

Marine Isopoda from Martinique, French Antilles : Cirolanidae and Gnathiidae (Crustacea : Cymothoidea).

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Abstract : Three species of cirolanid isopods in 3 genera and 2 species of *Gnathia* (Gnathiidae) are recorded from mainly coral reef localities along the east coast of Martinique, French Antilles. *Cirolana parva* Hansen, 1890 is redescribed. The new species *Gnathia calsi* n. sp. is described, with a brief discussion of its supposed affinities. *Gnathia puertoricensis* Menzies & Glynn, 1968 is considered a junior synonym of *Gnathia virginalis* Monod, 1926.

Résumé : Trois espèces de trois genres d'Isopodes Cirolanidea et deux espèces de *Gnathia* (Gnathiidae) sont recensées en différents endroits de la barrière de corail le long de la côte Est de la Martinique, dans les Antilles françaises. *Cirolana parva* Hansen 1890, est redécrite. *Gnathia calsi* n. sp. est décrite et ses affinités discutées. *Gnathia puertoricensis* Menzies & Glynn, 1968 est considérée comme un synonyme de *Gnathia virginalis* Monod, 1926.

INTRODUCTION

This paper is one of a series of contributions dealing with the marine crustacean fauna of Martinique, French Antilles.

Within the isopod suborder Cymothoidea three species of Cirolanidae and two species of Gnathiidae were collected during the author's three weeks' survey on marine invertebrates in April 1990. Most of the fieldwork was carried out on nearshore coral reefs or in seagrass beds along the east coast of the island.

Among the Gnathiidae a new species of *Gnathia* is described, with discussion of its interspecific relationships. A detailed redescription is given for *Cirolana parva* Hansen, 1890, one of the commonest marine isopods of the Caribbean.

The specimens are deposited in the Muséum National d'Histoire Naturelle, Paris, France (MNHN), Zoologisches Museum Berlin (ZMB) and in the author's private collection.

SYSTEMATIC ACCOUNT

Cirolanidae

Calyptolana Bruce, 1985

Calyptolana hancocki Bruce, 1985

1985 *Calyptolana hancocki* Bruce, J. Crust. Biol. 5 (4) : 710-714, figs. 1 a, 2, 3.

1989 *Calyptolana hancocki* - Kensley & Schotte, Guide to the marine isopod crustaceans of the Caribbean, Smiths. Inst. Press : 132, fig. 57.

1991 *Calyptolana hancocki* - Schotte, Heard & Kensley, Gulf Res. Rep. 8 (3) : 255.

Material : 2 manca (MNHN), Petite Anse de Macabou ; dead corals from nearshore patch reef ; exposed reef flat and seaside margin, 0-2 m, 6-15 April 1990. 2 ♀♀, 1 postmanca (Coll. Müller), Cap Chevalier ; reef flat of nearshore fringing reef, exposed location ; reef flat, from dead corals (*Porites*), 0.5-1.5 m, 11 April 1990.

Distribution : Caribbean Coast of Colombia (Müller, unpublished, in prep.), Dominican Republic, Aruba, Netherlands Antilles, Martinique, Turks and Caicos Islands.

Cirolana Leach, 1818

Cirolana parva Hansen, 1890 (Figs. 1-25)

1890 *Cirolana parva* Hansen, Vidensk. Selsk. Skr. 6 (5) : 340-341, pl. 2, figs. 6-6 b, pl. 3, figs. 1-1d.

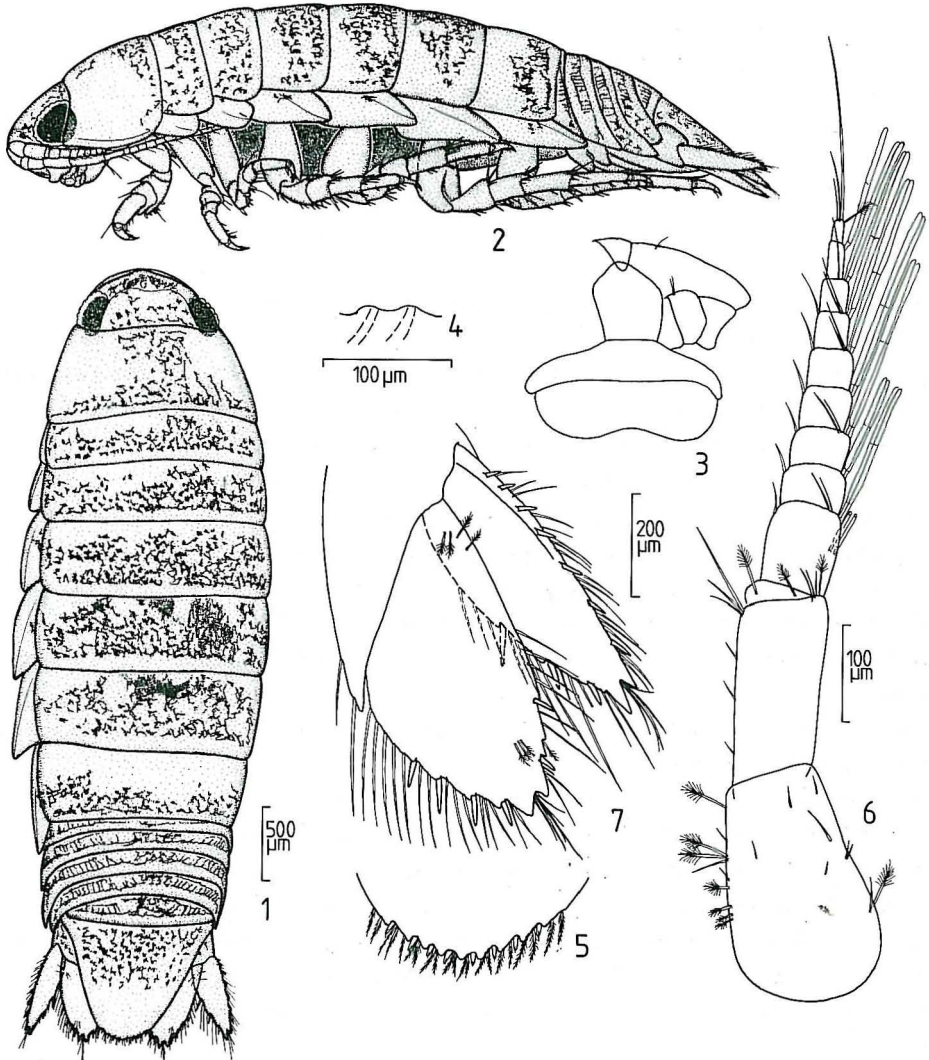
1982 *Cirolana parva* - Bruce & Bowman, Proc. biol. Soc. Wash. 95 (2) : 325-333, figs. 1-2 [literature].

1989 *Cirolana parva* - Kensley & Schotte, Guide to the marine isopod crustaceans of the Caribbean, Smiths. Inst. Press. : 135, figs. 59 C-E, 60.

1991 *Cirolana parva* - Schotte, Heard & Kensley, Gulf Res. Rep.8 (3) : 255.

Material : 9 specimens (ZMB), south of Le Vauclin ; borders of seagrass beds, mainly rhizomes of *Syringodium*, 0.5-1 m, 7 April 1990. 12 specimens (Coll. Müller), Petite Anse de Macabou ; seagrass beds (*Syringodium*, *Thalassia*), 0-1 m, 7 April 1990. 24 specimens (Coll. Müller), Madras, Baie de Tartane ; dead corals in seagrass beds, moderately exposed location ; 1-2 m, 18 April 1990. 170 specimens (Coll. Müller), Petite Anse de Macabou ; algal vegetation on rocks and nearshore patch reef, 0-1 m, 6-10 April 1990. 230 specimens (MNHN), Petite Anse de Macabou ; dead corals from nearshore patch reef ; exposed reef flat and seaside margin, 6-15 April 1990. 3 manca, 1 postmanca (Coll. Müller), Petite Anse de Macabou ; under stones and rocks, intertidal and in shallow rockpools, 10 April 1990. 1 specimen (Coll. Müller), Petite Anse de Macabou ; in coral rocks on rocky shore ; moderately exposed and sheltered locations, intertidal, 11 April 1990. 59 specimens (Coll. Müller), Cap Chevalier ; reef flat of nearshore fringing reef, exposed location ; from mainly dead corals (*Porites*), 0.5-1 m, 11 April 1990. 19 specimens (Coll. Müller), La Trinité, bank reef west of Pointe Rouge : Anse Rivière ; exposed reef flat, dead corals, 0-2 m, 12 April 1990.

Description, ♂ : total length about 5-7 mm (frontal margin of cephalon to tip of pleotelson, maximum width at pereonites 5-6. Body covered with many pigment spots and reticulations in rather variable arrangement. Cephalon 2.3 times wider than long, with narrowly rounded rostral process and large, well pigmented lateral eyes ; anterodorsal surface of cephalon with fine furrow between eyes. Clypeal region as figured. All coxae with carina ; coxae of pereonites 2-7 progressively more produced, those of pereonites 5-7 extending



Figs. 1-7 : *Cirolana parva* Hansen, 1890, ♂ : 1. dorsal view ; 2. lateral view ; 3. clypeal region ; 4. genital papillae ; 5. distal margin of pleotelson ; 6. antenna 1 ; 7. uropod.

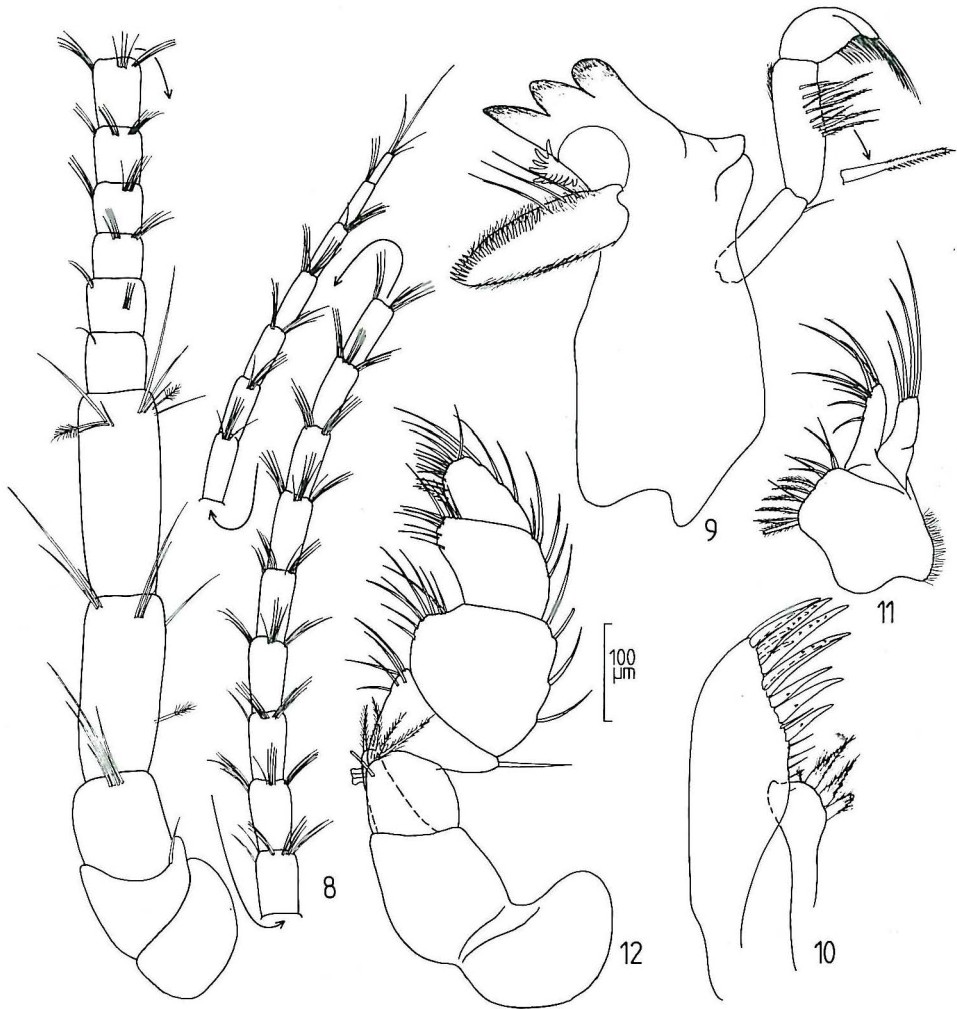
well beyond posterior margin of segment. Genital papillae inconspicuous, pair of shallowly rounded tubercles set close to one another. Pleonites subequal in length, anterior part of first one partly hidden below posterior margin of 7th pereonite. Pleotelson roughly triangular, with rounded distal margin bearing 8 small compound spines, each set within indentation ; compound spines separated from each other by 2-3 short feathered setae, respectively.

Antenna 1, peduncle biarticulate ; first article widest, 1.4 times length of second ; flagellum 10-articulated ; proximal article shortest, much wider than long ; second flagellar article largest, bearing 4 aesthetascs ; articles 3-8 with 2 aesthetascs, penultimate article with single aesthetasc. Antenna 2 slender, peduncle 5-articulated ; three proximal articles short, distal two articles elongate and subequal in length ; flagellum of 22 setose articles. Incisor of mandible strongly developed, with 3 sclerotized cusps and group of 10 spine-shaped structures near base of molar ; molar slender and setulose, an elongate-ovate lobe with several denticles along medial margin and 4 slender simple setae in proximal half ; distal two articles of mandibular palp with several slender distal, simple and pectinate spines. Maxilla 1, inner ramus slender and short, widening distally, bearing 3 strong plumose spine at mediobasal margin and a short distal feathered sensory seta ; mediobasal margin of outer ramus with 11 mostly denticulate spines of different length and 6 small simple setae. Inner ramus of maxilla 2 with truncate distal margin bearing 6 plumose and 6 simple setae ; inner and outer lobe of outer ramus slender ; inner lobe with 9, outer lobe with 4 curved setae. Maxillipedal endite reaching slightly beyond distal margin of first palp article, its distal margin bearing 4 plumose setae ; medial margin of endite with 3 coupling hooks ; 3rd article of 5-articulated palp much larger than other palp articles ; mediobasal margin of these articles much more densely setose than outer margin.

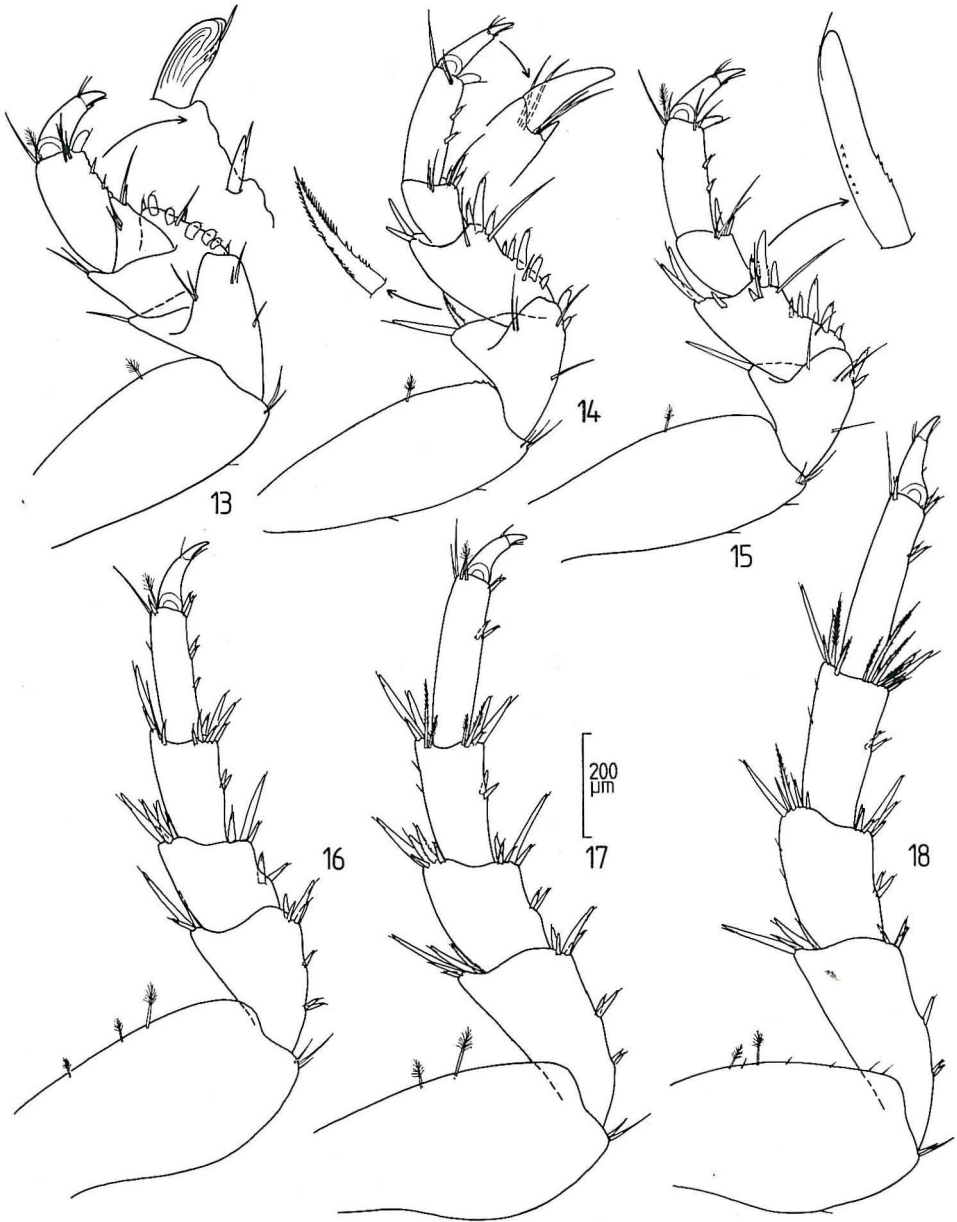
Pereopods relatively slender and barely setose. Propodus of pereopod 1 with 2 small compound spines and a much larger, rounded distal compound spine at posterior margin ; carpus of pereopod 1 very short and triangular, lacking free anterior margin and bearing slender compound spine at posterior margin ; posterior margin of merus with 5 robust, rounded compound spines and two much smaller compound spines. Pereopods 2-7, posterior and distal margin of all articles except dactylus and basis bearing varying number of robust, partly denticulate or pectinate compound spines.

Endopodite of pleopods 1-5 always somewhat smaller than exopodite ; exopodite of pleopods 3-5 with transverse suture line at about midlength ; medial margin of sympodite with 5 retinacula in pleopod 1, 4 retinacula in pleopods 2-3 and 3 retinacula in pleopod 4 ; outer distal margin of sympodite in pleopod 1 with a slender spine. Pleopod 1, lateral margins of endopodite straight, distal margin bearing 11 plumose setae ; ovate exopodite bearing 26 plumose setae and a slender spine at outer proximal margin. Endopodite of pleopod 2 with almost straight lateral margins, wider than endopodite of pleopod 1 ; appendix masculina slender, articulating at inner base of endopodite, tapering to acute and spinulose distal part ; appendix masculina extending beyond distal margin of endopodite with 1/4 of its entire length ; distal margin of endopodite bearing 13 plumose setae ; margin of ovate exopodite with about 30 plumose setae. Pleopod 3, endopodite with straight medial margin and

convex outer margin, bearing 11 distal plumose setae ; outer and distal margin of exopodite with 33 plumose setae. Rami of pleopod 4 quite similar to pleopod 3 ; endopodite bearing 7, exopodite 33 distal plumose setae. Pleopod 5 ovate, devoid of any setae, with slender, anteriad directed lobe at inner proximal margin ; exopodite broadly ovate, with 30 plumose marginal setae. All plumose setae of pleopodal rami drawn as simple setae. Uropodal sympodite with mediolateral projection bearing 2 plumose setae ; uropodal endopodite well extending beyond distal margin of pleotelson ; exopodite narrower than but subequal in length to endopodite ; lateral margins of both uropodal rami convex ; endopodite with strong distal notch and group of some setae set within this notch ; medial margin of endo-



Figs. 8-12: *Cirolana parva* Hansen, 1890, ♂ : 8. antenna 2 ; 9. mandible ; 10. maxilla 1 ; 11. maxilla 2 ; 12. maxilliped.

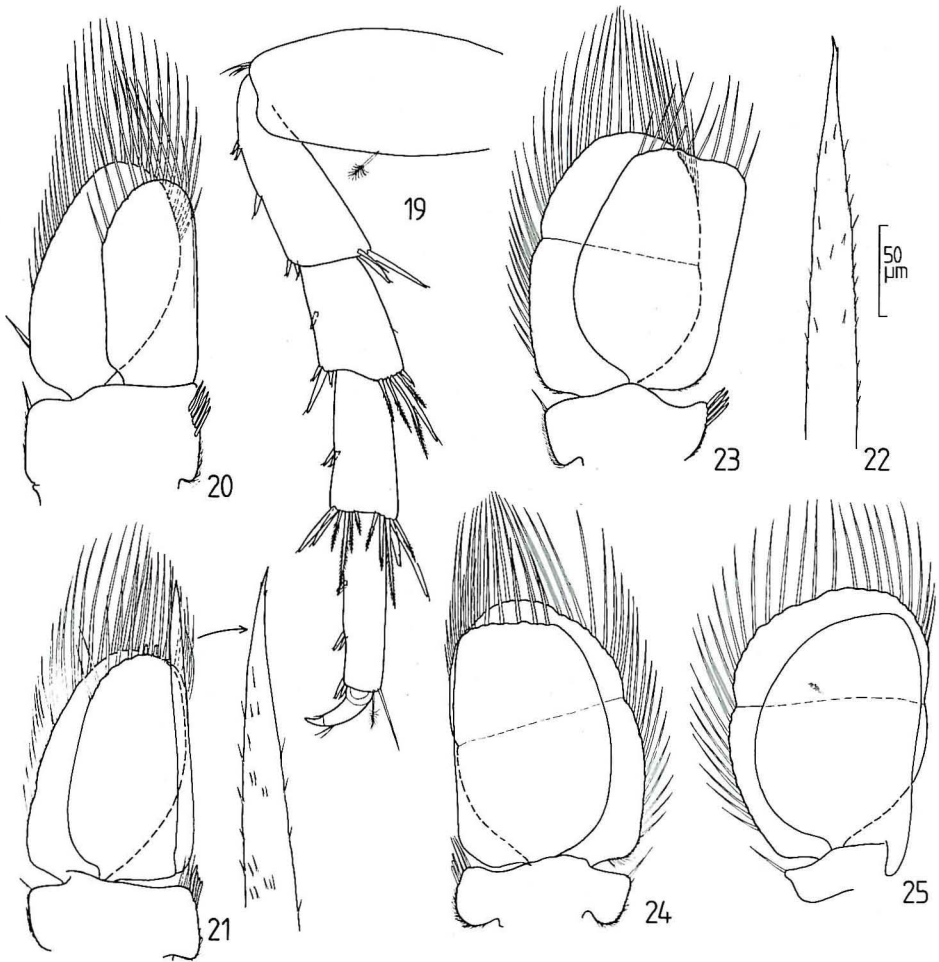


Figs. 13-18 : *Cirolana parva* Hansen, 1890, ♂ : 13. pereopod 1 ; 14. pereopod 2 ; 15. pereopod 3 ; 16. pereopod 4 ; 17. pereopod 5 ; 18. pereopod 6.

podite with 4, outer margin with 2 compound spines ; dorsal surface of endopodite, near outer margin with 8 feathered sensory setae ; exopodite also with strong distal notch and group of some setae ; inner margin of exopodite with 3, outer margin with 7 compound spines, compound spines of uropodal rami separated from each other by some plumose setae. All plumose setae of uropod drawn as simple setae.

♀ : apart from sexual characters, same as the ♂.

Remarks : during the past century *Cirolana parva* was a source of confusion with other *Cirolana* species of similar morphology. Bruce & Bowman (1982) presented some additional drawings to the original description based on the type material of *parva* from the



Figs. 19-25 : *Cirolana parva* Hansen, 1890, ♂: 19. pereopod 7 ; 20. pleopod 1 ; 21. pleopod 2 ; 22. appendix masculina of pleopod 2, other ♂ ; 23. pleopod 3 ; 24. pleopod 4 ; 25. pleopod 5.

Zoologisk Museum, Copenhagen, to feature its specific characters. This species belongs to the *parva*-group of *Cirolana*, where species are difficult to distinguish among one another. Because Bruce & Bowman did not show all the features of importance to characterize *C. parva* (mandible, maxilla 1 and 2, pereopods 3-5, pleopod 3 are omitted, the spination and arrangement of setae on pleotelson and appendages is not shown in detail) it was found useful to give a complete redescription based on the specimens available from Martinique. This will allow an easy identification of that species and help to separate it from other members of the *parva*-complex. In the Caribbean *C. parva* superficially resembles *Cirolana albidoida* Kensley & Schotte, 1987, known only from Grand Bahama. *C. parva* is distinguishable from *albidoida* by the broader pleotelson and uropodal rami, more robust pereopods 3-7 and a much shorter appendix masculina in the male second pleopod (cf. Kensley & Schotte 1987 : 227-233, figs. 10-12).

There are two minor differences between the specimens from Martinique compared with the drawings of the type material given by Bruce & Bowman (1982 : 326-327, figs. 1-2) : the genital papillae of the ♂ appear to be more pronounced and the maxillipedal endite bears 6 plumose setae instead of 4 in the material from Martinique.

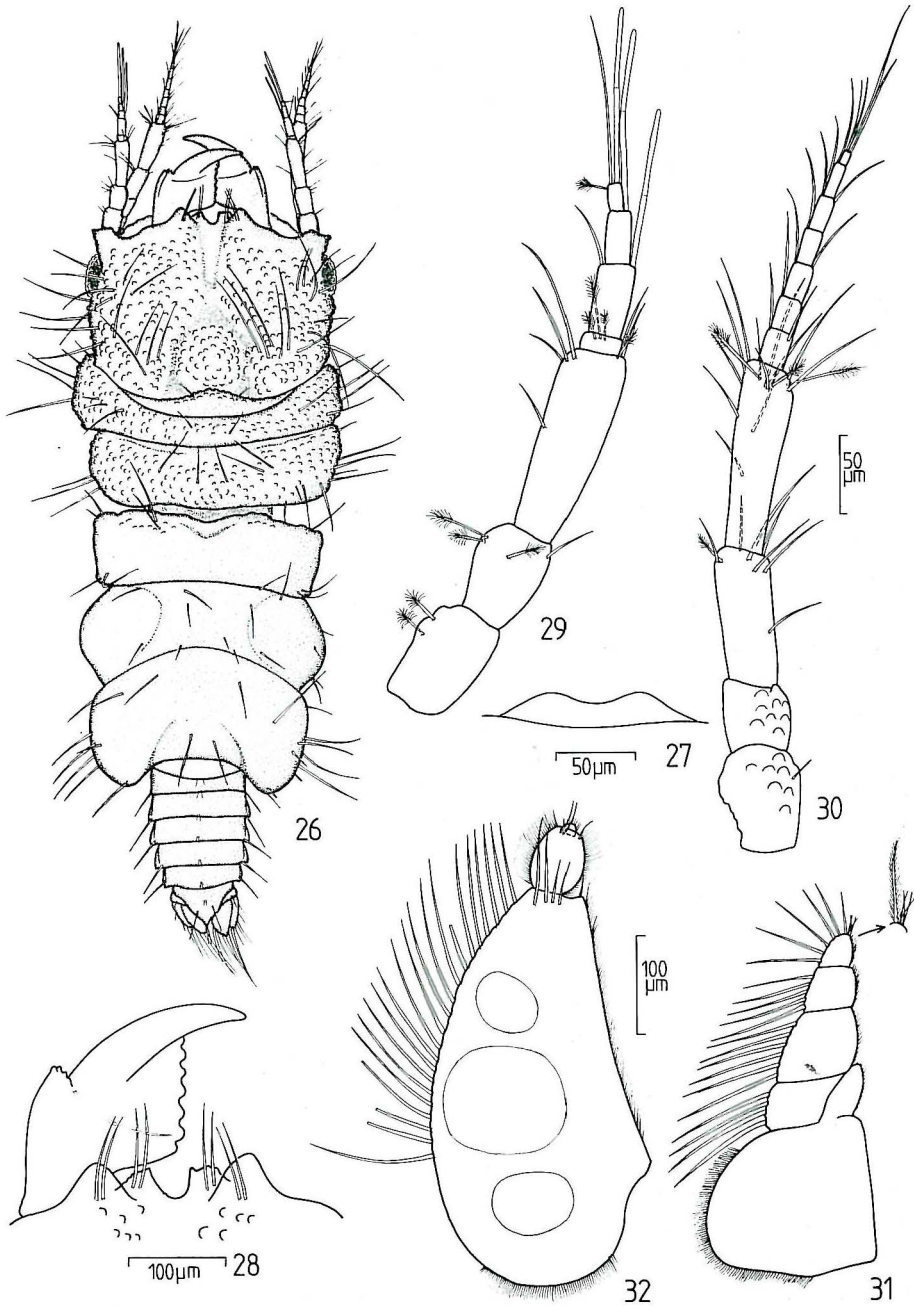
C. parva was the most numerous species of all marine isopods collected by myself at Martinique, present in all developmental stages. More often it was found associated with dead coral substrate or algae growing on dead corals.

Distribution : Bowman & Bruce (1982) re-examined the type material of *C. parva* and clarified numerous distribution data for this species, which was thought to be cosmopolitan up to then. Ten records in the Gulf of Mexico and northern Caribbean are provided for this species, from Florida in the north to Jamaica, Puerto Rico, US Virgin Islands and Quintana Roo, Mexico in the South. Some additional records are presented by Kensley & Schotte (1989 : 135) and Schotte, Heard & Kensley (1991 : 255), extending the range of this species south to Panamá. Additional material collected by myself on the Caribbean coast of Colombia (unpublished, in prep.) and Martinique shows, that *C. parva* is widely distributed in the Western Atlantic between Florida and the Caribbean coast of South America.

Metacirolana Nierstrasz, 1931

Metacirolana sphaeromiformis (Hansen, 1890)

- 1890 *Cirolana sphaeromiformis* Hansen, Vidensk. Selsk. Skr. 6 (5) : 351-353, pl. 4, figs. 3-3 g.
- 1901 *Cirolana sphaeromiformis* - Richardson, Proc. US Natn. Mus. 23 : 512.
- 1905 *Cirolana sphaeromiformis* - Richardson, Bull. US Natn Mus. 54 : 84-86, figs. 6 a-h.
- 1968 *Cirolana sphaeromiformis* - Menzies & Glynn, Stud. Fauna Curaçao and other Caribb. Isl. 27 : 37-38, figs. 14 A-B.
- 1989 *Metacirolana sphaeromiformis* - Kensley & Schotte, Guide to the marine isopod crustaceans of the Caribbean, Smiths. Inst. Press. : 154-156, figs. 71 C-D.
- 1991 *Metacirolana sphaeromiformis* - Schotte, Heard & Kensley, Gulf Res. Rep., 8 (3) : 255.



Figs. 26-32 : *Gnathia calsi* n. sp., ♂, holotype : 26. dorsal view ; 27. genital papillae ; 28. frontal margin of cephalon and left mandible ; 29. antenna 1 ; 30. antenna 2 ; 31. maxilliped ; 32. pylopod.

Material : 1 specimen (ZMB), southern coast of Ilet Cabrits ; dead corals and rocks covered with algae, area with some wave exposition ; 0-1 m, 2 April 1990. 1 ♂, 1 ♀ (Coll. Müller), Madras, Baie de Tartane ; dead corals in seagrass beds, moderately exposed location ; 1-2 m, 18 April 1990. 1 specimen (Coll. Müller), Petite Anse de Macabou ; algal vegetation on rocks and nearshore patch reef, 0-1 m, 6-10 April 1990. 4 specimens (MNHN), Petite Anse de Macabou ; dead corals from nearshore patch reef ; exposed reef flat and seaside margin, 0-2 m, 6-15 April 1990. 19 specimens (Coll. Müller), Cap Chevalier ; reef flat of nearshore fringing reef, exposed location ; from mainly dead corals (Porites), 0.5-1.5 m, 11 April 1990.

Distribution : The species is known from Florida, Turks and Caicos Islands (British West Indies), St. Thomas (US Virgin Islands) and Martinique.

Gnathiidae

Gnathia Leach, 1814

Gnathia calsi n. sp. (Figs. 26-43)

Holotype : ♂ (MNHN), La Trinité ; bank reef west of Pointe Rouge, Anse Rivière ; dead corals on exposed reef flat, 0-2 m, 12 April 1990.

Paratype : 1 ♂, damaged (Coll. Müller), collected together with holotype.

Derivatio nominis : the species is dedicated to Dr. Philippe Cals, Paris, for his detailed contributions on Gnathiidae.

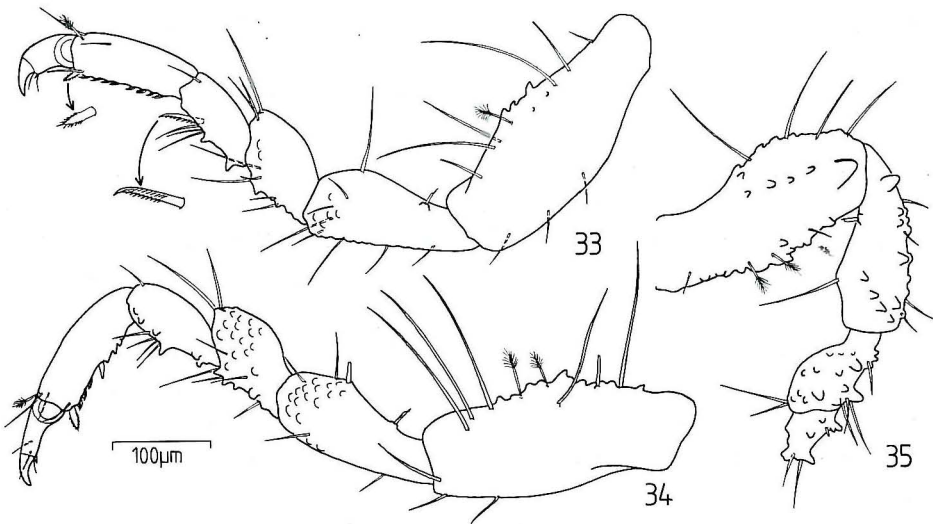
Description, ♂ holotype : total length 1.9 mm (frontal margin of cephalon to tip of pleotelson), maximum width at pereonite 2. Body covered with many slender setae, these more numerous on cephalon, pereonite 2 and pereonite 6. Cephalon and pereonites 2-3 covered with numerous granules ; moreover, several granules present along anterior margin of pereonites 1 and 4 ; pereonites 5-7 smooth. Cephalon 1.3 times wider than long ; anteromedial part of cephalon with shallow sulcus, divided into 2 longitudinal furrows in posterior half of cephalon adjacent to midline ; supraocular lobes well developed ; frontal margin of cephalon with deeply notched medifrontal process, each lobe with 2 simple setae on dorsal surface ; narrowly rounded superior frontolateral processes with 2 simple setae on dorsal surface, respectively. Eyes large and well pigmented, of 1/5 length of cephalon. Pereonite 1 very short, lateral margins not visible in dorsal view ; pereonites 3-5 subequal in length, pereonite 6 longest ; pereonite 7 very short, hidden beneath posterior margin of pereonite 6. Genital papillae inconspicuous, small shallowly rounded tubercles set close to one another. Pleon straight, with pleonites subequal in length, bearing some short setae at posteromedian and lateral margins. Telson triangular, 1.2 times wider than long, with sinuous lateral margins ; 2 dorsal setae in posterior half of telson as long as pair of terminal setae.

Antenna 1, peduncle of 3 articles ; elongate third article almost as long as first and second articles combined ; flagellum 4-articulated ; first flagellar article shortest and wider than long ; distal 3 articles bearing aesthetasc. Antenna 2, peduncle 4-articulated, proximal

2 articles short, with some scales ; distal 2 articles elongate, bearing several slender setae in distal half ; 4th peduncular article 1-6 times length of 3rd article ; flagellum with 7 slender setose articles. Mandibles $2/3$ length of cephalon, with simple seta at inner dorsal margin ; carina distally granular ; mandibular blade with several small, rounded teeth. Maxilliped of 5 articles ; large proximal article with ovate mediiodistal lobe, reaching somewhat beyond distal margin of second article ; convex outer margin of first article densely setulose ; distal 4 articles bearing finely fringed setae (drawn as simple setae) at ectal and distal margins in formula 4 : 6 : 5 : 6 ; moreover, distal margin of terminal article with 4 minute simple setae. Pylopod of 3 articles ; enlarged blade-like proximal article with 21 finely fringed setae at convex medial margin (drawn as simple setae), and 5 simple setae on ventral surface near distal margin ; posterior and ectal margin of first pylopod article densely setulose ; moreover, outer distal margin of this article bearing a short simple seta ; second article ovate, with 3 small distal, simple setae and setulose lateral margins ; terminal article minute, devoid of any setae.

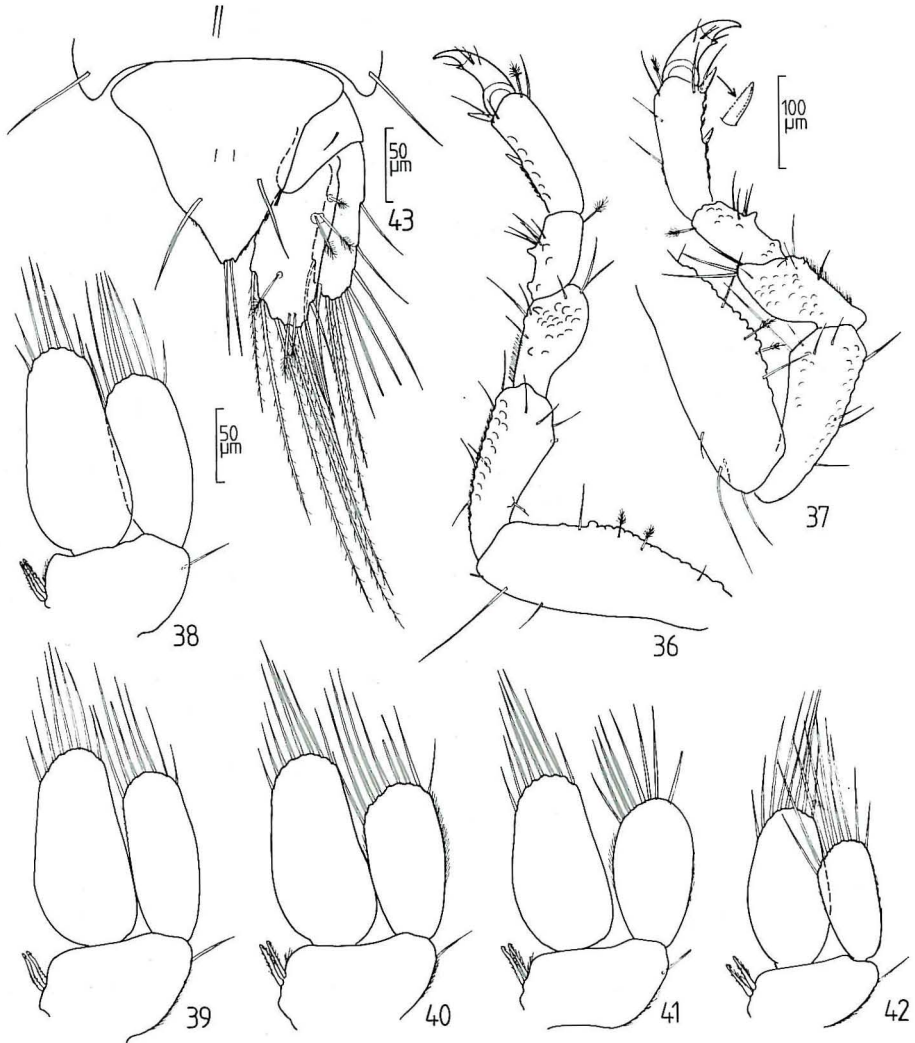
Pereopods relatively robust and moderately setose. Toothshaped tubercles present on carpus and merus in pereopods 1-5, as well as on ischium and basis of pereopods 3-5 ; posterior margin of propodus in pereopods 1-2 and 4-5 with 2 robust, partly denticulate or combed compound spines ; distal part of 3rd pereopods broken off.

Both rami of pleopods 1-5 ovate, exopodite always distinctly shorter than endopodite. Sympodite of pleopods 1-5 with 2 setulose retinaculæ and slender simple seta at outer distal margin. Pleopod 1, distal margin of endopodite with 7, of exopodite with 8 plumose setae. Pleopod 2, distal margin of endopodite with 8, of exopodite with 7 plumose setae.



Figs. 33-35 : *Gnathia calsi* n. sp., ♂, holotype : 33. pereopod 1 ; 34. pereopod 2 ; 35. pereopod 3, propodus and dactylus broken off.

Pleopod 3, distal margin of endopodite with 8, of exopodite with 9 plumose setae. Pleopod 4, distal margins of both rami with 8 plumose setae. Pleopod 5, distal margin of endopodite with 8, of exopodite with 9 plumose setae. All plumose setae of pleopodal rami drawn as simple setae. Uropodal exopodite narrower and somewhat shorter than endopodite, both rami bearing several long fringed setae and simple setae; endopodite with 6 feathered sensory setae on dorsal surface.



Figs. 36-43: *Gnathia carsi* n. sp., ♂, holotype: 36. pereopod 4; 37. pereopod 5; 38. pleopod 1; 39. pleopod 2; 40. pleopod 3; 41. pleopod 4; 42. pleopod 5; 43. posterior margin of 5th pleonite, telson and right uropod.

Remarks : the new species resembles closely *Gnathia margaritarum* Monod, 1926 from the Pacific Coast of Panamá. *G. calsi* n. sp. is best distinguishable from *margaritarum* by the lack of granular, paraocular tubercles and a more robust habitus. The distal part of the mandibles is slender and acute in *calsi*, strongly curved and narrowly rounded in *margaritarum*. Moreover, the cephalic and pereonal setae of *calsi* are more numerous and much longer than in *margaritarum* (cf. Müller 1989 : 73-78, figs. 30-42). Superficially the new species resembles also *Gnathia beethoveni* Paul & Menzies, 1971 from the Caribbean coast of Colombia and Venezuela. *G. beethoveni* is distinguishable from *calsi* n. sp. at first glance by the smooth, non-granular pereonites, the slender habitus and few short setae on cephalon and pereonites (cf. Müller 1988 : 89-92, figs. 1-2).

Distribution : Martinique.

Gnathia virginalis Monod, 1926

1926 *Gnathia virginalis* Monod, Mém. Soc. Sci. nat. Maroc, 13 : 552-554, fig. 251.

1968 *Gnathia puertoricensis* Menzies & Glynn, Stud. Fauna Curaçao and other Caribb. Isl. 27 : 23-24, figs. 6 A-G, 7 C-D (new synonymy).

1988 *Gnathia puertoricensis* Müller, Bijdr. Dierk. 58 (1) : 94-95, fig. 7 [literature].

1988 *Gnathia virginalis* Müller, Bijdr. Dierk. 58 (1) : 102-104, figs. 12-13.

1989 *Gnathia puertoricensis* Kensley & Schotte, Guide to the marine isopod crustaceans of the Caribbean, Smiths. Inst. Press. : 241, figs. 103 E-G.

1989 *Gnathia virginalis* Kensley & Schotte, Guide to the marine isopod crustaceans of the Caribbean, Smiths. Inst. Press. : 243, fig. 104 D.

Material : 2 ♂♂, 2 *Praniza* larvae (Coll. Müller), south of Le Vauclin ; borders of sea-grass beds, mainly rhizomes of *Syringodium*, 0.5-1 m, 5 April 1990. 18 ♂♂, 3 ♀♀ (1 ovigerous), deposited as follows : 12 ♂♂, 1 ovigerous ♀ (Coll. Müller), 5 ♂♂, 2 ♀♀ (MNHN), 1 ♂ (ZMB), Madras, Baie de Tartane ; dead corals in seagrass beds ; moderately exposed location, 1-2 m, 18 April 1990. 1 ♂, 1 ovigerous ♀, 1 *Praniza* larva (Coll. Müller), Petite Anse de Macabou ; dead corals from nearshore patch reef ; exposed reef flat and seaside margin, 0-2 m, 6-15 April 1990. 1 ♂ (Coll. Müller), Petite Anse de Macabou ; under stones and rocks, intertidal and in shallow rockpools, 10 April 1990. 1 ♂ (Coll. Müller), Cap Chevalier ; reef flat of nearshore fringing reef, exposed location ; from mainly dead corals (*Porites*), 0.5-1.5 m, 11 April 1990.

Remarks : in the author's (1988) review of Gnathiidae from the Caribbean and Gulf of Mexico and in Kensley & Schotte's (1989) guide to the Caribbean marine isopods *Gnathia puertoricensis* and *virginalis* are treated as separate species. Now it became obvious from the many specimens collected at Martinique, that the features thought to distinguish both species are quite variable (granulation of anterior pereonites, shape and relative side of tubercles of frontal cephalic margin). Because of these variable features, I see no reason to keep these species apart and consider *G. puertoricensis* as a junior synonym of *virginalis*.

Distribution : Caribbean Sea of Colombia, Belize (Carrie Bow Cay, Puerto Rico, Martinique, US Virgin Islands).

REFERENCES

- BRUCE, N.L. & T.E. BOWMAN, 1982. The status of *Cirolana parva* HANSEN, 1890 (Crustacea, Isopoda, Cirolanidae) with notes on its distribution. *Proc. biol. Soc. Wash.* 95 (2) : 325-333.
- KENSLEY, B. & M. SCHOTTE, 1987. New records of isopod Crustacea from the Caribbean, the Florida Keys, and the Bahamas. *Proc. biol. Soc. Wash.* 100 : 216-247.
- KENSLEY, B. & M. SCHOTTE, 1989. Guide to the marine isopod crustaceans of the Caribbean. Smiths. Inst. Press (N. Dutro ed.) : 1-308.
- MONOD, T., 1926. Les Gnathiidae, essai monographique (morphologie, biologie, systématique). *Mém. Soc. Sci. nat. Maroc* 13 : 1-667.
- MÜLLER, H.-G., 1988. The genus *Gnathia* Leach (Isopoda) from the Santa Marta area, northern Colombia, with a review of Gnathiidea from the Caribbean Sea and Gulf of Mexico. *Bijdr. Dierk.* 58 (1) : 88-104.
- MÜLLER, H.G., 1989. Two new species of *Gnathia* Leach from coral reefs at Moorea, Society Islands, with redescription of *Gnathia margaritarum* Monod, 1926 from Panama Pacific (Isopoda : Cymothoidea : Gnathiidae). *Bull. Zoöl. Mus. Univ. Amsterdam* 12 (3) : 65-78.
- SCHOTTE, M., R.W. HEARD & B. KENSLEY, 1991. Studies on the Crustacea of the Turks and Caicos Islands, British West Indies. III. Records of marine Isopoda from Pine Cay, Fort George Cay and adjacent waters - Gulf Res. Rep., 8 (3) : 251-257.