毛顎類 Spadella angulata の体色パターンおよび北限記録について

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短　　報
(Notes)

Colour Pattern of *Spadella angulata* (Chaetognatha: Spadellidae) with a Note on Its Northern Range Extension[1), 2)]

A single specimen of *Spadella angulata* Tokioka was collected off the Otsuchi Marine Research Center, Iwate Prefecture (39.4°N, 142.9°E) on October 27, 1986 when a Norpac plankton net (0.33 mm in mesh-opening) struck bottom for a few seconds. The water depth was approximately 70 meters, and the sediment in the net was sand and silt—any clay, if present, was washed out during the retrieval of the net. The specimen is immature at 3.5 mm length, and the living animal was observed within one hour after it was collected. Because the colour pattern is different from that reported by TOKIOKA & BIERI (1966) for this species, we wish to report our observations. In addition to this single specimen, we have examined more than a hundred preserved specimens of *Spadella angulata* collected from *Ulva pertusa* at about four meters off the Misaki Marine Biological Station, Kanagawa Prefecture (35.1°N, 139.7°E), however we made our observations after all possible pigment had faded. These specimens do show that *S. angulata* also occurs in shallow water.

First, the eyes of the Otsuchi specimen were a brilliant, almost luminescent, emerald green. This agrees with the original description by BIERI (1974) of *Spadella bradshawi* from the eastern North Pacific, but not with that of TOKIOKA & BIERI (1966) in which the specimens were examined shortly after preservation in formalin. Although many scientists have studied *Spadella* alive, recently for example, GHIRARDELLI (1968), FEIGENBAUM & REEVE (1977), and GOTO & YOSHIDA (1985), this striking colour has not been reported in other species. Perhaps they saw this colour but did not think it worthy of mention.

The tail segment was creamy white. The trunk had six chestnut coloured spots on each side extending from the neck to the transverse septum. To see these clearly the specimen had to be turned on its sides. On the dorsal surface there were two chestnut coloured spots just posterior to the neck septum closer together than the eyes. There was a large, chestnut coloured spot at the neck on the ventral side. This was not seen by TOKIOKA & BIERI (1966). Two chestnut coloured bands across the trunk on the ventral side at either end of the ventral ganglion did not reach to the sides of the body. Not reported by TOKIOKA & BIERI (1966), this is similar to the colour pattern reported by BIERI (1974) for *Spadella bradshawi*. The posterior quarter of the gut was bright yellow when alive and roughly corresponds to the yellowish-orange colour reported in the freshly preserved specimen of TOKIOKA & BIERI (1966). This colour had completely disappeared two days after preservation in formalin. However, two red-brown stripes not previously visible were observod inside the gut extending from the transverse septum two-thirds of the way to the head as well as a pale brown spot on the right side just anterior to the transverse septum. A pale orange exudate extended about a millimeter from the anus.

The transitory character of the pigmentation of *Spadella angulata* reported here and by TOKIOKA & BIERI (1966) and in *Spadella bradshawi* by BIERI (1974) stands in sharp contrast to the slowly fading orange carotenoid pigment of the bathyal chaetognaths such as *Eukrohnia fowleri* Ritter-Zahony and *Caecosagitta macrocephala* (Fowler) (TERAZAKI et al. 1977); these species often retain considerable pigmentation for several years after preservation in formalin. The colour and lability of the pigmentation in *Spadella* suggests a possible melanin-like pigment rather than the carotenoid pigment found in *Eukrohnia* and *Caecosagitta*. The highly labile nature of the pigment is further shown by the fact that the orange-brown rings on the tail segment illustrated in TOKIOKA & BIERI (1966) were three to four times wider when first seen by BIERI than when drawn by TOKIOKA four or five hours later. It seems quite possible that the pigmentation pattern in *Spadella* can change rapidly to adapt to different environmental conditions including biotic and diurnal changes. However, no direct evidence of this is yet available.

Four features then stand out from these brief observations. First, *Spadella angulata* lives all the way north along the Japanese coast to at least latitude 39.4 degrees. Second, it must be a rather abundant species even in the depth range of 50 to 70 meters

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because plankton nets are quite inefficient tools for collecting spadellid arrowworms. Third, the colour pattern of the species apparently varies with the developmental stage becoming more complex and more widespread with increased maturation. Fourth, the pigment is highly labile and may change also in response to different environmental conditions.

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