

# A New Species of Tergipedid Nudibranch from Morro Bay, California

by

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**Abstract.** Specimens of a new species of aeolidacean nudibranch, *Cuthona rolleri*, are described from the central coast of California. This species, although aberrant in its dorsoventrally flattened body, resembles other members of *Cuthona* in its internal characteristics. Although demonstrating some primitive features, *C. rolleri* is highly modified in most of its anatomy. Certain anatomical features suggest a burrowing lifestyle.

## INTRODUCTION

The systematics of the Tergipedidae of the northeastern Pacific has been reviewed and revised by several authors in recent years (WILLIAMS & GOSLINER, 1979; GOSLINER, 1981; GOSLINER & MILLEN, 1984; BEHRENS, 1984, 1985; MILLEN, 1986; BEHRENS, 1987). This paper describes the morphology of a new species of aeolidacean nudibranch belonging to the genus *Cuthona* Alder & Hancock, 1855. In addition to some primitive morphological characteristics, this species appears advanced in much of its morphology. It is unique owing to its apparent burrowing behavior under the surface of mud substrates.

TERGIPEDIDAE Thiele, 1931

*Cuthona* Alder & Hancock, 1855

*Cuthona rolleri* Behrens & Gosliner, sp. nov.

(Figures 1-4)

Morro Bay Aeolid: BEHRENS, 1980:105, fig. 162.

**Type material: Holotype:** California Academy of Sciences, CASIZ 064894, approximately 7 mm (preserved), collected intertidally, Morro Bay, California (35°22'N,

120°51'W), 18 August 1970, by Gary McDonald. **Paratypes:** (1) One specimen, dissected, CASIZ 064895, 7 mm (preserved), collected intertidally, Morro Bay State Park boat basin, Morro Bay, California (35°22'N, 120°51'W), 19 July 1970 by Gary McDonald. (2) One specimen, dissected, CASIZ 064896, 13 mm (preserved), collected intertidally, Morro Bay, California (35°22'N, 120°51'W), 26 April 1985 by L. L. Bud Laurent.

**Distribution:** Specimens are known from Piedras Blancas, northern San Luis Obispo County, to the southern portion of Morro Bay, San Luis Obispo County, California.

**Etymology:** The specific epithet, *rolleri*, is chosen to acknowledge the contributions made by Mr. Richard A. Roller in the field of opisthobranch biology, particularly those efforts centering on Morro Bay of the central coast of California, the type locality of this species.

## Description

**External morphology:** The living animals (Figures 1, 2A) may reach 15 mm in length. The body is dorsoventrally flattened and elongate. The foot is very wide, approximately twice the width of the notum, and tapers posteriorly to a rounded tail. The rhinophores are simple, smooth, and tapering. The oral tentacles are moderately long, ta-





Figure 1

*Cuthona rolleri* Behrens & Gosliner, sp. nov., specimen collected November 1977 from Piedras Blancas, California, by David Laur. Photograph by Gary McDonald.

pering to a blunt end. Medially the oral tentacles are connected, forming an oral veil. The foot corners are rounded. The cerata are very long and flattened antero-posteriorly. Each ceras contains a small but distinct cnidosac at its apex. The cerata are arranged in five widely separated dorsolateral groups, set on slight elevations. The cerata are held nearly horizontal to the body and are closely appressed to the substrate. The cerata of the pre-pericardial group are arranged in six simple rows per side, while the posterior groups are in four simple rows per side (Figure 2). The ceratal formula of the specimen collected on 26 April 1985 is: I-2, II-2, III-4, IV-4, V-5, VI-5 (pre-pericardial) and VII-5, VIII-5, IX-4, X-3 (post-pericardial). The anus is acleioproctic, located on the right side of the body, immediately anterior to the most dorsal ceras of the first row of the right posterior digestive branch (Figure 2B). The nephroproct is located immediately dorsal to the anus on the anal papilla (Figure 2B). The gonopores are located on the right side of the body, ventral to the anterior first ceratal group.

The ground color of the body is white. The golden jaws

and white central nervous system are readily visible in the head. The ceratal cores are salmon pink. The tips of the cerata are frosted white. There are very fine brown specks scattered over the surface of each ceras. In one specimen there was a single row of subcutaneous reddish spots between the ceratal insertions and the foot margin, from the anterior ceratal group to the tail.

**Digestive system:** The buccal mass is thick and muscular. The thick oval jaws (Figure 3A) are gold in color. Their masticatory border is long and arched, bearing a single row of 26–32 tall, bifurcate denticles (Figure 3B). In one specimen, the denticles appeared bristled. The radular formula is  $23-31 \times 0.1-0$ . The radular teeth (Figures 3C, D) are thin and elongate with a deep arch. On either side of the prominent, triangular central cusp are five to seven denticles.

**Reproductive system:** The reproductive system (Figure 4) is androdiaulic. The ovotestis consists of numerous hermaphroditic units, with a large central male acinus and about 10 smaller, peripheral female acini. From the ovo-



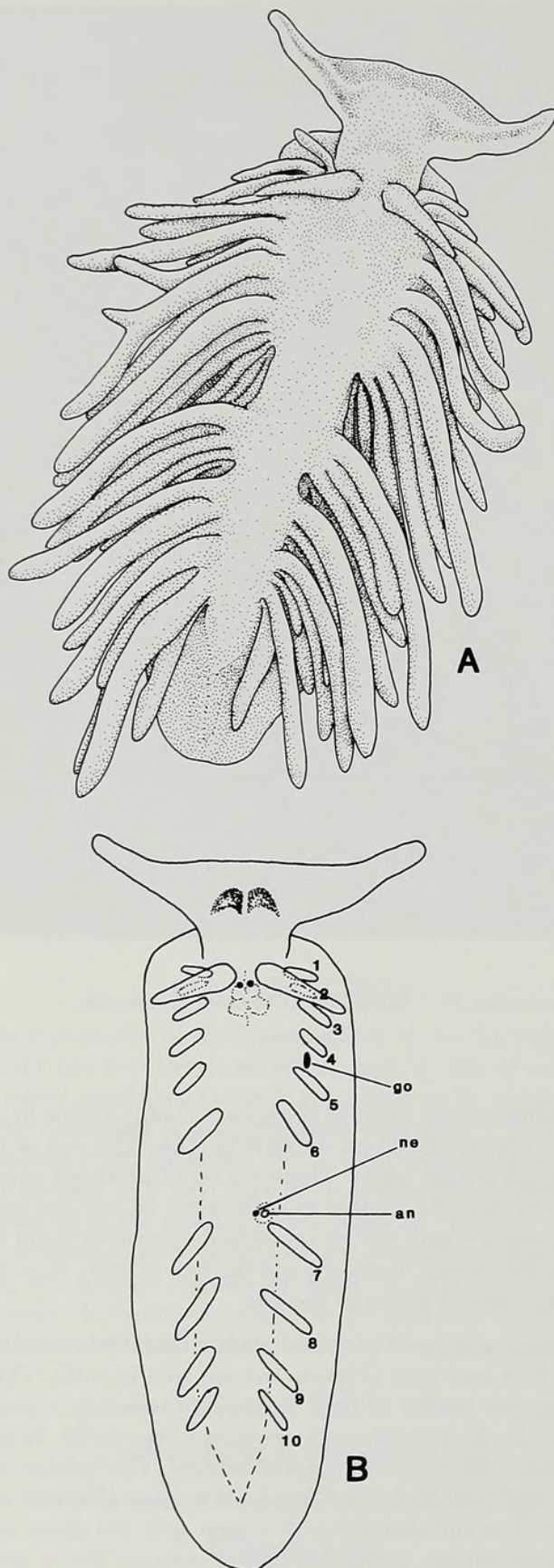


Figure 2

*Cuthona rolleri*, sp. nov. A. Living animal drawn by Bruce Stuart, from color transparency. B. Dorsal view. Key: an, anus; go, genital orifice; ne, nephroproct; numbers designate ceratal groups.

testis, a narrow preampullary duct expands into a large saccate ampulla. The distal end of the ampulla bifurcates into the short oviduct and the longer vas deferens. The oviduct enters the female gland mass near the junction of albumen and membrane glands with the larger mucous gland. The vas deferens is narrow and does not appear prostatic. It enters the base of the penis. A spherical penial gland is present distal to the base of the penial papilla. The papilla is conical and unarmed, devoid of any chitinous stylet. A small, spherical receptaculum seminis joins the female gland mass, by means of a short stalk.

**Natural history:** Except for a specimen collected at Piedras Blancas, California, November 1977, by David Laur, all specimens were from shallow tidal pools on mud flats. The specimen collected on 16 August 1970 was found together with the burrowing cephalaspidean, *Acteocina inculta* (Gould, 1885) (Gary McDonald, personal communication). The broad head, wide foot, and flattened cerata appear to be adaptations for burrowing.

**Discussion:** Although the present species is aberrant in its external morphology, having a dorsoventrally flattened body and a broad oral veil, its internal characteristics closely resemble other members of the Tergipedidae. *Cuthona rolleri* has a uniseriate radula, acleiproctic anus, central male and peripheral female acini in the ovotestis, a penis with a rounded penial gland, and a receptaculum seminis situated proximally to the gonopore. All of these features clearly indicate that the present species is properly placed within the Tergipedidae.

Generic divisions within the Tergipedidae have been reviewed by MILLER (1977), WILLIAMS & GOSLINER (1979), BROWN (1980), and MILLEN (1986). There is not universal agreement as to which genera are distinct, particularly relative to the genus *Catriona*. MILLER (1977) and BROWN (1980) considered *Catriona* Winkworth, 1941, as a junior synonym of *Cuthona* Alder & Hancock, 1855, while WILLIAMS & GOSLINER (1979), GOSLINER & GRIFFITHS (1981), EDMUNDS & JUST (1983), and BEHRENS (1984) maintain the distinctness of *Catriona*. MILLER (1977) placed several tergipedid genera in synonymy with *Cuthona*, and WILLIAMS & GOSLINER (1979) united *Precuthona* and *Cuthona* since it was determined that the type species of both genera are in fact synonymous. Most recently, MILLEN (1986) demonstrated that there is no distinct morphological gap between *Cuthonella* Bergh, 1884, and *Cuthona*. She also discussed primitive features within *Cuthona*. *Cuthona rolleri* is primitive in that it lacks a penial stylet and has a broad foot, but is modified in all other aspects of its morphology. It has simple rather than divided ceratal rows, a penial gland at the base of the penis rather than on the vas deferens, and a receptaculum seminis but no bursa copularis.

*Cuthona rolleri*, based on several aspects of its morphology, is placed within the genus *Cuthona*. Members of several tergipedid genera, *Phestilla* Bergh, 1874, *Tergipes*



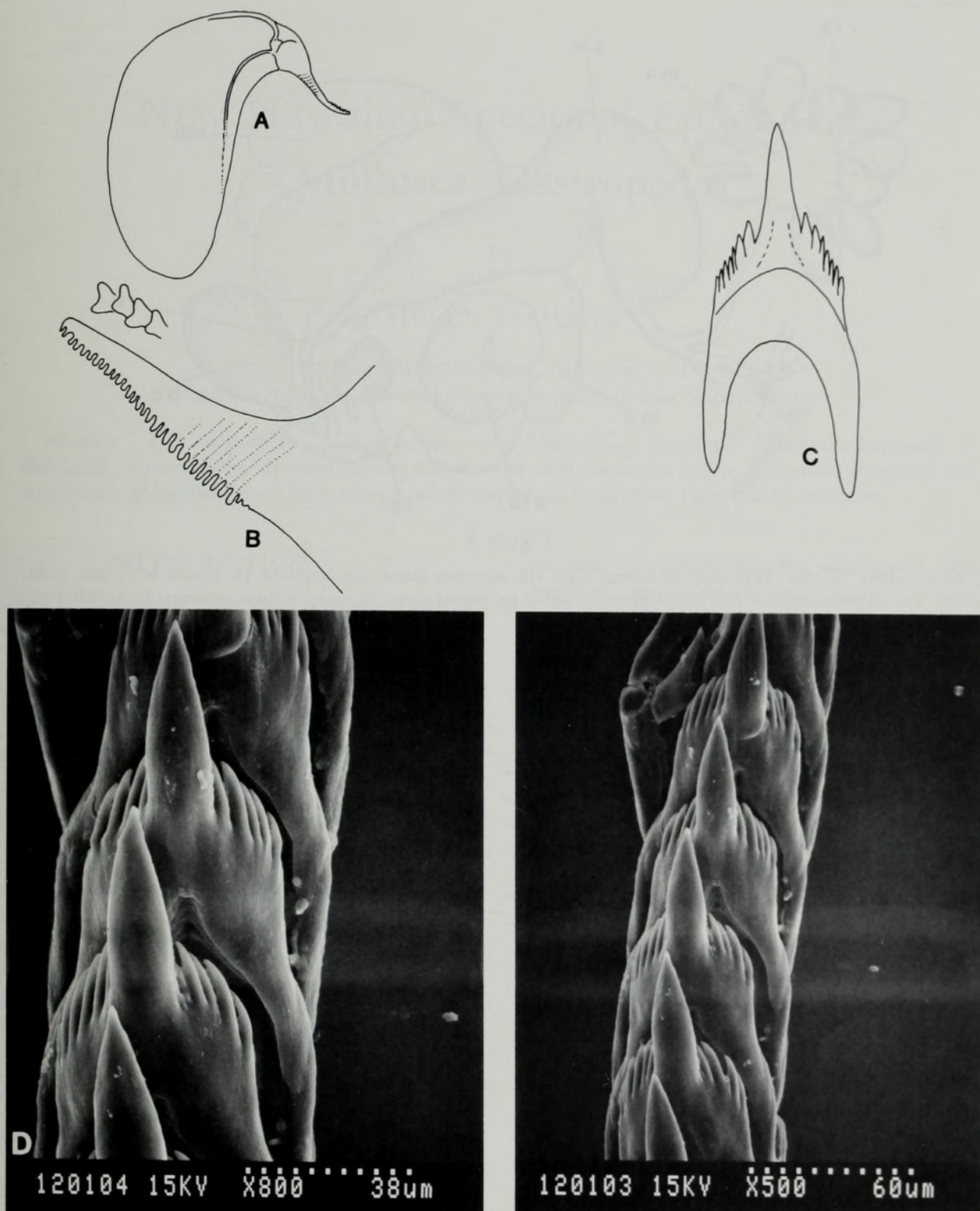


Figure 3

*Cuthona rolleri*, sp. nov. A. Jaw. B. Masticatory edge. C. Radular tooth. D. Scanning electron micrographs of radula.

Cuvier, 1805, *Tenellia* A. Costa, 1866, and *Catriona* Winkworth, 1941, bear some resemblance to *C. rolleri*. Though similar in body form, species of *Phestilla* lack cnidosacs, have radular teeth with elongate denticles, and are specialized predators on scleractinean corals. Species of *Ter-*

*gipes* have only a single ceras per ceratal branch. Members of the genus *Tenellia* entirely lack oral tentacles. Without exception, members of *Catriona* have pre-radular teeth which are absent in *C. rolleri*. All species of these genera, except *Catriona rickettsi* Behrens, 1984, and the species



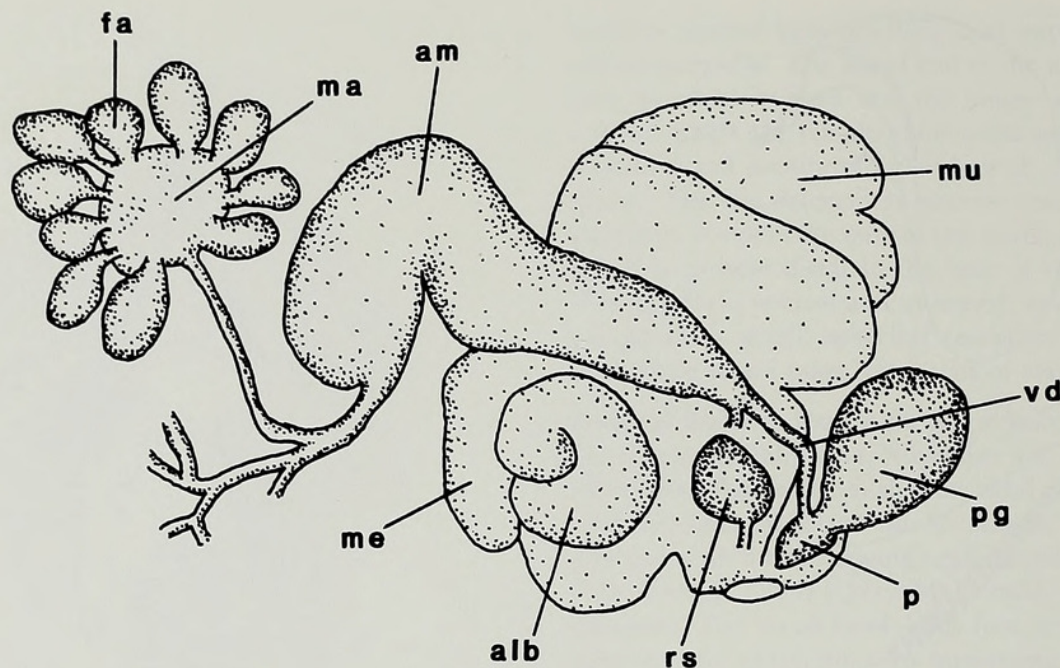


Figure 4

*Cuthona rolleri*, sp. nov. Reproductive system. Key: alb, albumen gland; am, ampulla; fa, female acini; ma, male acinus; me, membrane gland; mu, mucus gland; p, penis; pg, penial gland; rs, receptaculum seminis; vd, vas deferens.

described by MILLER (1977) as *Catriona alpha* (Baba & Hamatani, 1963) possess a penial stylet, while *C. rolleri* has an unarmed penis.

*Cuthona rolleri* can be clearly differentiated from all other described members of the genus, based on its unique dorsoventrally flattened body form, partially united cephalic tentacles, and cerata somewhat elevated on peduncles. Several other northeastern Pacific species of *Cuthona* have a broad foot and lack a penial stylet. However, they also possess other morphological characteristics not present in *C. rolleri*. *Cuthona concinna* (Alder & Hancock, 1842) and *C. punicea* Millen, 1986, have a penial gland that inserts on the vas deferens rather than at the base of the penis. *Cuthona nana* (Alder & Hancock, 1842) and *C. divae* (Marcus, 1961) have compound, divided ceratal rows (WILLIAMS & GOSLINER, 1979; BROWN, 1980) when fully mature. *Cuthona cocochroma* Williams & Gosliner, 1979, is more narrow and elongate than *C. rolleri*. It also has angular foot corners rather than the rounded anterior margin of the foot that is present in *C. rolleri*.

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