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Morphology, Metabolism and Reproduction of Agnatha

John Francis*

Department of Zoological Sciences, Gaziantep University, Gaziantep, Turkey

Short Communication

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***For Correspondence:**
John Francis, Department of Zoological Sciences, Gaziantep University, Gaziantep, Turkey
E-mail: johnfrancis159@gmail.com

ABOUT THE STUDY

Agnatha is an infraphylum of jawless fish in the phylum *Chordata*, subphylum *Vertebrata*, consisting of both present (cyclostomes) and extinct (conodonts and ostracoderms) species. Among recent animals, cyclostomes are sister to all vertebrates with jaws, known as *gnathostomes*. Recent molecular data, both from rRNA and from mtDNA as well as embryological data, strongly supports the hypothesis that living Agarthans, the cyclostomes, are monophyletic.

The oldest fossil Agarthans appeared in the Cambrian, and two groups still survive today: the lampreys and the hagfish, comprising about 120 species in total. Hagfish are considered members of the subphylum Vertebrata, because they secondarily lost vertebrae; before this event was inferred from molecular and developmental data, the group Craniata was created by Linnaeus (and is still sometimes used as a strictly morphological descriptor) to reference hagfish plus vertebrates. While a few scientists still regard the living agnathans as only superficially similar, and argue that many of these similarities are probably shared basal characteristics of ancient vertebrates, recent taxonomic studies clearly place hagfish (the Myxini or Hyperotreti) with the lampreys (Hyperoartii) as being more closely related to each other than either is to the jawed fishes.

Metabolism

Agnathans are ectothermic, meaning they do not regulate their own body temperature. Agnathan metabolism is slow in cold water, and therefore they do not have to eat very much. They have no distinct stomach, but rather a long gut, more or less homogeneous throughout its length. Lampreys feed on other fish and mammals. Anticoagulant fluids preventing blood clotting are injected into the host, causing the host to yield more blood. Hagfish are scavengers, eating mostly dead animals [1-2]. They use a row of sharp teeth to break down the animal. The fact that agnathan teeth are unable to move up and down limits their possible food types.

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Morphology

In addition to the absence of jaws, modern agnathans are characterised by absence of paired fins; the presence of a notochord both in larvae and adults; and seven or more paired gill pouches. Lampreys have a light sensitive pineal eye (homologous to the pineal gland in mammals). All living and most extinct agnatha do not have an identifiable stomach or any appendages. Fertilization and development are both external. There is no parental care in the agnatha class [3-4]. The Agnatha are ectothermic or cold blooded, with a cartilaginous skeleton, and the heart contains 2 chambers.

Body covering: In modern agnathans, the body is covered in skin, with neither dermal nor epidermal scales. The skin of hagfish has copious slime glands, the slime constituting their defense mechanism. The slime can sometimes clog up enemy fishes' gills, causing them to die. In direct contrast, many extinct agnathans sported extensive exoskeletons composed of either massive, heavy dermal armour or small mineralized scales.

Appendages: Almost all agnathans, including all extant agnathans, have no paired appendages, although most do have a dorsal or a caudal fin [5]. Some fossil agnathans, such as osteostracans and pituriaspids, did have paired fins, a trait inherited in their jawed descendants.

Reproduction

Fertilization in lampreys is external. Mode of fertilization in hagfishes is not known. Development in both groups probably is external. There is no known parental care. Not much is known about the hagfish reproductive process. It is believed that hagfish only have 30 eggs over a lifetime. There is very little of the larval stage that characterizes the lamprey. Lamprey are only able to reproduce once [6]. After external fertilization, the lamprey's cloacas remain open, allowing a fungus to enter their intestines, killing them. Lampreys reproduce in freshwater riverbeds, working in pairs to build a nest and burying their eggs about an inch beneath the sediment. The resulting hatchlings go through four years of larval development before becoming adults

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