

**TRAPEZICANDONA ITALICA N. SP. FROM THE UNDERGROUND  
WATERS OF SOUTHERN ITALY  
(Crustacea, Ostracoda)**

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**INTRODUCTION**

Klie (1938) described the species *Candona laisi*, and formed the *mixta*-group within the genus *Candona* Baird, 1835. However, he has never described the genus *Mixtacandona*, neither in that paper nor in his later papers that were dealing with the species belonging to the *mixta*-group (Klie 1938a, 1943). Sywula (1970) was the first who described *Mixtacandona* as a subgenus of the genus *Candona*, and assigned *Candona (Mixtacandona) laisi* Klie, 1938 as the type species. The same opinion he confirmed one year later (Sywula 1971). It is very confusing to find in many papers (Danielopol 1973, 1977, 1978, 1981, 1982; Danielopol & Cvetkov 1979; Danielopol & Hartmann 1984; Rogulj & Danielopol 1993) Klie's name after the genus *Mixtacandona*. Only Kempf (1980) in the index and bibliography of non-marine ostracoda, and Meisch (1996) in the list of the genera belonging to the tribe Candonini, correctly put Sywula (1970) as the author of the genus *Mixtacandona*. We have to point out that also in many recent papers there is confusion about the correct spelling of the name: in some *Mixtacandona*, while in others it is *Mixtocandona*.

In one of his papers Danielopol (1977) gave good diagnosis for the genus *Mixtacandona*, and cited one sentence from Klie (1938): "Will man hervorgehobenen Unterschieden als ausreichend und für die Abtrennung einer neuen Gattung ansehen, so wäre die beschriebene Art als *Mixtacandona laisi* zu bezeichnen." But after this sentence

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Klie (1938) continues: "Doch ist es wohl zunächst geratener, weitere Funde abzuwarten". No matter what is written in this discussion, we have to point out once again that Klie (1938) in the same paper named the species as *Candona laisi*, what is also assigned below all his figures. It is very interesting that after the diagnosis given by Danielopol (1977), one year later, Löffler & Danielopol (1978) in the "Limnofauna Mundi" assigned only the *mixta*-group within the genus *Candona*, but not the genus *Mixtacandona*. We want to point out that the diagnosis given by Danielopol (1977) is good and includes all species that belong to the *mixta*-group. Same author has been working for a long time on this group of species and gave a great contribution to our recent knowledge of its ecology, distribution and evolution. Danielopol (1977) and Danielopol & Cvetkov (1979) also divided the genus into five groups according to the carapace shape. In the present paper we have to raise the question about validity of the name *Mixtacandona* for the *mixta*-group of species. Reason for such a decision is the fact that Schornikov (1969), one year before Sywula (1970), described the subgenus *Trapezicandona* within the genus *Candona* and assigned *Candona (Trapezicandona) taurica* Schornikov, 1969 as the type species. The diagnosis he gave in that paper almost perfectly encloses all species of the *mixta*-group. The great affinity between this subgenus and the *mixta*-group was also noticed by Schornikov (1969). The species *Candona (Trapezicandona) taurica* was afterwards allocated into the genus *Mixtacandona* (even though younger one) without even mentioning *Trapezicandona*, and without putting Schornikov (1969) between brackets (see Danielopol 1977, 1981). As in taxonomy the priority rule is considered as the most important, the valid generic name for all species belonging to the *mixta*-group is *Trapezicandona*. Also, only 30 years passed after the description of this subgenus, so the name could not be considered as forgotten (that limit is 50 years). In the present paper we rise the subgenus *Trapezicandona* on the generic rank, and also we give the revised diagnosis for it.

During an investigation of the underground waters of Puglia (southern Italy) one new species of the genus *Trapezicandona* Schornikov, 1969 was collected. This species is described in the present paper as *Trapezicandona italica* n. sp.

## METHODS

The samples were collected with a modified Cvetkov net (Vigna Taglianti et al. 1969) from two freshwater wells. The specimens were sorted under a Leitz stereo-microscope in 70% ethyl alcohol. Ostracods were dissected with fine entomological needles in a mixture of distilled water and glycerol (1:1). All drawings were prepared using a camera lucida on a Leica DMLS microscope with C-PLAN achromatic objectives. Chaetotaxy of the antenna and mandibular palp follows the model proposed by Broodbakker & Danielopol (1982); the names for all limbs are used according to Martens (1998).

## DESCRIPTIVE PART

**CANDONIDAE** Kaufmann, 1900

**CANDONINAE** Kaufmann, 1900

**Trapezicandona** Schornikov, 1969 (syn. *Mixtacandona* Sywula, 1970)

**REVISED DIAGNOSIS.** Candonidae, Candoninae. Valve shape trapezoidal, triangular or elongated. Valve surface smooth or slightly ornamented. Antennula 7-segmented. Antenna of male with or without male bristles. Aesthetasc (Y) on same appendage very long (more than 60% of first endopodal segment). Exopodite on antenna consisting of plate, one long and two small setae. Exopodite of first thoracic leg with 3 setae, prehensile palps slightly asymmetrical. Protopodite of walking leg without setae. Same appendage 5-segmented. Protopodite of cleaning leg with 3 setae. Cleaning leg 4 or 5 segmented. Penultimate segment of same leg with 1 or 2 setae, while terminal segment consisting of 2 short and 1 long seta. Furca with very short posterior seta. Genital segment without appendages. Zenker's organ with 7 whorls of spines. Hemipenis typical with lateral lobe very thin comparing with other lobes.

**TYPE SPECIES:** *Trapezicandona taurica* (Schornikov, 1969)

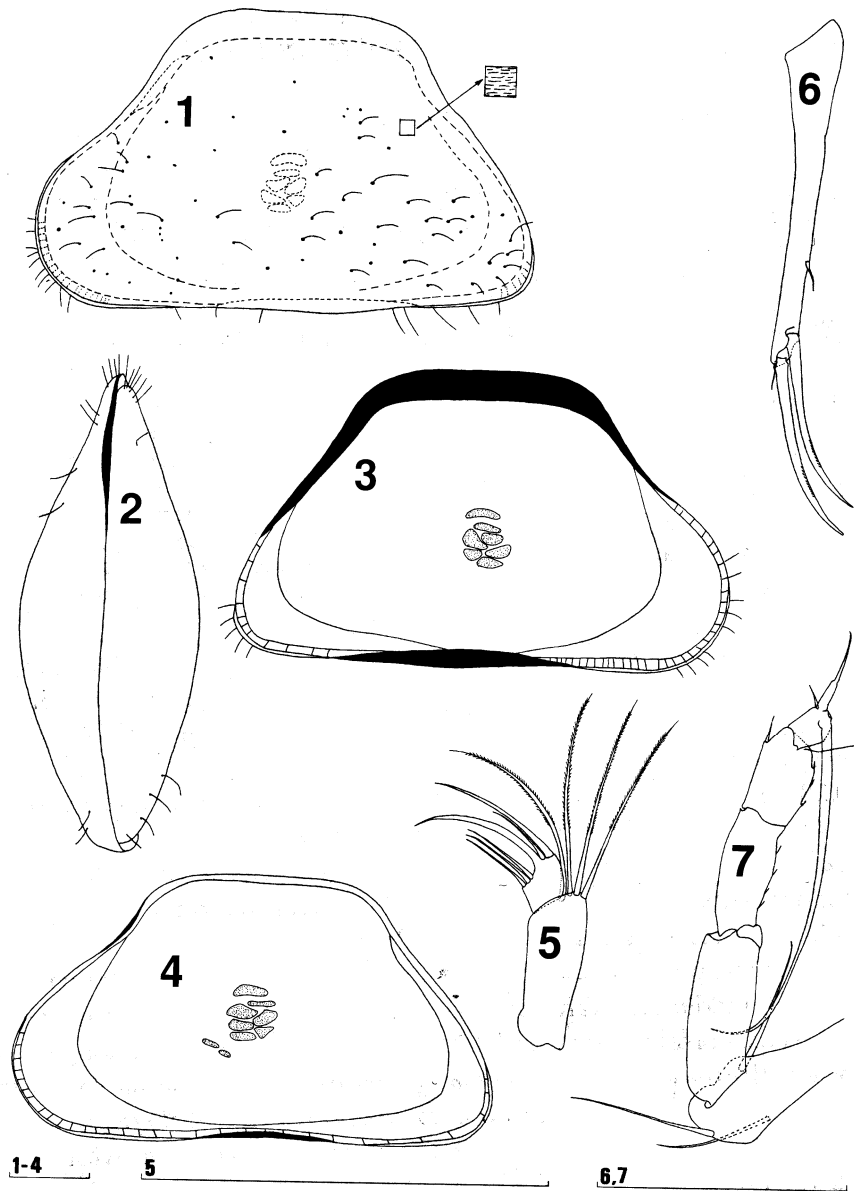
**OTHER SPECIES AND SUBSPECIES:** *Trapezicandona botosaneanui* (Danielopol, 1982), *T. chappuisi* (Klie, 1943), *T. coineauae* (Rogulj & Danielopol, 1993), *T. cottarellii* (Danielopol, 1981), *T. elegans* (Danielopol, 1979), *T. hvarensis* (Danielopol, 1969), *T. italica* n. sp.,

*T. juberthiae* (Danielopol, 1977), *T. laisi* (Klie, 1938), *T. l. vindobonensis* (Loffler, 1963), *T. latingerae* (Rogulj & Danielopol, 1993), *T. loffleri* (Danielopol, 1978), *T. ljuvuschkini* (Rudjakov, 1963), *T. pietrosani* (Danielopol, 1979), *T. peliaca* (Schafer, 1945), *T. pseudocrenulata* (Schafer, 1945), *T. riongessa* (Bronstein, 1947), *T. spandii* (Rogulj & Danielopol, 1993), *T. stammeri* (Klie, 1938), *T. tabacarui* (Danielopol, 1979), *T. transleithanica* (Loffler, 1960). All above mentioned species and one subspecies, except the new one, are new combinations.

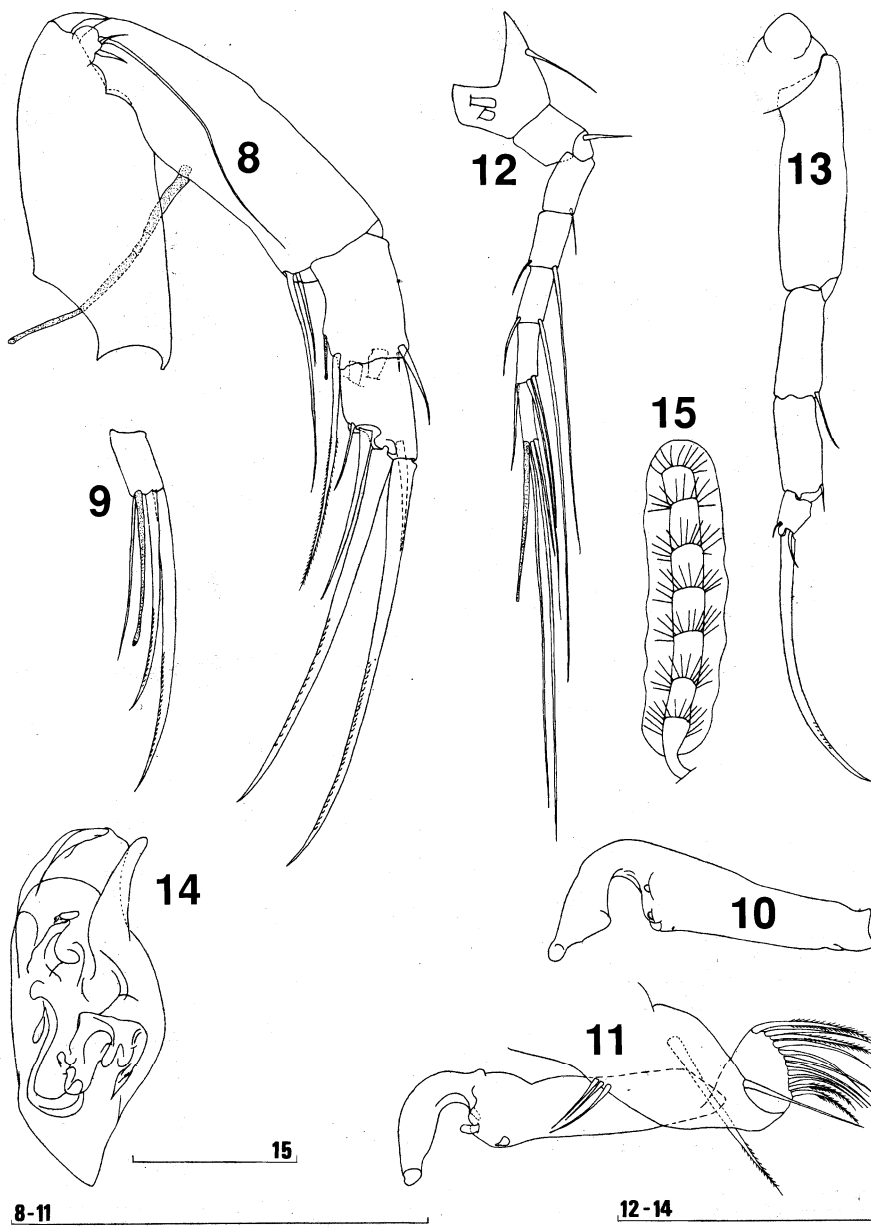
### **Trapezicandona italica** n. sp. (figs 1-20)

**MATERIAL EXAMINED.** 1) Holotype (♂♂), allotype (♀♀) and 3 paratypes (♀♀ and 2 juveniles) from a freshwater well along the main road Foggia-Manfredonia (type locality), Puglia, Italy, 01 May 1975, collectors: G. L. Pesce & G. Fusacchia. 2) Two ♂♂ and 8 juveniles from a well situated 100 m from the type locality, 01 May 1975, collectors: G. L. Pesce & G. Fusacchia. Holotype, allotype, paratype female and one male are dissected and mounted on slides in Faure's medium. Other material is preserved in 70% ethyl alcohol. Holotype and allotype are deposited in the Museum of Verona (Italy), while the other material is in the working collection of the first author.

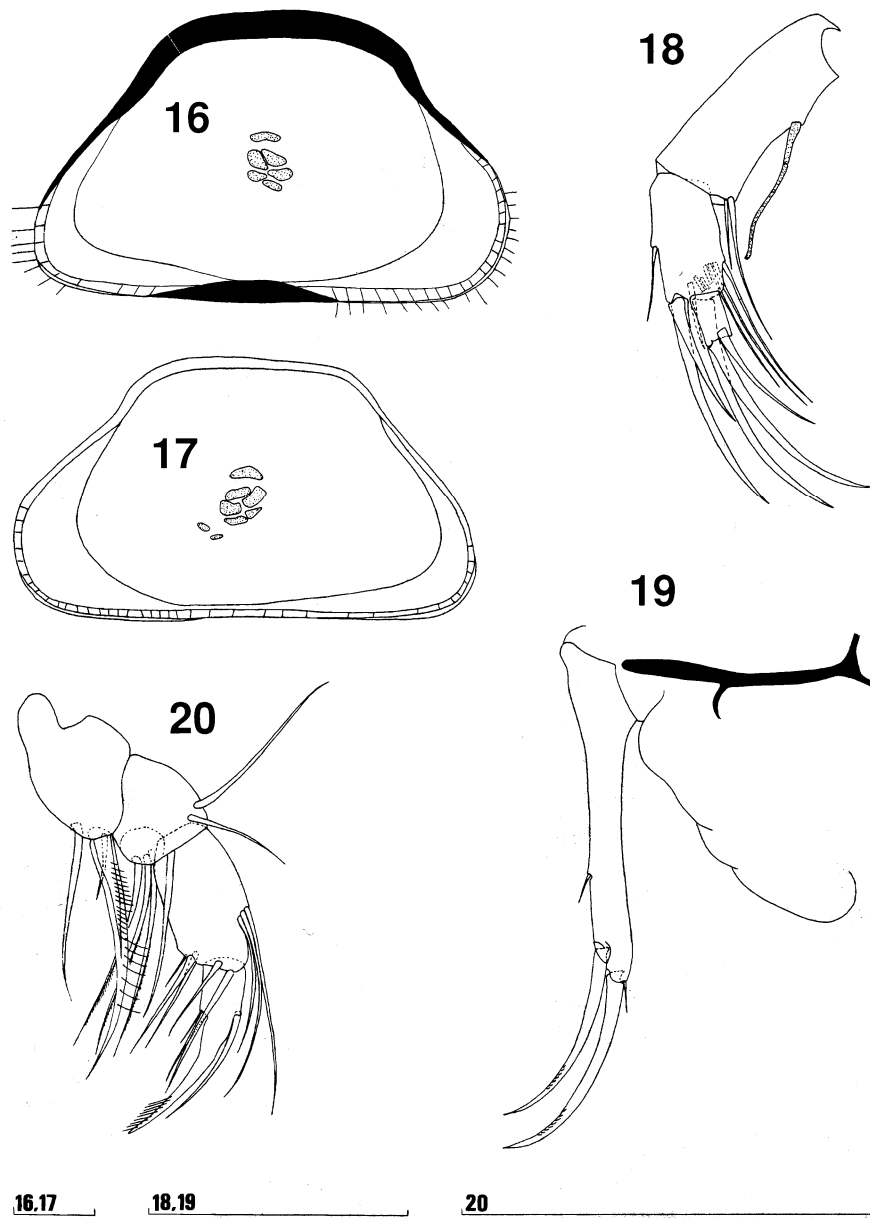
**DESCRIPTION OF MALE (HOLOTYPE).** Carapace trapezoidal, length of right valve 0.606 mm, left one 0.621 mm. Greatest width situated around mid-length, equals 0.288 mm, or 36.7% of length. Greatest height on right valve equals 0.335 mm (54% of length), on left valve 0.381 mm (61% of length). Viewed dorsally (fig. 2) left valve overlaps right one clearly on anterior and posterior ends. Anterior end gently pointed, posterior not broadly rounded, but clearly broader than anterior one. Viewed laterally (figs 1, 3, 4) dorsal margin straight in the middle (straight on about 53% of length). Anterior margin clearly wider than posterior one. Ventral margin straight or slightly convex around middle. Left valve overlaps right one clearly on anterior, posterior ends, dorsally and ventrally. Marginal zone broader anteriorly (16% of length) than posteriorly (12% of length). Fused zone narrow with dense and short marginal pore canals. Selvage peripheral on both valves. Valve surface covered with dense hairs, ornamented with short striae. Colour white. Eye pigment missing. Antennula (fig. 12) 7-segmented. First segment with 2 long and 1 short seta. Second and third segments with 1 short seta each. Fourth and fifth segments with 2 setae each (1 long and 1 short), sixth segment with 2 long and 1 short seta, seventh segment with 2 long and 1 short seta and aesthetasc 2.6 times longer than same segment. Length ratios of five distal segments



Figs 1-7 - *Trapezicandona italica* n. sp., holotype male, 0.621 mm: 1, external view from the left side (square shows the ornamentation of the carapace); 2, dorsal view; 3, left valve (internal view); 4, right valve (internal view); 5, maxillular palp; 6, furca; 7, cleaning leg. Scales = 0.1 mm.



Figs 8-15 – *Trapezicandona italica* n. sp., holotype male, 0.621 mm: 8, antenna without terminal segment; 9, terminal segment of antenna; 10, left prehensile palp; 11, right prehensile palp; 12, antennula; 13, walking leg; 14, hemipenis; 15, Zenker's organ. Scales = 0.1 mm.



Figs 16-20 – *Trapezicandona italica* n. sp., 1-19 allotype female, 0.571 mm; 20 male, 0.59 mm: 16, left valve (internal view); 17, right valve (internal view); 18, endopodite of antenna; 19, furca with genital segment; 20, mandibular palp. Scales = 0.1 mm.

(measuring middle of segments) from proximal to distal end equal 1 : 1 : 1 : 1.12 : 1.12. Exopodite of antenna (fig. 8) consisting of plate with 2 short and 1 long seta. Aesthetasc (Y) equals 96% of first endopodal segment (measuring posterior margin). Same segment with 2 setae postero-distally. Penultimate segment divided and with 5 setae, of which 2 RC present males bristles (equaling 67% of first endopodal segment). Penultimate segment distally with 4 claws and 1 seta. Claw G1 1.6, G2 0.42, G3 1.47 as long as first endopodal segment (measuring posterior margin). One z-seta claw like and equals 0.67 of first endopodal segment. Terminal segment with 2 claws, one aesthetasc and one seta. Claw GM 1.15, Gm 0.83 as long as first endopodal segment. All claws slightly serrated. First segment of Mandibular palp carries two smooth setae (the shorter one  $\alpha$  seta), one plumose (S1) and one pappose seta (S2). Second segment externally with 2 setae, internally with 3 setae in bunch and 1 seta medio-distally. Penultimate segment with 3 setae externally, 2 setae medio-distally ( $\gamma$  seta smooth) and 3 setae intero-distally. Terminal segment carries 1 claw (fused with segment) with fine hairs distally, and 3 setae (2 internally and 1 externally). First segment of maxillular palp (fig. 5) with 4 setae. Terminal segment distally with 2 claws and 4 setae. Prehensile palps (figs 10-11) slightly asymmetrical. Both palps with short, wartlike setae. Exopodite of first thoracic leg with 3 setae. Walking leg 5-segmented (fig. 13). Protopodite and first endopodal segment without setae, second and third endopodal segments with one short seta each, while terminal segment carries 2 setae and claw (1.1 times as long as 3 distal segments combined). Claw slightly serrated on distal end. Cleaning leg (fig. 7) 5-segmented. Protopodite with 3 setae, penultimate segment divided, with 1 short seta. Terminal segment with 2 short and 1 long seta. Furca (fig. 6) with length ratios of anterior margin, anterior and posterior claws 1.66 : 1 : 1. Both anterior and posterior setae smooth. Claws slightly serrated. Zenker's organ (fig. 15) with 7 whorls of spines. Hemipenis shown on fig. 14.

**DESCRIPTION OF FEMALE (ALLOTYPE).** Carapace trapezoidal, length of right valve 0.552 mm (fig. 17), left one 0.571 mm (fig. 16). Greatest height on left valve equals 0.362 mm (63% of length), while on right valve equals 0.32 mm (56% of length). Greatest width equals 0.229 mm (40% of length). General appearance of carapace same as in male. Antenna (fig. 18) with aesthetasc which equals 84% of first endopodal segment. Penultimate segment with one seta anteriorly, all t-setae developed. All z-setae short. Penultimate segment with 3



claws: G1 1.32, G2 0.77 and G3 1.45 times as long as first endopodal segment. Claw GM 1.25, while Gm 0.775 times as long as same segment. Claws smooth. Furca (fig. 19) with length ratio of anterior margin, anterior and posterior claw 1.32 : 1.09 : 1. Genital field rounded. All other appendages same as in male.

**ETYMOLOGY.** The species is named after the latin adjective "italicus" which means italian, agreeing in gender with the feminine generic name.

**VARIABILITY.** There is variability in the appearance of S2 seta on the first segment of mandibular palp. Namely, in one male (fig. 20) this seta is long (half the length of S1 seta) and it carries small setulae only on one side (plumose) (fig. 20). In all other specimens this seta is much shorter and carries setulae on all its sides (pappose).

**ECOLOGY.** *Trapezicandona italica* n. sp. was found in two wells situated near each other. The colour of carapace, absence of eye-pigment and long aesthetacs (Y) may suggest that this could be an underground species, but as no other evidence is available, it is difficult to discuss about its ecology.

**DISTRIBUTION.** The new species is only known from two localities in Puglia (southern Italy).

**AFFINITIES.** *Trapezicandona italica* n. sp. does not fit well within any of the groups created by Danielopol (1977) and Danielopol & Cvetkov (1979) and, as phylogenetical discussion of the grouping within this genus is out of the scope of this paper, we will compare *T. italica* with all described species. *Trapezicandona italica* n. sp. stands apart from all other 20 species (and 1 subspecies) of the genus by the combination of two following features: trapezoidal valve form and obvious difference between height/length ratios on the left (height is 61% of the length) and right valve (height is 54% of the length). Disproportion of valves is noticed also in *Trapezicandona riongessa* (Bronstein, 1947) and *T. tabacarui* (Danielopol, 1979). In *T. riongessa* both valves are triangular, while in *T. tabacarui* left valve is triangular, and right one is trapezoidal. *T. italica* and *T. tabacarui* are two species in the genus with the largest height/length ratio ( in *T. tabacarui* height is 58% of the length). Triangular valve

shape also have five following species: *Trapezicandona coineauae* (Rogulj & Danielopol, 1993), *T. hvarensis* (Danielopol, 1969); *T. lattingerae* (Rogulj & Danielopol, 1993), *T. pietrosani* (Danielopol, 1979) and *T. spandii* (Rogulj & Danielopol, 1993). Except the details in the appearance of the soft parts, the main differential character which clearly separates the new and those species is certainly the carapace shape. In the genus *Trapezicandona* the following species and one subspecies have more or less trapezoidal valve form: *Trapezicandona botosaneanui* (Danielopol, 1982), *T. chappuisi* (Klie, 1943), *T. cottarellii* (Danielopol, 1981), *T. juberthiae* (Danielopol, 1977), *T. laisi* (Klie, 1938), *T. laisi vindobonensis* (Loffler, 1963), *T. loffleri* (Danielopol, 1978), *T. stammeri* (Klie, 1938) and *T. taurica* (Schornikov, 1969). All those species have clearly smaller height/length ratio (at the most 51%) and they do not possess such disproportion between left and right valve. Among those species *T. loffleri* is the most similar with *T. italica*. This species, according to Danielopol (1982), has slight disproportion between left and right valve. Namely, in the left valve the greatest height is 51%, while in the right valve it is 50% of the length. But this is very small comparing with *T. italica*. Also, *T. loffleri* has widely rounded frontal margin and has undivided penultimate segment on the cleaning leg. Also, all other trapezoidal species, except *T. taurica*, have undivided or incompletely divided same segment. *T. taurica* and *T. juberthiae*, among other above mentioned differential characteristics, also do not possess male bristles on antenna. Species *Trapezicandona peliaca* (Schafer, 1945), *T. pseudocrenulata* (Schafer, 1945) and *T. transleithanica* (Loffler, 1960) have elongated valve form with slightly rounded dorsal margin, and in all those species height is only about 43% of the length. At the end we also have to mention the species *Trapezicandona elegans* (Danielopol, 1979) and *T. ljevuschkini* (Rudjakov, 1963), which differs from *T. italica* by extremely elongated posterior end of the carapace.

#### SUMMARY

*Trapezicandona italica* n. sp. is described. The new species was collected in two wells during the investigation of the underground faunas of Puglia (southern Italy) by the Dipartimento di Scienze Ambientali, University of L'Aquila (Italy). The new species is easily distinguishable from all other species in the genus by the characteristic appearance of its carapace. The erection of *Trapezicandona* Schornikov, 1969 at generic rank and a revised diagnosis of the genus are proposed.

## RIASSUNTO

Viene descritta *Trapezicandona italica* n. sp., raccolta da due pozzi di acqua dolce in provincia di Foggia, nel corso delle ricerche promosse dal Dipartimento di Scienze Ambientali sulla fauna acquatica sotterranea della Puglia. La nuova specie si differenzia da tutte le altre congeneriche per la peculiare morfologia del suo carapace. Il sottogenere *Trapezicandona* viene elevato a rango generico e ne viene fornita una diagnosi aggiornata.

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