Blooming salps

For the last 30 years **Kevin Moffat** has been snorkelling regularly in the Isles of Scilly, coming face-to-face with amazing sealife: sea grasses, invertebrates, birds, fish and marine mammals. More recently, however, he has been swimming with salps…

What is a salp?

Salps are barrel-shaped, transparent, marine invertebrates. Though they are usually rare in British waters, the last few summers have seen large blooms appear in the waters around the islands and the coast of Cornwall. Of the 45 species, the predominant salp seen in British waters is *Salpa fusiformis*. It occurs singly or as a colony. A single animal grows to just over 5 cm, while reproductive colonies grow in chains that can reach several metres.

Salps are almost transparent and are often mistaken for jellyfish, despite having no stinging cells. They are filter feeders, consuming vast quantities of phytoplankton and other small particles by filtering the water as they move.


Salps washed up on a beach at St Agnes in the Isles of Scilly

Classification

Not all gelatinous animals that drift on ocean currents are jellyfish. Others include the comb-jellies and the salps. Surprisingly, salps share a more recent common ancestor with us than they do with either comb-jellies or jellyfish. Salps, like us, are classified in the phylum Chordata (see Figure 1). Chordates share a set of five common features: a **notochord**, a **dorsal** nerve cord, slits in their **pharynx**, a thyroid-type gland, and a post-anal tail. These features are not always apparent at every stage of a chordate's life cycle. In tunicates (salps and sea squirts), which have a tough, leathery outer 'tunic', the larval stage is a tadpole-like form with a notochord. The adult tunicates attach to surfaces and lose their chordate features.

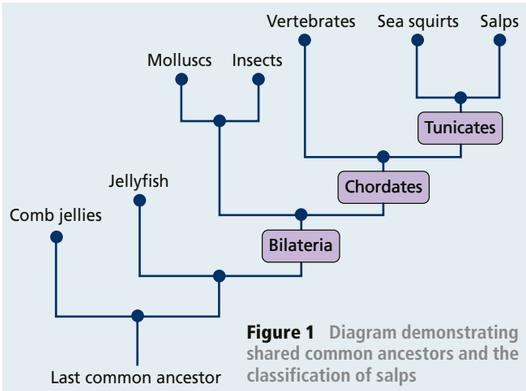


Figure 1 Diagram demonstrating shared common ancestors and the classification of salps

Life cycle

The life cycle of salps includes both sexual and asexual generations (see Figure 2). Mature free-moving individuals reproduce asexually, subsequently forming long chains of connected salps. It is here in the chains that sexual reproduction occurs. Salps are **hermaphrodites**. Within the chains, individuals internally produce one or two eggs. These are then fertilised by sperm released from other chains. The entire chain then switches gamete production, releasing sperm to fertilise other nearby chains. The mechanism for the switch in gamete production is still unclear, but spermatogenesis appears to be under environmental gene regulation.

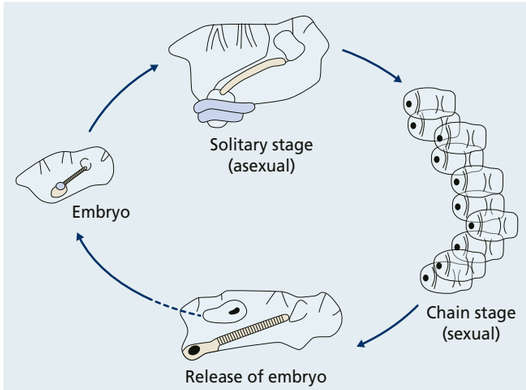


Figure 2 Life cycle of a salp

Anatomy and feeding

Salps have nervous, digestive and heart/circulation systems. Their digestive system has a powerful pumping system facilitated by a large pharynx and barrel-like muscle bands. This allows the salps to filter-feed phytoplankton efficiently, moving substantial water volumes and contributing significantly to biogeochemical cycles.

Salps pump large quantities of water – a single 5 cm animal might pump over 50 litres in an hour. Scientists have been studying the contributions these organisms make to the oceanic carbon cycle. They consume large amounts of carbon from phytoplankton, which is quickly deposited on the ocean floor – through both defecation from live animals and the sinking of their carcasses following death. In 2023 a team from Virginia in the USA reported that a salp bloom covering 11 000 km^2 was able to absorb over 100 tonnes of CO_2 per day. This is a significant contribution to the oceans' biological **carbon pump**.

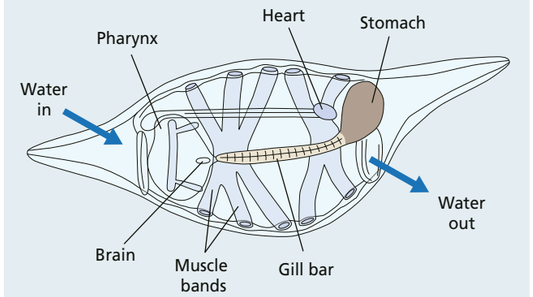
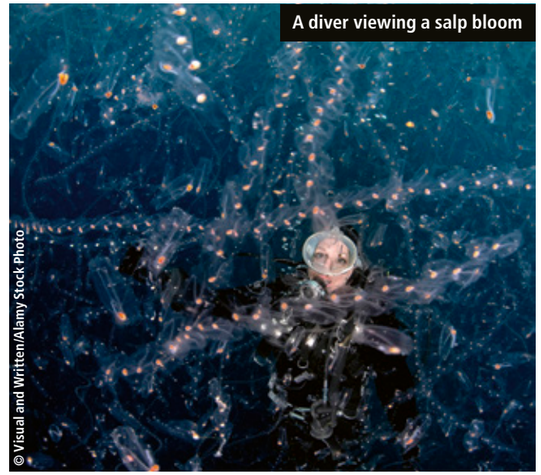


Figure 3 Anatomy of a salp


A chain of salps

Blooming

Salps are one of the fastest growing animals known. In the presence of sufficient phytoplankton and warm seas, and with the efficiency of their pharynx as a pump, they can rapidly increase their mass. Measurements demonstrate that they can increase their body length by 10% in an hour. Individuals can reach maturity in just 48 hours. With recent marine heatwaves affecting the UK, increasing the sea surface temperature by up to 3°C, the probability of these organisms blooming has increased.


A diver viewing a salp bloom

TERMS EXPLAINED

Carbon pump A process by which carbon is taken from the atmosphere and deposited onto the ocean floor.

Dorsal Relating to the upper part of an animal, for example the spine.

Hermaphrodite An organism able to produce both male and female gametes.

Notochord A cellular rod-like structure present in all embryonic and some adult chordates.

Pharynx A muscular cavity behind the mouth.

RESOURCES

Heather Hamilton's salp images:
www.cornwallunderwater.com/general-6

University of Virginia study on salp carbon cycling:
www.sciencedaily.com/releases/2023/02/230205081319.htm

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