

SPADELLA GAETANOI, A NEW BENTHIC CHAETOGNATH
FROM HAWAII

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Abstract.—The new *Spadella* is described and compared with the related species *S. cephaloptera*, *S. angulata* and *S. bradshawi*, with which it agrees in the lack of adhesive digital organs. The diagnostic characteristics of *S. gaetanoi* and the three closely related species of *Spadella* are compiled (Table 1). Information on the habitat and the food of *S. gaetanoi* is also included.

The genus *Spadella* Langerhans was discussed by Alvariño (1970), who compiled the diagnostic characteristics and world distribution of the species. Since that time, another species of *Spadella*, *S. bradshawi* Bieri, 1974, has been described from California. The new species described herein is related to *S. cephaloptera*, *S. angulata* and *S. bradshawi*, with which it agrees in several characteristics, such as lack of adhesive digital organs. However, *S. cephaloptera* and *S. angulata* have intestinal diverticula, which are absent in *S. bradshawi* and *Spadella* new species.

Spadella gaetanoi, new species
Figs. 1-2

Material.—Holotype (USNM 55361) and 6 paratypes (USNM 55362) collected at Kure Atoll (Hawaii) in August 1977.

Diagnosis.—The body is opaque, flattened dorso-ventrally and with well developed muscles (Fig. 1A, B). Total length when mature, 2-3 mm, tail fin not included. The body is widest at the posterior part of the trunk. The head is large, roundish, almost twice as wide as the neck. Neck is distinct, and covered by a thick collarete (Fig. 2A). The caudal segment constitutes 53-55% of the total length. The eyes are large, round; the pigmented region is large, and the pigment is in an H shape, leaving 4 clear spaces filled by lenses. The hooks are slender, rather strongly curved, usually 8 or 9 (up to 10) at each side of the head. The anterior teeth are 4 per set at each side of the head. They are long, thin and curved. The teeth at the middle of each set are the longest. The posterior teeth are 4 or 5 at each side of the head. They are thin and small, when present. The corona ciliata is a perfect oval, not as thick as in *S. bradshawi*, with the longest axis transverse to the longitudinal axis of the body. It covers the neck, extending into the collarete region of the neck. The collarete is thick, well developed, extending from the head to the level of the posterior septum and

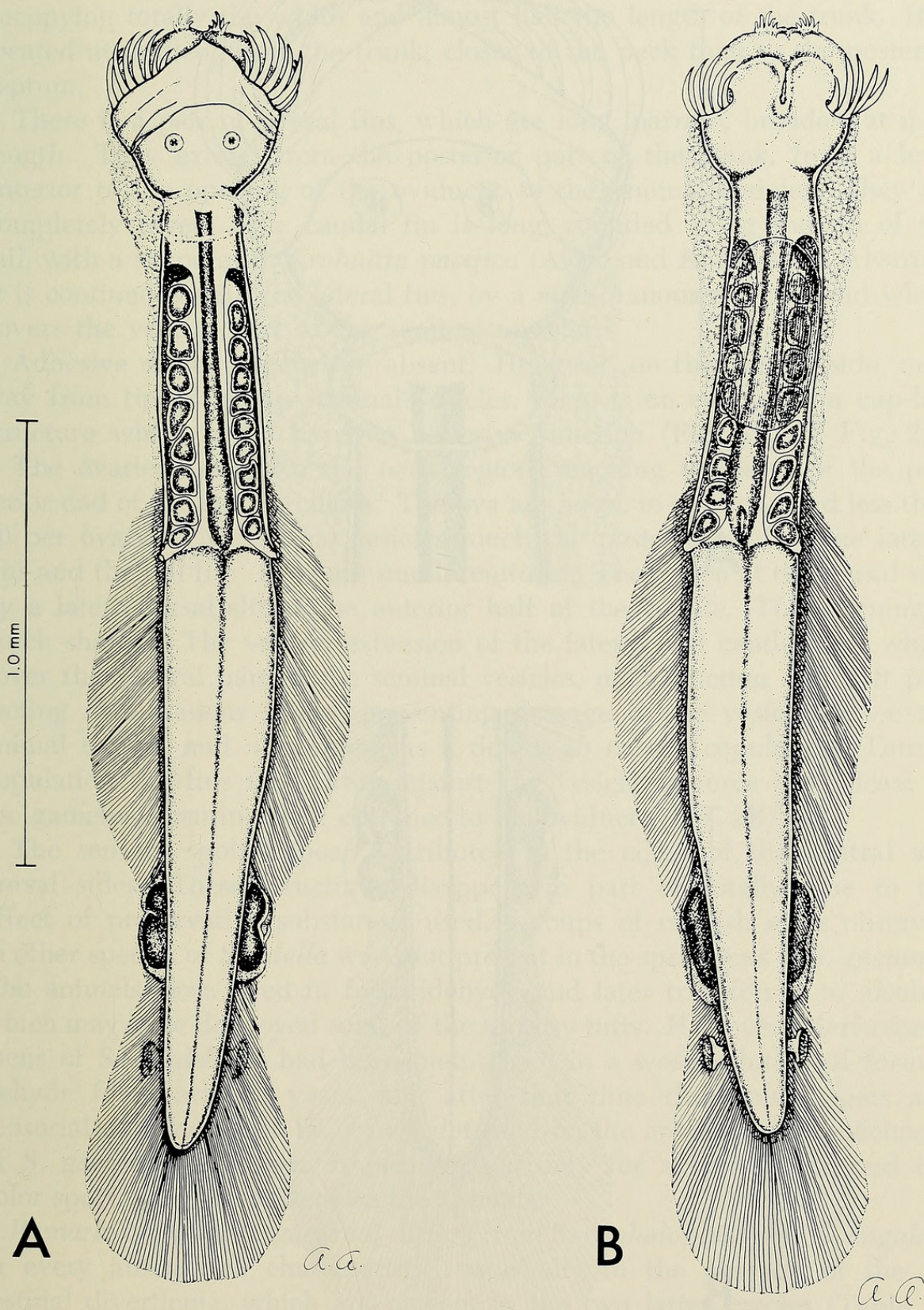


Fig. 1. *Spadella gaetanoi*. A, Dorsal view; B, Ventral view.

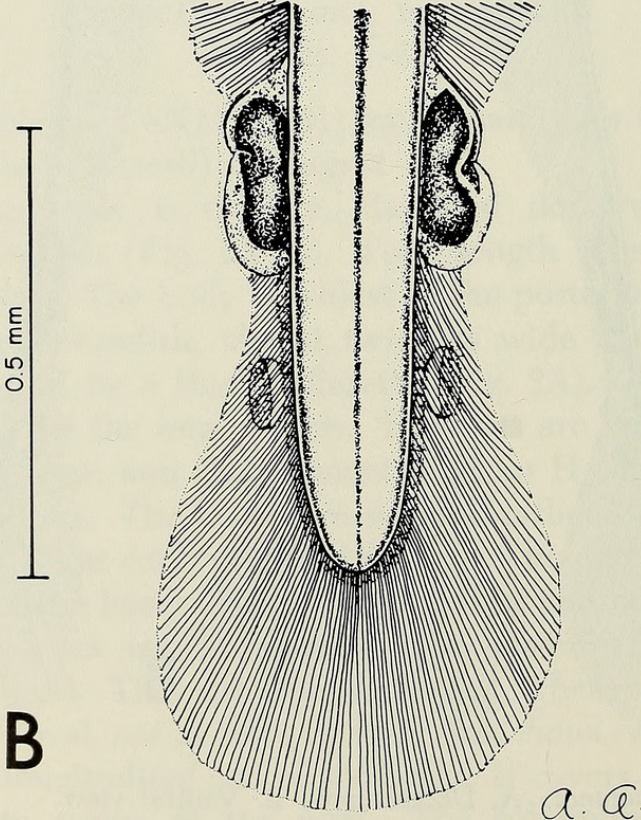
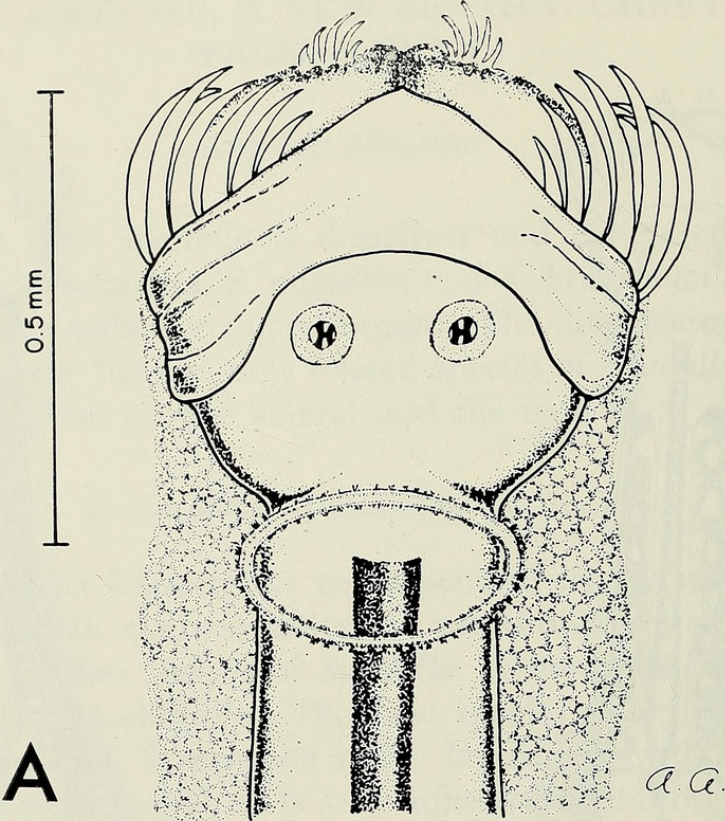


Fig. 2. *Spadella gaetanoi*. A, Dorsal view of head, with detail of hooks, teeth, eyes, corona ciliata, neck, collarette, and anterior part of intestine; B, Dorsal view of posterior part of tail segment, with detail of seminal vesicles and tail fin.

progressing along the tail segment to the tail fin. It is widest at the neck region. Intestinal diverticula absent. The ventral ganglion is large, thick, occupying totally the width and almost half the length of the trunk. It is located at midlength of the trunk, closer to the neck than to the posterior septum.

There is a pair of lateral fins, which are long, narrow, broadest at midlength. They extend from the posterior part of the trunk, from a level anterior to the opening of the oviducts, to the seminal vesicles. They are completely rayed. The caudal fin is long, rounded along the tip of the tail, with a shape as in *Krohnitta pacifica* (Aida) and *K. mutabbii* Alvariño. It is continuous with the lateral fins, by a membranous rayless band which covers the ventral part of the seminal vesicles.

Adhesive digital organs are absent. However, on the ventral side, midway from tip of tail to seminal vesicles, there is on each side a cup-like structure which could have an adhesive function (Fig. 1A, B; Fig. 2B).

The ovaries extend to the neck region, reaching the level of the posterior end of the corona ciliata. The ova are large, in one row, and less than 10 per ovary. The seminal vesicles touch the posterior end of the lateral fins and the tail fin. They are small, reniform. They open at the dorsal side by a latero-dorsal slit at the anterior half of the vesicle. This opening is notch shaped. The ventral extension of the lateral and caudal fins, which cover the ventral part of the seminal vesicles, may function as a soft protecting membranous shield, preventing damage to the vesicles when the animal crawls, and also acting as a device to ensure copulation. During copulation the fins may press against the vesicle to force the release of the gametes, ensuring their entrance to the oviducts (Fig. 2B).

The sensory spots appear distributed at the edges of the ventral and dorsal sides. These structures disappear in part or totally, due to the effect of preservative substances used. Groups of reddish spots observed in other species of *Spadella* were not present in the specimens of *S. gaetanoi*. The animals were fixed in formaldehyde and later transferred to alcohol, which may have destroyed some of the sensory tufts. However, Bieri's specimens of *S. bradshawi* had been maintained in a weak solution of formaldehyde for nearly 20 years, and after that time the orange spots and sensorial papillae could be clearly detected on the animals. The specimens of *S. gaetanoi* had been in preservation only for a few weeks, and the color spots were not evident on the animals.

Remarks.—*Spadella gaetanoi* differs from *S. cephaloptera* and *S. angulata* in every anatomical characteristic, especially in the absence of the intestinal diverticula, which are present in the two latter species (Table 1). *Spadella gaetanoi* and *S. bradshawi* do not have intestinal diverticula. They differ conspicuously in other anatomical features, including body size, dimensions of ventral ganglion in relation to the length of the trunk, shape of the seminal vesicles and their position in relation to the lateral and

Table 1. Differential characteristics of species of *Spadella* with no digital adhesive organs.

Charact.	<i>S. cephaloptera</i> Bush, 1851	<i>S. angulata</i> Tokioka, 1951	<i>S. bradshawi</i> Bieri, 1974	<i>S. gaetanoi</i> , n. sp.
Body length, mm	2-10, firm, broad, wider at posterior septum. Yellow-brownish.	2.5-4-18, including tail fin. Slender, broadest at posterior septum	5.5 to 6.5	2.00 to 3.00
Head	Medium size, neck distinct	Faint orange spots on head		Large, twice as broad as neck.
% tail segment	20-38	51.2-57.9 including tail fin	53-54	53-55
Lateral fins	One pair, long, narrow, from posterior septum to seminal vesicles. Broadest at mid-length	One pair, from posterior part trunk to anterior end seminal vesicles. Broadest at mid-length. No rayless zone. Separated from tail fin	One pair, from level anterior to transverse septum to near seminal vesicles, but not reaching them. No rayless zone.	One pair, from posterior part of trunk to seminal vesicles, joining tail fin over ventral side of seminal vesicles. No rayless zone.
Caudal fin	Long, spatulate starts as posterior end of seminal vesicles	Spatulate	Square spatulate	Roundish-spatulate joining lateral fins at ventral side No rayless zone.
Eyes	Pigmented region crescent shape	Pigmented region roundish		Round, prominent. Pigmented region in X shape.
Hooks	7-11, slender, slightly saginated, points sharp, curved	8-10	7-12	8-9 or 10, slender, strongly curved.

Table 1. Continued.

Charact.	<i>S. cephaloptera</i> Bush, 1851	<i>S. angulata</i> Tokioka, 1951	<i>S. bradshawi</i> Bieri, 1974	<i>S. gaetanoi</i> , n. sp.
Anterior teeth	2-5, long, thin, innermost longer	2-4	3-5	4-5, long, thin, strongly curved, mid ones on each side are longest.
Posterior teeth	0-4, short, thick	None	None	None, or 4-5, thin, small.
Corona ciliata	Elliptical, rec- tangular, crescent shape, slightly waved at posterior part, longest axis transverse	Transversely elongated oval, protruding undulation at anterior part.	Oval, massive	Perfect ellipse, extending slightly over collarete
Ventral ganglion		Large, 1/3 of length of trunk	Covers middle 1/3 of trunk	Large, at midlength of trunk, closer to neck than to pos- terior septum. About half of trunk length
Sensory spots		Evenly spaced, 5 on midline of dorsal side tail segment	4 on midline of dorsal side of tail segment, 2 anterior more spaced than 2 posterior	Along edges of ventral and dorsal sides
Ovaries	Reach neck or anterior end of ventral ganglion. Ova large, close together.	Reach posterior end ventral ganglion. Ova roundish, of regular size.	Reach neck	Reach neck. Ova large, in one row.

Table 1. Continued.

Charact.	<i>S. cephaloptera</i> Bush, 1851	<i>S. angulata</i> Tokioka, 1951	<i>S. bradshawi</i> Bieri, 1974	<i>S. gaetanoi</i> , n. sp.
Seminal vesicles	Small, spherical or reniform, touching lateral and tail fins.	Elongated ellipse, breaking at lateral anterior half.	Do not touch tail fin or lateral fins. U shape tube projects to anterior lateral side.	Reniform, breaking by slit of flute point shape, at latero-dorsal side of anterior half.
Intestinal diverticula	Present	Short, distinct.	Absent	Absent.
Adhesive digital organs	None. Adhesive cylindrical cell groups and small glandular lobes on ventral side, mainly on caudal septum.	None	None	None. Adhesive cylindrical disks at ventral side of tail at mid-distance from tip of tail to seminal vesicles.
Collarette	Wide at neck, diminishing in thickness towards tail segment.	Well developed at neck, diminishing thickness towards seminal vesicles.	From head to trunk and tail fin.	Head to tail fin. Thickest at neck region.

tail fins. In *S. gaetanoi* the seminal vesicles touch both lateral fins and tail fin (with a prolongation of those fins covering the ventral side of the seminal vesicles), whereas in *S. bradshawi* the seminal vesicles are separated from both lateral fins and tail fin (Table 1).

Food of Spadella gaetanoi.—The specimens analyzed had been feeding on Copepoda and invertebrate larvae, as those items appeared in the digestive tract in various stages of digestion.

Distribution.—The specimens studied were collected at night at the Kure Atoll (Hawaii) on the western side of the atoll inside the lagoon, on sandy rubble substrata at about 6 m depth. The collections were obtained with an emergence trap attached to the bottom during a survey program by NMFS Honolulu Laboratory on benthic marine communities. With this program Dr. Edmund Hobson and James R. Chess are comparing various marine communities of the leeward islands and the main Hawaiian Islands. Collections were also obtained from Midway Atoll, but *S. gaetanoi* was not found there.

Etymology.—Named after the navigator Juan Gaetano, discoverer of the Hawaiian Islands in 1555. The Hawaiian Islands were first named Isles of Volcanoes. They appear in the world map by Juan Martinez (1587), and the map of the Pacific Ocean by Juan Riero Oliva (1591). Cook in his diary and memoirs explains that he was not the first European to visit these islands, and that he knew of the information regarding the discovery of the islands.

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