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*CAMBARUS TYPHLOBIUS* JOSEPH, 1880, AND *AUSTROPOTAMOBIOUS*  
*PALLIPES BISPINOSUS* KARAMAN, 1961 (DECAPODA ASTACIDAE)

BY

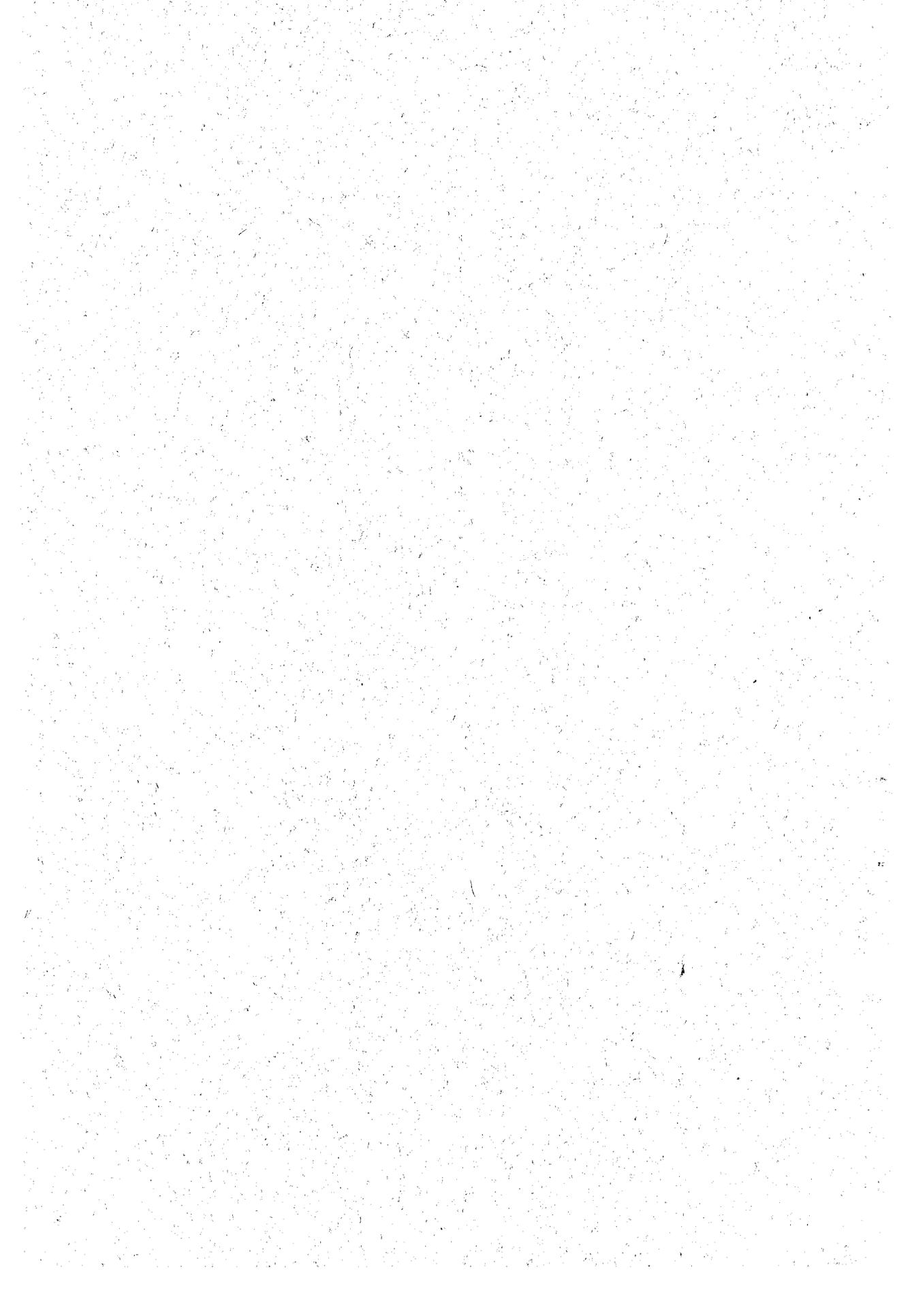
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In preparing the chapter on the decapod Crustacea for "Limnofauna Europaea" a problem arose regarding two Astacidae, which had been described as belonging to the European fauna, but the status of which proved to be rather dubious. It is the object of the present paper to try and find the correct identity of each of these two forms.

***Cambarus typhlobius* Joseph, 1880**

Morphology. — The species was first mentioned under the above name by Joseph (1880: 202) in a very short note in which that author gave the locality of the animal, its length (9 cm), the fact that it is blind and that it inhabited a cave. Joseph considered the species to be very close to *Orconectes pellucidus* (Tellskamp). Though his account is very meagre it gives sufficient details to make the name *typhlobius* an available name. The next year Joseph (1881) in another publication mentioned the species as *Cambarus coecus* (: 237) and as *Cambarus stygius* (: 241, 248); since he gave no description or indication with these names, they must be considered nomina nuda. Finally in 1882 a more extensive discussion of the species, which was now named *Cambarus stygius*, was published by Joseph (1882: 12). Here he stated the length of the animal, measured from the tip of the rostrum to the end of the telson, to be 6.5 cm, which makes it probable that his 1880 measurement included the chelipeds. Joseph compared his specimen with the account given by Packard (1872: 17, fig. 131) of *Orconectes pellucidus*, a species of which Joseph, according to his own statement, had neither actual material nor better descriptions or better figures. The characters given by Joseph of his animal are the following:

1. The antennae of *Cambarus stygius* are  $1\frac{1}{10}$  longer than those of *O. pellucidus*.
2. The antennular peduncle reaches beyond the rostrum (in Packard's figure it does not show at all, seemingly being covered entirely by the rostrum).
3. The eyes are distinctly visible (they are not shown in Packard's figure), but have no optical elements or facets, the entire eye being covered by an opaque cuticle. The interior of the eye consists of a mass of fat and tissue, while in the

ophthalmic peduncle a strand of tissue is visible which extends in the direction of the upper oesophageal ganglion.

4. The second segment of the third pereopod shows a hook-shaped process which has about  $1/3$  of the length of the segment and is directed obliquely forwards and (proximally) medially. The fourth pereopod has a similarly located process, which is of about the same shape, but shorter and more slender.

5. The first pair of pleopods is, like in *Astacus*, transformed to a pair of copulation organs. The last segment of the second pair of pleopods is membranous and deeply cleft.

These characters are those of a cambarine crayfish and later carcinologists dealing with the species, like Faxon (1885: 45, 46; who cited both Joseph's 1880 and 1882 descriptions in full) and Bouvier (1940: 68) are fully convinced that Joseph's animal belongs to the genus *Cambarus* in the wide sense in which it was employed at that time (including all genera of Cambarinae). Bott (1950: 25) did not commit himself as to the real identity of *Cambarus stygius* Joseph; he only remarked that he assumed that some mix-up had taken place.

The differences between *Cambarus stygius* Joseph and *Orconectes pellucidus* (Tellskamp) enumerated by Joseph (1882) do not actually exist and can be explained by errors in Packard's (1872) figure. (1) The length of the antennae is very difficult to indicate correctly as it often happens that the flagella are broken at the tip, therefore the fact that in *C. stygius* the antennae are  $1/10$  longer than in Packard's figure of *O. pellucidus* means very little. In Hay's (1893: pl. 44) figure of *O. pellucidus testii* (Hay) the antennae are shown longer (even more than 10%) than they are in Packard's figure (in the former the antennae are distinctly longer than the body, while in the latter they are definitely shorter). (2) As shown in Hay's (1893: pl. 44) figure, the antennular peduncle in the American species reaches beyond the rostrum, so that Packard's figure is incorrect in this respect. (3) Various published accounts of *Orconectes pellucidus* (e.g., by Parker, 1890: 157, pl. 1 figs. 2-6) have shown that eyes are present in this species, that no optical elements or facets can be found, though an optic nerve is present, which checks exactly with Joseph's rather primitive description of this organ in *Cambarus stygius*. (4) The hook-shaped processes on the third and fourth pereopods, though not shown in Packard's figure, are very characteristic for *Orconectes pellucidus*. (5) The shape of the male pleopods is so superficially described by Joseph that his description practically fits any cambarine or astacine crayfish.

Judging by the morphological data known about *Cambarus typhlobius* Joseph, there can be no doubt that it indeed is a cambarine crayfish. With the available data it is impossible to distinguish this species from *Orconectes pellucidus* (Tellskamp).

Locality. — Joseph (1880) mentioned that his specimen came from Krain (= Carniola, now N. Jugoslavia). In his 1882 paper he gave a more accurate description of the locality: Recca (= Reka) River in St. Kanzian Cave (= St.

Canzian Cave, = Škocijanska Jama) near Mataùn (= Matavunje) not far from Divazza (= Divača), east of Trieste in Carniola (at present province of Slovenija, N. Jugoslavia). The seemingly accuracy of this locality indication made that hardly anyone ever questioned its correctness. The cave is well-known and well explored speologically. Many zoologists have visited this and neighbouring caves with the object to find *Cambarus typhlobius*, but without success. So Joseph himself, in company of Dr. Graeffe of the Trieste Zoological Station, in September 1881 explored the Ospo Cave near Trieste, after a large crayfish had been reported from there, but with "ein negatives Resultat" (Joseph, 1882: 13). Hamann (1896: 225) stated that after the publication of Joseph's report of 1882 not a single blind *Cambarus* had been found in the St. Canzian Cave, but that in it "seither nur *Astacus fluviatilis* gefunden worden ist". These specimens of *Astacus* were remarkable by their spotted appearance. Chappuis (1927: 90) stated: "Auch in der Höhle bei St. Canzian wurde *P. [otamobius] astacus* gefunden". Spandl (1926: 95) indicated that in the collection of the Vienna Museum there are "mehrere Exemplare von *Astacus (Potamobius) fluviatilis* L., die aus der Höhle von St. Canzian (Krain) stammten". Stammer (1932: 608), when dealing with "*Astacus fluviatilis* Fabr." stated "Ich fing ein Tier in der Reka, sowie mehrere jüngere Exemplare in den Höhlen von St. Canzian". The conclusion of these speologists, who only found *Astacus astacus* (L.) in the St. Canzian Cave and no *Cambarus typhlobius* Joseph, as to the identity of the latter species is quite unanimous: "Höchst wahrscheinlich handelt es sich um einen *Astacus fluviatilis*!" (Hamann, 1896: 225); "der *Cambarus stygius* Josephs ist sicherlich mit dieser Art [= *Astacus astacus*] identisch" (Chappuis, 1927: 90); "Joseph's *Cambarus stygius* [ist] zweifellos mit *Astacus fluviatilis* identisch" (Stammer, 1932: 608); while also Spandl (1926: 95) refused to accept the possibility that a *Cambarus* should occur in European subterranean waters: "Zurückzuführen sind diese Nachrichten auf den Phantasten Joseph ... der einen *Cambarus stygius* in den Höhlen von St. Canzian (Krain) entdeckt haben wollte". Apfelbeck's (1895) statement, cited by Spandl (1926), evidently is solely based on Joseph's report as he said: "Dans les eaux souterraines d'Herzégovina vivrait aussi un Astacide aveugle [*Cambarus*]", clearly indicating thereby that he has not seen such an animal himself.

It is interesting to note that carcinologists after studying the description of *Cambarus stygius* Joseph all arrive at the conclusion that the animal is a true subterranean cambarine crayfish, but that speologists, who know the type locality well and have thoroughly explored it, refuse to accept the possibility of the occurrence there of a blind cambarine and insist that Joseph's species be *Astacus astacus* (L.), the most common and perhaps the only crayfish occurring there.

Apart from the above discussed specimen from Joseph's own collection, which according to its author had been preserved in spirit for 7 years, Joseph in his 1882 description also mentioned the following additional material which he brought to his new species: (1) A dry specimen, also from St. Canzian Cave, which under the name "*Astacus saxatilis*(?)" had "zur Zeit" formed part of the

collection of the well known Carniolan speologist Ferdinand Schmidt, and (2) some fragments of chelae found in the intestines of a *Proteus* from a cave near Gabroviza above Trieste. This additional material is of little value as Schmidt's specimen evidently was not before Joseph when the latter drew up his description, and, if it was labelled correctly as to locality, it might indeed have been "*Astacus saxatilis*" [= *Austropotamobius torrentium* (Schrank)] or *Astacus astacus* (L.). However, as no details of the specimen are given by Joseph, its identity can only be guessed at. This is also true for the chela fragments. The only thing to go by therefore is Joseph's own specimen, which evidently is the holotype of *Cambarus typhlobius* Joseph, 1880, and which is made here the lectotype of *Cambarus stygius* Joseph, 1882. It is not known how Joseph obtained his specimen; his reference to the species as "dieser von mir entdeckten Krebsart" (Joseph, 1882: 12), clearly refers to his discovery that the species was new and not to the actual collecting of the material. The fate of the type after the publication of Joseph's papers is equally unknown. Spandl (1926) made it clear that this type is not in the Vienna Museum as was suggested by Apfelbeck (1895). Hamann (1895) found only *A. astacus* from St. Canzian Cave in the collections of the Berlin Museum. According to Horn & Kahle (1935: 128; 1937: 358) Joseph's entomological collections seem to have found their way into the hands of dealers and became scattered, their present whereabouts are unknown; I could not find a single indication as to what happened to his Crustacean material.

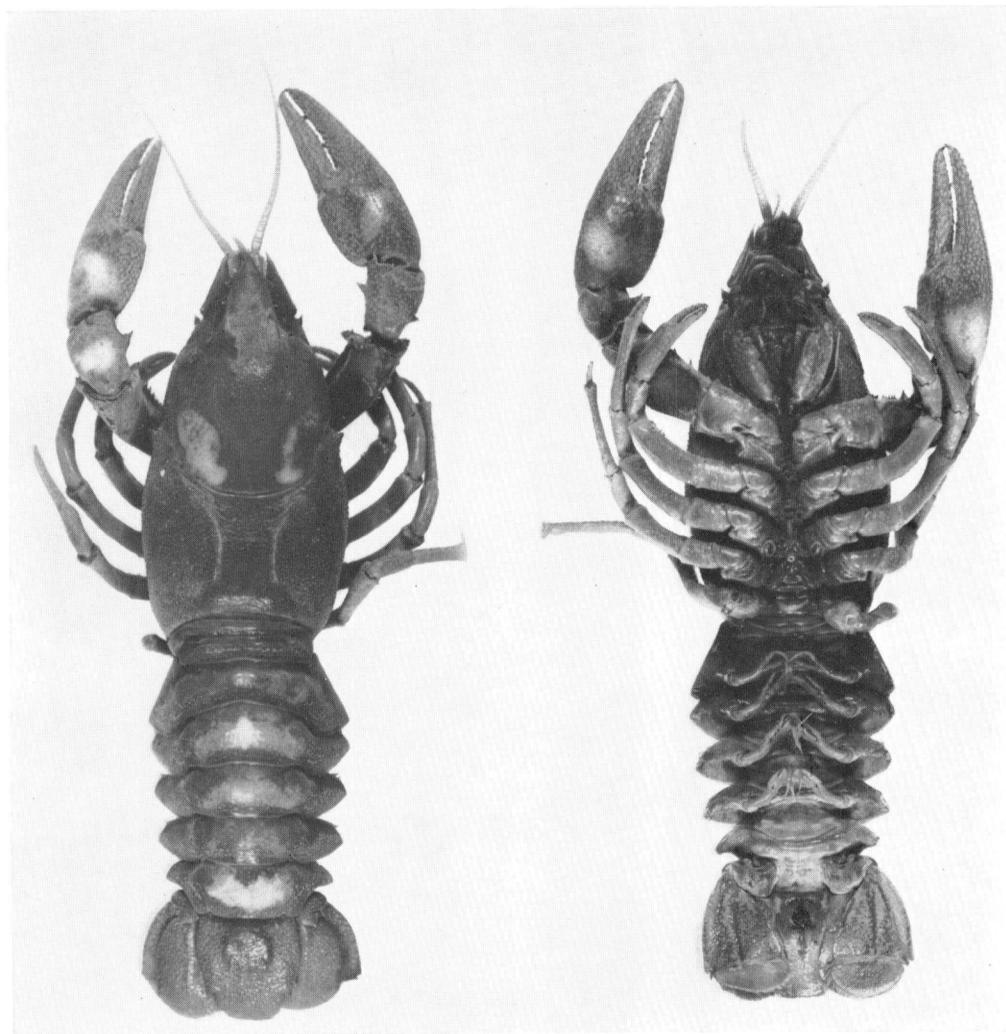
The most probable solution of the whole problem, in my opinion, is that Joseph's type specimen actually was an American specimen of *Orconectes pellucidus* (Tellkampff), which had been incorrectly labelled as to locality. The morphology of Joseph's specimen, as far as we can judge by his description, agrees perfectly with that of *O. pellucidus*: Joseph himself already stated his new species to be "sehr nahe" to the American one, while the differences that he thought to be present between the two forms, now prove to be non-existent. If Joseph really had an American cave crayfish before him, it practically must have been *O. pellucidus*, since this is the only species known at that time which agrees with Joseph's description. Furthermore, *O. pellucidus*, even at that time, was a well known species of which material had been sent to Europe. It is not improbable therefore that specimens came into the hands of European collectors. The fact that no cambarine crayfish has ever been found in Europe (apart from the introduced species *Orconectes limosus* (Rafinesque)), and that, notwithstanding the subsequent intensive exploration of St. Canzian Cave and the caves of the entire Carniola region, not a single specimen of the large, conspicuous, white *Cambarus typhlobius* was ever found there after the publication of the original description, makes it practically certain that Joseph's specimen did not originate from European waters.

Conclusions. — Taking all this evidence into account, it seems most probable that the type specimen of *Cambarus typhlobius* Joseph, 1880 (= *Cambarus coecus* Joseph, 1881, nom. nud., = *Cambarus stygius* Joseph, 1882) is nothing but a specimen of *Orconectes pellucidus* (Tellkampff, 1844), which was incorrectly

labelled as having been collected in northern Yugoslavia. Unless other evidence is forthcoming, which after 80 years seems quite unlikely, all of Joseph's names for the species could best be placed in the synonymy of Tellkamp's species and "*Cambarus typhlobius*" may safely be struck from the list of European crayfishes. Since my knowledge of American crayfishes is rather superficial, I submitted my conclusions to the foremost specialist of that group, Dr. Horton H. Hobbs, head curator of the Zoology Department, U. S. National Museum, Washington, D.C., who was so kind as to look into this matter and gave the following conclusion: "I think you are absolutely right in assuming that he [Joseph] had a mislabelled *O. p. pellucidus*".

#### ***Austropotamobius pallipes bispinosus* M. Karaman, 1961**

The second problem discussed here is that offered by the recently described *Austropotamobius pallipes bispinosus* Karaman, 1961. This subspecies was described and figured by Karaman (1962: 180, figs. 7, 11) but one year before the same author (Karaman, 1961: 12) had mentioned it in a key to species, subspecies, and nations of the genus *Austropotamobius* and thereby validated the name as from the earlier date. The new subspecies was based on four female specimens from "Amorsee-Tatanz", forming part of the collection of the Naturhistorisches Museum, Vienna, Austria. In his description Karaman (1962) remarked that according to the shape of the rostrum, which shows no lateral teeth, these specimens belong to *Austropotamobius pallipes*, but that they differ from the typical form by having on each side a strong spine behind the cervical groove, while the merus of the third maxilliped shows just one spine on the inner margin. His figures show the shape of the rostrum and that of the merus of the third maxilliped. The description and figures did not convince me that Karaman's specimens really belong to *A. pallipes*, the more so as I was struck by the resemblance of this form to the East Siberian species *Cambaroides schrenckii* (Kessler), while moreover the locality "Amorsee-Tatanz", which I was unable to find on any map or in any gazetteer at my disposal, actually might have something to do with the Amur basin, where *Cambaroides schrenckii* does occur. Therefore I wrote to Mr. Karaman explaining my doubts about the distinctness of his form from *Cambaroides schrenckii* and inquired about the position of its type locality. Mr. Karaman very kindly replied me that in his opinion the locality Amorsee was in Germany or Austria, the word Amorsee might even be an incorrect spelling of Ammersee, the name of a lake in Bavaria, while furthermore the localities Amorsbrunn and Amorbach do exist in Germany. Neither he, nor the authorities of the Vienna Museum, however, could indicate the exact position of the type locality of *Austropotamobius pallipes bispinosus*. When my work on the Decapoda for the "Limnofauna Europaea" compelled me to definitely decide the matter of the identity of Karaman's form, I wrote to Dr. G. Pretzmann of the Vienna Museum, who graciously sent me the type lot on loan. It is a very pleasant duty to express



*Cambaroides schrenckii* (Kessler). Lectotype of *Austropotamobius pallipes bispinosus* M. Karaman, in dorsal and ventral view. Natural size.



here my sincere gratitude to Dr. Pretzmann for his cooperation in this matter. As already stated by Karaman all four types are females (their carapace length varying between 29 and 50 mm). The examination of this material clearly showed that the specimens do not belong to the genus *Austropotamobius* but actually are a species of *Cambaroides*: the telson shows in the posterior third of each lateral margin a spine, to the inside of which a second spine is placed, but there is no groove running inwards from these spines, so that the posterior part of the telson does not articulate with the anterior part as in *Austropotamobius* and *Astacus*, but is immovably connected with it. The wider of the two antennular flagella is distinctly serrate in the distal part of its lower margin, and each segment bears just one and not two tufts of sensorial hairs. The first abdominal somite of these females shows no trace of pleopods. A further comparison of these types with the descriptions and figures given in the literature of *Cambaroides schrenckii* (Kessler), fully convinced me that they belong to that species, agreeing in every detail. Unfortunately I had no actual material of Kessler's species for comparison. The name *bispinosus* Karaman, 1961, thus has to fall as a junior subjective synonym of that of *schrenckii* Kessler, 1874.

A photograph of both the dorsal and the ventral surface of the largest of the types of *Austropotamobius pallipes bispinosus* Karaman (cl. 50 mm), which is now made the lectotype of that subspecies, is herewith reproduced.

The exact position of the type locality still is uncertain, and I did not succeed in my efforts to shed more light on it. The original label of the type lot reads "Amor-see Tatan, 27/4.99". It is possible that "Amor-see" stands for "lake in the Amur basin", since the range of *Cambaroides schrenckii* includes the lower Amur basin, and the basin of the Ussuri River southward to Lake Khanka (cf. Birstein & Vinogradov, 1934: 56, fig. 24). However this may be, it is highly unlikely that the locality is in Europe and consequently the name *Austropotamobius pallipes bispinosus* Karaman can be removed from the list of European crayfishes even without having to be replaced on that list by its older synonym *Cambaroides schrenckii* (Kessler).

The two cases discussed in this paper show again very clearly to what endless confusion and unnecessary trouble the incorrect, inaccurate or incomplete labelling of scientific material may lead.

#### ZUSAMMENFASSUNG

*Cambarus typhlobius* Joseph, 1880 (= *Cambarus stygius* Joseph, 1882), ein blinder Grottenkrebs der von Joseph aus der Höhle von St. Kanzian gemeldet wurde, gehört nicht der europäischen Fauna an. Aller Wahrscheinlichkeit nach ist der Typus Josephs ein aus der Mammuth-Höhle in Kentucky (U.S.A.) stammendes Exemplar von *Orconectes pellucidus* (Tellkamp, 1844) das versehentlich mit der Fundortsangabe „St. Kanzianhöhle, Krain“ versehen war.

Eine Nachuntersuchung der Typen des *Austropotamobius pallipes bispinosus* M. Karaman, 1961, hat ausgewiesen dass die Tiere der Art *Cambaroides schrenckii* (Kessler, 1874) angehören.

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