

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

DENDROSOMIDES LUCICUTIAE, A NEW SPECIES
OF SUCTORIAN FROM THE PELAGIC CALANOID
COPEPOD, *LUCICUTIA*

BY THOMAS E. BOWMAN

*Department of Invertebrate Zoology, Smithsonian Institution,
Washington, D.C. 20560*

While enumerating the copepods in plankton samples collected by M/V THEODORE N. GILL off the southeastern United States (Bowman, 1971), I noticed a striking suctorian attached to the urosome of *Lucicutia gaussae*. During subsequent counts of copepod species I removed all specimens of *Lucicutia* carrying this suctorian, and obtained 18 copepods from 14 stations carrying a total of 40 suctorians. Two more infested specimens of *Lucicutia* from NE of the Madeira Islands collected by M/V PILLSBURY brought the total to 43 suctorians from 21 copepod hosts. Sixteen of the hosts were *Lucicutia gaussae* and 4 were *L. flavicornis*, a much more abundant species.

These suctorians are herein assigned to a new species of *Dendrosomides*, the 6th of the genus. The classification followed below is that recently proposed by Batisse (1975a, 1975b).

Superorder SUCTORIDEA Clarapède & Lachmann, 1858
Order SUCTORIDA Clarapède & Lachmann, 1858
Suborder OPHRYODENDRINA Batisse 1975a
Family RHABDOPHYIDAE Jankowski, 1967
Dendrosomides Collin, 1906

***Dendrosomides lucicutiae*, new species**

Figures 1-2

Material examined: From the calanoid copepods, *Lucicutia gaussae* Grice and *L. flavicornis* (Claus), attached to the last pediger, the uro-

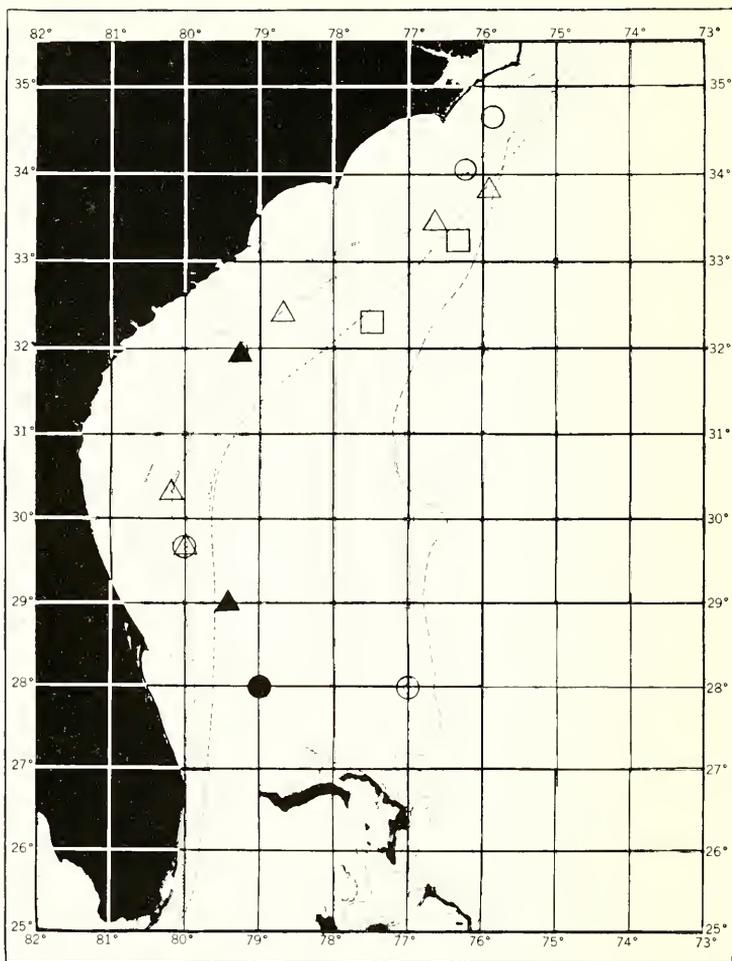


FIG. 1. Occurrence of *Dendrosomides lucicutiae* on T. N. GILL cruises 2 (circles), 3 (triangles), and 4 (squares). Open symbols, on *Lucicutia gaussae*; solid symbols, on *L. flavicornis*.

somites, caudal rami, caudal setae, or male 5th legs. Copepods were collected off the southeastern United States between Cape Hatteras and Cape Canaveral during Cruises 2 (16 April–15 May), 3 (16 July–12 August) and 4 (5 October–14 November) of M/V Theodore N. Gill in 1953. Collections were made with a half meter silk or Monel metal (Gulf III) net towed obliquely from about 70 m to the surface (Bow-

TABLE 1. Occurrences and position on host of *Dendrosomides lucicutiae*.

T. N. GILL Cruise	Sta.	Sex of Copepod	Location on Copepod							
			Pediger 4-5	Leg 5	Urosomite				Caudal ramus	Caudal seta
					1	2	3	4		
2	18	♀							2	1
	71	♀							1	1
	75	♀	1							1
		♂		1	1					
	Spec. 7	♀							1	
	Spec. 9	♂*				5	3			
3	16	♀*						1		
	26	♀								1
	42	♀								2
	48	♀*							2	
		♀								1
	64	♀					1			1
		♀						1	1	
	72	♂		1						
4	18	♀	1							
	51	♀						1	1	
		♀		1			1	1	1	1
	63	♀						1	1	
		♀						1		
NE of Madeira Is.		♀								1
		♀*							1	
	Totals		2	3	1	5	5	6	11	10

* *Lucicutia flavicornis*. All others are *L. gausae*.

man, 1971). The localities where *Dendrosomides lucicutiae* was found on *Lucicutia* are shown in Fig. 1.

Type-material: Holotype, USNM 24412, dendritic individual attached dorsally to next-to-innermost caudal seta of right caudal ramus of female *Lucicutia gausae* Grice (Fig. 2A); T. N. Gill Cruise 4, station 51, in Gulf Stream east of Beaufort, South Carolina, 32°18'N, 77°29'W; depth 643 m; 26 October 1953. The remaining 42 specimens, listed in Table 1, are paratypes. All specimens are deposited in the Ciliate Type-Specimen Collection of the Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution.

Etymology: Named for the host copepod genus, *Lucicutia*.

Description: Stalk of dendritic specimens short to moderately long, of nearly uniform width, with very faint longitudinal striations visible in stained specimens. Body with shape of flattened vase, branching distally into 4-8 long slender arms bearing circles of knobbed tentacles at

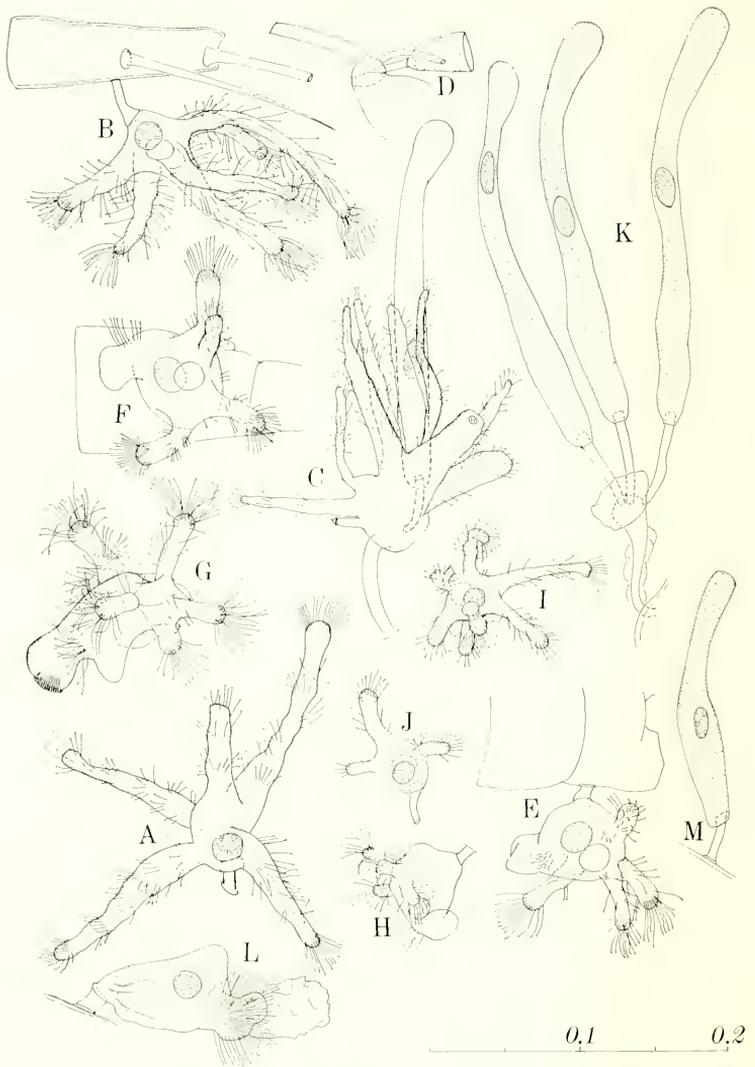


FIG. 2. *Dendrosomides lucicutiae*: A-J, from ♀ *Lucicutia gausae*, T. N. GILL Cruise 4, sta. 51. A, Holotype, at base of caudal seta; B, On ventral surface of left caudal ramus; C, On right side of last pediger; D, Another view of same, showing stalk of veniform attached to stalk of dendritic; E, On left side of anal segment; F, Same, from above arms; G, On ventral surface of urosomite 3 (nucleus omitted); H, On dorsal surface of anal segment (5th arm hidden by body, not shown);

more or less distinct nodes and a denser cluster of tentacles at distal end. Macronucleus spherical to elliptical, located at center of body slightly distal to attachment of stalk, not branching into arms. Contractile vacuole, when present, in body distal to macronucleus; diameter subequal to that of nucleus. Vermiform individuals much longer than dendritic specimens, up to nearly 300 μm , slightly inflated at apex; stalk usually longer; location of macronucleus variable, somewhat proximal or distal to midlength. Basal bodies randomly distributed in both dendritic and vermiform specimens.

Measurements: Dendritic individuals, stalk 10–70 μm ; width of body 50–60 μm ; length of tentacle 40–140 μm ; diameter of nucleus 16–21 μm . Vermiform individuals, stalk about 60 μm ; body length 260–280 μm .

Relationships: *D. lucicutiae* differs most significantly from other species of *Dendrosomides* by the form of the macronucleus. In other species of *Dendrosomides* the macronucleus is elongate and branches into the arms; in *D. lucicutiae* the spherical to elliptical macronucleus is confined to the body. Such a difference might seem to justify the erection of a separate genus for *D. lucicutiae*, but a number of ciliate genera (e.g., *Blepharisma*, *Stentor*) have quite different macronuclei in different species of the same genus.

D. lucicutiae most closely resembles *D. paguri* Collin, the type-species of the genus, but, in addition to the unbranched macronucleus, has 4–8 arms in contrast to the 3 in *D. paguri*. The constancy of the 3 arms in *D. paguri* is evident from Collin's (1912) statement that in examining 200–300 specimens, he found 3 arms in all but 1 specimen; the latter had 4 arms.

The vermiform stage of *D. paguri* has a nearly random distribution of basal bodies, but at both ends there is a slight tendency for them to form longitudinal rows (Guilcher, 1951). No such tendency was observed in silver impregnated specimens of *D. lucicutiae*.

LIFE CYCLE

The life cycle of *D. lucicutiae* appears to be similar to that of *D. paguri* as given by Collin (1912). In the dendritic form of *D. paguri* a bud grows out of the body just proximal to the level at which the 3 arms branch from the body. The bud elongates into a vermiform individual

←

I, On lateral surface of left caudal ramus, from above arms; J, Same from side (only 3 arms shown); K, From ♀ *L. gaussae*, GILL Cruise 2, sta. 75, 3 vermiforms with stalks attached to stalk of former dendritic; L, From ♀ *L. gaussae*, GILL Cruise 2, sta. 71, on ventral surface of anal segment; M, Vermiform from ♀ *L. flavicornis*, NE of Madeira Is., on caudal ramus. Scale in mm.

which separates from its dendritic parent, attaches to a new host by a basal sucker, and develops a stalk. The vermiform individual buds off 2 arms near its base and develops tentacles, thereby becoming a 3-armed dendritic individual. Budding of ciliated embryos is not known in *Dendrosomides*. It was reported to occur in the related genus *Oplryodendron* by Martin (1909), but Guilcher (1951) states that external budding of vermiforms is the only method of reproduction in both *Oplryodendron* and *Dendrosomides*.

Presumably *D. lucicutiae* has a similar life history, but living specimens were not available for study, and the preserved specimens did not reveal the complete life history. A stage not shown by any of my specimens is that of an unstalked vermiform being budded from the body of the dendritic, hence it is not known how the vermiform of *D. lucicutiae* acquires its macronucleus. In *D. paguri* a branch of the dendritic macronucleus grows into the bud of the vermiform, but in *D. lucicutiae* division of the macronucleus, with one of the daughter nuclei passing into the vermiform seems likely. All well developed vermiforms were nucleated and attached by a stalk to the copepod host (Fig. 2M) or to the stalk of a dendritic (Fig. 2C, D, K).

What I interpret to be formation of dendritics from vermiforms by budding of arms is shown in Figs. 2C, E, F, G, H, and L. In all these individuals a broad arm with few or no tentacles represents the untransformed remnant of the parent vermiform. Comparison with fully formed vermiforms (Fig. 2K, M) indicates that formation of arms is accompanied by shortening and thickening of the vermiform body.

DISTRIBUTION

Both *Lucicutia gausgae* and *L. flavicornis* are widely distributed and are essentially circumglobal in tropical, subtropical and temperate regions (for details see Vervoort (1965), where *L. gausgae* is listed as *L. ovalis* Wolfenden). Whether or not the distribution of *D. lucicutiae* is as extensive remains to be determined. Its occurrence on both hosts from NE of the Madeira Islands suggests that it is widespread at least in the Atlantic. Vidal (1971) found high incidences of suctorians on 3 species of *Lucicutia* in the Arctic Ocean, but gave no information on their morphology.

INCIDENCE OF INFESTATION

The incidence of infestation of *Lucicutia* with *Dendrosomides lucicutiae* is summarized below:

T.N. Gill Cruise No.	Total no. of stations	<i>L. gausgae</i>		<i>L. flavicornis</i>	
		Sta. where present	Sta. with <i>D. lucicutiae</i>	Sta. where present	Sta. with <i>D. lucicutiae</i>
2	85	12	4	38	1
3	75	13	5	26	2
4	72	15	2	29	0

The preference of *D. lucicutiae* for *L. gausiac*, much the rarer of the 2 host species, is clearly evident. Of 22 specimens of *L. gausiac* encountered during enumeration of the calanoids from the Gill Cruises 2, 3, and 4, 20 carried *D. lucicutiae*. In contrast, in the 3 samples where *D. lucicutiae* occurred on *L. flavicomis* it was present on 1 of 4, 1 of 12, and 1 of 32 hosts.

POSITION ON THE HOST

Dendrosomides lucicutiae was found most commonly on the urosomites, caudal rami, and caudal setae, but in a few instances was attached to the 5th leg or the posterior prosome segment (pediger 4 + 5) (Table 1). Because of the limited mobility of the vermiform, which lacks cilia, infestation of a new host probably occurs during host copulation, at which time the urosomes of the copulating pair are in contact (Gauld, 1957). Thus the position of *D. lucicutiae* on the host favors transference of the infestation to a new host.

ACKNOWLEDGMENTS

I am grateful to Dr. W. Duane Hope for a Feulgen stain of the holotype, and to Ms. Linda Cullen for assistance with a silver impregnation. Dr. John L. Mohr kindly reviewed the manuscript.

LITERATURE CITED

- BATISSE, A. 1975a. Propositions pour une nouvelle systématique des Acinétiens (Ciliophora, Kinetofragmophora, Suctorida). C. R. Hebd. Séances Acad. Sci., Sér. D, Sci. Natur. (Paris) 280: 1797-1800.
- . 1975b. Propositions pour une nouvelle systématique des Acinétiens (Ciliophora, Kinetofragmophora, Suctorida). C. R. Hebd. Séances Acad. Sci. Sér. D, Sci. Natur. (Paris) 280:2121-2124.
- BOWMAN, T. E. 1971. The distribution of calanoid copepods off the southeastern United States between Cape Hatteras and southern Florida. Smithsonian Contrib. Zool. 96:1-58.
- COLLIN, B. 1906. Note préliminaire sur un Acinézien nouveau: *Dendrosomides paguri*, n. g., n. sp. Arch. Zool. Exptl. Gén. LXIV-LXVI.
- . 1912. Étude monographique sur les Acinétiens. II. Morphologie, physiologie, systématique. Arch. Zool. Exptl. Gén. 51:1-457, pls. 1-6.
- GAULD, D. T. 1957. Copulation in calanoid copepods. Nature 180 (4584):510.
- GUILCHER, Y. 1951. Contribution à l'étude des ciliés gemmipares, chonotriches et tentaculifères. Ann. Sci. Nat., Zool., sér. II, 13:33-132.

- MARTIN, C. H. 1909. Some observations on Acinetaria. 3. The dimorphism of *Ophryodendrum*. *Quart. Jour. Microscop. Sci.* 53:629-664.
- VERVOORT, W. 1965. Pelagic Copepoda. Part II. Copepoda Calanoida of the families Phaennidae up to and including Acartiidae, containing the description of a new species of Aetideidae. *Atlantide Rep.* 8:9-216.
- VIDAL, J. 1971. Taxonomy and distribution of the Artic species of *Lucicutia* (Copepoda: Calanoida). *Bull. S. California Acad. Sci.* 70:23-30.