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Part 1

A new form of *Sagitta bedoti* Beraneck found in the littoral waters near Penang

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INTRODUCTION

SIXTY SMALL SPECIMENS of a chaetognath less than 8.5 mm. in body length were collected at three stations near Penang very close inshore, depth 6 to 8 metres, and in waters of low salinity of between 23.0 and 27.0 parts per thousand. Forty-three specimens were examined closely by the junior author, while the other seventeen specimens were sent to and examined by the senior author in Japan. These are now believed to be a form of *S. bedoti* Beraneck which is as yet undescribed.

DESCRIPTION

Sagitta bedoti forma *littoralis* nov.

Figure 1.

The maximum size of the specimens obtained lay in the range 8.0–8.5 mm. total length with tail fin. The body looks rather transparent in larger individuals, but somewhat opaque in the smaller. The trunk is widest in the middle third and narrows gradually towards the anterior, and just before the juncture between trunk and head there is a slight constriction. There is an insignificant constriction at the tail septum as it passes into the tail segment. The anterior fin begins on the ventral ganglion near its posterior end, is widest posteriorly and narrows gradually anteriorly. It is as wide as the posterior fin and with a narrow rayless zone along the base in the anterior half. The posterior fin begins 3 to 5 per cent of total length with tail fin, from the posterior end of the anterior fin, is widest below the tail septum with 43 to 46 per cent of the fin above it. A narrow rayless zone is found around the seminal receptacle. The tail fin is rather high. The fully mature seminal vesicle was observed only on one specimen, 7.4 mm. in total length with tail fin; it is elongate, slender, with a slight thickening of the vesicle wall near the anterolateral corner. It is in contact with both posterior and anterior tail fins. The ovary is short and does not reach the anterior end of the posterior fin. The collarette is short, stretching behind the neck for a distance equivalent to the head length, and varies from fairly wide to wide. The corona ciliata is long, slightly sinous, begins above the eyes and extends about two-thirds the distance between neck (juncture of head and trunk) and ventral ganglion. Usually five large sensory patches are found along each lateral side of the corona. The outline of eye-pigment is roundish and rather small, and the distance between the eyes is comparatively large, being approximately one third the breadth of the head at that level. Intestinal diverticula are absent. Hooks usually 8–9, but may be 7 in larger individuals. Anterior teeth up to 10 and posterior teeth up to 21 in larger individuals. Rows of anterior teeth meet each other at an acute angle.

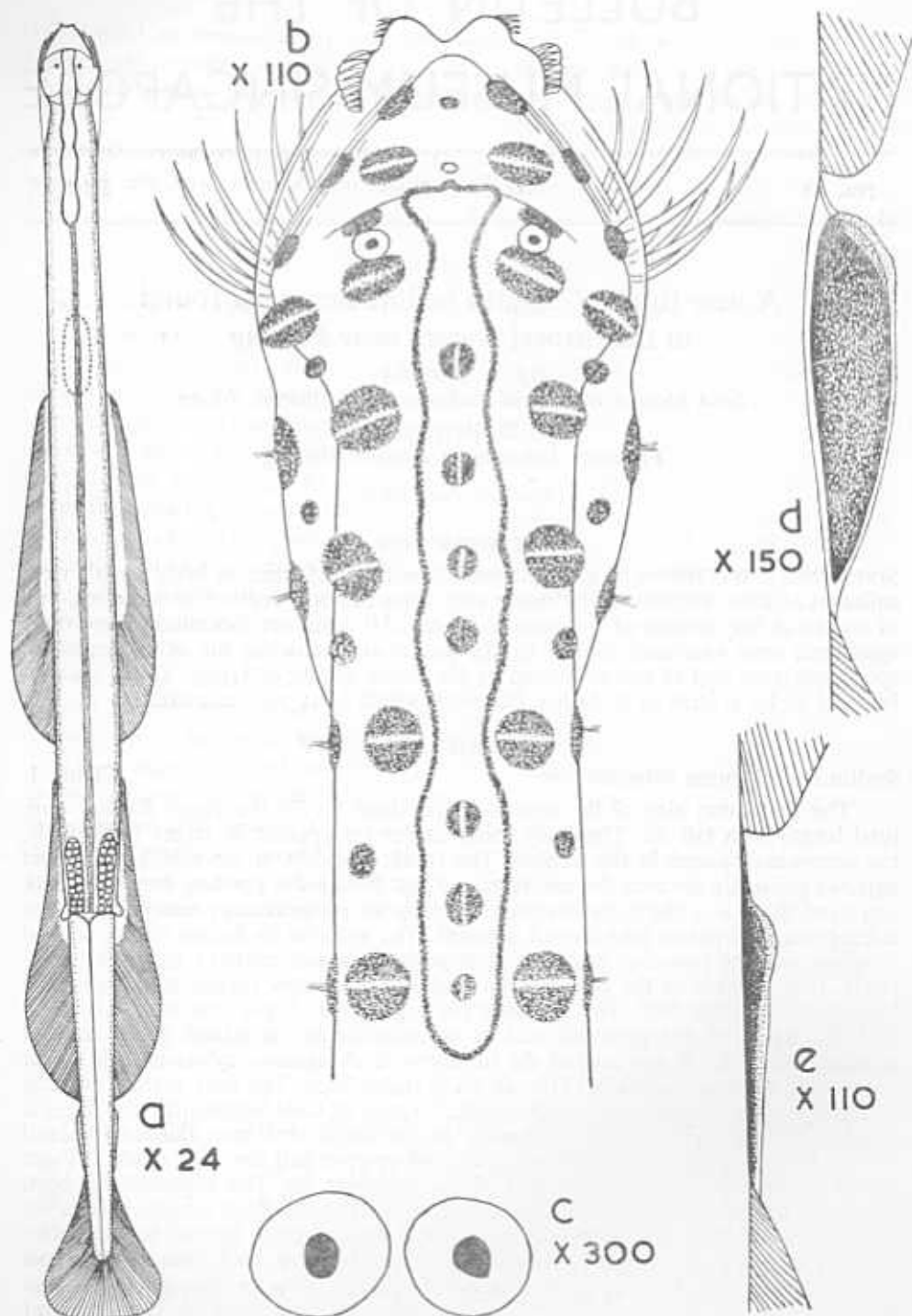


Figure 1. *Sagitta bedoti* forma *littoralis* nov. (a) Whole animal, dorsal view, X 24. (b) Anterior part of body, dorsal view, X 110. (c) Eye pigment, X 300. (d) Mature seminal vesicle, dorsal view, X 150. (e) Immature seminal vesicle, dorsal view, X 110.

It is not impossible that *S. tenuis* described from Indian waters by John (1933) is identical with the present specimens, and any comparison between the present specimens and *S. bedoti* reported from the highly protected waters along the Indian coast is left for future studies.

Syntypes are deposited in the Seto Marine Biological Laboratory, Sirahama, Japan, the Fisheries Laboratories at Glugor, Penang, Malaya, and the National Museum, Singapore.

DISCUSSION

Results of the respective examinations made by the authors (Tables 1 & 2) conform very well to each other, and the armature formulae given in the two tables resemble on one hand those of *Sagitta tenuis* Conant and on the other hand those of *Sagitta bedoti* forma *minor* Tokioka. The superficial similarity of the general body appearance and structure between the present specimens and *S. tenuis* and the exact coincidence of their armature formulae first led us to the conclusion that the specimens might be identical with *S. tenuis* or represent a form of that species. However, more crucial examinations revealed some important differences between these two. Unlike *S. tenuis* the anterior fin in the present specimens is not shorter than the posterior fin, but is as long as or slightly longer than the posterior. Moreover, both anterior and posterior fins are provided each with a rayless zone that has never been observed in *S. tenuis*. The TC-value (the length of the frontal half of posterior fin anterior to the trunk-tail septum/the length of the rear half of posterior fin posterior to the septum $\times 100$) is much larger in the present specimens than in *S. tenuis*, excepting a single case of the 6.7 mm. long individual with mature ovaries (Table 2). There is not the slightest difference in the appearance of the immature seminal vesicle between these two, but in a single individual of the present specimens which had matured seminal vesicles, the vesicles assume an appearance quite different from that possessed by *S. tenuis*. In a similar stage of maturity, the vesicle of *S. tenuis* has a distinct "head" portion very easily discernible, while in the present specimens any "head" portion is not formed clearly, although there is a insignificant glandular thickening near the antero-lateral corner.

TABLE 1

The data on 43 specimens. Figures within brackets denote the number of species not measured for anterior and posterior fin lengths. Lengths expressed as percentage of total length with fin.

| No. of Specimens | Total length in mm. | Tail length % | Anterior fin % | Posterior fin % | Hooks | Anterior teeth | Posterior teeth |
|------------------|---------------------|---------------|----------------|-----------------|-------|----------------|-----------------|
| 6 (3) | 4.0-4.5 | 28-31 | 24-25 | 23-25 | 8-9 | 4-5 | 7-10 |
| 1 | 4.5-5.0 | 29 | 27 | 24 | 8-8 | 5-5 | 10-10 |
| (3) | 5.0-5.5 | 27-29 | — | — | 8-9 | 5-6 | 10-12 |
| 6 (3) | 5.5-6.0 | 28-30 | 26-27 | 24-25 | 8-9 | 5-6 | 10-12 |
| 7 (3) | 6.0-6.5 | 28-29 | 25-27 | 24-26 | 8-9 | 6-8 | 11-16 |
| 7 (3) | 6.5-7.0 | 27-31 | 26-28 | 23-25 | 8-9 | 5-8 | 12-15 |
| 5 (1) | 7.0-7.5 | 28-31 | 27-28 | 24-26 | 8-8 | 7-10 | 14-19 |
| 4 (1) | 7.5-8.0 | 29-30 | 26-27 | 24-25 | 8-8 | 7-10 | 15-18 |
| 4 | 8.0-8.5 | 28-31 | 26-28 | 24-25 | 7-8 | 8-9 | 17-21 |

TABLE 2

The data on 17 specimens

| Body length in mm. | Tail length as % | Hooks | Anterior teeth | Posterior teeth | TC-value | Ovary | Seminal vesicle |
|--------------------|------------------|-------|----------------|-----------------|------------|--------------------------------------|-----------------|
| 4.0 | 31.2 | 8-9 | 4-4 | 7-8 | 82.3-86.7 | quite immature | quite immature |
| 4.3 | 30.3 | 9-9 | 4-5 | 8-8 | 79.4-95.0 | quite immature | quite immature |
| 4.3 | 28.3 | 8-9 | 5-5 | 8-8 | 94.9-100.0 | quite immature | quite immature |
| 5.1 | 27.1 | 9-9 | 6-6 | 11-11 | 89.0-93.2 | quite immature | quite immature |
| 5.3 | 28.9 | 9-9 | 6-6 | 11-12 | 84.6-87.7 | quite immature | quite immature |
| 5.4 | 29.0 | 8-8 | 5-6 | 10-11 | 93.6-98.6 | rudimentary | quite immature |
| 5.6 | 29.7 | 8-8 | 6-6 | 11-12 | 78.2-87.5 | quite immature | quite immature |
| 5.9 | 28.1 | 9-9 | 6-6 | 12-12 | 74.4-86.9 | quite immature | quite immature |
| 6.0 | 29.0 | 8-9 | 5-6 | 12-12 | 91.4-91.7 | quite immature | quite immature |
| 6.1 | 29.3 | 8-8 | 6-6 | 11-13 | 79.1-88.4 | early stage of maturity ¹ | quite immature |
| 6.1 | 28.4 | 8-8 | 6-7 | 15-16 | 83.5-87.6 | mature ¹ | quite immature |
| 6.2 | 28.9 | 8-8 | 7-7 | 14-15 | 88.2-89.1 | quite immature | quite immature |
| 6.7 | 27.3 | 8-9 | 8-8 | 14-15 | 79.2-82.5 | quite immature | quite immature |
| 6.7 | 30.5 | 9-9 | 6-7 | 12-13 | 59.1-62.6 | fully mature ² | very low |
| 6.8 | 28.7 | 8-9 | 5-6 | 13-14 | 74.3-82.3 | quite immature | quite immature |
| 7.5 | 28.5 | 8-8 | 8-10 | 17-19 | 68.3-73.3 | fully mature ² | very low |
| 7.6 | 29.1 | 8-8 | 9-10 | 16-17 | 86.7-88.3 | fully mature ² | low |

On the other hand, the presence of rayless zones in the anterior and posterior fins is a very important characteristic of *S. bedoti*. The essential structure of the seminal vesicle is quite the same in both *S. bedoti* and the present specimens. Numbers of anterior and posterior teeth of the present specimens are quite the same as those found in individuals of *S. bedoti* f. *minor* of corresponding body sizes. Only the hooks of the present specimens seem to be too numerous for *S. bedoti* f. *minor*. However, it is not strange that the hooks are more numerous in smaller individuals of the present specimens than in larger individuals of *S. bedoti* f. *minor*, as the hooks may wear out with growth in some species.

In considering the above-mentioned features altogether, we are now of the opinion that these specimens are but a form of *S. bedoti* limited to waters of a strongly neritic nature. The smaller body size, and the distinct collarette behind the neck might be accepted as characteristics of the present specimens and which distinguish them from *S. bedoti* f. *minor*. Generally, the typical form of *S. bedoti* and f. *minor* are found further offshore where the salinity is 29.5 parts per thousand or more, although their distributions are confined to the neritic water masses along the continents. For these reasons, the present specimens are named *Sagitta bedoti* forma *littoralis*.

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¹ Anterior end at the level of the middle of the anterior half of the posterior fin above the septum.

² Anterior end at or near the anterior end of the posterior fin.

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