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**A NEW SPECIES OF ARROW WORMS,  
*SAGITTA DIMITRYI* SP. NOV. (CHAETOGNATHA, SAGITTOIDEA),  
FROM THE SEA OF OKHOTSK (NORTHWEST SAKHALIN)**

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A new species of chaetognaths, *Sagitta dimitryi* sp. nov., was discovered in the waters of the Sea of Okhotsk, near the northwestern part of Sakhalin. The aim of this article is to describe the new species. A table of identification keys for species of the genus *Sagitta* is given, including *Sagitta dimitryi* sp. nov. The relationship of modern *Sagitta* with ancient Chaetognatha is discussed, including possible reasons for the evolution of the intestinal apparatus.

**Keywords:** *Sagitta dimitryi* sp. nov., Chaetognatha, Sakhalin, Sea of Okhotsk

The classification of chaetognaths (the phylum Chaetognatha Leucart, 1894) remains a problem since the discovery of this group by M. Slabber [1769]. Only in 1905, the class Sagittoidea Claus et Grobben, 1905 was described. The first researcher attempting to classify chaetognaths was P. Abric [1905]. Despite certain shortcomings, his approach (species classification by the number of paired lateral fins) was not discarded. It was used later: the occurrence of two paired fins was applied as a character of the genus *Sagitta* sensu lato [Ritter-Záhony, 1911]. T. Tokioka [1965] divided the genus proposed by R. Ritter-Záhony into eight genera, with several species being allocated to the new genus *Sagitta* sensu stricto. However, his identification diagnoses did not take into account the occurrence of sac-like gelatinous structures (SGS). With SGS diversity considered in representatives of the family Sagittidae Claus et Grobben, 1905, the subfamilies Flaccisagittinae and Sagittinae were later identified [Kassatkina, 2007].

The difficulties of working with Chaetognatha are partly related to the simplicity of their organization. Those lack not only some organs (permanent oviducts and vas deferens), but also entire organ systems (excretory and respiratory ones). The recently discovered circulatory system is very primitive [Malakhov, Berezinskaya, 2001].

In this paper, we describe a new species to science, *Sagitta dimitryi* Kassatkina & Vasileva sp. nov., from the subfamily Sagittinae.

#### MATERIAL AND METHODS

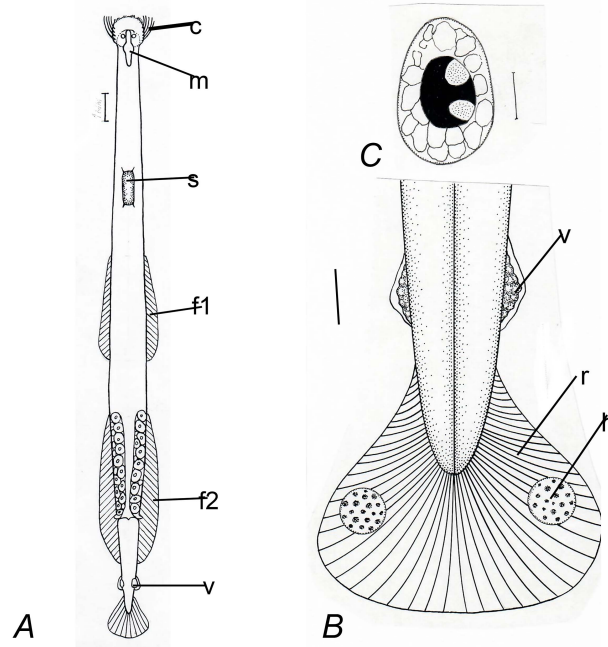
Planktonic chaetognaths were sampled during the 82<sup>nd</sup> cruise of the RV “Professor Gagarinsky” on 03.09.2022 and fixed in 4% formalin. The processing was carried out in such a way as not to damage soft tissues. In a laboratory, the material was examined under an MBS-10 binocular.

Photographs were taken with a Stemi 2000-C stereomicroscope equipped with an AxioCam ICc 3 camera in order to show the differences between healthy specimens and morphologically abnormal animals. The material is kept in the plankton sample storage in the Laboratory for Pollution and Environmental Research of POI FEB RAS (holotype SD N1. 82. 2022 and four paratypes). Immature specimens, about 100 ind., were sampled during the Kuril–Sakhalin expedition (1949), the cruise of the RV “Baidar” (1965), and the 24<sup>th</sup> cruise of the RV “Akademik Nesmeyanov” (1993). For comparison with characters of mature animals, characters of immature specimens from different plankton samples are given. To establish species affiliation of *Sagitta* at all stages of maturity, animals were stained according to the author’s method [Kassatkina, 2008].

## RESULTS AND DISCUSSION

**Taxonomy.** The new species to science belongs to the family Sagittidae, subfamily Sagittinae, genus *Sagitta* sensu stricto Quoy et Gaimard, 1827.

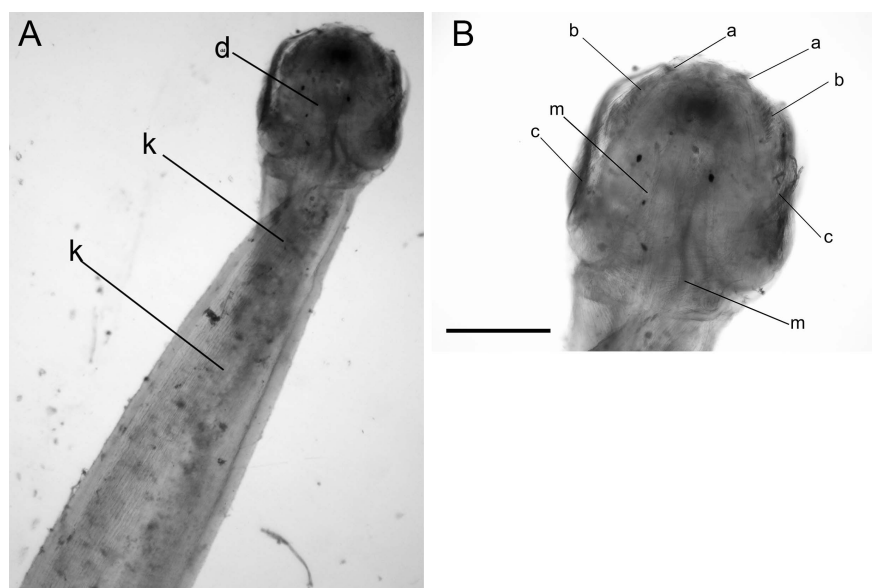
**Diagnosis of the species *Sagitta dimitryi* Kassatkina & Vasileva sp. nov.** The body is muscular and rigid. The head is the same width as the body; the neck is noticeable. The corona ciliata is short and has a unique shape: paired convexities at the level of the trunk-tail septum (Fig. 1A, m). The shape and location of the corona ciliata relative to the head ganglion are reliable taxonomic features at all stages: both in young, immature animals and in mature ones. The eyes have a dark pigment spot, with its shape being the same in both immature and mature animals (Fig. 1C). The seminal vesicles do not touch either the caudal fin or lateral fins (Fig. 1B, v). Alveolar tissue is absent.



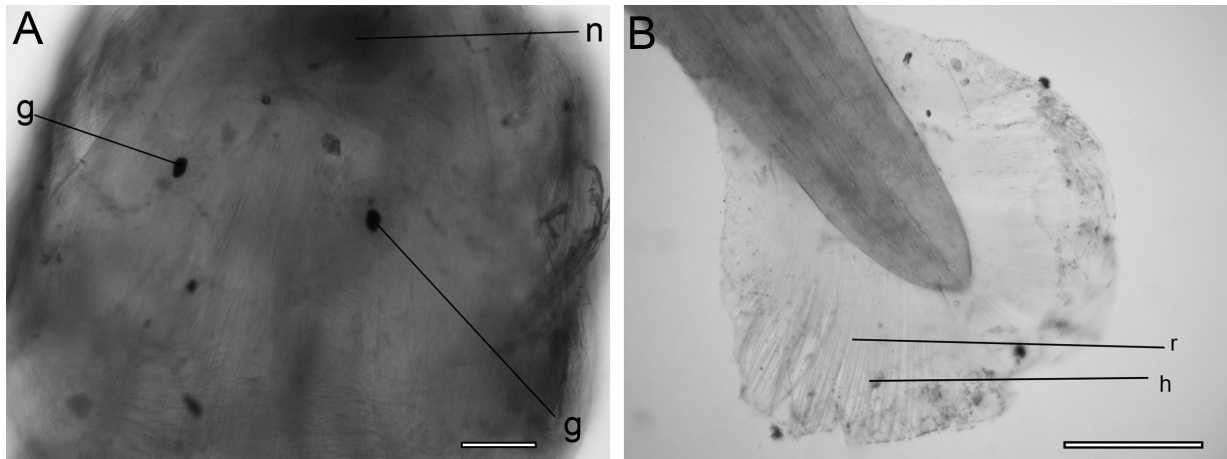
**Fig. 1.** *Sagitta dimitryi* Kassatkina & Vasileva sp. nov. general view. A: c, hooks; f1, front fin; f2, rear fin; f, tail fin; m, corona ciliata; s, ventral ganglion; v, seminal vesicle. B, rear end of the specimen: h, sensory locomotor organ; r, rays; v, seminal vesicle. C, eye. Scale bar: 1 mm (A); 0.5 mm (B); 0.1 mm (C)

**Description of the holotype.** Holotype SD N1. 82. 2022 (51.3°N, 144.3°E) is a mature individual at the 4<sup>th</sup> stage of maturity. Paratype is four mature individuals from one plankton sample taken during the 82<sup>nd</sup> cruise of the RV “Professor Gagarinsky.”

The body length is 20.5 mm. The caudal section is 19.5% of the body length. The upper part of the pharynx is muscular, wider than the midgut (Fig. 2A, d). The midgut wall does not have cells expanded to vacuoles; such cells occur in species of the genera *Parasagitta* and *Aidanosagitta* [Kasatkina, Stolyarova, 2010: Table 3, photos 1 and 3; Table 21, Figs 3–6]. Diverticula are absent, the same as in all *Sagitta* species [Kasatkina, Stolyarova, 2010: Table 29, Fig. 3]. The corona ciliata is short; it has one pair of convexities at the level of the trunk-tail septum. The corona ciliata begins from the brain, and its trunk part is shorter than the part lying on the head (those are almost of the same length). The length of the ventral ganglion is 5.8% of the body length. The anterior margin of the fins of the I pair is located behind the posterior end of the ventral ganglion. The gap between the fins of the I pair and the posterior end of the ventral ganglion is 1.4 times larger than the ganglion and comprises 8.3% of the body length. The fin of the I pair is 17.6% of the body length; it is 1.4 times shorter than the fin of the II pair, and its length is equal to the length of the trunk part of the fins of the II pair. The gap between the lateral fins of the II and I pairs is slightly larger than the gap between the ventral ganglion and the fins of the II pair, with the latter gap being about 9% of the body length. The fin of the II pair is 25% of the body length; its trunk part is 2.3 times longer than the caudal one. The rays in the fins are complete, and there are no rayless zones (Fig. 3B). Alveolar tissue is absent. Sensory-locomotor bodies are few in number; those occur on the caudal fin (Fig. 1B, h). On the head, there are one pair of rows of hooks and two pairs of rows of denticles (Fig. 2B, a, b). There are 7 hooks (Fig. 2B, c), 6 anterior denticles (Fig. 2B, a), and 12 posterior denticles on the left and right sides (Fig. 2B, b). The eyes have a weakly notched central pigment spot (Figs 1C, 3A, g). The seminal vesicles make up 2.6% of the total body length and 17% of the length of the caudal section. Those are located at a great distance from the paired lateral fins (approximately 2 times greater than the distance between the seminal vesicles and the caudal fin). The ovaries constitute 15.6% of the body length; those are located in front of the anterior ends of the fins of the II pair. The diameter of the ovary is equal to the diameter of the egg at its anterior end (0.55 mm) or to the size of the cluster of immature eggs (0.49 mm) at the posterior end. Mature eggs are large; their diameter is 0.55 mm, and it is equal to the length of the seminal vesicles.



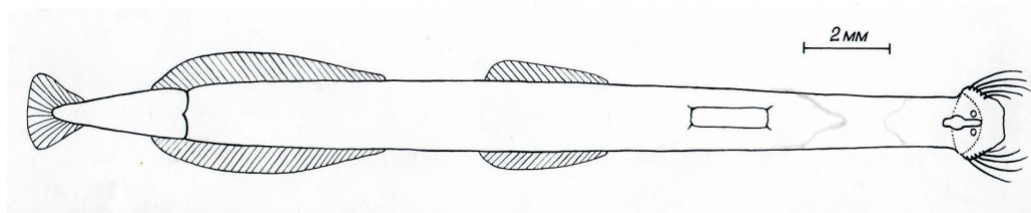
**Fig. 2.** Holotype. *Sagitta dimitryi* Kasatkina & Vasileva sp. nov. A, dorsal view of anterior part of the body (d, pharynx; k, gut). B, dorsal head (a, anterior teeth; b, posterior teeth; c, hooks; m, corona ciliata). Scale bar: 0.4 mm



**Fig. 3.** Holotype. *Sagitta dimitryi* Kassatkina & Vasileva sp. nov. A, dorsal side of the head: g, eyes; n, head ganglion. B, tail fin: r, rays. Scale bar: 0.1 mm (A); 0.5 mm (B)

**Morphological features of immature specimens of *Sagitta dimitryi* sp. nov.** A striking feature is the shape of the corona ciliata: with paired convexities at the level of the trunk-tail septum. It is small in size and is mainly located on the head. The corona ciliata begins to form already in the embryo of chaetognath, and its shape and location remain constant at all stages of maturity. Therefore, this organ is a reliable species character even for identifying immature animals, while the length of the fins and the distances between the fins change with the growth of an animal.

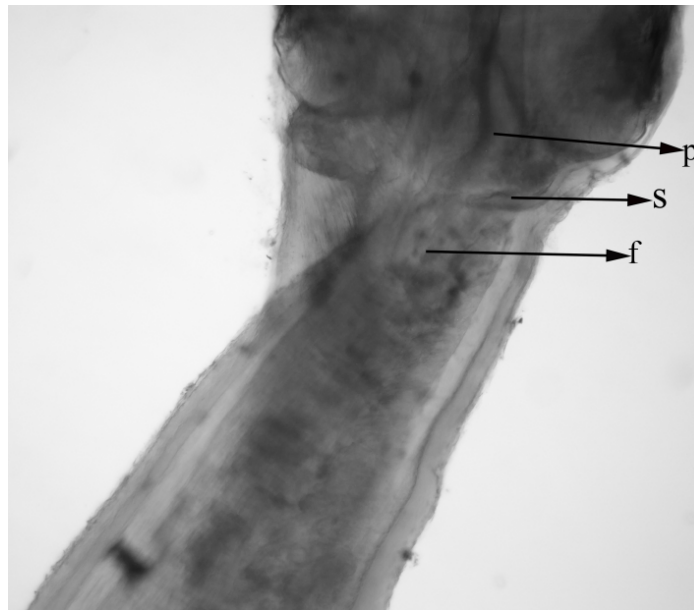
**Description of an immature specimen of *Sagitta dimitryi* sp. nov.** from a plankton sample taken on 11.08.1993 from a horizon of 55–23 m during the 24<sup>th</sup> cruise of the RV “Akademik Nesmeyanov,” station 2393 (Fig. 4).



**Fig. 4.** *Sagitta dimitryi* sp. nov. general view. Scale bar: 2 mm

The total body length is 11.1 mm. The muscles are rigid. The caudal section makes up about 13% of the body length. The upper part of the pharynx is muscular, wider than the midgut (Fig. 5, p). The trunk-caudal septum is wide; it clearly separates the pharynx from the midgut (Fig. 5, s). From the very beginning, from the trunk-caudal septum, the midgut is filled with large food which by its shape may be mistaken for outgrowths of the midgut, *i. e.*, diverticula (Fig. 5, f). However, diverticula are a paired organ (with a clearly defined epithelium). *Sagitta dimitryi* sp. nov. has no diverticula, the same as all *Sagitta* species. The corona ciliata is short; it has one pair of convexities at the level of the trunk-tail septum. The corona ciliata begins from the brain, and its trunk part is shorter than the part lying on the head (those are almost of the same length). The length of the ventral ganglion is about 8% of the body length. The anterior edge of the fins of the I pair is located behind the posterior end of the ventral

ganglion is slightly larger than the ganglion and is about 9% of the body length. The fin of the I pair constitutes 13% of the body length; it is 1.8 times shorter than the fin of the II pair and shorter than the trunk part of the fins of the II pair. The gap between the lateral fins of the II and I pairs is slightly larger than the gap between the ventral ganglion and the fins of the I pair, with the latter gap being about 9% of the body length. The fin of the II pair is about 20% of the body length; its trunk part is 5.7 times longer than the tail one. The rays in the fins are complete, and there are no rayless zones (Fig. 3B). Alveolar tissue is absent. On the head, there are one pair of rows of hooks and two pairs of rows of denticles. There are 5 hooks, 3 anterior denticles, and 7 posterior denticles.



**Fig. 5.** Dorsal view of anterior part of *Sagitta dimitryi* sp. nov. body: p, pharynx; s, trunk-tail septum; f, lump of food

**Description of an immature specimen of *Sagitta dimitryi* sp. nov.** from a plankton sample taken on 08.08.1949 from a horizon of 200–0 m during the expedition of the Zoological Institute of RAS, station 75. The length is 9.5 mm. The length of the ventral ganglion is about 8% of the body length (coincides with the length of the ganglion in the 11.1-mm individual). Other parameters do not coincide (the caudal section is 1.7 mm, 18%).

**Description of an immature specimen of *Sagitta dimitryi* sp. nov.** from a plankton sample taken on 20.08.1965 from a horizon of 75–0 m during the cruise of the RV “Baidar.” The length is 10.5 mm. The length of the ventral ganglion is about 7.9% of the body length (almost the same as the length of the ganglion in the 11.1-mm individual). Other parameters do not coincide (the caudal section is 1.5 mm, 13%).

**Differential diagnosis.** The new species differs from *Sagitta nageae*, *S. bedoti*, and *S. pulchra* in the position of the fins of the I pair relative to the ventral ganglion. Our specimens differ from *S. bruuni*, *S. izuensis*, and *S. abyssicola* not only in the position of the anterior pair of fins, but also in the location of the seminal vesicles relative to the fins (caudal one and lateral ones). It differs from *S. euneritica* and *S. modesta* in the length of the gap between the posterior end of the ventral ganglion and the fins of the I pair (in those species, this gap is smaller than the ganglion). Moreover, the new species differs from *S. modesta* in the absence of a rayless zone in the caudal fin.

The species closest to the new one is *Sagitta nutana* (by the location of the seminal vesicles and the length of the gap between the ganglion and the front fins). However, *S. nutana* has extensive alveolar tissue on the dorsal side which is absent in specimens of the new species; also, the corona ciliata has no convexities in *S. nutana*. The new species differs from *S. glacialis* in the shape and length of the corona ciliata and the absence of alveolar tissue: in *S. glacialis*, the corona ciliata has no convexities, and its part on the trunk is 2.5 times larger than the part located on the head. The new species differs from *S. setosa* in the location of the seminal vesicles: in *S. setosa*, those are tightly adjacent to the lateral fins. The new species differs from *S. sublica* in the occurrence of complete rays in the fins and long fins of the I pair, as well as in the smaller gap of the body between the ventral ganglion and the fins of the I pair.

**Distribution.** Mature individuals of the new species were found in the coastal, neritic zone on the Sea of Okhotsk side of Sakhalin. Immature animals were caught both in the neritic zone and in the central Sea of Okhotsk. For several years, we encountered hundreds of immature individuals of the species in the open area of the Sea of Okhotsk; we were unable to describe it, for new species can only be described based on mature animals. Apparently, mature individuals come to the coastal zone to spawn. As noted, mature animals go to the depths after spawning, and part of the population stays in this zone and reproduces again [Alvariño, 1968; Kasatkina, Stolyarova, 2010; Russel, 1932]. There is an assumption that adult animals leave the spawning ground after spawning as a part of a conservation strategy for the species [Russel, 1932].

In order to show the differences between the new species and other ones of this genus, we provide a key for identification of mature animals of all known *Sagitta* species in the world fauna (keys do not include animals at the early stages of maturity).

**Key for identification of mature individuals of species and subspecies of *Sagitta* s. str.  
of the world fauna**

- 1 (2) Anterior end of the fins of the II pair and the posterior end of the fins of the I pair appear fused from the ventral and dorsal sides. However, it is visible from the lateral side that the fins do not touch, but are located parallel to each other ..... *S. sceptrum*
- 2 (1) Front and rear fins are distant from each other ..... 3
- 3 (4) Fins of the I pair begin in front of the anterior end of the ventral ganglion ..... *S. nagae*
- 4 (3) Fins of the I pair begin behind the anterior end of the ventral ganglion ..... 5
- 5 (10) Fins of the I pair begin almost in the middle of the ventral ganglion ..... 6
- 6 (15) Fins of the I pair begin in front of the posterior end of the ventral ganglion ..... 7
- 7 (10) Front fins are longer than rear fins ..... 8
- 8 (9) Seminal vesicles are located close to both the lateral fins and the caudal fin ..... *S. bedoti*
- 9 (8) Seminal vesicles are distant from the lateral fins and touch the caudal fin ..... *S. pulchra*
- 10 (5) Fins of the I pair begin at the level of the posterior end of the ventral ganglion ..... 11
- 11 (12) Seminal vesicles touch both the lateral fins and the caudal fin ..... *S. bruuni*
- 12 (11) Seminal vesicles are distant from either the lateral fins or the caudal fin ..... 13
- 13 (14) Seminal vesicles are distant from the lateral fins and touch the caudal fin ..... *S. izuensis*
- 14 (13) Seminal vesicles touch the lateral fins and are distant from the caudal fin ..... *S. abyssicola*
- 15 (6) Fins of the I pair begin behind the posterior end of the ventral ganglion ..... 16
- 16 (17) A gap between the posterior end of the ventral ganglion and the fins of the I pair is less than  $\frac{1}{2}$  the length of the ganglion ..... *S. bipunctata*

- 17 (16) A gap between the posterior end of the ventral ganglion and the fins of the I pair is equal to the length of the ganglion or is more than  $\frac{1}{2}$  the length of the ganglion ..... 18
- 18 (21) A gap between the posterior end of the ventral ganglion and the fins of the I pair is more than  $\frac{1}{2}$  the length of the ganglion, but less than the length of the ganglion ..... 19
- 19 (20) The seminal vesicles touch the lateral fins and are located at a short distance from the caudal fin. The caudal fin has complete rays; there are no rayless zones ..... *S. euneritica*
- 20 (19) Seminal vesicles are located at a considerable distance from the lateral fins and the caudal fin. The caudal fin has an internal rayless zone ..... *S. modesta*
- 21 (18) A gap between the posterior end of the ventral ganglion and the fins of the I pair is more than  $\frac{1}{2}$  the length of the ganglion and larger than the ganglion ..... 22
- 22 (25) A gap between the posterior end of the ventral ganglion and the fins of the I pair exceeds the length of the ganglion, but no more than 1.5 times ..... 23
- 23 (24) Corona ciliata is smooth and has no convexities; the corona ciliata is mainly located on the trunk part, not on the head ..... *S. nutana*
- 24 (23) Corona ciliata has paired convexities; the corona ciliata is mainly located on the head part, not on the trunk part ..... ***S. dimitryi* sp. nov.**
- 25 (22) A gap between the posterior end of the ventral ganglion and the fins of the I pair exceeds the length of the ganglion by more than 1.5 times ..... 26
- 26 (29) There are no rayless zones in any of the fins ..... *S. glacialis*
- 27 (28) Relative length of the caudal section exceeds 17%; the length of the fins of the I pair exceeds 13%; and the length of the fins of the II pair exceeds 19% of the body length ..... *S. glacialis glacialis*
- 28 (27) Relative length of the caudal section does not exceed 17%; the length of the fins of the I pair does not exceed 13%; and the length of the fins of the II pair does not exceed 19% of the body length ..... *S. glacialis baltica*
- 29 (26) There may be rayless zones in the fins ..... 30
- 30 (35) Seminal sacs either touch the lateral fins or are located at a distance that is significantly shorter than the sacs ..... 31
- 31 (32) Seminal sacs touch the lateral fins and are located at a distance from the caudal fin ..... *S. setosa*
- 32 (31) Seminal sacs are located at a distance from the lateral fins and do not touch the caudal fin ..... 33
- 33 (34) Corona ciliata has no convexities ..... *S. euxina*
- 34 (33) Corona ciliata has paired convexities ..... *S. sublica*
- 35 (30) Seminal sacs are located at a distance from the lateral fins and almost touch the caudal fin; this gap between the sacs and the caudal fin is visible only under high magnification ..... *S. kussakini*

The genus *Sagitta* is morphologically closer than *Parasagitta* to the ancient Chaetognatha called protoconodonts. It is *Parmia anastassiae* [Gnilovskaya, 1998] from the Proterozoic layers of the northeast of the Russian Platform (the age of 1 billion years) [Gnilovskaya et al., 2000]. Their evolution was directed towards increasing the complexity of the organization (the appearance of grasping hooks-setae, eyes, and corona ciliata); it was a response to the oxygenation of the environment; and it was aimed at protecting metabolic pathways [Fedonkin, 2003: p. 10].

Assumably, with such a tool, hooks, ancient chaetognaths scraped off unicellular organisms from microbial mats which they fed on, the same as protoarticates did [Ivanzov, 2011].

The size of food corresponded to the width of the intestine; therefore, the ancient Chaetognatha (*P. anastassiae*) had no intestinal diverticula. Their absence was also noted in *Protosagitta spinosa* [Hu, 2005] from the Lower Cambrian (540–520 million years). Apparently, there was no larger

prey in the Vendian and Lower Cambrian [Fedonkin, 2003; Hu, 2005]. This ancient morphological character (absence of diverticula and narrow intestine) has been preserved in some modern Chaetognatha. The evolution of chaetognaths (a rise in the level of organization or degradation of the general structure) depends entirely on external environmental factors [Gasmi et al., 2014; Kasatkina, 2022]. An increase in the width of the intestine during evolution (the appearance of diverticula) was noted in *Paucijaculum samamithion* Schram, 1973 (the Paleozoic Era, Carboniferous Period, from the Pennsylvanian Subperiod layer). Presumably, it was associated with the ability to feed on larger prey.

For chaetognaths with intestinal diverticula, T. Tokioka [1965] formed the genus *Parasagitta* which is close to *Sagitta* in other morphological features. In 1847, J. Müller described the species *Sagitta setosa* [Müller, 1847] and provided drawings clearly showing the midgut without diverticula. However, some researchers, e. g., [Müller et al., 2019], mistakenly attributed *S. setosa* to *Parasagitta* whose representatives have diverticula. Genetic studies have shown that the branches with *Parasagitta* species are definitely different from the branch with *Sagitta* species [Gasmi et al., 2014]. We also believe that the occurrence of diverticula on the trunk (midgut) is a feature of the genus in the taxonomy of chaetognaths. The species *S. setosa* cannot be classified as a *Parasagitta* one. We have included *S. setosa* in the “Key for identification of mature individuals of species and subspecies of *Sagitta* s. str. of the world fauna.”

Chaetognaths are a sensitive and convenient indicator of the state of the marine environment. Its anthropogenic pollution of any origin (in particular, radioactive) causes changes in the shape of the body and organs of these animals [Kasatkina et al., 2017]. The pattern of alterations in tissues of chaetognaths and the percentage of abnormal individuals in samples can be used to predict a forthcoming of such a natural disaster as the earthquake: when it is coming, intestinal walls (Fig. 2A, k) are destroyed, the symmetry of the eyes (Fig. 3A, g) is disrupted, and the central pigment spot disappears. Elevated levels of radioactivity in seawater affect the fins of chaetognaths. Specifically, the rays on the fins (Fig. 3B, r) stick out the fin plate [Kasatkina, 1995; Kasatkina, Stolyarova, 2016].

**Conclusion.** The finding of a new Chaetognatha species adds to our knowledge of marine biodiversity. Comparative analysis of the morphological features of the discovered species showed as follows: the absence of intestinal diverticula brings *Sagitta dimitryi* sp. nov. closer to fossil and some modern species. The new organ (diverticula) is thought to have evolved as a result of animals gaining the ability to feed on larger prey. In terms of general morphology, the genus *Sagitta* s. str. is closest to the genus *Parasagitta*. However, genetic studies have shown the isolation of these two genera. By the location of the fins, the occurrence of the gap between the ganglion and the front fins, the location of the seminal vesicles, the occurrence of the gap between the rear and the front fins, the absence of alveolar tissue, and the occurrence of convexities of the corona ciliata at the level of the trunk-tail septum, *S. dimitryi* sp. nov. is an independent species new to science. It is clearly distinguishable from *Sagitta* species which is reflected in the “Key for identification of mature individuals of species and subspecies of *Sagitta* s. str. of the world fauna.”

**Etymology.** The species *Sagitta dimitryi* Kasatkina & Vasileva sp. nov. is named in honor of a historian and famous writer Dmitry Kasatkin, may his memory be blessed.

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## REFERENCES

1. Ivanzov A. Yu. Feeding traces of Proarticulata – the Vendian Metazoa. *Paleontologicheskii zhurnal*, 2011, no. 3, pp. 3–13. (in Russ.)
2. Kasatkina A. P. Mass anomalies in plankton of marginal seas and adjacent waters of the Pacific Ocean. *Doklady Akademii nauk*, 1995, vol. 345, no. 6, pp. 845–848. (in Russ.)
3. Kasatkina A. P., Stolyarova M. V. *Morphology, Taxonomy, Ecology of Chaetognatha of the Japan Sea and Adjacent Water Areas*. Vladivostok : Dal'nauka, 2010, 260 p. (in Russ.)
4. Malakhov V. V., Berezinskaya T. L. The structure of the hemal system in Chaetognatha. *Doklady Akademii nauk*, 2001, vol. 376, no. 4, pp. 566–568. (in Russ.)
5. Abric P. Sur la systematique des Chaetognathes. *Comptes Rendus Sciences de l'Académie*, 1905, vol. 141, pp. 222–224.
6. Alvarino A. Egg pouches and other reproductive structure in pelagic Chaetognatha. *Pacific Science*, 1968, vol. 22, no. 4, pp. 488–492. <http://hdl.handle.net/10125/12573>
7. Fedonkin M. A. The origin of the Metazoa in the light of the Proterozoic fossil record. *Paleontological Research*, 2003, vol. 7, iss. 1, pp. 9–41. <https://doi.org/10.2517/prpsj.7.9>
8. Gasmi S., Nve G., Pech N., Tekaya S., Gilles A., Perez Y. Evolutionary history of Chaetognatha inferred from molecular and morphological data: A case study for body plan simplification. *Frontiers in Zoology*, 2014, vol. 11, art. no. 84 (25 p.). <https://doi.org/10.1186/s12983-014-0084-7>
9. Gnilovskaya M. B. The oldest annelidomorphs from the upper Riphean of Timan. *Doklady Akademii nauk*, 1998, vol. 359, no. 3, pp. 334–337.
10. Gnilovskaya M. B., Becker Yu. R., Veis A. F., Olovyanishnikov V. G., Raaben M. E. Pre-Ediacaran fauna of Timan (Upper Riphean annelidomorphs). *Stratigrafiya. Geologicheskaya korrelyatsiya*, 2000, vol. 8, no. 4, pp. 327–352.
11. Hu S. X. Taphonomy and palaeoecology of the early Cambrian Chengjiang biota from Eastern Yunnan, China. *Berliner paläobiologische Abhandlungen*, 2005, vol. 7, pp. 1–197.
12. Kasatkina A. P. Taxonomic composition and keys for identification of *Eukrohnia* Tokioka, 1965 (Chaetognatha) with description of the new bathypelagic species *Eukrohnia helgae* sp. nov. from the Laptev Sea to the west of the Lomonosov Ridge. *Cahiers de Biologie Marine*, 2022, vol. 63, no. 2, pp. 93–102.
13. Kasatkina A. P. New species of the genus *Sagitta* sensu str. (Chaetognatha) from the Sea of Japan with description of an original staining and dissection technique. *Zoosystematica Rossica*, 2008, vol. 17, no. 1, pp. 3–6. <https://doi.org/10.31610/zsr/2008.17.1.3>
14. Kasatkina A. P. Review of the genera of the family Sagittidae with separation of a new subfamily and description of a new species of the genus *Sagitta* from the Sea of Japan (Chaetognatha). *Zoosystematica Rossica*, 2007, vol. 16, no. 2, pp. 157–162. <https://doi.org/10.31610/zsr/2007.16.2.157>
15. Kasatkina A., Stolyarova M. Marine animals Chaetognatha as bioindicators of geophysical activity. *Ecology and Safety*, 2016, vol. 10, pp. 339–348.
16. Kasatkina A., Stolyarova M., Sergeev A. Morphological changes in marine planktonic animals Chaetognatha under radiation exposure. *Ecology and Safety*, 2017, vol. 11, pp. 211–219.
17. Müller J. Fortsetzung des Berichts über einige neue Thierformen der Nordsee. *Archiv für Anatomie, Physiologie und wissenschaftliche Medicin*, 1847, S. 157–179.
18. Müller C. H. G., Harzch S., Perez Y. Chaetognatha. In: *Handbook of Zoology. Miscellaneous Invertebrates* / A. Schmidt-Rhaesa (Ed.). Berlin : De Gruyter, 2019, pp. 163–283.
19. Ritter-Záhony R. Revision der Chätognathen. In: *Deutsche Südpolar-Expedition. 1901–1903, 1911, Bd. 13, Zool. 5, Heft 1, S. 1–72*.
20. Russel F. S. On the biology of *Sagitta*. The breeding and growth of *Sagitta elegans* Verrill in the Plymouth area, 1930–1931. *Journal of the Marine Biological Association of the United*

- Kingdom*, 1932, vol. 18, iss. 1, pp. 131–145.  
<https://doi.org/10.1017/S0025315400051353>
21. Slabber M. *Natuurkundige Verlustingen: behelzende microscopise Waarnemingen van inen uitlandse Water en Land-Dieren*. Te Haarlem : by J. Bosch, 1769, St. 6, Pl. 6, S. 47.
22. Tokioka T. The taxonomical outline of Chaetognatha. *Publications of Seto Marine Biological Laboratory*, 1965, vol. 12, no. 5, pp. 335–357.  
<http://hdl.handle.net/2433/175381>

**НОВЫЙ ВИД ЩЕТИНКОЧЕЛЮСТНЫХ  
SAGITTA DIMITRYI SP. NOV. (CHAETOGNATHA, SAGITTOIDEA)  
ИЗ ОХОТСКОГО МОРЯ (СЕВЕРО-ЗАПАДНЫЙ САХАЛИН)**

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В статье описан новый вид щетинкочелюстных *Sagitta dimitryi* sp. nov., обнаруженный в водах Охотского моря у северо-западной части Сахалина. Дана таблица определительных ключей для видов рода *Sagitta* с включением *Sagitta dimitryi* sp. nov. Обсуждается родство современных *Sagitta* с древними Chaetognatha, в том числе возможные причины эволюции кишечного аппарата.

**Ключевые слова:** *Sagitta dimitryi* sp. nov., Chaetognatha, Сахалин, Охотское море