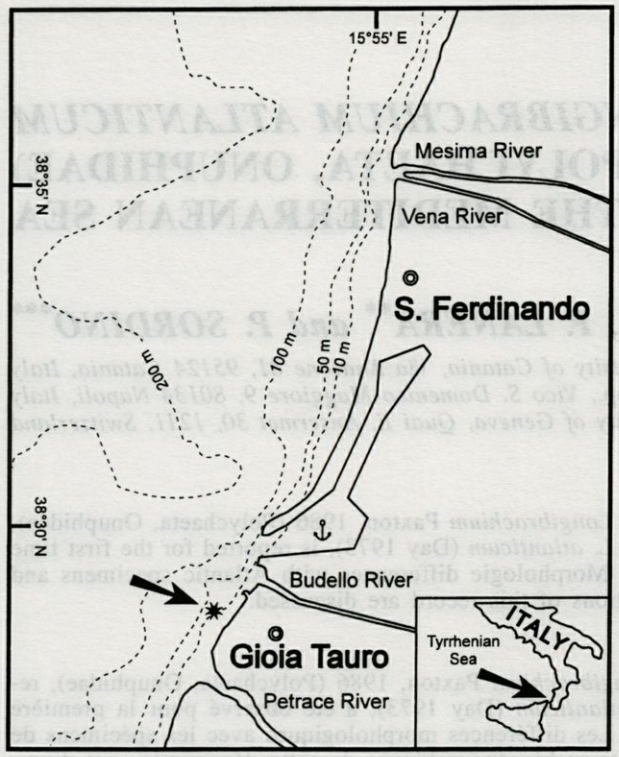

Fig. 1. – Collecting site of *Longibrachium atlanticum*.

Description

Single adult specimen, posteriorly incomplete, with 33 setigers, 22 mm long, 3 mm wide. Prostomium with two frontal globular palps, two labial palps and 5 antennae (Figs. 2A-B). Median antenna extending back to setiger 12, anterior lateral antennae to first setiger and posterior lateral antennae to setiger 8. All antennae have proximal annulated ceratophores with 3-4 proximal rings and a longer distal one. A pair of rounded eyespots at the outer base of the posterior lateral antennae (Fig. 2A). Long, slender tentacular cirri emerging distally from the peristomium, backward between prostomial median antenna and posterior lateral ones, almost reaching the tip of the frontal palps. First 4 setigers provided with modified, projecting anteriorly parapodia; parapodium 1 slightly longer (Fig. 2A). First 3 parapodia appear contracted and damaged, lacking both podial lobes and setae, with long, stout dorsal cirri and short, cuspidate ventral ones. Parapodium 4 partially extended, carrying a finger-like post-setal lobe (Fig. 3A) and spiny hooks (Fig. 3B).

Parapodia shorter from the setiger 5 on; dorsal cirri extending slightly beyond podial lobes; ventral cirri only present on the parapodium 5 on one side, thereafter replaced by glandular ventral pads. Gills from setiger 6 as a single filament, up to 4 filaments from the parapodium 29 (Fig. 3C) in a

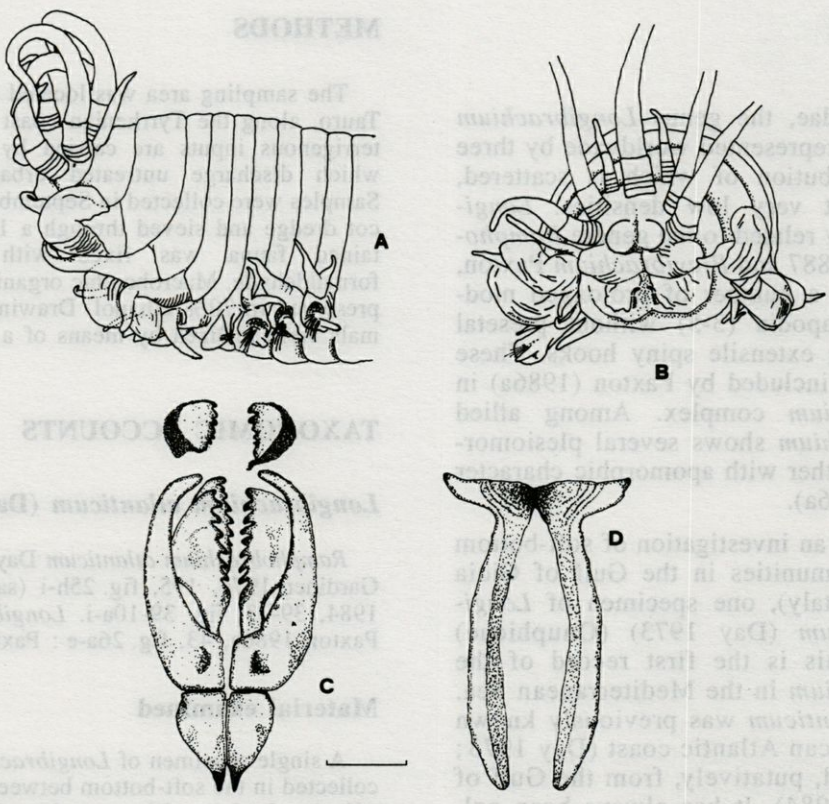

Fig. 2. – *Longibrachium atlanticum* : A – anterior end, dorsal view; B – anterior end, frontal view; C – mandibles, D – maxillae. Scale : A,B 1 mm; C,D 0.3 mm.

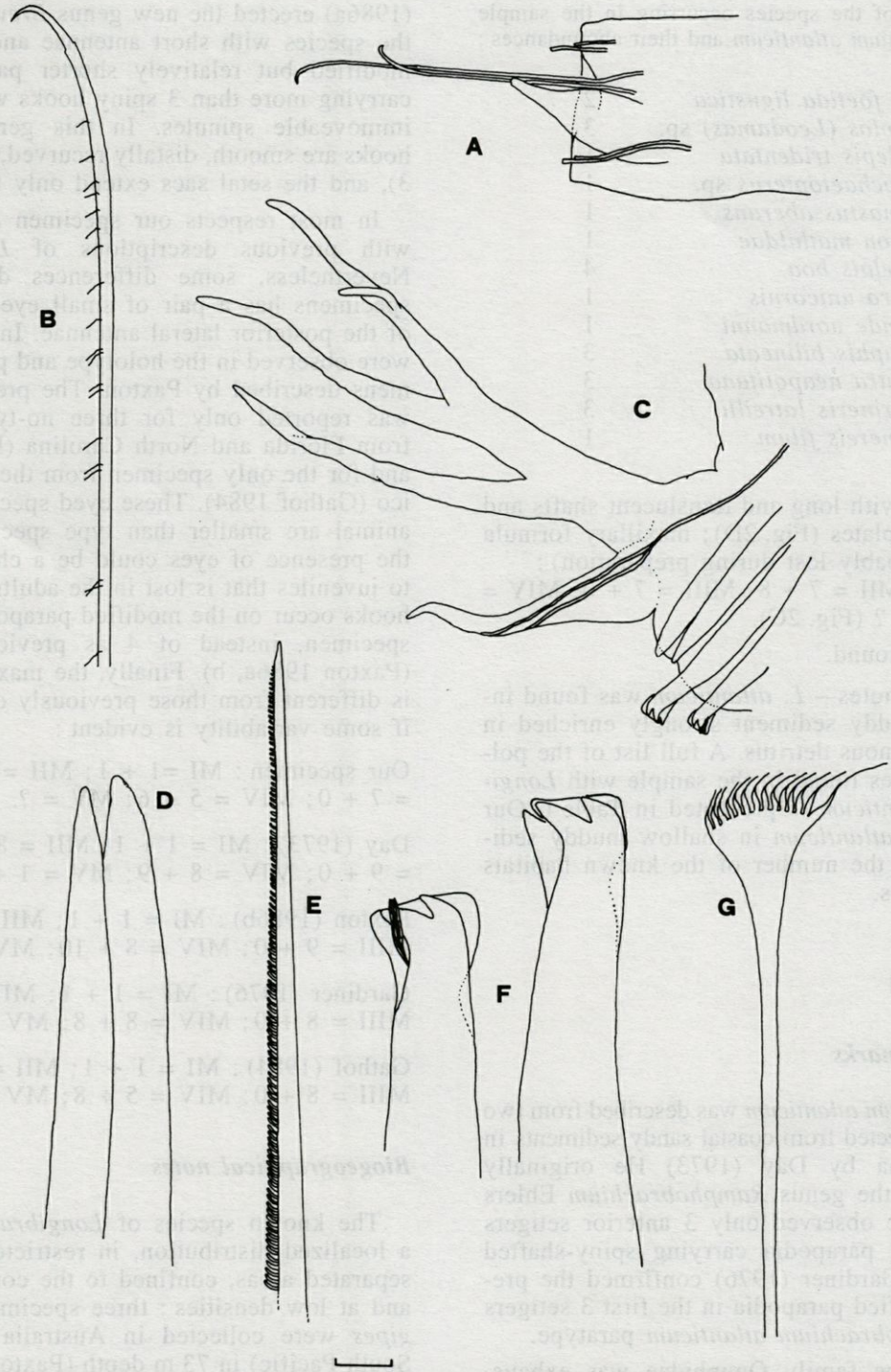

Fig. 3. – *Longibrachium atlanticum*: A – parapodium 4, posterior view; B – parapodium 4, spiny hook; C – parapodium 29; D – aciculae; E – limbate seta; F – acicular seta; G comb seta. Scale: A,C 100 µm; D 50 µm; B,F 25 µm; E,G 10 µm.

pectinate arrangement. Presetal lobes low, postsetal ones conical up to setiger 20, thereafter reduced. Only 7 thin long spiny hooks are evident on the modified parapodia, with recurved tips and two rows of immoveable spinules almost reaching the distal end (Fig. 3B); setal sacs extending to setiger 27. On the other segments, 2-3 thick aciculae with slightly recurved distal end (Fig. 3D) and 2-4 thin ones extending into the dorsal cirri (Fig. 3C); up to 13 limbate and serrated setae (Fig. 3E); 2-3 bidentate acicular setae from the setiger 15 (Fig. 3F); 1-2 comb setae with 13-14 teeth and with a lateral tooth longer than others from the setiger 21 (Fig. 3G). Pygidium missing.

Table I. – List of the species occurring in the sample with *Longibrachium atlanticum* and their aboundances :

Phylo foetida ligustica	2
Scoloplos (Leodamas) sp.	3
Scolelepis tridentata	1
Phyllochaetopterus sp.	1
Notomastus aberans	1
Sigalion mathildae	1
Sthenelais boa	4
Glycera unicornis	1
Glycinde nordmanni	1
Aponuphis bilineata	3
Diopatra neapolitana	3
Lumbrineris latreilli	3
Drilonereis filum	1

Mandibles with long and translucent shafts and distal cutting plates (Fig. 2D); maxillary formula (MV was probably lost during preparation) : MI = 1 + 1; MII = 7 + 8; MIII = 7 + 0; MIV = 5 + 6; MV = ? (Fig. 2C).

No tube was found.

Ecological notes – *L. atlanticum* was found inhabiting a muddy sediment strongly enriched in vegetal terrigenous detritus. A full list of the polychaetes species found in the sample with *Longibrachium atlanticum* is presented in Table I. Our finding of *L. atlanticum* in shallow muddy sediment enlarges the number of the known habitats for this species.

DISCUSSION

Systematic remarks

Longibrachium atlanticum was described from two specimens collected from coastal sandy sediments in North Carolina by Day (1973) He originally ascribed it to the genus *Ramphobrachium* Ehlers 1887, since he observed only 3 anterior setigers with modified parapodia carrying spiny-shafted hooks. Later Gardiner (1976) confirmed the presence of modified parapodia in the first 3 setigers of the *Ramphobrachium atlanticum* paratype.

Recently, the family Onuphidae was exhaustively revised by Paxton (1986a) who included *R. atlanticum* and *R. quadripes* Kucheruk 1979 in a new genus, *Longibrachium* diagnosed by : posterior antennae with long styles, 4 pairs of prolonged parapodia provided with 3 or more spiny and recurved hooks, each hook with two rows of immoveable spinule, setal sacs extending beyond setiger 20. Whereas species with only 3 pairs of prolonged parapodia, each carrying 3 recurved spiny hooks provided with moveable spinules, and long setal sacs, were considered as belonging to the emended genus *Ramphobrachium*. Paxton (1986a) erected the new genus *Brevibrachium* for the species with short antennae and 3-5 pairs of modified but relatively shorter parapodia, each carrying more than 3 spiny hooks with 2 rows of immoveable spinules. In this genus the spiny hooks are smooth, distally recurved, or toothed (1-3), and the setal sacs extend only to setiger 4-8.

In most respects our specimen agrees closely with previous descriptions of *L. atlanticum*. Nevertheless, some differences do exist. Our specimens has a pair of small eyes at the bases of the posterior lateral antennae. Instead, no eyes were observed in the holotype and paratype specimens described by Paxton. The presence of eyes was reported only for three no-type specimens from Florida and North Carolina (Paxton 1986b) and for the only specimen from the Gulf of Mexico (Gathof 1984). These eyed specimens and our animal are smaller than type specimens. Maybe the presence of eyes could be a character linked to juveniles that is lost in the adults. Seven spiny hooks occur on the modified parapodium 4 of our specimen, instead of 4 as previously reported (Paxton 1986a, b). Finally, the maxillary formula is different from those previously described even if some variability is evident :

Our specimen : MI =1 + 1; MII =7 + 8; MIII = 7 + 0; MIV = 5 + 6; MV = ?.

Day (1973) : MI = 1 + 1; MII = 8 + 10; MIII = 9 + 0; MIV = 8 + 9; MV = 1 + 1.

Paxton (1986b) : MI = 1 + 1; MII = 8 + 10; MIII = 9 + 0; MIV = 8 + 10; MV = 1 + 1.

Gardiner (1976) : MI = 1 + 1; MII = 8 + 9; MIII = 8 + 0; MIV = 8 + 8; MV = 1 + 1.

Gathof (1984) : MI = 1 + 1; MII = 8 + 11; MIII = 8 + 0; MIV = 5 + 8; MV = 1 + 1.

Biogeographical notes

The known species of *Longibrachium* present a localized distribution, in restricted and widely separated areas, confined to the continental shelf and at low densities : three specimens of *L. longipes* were collected in Australia (Queensland, South Pacific) in 73 m depth (Paxton 1986b); one specimen of *L. quadripes* is known from the Gulf of Tonkin (Western North Pacific) in 157 m depth (Kucheruk 1979); 5 specimens of *L. atlanticum* were collected from 18 m to 44 m depth in North Carolina and Florida (Western North Atlantic) (Day 1973; Paxton 1986b), and, putatively, one from the Gulf of Mexico in 37 m (Gathof 1984).

The distribution and the phenotypic plasticity of *Longibrachium*, shared by *Brevibrachium* too, is thought to imply an ancient phylogenetic origin (Paxton 1986a). This evolutionary lineage leading to *Longibrachium*, supported by highly special-

ized characters, could have limited the range of habitable areas (Begon *et al.* 1986). Vice versa, a more successful lineage would have led to *Ramphobrachium,* characterized by a wider geographical distribution and a more uniform morphology (Paxton 1986a).

In the light of our record, a widely disjunct distribution of *L. atlanticum* appears. This could be explained by a number of hypotheses. Although the life cycle of *L. atlanticum* is not known, onuphid species are brooders with direct development or with lecitotrophic larvae (Fauchald 1983; Wilson 1991). Hence a planktonic larval life, if present, would be brief and would limit dispersal to very short distances (Scheltema 1986). So it is doubtful that our specimen came from the Atlantic Ocean through Strait of Gibraltar. Similarly, geneflow between north-american and mediterranean populations is unlikely, due to the large open water surface, the Atlantic Ocean, separating them. This conclusion suggests that our specimen could be also a new species. This hypothesis could be demonstrated by further findings and by comparison of the two populations.

Accidental ship-borne introductions may be also taken into account (Byers *et al.* in press.), because the collecting site is not far from international shipping routes crossing the Strait of Messina, which is characterized by strong coastal currents (Mazzarelli 1936). Planktonic larvae could be transported in ballast waters from the eastern coast of North America, even though we would have to assume that planktonic larval stages are able to survive during the crossing.

The presence of *L. atlanticum* in the Tyrrhenian Sea supports the affinity of the western Mediterranean polychaete fauna with the north Atlantic one, as it has already been pointed out (Bellan 1965; Laubier 1966).

Finally, although the rarity and the very low density of *L. atlanticum* prohibits any distinction between intra-population variability and geographic variation, and the reasons for the presence of *L. atlanticum* in Mediterranean Sea are unclear, this record brings new information on the distribution distribution and ecology of a poorly known taxon.

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