ISOPODA: CIROLANIDAE

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The Cirolanidae is one of the two families of Isopoda Flabellifera which include stygobiont elements (the other family being Sphaeromatidae). In the classification here adopted the genera including — or comprising exclusively — stygobionts are placed in the general frame of the predominantly or exclusively marine (non-subterranean) genera. This classification is as follows (genera represented in groundwater printed in italics).

EURYDICINAE

Eurydice group:	Eurydice.
Pseudaega group:	*Annina,* Eurylana, Excirolana, Pontogelos, Pseudaega, Pseudolana.
Colopisthus group:	*Arubolana,* Colopisthus, Metacirolana.

UNNAMED SUBFAMILY

Conilera group:	Conilera, Conilorpheus, Natatolana, Orphelana, Politolana.

CIROLANINAE

Bathynomus group:	Bathynomus, Parabathynomus.
Cirolana group:	*Anopsilana,* Cirolana, *Creaseriella,* Hansenolana, *Haptolana,* Neocirolana, *Saharolana.*
Gnatholana group:	Cartetolana, Gnatholana.
Sphaeromides group:	*Antrolana, Bahalana, Cirolanides, Mexilana, Oncilorpheus, Speocirolana, Sphaeromides, Turcolana, Typhlocirolana.*
Faucheria group:	*Faucheria, Skotobaena, Sphaerolana.*

Incertae sedis.

Ceratolana

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The Cirolanidae are a predominant marine family with about 300 species presently known (the validity of some marine and some stygobiont species is open to question). In the tabellar part of this chapter, 45 species and subspecies are numbered, but a few of them are doubtful Western-Mediterranean *Typhlocirolana* species. Certainly more stygobiont as well as marine species will be described, and it is possible to say that almost 1/7 of all the Cirolanidae have found their way to the Stygal. If genera are considered, the proportion is even more impressive: from some 40 presently recognized genera, 17 are stygobiont or include also stygobionts or stygophiles (only *Annina* and *Anopsilana* are presently recognized as including both marine and subterranean species; but this may prove to be true also for *Cirolana:* see notes for *Anopsilana* and *Creaseriella);* of course, this is partly a result of the tendency to describe monotypic genera of stygobiont Cirolanidae — a tendency which, in our opinion, is a justified one in this specific case.

One species was excluded from the tabular part: *Conilera stygia* Packard, 1894, from Monterey, Nuevo León, Mexico: this is unanimously considered as extremely poorly described and unrecognizable (will probably prove to belong in *Speocirolana).* Two species which are obviously non-stygobionts are nevertheless included in the tables, because they have clear relations to the subterranean habitats: *Annina lacustris* and *Saharolana seurati* (see "notes"). There are no other problems with the delimitation of stygobiont and non-stygobiont Cirolanidae.

The subterranean Cirolanidae show a remarkable variety of body shapes, and the illustration of this chapter gives a good idea of this situation. Not less impressive are the differences in size (the figures which follow are maximal total lengths in published accounts). Smaller than 5 mm are: *Arubolana parvioculata* (with 2.8-2.9 mm the smallest of all), *A. aruboides, Saharolana, Turcolana, Faucheria;* the group between 5 and 10 mm consists of *Arubolana imula,* most of *Anopsilana, Bahalana cardiopus,* most of *Typhlocirolana;* the following range between 10 and 15 mm: *Annina, Anopsilana poissoni, Haptolana, Bahalana geracei, Mexilana, Speocirolana thermydronis, Sphaeromides polateni,* and two N. African *Typhlocirolana;* between 15 and 24 mm: *Creaseriella, Antrolana, Cirolanides, Speocirolana pubens, Sphaeromides bureschi bureschi* and *S. virei montenigrina, Skotobaena,* and *Sphaerolana;* largest (24 mm or more) are most of *Sphaeromides* and of *Speocirolana, Speocirolana* *bolivari* being, with 33 mm, the giant of the group. The females are often larger than the males. Almost all the stygobionts are anophtalmous *(Arubolana parvioculata* is micro-oculate, as is the stygophile *Saharolana)* and devoid of pigment in the teguments; but it must be kept in mind that several true marine cirolanids are equally devoid of eyes and/or depigmented (examples: *Cirolana lata, Natatolana californiensis, N. caeca, Metacirolana caeca...).*

Important characters used in the classification of the (subterranean) cirolanids and in assessing the relationships inside the family, are: the pleon segmentation (Bowman, 1975), the morphology of the antennule- and antennal peduncles, the shape of the three first pairs of pereiopods, the segmentation and setation of the pleopods, the insertion of appendix masculina on the endopodite of pleopod II ♂, and uropod characteristics. Extremely interesting is the fact that 7 species belonging to five genera (in what seems to be 3 different lineages) are capable of rolling into a ball when disturbed, this implying of course more or less drastic modifications in the morphology of body and appendages; in *Creaseriella, Turcolana* and *Faucheria,* the volvation is described as perfect; it is very imperfect in *Skotobaena mortoni* and somewhat less imperfect in *S. monodi;* volvation is also reported in the two species of *Sphaerolana* (no details available); the phenomenon — absent in all non-subterranean Cirolanidae! — is considered by some authors as possible defensive strategy, useful in the conditions of the subterranean realm.

In the geographical distribution it is possible to distinguish an important peri-ponto-mediterranean grouping (with a western-mediterranean, a balkanic and a levantine sub-groupings), an even more important peri-caribbean grouping (Mexico having more species than any other part of the world), and a small eastern-african grouping. Two species cannot be included in any of these groupings: *Antrolana lira* (in the Appalachians) and *Arubolana aruboides* (on Bermuda). Several clusters of species are clearly distinguished, this clustering having three different aspects concerning affinities, distribution, inhabited biotopes. Many species are presently restricted in their distribution to localities very near to, or not far from marine or oceanic shores; but this is not valid for a series of other species; to name some taxa found at 200 km or more from the nearest present marine shores: *Antrolana* (ca. 200), *Speocirolana thermydronis* (> 450, *Sphaeromides bureschi* (ca. 260), *S. polateni* (ca. 230), *Typhlocirolana fontis* (ca. 750 at Fort Miribel), *Sphaerolana* (> 450).

The stygobiont and stygophile Cirolanidae being obviously derived from marine forms (this is unanimously recognized), the distance separating their localities from present shorelines immediately strikes the imagination in the context of the question of their origin. But this is certainly not the essential aspect, far more important questions being: when, in the geological past, were the areas wherefrom stygobionts are known covered by marine waters? When did the subterranean realm (in the specific case of this group: mainly a karstic aquatic environment) become available for colonization by marine immigrants? The peculiar aspects of the origin (time, place, possible ancestors...) of the different subterranean taxa are evoked in rather many publications, a Pleistocene, Tertiary, Cretaceous, Jurassic or even Paleozoic origin being postulated. Possibly the most difficult case is that of *Antrolana lira,* found in an area unexposed to marine waters since the early Permian; for this species (but also, for instance, for *Cirolanides texensis,* for some Western-mediterranean *Typhlocirolana...)* it was assumed, for different reasons, that they are possibly derived from a marine stock through the intermediacy of a freshwater epigean ancestor.

Rather little is known about the biology, autecology and behaviour of these animals. A few useful references: Nourisson, M., 1956 *(Typhlocirolana buxtoni);* Por, F., 1962: *Typhlocirolana reichi* n.sp., un nouvel isopode Cirolanidae de la Dépression de la Mer Morte. Crustaceana, 4: 247-252; Sket, B., 1964 *(Sphaeromides virei virei);* Delhez, F., 1966: Recherches écologiques sur un crustacé troglobie *Sphaeromides raymondi* Dollfus. Ann. Spéléol., XXI, 4: 838-844; Bertrand, J.Y., 1974: Recherches sur l'écologie de *Faucheria faucheri.* Thèse doctorat 3ᵉ cycle, Univ. Paris VI, not printed; Collins, T.L. & Holsiger, J.R. 1981: Population ecology of the troglobitic isopod crustacean *Antrolana lira* Bowman. Proc. 8th Int. Congr. Speleol., 1: 129-132; Carpenter, J.H., 1981 *(Bahalana geracei).* Most species are reported as normally crawling on the substrata, never swimming or swimming only when disturbed *(Arubolana imula, Antrolana, Bahalana geracei, Speocirolana pelaezi, Sphaeromides raymondi, Typhlocirolana reichi, Faucheria, Skotobaena mortoni, Sphaerolana),* whereas swimming actively in open waters is the normal mode of movement for some other species *(Arubolana aruboides, Anopsilana crenata, Speocirolana thermydronis).* An absolute indifference towards light or absence of light has been occasionally noted *(Sphaeromides raymondi),* and also the fact that the two species of *Sphaerolana* are active mostly during the night. Although the mouthparts of most cirolanids seem to indicate predatory or scavenging habits, there is no definite indication supporting this (concerning *Arubolana aruboides, Sphaeromides virei, Bahalana geracei,* it is supposed that they could predate on living prey, and cannibalism was observed in this last species); most species are more or less opportunistic detritivorous *(Arubolana imula:* rotting wood; *Bahalana geracei:* scavenging on a variety of animals; *Cirolanides:* organic material, like guano; *Speocirolana guerrai:* guano?; *Sphaeromides raymondi:* clay, animal remainders...). Concerning the reproduction, it is interesting to note that ovigerous females or females with brood plates or pouches, were apparently never found in the subterranean species (this was expressely noted, for instance, for *Antrolana, Bahalana,* some *Typhlocirolana...);* this phenomenon still awaits explanation (one published explanation being that ovigerous ♀♀ are very rare and secretive, rarely foraging in areas accessible to sampling); evidence of ovoviviparity was found in (epigean) *Annina lacustris* from the Comoro Islands. Three confirmed cases of co-existence of stygobiont species in the same locality are known: *Speocirolana bolivari* and *S. pelaezi* coexist in the Grutas de Quintero and in the Bee Cave (Tamaulipas) as well as in the spring at La Laja (San Luis Potosí); *Speocirolana thermydronis, Sphaerolana affinis,* and *Sphaerolana interstitialis,* are found together in some of their localities near Cuatro Ciénegas; *Typhlocirolana leptura* coexists in some wells in Morocco with an unidentified species of the same genus.

In a large majority of cases, the stygobiont Cirolanidae are clearly associated with karstic habitats, sometimes inhabiting karstic waters near, or not far from marine shores and more or less influenced by the vicinity of the sea, sometimes karstic waters which are far inland on the islands or continents, where all influence of the sea has been excluded. The richest habitats are the saturated zones in cave systems, and the karstic springs associated with them (underground streams are seldom inhabited, pools in the vadose zone of caves possibly never). Species definitely associated with interstitial habitats are far more rare, and, unfortunately, information is sometimes scanty and misleading; *Arubolana parvioculata* is very definitely associated with an interstitial habitat; such an association could also be made for *Anopsilana acanthura, Cirolanides* (only in some of its localities!), *Turcolana,* some maghrebine *Typhlocirolana,* and the two levantine species of this genus.

An extremely vast gradient of water salinity is tolerated by the different subterranean cirolanids, from perfectly fresh water to water having salinity near that of sea water. In fresh water (upper limit of saline concentration: ca. 2 g/l) we may mention: *Anopsilana cubensis, A. radicicola, Haptolana, Antrolana, Speocirolana pelaezi,* all the species of *Sphaeromides, Turcolana, Typhlocirolana moraguesi, Faucheria.* In slightly brackish water, often fresh to taste: *Anopsilana acanthura, A. crenata, Creaseriella, Skotobaena monodi. Bahalana cardiopus* was found in strongly brackish water (9.68 g/l), and *B. geracei* in very strong brackish to water with full marine salinity (21.26-35 g/l). Some species are known as tolerating more or less important variations of the salinity: *Arubolana parvioculata* (4.85-26.5 g/l), *Annina* (from slightly brackish to sea water), *Arubolana imula* (1.34-3.78 g/l, at different times), *Typhlocirolana reichi* 2.52-8.64 g/l). The two species of *Sphaerolana* live in very strongly mineralized water.

Concerning endangered habitats and species, special mention has to be made of the catastrophic modifications undergone these last years and decades by the habitats of *Speocirolana thermydronis, Sphaerolana affinis* and *Sphaerolana interstitialis,* in the vicinity of Cuatro Ciénegas de Carranza, northern Mexico (one of the most extraordinary zones of the globe for fresh water fauna, subject of systematic and savage destruction).

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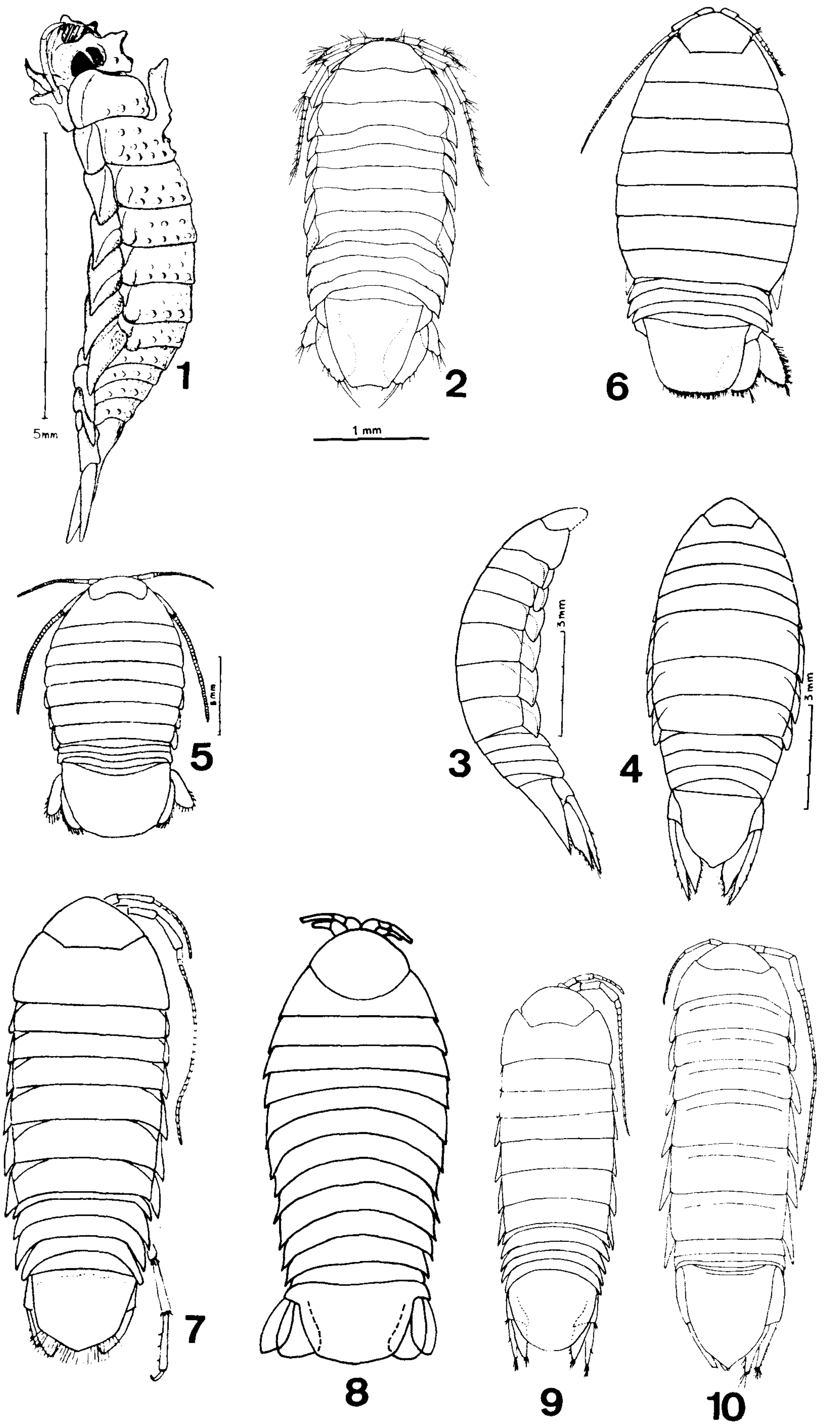
FIGURES

1: *Annina lacustris* (from Gordon & Monod, 1968); 2: *Arubolana imula* (from Botosaneanu & Stock, 1979); 3-4: *Anopsilana poissoni*, lateral and dorsal (from Monod, 1976); 5: *Creaseriella anops* (from Creaser, 1936); 6: *Haptolana trichostoma* (from Bowman, 1966); 7: *Antrolana lira* (from Bowman, 1964); 8: *Bahalana geracei* (from Carpenter, 1981); 9: *Cirolanides texensis* (from Bowman, 1964); 10: *Mexilana saluposi* (from Bowman, 1975); 11: *Speocirolana pubens* (from Bowman, 1981); 12: *Sphaeromides virei virei* (from Sket, 1964); 13: *Turcolana cariae* (from Argano & Pesce, 1980); 14: *Typhlocirolana moraguesi* (from Racovitza, 1912); 15: *Typhlocirolana steinitzi* (from Strouhal, 1960); 16-17: *Faucheria faucheri*, dorsal and in volvation, lateral (from Racovitza, 1912); 18: *Skotobaena monodi* (from Ferrara & Lanza, 1978); 19-20: *Skotobaena mortoni*, in volvation, lateral and frontal views (from Monod, 1972).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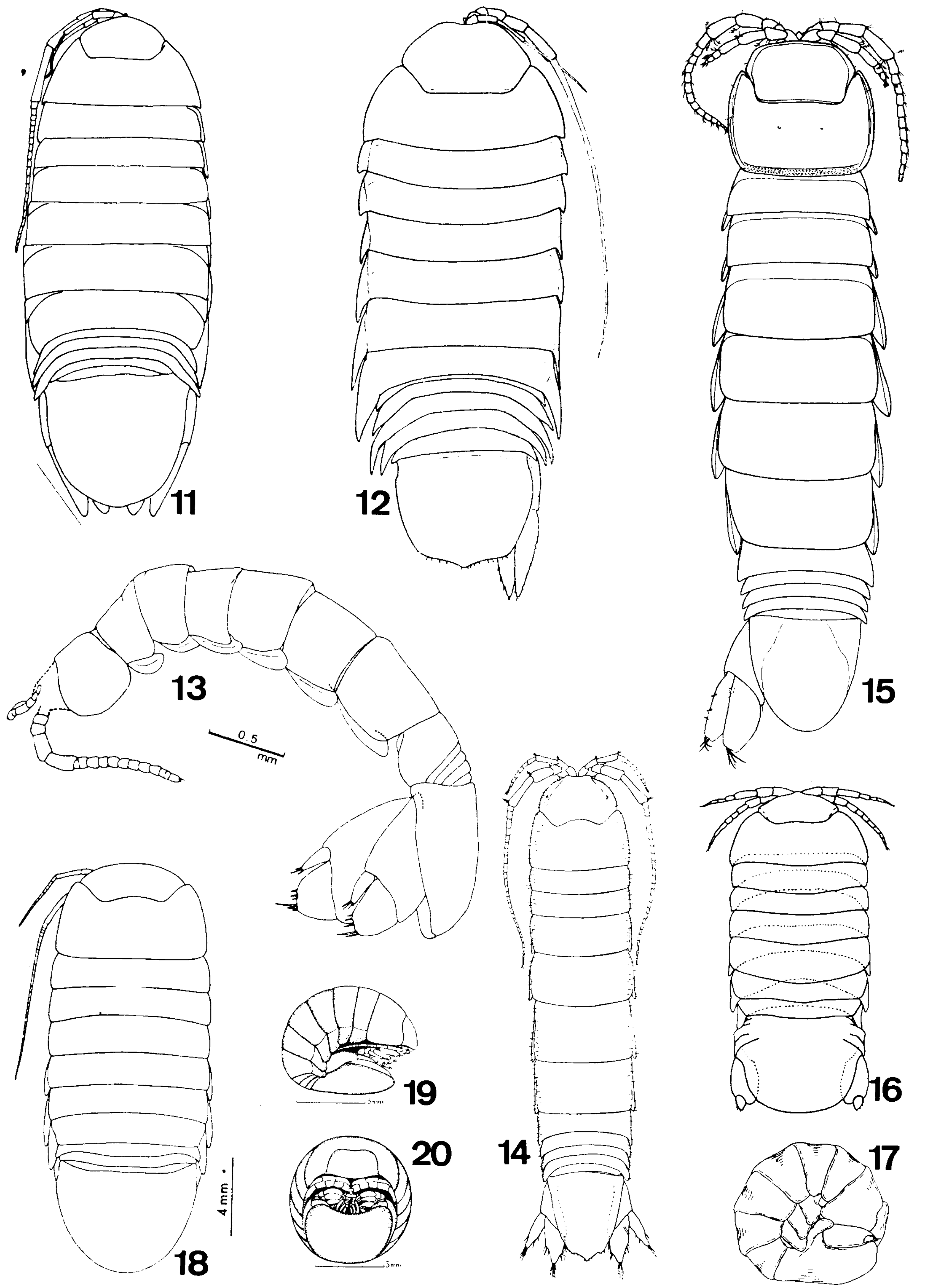
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	Cirolanidae Harger, 1880		
	Eurydicinae Stebbing, 1905		
	Gr. Pseudaega		
	Annina Budde-Lund, 1908		
1	lacustris Budde-Lund, 1908	IV 2: Shimoni, S. E. corner of Kenya IV 6: Zanzibar (also Comoro islands)	D?, G?, α Also epigean!
	Gr. Colopisthus		
	Arubolana Botosaneanu & Stock, 1979		
2	imula Botosaneanu & Stock, 1979	VII 4: Mangel Cora Tunnel, Aruba	D-I
3	aruboides (Bowman & Iliffe, 1983)	VIII 10: Church cave and Wonderland cave, Bermuda	G
4	parvioculata Notenboom, 1984	VII 9: dry bed of Rio Secco, Discovery Bay, Jamaica	L-R1
	Cirolaninae Harger, 1880		
	Gr. Cirolana		
	Anopsilana Paulian & Delamare Deboutteville, 1956		
5	acanthura (Notenboom, 1981)	VII 8: well at Marigot, southern coast of Dépt. de l'Ouest, Haiti	K
6	crenata Bowman & Franz, 1982	VII 11: West Bay Cave, NW end of Grand Cayman Island	G
7	cubensis (Hay, 1903)	VII 10-11: several freshwater caves in the Cuban provinces Pinar del Rio, Habana, Matanzas, as well as on Isla de Pinos	D, E
8	poissoni Paulian & Delamare Deboutteville, 1956	IV 5: Grotte de Mitoho, South-Western Madagascar	D; α
9	radicicola (Notenboom, 1981)	VII 8: "Source Débarasse", large karstic spring flowing from cave near Jérémie, southern peninsula of Haiti	T, A
	Creaseriella Rioja, 1953		
10	anops (Creaser, 1936)	VII 2: many caves (some of them true cenotes), states Quintana Roo & Yucatan of the Yucatan Peninsula. One well in Campeche, same peninsula	D, E; I?

	Haptolana Bowman, 1966		
11	trichostoma Bowman, 1966	VII 10: several freshwater caves, Sierra de Cubita, province Camaguëy, Cuba	D
	Saharolana Monod, 1930		
12	seurati Monod, 1930	I 13-IV 1: epigean brook fed by springs at Kebili, near Chott Djerid, Tunisia	β
	Gr. Sphaeromides		
	Antrolana Bowman, 1964		
13	lira Bowman, 1964	VIII 1: Madison Saltpetre Cave and Stegers Fissure, near Grottoes, Augusta Co., Virginia, USA	D
	Bahalana Carpenter, 1981		
14	cardiopus Notenboom, 1981	VII 12: Mount Misery Cave, Little Bay, Mayaguana Island, Bahamas	G?
15	geracei Carpenter, 1981	VII 12: Dixon Hill Lighthouse Cave, San Salvador Island, Bahamas	G
	Cirolanides Benedict, 1896		
16	texensis Benedict, 1896	VIII 7a: caves and phreatic waters of south central Texas, from the vicinity of Del Rio in the west to San Marcos in the east (± southern limit of Edwards Plateau)	D, I
	Mexilana Bowman, 1975		
17	saluposi Bowman, 1975	VII 1: Cueva del Huisache, 4 km NW Micos, San Luis Potosí	A
	Speocirolana Bolivar y Pieltain, 1950		
18	bolivari (Rioja, 1953)	VII 1: one cave in the Sierra de El Abra, one in the Sierra de Guatemala (both Tamaulipas), and one spring at La Laja, San Luis Potosí	D, T
19	endeca Bowman, 1981	VII 1: Sotano de las Calenturas, Yerbabuena, and Cueva del Tecolote, Los San Pedro (both NW of Ciudad Victoria, Tamaulipas)	A
20	guerrai Contreras-Balderas & Purata-Velarde, 1982	VII 1: Cueva de la Chorrera, Linares, Nuevo León	D
21	pelaezi (Bolivar y Pieltain, 1950)	VII 1: many caves in the states Puebla, San Luis Potosí, and Tamaulipas	D; B
22	pubens Bowman, 1981	VII 1: Cueva de la Bonita, San Nicolas de los Montes, S. Luis Potosí; Cueva del Ojo de Agua de Manantiales, 14 km of Ocampo, Tamaulipas	A

23	thermydronis Cole & Minckley, 1966	VII 1: Posos de la Becerra and one more poso, SW of Cuatro Ciénegas, Coahuila	β
	Sphaeromides Dollfus, 1897		
24	bureschi Strouhal, 1963	I 9a: 3 caves (near Iskretz, Cerowo, monastery Iwan Matnij) and one karstic spring (by Opizwet), all in westernmost part of Stara Planina Mts., Bulgaria	C, T
25	bureschi serbica Pljakič, 1968	I 9a: karstic spring Gradište, ca. 10 km NW from Dimitrovgrad (in SE Serbia but quite near the Bulgarian border). Possibly also Peterlaš Cave (same zone)	T; A?
26	polateni Angelov, 1968	I 9a: cave in Polaten, not far from Teteven, central part of Stara Planina Mts., Bulgaria	C, T
27	raymondi Dollfus, 1897	I 4: subterranean river of La Dragonnière, Vallon, Ardèche; Grotte des Cent-Fonts, Grotte de Ressecs, and Grotte de l'Avencas (Hérault)	D, C, T
28	virei virei (Brian, 1923)	I 7b: 4 caves and 2 wells in Istria I 7c: one cave at Vrana, central Dalmatia, one cave at Ston, southern Dalmatia. All localities very near the coast	D, I, L3; probably also: C, T
29	virei mediodalmatina Sket, 1964	I 7c: 2 caves (Milića Pećina and Kusaća), near Žegar, Middle Dalmatia. Rather far from coast	A
30	virei montenigrina Sket, 1957	I 7f: Obodska Pécina (karstic spring of Rijeka Crnojevića), near northern end of Scutari-lake, Jugoslavia	T; certainly also D-C
	Turcolana Argano & Pesce, 1980		
31	cariae Argano & Pesce, 1980	I 11: freshwater well between Ula and Köyecegiz, SW Anatolia	α
32	rhodica Botosaneanu, Boutin & Henry, 1985	I 8e: springbrook Gadouras, 1.5 km. W from Apolona (Rhodos); interstitial water in peebles	L1
	Typhlocirolana Racovitza, 1905		
33	buxtoni Racovitza, 1912	I 13: "Grotte du ravin de Bou Jacor", and artesian well at Bredea, both near Bou Tlelis, wilaya Oran, Algeria	D, K1
34	fontis (Gurney, 1908)	I 13: several groups of springs near Biskra and in the wilayas Oran, Sidi-Bel-Abbès, and Constantine (old provinces of Oran and Constantine); wells near Algiers. IV 1: wells at Hassi Chebaba (Fort Miribel) 135 km S from El Goléa, and at Colomb-Bechar, both Algeria	T, S, α
35	gurneyi Racovitza, 1912	I 13: "Grotte de la 4ème source du ravin de Misserghin", wilaya Oran, Algeria (quoted also from "Grotte du ravin de Bou Jacor": see *buxtoni*)	D
36	leptura Botosaneanu, Boutin & Henry, 1985	I 13: wells in Morocco (2 km E from Chichaoua, 10 km S and 4 km N from Marrakech)	K

37	moraguesi Racovitza, 1905	I 2: caves and wells on the islands Mallorca, Menorca, and Dragonera. I 5c: "pozzi artesiani salmastri", Sicily	D, I; K?K1?
38	reichi Por, 1962	I 12: two springs and one "water hole", Arava Valley, S. of the Dead Sea; one well at Be'er Aharon, Negev; all in Israel	S (Z), α
39	rifana Margalef, 1958	I 13: "aguas freaticas", Monte Arruit, Melilla (Morocco)	α
40	steinitzi Strouhal, 1960	I 12: well ("forage") at Kfar Atah (Haifa, Israel)	α
	Gr. Faucheria		
	Faucheria Dollfus & Viré, 1905		
41	faucheri (Dollfus & Viré, 1900)	I 4: wells in limestones and vertical caves reaching the water of underground river, near Sauve, Dépt. Gard; Grotte et résurgence des Cent-Fonds (Hérault). Also cave (s) in Dépt. de l'Aude ? All in France	C, I, D, T
	Skotobaena Ferrara & Monod, 1972		
42	mortoni Monod, 1972	IV 2: Cave of Sof Omar (on river Webbe, Prov. Balé, Ethiopia)	C; probably also D
43	monodi Ferrara & Lanza, 1978	IV 2: shallow wells at El Gambole, Southern Somalia	α (probably I)
	Sphaerolana Cole & Minckley, 1972		
44	affinis Cole & Minckley, 1970	VII 1: various "pozos" ("springfed wells") near Cuatro Ciénegas de Carranza; flooded mine "about 30 m. below entrance of Cueva de la Boca, near Villa Santiago", Nuevo León	S (Z), α; D?
45	interstitialis Cole & Minckley, 1970	VII 1: small springs and "pozos" near Cuatro Ciénegas de Carranza, Coahuila	S (Z), α

NOTES

1: not stygobiont, but certainly stygophilous; this oculate and pigmented species was recorded from "Seewassertümpeln" inside Zanzibar, from mangrove habitats, but also from wells, and especially from the "partly subterranean lakes" Machumwi Ndongo and Machumwi Kumbwa on Zanzibar (these being parts of a groundwater table accessible through caves with collapsed roof), and from the, apparently similar, cave Shimoni (SE Kenya).

2: in partly artificial gallery dug in coral limestones near sea-shore.

3: described as *Bermudalana;* in large bodies of salt water with characteristics of anchihaline habitats, deep inside caves ca. 250-420 m. from next marine shore.

Anopsilana: only very slightly distinct from the marine *Cirolana,* and considered as possibly paraphyletic genus. *Troglocirolana* Rioja, 1956, and *Haitilana* Notenboom, 1981, are considered as synonyms. An *Anopsilana* sp. was mentioned (as *Haitilana* sp.) from a well near Thomazeau, Dépt. de l'Ouest, Haiti.

Creaseriella: apparently only slightly differing from the marine *Cirolana.*

12: not stygobiont, but possibly stygophilous. This oculate (very small eyes) and pigmented species is known from a habitat well described by Monod, 1930: a sluggish freshwater streamlet fed by a nearby spring complex.

14: in a "muddy hole filled with water (probably the water table)".

15: in cave pools with characteristics of anchihaline habitats, but in a cave ca. 1 km from the Ocean.

21: according to Bolivar y Pieltain, 1950, in the first discovered locality, Cueva de los Sabinos, lives in "un pozo situado en la galeria superior de la caverna .... nunca pudo ser encontrada en las lagunetas de la galeria inferior de la caverna" (rather surprising situation).

23: in a complex and peculiar habitat: interstices in blocks of porous travertine along sides of natural wells (posos) fed by the water of thermal springs.

27: Dr. R. Rouch (Moulis) has kindly provided some unpublished information concerning the distribution of this species.

28: *S. virei* was initially placed (by Valle-as nomen nudum-, then by Brian) in the genus *Troglaega,* now no longer recognized. The specimens of *virei virei* from Istria and from Dalmatia are slightly different.

33-35, 37, and 39: the systematic problems related with the western-mediterranean *Typhlocirolana* are complex and difficult, and there is yet no definite solution for them (see, for instance: Racovitza 1912, Monod 1930, Nourisson 1956, Margalef 1958). That *fontis, buxtoni,* and *gurneyi* represent only one species, is almost beyond doubt; but is this species distinct from *moraguesi?* The status of *rifana* as species distinct from *moraguesi* is also rather uncertain. It seemed, nevertheless, more reasonable to keep for the time being all these as independent taxa in the tabellar part, until a badly needed revision of western-mediterranean *Typhlocirolana* is available (only *T. lulli* Pujiula, 1911, described from Cuevas dels Hams, Mallorca, and almost certainly synonymous with *moraguesi,* was excluded). It is possible that such a revision will show that we are concerned here with an unique species *(moraguesi)* — perhaps showing some geographical variability. Mention should be also made of the following facts: a) two populations of *Typhlocirolana* from S. Morocco are studied by Nourisson, 1956, as *Typhlocirolana* sp.sp.; b) in recent years abundant material still awaiting study, was colledted in Algeria, Morocco, and in Spain (the description of a n.sp. from peninsular Spain is presently in press: inf. L. Pretus).

38: found also in the wet mud filling a "water hole" after drought.

42: in a small cave brooklet, sometimes dry; can leave the water to climb on wet mud; supposedly also living in "fentes noyées ou d'autres cavités ... humides". Locality remote from any marine coast.

43: in wells dug in limestones, but reaching "une nappe aquifère très superficielle", ca. 120 km from the Indian Ocean coast.

ADDITIONAL NOTES

Haptolana. A second species — ascribed with some doubts by the authors to this genus — was described from Somalia (Messana, G. & Chelazzi, L., 1984: Haptolana somala n.sp., a phreatobic cirolanid isopod (Crustacea) from the Nogal Valley (northern Somalia). — Monitore Zool. ital., N.S. Suppl. XIX (9): 291-298).

The localities are Gibaganle, Callis, and Eil, along the Wadi Nogal; IV 2; apparently true phreatic water: K.

Typhlocirolana. With regard especially to the notes 33-35, 37, and 39: it is quite possible that we were too sceptical concerning the distinctness and validity of the various Western-mediterranean species; see comments on this problem in the publication mentioned below.

An addition to the key bibliography: Botosaneanu, L., Boutin, C., Henry, J.P., 1985: Deux remarquables Cirolanides stygobies nouveaux du Maroc et de Rhodes: problématique des genres Typhlocirolana Racovitza, 1905 et Turcolana Argano & Pesce, 1980. — Stygologia, 1 (2).