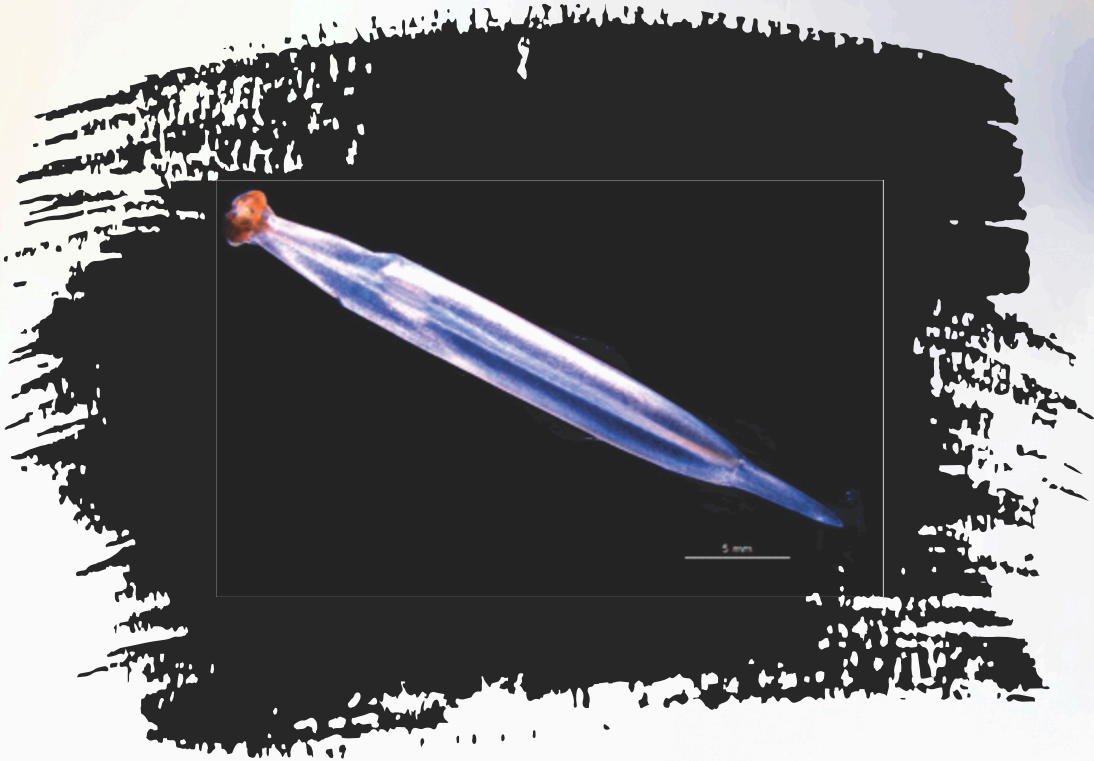


FAUNA OF INDIA CHECKLIST

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ONLINE VERSION 1.0



PHYLUM CHAETOGNATHA

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Comments on the checklist:
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ZOOLOGICAL SURVEY OF INDIA
Ministry of Environment, Forest & Climate Change

PHYLUM CHAETOGNATHA

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Introduction: Chaetognaths (from Greek 'chaeto' or bristle and 'gnathos' or jaw) are a phylum of marine invertebrate predators distinguished by their bilaterally symmetrical coelomate body that range in size from 1.3 to 105 mm (Pauly et al., 2021). Due to their rapid darting movements, they are frequently called as "arrow worms". They are also referred to as "glass worms" due to their elongated, thin, and typically transparent body structure. Other major diagnostic features include their lateral/tail fins, grasping hooks or spines located on either sides of the mouth, and teeth rows located at the frontal end of the mouth (Harzsch et al., 2015). Despite their delicate and slender body structure, chaetognaths were reportedly present during the early Cambrian Period (Vannier et al., 2007). They are prominent pelagic zooplankton constituting upto 15% of the zooplankton biomass across the global oceans and are present in all marine habitats, from estuarine waters to open oceans, polar waters, and deep sea ecosystems (Bone et al., 1991). Chaetognaths are protandric hermaphrodites showing direct development; cross-fertilization is more habitual, while some species are known to self-fertilize (Reeve, 1970). They are a conspicuous carnivorous zooplankton group with the juveniles feeding mainly on smaller-sized preys such as copepod nauplii and tintinnids, while their adult counterparts are voracious feeders of copepods, other crustacean groups, larval fishes, and other chaetognaths. They in turn form a substantial food source for other marine invertebrates and commercially important fishes. Thus arrow worms facilitate structuring of the pelagic food web mainly by cropping a sizeable portion of copepods, and also serve as an essential connecting link between primary consumers and higher trophic level consumers.

Global diversity: Currently 132 chaetognath species have been identified throughout the global oceans, belonging to a single class, two orders, and nine families (WORMS, 2023).

Diversity in India: In the Indian marine waters, 37 extant species belonging to a single class, two orders and five families have been reported so far.

Table-01. Diversity in States

Sl. No.	State/UT	No. of species	No. of Endemic species
	INDIA TOTAL	37	6
1	Andhra Pradesh	9	0
2	Arunachal Pradesh	0	0
3	Assam	0	0
4	Bihar	0	0
5	Chhattisgarh	0	0

Sl. No.	State/UT	No. of species	No. of Endemic species
6	Gujarat	5	0
7	Goa	6	0
8	Haryana	0	0
9	Himachal Pradesh	0	0
10	Jharkhand	0	0
11	Karnataka	9	0
12	Kerala	19	0
13	Madhya Pradesh	0	0
14	Maharashtra	7	0
15	Manipur	0	0
16	Meghalaya	0	0
17	Mizoram	0	0
18	Nagaland	0	0
19	Odisha	6	0
20	Punjab	0	0
21	Rajasthan	0	0
22	Sikkim	0	0
23	Tamil Nadu	19	0
24	Telangana	0	0
25	Tripura	0	0
26	Uttar Pradesh	0	0
27	Uttarakhand	0	0
28	West Bengal	2	0
29	Andaman & Nicobar	13	2
30	Chandigarh	0	0
31	Dadra Nagar Haveli, Daman & Diu	0	0
32	Delhi	0	0
33	Jammu & Kashmir	0	0
34	Ladakh	0	0
35	Lakshadweep	10	2
36	Puducherry	0	0
37	Unknown	31	2 (Endemic to Indian Ocean)

Endemism: Six endemic species are known to exist in Indian waters to date: *Krohnitta balagopali* Nair, Panampunnayil, Pillai & Gireesh, 2008 and *Aidosagitta meenakshiae* (Nair, Panampunnayil, Pillai & Gireesh, 2008) are endemic to the Andaman waters; *Aidosagitta nairi* (Casanova & Nair, 2002) and *Ferosagitta madhupratapi* (Casanova & Nair, 1999) are endemic species reported from the Agatti Lagoon, Laccadive Sea (India); *Sagitta bombayensis* Lele & Gae, 1936 is found to be endemic to the Indian neritic waters; *Eukrohnita minuta* Silas & Srinivasan, 1969 is an endemic species to the Indian ocean.

Habitat : Chaetognaths are exclusively marine organisms with a wide distribution pattern, spanning across all marine settings, from tropics to polar oceans, from pelagic to benthic (58% of the 132 extant chaetognath species are pelagic organisms while the remaining 42% are benthic or benthopelagic), and

also from neritic to oceanic regions. They have been documented in the pelagic zones of the global oceans from the surface to the deeper layers (5000 m); they are allegedly abundant along the surface waters.

Ecological Significance: Chaetognaths are active planktonic predators and their pelagic trophodynamics is an index for measuring global ocean ecology. Despite their pivotal roles as predators, competitors, and as prey in shaping the marine food chains, they are reportedly important indicators of water-masses and changing oceanographic processes. Only two species of luminous chaetognaths, *Caecosagitta macrocephala* and *Eukrohnia fowleri*, have been recognised to date (Theusen et al., 2010). Certain arrow worms use a potent marine neurotoxin (most likely of bacterial origin) called tetrodotoxin to paralyze their prey. Furthermore, they also function as hosts for a variety of parasites and ectoparasites.

Human Significance : Chaetognaths are key prey for a variety of economically important fishes that contribute to a significant fraction of human diet. They are also extensively employed for scientific research opportunities due to their significant ecological traits.

Threatened species as per IUCN : No species are evaluated as threatened species as per IUCN

Protected Species as per WPA (2022) : No species are included under any schedule as per the WPA (2022)

Species under CITES : No species are included under appendices of CITES

Invasive alien species : No invasive alien species of chaetognaths are known from India

Gap areas : Since their original description, chaetognaths have always perplexed taxonomists. They are ancient invertebrates with obscure evolutionary origin. Their affinity towards protostomes remains ambiguous and requires systematic research. More qualitative and quantitative research on chaetognaths of Indian waters is required in monitoring the health and productivity of the marine ecosystem as they directly react to physical process in marine systems. Although a few species have been identified as consumers of bacteria and particulate matter, specialised research concentrating on more species of arrow worms is required to broadly generalise these food types for the complete phylum. Additionally, the true source of tetrodotoxin is still not clearly understood in chaetognaths and requires thorough studies.

Checklist of Chaetognatha

Family: Eukrohniidae Tokioka, 1965

1. *Eukrohnia bathypelagica* Alvarino, 1962
2. *Eukrohnia fowleri* Ritter-Záhony, 1909
3. *Eukrohnia hamata* (Möbius, 1875)
4. *Eukrohnia minuta* Silas & Srinivasan, 1969

Family: Krohnittidae Tokioka, 1965

5. *Krohnitta balagopali* Nair, Panampunnayil, Pillai & Gireesh, 2008
6. *Krohnitta pacifica* (Aida, 1897)
7. *Krohnitta subtilis* (Grassi, 1881)

Family: Pterosagittidae Tokioka, 1965

8. *Pterosagitta draco* (Krohn, 1853)

Family: Sagittidae Claus & Grobben, 1905

9. *Aidosagitta bedfordii* (Doncaster, 1902)
10. *Aidosagitta meenakshiae* (Nair, Panampunnayil, Pillai & Gireesh, 2008)
11. *Aidosagitta nairi* (Casanova & Nair, 2002)
12. *Aidosagitta neglecta* (Aida, 1897)
13. *Aidosagitta oecania* (Grey, 1930)
14. *Aidosagitta regularis* (Aida, 1897)
15. *Caecosagitta macrocephala* (Fowler, 1904)
16. *Decipsisagitta decipiens* (Fowler, 1905)
17. *Ferosagitta ferox* (Doncaster, 1902)
18. *Ferosagitta hispida* (Conant, 1895)
19. *Ferosagitta madhupratapi* (Casanova & Nair, 1999)
20. *Ferosagitta robusta* (Doncaster, 1902)
21. *Flaccisagitta enflata* (Grassi, 1881)
22. *Flaccisagitta hexaptera* (d'Orbigny, 1836)
23. *Mesosagitta minima* (Grassi, 1881)
24. *Parasagitta elegans* (Verrill, 1873)
25. *Parasagitta tenuis* (Conant, 1896)
26. *Pseudosagitta lyra* (Krohn, 1853)
27. *Pseudosagitta maxima* (Conant, 1896)
28. *Sagitta bipunctata* Quoy & Gaimard, 1827
29. *Sagitta bombayensis* Lele & Gae, 1936
30. *Serratosagitta pacifica* (Tokioka, 1940)
31. *Serratosagitta tasmanica* (Thompson, 1947)
32. *Solidosagitta planctonis* (Steinhaus, 1896)
33. *Solidosagitta zetesios* (Fowler, 1905)
34. *Zonosagitta bedoti* (Béraneck, 1895)
35. *Zonosagitta pulchra* (Doncaster, 1902)

Family: Spadellidae Tokioka, 1965

36. *Spadella angulata* Tokioka, 1951
37. *Spadella cephaloptera* (Busch, 1851)

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