

# **SUNARISTES AND PORCELLIDIUM (COPEPODA, HARPACTICOIDA) ASSOCIATED WITH HERMIT CRABS IN NEW CALEDONIA**

ARTHUR G. HUMES

Boston University Marine Program, Marine Biological Laboratory, Woods Hole, Massachusetts, 02543

## RÉSUMÉ

*En Nouvelle-Calédonie Sunaristes dardani s'associe à un hôte nouveau, Clibanarius virescens; Sunaristes inaequalis à trois hôtes nouveaux, D. scutellatus, C. virescens, et Calcinus latens; et Porcellidium brevicaudatum à cinq hôtes nouveaux, D. deformis, D. scutellatus, C. virescens, Pagurus sp., et C. latens. Observations sur la variabilité de S. inaequalis sont incluses.*

## ABSTRACT

*In New Caledonia Sunaristes dardani is associated with a new host, Clibanarius virescens; Sunaristes inaequalis with three new hosts, D. scutellatus, C. virescens, and Calcinus latens; and Porcellidium brevicaudatum with five new hosts, D. deformis, D. scutellatus, C. virescens, Pagurus sp., and C. latens. Observations on variability in S. inaequalis are included.*

Three harpacticoid genera are associated with hermit crabs in the Indian and Pacific Oceans. These are *Sunaristes* Hesse, 1867 (Canuellidae), *Porcellidium* Claus, 1860 (Porcellidiidae), and *Paraidya* Sewell, 1940 (Tisbidae) (Humes and Ho, 1969a, 1969b, and Humes, 1971). *Sunaristes dardani* Humes and Ho, 1969, is known from Madagascar, Mauritius, and Eniwetok Atoll. *Sunaristes inaequalis* Humes and Ho, 1969, has been found in Madagascar and the Red Sea. The third and type species of the genus, *Sunaristes paguri* Hesse, 1867, is known from many localities in Europe. Its presence in Ceylon (Thompson and A. Scott, 1903) and in New Guinea (A. Scott, 1909) needs verification, however. Only one species of *Porcellidium*, *P. brevicaudatum* Thompson and A.

Scott, 1903, lives with hermit crabs, such an association having been recorded in Madagascar and Mauritius (Humes and Ho, 1969b). One member of the genus *Paraidya*, *P. occulta* Humes and Ho, 1969, is an associate of pagurids in Madagascar. (Although several of the New Caledonian hermit crabs examined during this work harbored *Paraidya*, the relatively small numbers of these copepods collected preclude a detailed study at this time.)

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*Sunaristes dardani* Humes and Ho, 1969

SPECIMENS COLLECTED. — From *Clibanarius virescens* Krauss: 2 copepodids from 15 hosts, in 0.5-1 m, Rocher à la Voile, Noumea, 20°18'24" S, 166°25'50" E, 2 June.

From *Dardanus lagopodes* (Forskål) [= *D. sanguinolentus* (Quoy and Gaimard)]: 8 ♀♀, 2 ♂♂ from 2 hosts, in 2 m, eastern edge of Isle Maître, near Noumea, 22°20'35" S, 166°25'10" E, 8 June; 2 ♂♂ from 10 hosts, in intertidal pools, about 5 kms south of Yaté, southeastern New Caledonia, 22°11'00" S, 166°59'00" E, 23 June; 20 ♀♀ from 1 host, west of Isle Mando, near Noumea, 22°18'59" S, 166°09'30" E, 3 July; 2 ♀♀, 1 ♂ from 1 host, intertidal, Ricaudy Reef, Noumea, 21 July; 6 ♀♀ from 1 host, in 2 m, west of Isle N'Gou, near Noumea, 22°13'44" S, 166°23'01" E, 29 July,

From *Dardanus megistos* (Herbst): 6 ♀♀, 1 ♂ from 1 host, intertidal, Ricaudy Reef, Noumea, 21 July; 8 ♀♀ from 1 host, intertidal, eastern side of Isle Maître, near Noumea, 22°20'35" S, 166°25'45" E, 31 July.

REMARKS. — This species has been reported from Madagascar and Mauritius (Humes and Ho, 1969a) and Eniwetok Atoll (Humes, 1971). In Madagascar it is associated with *Dardanus megistos*, *D. deformis*, *D. guttatus*, *D. lagopodes*, and *Calcinus latens*. In Mauritius its hosts are *D. deformis* and *D. lagopodes*. At Eniwetok it lives with *D. guttatus*, *D. megistos*, *D. lagopodes*, *D. scutellatus*, and *Calcinus latens*.

*Clibanarius virescens* is a new but infrequent host for *Sunaristes dardani*. From more than 700 hosts examined only two copepodids were recovered.

*Sunaristes inaequalis* Humes and Ho, 1969

SPECIMENS COLLECTED. — From *Calcinus latens* Randall: 1 ♀, 1 ♂ from 8 hosts, in 0.5-1 m, Rocher à la Voile, Noumea, 2 June.

From *Clibanarius virescens* Krauss: 1 ♀, 5 ♂♂, and 1 copepodid from 60 hosts, intertidal, Ricaudy Reef, Noumea, 9 June; 2 ♀♀, 11 ♂♂, and 11 copepodids from 160 hosts, intertidal, Ricaudy Reef, 9 June; 4 ♀♀, 6 ♂♂, and 1 copepodid from 150 hosts, intertidal Ricaudy Reef, 19 June; 2 ♀♀, 1 ♂, and 2 copepodids from 40 hosts, intertidal, Ricaudy Reef, 19 June;

2 ♀♀, 2 ♂♂, and 1 copepodid from 200 hosts, intertidal, Ricaudy Reef, 26 July; 1 copepodid, from 117 hosts, intertidal, Ricaudy Reef, 5 June.

From *Dardanus megistos* (Herbst): 6 ♀♀, 1 ♂ from 1 host, intertidal, at public beach west of Paita, near Noumea, 22°07'00" S, 166°12'00" E, 22 July; 1 ♂ from 1 host, intertidal, northwestern side of Port Ngea, near Noumea, 22°18'18" S, 166°26'47" E, 8 July.

From *Dardanus scutellatus* H. Milne Edwards: 288 ♀♀, 65 ♂♂, and 33 copepodids from 218 hosts, in 0.5 m, on sand behind reef at Poe, near Bourail, 21°40'00" S, 165°27'00" E, 4 August.

REMARKS. — *Sunaristes inaequalis* is known from Madagascar and the Red Sea (Humes and Ho, 1969a). In Madagascar it is associated with *Dardanus megistos* and in the Red Sea (Ethiopia) with *Clibanarius carnifex* Heller.

The new hosts reported here for this copepod are: *Calcinus latens*, *Clibanarius virescens*, and *Dardanus scutellatus*. The high incidence of *S. inaequalis* with *D. scutellatus* at Poe suggests a preference for that host.

The original description of *S. inaequalis* was based on a relatively small number of specimens. The large collection from Poe (350 adults) afforded an opportunity to make further observations on the extent of variation in certain aspects of external anatomy, particularly the armature and ornamentation of legs 1-4.

The usual spine and setal formula of the four swimming legs (observed in dissections of 10 males and 10 females) is as follows:

P <sub>1</sub> coxa	0-1	basis	1-I	exp	I-0; I-1; III,4
				enp	0-1; 0-1; III,3
P <sub>2</sub> coxa	0-0	basis	1-0	exp	I-0; I-1; III,4
				enp	0-1; 0-1; II,3
P <sub>3</sub> coxa	0-0	basis	1-0	exp	I-0; I-1; II,3
				enp	0-1; 0-1; I,2
P <sub>4</sub> coxa	0-0	basis	1-0	exp	I-0; I-1; I,3
				enp	0-1; 0-0; I,2

The armature varies occasionally, however, from this condition. In one female the right exopod of leg 1 was I-0; I-1; III,3, and in another the right exopod of leg 2 was I-0; I-1; II,4. The remaining legs of the 10 females and of all the males had a normal appearance, except for two cases where one of the rami was 2-segmented instead of 3-segmented. In one female the right exopod of leg 1 was 0-1; 2 and the left exopod of leg 3 was I-0; 4. In one male the left endopod of leg 1 was I-1; 4.

The outer groups of spinules on the rami of legs 1-4 are present in the 10 males and 10 females as follows:

	leg 1			leg 2		
	exopod	endopod		exopod	endopod	
	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3
♀	+ - -	+ + -	+ + +	(+ - -)*		
♂	+ - -	+ + -	+ + +	- + -		

	leg 3			leg 4		
	exopod	endopod		exopod	endopod	
	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3
♀	+ + +	(+ + -)	+ + +	(- - -)*		
♂	+ + +	(+ + -)	+ + +	(+ + -)*		

Those rami marked with an asterisk showed rare deviations from this pattern. Thus in one female both endopods of leg 2 were + + - and the right endopod of leg 4 was + - -. In another female the right endopod of leg 4 was also + - -. In one male the left endopod of leg 4 was + + +. The formulas enclosed in parentheses differ from the pattern of spinulation given by Humes and Ho (1969a, p. 14) for Madagascan *S. inaequalis*. Two interpretations of the significance of these differences may be offered. It may be that the observations on the small number of Madagascan specimens were insufficient to show the usual condition and to demonstrate the range of variation. On the other hand the New Caledonian specimens may represent a population with a slightly different arrangement of spinules. In any event the variability in armature and ornamentation in *Sunaristes* must be recognized in establishing the criteria for species in this genus.

*Porcellidium brevicaudatum* Thompson and A. Scott, 1903

SPECIMENS COLLECTED. — From *Clibanarius virescens* Krauss: 5 ♀♀, 5 ♂♂, and 4 copepodids from 15 hosts, in 0.5-1 m, Rocher à la Voile (Pt. Pontillon), Noumea, 22°18'24" S, 166°25'50" E, 2 June; 5 ♀♀ from 150 hosts, intertidal, Ricaudy Reef, Noumea, 19 June; 10 ♀♀, 8 ♂♂ from 40 hosts, intertidal, Ricaudy Reef, 19 June.

From *Pagurus* sp.: 1 ♀, 2 ♂♂ from 3 hosts, in 0.5-1 m, Rocher à la Voile, Noumea, 2 June.

From *Calcinus latens* Randall: 1 ♀ from 8 hosts, in 0.5-1 m, Rocher à la Voile, Noumea, 2 June.

From *Dardanus lagopodes* (Forskål): 28 ♀♀, 18 ♂♂, and 12 copepodids from 2 hosts, in 2-3 m, western end of Ricaudy Reef, Noumea, 22°19'05" S, 166°26'28" E, 6 June; 54 ♀♀, 82 ♂♂, 6 pairs in amplexus, and 40 copepodids from 2 hosts, eastern edge of Isle Maitre, near Noumea, 22°20'35" S, 166°25'10" E, 8 June; 93 ♀♀, 73 ♂♂, 12 pairs in amplexus, and 77 copepodids from 10 hosts, in intertidal pools, about 5 kms south of Yaté, southeastern New Caledonia, 22°11'00" S, 166°59'00" E, 23 June; 11 ♀♀,

5 ♂♂, 1 pair in amplexus, and 4 copepodids from 1 host, west of Isle Mando, near Noumea, 22°18'59" S, 166°09'30" E, 3 July; 17 ♀♀, 11 ♂♂, and 10 copepodids from 1 host, intertidal, Ricaudy Reef, 21 July; 43 ♀♀, 29 ♂♂, and 13 copepodids from 1 host, in 2 m, west of Isle N'Gou, near Noumea, 22°13'44" S, 166°23'01" E, 29 July.

From *Dardanus gullatus* (Olivier): 21 ♀♀, 25 ♂♂, and 7 copepodids from 1 host, intertidal, southwestern side of Port Ngea, 2 kms north of Ricaudy Reef, near Noumea, 22°18'18" S, 166°26'47" E, 8 July.

From *Dardanus megistos* (Herbst): 67 ♀♀, 72 ♂♂, and 45 copepodids from 1 host, in tide pool, southwestern side of Port Ngea, near Noumea, 22°18'18" S, 166°26'47" E, 8 July; 15 ♀♀, 15 ♂♂, and 1 copepodid from 1 host, intertidal, Ricaudy Reef, Noumea, 21 July; 37 ♀♀, 20 ♂♂, and 8 copepodids from 1 host, intertidal, at public beach west of Païta, near Noumea, 22°07'00" S, 166°12'00" E, 22 July; 5 ♀♀, 5 ♂♂, and 1 copepodid from 1 host, intertidal, eastern side of Isle Maitre, near Noumea, 22°20'35" S, 166°25'45" E, 31 July; 243 ♀♀, 231 ♂♂, 10 pairs in amplexus, and 129 copepodids from 1 host, intertidal, southwestern side of Port Ngea, near Noumea, 22°18'18" S, 166°26'47" E, 8 July.

From *Dardanus deformis* (H. Milne Edwards): 7 ♀♀, 5 ♂♂, and 20 copepodids from 1 host, in 2 m, Ricaudy Reef, near Noumea, 21 July; 18 ♀♀, 11 ♂♂, 1 pair in amplexus, and 3 copepodids from 1 host, in tide pool, Ricaudy Reef, 21 July; 14 ♀♀, 11 ♂♂, and 21 copepodids from 1 host, intertidal, Ricaudy Reef, 21 July.

From *Dardanus scutellatus* H. Milne Edwards: 102 ♀♀, 86 ♂♂, and 51 copepodids from 218 hosts, in 0.5 m, on sand behind reef, beach at Poe, near Bourail, 21°40'00" S, 165°27'00" E, 4 August.

REMARKS. -- The New Caledonian specimens agree in all essential features with *Porcellidium brevicaudatum* from Madagascar and Mauritius as redescribed by Humes and Ho (1969b). Five new hosts are reported here: *Clibanarius virescens*, *Pagurus* sp., *Calcinus latens*, *Dardanus deformis*, and *Dardanus scutellatus*. With *Dardanus megistos*, *D. gullatus*, and *D. lagopodes* previously known to be hosts, the total number of pagurid species harboring this copepod is now eight. The broad host specificity suggests a rather loose relationship with the hermit crabs. The number of copepods on an individual pagurid may be very large, as in the case of the single *Dardanus megistos* from Port Ngea, 8 July, with which there were associated 623 *Porcellidium* (253 ♀♀, 241 ♂♂, and 129 copepodids).

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