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# STYGOFAUNA MUNDI

*A Faunistic, Distributional, and Ecological Synthesis  
of the World Fauna inhabiting Subterranean Waters  
(including the Marine Interstitial)*

EDITED BY

LAZARE BOTOSANEANU

Institute of Taxonomic Zoology, University of Amsterdam



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AMPHIPODA: BOGIDIELLIDAE

NICOLE GOINEAU\* & J. H. STOCK\*\*

This family is a rather weakly characterized cluster, containing exclusively blind, unpigmented stygobionts. The taxa of the cluster have many characters in common (those marked with an asterisk are not present in all genera or subgenera of the family):

Body more or less elongate\* (general shape intermediate between "normal" Gammaridae and wormlike Ingolliellidae); coxal plates wider than long and not overlapping\*; number of coxal gills in reduction, often 3 pairs\*; no sternal gills; mandible palp 3-segmented\*; accessory flagellum of first antenna 1- to 3-segmented; second antenna without calceoli; sexual differences in the gnathopods feeble; propodus of gnathopod 2 smaller than (rarely subequal to) that of gnathopod 1; carpus of gnathopod 1 with distoposterior projection\*; pleopodal endopodite segments fused\* to a single segment, reduced to a vestige or entirely absent; in the more apomorphic genera the pleosomal and/or urosomal appendages are modified, presumably for sperm transfer; uropod 3 biramous, magniramous\*, with 1-segmented exopodite\*; telson entire; oostegites linear, with limited (terminal and subterminal) setation only; the little efficient marsupium contains a low number of large eggs, which are poorly retained.

The Bogidiellidae are exclusively known from subterranean waters (caves, springs, wells, interstia of running water alluvia, marine sandy beaches and sublittoral sands). The euryhalinity and eurythermy of the taxa of littoral sands favors the passage to subterranean continental waters. The great ecological spectrum is also demonstrated by the vertical distribution of the taxa (caves at altitudes up to 2500 m, cold mountain springs of 4° C, warm mineral springs of 29°, marine sands down to about 50 m, and every intermediate habitat).

The species manifest a positive thigmotaxis, but are able to swim. They feed on the depot accumulated between the sand grains or on the bottom, containing bacteria and vegetable remains, but they also take small preys.

The biology of the group is poorly known. In *B. (M.) chapuisi* (littoral interstitial), the development is prolonged, in comparison with related epigeic forms. It is feasible that

this slow development is even more pronounced in the continental hypogean taxa.

The low number of eggs, and the poor brood care are noteworthy, and are probably an indication of low competitive stress in the subterranean environment. At any rate they form an indication for a K-strategy, along with low dispersal faculties.

Summarizing, not only in their morphology, but also in their biology and ecophysiology, the Bogidiellidae are real stygobionts.

The group has an almost world-wide distribution (not known from continental Africa south of the Equator, from continental Australia, and from boreal, arctic, and antarctic parts of the continents). The fact that certain freshwater taxa (at generic/subgeneric level) occur in both the Old World (Europe in particular) and the New World (South America) seems to indicate that the generic differentiation within the Bogidiellidae has taken place already before the break-up of Pangaea. That this family constitutes an old group, can also be concluded from its mondial distribution (not limited to areas formerly belonging to the Tethys Sea, but also occurring outside that region).

The family contains, as remarked, both limnic, mixohaline and marine taxa. The marine taxa are not the most plesiomorphous; apparently, the most plesiomorphous taxa are found nowadays in limnic subterranean habitats (e.g. the genus *Artesia*, sometimes classified with a special family, the Artesiidae).

The family comprises 21 genera and subgenera containing between 60 and 70 species and subspecies.

KEY REFERENCES

The biogeography, cladistics, and taxonomy of the family are reviewed by Stock, 1981. A thorough older taxonomic review has been published by Ruffo, 1973.

Ruffo, S., 1973. Contributo alla revisione del genere *Bogidiella* Herizog. — Boll. Ist. Ent. Univ. Bologna, 31: 49-76.

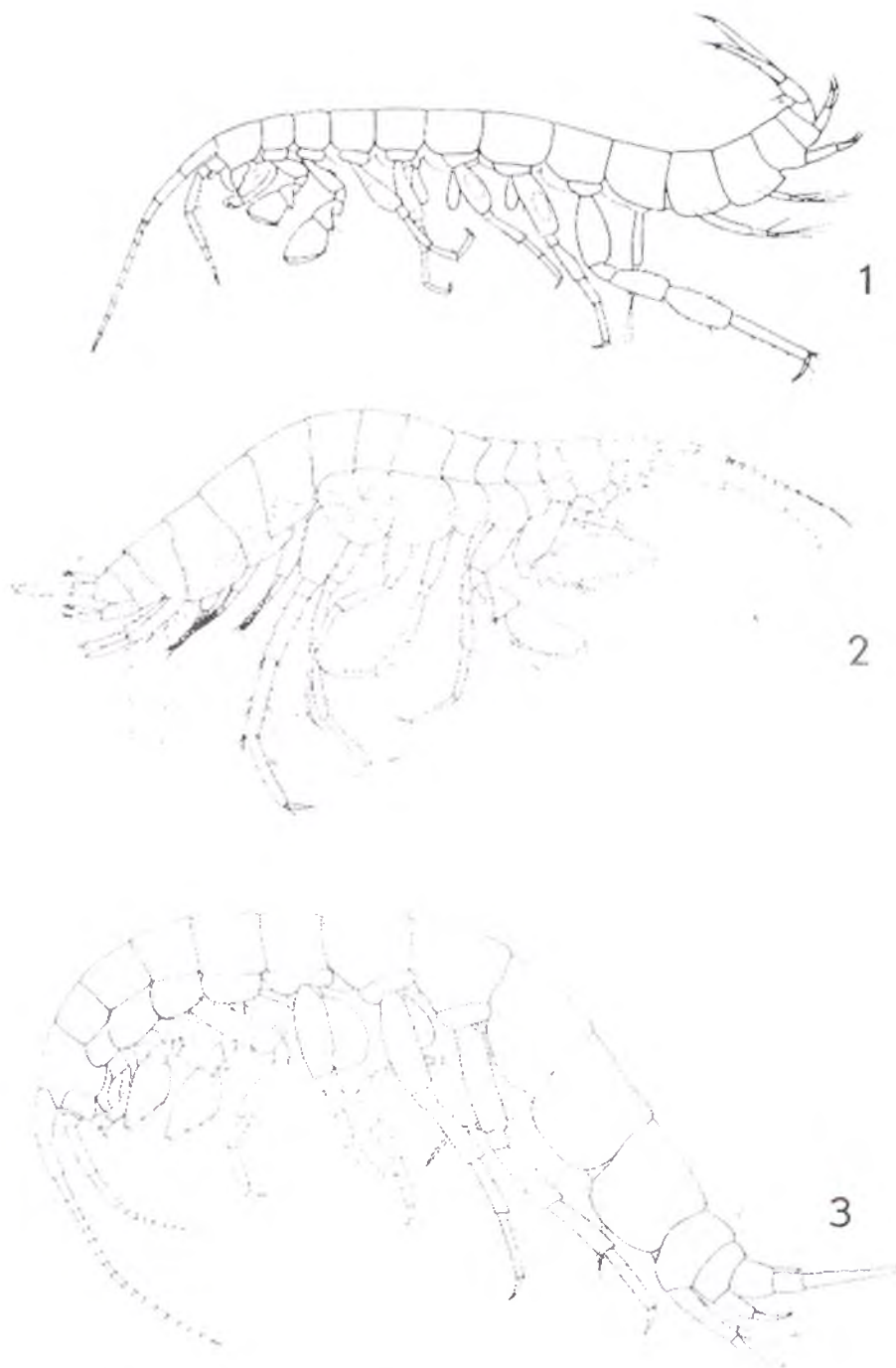
Karaman, G. S., 1982a. Revision of *Bogidiella*-group of genera with description of some new taxa (fam. Gammaridae). — Poljoprivreda i Sumarstvo, 27 (3): 23-44 ("1981").

—, 1982b. Critical remarks to the recent revisions of *Bogidiella*-group of genera with study of some taxa (fam. Gammaridae). — Poljoprivreda i Sumarstvo, 28 (3-4): 31-57.

Stock, J. H., 1981. The taxonomy and zoogeography of the family Bogidiellidae, with emphasis on the West Indian taxa. — Tijdschr. Dierk., 51 (2): 345-374.

\*Laboratoire Arago, 66650 Banyuls-sur-Mer, France.

\*\*Institute of Taxonomic Zoology, University of Amsterdam, P.O.B. 20125, 1000 HC Amsterdam, The Netherlands.



1: *Bogidiella (Orchestigidiella) onchestipes* Ruffo & Vigna, 1977 (actual size 3.5-4 mm), a typical bogidiellid (from Ruffo & Vigna, 1977); 2: *Artesia subterranea* Holsinger, 1980 (actual size 6.6-7.4 mm), a strongly plesiomorphic bogidiellid (from Holsinger & Longley, 1980); 3: *Dussartiella madagassa* Ruffo, 1979 (actual size 5.5 mm), an apomorphic bogidiellid (from Ruffo, 1979).

	Bogidiellidae Hertzog, 1936		
	<b>Actogidiella</b> Stock, 1981		
1	cultrifera Stock, 1981	VII 13: Tortola	P2
2	sp., Stock, 1981	VII 13: Curaçao	P2
	<b>Afridiella</b> Karaman & Barnard, 1979		
3	pectinicauda Ruffo, 1982	IV 2: Somalia, Bud Bud	$\alpha$
4	somala (Ruffo, 1970)	IV 2: Somalia (140 km N. of Mogadiscio, and basin of Uebi Scebeli)	$\alpha$ (K <sup>2</sup> )
	<b>Artesia</b> Holsinger, 1980		
5	subterranea Holsinger, 1980	VIII 7a: Texas, Edwards aquifer	K I
	<b>Bogidiella</b> Hertzog, 1933		
	sg. <b>Antillogidiella</b> Stock, 1981		
6	martini martin Stock, 1978	VII 5: St. Martin (French Antilles), slightly brackish wells	K
7	martini subsp. Sket & Iliffe, 1980	VIII 10: Bermuda, Walsingham caves (salty)	F or G
	sg. <b>Bogidiella</b> Hertzog, 1933		
8	albertimagni Hertzog, 1933	I 4, I 5a, I 7, I 9a, II 7, II 8	$\alpha$ , K, L
9	aprutina Pesce, 1980	I 5c: Abruzzes (Italy), Colleranesco, Guilianova	$\alpha$ (K ?)
10	† cooki Grosso & Ringuelet, 1979	IX 1: Argentina, Rio Grande near Jujuy	L (L2?)
11	cyrnensis Hovenkamp, Hovenkamp & van der Heide, 1983	I 6a: Cap Corse	L
12	† dalmatina S. Karaman, 1953	I 7c	S (T), G (F)
13	† glacialis S. Karaman, 1959	I 8b: Jakupica Mts., alt. 1900 m	S

helenae Mateus & Maciel, 1967	I 1a: Portugal, S. of river Douro	I,2/P2, R1
ischnusae ischnusae Ruffo & Vigna, 1975	I 6b: river Liscia	L
ischnusae africana G. Karaman & Pesce, 1980	I 13: Algeria, Biskra	$\alpha$ (K?)
† lindbergi Ruffo, 1958	III 3: Afghanistan, Nayak cave near Pol-Ranga (= E. of Kabul)	A
longiflagellum S. Karaman, 1959	I 8b (Macedonia); I 8c; I 8d (Cephalonia); I 8f	$\alpha$ (K?), L
† michaelae Ruffo & Vigna, 1977	VII 1: Mexico, Oaxaca, Etla	$\alpha$
neotropica Ruffo, 1952	IX 3: Amazonia, spring at Igarapè Centrinho; IX 4: Venezuela, wells in Calabozo	S K
niphargoides Ruffo & Vigna, 1977	VII 1: Mexico, Oaxaca, Etla	$\alpha$
ruffoi Birstein & Ljovuschkín, 1968	III 2: Turkmenian SSR	T
† semidenticulata Meštrov, 1962	I 7a, II 8: Yugoslavia, valleys of the Sava, Drava and Mura	$\alpha$ (K), L
skopljensis (S. Karaman, 1933)	I 3, I 8b, I 8c, II 8	$\alpha$ (K), L
vomeri Ruffo & Vigna, 1977	VII 1: Mexico, Chiapas, Cueva de Chanchanipuc	C
sp., cf. vomeri Ruffo & Vigna, 1977	VII 1: Mexico, Chiapas, Sumidero de Canada	B
sg. <b>Guagidiella</b> Stock, 1981		
holsingeri Ruffo & Vigna, 1973	VII 3: Guatemala, Cueva Deamay, Cueva Sepacuite	B, C
pasquinii Ruffo & Vigna, 1977	VII 3: Guatemala, Cueva de los Resadores (alt. 2500 m)	D
sg. <b>Medigidiella</b> Stock, 1981		
arganoi Ruffo & Vigna, 1973	VII 1: Mexico, Veracruz, Cordoba	K
sp., cf. arganoi Ruffo & Vigna, 1977	VII 1: Mexico, Oaxaca	$\alpha$
† balearica Dancau, 1973	I 2: Mallorca, Cuevas del Drach, Cuevas del Puente	D
chappuisi Ruffo, 1952	I 1b, I 3, I 4, I 5b, I 5c, I 6a, I 6b, I 8f, I 13	F/G, I,2, P2

33	† hebraea Ruffo, 1963	I 12: spring of Ein Hakikar (S. of Dead Sea), spring on northern shore of Lake Tiberias	S
34	† italica G. Karaman, 1979	I 14: Naples, depth 1-2 m	Q
35	† paolii Hovenkamp, Hovenkamp & van der Heide, 1983	I 6a: stream Melaja	L1
36	paraischnusae G. Karaman, 1979	I 14: Naples	P
37	sarawacensis Stock, 1983	V 5: Sarawak, Niah Great Cave and Deer Cave (Gua Pavan)	B, B1
38	† silverii Pesce, 1981	I 6b: well near Gounosfanadiga	α (K?)
39	vandeli Coineau, 1968	I 6b: Rio di Quirra	L
40	sp., Ruffo, 1953	I 14: Sitges (S. of Barcelona)	P
41	sp., to be described by Coineau	I 13: Tunisia, Oued Zarga	K 1.
42	sp., to be described by Coineau	IX 5: Galapagos, coarse littoral sediments	P2
43	sp., Cvetkov, 1965	I 9b: Thracia, wells and hyporheal of the Maritza	K/1.
	sg. <i>Mexigidiella</i> Stock, 1981		
44	chitalensis G. Karaman, 1982	VII 1: Grutas de Rancho Nuevo, alt. 2275 m and Cueva de Chital, alt. 1390 m	A (D?)
45	mexicana G. Karaman, 1982	VII 1: Mexico, resurgence of La Planta (Chiapas), alt. 2130 m, and Cueva de los Chivos (Chiapas), alt. 1100 m	C (T), D
46	sbordonii Ruffo & Vigna, 1973	VII 1: Mexico, caves in Chiapas	A, B1, C
47	tabascensis Villalobos, 1961	VII 1: Mexico, caves in Chiapas and Tabasco	A, B, B1
	sg. <i>Orchestigidiella</i> Stock, 1981		
48	orchestipes Ruffo & Vigna, 1977	VII 1: Mexico, well in S. Cristobal de las Casas	α. (K?)
	sg. <i>Stygogidiella</i> Stock, 1981		
49	bredini Shoemaker, 1959	VII 5: Barbuda, Dark Cave	D

50	† cerberus Bou & Ruffo, 1980	I 8c: Peleponnesos, cave Glyphada	D (brackish)
51	† perla Stock, 1981	VII 4: Margarita, La Plaza (well)	α (K?)
52	virginalis Stock, 1981	VII 6: Tortola and St. John (Virgin Is.)	α (K?)
	sg. <b>Xystriogidiella</b> Stock, 1984		
53	capricornea Stock, 1984	VI 6: Heron Island, Great Barrier Reef	P2
53A	sg.? nubica Ruffo, 1984	IV 2: Sudan, Ghor Komosar	L
	<b>Bollegidia</b> Ruffo, 1974		
54	capensis Ruffo, 1974	IV 8: Table Bay, sand at low tide	P2
55	sootai (Coineau & Rao, 1972)	V 7: Gulf of Bengal	P2
	<b>Dussartiella</b> Ruffo, 1979		
56	madegassa Ruffo, 1979	IV 5: Mantasso reservoir, in small trickle	S (U?)
	<b>Eobogidiella</b> G. Karaman, 1982		
57	purinamarcensis (Grosso & Ringuelet, 1969)	IX 1: Argentina, Rio Grande near Jujuy	L
	<b>Kerguelenicola</b> Ruffo, 1974		
	macer (Ruffo, 1970)	IV 6: Kerguelen (probably subterranean; found in fish stomach, in fresh water)	
	<b>Marigidiella</b> Stock, 1981		
59	brasiliensis (Siewing, 1953)	IX 6: Brazil	P (P2?)
60	crassipes Stock, 1981	VII 6: Tortola	P2
	<b>Marinobogidiella</b> G. Karaman, 1982		
	tyrrhenica (Schiecke, 1973)	I 14: Ischia, depth 6 m	Q
	<b>Parabogidiella</b> Holsinger, 1980		
62	americana Holsinger, 1980	VIII 7a: Edwards aquifer	K1

63	sp., Holsinger, 1980	VIII 7a: Edwards aquifer	K1
	<b>Paracrangonyx</b> Stebbing, 1899		
64	compactus (Chilton, 1882)	VI 4: New Zealand, pumps and wells at Eyreton, Leeston, and Canterbury	$\alpha$ (K?)
	<b>Pseudingolfiella</b> Noodt, 1965		
65	chilensis (Noodt, 1959)	IX 7: Central Chile, in sand and gravel near mouth of stream, near the sea	R1 and/or L2
66	soyeri Coineau, 1977	IV 6: Kerguelen, same habitat as chilensis	R1 and/or L2
	<b>Spelaeogammarus</b> da Silva Brum, 1973		
67	bahiensis da Silva Brum, 1973	IX 3: cave waters, State of Bahia	A

## NOTES

General. A "\*" before a species name in the tabular part indicates that the subgeneric assignment of that species is uncertain.

3 and 4: *Somagidiella* Stock, 1981, is an objective junior synonym of *Afridiella*.

8: *B. (B.) denticulata* Mestrov, 1962, is synonymous with *B. (B.) albertimagni*.

24: as *Jugocrangonyx*, a subjective junior synonym of *Bogidiella*.

31: *B. balearica* is possibly synonymous with *B. chappuisi*.

32: incl. *B. (M.) minotaurus* Ruffo & Schiecke, 1976, from coastal groundwaters on Kreta.

40: possibly identical with *B. (M.) chappuisi*.

57, 61: *Eobogidiella* and *Marinobogidiella* have been described by G. S. Karaman in a paper of which the reprints are dated "1981", but reprint and periodical were post-marked "March 1982". (Received at the library of the Zoological Record, London, on April 1, 1982, according to Dr. Marcia A. Edwards, Editor, in litt., 15 April 1982).

Unprecise records. — Several unnamed and undescribed bogidiellids have been recorded in the literature, under the name of *Bogidiella* sp. These are from Ecuador (Sket, 1979), Marie-Galante, French Antilles (Stock, 1980), the English Channel (Spooner, 1959, 1960), Reunion island in the Indian Ocean (Ruffo, 1973), Japan (Matsumoto, 1976).

## ADDITIONAL NOTES

*Antillogidiella martini* subsp. (no. 7 in the tabular part) has proved to be a separate species (Stock, Holsinger, Sket & Iliffe, in prep.).

*Bogidiella (Hagidiella) prionura* Stock, 1985 (Stygologia, 1, VII 8: K (Haiti)).

*Bogidiella (Mexigidiella) hamatula* Stock, 1985 (l.c.). VII 8: L (Haiti).

A new genus and species of bogidiellids (Diviacco & Ruffo, in press) will be described from the Marrakech region, Morocco.

The following range extensions came to notice after completion of the tabular part:

18. Also I 8c (Rhodes) (Pesce & Maggi, 1983), *Natura*-Milano, 74).

24. Also I 8c (Evvoia Id.) (Pesce & Maggi, l.c.).

32. Also I 8c (Rhodes) (Pesce & Maggi, l.c.).