

Pontomyia Edwards (Diptera: Chironomidae), a Member of the Coral Reef Community at Carrie Bow Cay, Belize

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ABSTRACT

The occurrence of the genus *Pontomyia* (Chironomidae, Tanytarsini) in the Caribbean Sea is reported for the first time. Larvae were found around Carrie Bow Cay, Belize, in the lagoon, on the reef flat, on the fore reef and along the fore-reef slope to a depth of 25–30 m (maximum sampling depth). Distribution of larvae indicates that *Pontomyia* is a true member of the off-shore benthic community. Pupal skins and females closely resembling those of *P. natans* Edwards, 1926, were common in plankton samples. Species identification is not possible, however, because no males were found.

Introduction

Previous studies have reported species of the genus *Pontomyia* from only Pacific locations. It was first found in Samoa by Buxton (1926), whose collection was described by Edwards (1926). Characteristic features of the genus are larvae that morphologically resemble normal Tanytarsini larvae, a highly specialized adult male, and a completely reduced female that lacks all appendices on head and thorax except inoperative stumps of the second and third pairs of legs. Buxton (1926) reported that the species he studied, *P. natans*, spends its entire life-cycle under water, that males swim with their legs, and that females do not leave their pupal housings.

Another species, *Pontomyia pacifica*, was described from Japan by Tokunaga (1932), whose detailed field observations and laboratory experiments revealed that males of *P. pacifica* are unable to swim. They are true surface gliders propelled by their wing activity. Like the males, females emerge on the water surface, where they await copulation with a male passing by.

Recently, Hashimoto (1959) showed that the biology of *Pontomyia natans* is very similar to that of *P. pacifica* in that adults are confined to the surface and are unable to copulate while submerged. Flying males of *P. natans* have been reported from the Red Sea and from northeast Australia (Thienemann, 1974).

Larvae of *Pontomyia* have been found in association with various algae and in sandy mud below plant beds (Tokunaga, 1932; Hashimoto, 1959). All marine chironomid species are reported to be restricted to the intertidal zone; only *P. natans* has been found below the extreme low water level (Hashimoto, 1976), but always near the shore (Hashimoto, 1962). This author concluded that "in site of the excellent adaptation to the open sea, the territories of *Clunio* and *Pontomyia* are confined to the coast" (1962:241).

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Study Area and Methods

Sampling for this study took place in May 1977 around Carrie Bow Cay (16°48'N, 88°05'W) a small island on the Caribbean barrier reef off Belize (Rützler and Macintyre, herein: 9). Benthic samples (Figure 168) were taken in the *Thalassia* stands between patch reefs in the lagoon, and from sand substrates on the fore reef, including sand trough and fore-reef slope, to a depth of about 25–30 meters. All samples were qualitative; two to three liters of sediments were brought to the laboratory in a plastic bag and subsequently were well mixed with sea water in a bucket. After a few hours, the bottom layers in the bucket became anoxic, and chironomid larvae swam to the surface and were collected. Chironomid larvae were also present in four semiquantitative samples taken on the reef flat by K. Rützler in April–May 1974.

Seventy-one quantitative plankton tows (250 μm mesh size, water depth of 0–0.5 and 2.5–3.0 m) were taken by J. D. Ferraris (herein: 143) parallel to the reef, in the lagoon and outside the

fore-reef slope, and during different lunar and tidal phases, in April–May 1976 (Figure 168). Nets were towed horizontal distances that varied from 200 to 552 m, and the volume of water filtered per tow ranged from 13.2 to 36.4 m^3 .

Results and Discussion

Out of 13 large benthic samples, 11 contained chironomid larvae and a few females (Figure 169). Chironomids were absent only in one sample of coarse sand from inside of a patch reef and in one sample of detached *Thalassia* seagrass leaves. The positive samples included muddy sands—with and without *Thalassia*—from the lagoon (2–5 m deep), coral rubble from the reef flat (0.5 m), and fine sands from the fore reef (3–23 m) and along the reef drop-off (12–30 m) (Figure 168). Although the abundance of larvae is rather low everywhere, it is slightly higher in the lagoon. In the semiquantitative reef-flat samples densities range from about 10 to 150 larvae/ m^2 and are comparable to plankton samples having maximum counts of 2.2 pupal skins/ m^3 in the lagoon

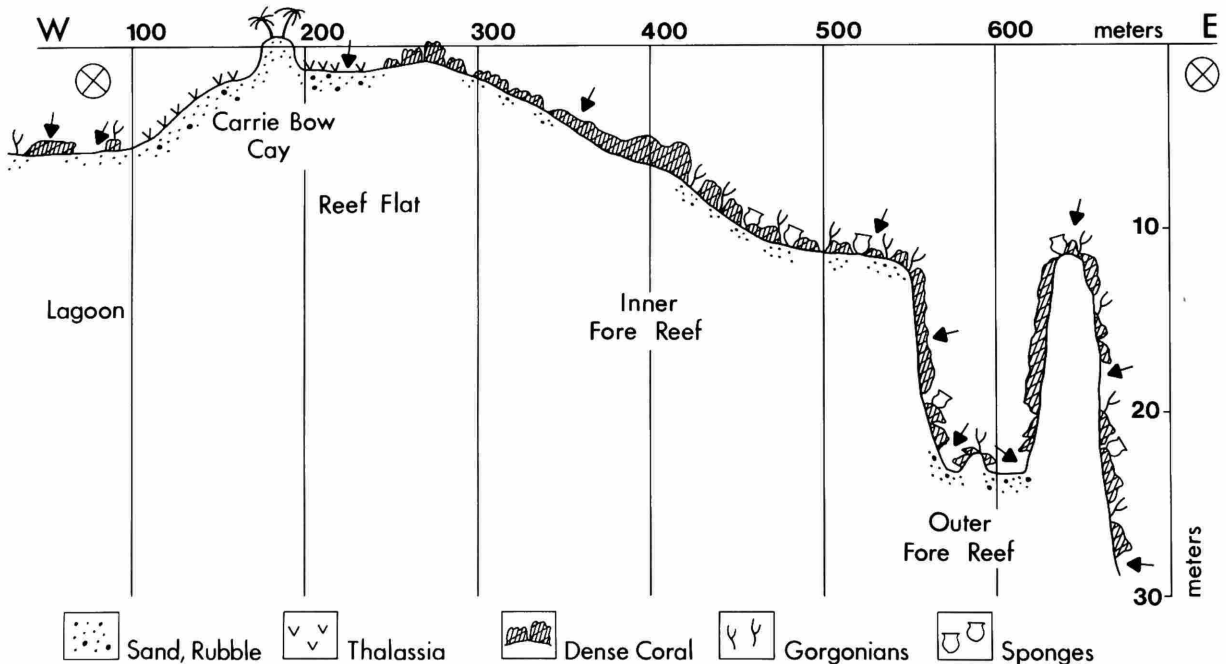


FIGURE 168.—Transect across Belizean barrier reef near Carrie Bow Cay indicating sample locations (circle = plankton tow, arrow = benthic sample).

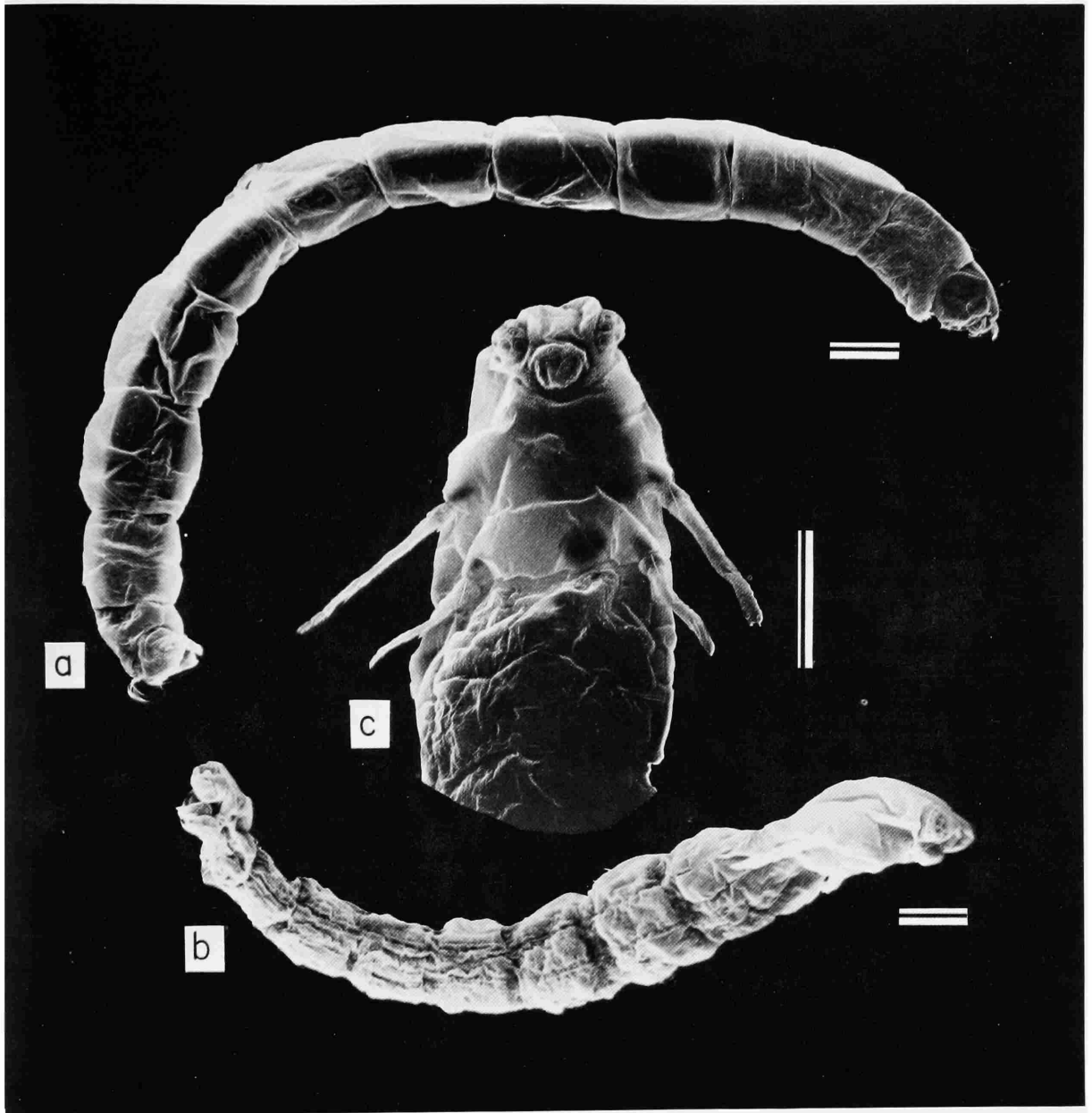


FIGURE 169.—*Pontomyia* sp., scanning electron micrographs: *a*, larva, fourth instar; *b*, female, vermiform body somewhat shrunken; *c*, front end of female, with eyes and first two pairs of legs largely reduced, mouthparts, wings, and last pair of legs absent (scales = 200 μm).

and $0.4/\text{m}^3$ along the drop-off. The wide distribution of *Pontomyia* sp. around Carrie Bow Cay and its occurrence in relatively deep waters clearly indicates—contrary to earlier reports—

that this chironomid species is a member of the marine offshore benthic community.

The occurrence in the samples of all developmental stages at the same time suggests continu-

ous reproduction. Analysis of 273 specimens indicated the absence of males, which in such a large sample points to a parthenogenetic population—a characteristic previously unknown for members of the genus *Pontomyia*.

Thirty-four plankton samples contained skins of chironomid pupae and a few partly macerated females. Considerably more pupal skins were present in planktonic samples from the lagoon than in samples from the outer fore-reef ($t = 3.882$, $d.f. = 34$ for 0.0–0.5 m depth; and $t = 4.772$, $d.f. = 33$ for 2.5–3.0 m depth, respectively). These results support the findings drawn from the qualitative benthic samples. A correlation with moon phases and tide could not be established. A distinct relationship, however, exists between the abundance of exuviae and the diurnal cycle: pupal-skin density is significantly higher in samples taken between 1800 and 2400 h compared to samples taken at all other 6-hour intervals ($t = 3.803$ – 4.786 , $d.f. = 29$ – 37 , for all samples taken together). Surface tows (0–0.5 m) yielded more chironomids at all times of day than did tows from depths of 2.5 to 3.0 m (lagoon: $t = 1.883$, $d.f. = 37$; off fore-reef slope: $t = 4.999$, $d.f. = 30$). The specific gravity of the pupal skins may well be the reason for these differences.

Of the four species described for the genus *Pontomyia*, *P. cottoni* Womersley (1937) was thought to be a junior synonym of *P. natans* Edwards (Hashimoto, 1959). In a recently pub-

lished paper (Cheng and Hashimoto, 1978), the species *P. cottoni* is listed, yet without further taxonomic comments. Morphological differences between *P. cottoni* and *P. natans* are still considered of doubtful value (Hashimoto, 1973) but from an ecological point of view *P. cottoni* could be separated as a dweller of rather shallow water and tide pools (H. Hashimoto, pers. comm., 1979). The remaining three species are *P. natans* Edwards (1926), *P. pacifica* Tokunaga (1932), and *P. oceana* Tokunaga (1964). Immature stages and females, in addition to the males, are described for *P. pacifica* and *P. natans*. The larvae described for *P. natans* may not belong to *Pontomyia* at all, but to some other species of the Tanytarsini group (Tokunaga, 1932).

This is the first observation of a *Pontomyia* species outside the Indo-Pacific region. Confident specific identification of the present material (larvae, pupal skins, a few females) is not possible because chironomid taxonomy is based on the morphology of the adult male which has not yet been found in the Caribbean population. The presence of four joints on the female leg excludes *Pontomyia oceana* and *P. pacifica*, although the larval antennae resembles the latter species more than the remaining *P. natans*. If we are dealing with a new species it is probably most closely related to *P. natans*. The taxonomic status of *P. cottoni* might require further collection and reevaluation.

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