# ON SOME PLANKTON ANIMALS COLLECTED BY THE SYUNKOTU-MARU IN MAY-JUNE 1954

## I. CHAETOGNATHA[1)]

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*With 4 Text-figures and a map*

The good fortune was bestowed on me by courtesy of Mr. H. MAÉDA of the Simonoseki College of Fisheries to examine plankton samples collected by the Syunkotu-Maru during her surveying voyage around Bikini Island in the Marshall Islands for the purpose to investigate the influences of a series of experiments of atomic or hydrogen bombs upon the water of the surrounding sea and on the pelagic fauna and flora in this area. The samples were hauled vertically from 150 m to surface by fish larva net with the mouth 1 m in diameter, at 25 stations during the period from May 21 to June 29, 1954.

Sixteen species of chaetognaths were found in these samples in the following proportion.

| Species | Individual number | Percentage |
|---|---|---|
| 1. *Sagitta hexaptera* | 1058 | 11 |
| 2. *Sagitta lyra* | 4 | |
| 3. *Sagitta enflata* | 4091 | 41 |
| 4. *Sagitta bipunctata* | 187 | 2 |
| 5. *Sagitta ferox* | 50 | 0.5 |
| 6. *Sagitta robusta* | 206 | 2 |
| 7. *Sagitta pulchra* | 1 | |
| 8. *Sagitta serratodentata pacifica* | 2586 | 26 |
| 9. *Sagitta serratodentata atlantica* f. *pseudoserratodentata* | 32 | |
| 10. *Sagitta neglecta* | 2 | |
| 11. *Sagitta regularis* | 51 | 0.5 |
| 12. *Sagitta minima* | 41 | |
| 13. *Sagitta decipiens* | 1 | |
| 14. *Pterosagitta draco* | 1265 | 13 |
| 15. *Krohnitta subtilis* | 39 | |

1) Contributions from the Seto Marine Biological Laboratory, No. 255.

| | | | |
|---|---|---|---|
| 16. | *Krohnitta pacifica* | 146 | 1 |
| 17. | Damaged individuals or juv. | 252 | 3 |
| | | 10012 | |

Occurrence of these species at each station is shown in detail in the table at the end of this article. Dominant species in the present material are *Sag. enflata*, *Sag. serratodentata pacifica*, *Pterosagitta draco* and *Sag. hexaptera*. *Sag. bipunctata* and *Sag. robusta* follow these four species, although they are much less in number. *Krohnitta pacifica*, *Sag. ferox*, *Sag. regularis* and *Krohnitta subtilis* are rather rare. And it is a noticeable fact that *Sag. bedoti* is quite absent in this material from the tropical oceanic waters of the Western Pacific.

## Distribution

*Total amount*: At stations in the South Equatorial Current, south from 3°N or thereabout, the total number of chaetognaths in each haul was much larger than at stations in the Equatorial Counter-Current and the North Equatorial Current; no clear quantitative difference was found between hauls from stations in the North Equatorial Current and those from stations in the Equatorial Counter-Current. The number of species was not proportional to the total amount. However, as each sample was not hauled accurately for the quantitative investigation, I wish hereafter to cease to refer to the total amount and go further on problems about the proportional composition of these samples.

*Proportional composition*: The proportional composition about each three of the four chief species, *Sag. enflata* (E), *Sagitta serratodentata pacifica* (S), *Pterosag. draco* (P) and *Sag. hexaptera* (H).

St. 18 is excluded from this consideration, because individuals in the sample from this station were very few in number and more or less mutilated and thus the sample at this station could not be considered to be hauled in normal condition.

1. Diagram EPS (Fig. 1). The following four points are noticeable.
   a) St. 2 is characterized by unusual predominance of S.
   b) Stations in the South Equatorial Current, south from 3°N, are located in the apical quater beyond 50 % of E.
   c) Stations in the Equatorial Counter-Current, south from 10°N or thereabout, are situated in the section upper than 40 % of E.
   d) St. 1 is ramarkable in the predominance of P.
2. Diagram EHS (Fig. 2).
   a) St. 2 is characterized by unusual predominance of S.
   b) Stations in the South Equatorial Current, south from 3°N, are situated in the quater upper than 50 % of E.
   c) E is dominant at most stations in the Equatorial Counter-Current, south from 10°N, attaining to 40–50 %, but here H increases gradually. The increase of H is considerable at stations north from 8°N.

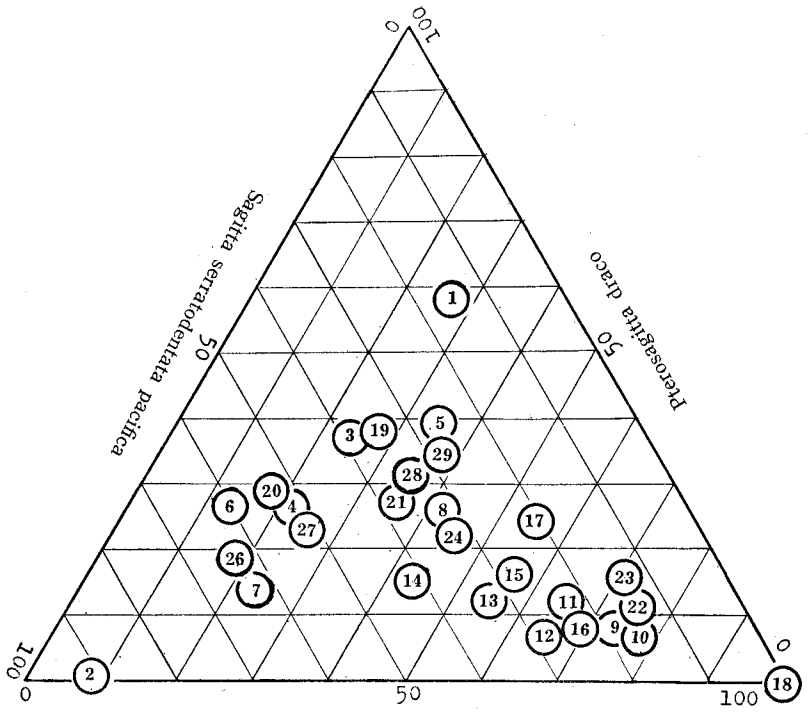



Fig. 1. Distribution of stations shown by the percentages of *Sag. enflata*, *Pterosag. draco* and *Sag. serratodentata pacifica*.

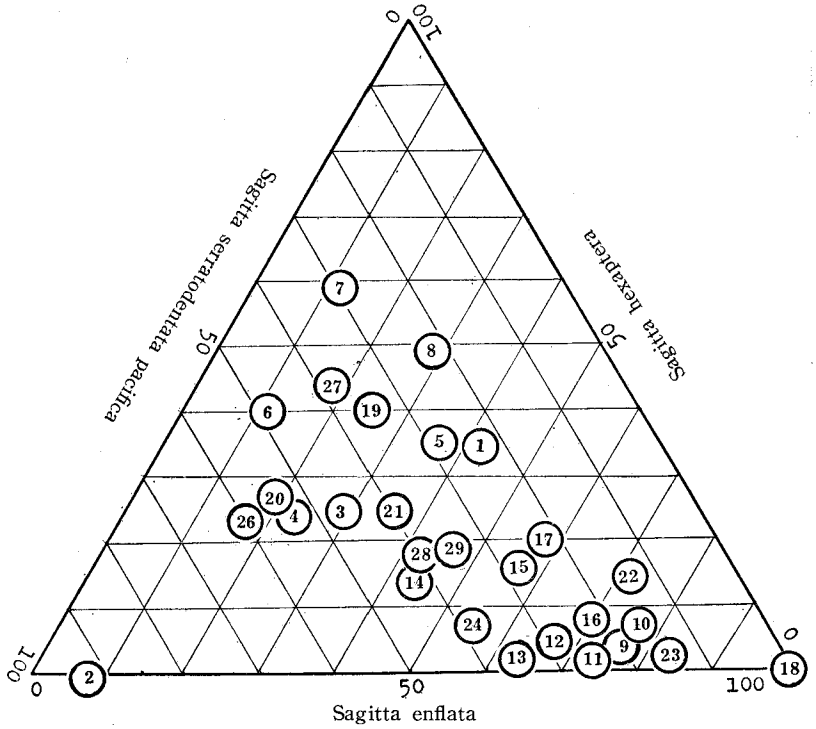



Fig. 2. Distribution of stations shown by the percentages of *Sag. enflata*, *Sag. hexaptera* and *Sag. serratodentata pacifica*.

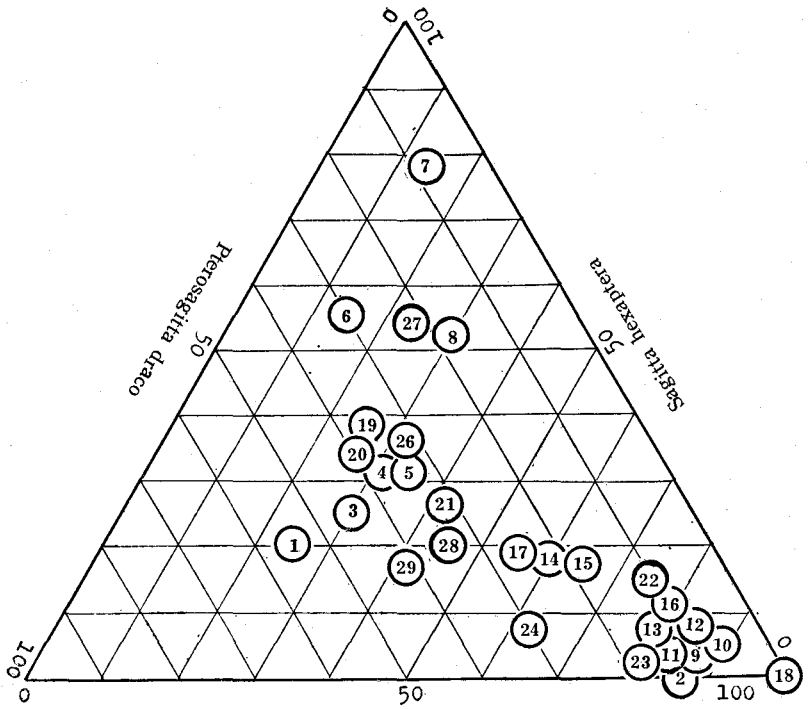



Fig. 3. Distribution of stations shown by the percentages of *Sag. enflata*, *Sag. hexaptera* and *Pterosag. draco.*

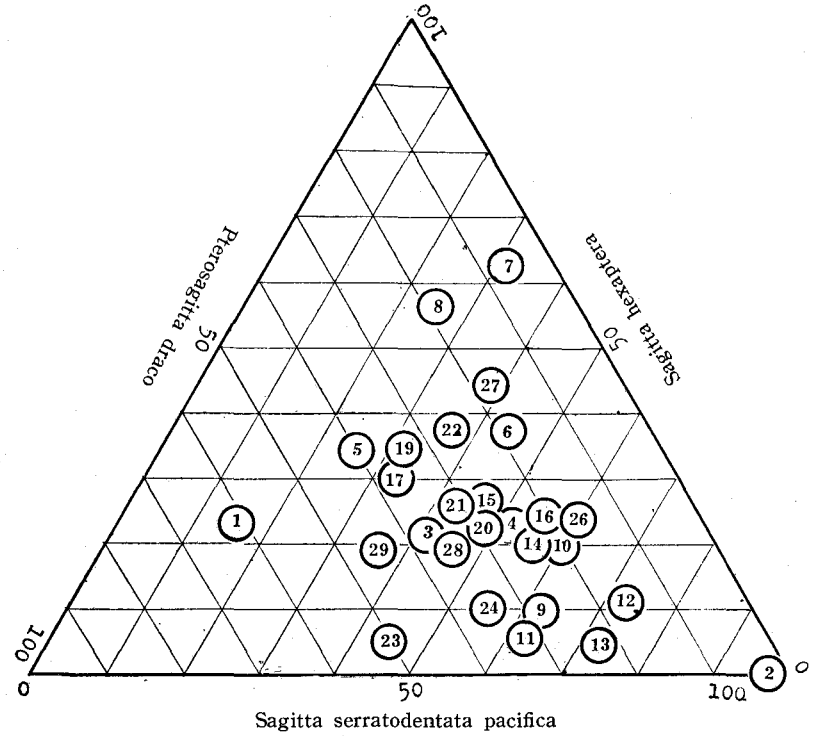



Fig. 4. Distribution of stations shown by the percentages of *Sag. serratodentata pacifica*, *Sag. hexaptera* and *Pterosag. draco.*

3. Diagram EHP (Fig. 3).
   a) E shows high values at stations south from 3°N.
   b) E is high also at stations in the Equatorial Counter-Current, mostly reaching 50 % or beyond it, but here H increases considerably, especially at stations between 8°N and 14°N.
4. Diagram SHP (Fig. 4).
   a) St. 2 is remarkable in the predominance of S.
   b) St. 1 is noticeable by abundance of P.
   c) H is very low at stations in the South Equatorial Current.
   d) H is especially high at Sts. 7 and 8.

Throughout the tendencies shown by diagrams given above, the following two features may be accepted as of the general significance.

a) The proportion of *Sag. enflata* was higher at stations in the Equatorial Counter-Current than at those in the North Equatorial Current, and especially remarkable at stations in the South Equatorial Current.
b) The proportion of *Sag. hexaptera* was low at stations in the South Equatorial Current, but increased at stations in the Equatorial Counter-Current and much more in the North Equatorial Current. The highest values were observed at Sts. 7 and 8 during the present survey.

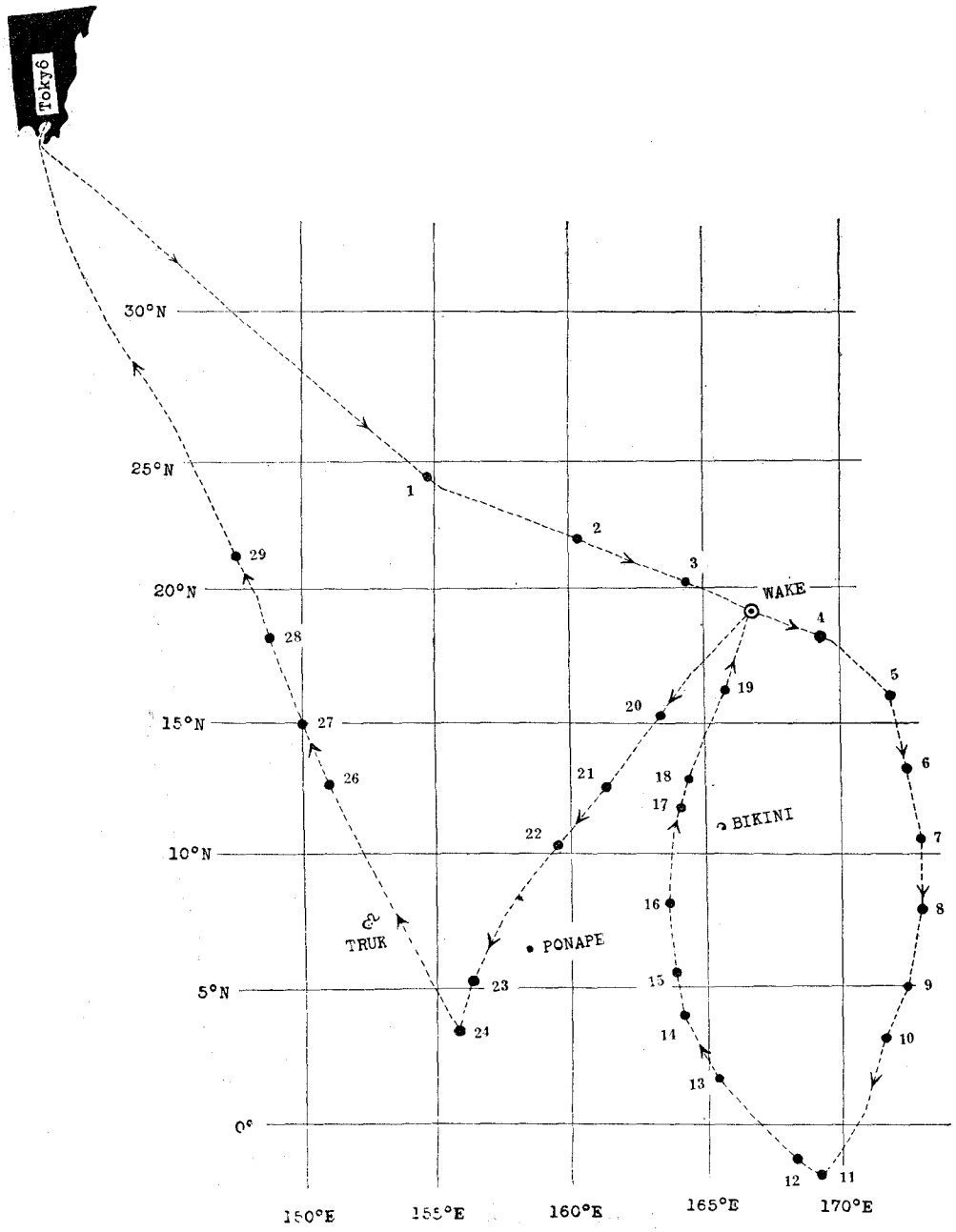
High P at St. 1 and high S at St. 2 are also evident features. These two are, however, not considered to be of the general significance, but they are merely examples of the sporadic unevenness in the distribution of these animals. The two features, above-mentioned a and b, are very evident, although it must be noticed here that there was no discontinuity-line in the distribution of *Sag. enflata* and *Sag. hexaptera* and that it is quite uncertain whether such distributions are observable constantly or merely temporarily. Besides all, the occurrence of *Sag. minima* merely at Sts. 1 and 29, both north from 21°N, seems to be a noteworthy record.

Lastly I express here my hearty thanks to Mr. H. MAÉDA for his kindness in offering me the chance to examine the present precious material.

| Station | Date | Situation | Time |
|---|---|---|---|
| 1 | 21 V | 23°58′ N<br>154°40′ E | 5.00–7.15 |
| 2 | 22 V | 21°55′ N<br>160°00′ E | 19.03–20.46 |
| 3 | 24 V | 19°53′ N<br>164°00′ E | 9.09–10.25 |
| 4 | 29 V | 18°12′ N<br>169°43′ E | 10.00–11.53 |
| 5 | 30 V | 16°02′ N<br>171°50′ E | 11.00–12.32 |
| 6 | 31 V | 13°51′ N<br>172°56′ E | 4.00–5.38 |

| Station | Date | Situation | Time |
|---|---|---|---|
| 7 | 1 VI | 10°44′ N<br>173°03′ E | 4.00–6.00 |
| 8 | 2 VI | 8°02′ N<br>173°02′ E | 3.15–4.42 |
| 9 | 3 VI | 5°03.5′ N<br>172°59′ E | 9.45–14.00 |
| 10 | 4 VI | 3°01′ N<br>171°59′ E | 4.00–12.44 |
| 11 | 6 VI | 2°21′ N<br>169°56′ E | 4.00–17.40 |
| 12 | 7 VI | 1°15′ S<br>168°05′ E | 4.00–6.00 |
| 13 | 8 VI | 1°04′ N<br>165°47′ E | 4.00–6.15 |
| 14 | 9 VI | 3°55′ N<br>163°52′ E | 4.00–11.00 |
| 15 | 10 VI | 5°44′ N<br>163°58′ E | 4.17–7.30 |
| 16 | 11 VI | 8°43′ N<br>164°01′ E | 8.00–10.05 |
| 17 | 12 VI | 10°55′ N<br>163°51′ E | 4.00–7.58 |
| 18 | 13 VI | 13°23′ N<br>164°25′ E | 8.00–10.39 |
| 19 | 14 VI | 15°57′ N<br>165°22′ E | 4.45–7.15 |
| 20 | 19 VI | 15°03′ N<br>163°15′ E | 4.00–5.55 |
| 21 | 20 VI | 12°42′ N<br>161°26′ E | 8.00–10.30 |
| 22 | 21 VI | 10°21′ N<br>159°35′ E | 7.15–9.33 |
| 23 | 23 VI | 5°03′ N<br>155°53′ E | 7.47–13.00 |
| 24 | 24 VI | 3°24.5′ N<br>155°34′ E | 8.00–10.25 |
| 26 | 27 VI | 12°00′ N<br>151°10′ E | 4.38–5.30 |
| 27 | 28 VI | 14°46′ N<br>149°56′ E | 0.20–1.22 |
| 28 | 29 VI | 18°00′ N<br>148°38.5′ E | |
| 29 | 29 VI | 21°00′ N<br>147°21′ E | 21.56–22.45 |

Station Map of the Syunkotu-Maru Survey in May—June 1951.



| Species \ Stations | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 26 | 27 | 28 | 29 | Frequency of occurrence | Mean individual number per a haul |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sagitta hexaptera* | 28 (13) | 1 | 13 (15) | 5 (17) | 45 (23) | 76 (30) | 47 (49) | 49 (34) | 11 (3) | 55 (5) | 19 (2) | 33 (4) | 30 (2) | 58 (11) | 4 (11) | 14 (6) | 32 (14) | — | 66 (27) | 122 (19) | 33 (17) | 42 (11) | 1 (1) | 8 (5) | 18 (16) | 176 (32) | 33 (12) | 39 (9) | 27/28 | 39 |
| *Sagitta lyra* | 4 (2) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1/28 | 4 |
| *Sagitta enflata* | 35 (16) | 21 (6) | 15 (18) | 5 (17) | 48 (24) | 19 (8) | 9 (9) | 30 (20) | 245 (69) | 683 (68) | 504 (58) | 548 (58) | 718 (54) | 180 (35) | 14 (38) | 118 (54) | 91 (41) | 8 (66) | 41 (17) | 100 (15) | 47 (25 | 235 59) | 61 (51) | 56 (38) | 14 (13) | 75 (14) | 78 (28) | 93 (21) | 28/28 | 146 |
| *Sagitta bipunctata* | 18 (8) | 44 (13) | — | 2 (7) | 7 (4) | 9 (4) | 4 (5) | 17 (12) | 1 | — | 3 | 2 | 2 | 4 (1) | — | 4 (2) | 3 (1) | 2 (17) | 8 (3) | 3 | 5 (3) | 6 (2) | 3 (3) | — | 5 (5) | 25 (4) | 6 (2) | 4 (1) | 24/28 | 8 |
| *Sagitta ferox* | 1 | — | — | — | — | — | — | — | — | — | 12 (1) | 21 (2) | 3 | — | — | 2 (1) | 2 (1) | — | — | 2 | 1 (1) | — | 1 (1) | 1 (1) | — | 1 | — | 3 (1) | 12/28 | 4 |
| *Sagitta robusta* | — | 8 (2) | 3 (4) | — | 5 (2) | 6 (2) | 5 (5) | 1 (1) | 5 (2) | 6 (1) | 8 (1) | 23 (2) | 6 | 15 (3) | 3 (8) | 11 (5) | 6 (3) | — | 2 (1) | 4 (1) | 2 (1) | 12 (3) | 25 (21) | 13 (8) | 3 (3) | 26 (5) | 1 | 7 (2) | 25/28 | 8 |
| *Sagitta pulchra* | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 (1) | — | — | — | — | 1/28 | 1 |
| *Sagitta serratodentata pacifica* | 19 (9) | 244 (70) | 24 (29) | 12 (40) | 35 (18) | 89 (36) | 24 (25) | 22 (15) | 62 (18) | 150 (15) | 179 (21) | 239 (25) | 416 (31) | 169 (33) | 7 (19) | 37 (17) | 34 (15) | — | 57 (23) | 264 (40) | 53 (28) | 43 (11) | 11 (9) | 41 (28) | 47 (43) | 161 (29) | 72 (26) | 75 (17) | 27/28 | 96 |
| *Sagitta serratodentata atlantica* f. *pseudoserratodentata* | 1 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 (1) | — | — | — | — | 30 (7) | 3/28 | 11 |
| *Sagitta neglecta* | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 | 1 | — | — | — | — | — | — | — | — | — | — | — | 2/28 | 1 |
| *Sagitta regularis* | — | — | — | — | 1 | — | 1 (1) | 1 (1) | 1 | 5 (1) | 14 (2) | 7 (1) | 1 | 1 | 1 (3) | 2 (1) | 2 (1) | — | — | — | 1 (1) | — | — | — | 1 (1) | — | 2 (1) | 10 (2) | 16/28 | 3 |
| *Sagitta minima* | 17 (8) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 24 (6) | 2/28 | 21 |
| *Sagitta decipiens* | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 (3) | — | — | — | — | — | — | — | — | — | — | — | — | — | 1/28 | 1 |
| *Pterosagitta draco* | 77 (35) | 2 (1) | 23 (27) | 6 (20) | 54 (27) | 40 (16) | 4 (5) | 17 (12) | 28 (8) | 55 (5) | 100 (11) | 57 (6) | 136 (10) | 61 (12) | 4 (11) | 15 (7) | 39 (18) | — | 62 (25) | 142 (22) | 36 (19) | 33 (8) | 12 (10) | 27 (18) | 14 (13) | 73 (13) | 57 (21) | 91 (21) | 27/28 | 47 |
| *Krohnitta subtilis* | 14 (6) | — | 2 (2) | — | — | — | — | — | — | — | — | — | — | 6 (1) | — | — | 2 (1) | — | 2 (1) | — | — | — | — | — | — | — | — | 13 (3) | 6/28 | 7 |
| *Krohnitta pacifica* | 4 (2) | 24 (7) | 1 (1) | — | — | — | — | — | — | 25 (2) | 15 (2) | 17 (2) | 2 | — | 1 (3) | 2 (1) | — | — | — | — | — | — | — | 1 (1) | — | — | 22 (8) | 32 (7) | 12/28 | 12 |
| Damaged individuals or juv. | 2 (1) | 3 (1) | 3 (4) | — | 5 (2) | 11 (4) | 1 (1) | 7 (7) | 1 | 28 (3) | 19 (2) | 4 | 10 (1) | 22 (4) | 2 (5) | 14 (6) | 10 (5) | 2 (17) | 7 (3) | 20 (3) | 10 (5) | 24 (6) | 5 (4) | — | 7 (6) | 16 (3) | 6 (2) | 13 (3) | 26/28 | 10 |
| Total individual number | 220 | 347 | 84 | 30 | 200 | 250 | 95 | 144 | 354 | 1007 | 873 | 951 | 1324 | 516 | 37 | 220 | 222 | 12 | 245 | 657 | 188 | 395 | 120 | 148 | 109 | 553 | 277 | 434 | | |