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STAMMERICARIS JAKOBI, 1972 REDEFINED AND A NEW GENUS OF PARASTENOCARIDIDAE (COPEPODA, HARPACTICOIDA)

BY

HORST KURT SCHMINKE[1])

Institut für Biologie und Umweltwissenschaften, Fakultät V, Universität Oldenburg, D-26111 Oldenburg, Germany

ABSTRACT

This study deals with two genera proposed by Jakobi (1972a), i.e., *Stammericaris* and *Phreaticaris*. Their species are characterised by the same kind of complex endopod P4 male which is unique within Parastenocarididae and, therefore, regarded as a synapomorphy of these species. In the meantime many more species with this particular endopod P4 male have been described. They fall into two morphologically distinct subgroups. In all species of subgroup A the distal outgrowth on the outer border of the endopod P4 male is an elongate lamella with undulating margins, the P3 male has a short apophysis and the female P3 has a long endopod. In all species of subgroup B the distal outgrowth on the outer border of the endopod P4 male is a plain or feathered seta, the P3 male has a long apophysis and the P3 female has a short endopod. Subgroup B coincides with the definition of both *Stammericaris* and *Phreaticaris*. It is, therefore, suggested to synonymise *Phreaticaris* with *Stammericaris*. As none of Jakobi's genera fits the definition of subgroup A, it is regarded as a new taxon on the generic level, for which the name *Cottarellicaris* gen. n. is proposed. *Stammericaris stammeri gallicus* has nothing to do with *Stammericaris stammeri*, but is a separate species of the genus *Cottarellicaris* gen. n. Arguments are presented that *Parastenocaris palmerae* may belong in the vicinity of the two higher taxa dealt with here.

ZUSAMMENFASSUNG

Diese Untersuchung befasst sich mit zwei Gattungen, die von Jakobi (1972a) vorgeschlagen worden sind, nämlich *Stammericaris* und *Phreaticaris*. Ihre Arten zeichnen sich durch denselben komplex gebauten Endopoditen P4 Männchen aus, der innerhalb der Parastenocarididae einmalig ist und deshalb als Synapomorphie dieser Arten betrachtet wird. Inzwischen sind sehr viel mehr Arten mit diesem besonderen Endopoditen P4 Männchen bekannt, die in zwei morphologisch klar zu trennende Teilgruppen zerfallen. Alle Arten der Teilguppe A haben am Außenrand des Endopoditen P4 Männchen einen distalen Vorsprung, der aus einer Membran mit undulierenden Rändern besteht; alle haben außerdem eine kurze Apophyse am P3 Männchen und einen P3 Weibchen mit einem langen Endopoditen. Alle Arten der Teilgruppe B haben am Außenrand des Endopoditen P4 Männchen einen distalen Vorsprung, der aus einer glatten oder gefiederten Borste

[1]) e-mail: horst.k.schminke@uni-oldenburg.de

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besteht; alle haben außerdem eine lange Apophyse am P3 Männchen und einen P3 Weibchen mit einem kurzen Endopoditen. Die Teilgruppe B stimmt mit der Definition sowohl von *Stammericaris* als auch *Phreaticaris* überein. Es wird deshalb vorgeschlagen, *Phreaticaris* mit *Stammericaris* zu synonymisieren. Da die Definition der Teilgruppe A mit keiner Diagnose von Jakobis Gattungen übereinstimmt, wird sie als eigenständige Gattung betrachtet, für die der Name *Cottarellicaris* gen. n. vorgeschlagen wird. *Stammericaris stammeri gallicus* hat nichts mit der Art *Stammericaris stammeri* zu tun, sondern ist eine eigenständige Art der Gattung *Cottarellicaris* gen. n. Es wird argumentiert, dass *Parastenocaris palmerae* in die Nähe der beiden hier behandelten höheren Taxa gehören könnte.

INTRODUCTION

At present, studying the systematics of Parastenocarididae is not an easy task. It means working up the legacy of Jakobi (1972a, b). In a big step forward he proposed 24 new genera, but the diagnoses he provided for them were rather woolly and ambiguous. This led to these genera being widely ignored for a long time. There is, however, no denying the fact that they are valid according to the rules of the ICZN, so that it is inevitable to either redefine them or to show that they are synonymous with other genera.

Reid (1995) was the first to embark on this task by synonymising *Biwaecaris* Jakobi, 1972 with *Parastenocaris* Kessler, 1913 and by redefining *Parastenocaris* at the same time. Corgosinho & Martínez Arbizu (2005) followed with redefining *Remaneicaris* Jakobi, 1972 and Schminke (2008) redefined *Kinnecaris* Jakobi, 1972 synonymising *Cafferocaris* Jakobi, 1972 with it at the same time. Then *Brasilibathynellocaris* Jakobi, 1972 was redefined by Corgosinho et al. (2010) and with it *Parareмaneicaris* Jakobi, 1972 and *Paraforficatocaris* Jakobi, 1972 were synonymised. Karanovic et al. (2012) followed with redefining *Proserpinicaris* Jakobi, 1972 and with synonymising with it *Nipponicaris* Jakobi, 1972 and *Pannonicaris* Jakobi, 1972. Finally, Corgosinho et al. (2012) redefined *Siolicaris* Jakobi, 1972. Furthermore, it has to be borne in mind that the genera *Brinckicaris* Jakobi, 1972, *Enckellicaris* Jakobi, 1972 and *Oshimaensicaris* Jakobi, 1972 will eventually have to be synonymised with *Parastenocaris*, with which they form the *brevipes*-group of species as defined by Reid (1995). For practical reasons it has been suggested (Schminke, 2010) to postpone this step until it is clear which of Jakobi's genera will outlast and which will disappear.

While redefining *Proserpinicaris*, Karanovic et al. (2012) also formally synonymised *Lacustricaris* Jakobi, 1972 with *Parastenocaris*. This was premature. The reason for this procedure is a mistake by Schminke (2010), who had erroneously listed *Parastenocaris lacustris* Chappuis, 1958 as the type species of the genus *Lacustricaris* instead of *P. budapestiensis* Toeroek, 1935, as would have been correct. As a consequence Karanovic et al. (2012) had argued quite understandably

(p. 1605) "that by excluding the type species from the genus *Lacustricaris* it cannot be a valid genus any longer" and, therefore, they synonymised it with *Parastenocaris*. The correct procedure, though, would have been to list *Lacustricaris* with its type species *P. budapestiensis* as a valid genus of Parastenocaridinae and to designate, as also done by Karanovic et al. (2012), *P. lacustris* as incertae sedis in Fontinalicaridinae. If this is done there is as yet no need to synonymise *Lacustricaris* with *Parastenocaris*.

Summing up it can be said that scrutiny of Jakobi's (1972a) 24 new genera so far has led to 5 of them having been redefined and 5 (plus eventually 3 more) having been sunk into synonymy. *Paraforficatocaris* is not one of the new genera in Jakobi (1972a), but has been published elsewhere (Jakobi, 1972b). This means that 11 of Jakobi's (1972a) genera are left, which have either to be redefined, or to be synonymised. Two of these genera are the subject of the present contribution.

MATERIAL AND METHODS

This study relies exclusively on data from the published literature and does not add any new data. It shows that meaningful conclusions can be drawn from the existing data in order to obtain new phylogenetic insights. The following publications are the basis of the present study: Chappuis (1936, 1937, 1938), Noodt (1955), Chappuis & Rouch (1959), Petkovski (1959), Enckell (1965), Cottarelli (1969, 1972), Cottarelli & Drigo (1972), Cottarelli et al. (1981, 1995, 2008, 2012), Rouch (1987, 1990), Pesce et al. (1988, 1995), Cottarelli & Bruno (1993, 1994, 1997) and Berera & Cottarelli (2003).

RESULTS

In 1936 Chappuis described *Parastenocaris phreatica* from the pebbly bank of the Vadar River near Skopje (Macedonia), which was distinguished from all species known so far by "the curiously formed endopod P4 male". In 1937 *P. stammeri* was described by Chappuis from a cave near Santander (Spain), which has a very similar endopod P4 male, and when in 1938 Chappuis published the description of *P. orcina* from a cave near Salerno (Italy) with the same kind of endopod P4 male, he assumed that this similarity must be an indication of closer relationship. Lang (1975) followed this lead by placing these three species in his *minuta*-group because of the 2-4 spinules (called setae by him) on the basis of P4 medially of the endopod, but stressing at the same time that they are very close to each other and, therefore, part of a distinct subgroup within the *minuta*-group.

Until Jakobi (1972a) five more species with this particular kind of P4 male (see fig. 1C) were described, but in his revision only two of them (*P. acherusia* Noodt,

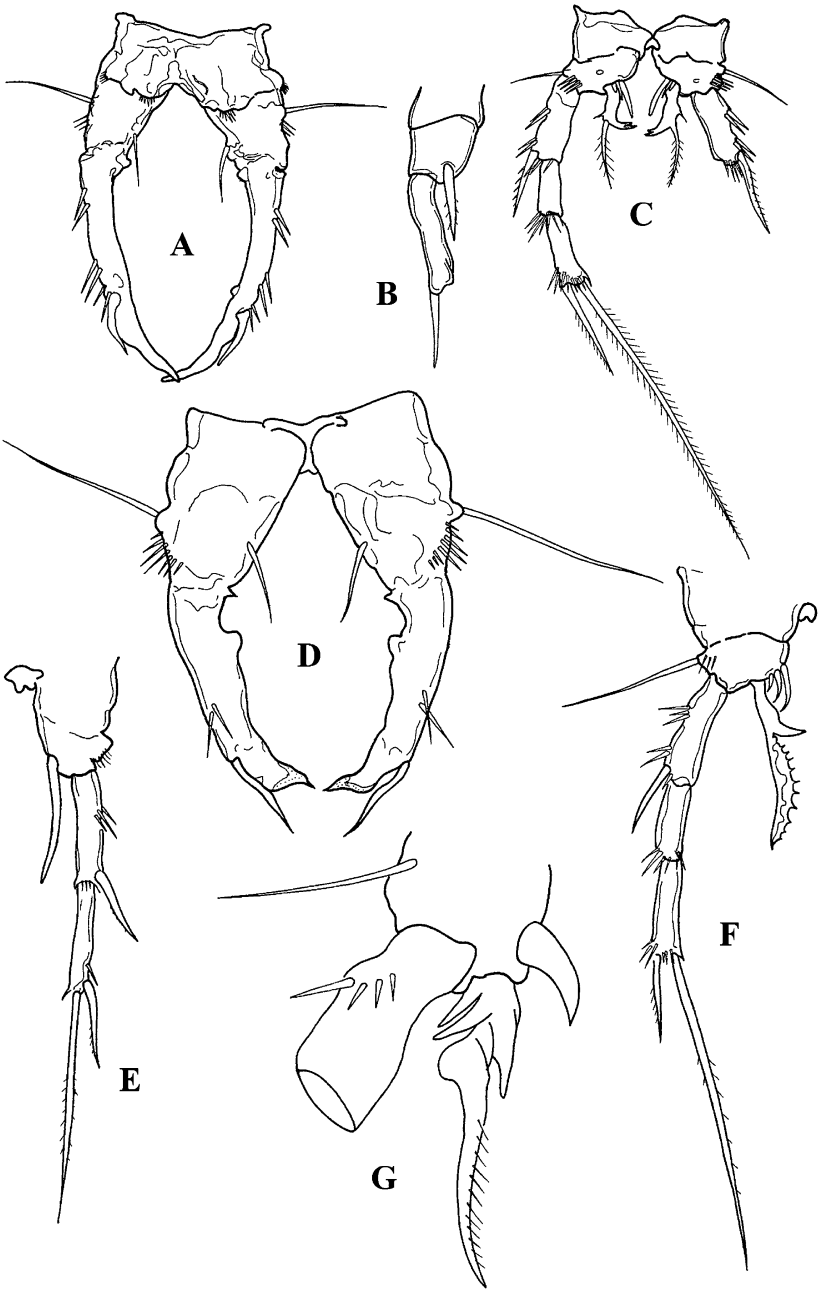

Fig. 1. A-C, *Stammericaris diversitatis* (after Cottarelli, Bruno, Spena & Grasso, 2012): A, P3 male; B, endopod P3 female and first segment of corresponding exopod; C, P4 male; D-F, *Cottarellicaris etrusca* (after Cottarelli, Bruno & Venanzetti, 1995); D, P3 male; E, P3 female; F, P4 male; G, *Parastenocaris palmerae* (after Reid, 1992): endopod P4 male and first segment of corresponding exopod. Different scales.

1955 and *P. andalusica* Enckell, 1965) were considered, which together with *P. stammeri* and *P. orcina* were grouped in the new genus *Stammericaris*. In the diagnosis of this genus Jakobi mentions as very typical the (as he calls it) "antler-like" endopod P4 male. Despite the same type of endopod P4 male the third species of Lang's (1975) subgroup within the *minuta*-group of species, *P. phreatica*, is not part of *Stammericaris* but is declared by Jakobi (1972a) the sole species of another new genus, called *Phreaticaris*.

Since Jakobi (1972a) many more species have been described which seem to have a close relationship with the species just mentioned. That this relationship is very likely can be concluded from the discussions in which the authors of the new species have to compare them with those already known species which they regard as the most similar ones (see table I). So many different authors cannot be wrong. The species in question are: *P. amyclaea* Cottarelli, 1969, *P. hera* Cottarelli, 1969, *P. pasquinii* Cottarelli, 1972, *P. stellae* Cottarelli, Saporito & Puccetti, 1981, *P. numidiensis* Rouch, 1987, *P. rivi* Cottarelli & Bruno, 1994, *P. oligoalina* Cottarelli, Bruno & Venanzetti, 1995, *P. etrusca* Cottarelli, Bruno & Venanzetti, 1995, *P. lorenzae* Pesce, Galassi & Cottarelli, 1995, *P. aphroditis* Cottarelli & Bruno, 1997, *P. sibaritica* Berera & Cottarelli, 2003, *P. luciae* Cottarelli, Bruno & Berera, 2008, *P. diversitatis* Cottarelli, Bruno, Spena & Grasso, 2012. All these 13 species and the five considered by Jakobi (1972a) have one character in common: the endopod P4 male. The question now is: to which genus they do belong? Before we can answer this we must have a look at the characters.

Let us start with the endopod P4 male. Chappuis (1936) calls it a complex structure ("kompliziert gebaut") and, indeed, later authors have difficulties in giving a comprehensible description of it. Chappuis (1936) himself describes it as a hyaline structure with two setae and an inner lobed outgrowth. *P. acherusia* also has this outgrowth, as can be seen in fig. 23 of Noodt's (1955) description. No mention of it is made in the text, where Noodt summarily calls the P4 male a complex two-branched hyaline structure. In other species the lobed part of the outgrowth has disappeared, leaving a curved plate with a pointed inner tip carrying at its outer border two outgrowths, the proximal one of them (which can also be lost) being shorter and having the form of a spine, the distal one being either a feathered or plain seta or an elongate lamella with undulating (crenulate) margins (see fig. 1C and F).

Another important element in the systematics of Parastenocarididae is the P3 male. In the present case there are two types which differ in the structure of the exopod. Type 1 (fig. 1D) has on the inner margin of exp-1 a small pointed tubercle proximally and a bigger round tubercle at about midlength. Type 2 (fig. 1A) has only the proximal tubercle and in case there is a second one it lies near the transition from exp-1 to the apophysis. Both types have two groups of spinules

TABLE I

Species of *Stammericaris* and *Cottarellicaris* gen. n. and most similar other species according to authors

Species	Author(s)	Similar species according to author(s)
phreatica	Chappuis, 1936	
stammeri	Chappuis, 1937	*phreatica*
orcina	Chappuis, 1938	*phreatica*, *stammeri*
acherusia	Noodt, 1955	*phreatica*, *stammeri*, *orcina*
gallicus	Chappuis & Rouch, 1959	*stammeri*
andalusica	Enckell, 1965	*phreatica*, *stammeri*, *orcina*, *acherusia*
amyclaea	Cottarelli, 1969	*orcina*, *acherusia*, *hera*
hera	Cottarelli, 1969	*stammeri*, *orcina*, *acherusia*, *andalusica*, *amyclaea*, *calliroe*
pasquinii	Cottarelli, 1972	*orcina*, *acherusia*, *hera*, *amyclaea*, *calliroe*
stellae	Cottarelli, Saporito & Puccetti, 1981	*hera*
numidiensis	Rouch, 1987	*phreatica*, *stammeri*, *orcina*, *acherusia*, *andalusica*, *hera*, *amyclaea*, *pasquinii*, *stellae*
trinacriae	Pesce, Galassi & Cottarelli, 1988	*orcina*
rivi	Cottarelli & Bruno, 1994	*andalusica*, *hera*, *stellae*, *etrusca*, *oligoalina*
oligoalina	Cottarelli, Bruno & Venanzetti, 1995	*andalusica*, *hera*, *stellae*, *numidiensis*
etrusca	Cottarelli, Bruno & Venanzetti, 1995	*andalusica*, *hera*, *stellae*, *numidiensis*, *oligoalina*
lorenzae	Pesce, Galassi & Cottarelli, 1995	*pasquinii*
aphroditis	Cottarelli & Bruno, 1997	*andalusica*, *hera*, *stellae*, *rivi*, *etrusca*, *oligoalina*
sibaritica	Berera & Cottarelli, 2003	*andalusica*, *hera*, *stellae*, *rivi*, *etrusca*, *oligoalina*, *aphroditis*
luciae	Cottarelli, Bruno & Berera, 2008	*andalusica*, *hera*, *stellae*, *rivi*, *oligoalina*, *etrusca*, *aphroditis* *sibaritica*, *admete*
diversitatis	Cottarelli, Bruno, Spena & Grasso, 2012	*lorenzae*, *pasquinii*

along the outer margin of exp-1, a proximal group at about one third of its length and a distal one at two thirds of its length. In type 1 there are 1-4 spinules in the distal and 1 or no spinule in the proximal group while in type 2 the respective numbers are 2-8 and 2-8, the difference between the two types being that in the proximal group there never are more than 1 spinule in type 1 and never less than 2 spinules in type 2. Another important difference is the structure of the apophysis (exp-2) and its length relationship with the thumb (outer seta of exp-1). In type 1 (fig. 1D) the apophysis is short and described as leaf-like with an acute tip (resulting from fusion of exp-2 with one of the terminal setae) and the thumb is said and shown to be as long as or longer than the apophysis. In type 2 (fig. 1A)

the apophysis is very long with a rounded tip and slightly curved inwards. It is twice as long as the thumb or even longer.

There also is a difference in the endopod of the P3 female. It either is half as long as segment 1 of the corresponding exopod (fig. 1B) or even shorter, or it is as long as this segment or somewhat longer (fig. 1E).

No other differences could be detected in the species descriptions except that there are 5 species with a hook on the inner side of the basis of the P1 male.

If we have a look at how these characters are distributed among the 18 species mentioned above clear correlations become apparent. All species with the distal outgrowth on the outer border of the endopod P4 male being an elongate lamella with undulating margins also have the type 1 P3 male with a short apophysis and they have a long endopod P3 female (subgroup A). On the other hand, all species with the distal outgrowth on the outer border of the endopod P4 male being a plain or feathered seta also have the type 2 P3 male with a long apophysis and they have a short endopod P3 female (subgroup B). The result of this character analysis is that there are two groups which morphologically are clearly distinct.

The next phase is to find out which species belong to which subgroup. A look at the morphological characters shows that the following species are part of subgroup A: *Stammericaris andalusica*, *Parastenocaris aphroditis*, *P. etrusca*, *P. hera*, *P. luciae*, *P. numidiensis*, *P. oligoalina*, *P. rivi*, *P. sibaritica* and *P. stellae*. The species belonging to subgroup B are: *Stammericaris acherusia*, *Parastenocaris amyclaea*, *P. diversitatis*, *P. lorenzae*, *St. orcina*, *P. pasquinii*, *Phreaticaris phreatica* and *St. stammeri*.

DISCUSSION

In 1959 Chappuis & Rouch described a subspecies of *Parastenocaris stammeri* (later classified as *Stammericaris stammeri* by Jakobi (1972a)) from caves in the province (département) Pyrénées-Atlantiques (formerly Basses-Pyrénées). In their opinion the differences between *Stammericaris stammeri stammeri* and *St. stammeri gallicus* were confined to a few features only, but these are in fact quite important. The P3 male of the subspecies, they say, is shorter and stronger and in particular the apophysis is squat and also shorter. The biggest difference, however, is found in the endopod P4 male. The proximal outgrowth on the outer border is less prominent in the subspecies and followed by a sensitive lamella as they call it. A short apophysis of P3 male and the second outgrowth on the outer border of the endopod P4 male being a lamella are characteristic features of subgroup A. The subspecies thus has nothing to do with the species *Stammericaris stammeri* which belongs to subgroup B. The subspecies must, therefore, be recognised as a separate species within subgroup A.

There are four species of which it is not quite clear to which (sub)group they belong. *Parastenocaris trinacriae* Pesce, Galassi & Cottarelli, 1988 would fit the species discussed here because of its endopod P4 male having the typical appearance, whereas the P3 male and the endopod P3 female are different. Despite these differences *P. trinacriae* is regarded here as a member of the species discussed here and because of its elongate apophysis of the P3 male it is classified in subgroup B. It could also be that *P. balcanica* Petkovski, 1959, *P. nertensis* Rouch, 1990 and *P. triphyda* Cottarelli & Bruno, 1993 belong to the group of species dealt with here. When discussing the position of *P. triphyda*, Cottarelli & Bruno (1993) state that it resembles *P. trinacriae* and even more *P. nertensis*, but reasons for this are not given. Rouch (1990) compares *P. nertensis* with *P. orcina*, *P. balcanica* and *P. trinacriae* because of the more simple structure of the endopod P4 male with only two outgrowths. *P. orcina* has a typical endopod P4 male, though, while it is quite different in *P. balcanica*, *P. nertensis* and *P. triphyda*. It is a matter of interpretation whether one regards its structure in the latter three species as the result of a simplification of the typical endopod P4 male or as something different that excludes these species from the present discussion. I am inclined to opt for this latter decision because also other characters do not fit, in particular the P3 male in all three species and the P5 in the case of *P. nertensis*.

So far it has been shown that there are two distinct subgroups of species and it has also been clarified which species belong to which of these subgroups. The final question now is how these groups fit with Jakobi's genera *Stammericaris* and *Phreaticaris*. From the diagnoses given by Jakobi (1972a) for these two genera it is not quite clear what the difference is between them. They both have the typical endopod P4 male called by Jakobi (1972a) "antler-like" ("geweihförmig") in the case of *Stammericaris* and they also have an elongate apophysis of the P3 male which is longer than the thumb. This is an indication that both coincide with subgroup B as defined above. Subgroup B represents the genus *Stammericaris* and the genus *Phreaticaris* as well. Neither *Stammericaris* nor *Phreaticaris* could represent subgroup A because of their long apophysis P3 male, their short endopod P3 female and the distal outgrowth of the endopod P4 male being a seta and not a lamella. As a consequence one genus has to be synonymised with the other. Since in Jakobi (1972a) *Stammericaris* is listed first, it is proposed to synonymise *Phreaticaris* with *Stammericaris*.

In 2003 Berera & Cottarelli defined a new species-group within the genus *Parastenocaris* which they called the *hera*-group. In this group they included the following species: *P. andalusica*, *P. hera*, *P. stellae*, *P. rivi*, *P. oligoalina*, *P. etrusca*, *P. aphroditis* and *P. sibaritica*. This list of species is identical with that of subgroup A as defined above, except for *P. numidiensis* and *P. luciae*. The latter species was included by Cottarelli et al. (2008) when discussing its relationships. Berera

& Cottarelli (2003) also gave a definition of the *hera*-group encompassing seven characters, of which only the last three are relevant here. Their character 7 refers to the male P4 endopod ending in a narrow lamina with an acute tip. Their character 6 concerns the male P3 exp-1 with 1 or 2 groups of outer spinules, ending in a leaf-like apophysis slightly shorter than exp-2 (= thumb). Their character 5 refers to the male P1 basis having a hook and a seta near the endopod insertion. This is true for *P. aphroditis*, *P. sibaritica* and *P. luciae*, but is not mentioned for the other species in the respective descriptions. On the other hand, it has also been described for one species (*P. diversitatis*) of subgroup B. The remaining four characters are of no importance here because they are not confined to the *hera*-group. The definition and list of species of the *hera*-group leave no doubt that it is identical with subgroup A as defined above. As none of Jakobi's genera fits this definition it is clear that it represents a separate and new taxon on the generic level for which the name *Cottarellicaris* gen. n. is proposed.

The diagnosis of this new taxon is as follows:

Cottarellicaris gen. n.

Diagnosis.— Male antennule 8-segmented and of the pocket-knife type. Basis P1 male with or without hook and seta near endopod insertion. Endopod P3 female as long as or longer than first segment of corresponding exopod. Outer margin of P3 male exp-1 proximally with 1 or no spinule, distally with 1-4 spinules, apophysis leaf-like with an acute tip, as long as thumb or shorter. Basis P4 male with an inner row of 1-4 curved spinules decreasing in size laterally, endopod P4 male a curved plate with a pointed inner tip carrying at its outer border 2 outgrowths, the distal one being an elongate lamella with undulating (crenulate) margins. Caudal rami cylindrical and shorter than anal somite, group of lateral setae located at end of rami.

Type species.— *Parastenocaris etrusca* Cottarelli, Bruno & Venanzetti, 1995.

Etymology.— This genus is named in honour of Prof. Vezio Cottarelli (Viterbo, Italy) for the achievements of him together with his co-workers in the study of in particular the parastenocaridids of the Mediterranean region.

Other species.— *Cottarellicaris andalusica* (Enckell, 1965) comb. n., *C. aphroditis* (Cottarelli & Bruno, 1997) comb. n., *C. gallicus* (Chappuis & Rouch, 1959) comb. n., *C. hera* (Cottarelli, 1969) comb. n., *C. luciae* (Cottarelli, Bruno & Berera, 2008) comb. n., *C. numidiensis* (Rouch, 1987) comb. n., *C. oligoalina* (Cottarelli, Bruno & Venanzetti, 1995) comb. n., *C. rivi* (Cottarelli & Bruno, 1994) comb. n., *C. sibaritica* (Berera & Cottarelli, 2003) comb. n. and *C. stellae* (Cottarelli, Saporito & Puccetti, 1981) comb. n.

Jakobi's (1972a) generic diagnosis for *Stammericaris* has to be complemented because it mentions a few but not all of the relevant characters. The revised diagnosis is as follows:

Stammericaris Jakobi, 1972

Diagnosis.— Male antennule 8-segmented and of the pocket-knife type. Basis P1 male (with one exception) without hook and seta near endopod insertion. Endopod P3 female half as long as or shorter than first segment of corresponding exopod. Outer margin of P3 male exp-1 proximally and distally with group of several spinules, apophysis very long with a rounded tip and slightly curved inwards, being twice as long as the thumb or even longer. Basis P4 male with an inner row of 2-4 curved spinules decreasing in size laterally, endopod P4 male a curved plate with a pointed inner tip carrying at its outer border 2 outgrowths, the distal one being a feathered or plain seta. Caudal rami cylindrical and as long as or shorter than anal somite, group of lateral setae located at end of rami.

Type species.— *Parastenocaris stammeri* Chappuis, 1937.

Other species.— *Stammericaris acherusia* (Noodt, 1955), *St. amyclaea* (Cottarelli, 1969) comb. n., *St. diversitatis* (Cottarelli, Bruno, Spena & Grasso, 2012) comb. n., *St. lorenzae* (Pesce, Galassi & Cottarelli, 1995) comb. n., *St. orcina* (Chappuis, 1938), *St. pasquinii* (Cottarelli, 1972) comb. n., *St. phreatica* (Chappuis, 1936) comb. n. and *St. trinacriae* (Pesce, Galassi & Cottarelli, 1988) comb. n.

As shown the two subgroups defined above can be clearly distinguished diagnostically but are they also monophyletic? Both subgroups are sister taxa because their members have the same endopod P4 male which is unique within Parastenocarididae and which, therefore, is regarded here as a synapomorphy for both subgroups. Within this group there are two subgroups called *Cottarellicaris* gen. n. and *Stammericaris*. The potential autapomorphy of *Cottarellicaris* gen. n. is the distal outgrowth of the endopod P4 male being an enlongate lamella with undulating margins. The seta found in this position in *Stammericaris* is the plesiomorphic condition. The potential autapomorphy of *Stammericaris* is the very long apophysis with a rounded tip of the P3 male which is slightly curved inwards. Such an elongation has developed independently from other cases within Parastenocarididae in the potentionally monophyletic group characterized by the peculiar endopod P4 male.

Both genera belong to Parastenocaridinae and have a similar distribution, with their species being scattered around the Mediterranean (fig. 2). As a result of this study only nine of Jakobi's (1972a) genera are left either to be redefined or to be synonymised, eight belonging to Parastenocaridinae (viz., *Clujensicaris*,

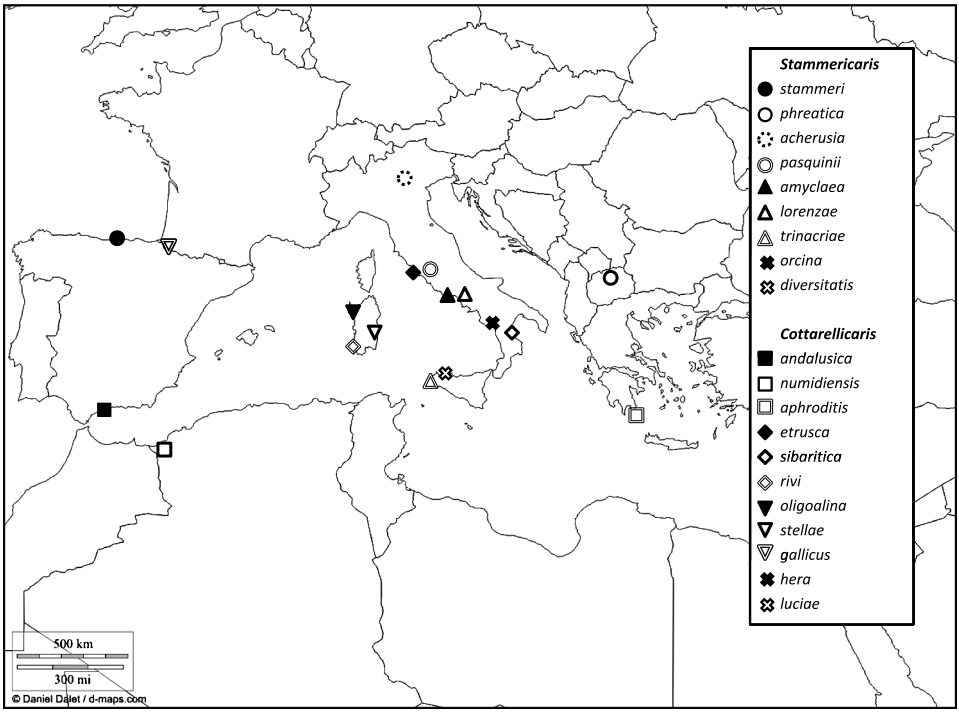

Fig. 2. Map of distribution of the species of *Stammericaris* and *Cottarellicaris* gen. n. in the Mediterranean region (locus typicus only).

Entzicaris, *Italicocaris*, *Lacustricaris*, *Macacocaris*, *Michelicaris*, *Minutacaris* and *Nanacaris*) and one to Fontinalicaridinae (viz., *Fontinalicaris*).

There is a little debate about the position of *Parastenocaris palmerae* Reid, 1992. Reid (1995) counts this species among those that have been loosely considered members of the *brevipes*-group as defined by Lang (1975) but which do not belong there. Karanovic (2005, p. 370; 2006, p. 212) opposes this view with the stunning argument that "there currently are no strong reasons to exclude this species". In a recent cladistic analysis (Karanovic & Lee, 2012) *P. palmerae* clusters with some species of the *brevipes*-group but this cluster is not supported by a single clear synapomorphy. Reid (1995) conceded that the structure of the endopod P4 male complex and the long and spinulate endopod P4 female could be taken as an indication that *P. palmerae* is part of the *brevipes*-group, but she argued that the short female genital field, the P3 male and the setation of the caudal rami speak against it. This is plausible, but where else could *P. palmerae* belong? It is suggested here that it may belong in the vicinity of the two taxa just characterized. Reid (1992) states that the endopod P4 male is a hyaline structure and she does not mention any sclerotised parts as in her description (Reid, 1995) of *Parastenocaris brevipes* Kessler, 1913. Also the endopods P4 male of *Stammericaris phreatica*,

St. stammeri, *St. orcina* and *St. acherusia* are said by their describers (Chappuis, 1936, 1937, 1938; Noodt, 1955) to be hyaline structures. In *P. palmerae* this hyaline structure is divided into five short processes and one long process. In *Stammericaris* there are two short processes (an inner and an outer one) and one long process. The structure in *P. palmerae* is more complicated but could be viewed as a precursor of the condition in *Stammericaris*. A look at Reid's (1992) fig. 42 (see fig. 1G) gives an idea of how the transformation to a simpler structure could have taken place. If this interpretation is acceptable it would mean that also the endopod P4 male complex of *P. palmerae* has nothing to do with that of *P. brevipes* and also the P3 male and the setation of the caudal rami of *P. palmerae* would fit better with *Stammericaris* than with the *brevipes*-group.

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