

Nomenclatorial revision of the supraspecific taxa of Bembidiini s.str. of South America described by JEANNEL (1962) and related taxa with some considerations on the fauna of South America (Coleoptera: Carabidae)

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Abstract

The supraspecific groups of Bembidiini sensu stricto of the South American region described or mentioned by JEANNEL (1962) and related taxa are here examined in order to reorganize the systematics of the species of this region, divided by JEANNEL (1962) into many genera. LORENZ (1998) downgraded these genera to subgenera of *Bembidion* LATREILLE, 1802, in his catalog, where no explanation was given for these nomenclatorial acts. These acts are confirmed here in a more formal way, and brief systematic discussions are reported here to explain the reasons of their validity. After this downgrading, 13 species fall into secondary homonymy, and new names are proposed here for them. The nomenclatorial acts proposed in this work are: genera downgraded to subgenera of *Bembidion*: *Nothocys* JEANNEL, 1962, *Notaphiellus* JEANNEL, 1962, *Notholopha* JEANNEL, 1962, *Pseudotrepanes* JEANNEL, 1962, *Noithonepha* JEANNEL, 1962, *Plocamoperypus* JEANNEL, 1962, *Notoperypus* BONNIARD DE SALUDO, 1969. New synonymies: *Bembidion* subgen. *Austronotaphus* JEANNEL, 1962, syn.n. of *Bembidion* subgen. *Notaphus* STEPHENS, 1829, *Bembidion* subgen. *Notaphidius* JEANNEL, 1962, syn.n. of *Bembidion* subgen. *Notaphus*. Revised synonymies: *Bembidion* (*Notaphus*) *olivieri* (JEANNEL, 1962), syn. of *B. (Notaphilellus) aereum* (JEANNEL, 1962) as informally proposed by NÈGRE (1973), *Bembidion* (*Notaphus*) *antarcticum* FAIRMAIRE, 1889, valid name for *Bembidion* (*Austronotaphus*) *luridum* (BLANCHARD, 1853) (nec DUFTSCHMID, 1812), and not *B. riparum* KOLBE, 1907, as listed in LORENZ (1998), *Bembidion* (*Notaphus*) *servillei* SOLIER, 1849, good species nec synonym of *Bembidion* (*Notaphus*) *bonariense* GEMMINGER & HAROLD, 1868 (= *laticolle* BRULLÉ, 1849; *montevideum* GEMMINGER & HAROLD, 1868). Subgenera transferred to *Bembidion* from *Notholopha*: *Bembidion* subgen. *Pacmophena* JEANNEL, 1962. Subgenera transferred to *Bembidion* from *Peryphus* STEPHENS, 1829: *Bembidion* subgen. *Antiperypus* JEANNEL, 1962, *Bembidion* subgen. *Antiperypus* JEANNEL, 1962, *Bembidion* subgen. *Chilioperypus* JEANNEL, 1962. New names: *Bembidion* (*Notaphus*) *lorenzi* nom.n. for *B. (Notaphus) stenoderum* (JEANNEL, 1962), nec *B. (Bracteon) stenoderum* BATES, 1873, *B. (Austronotaphus) ugartei* nom.n. for *B. (Austronotaphus) deplanatum* (JEANNEL, 1962), nec *B. (Trichoplataphus) deplanatum* MORAWITZ, 1862, *B. (Nothocys) jeannelicum* nom.n. for *B. (Nothocys) nitidum* (JEANNEL, 1962), nec *B. (Eudromus) nitidum* (KIRBY, 1837), *B. (Nothocys) sanandresi* nom.n. for *B. (Nothocys) marcidum* (JEANNEL, 1962), nec *B. marcidum* CASEY, 1918, *B. (Nothocys) bolsoni* nom.n. for *B. (Nothocys) coerulescens* (NÈGRE, 1973), nec *B. coerulescens* DALLA TORRE, 1877, *B. (Nothocys) paralongulum* nom.n. for *B. (Nothocys) longulum* (JEANNEL, 1962), nec *B. longulum* LÉCONTE, 1848, *B. (Notaphiellus) cecalovicianum* nom.n. for *B. (Notaphiellus) aereum* (JEANNEL, 1962), nec *B. aereum* JACQUELIN DU VAL, 1851, *B. (Pacmophena) penai* nom.n. for *B. (Pacmophena) kuscheli* (JEANNEL, 1962), nec *B. (Austronotaphus) kuscheli* (JEANNEL, 1962), *B. (Pacmophena) renei* nom.n. for *B. (Pacmophena) tenuestriatum* (JEANNEL, 1962), nec *B. tenuestriatum* FAIRMAIRE, 1876, *B. (Antiperypus) germanianum* nom.n. for *B. (Antiperypus) germani* JEANNEL, 1962, nec *B. germani* CSIKI, 1928, *B. (Antiperypus) loscondesi* nom.n. for *B. (Antiperypus) nivale* JEANNEL, 1962, nec *B. (Testedium) bipunctatum* ssp. *nivale* HEER, 1841, *B. (Antiperypus) negreanum* nom.n. for *B. (Antiperypus) kaszabi* NÈGRE, 1973, nec *B. kaszabi* JEDLIČKA, 1961, *B. (Notoperypus) bonniardae* nom.n. for *B. (Notoperypus) cecalovici* BONNIARD DE SALUDO, 1969, nec *B. (Notaphiellus) cecalovici* JEANNEL, 1962.

Key words: Coleoptera, Carabidae, Bembidiini, *Bembidion*, *Bembidrenas*, South America, revision, taxonomy.

Introduction

During the compilation of data for a paper (MORET & TOLEDANO, in press) on the systematic position of a new South American subgenus of *Bembidion*, we discovered that the separation of *Nothocys* JEANNEL, 1962, and *Notaphiellus* JEANNEL, 1962, was very problematic, if based on the key of JEANNEL (1962). Reading this key, it was difficult to trust the generic value of the supraspecific taxa mentioned in it. With the reexamination of the validity of several Palaearctic and Holarctic supraspecific taxa in several papers (TOLEDANO 1998, 1999, 2000), I began a work of reorganization of the systematics of the group in order to reduce the number of genera of the Bembidiini. In fact, in the past, several authors, following JEANNEL (1941), raised to genera several taxa used before as subgenera, changing the current systematics of the group in a way not consistent, in my opinion, with the extreme homogeneity of the tribe. This had already been pointed out by LINDROTH (1976), an author who always dealt with the genus *Bembidion* as the largest genus of the Carabidae, worldwide in distribution. Because of this oversplitting, often a clear dividing point between two "genera" cannot be found, and it becomes very difficult to find the correct systematic position of a new species. For this reason, in the past many species have been described without any subgeneric assignment, and still remain incertae sedis in *Bembidion* sensu lato, where they provisionally were placed by the authors. PERRAULT (1981) began his very good work of reexamination of the supraspecific taxonomy of the Bembidiini, but unfortunately his premature death prevented him from finishing his work. In that paper, he strongly reduced the number of valid genera of the Bembidiini (twelve genera: *Asaphidion* GOZIS, 1886; *Amerizus* CHAUDOIR, 1868; *Synechostictus* MOTSCHULSKY, 1864; *Cillen* SAMOUELLE, 1819; *Ocys* STEPHENS, 1829; *Lymneops* CASEY, 1918; *Odontium* LECONTE, 1848; *Phyla* MOTSCHULSKY, 1844; *Metallina* MOTSCHULSKY, 1850; *Bembidarenas* ERWIN, 1972; *Ocydromus* CLAIRVILLE, 1806; and *Bembidion*), but in my opinion their number can be reduced further.

Here I try to extend my work of reassessment of genera to the fauna of South America, which was also a subject of the studies of JEANNEL (1962). This fauna also was divided by Jeannel into too many genera, as already pointed out by LINDROTH (1976). I must emphasize that my observations will be made only on the validity of some supraspecific taxa as genera, because I follow a different philosophy in the systematics of the Bembidiini, while I here have little to say about the validity of the specific taxa, certainly correctly examined, grouped and described by JEANNEL (1962), great entomologist as he no doubt was. In JEANNEL's (1962) keys, the first division of the Bembidiini s.str. was based upon the position of the discal elytral pores. As I already explained (TOLEDANO 1999, 2000), I do not trust the generic value of this character for the Palaearctic fauna. I feel the same for the South American fauna. Therefore I do not give a generic value to the division between the "série philetique de *Notaphus*" and the "série philetique de *Peryphus*" (JEANNEL, 1962), divided by this character. Also the other characters used in the generic diagnosis by JEANNEL (1962) in my opinion have no generic value.

Therefore, every species assigned in JEANNEL (1962) to the genera *Notaphus* STEPHENS, 1829, *Nothocys*, *Notaphiellus*, *Notholopha*, *Pseudotrepanes*, *Nothonepha*, *Peryphus*, and *Plocamoperyphus*, must be assigned to the genus *Bembidion*, and every generic name mentioned above must be downgraded to subgenus of *Bembidion*. The subgenera *Pacmophena*, *Antiperyphus*, *Chilioperyphus*, and *Antiperyphanes* must be assigned to *Bembidion*. The species described by BONNIARD DE SALUDO (1969) as belonging to *Notaphus* subgen. *Notaphidius*, must be assigned to *Bembidion* subgen. *Notaphus*, since the subgenus *Notaphidius* is here formally synonymized with the subgenus *Notaphus*. The genus *Notoperyphus*, must be downgraded to a subgenus of *Bembidion*, and the species from Argentina described by NÈGRE (1973) under the generic names of *Notaphus*, *Nothocys* and *Peryphus* must be assigned to *Bembidion*. LORENZ (1998) already proposed these systematic changes in his catalog, but in his work the author did

not propose any formal nomenclatorial acts for them. I prefer to propose them here in a formal way, in order to prevent any misunderstanding of the systematic position of these taxa in the future.

The third "série philetique" of JEANNEL (1962) was already the subject of study for ERWIN (1972). He correctly reinterpreted the taxonomical characters of *Bembidion reicheellum* CSIKI, 1929, wrongly assigned by JEANNEL (1962) to the Holarctic subgenus *Plataphus* MOTSCHULSKY, 1864. The assignment of a species living in the extreme south of the South American continent to a typically boreal subgenus (a taxon considered by JEANNEL (1941, 1962) as a genus) is probably incorrect. Also the human introduction of an unknown boreal species in South America (suggested as a possibility by JEANNEL (1962)) seems unlikely in light of the studies of most boreal species of *Plataphus* and related subgenera I am doing in order to prepare a revision of the *Plataphus* species of China. In any case the structure of the symmetrical basal lobes of the aedeagus, somewhat similar to that of typical *Plataphus* species, already noted by JEANNEL (1962), together with the absence of the central brush (ERWIN 1972; LINDROTH 1976), confirms that this species is clearly isolated from the other complexes of Bembidiini of the region. In his study, ERWIN (1972) described also the presence in this species of another extremely important apomorphic character, absolutely unique in the Bembidiini: the presence of double setae at each side on the clypeus. This led ERWIN (1972) to describe the genus *Bembidarenas* ERWIN, 1972, one of only two genera of Bembidiini sensu stricto occurring, in my opinion, in South America. Only one other species sharing the same character has been found so far, *Bembidarenas setiventre* NÈGRE, 1973, from Argentina, assigned to the same genus. Recently I have discovered the double setae on the clypeus, as far as I know as an aberration, in a single specimen of *Bembidion (Nothocys) coerulescens*, NÈGRE, 1973, where the doubled seta was present only on the right side.

For some of the species belonging to the downgraded genera mentioned above, a new name is given here in order to replace the original one, now fallen into secondary homonymy, as already discovered by LORENZ (1998, and personal communication), who did not give new names to these species, but only mentioned the species names needing to be replaced.

The nomenclatorial acts proposed below are preceded by brief systematic discussions.

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Subgenera of *Bembidion* with elytral discal pores in the third interval

I begin here the examination of the *Bembidiini* described by JEANNEL (1962) with the group of taxa with discal pores in the third interval, the "série philetique de *Notaphus*" (JEANNEL, 1962), the subgenera more strictly related to the complex of *Bembidion* sensu stricto.

Bembidion subgen. *Notaphus* STEPHENS, 1829

Notaphus STEPHENS, 1829, is a name used in the past both generically and subgenerically. Here it is assigned as a subgenus of *Bembidion*. The distribution of the subgenus known at present, Holarctic, Neotropical and Oceanic, the most extensive in the whole *Bembidiini* s.str., shows the extreme antiquity of this group of beetles. Most species of *Notaphus* and related subgenera (e.g. *Eupetedomus* NETOLITZKY, 1911) share a similar habitus with bronze-greenish colour (sometimes darker), strongly developed microsculpture (as a rule isodiametric), flat elytral intervals and typical yellow spots made by longer and shorter contiguous yellow parts of adjacent intervals with anterior margins more or less advanced, sometimes transversely steplike across each elytron. Even though this group is clearly recognizable, I think that these characters have no generic value.

As in the Holarctic fauna, in JEANNEL's (1962) keys for the Neotropical region they are also easy to distinguish from the other *Bembidion* species with discal pores in the third interval by the shape of the pronotum, broad and weakly sinuate before the hind angles. In my opinion, this also cannot be used as a generic character. In the South American region, many other taxa belonging to a new subgenus in description (MORET & TOLEDANO, in press) share the same character, while their elytral structure, except for the position of the discal pores, is completely different. Therefore, all the species attributed by JEANNEL (1962) to *Notaphus*, are here attributed to *Bembidion*.

According to NÈGRE (1973), two species, both described by JEANNEL (1962) from single female specimens, are synonyms. In the opinion of that author, *Notaphiellus aereus* JEANNEL, 1962, and *Notaphus olivieri* JEANNEL, 1962, are identical except for the position of the humeral elytral pores, a character which in some groups can be variable. With only female specimens, there was no possibility of comparing the types for other important diagnostic characters (NÈGRE 1973), such as the male genitalia or the first article of the male protarsi, more strongly dilated in the subgenus *Notaphiellus*. His decision was to keep *N. aereus* as the senior synonym. In his paper he says "L'identité de cette espèce et de *Notaphus olivieri* JEANNEL, 1962 m'incite à mettre les deux noms en synonymie". Actually a formal nomenclatorial act is not proposed for this synonymy, but there is no reason to doubt the validity of this observation. Therefore I prefer to honor the intent of the first reviser (NÈGRE 1973) and to keep *B. aereum* JEANNEL, 1962, as senior synonym of *B. olivieri* JEANNEL, 1962, as suggested by Dr. Robert Davidson (personal communication). The assignment of both taxa to the genus *Bembidion*, as proposed here, puts both names into secondary homonymy (*Notaphiellus aereus* JEANNEL, 1962, with *Bembidion aereum* JACQUELIN DU VAL, 1851, and *Notaphus olivieri* JEANNEL, 1962, with *Bembidion olivieri* CROTCH, 1868), so at least the senior name should be replaced. The subgeneric placement of this species (*Notaphus* or *Notaphiellus*) remains uncertain until males are discovered, but, at least provisionally, the species name is listed below under the subgeneric name of *Notaphiellus*, the same as that of the species which has been renamed.

Bembidion (*Notaphus*) *olivieri* JEANNEL, 1962, synonym of *Bembidion* (*Notaphiellus*) *aereum* JEANNEL, 1962.

LORENZ (1998) lists *Bembidion* subgen. *Notaphidius* JEANNEL, 1962, and *Bembidion* subgen. *Austronotaphus* JEANNEL, 1962, as synonyms of *Bembidion* subgen. *Notaphus* STEPHENS, 1829. According to JEANNEL (1962) the subgen. *Notaphidius* is distinguishable from *Notaphus* by the apical stria connected with stria 5 (connected with stria 7 in *Notaphus*), and the subgen. *Austronotaphus* is distinguishable from *Notaphus* by the frontal sulci, extended to the clypeus (not extended to the clypeus in *Notaphus*). The diagnostic characters mentioned by JEANNEL (1962) to distinguish both subgenera from *Notaphus* are mainly used for the *Bembidiini* to separate species or groups of species, but never valid as subgeneric characters. The apical stria can be connected with stria 5 or stria 7 in different specimens of the same species and populations (e.g., some undescribed species of *Bembidion* subgen. *Bembidionetolitzkya* STRAND, 1929 from China). In these cases, the character lacks specific significance, let alone subgeneric value. In the case of the subgen. *Notaphidius* it seems to be a constant character, but valid to differentiate, in my opinion, only a group of species. The extension of the frontal sulci to the clypeus is sometimes used to separate species (e.g. *Bembidion (Emphanes) azurescens* DALLA TORRE, 1877, from *Bembidion (Emphanes) tenellum* ERICHSON, 1837), but it does not have subgeneric significance. I prefer to formalize here the synonymies of LORENZ (1998). Therefore:

Bembidion subgen. *Austronotaphus* JEANNEL, 1962, **syn.n.** of *Bembidion* subgen. *Notaphus* STEPHENS, 1829

Bembidion subgen. *Notaphidius* JEANNEL, 1962, **syn.n.** of *Bembidion* subgen. *Notaphus* STEPHENS, 1829

The following species are transferred to *Bembidion* subgen. *Notaphus*, from *Notaphus* s.str.:

Bembidion (Notaphus) aubei SOLIER, 1849

Bembidion (Notaphus) calverti GERMAIN, 1906

Bembidion (Notaphus) inconstans SOLIER, 1849

Bembidion (Notaphus) mirasoi JENSEN-HAARUP, 1910

Bembidion (Notaphus) fischeri SOLIER, 1849

Bembidion (Notaphus) posticale GERMAIN, 1906

Bembidion (Notaphus) posticale platense (NÈGRE, 1973) **comb.n.**

Bembidion (Notaphus) jacobseni JENSEN-HAARUP, 1910

Bembidion (Notaphus) chaudoirianum CSIKI, 1929

Among the species assigned by JEANNEL (1962) to the genus *Notaphus*, three species, *Bembidion (Austronotaphus) luridum* (BLANCHARD, 1853), *Bembidion (Notaphus) servillei* SOLIER, 1849 and *Bembidion (Austronotaphus) gameani* (JEANNEL, 1962), have been mentioned in LORENZ (1998) as junior synonyms of other species. One of these synonymies, as suggested by the author himself (personal communication) is due to a mistake. A short explanation of these synonymies is given below here.

The name *riparum* KOLBE, 1907, was used by LORENZ (1998) as the valid name for *luridum* (BLANCHARD, 1853), nec DUFTSCHMID, 1812, but in the list of the synonyms mentioned in LORENZ (1998) there is an older name, *Bembidion antarcticum* FAIRMAIRE, 1889. The author himself explained to me that this choice is due to a mistake, and I report here the text of his communication, to make clear which one actually is the valid name, in the author's opinion:

"JEANNEL, 1962 used the name *luridus* BLANCHARD, 1853 nec DUFTSCHMID, 1812 and listed as synonyms: *antarcticum* FAIRMAIRE, 1889, *magellanicum* GERMAIN, 1906, *fuegianum* KOLBE, 1907, *riparum* KOLBE, 1907, but did not mention CSIKI's (1928) unjustified replacement name *patagonicum*. This is how I first listed the species in my databank. Later I found that *luridum* was

preoccupied and *riparum* was not preoccupied, - but I missed that there was an older name" (LORENZ, personal communication). Therefore the oldest, available, name is *Bembidion (Notaphus) antarcticum* FAIRMAIRE, 1889.

About *Bembidion (Notaphus) servillei* SOLIER, 1849, there is a nomenclatorial problem. "JEANNEL (1962) used the name *servillei* SOLIER, 1849 and mentioned as synonyms: *B. lacustre* GERMAIN, 1906 nec LÉCONTE, 1848 and *B. uliginosum* CSIKI, 1928. CSIKI (1933) (p.1645), in an appendix to Coleopterorum Catalogus, stated that *B. bonariense* BOHEMAN, 1858 was *B. montevidium* GEMMINGER & HAROLD, 1868. Finally, NÈGRE (1973) (p. 296) synonymized *B. laticolle* BRULLÉ, 1843 with *B. servillei* SOLIER, 1849" (Lorenz, personal communication).

The name used by LORENZ (1998) as the valid one for this group of synonyms was *bonariense* BOHEMAN, 1858.

"In the discussion by Lorenz (personal communication) of *B. bonariense* all the names are considered as synonyms, with *B. laticolle* synonymized with *B. servillei* by NÈGRE (1973), *B. laticolle* preoccupied and replaced by *B. montevidium* by CSIKI (1933), who also later states that *B. bonariense* is the same as *B. montevidium*. If all this were true, the oldest available name would be *B. servillei* SOLIER, 1849, which as far as I can tell is not preoccupied within *Bembidion*, and not *B. bonariense* BOHEMAN, 1858. However, in my reprint of the NÈGRE (1973) paper, there is a page attached at the end with an erratum, probably included in the original journal at the end of the volume or perhaps in the next year. It reads as follows: "*Notaphus laticolle* BRULLÉ 1843 (nec. Duft. 1812) has to be named *montevidius* Gemm. and Har. 1868, it has been captured at the station 773. The specimens of the stations 222, 265, 536 and 565 belong to the species *servillei* Sol. 1849, which is not synonymous with *laticolle* BRULLÉ." It means that *B. servillei* is a good species and should be listed separately as *Bembidion (Notaphus) servillei* SOLIER, 1849. And it means that if *B. bonariense* in fact is the same as *B. laticolle* (= *montevidium*), it is also a valid species and the valid name. Since no one has checked types, though, and we have only CSIKI's (1933) statement that *bonariense* = *montevidium*, I don't know how we can be sure that *B. bonariense* is the same as *B. laticolle (montevidium)* and not the same as *B. servillei*. NÈGRE (1973) seems to have seen the Brullé type and the Solier type and is sure they are different species, but he does not deal with or mention the name *B. bonariense*" (Davidson, personal communication).

Therefore *Bembidion (Notaphus) servillei* SOLIER, 1849, and *B. (Notaphus) bonariense* BOHEMAN, 1858, are kept here "as good species, *B. bonariense* as the senior name of *montevidium* (= *laticolle*) as suggested by CSIKI (1933) but since the group has not been recently revised and, as always, examination of the types might reveal *bonariense* actually belongs to *B. servillei* (or it could even be a third species), the whole thing at the species level is tentative anyway, pending a revision of the Neotropical fauna and checking of types" (Davidson, personal communication).

According to LINDROTH (1976) *Bembidion (Australnotaphus) gameani* JEANNEL, 1962, is a junior synonym of *Bembidion (Notaphus) brullei* GEMMINGER & HAROLD, 1868 (the former described from New Zealand, where this South American species is adventive).

Therefore, to the list of the species of *Notaphus* must be added these four species:

Bembidion (Notaphus) antarcticum FAIRMAIRE, 1889

Bembidion (Notaphus) bonariense BOHEMAN, 1858

Bembidion (Notaphus) brullei GEMMINGER & HAROLD, 1868

Bembidion (Notaphus) servillei SOLIER, 1849

The following species are transferred to *Bembidion* subgen. *Notaphus*, from *Notaphus* subgen. *Austronotaphus*:

Bembidion (Notaphus) convergens BERG, 1883

Bembidion (Notaphus) kuscheli (JEANNEL, 1962) **comb.n.**

The following species are transferred to *Bembidion* subgen. *Notaphus*, from *Notaphus* subgen. *Notaphidius*:

Bembidion (Notaphus) aricense (JEANNEL, 1962) **comb.n.**

Bembidion (Notaphus) unifasciatum (BONNIARD DE SALUDO, 1969) **comb.n.**

Bembidion (Notaphus) gabrielum (BONNIARD DE SALUDO, 1969) **comb.n.**

Bembidion (Notaphus) bicolor (BONNIARD DE SALUDO, 1969) **comb.n.**

For two species, fallen into secondary homonymy after the transfer to *Bembidion* from *Notaphus*, a new name is proposed here:

Bembidion (Notaphus) lorenzi **nom.n.** for *Bembidion (Notaphus) stenoderum* (JEANNEL, 1962), nec *Bembidion (Bracteon) stenoderum*, BATES, 1873; the species name is dedicated to my friend Wolfgang Lorenz, who already discovered the need to rename many of the species described by JEANNEL (1962) and kindly asked me to do it.

Bembidion (Austronotaphus) ugartei **nom.n.** for *Bembidion (Austronotaphus) deplanatum* (JEANNEL, 1962), nec *Bembidion (Trichoplataphus) deplanatum* MORAWITZ, 1862; the species name is dedicated to my friend Alfredo Ugarte-Peña from Santiago, Chile.

***Bembidion* subgen. *Nothocys* JEANNEL, 1962, and subgen. *Notaphiellus* JEANNEL, 1962**

Nothocys, and *Notaphiellus*, are two supraspecific groups described as genera, and as to their generic validity there are many doubts. They are rather difficult to separate using the characters given by JEANNEL (1962) for the diagnosis, as mentioned before: *Nothocys* with strongly punctured elytral striae, habitus of small *Argutor* or *Phyla*, parallel and superficial frontal sulci, fourth elytral humeral seta distant from the third; *Notaphiellus* with sharp and superficial elytral striae, very finely punctate, four humeral setae regularly distributed, short and parallel frontal sulci. Both subgenera include species with unicolorous elytra, without yellow spots. The only character that seems to be useful for a supraspecific discrimination is the distribution of the elytral humeral umbilicate pores, a character I have already used, like JEANNEL (1941) himself, to separate Palaearctic subgenera (TOLEDANO 2000).

The male genitalia of both groups share most internal characters and the character state of each paramere with two setae (JEANNEL 1962). Though I still have some doubts about the subgeneric independence of *Nothocys* and *Notaphiellus*, in my opinion the generic independence of these taxa cannot be accepted, and their species are here transferred to *Bembidion* LATREILLE, 1802.

Bembidion subgen. *Nothocys* JEANNEL, 1962, and *Bembidion* subgen. *Notaphiellus* JEANNEL, 1962, are here downgraded to subgenera of *Bembidion* LATREILLE, 1802:

Bembidion subgen. *Nothocys* JEANNEL, 1962 **new subgeneric combination**

Bembidion subgen. *Notaphiellus* JEANNEL, 1962 **new subgeneric combination**

The following species are transferred to *Bembidion* subgen. *Nothocys*, from gen. *Nothocys*:

Bembidion (Nothocys) nigrita SOLIER, 1849

Bembidion (Nothocys) delamarei (JEANNEL, 1962) **comb.n.**

Bembidion (Nothocys) grossepunctatum GERMAIN, 1906

Bembidion (Nothocys) marginatum SOLIER, 1849

Bembidion (Nothocys) silvicola (JEANNEL, 1962) **comb.n.**

Bembidion (Nothocys) anthracinum GERMAIN, 1906

Bembidion (Nothocys) topali (NÈGRE, 1973) **comb.n.**

For four species, fallen into secondary homonymy after the transfer to *Bembidion* from the genus *Nothocys*, a new name is given here:

Bembidion (Nothocys) jeannelicum **nom.n.** for *Bembidion (Nothocys) nitidum* (JEANNEL, 1962), nec *Bembidion (Eudromus) nitidum* (KIRBY, 1837); the species name is dedicated to Dr. René Jeannel, the original describer of most of the taxa renamed in this work.

Bembidion (Nothocys) sanandresi **nom.n.** for *Bembidion (Nothocys) marcidum* (JEANNEL, 1962), nec *Bembidion marcidum* CASEY, 1918, synonym of *Bembidion (Notaphus) patruelle* DEJEAN, 1831; specific name derived from the type locality, Chili, Atacama prov., Vegas de San Andrés.

Bembidion (Nothocys) bolsoni **nom.n.** for *Bembidion (Nothocys) coerulescens* (NÈGRE, 1973), nec *Bembidion coerulescens* DALLA TORRE, 1877, synonym of *Bembidion (Ocydromus) cruciatum bualei* JACQUELIN DU VAL, 1852; the specific name is derived from the type locality, Argentina, Rio Negro, El Bolsòn.

Bembidion (Nothocys) paralongulum **nom.n.** for *Bembidion (Nothocys) longulum* (JEANNEL, 1962), nec *Bembidion longulum* LÉCONTE, 1848, synonym of *Bembidion (Hirmoplataphus) concolor* KIRBY, 1837; the specific name is derived from the former one, fallen into secondary homonymy.

The following species are transferred to *Bembidion* subgen. *Notaphiellus* JEANNEL, 1962, from *Notaphiellus* JEANNEL, 1962:

Bembidion (Notaphiellus) cupreostriatum GERMAIN, 1906

Bembidion (Notaphiellus) solieri GEMMINGER & HAROLD, 1868

Bembidion (Notaphiellus) oblitteratum SOLIER, 1849

Bembidion (Notaphiellus) cekalovici (JEANNEL, 1962) **comb.n.**

Bembidion (Notaphiellus) hornense (JEANNEL, 1962) **comb.n.**

For one species, fallen into secondary homonymy after the transfer to *Bembidion* from *Notaphiellus*, a new name is proposed here:

Bembidion (Notaphiellus) cekalovicianum **nom.n.** for *Bembidion (Notaphiellus) aereum* (JEANNEL, 1962), nec *Bembidion aereum* JACQUELIN DU VAL, 1851; the specific name is dedicated to the collector of the type specimen, Mr. Cekalovic.

***Bembidion* subgen. *Notholopha* JEANNEL, 1962, *Pacmophena* JEANNEL, 1962, and *Pseudotrepanes* JEANNEL, 1962**

Within the group of genera described by JEANNEL (1962) with elytral discal pores in the third interval, the "genera" *Notholopha* and *Pseudotrepanes* are distinguishable from *Nothocys*, *Notaphus* and *Notaphiellus* by the structure of the pronotum, which is narrow, not wider than the head, and has strongly sinuate sides, very narrow base, cordiform shape very similar to that of the Holarctic subgenus *Bembidion* s.str. In the other three "genera" mentioned above the pronotum is wider than the head, and not sinuate at sides. *Notholopha* and *Pseudotrepanes* are distinguishable from each other by examination of the four elytral humeral pores, closely and regularly distributed in *Notholopha*, with the fourth more distant from the first three closely and evenly spaced pores in *Pseudotrepanes*.

In the Palaearctic subgenera (the same character distinguishes *Bembidion*, from *Emphanes* MOTSCHULSKY, 1850), in parallel cases I have given to this level of difference only a subgeneric significance; therefore the species of *Notholopha* and *Pseudotrepanes* are here transferred to *Bembidion*.

Both subgenera attributed by JEANNEL (1962) to *Notholopha* are here transferred to *Bembidion*:

Bembidion subgen. *Notholopha* JEANNEL, 1962 **new subgeneric combination**

Bembidion subgen. *Pacmophena* JEANNEL, **new subgeneric combination**

The following species are transferred to *Bembidion* subgen. *Notholopha* JEANNEL, 1962, from gen. *Notholopha* JEANNEL, 1962:

Bembidion (*Notholopha*) *epistomale* (JEANNEL, 1962) **comb.n.**

Bembidion (*Notholopha*) *punctigerum* SOLIER, 1849

Bembidion (*Notholopha*) *atrum* GERMAIN, 1906

Bembidion (*Notholopha*) *sexfoveatum* GERMAIN, 1906

The following species are transferred to *Bembidion* subgen. *Pacmophena* JEANNEL, 1962, from *Notholopha* subgen. *Pacmophena* JEANNEL, 1962:

Bembidion (*Pacmophena*) *stricticolle* GERMAIN, 1906

Bembidion (*Pacmophena*) *rugosellum* (JEANNEL, 1962) **comb.n.**

Bembidion (*Pacmophena*) *scitulum* ERICHSON, 1834

Bembidion (*Pacmophena*) *melanopodum* SOLIER, 1849

For two species, fallen into secondary homonymy after the transfer to *Bembidion* from *Notholopha*, a new name is given here:

Bembidion (*Pacmophena*) **penai** **nom.n.** for *Bembidion* (*Pacmophena*) *kuscheli* (JEANNEL, 1962), nec *B. (Austronotaphus) kuscheli* (JEANNEL, 1962); the species name is dedicated to the late lamented Dr. Luis Peña, famous entomologist from Santiago, Chile.

Bembidion (*Pacmophena*) **renei** **nom.n.** for *Bembidion* (*Pacmophena*) *tenuestriatum* (JEANNEL, 1962), nec *B. tenuestriatum* FAIRMAIRE, 1876, synonym of *Bembidion* (*Philochthus*) *vicinum* LUCAS, 1846; the species name is dedicated to Dr. René Jeannel, the original describer of most of the taxa renamed in this work.

Bembidion subgen. *Pseudotrepanes* JEANNEL, 1962 **new subgeneric combination**

The following species is transferred to *Bembidion* subgen. *Pseudotrepanes* JEANNEL, 1962, from gen. *Pseudotrepanes* JEANNEL, 1962:

Bembidion (*Pseudotrepanes*) *derbesi* SOLIER, 1849

Subgenera of *Bembidion* with elytral discal pores on the third stria

The character of the position of the discal elytral pores (on the third stria or on the third interval) in the genus *Bembidion*, can be used to divide most subgenera in two main groups. The groups with the elytral discal pores near stria 3, the "série philetique de *Peryphus*" (JEANNEL 1962), are dealt with below. In the northern hemisphere, most species groups sharing the position of the discal pores in the third interval almost on stria 3 are more strictly related to the *Ocydromus* CLAIRVILLE, 1806, complex. In my opinion, in the case of the taxa transferred below to *Bembidion*, the sharing of this character with the *Ocydromus* complex seems to be more probably due to convergence than to a real phylogenetic affinity, because of the strong differences in the

structure of the internal sac of these South American subgenera from that of the boreal subgenus *Ocydromus* and related subgenera.

***Bembidion* subgen. *Nothonepha* JEANNEL, 1962**

The main character of the species of *Nothonepha* is the almost complete absence of elytral striae. Some traces of the inner striae are sometimes visible, enough to realize that the discal elytral pores are near stria 3. Reduction or effacement of the elytral striae is already known in a few subgenera (e.g., the Chinese subgen. *Microsinocys* TOLEDANO, 1998), while sometimes it is only a specific character (e.g., in the Chinese *Bembidion* (*Hoquedela*) *csikii* JEDLICKA, 1937, and in some species of the western Palaearctic subgen. *Nepha* MOTSCHULSKY, 1864). In any case, this character alone is insufficient for generic status, and for this reason the species of *Nothonepha* are transferred below to the genus *Bembidion*.

Bembidion subgen. *Nothonepha* JEANNEL, 1962 **new subgeneric combination**

The following species are transferred to *Bembidion* subgen. *Nothonepha* JEANNEL, 1962, from gen. *Nothonepha* JEANNEL, 1962:

Bembidion (*Nothonepha*) *lonai* JENSEN-HAARUP, 1910

Bembidion (*Nothonepha*) *pallideguttula* JENSEN-HAARUP, 1910

***Bembidion* subgen. *Antiperyphus* JEANNEL, 1962,
Antiperyphanes, JEANNEL, 1962, and *Chilioperyphus* JEANNEL, 1962**

In the Palaearctic region, most species ranked by JEANNEL (1941) under the genus *Peryphus* STEPHENS, 1829, for the presence of discal elytral pores near the third stria have been correctly included in the subgen. *Ocydromus* CLAIRVILLE, 1806, the oldest name available for the group, by KRYZHANOVSKIJ et al. (1995), and divided into several groups of species. At present there is no evidence of the occurrence of the subgen. *Ocydromus* CLAIRVILLE, 1806, south of the North American region. Therefore the assignment of the species mentioned here to the "genus" *Peryphus* made by JEANNEL (1962) is in my opinion incorrect, especially in light of the uniqueness of the internal sac of the aedeagus in the South American species. This has two long parallel sclerites in the subgen. *Antiperyphus* and in a species of the subgen. *Chilioperyphus* (*B. orregoi* GERMAIN, 1906); a single, very long, sclerite greatly surpassing the base of the aedeagus in the subgen. *Antiperyphanes*; and a single, long sclerite in the other species of the subgen. *Chilioperyphus* (*B. mendocinum* JENSEN-HAARUP, 1910). The most important feature of the internal sac of these groups is the absence, in most species, of the central sclerotized brush typical of the genus *Bembidion*, which is present only in *Bembidion* (*Antiperyphus*) *engelhardti* JENSEN-HAARUP, 1910 (LINDROTH 1976). The lack of this character has been used in the generic diagnosis for *Phrypeus* CASEY, 1924, and *Bembidarens* ERWIN, 1972 (LINDROTH 1963, 1976; ERWIN 1972). About the importance of this character in the subgenera dealt with here, I agree with LINDROTH (1976): "... it is not my intention to expel *Antiperyphanes* from genus *Bembidion* only because an evolutionary trend has been followed to its conclusion. The presence of the brush must consequently be dropped as a compulsory character diagnostic of *Bembidion*." In any case the subgeneric independence of these subgenera from *Ocydromus* is confirmed by this character.

The three subgenera attributed by JEANNEL (1962) to *Peryphus* are here transferred to *Bembidion*:

Bembidion subgen. *Antiperyphus* JEANNEL, 1962 **new subgeneric combination**

Bembidion subgen. *Antiperyphanes* JEANNEL, 1962 **new subgeneric combination**

Bembidion subgen. *Chilioperypus* JEANNEL, 1962 **new subgeneric combination**

The following species are transferred to *Bembidion* subgen. *Antiperyphus*, from *Peryphus* subgen. *Antiperyphus*:

Bembidion (Antiperyphus) ringueleti (JEANNEL, 1962) **comb.n.**

Bembidion (Antiperyphus) rufoplagiatum GERMAIN, 1906

Bembidion (Antiperyphus) uniforme CSIKI, 1929

Bembidion (Antiperyphus) parvum (JEANNEL, 1962) **comb.n.**

Bembidion (Antiperyphus) tucumanum (JEANNEL, 1962) **comb.n.**

Bembidion (Antiperyphus) engelhardti JENSEN-HAARUP, 1910

Bembidion (Antiperyphus) eburneonigrum GERMAIN, 1906

Bembidion (Antiperyphus) philippii GERMAIN, 1906

Bembidion (Antiperyphus) hirtipes (JEANNEL, 1962) **comb.n.**

The following species are transferred to *Bembidion* subgen. *Antiperyphanes*, from *Peryphus* subgen. *Antiperyphanes*:

Bembidion (Antiperyphanes) spinolai SOLIER, 1849

Bembidion (Antiperyphanes) chilense SOLIER, 1849

Bembidion (Antiperyphanes) maculiferum GEMMINGER & HAROLD, 1868

According to NÈGRE (1973) *Bembidion (Antiperyphanes) spinolai* SOLIER, 1849 is a senior synonym of *Bembidion (Antiperyphanes) delamarei* JEANNEL, 1962 (nec of *Bembidion (Nothocys) delamarei* JEANNEL, 1962) as reported also by LORENZ (1998). *Bembidion (Antiperyphanes) delamarei* JEANNEL, 1962 was also correctly treated by LORENZ (1998) as junior objective homonym of *Bembidion (Nothocys) delamarei* JEANNEL, 1962.

The following species are transferred to *Bembidion* subgen. *Chilioperypus*, from *Peryphus* subgen. *Chilioperypus*:

Bembidion (Chilioperypus) orregoi GERMAIN, 1906

Bembidion (Chilioperypus) mendocinum JENSEN-HAARUP, 1910

For two species, fallen into secondary homonymy after the transfer to *Bembidion* from *Peryphus*, a new name is given here:

Bembidion (Antiperyphanes) loscondesi **nom.n.** for *Bembidion (Antiperyphanes) nivale* (JEANNEL, 1962), nec *Bembidion (Testedium) bipunctatum* ssp. *nivale* DEJEAN, 1831; the specific name is derived from the type locality: Chili, Prov. of Santiago, Los Condes.

Bembidion (Antiperyphanes) negreanum **nom.n.** for *Bembidion (Antiperyphanes) kaszabi* (NÈGRE, 1973), nec *Bembidion kaszabi* JEDLICKA, 1961, synonym of *Bembidion (Odontium) persimile* MORAWITZ, 1862; the species name is dedicated to its original describer, J. Nègre.

***Bembidion* subgen. *Plocamoperypus* JEANNEL, 1962**

The genus *Plocamoperypus* was described by JEANNEL (1962) for a single species, *P. mandibularis* SOLIER, 1849, showing a set of external characters rather unusual for *Bembidion* species with discal elytral pores near stria 3: surface dull and light spots similar to those of *Notaphus* and related subgenera. The four humeral umbilicate elytral pores are distributed in a

rather unusual way, with the two posterior pores more distant from the anterior pores than the two anterior pores are from one another.

An interesting apomorphy shown by this species is the clypeus, fused with the frons (JEANNEL 1962). This character could perhaps be interpreted as of generic value (as in the genus *Ocys* STEPHENS, 1829, which has the mentum and submentum fused), but the male genitalia of this species are almost identical to those of *Bembidion* (*Chiloperiphys*) *mendocinum* JENSEN-HAARUP, 1910. In this case, in my opinion, more importance must be given to the structure of the male genitalia, and perhaps the external differences between *Plocamoperiphys* and *Chiloperiphys* are only specific. In any case, for now I keep both supraspecific taxa as valid and separate, and *Plocamoperiphys* is here downgraded to a subgenus of *Bembidion*. Therefore:

Bembidion subgen. *Plocamoperiphys* JEANNEL, 1962 **new subgeneric combination**

Bembidion (*Plocamoperiphys*) *mandibulare* SOLIER, 1849

***Bembidion* subgen. *Notoperiphys* BONNIARD DE SALUDO, 1969**

In order to explain my opinion about the taxonomic rank of this taxon, I report here the original description: "Genre appartenant à la Tribu Bembidiini, ressemble à *Plocamoperiphys* par ses téguments alutacés et par la disposition des fouets huméraux de la série ombiliquée. S'en différencie par la striation des élytres, par les sillons frontaux et par la prolongation de la strie récurrente apicale." (BONNIARD DE SALUDO 1969).

Among the characters mentioned in this description, in my opinion none is valid for generic rank. The elytral striae are deep and impunctate in *Plocamoperiphys*, while they are superficial and punctate in *Notoperiphys*. As a rule, the supraspecific validity of this character is limited to the level of the group of species, rarely to the subgeneric level. The general shape of the frontal sulci is sometimes of subgeneric value (e.g., to distinguish *Diplocampa* BEDEL, 1896, *Semicampa* NETOLITZKY, 1910, *Leja* DEJEAN, 1821), but, as mentioned above, their extension on the clypeus is normally used only to distinguish species (e.g., *Bembidion* (*Emphanes*) *azurescens* DALLA TORRE, 1877, from *Bembidion* (*Emphanes*) *tenellum* ERICHSON, 1837). In fact, the frontal sulci are not extended on the clypeus in the single species of the subgen. *Plocamoperiphys* JEANNEL, 1962, as is also the case in *Notoperiphys* *cekalovici* BONNIARD DE SALUDO, 1969, while they are extended on the clypeus in the only other species, *N. angelieri* BONNIARD DE SALUDO, 1969. Therefore this character is of use only as a specific character, not a generic one. The apical stria in *Notoperiphys* is connected with stria 7, while in *Plocamoperiphys* it is connected with stria 5. In the original description there is no mention of the male genitalia as at the time there were no male specimens available for either species. Surely two genera cannot be separated by the characters mentioned above. Therefore the species of *Notoperiphys* are here transferred to *Bembidion*. Until males are available so that the subgeneric validity of this taxon can be judged, *Notoperiphys*, is retained here as a subgenus of *Bembidion*.

Bembidion subgen. *Notoperiphys* BONNIARD DE SALUDO, 1969 **new subgeneric combination**

The following species is transferred to *Bembidion* (subgen. *Notoperiphys*) from *Notoperiphys*:

Bembidion (*Notoperiphys*) *angelieri* (BONNIARD DE SALUDO, 1969) **comb.n.**

For one species, fallen into secondary homonymy after the transfer to *Bembidion* from *Notoperiphys*, a new name is given here:

Bembidion (*Notoperiphys*) **bonniardae** **nom.n.** for *Bembidion* (*Notoperiphys*) *cekalovici* (BONNIARD DE SALUDO, 1969), nec *Bembidion* (*Notaphiellus*) *cekalovici* (JEANNEL, 1962); the specific name is dedicated to Mrs. Bonniard de Saludo, the original describer of this taxon.

Conclusions

To deal with the world Bembidiini is very difficult due to the large number of described species: the main group of species of the Bembidiini, the genus *Bembidion*, is the largest genus of the family Carabidae, according to LINDROTH (1976), including at present about 1600 species. One of the main problems of this study is that the different faunas have been studied by several authors in different ways, and therefore some supraspecific taxa occurring in different chorologic regions have been dealt with as genera, subgenera or groups of species. The classic path keeps most species under the generic name of *Bembidion*. JEANNEL (1941, 1962) studied the western Palaearctic and the southern South American faunas, splitting the complex of *Bembidion* species into a large number of genera (17 for the French fauna, 9 for the South American fauna). Several authors, mainly in western Europe, followed this path. As already pointed out by LINDROTH (1963, 1976), such a treatment of the Bembidiini does not match with the extreme homogeneity of the tribe. Therefore, after a preliminary study based on the papers of NETOLITZKY (1942-43), LINDROTH (1963, 1976, 1980), PERRAULT (1981), ERWIN & KAVANAUGH (1981), MÜLLER-MOTZFELD (1985, 1986a, 1986b, 1998), MADDISON (1993), and on my personal observations and opinions, only nine world genera still seem to me to be valid (TOLEDANO 2000): *Asaphidion* GOZIS, 1886, *Bembidion* LATREILLE, 1802, *Ocys* STEPHENS, 1829, *Orzolina* MACHADO, 1987, *Amerizus* CHAUDOIR, 1868, *Caecidium* UÉNO, 1971, *Phrypeus* CASEY, 1924, *Bembidarenas* ERWIN, 1972, and *Zecillenus* LINDROTH, 1980. The goal of this work and of the others I have done on the genus *Bembidion* (TOLEDANO 1998, 1999, 2000) is to try to unify the manner of dealing with the Bembidiini, and to make possible for world authors really to collaborate with each other in the building of the "genealogical tree" of the tribe.

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