

HARBOR SEALS: Pinnipeds with Providential Bioengineering

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They that go down to the sea in ships, that do business in great waters, these see the works of the LORD, and his wonders in the deep. (Psalm 107:23-24)

Those who fish at sea, and other who “go down to the sea in ships”, have many occasions to see God’s “wonders in the deep”. All creatures of oceans and their coast-waters fit that category – because all such sea creatures, by their very lives, are “wonders” in water, giving witness to God’s glory and caring providence, showcasing the amazing Creator He is. One such example of is the **Harbor Seal**.

The **HARBOR SEAL** (*Phoca vitulina*), known in Britain as the “**Common Seal**”, is a creature well-known to the Vikings of old, as is documented below. They are peerless swimmers and divers, as we shall see.

[See John O. Whitaker Jr., ***National Audubon Society Field Guide to North American Mammals***, 1998 revised edition. New York, NY: Alfred A. Knopf, pages 728-730, Plate # 358.]

And thankfully—according to a recent study in Svalbard, an arctic territory of Norway—at least one pollution problem is improving for this seal, as well as for white whales and other oceanic marine mammals.

The toxicological study, published by Dr. Gro Villanger and her team (noted below) in the science journal *Environmental Pollution*, shows how certain now-banned pollutants are appearing in reduced quantities in marine mammals, compared to earlier years, indicating a decrease of those pollutants in ocean waters and oceanic food chains. Fixing problems is a lot harder than causing them. This is true in land-based healthcare, and in oceanic “public health” matters, such as ocean pollutants that routinely poison food chains for both people and animals.

In particular, the harbor seal and other marine mammals are slowly recovering from years of exposure to ocean-dumped pollutants called perfluoroalkyl substances.

[Dr. Gro Villanger and her team reported: “PFOS [perfluoroöctane sulfonate] concentrations in white whales were about half the concentrations in harbour (*Phoca vitulina*) and ringed (*Pusa hispida*) seals, similar to hooded seals (*Cystophora cristata*) and higher than in walruses (*Odobenus rosmarus*) from that same area. From 1996 ... to 2013-2014, plasma concentrations of PFOS decreased by 44%, whereas four C₉₋₁₂ PFCAs [perfluoroalkyl substances] and total PFCAs increased by 35-141%. These results follow a similar trend to what has been reported in other studies of Arctic marine mammals from Svalbard.” See Villanger, G. D., K. M. Kovacs, et al. 2020. “Perfluoroalkyl Substances (PFASs) in White Whales (*Delphinapterus leucas*) from Svalbard: A Comparison of Concentrations in Plasma Sampled 15 Years Apart”, *Environmental Pollution*. 263:114-497.]

The harbor seal has many other challenges in life, but at least the problem of perfluoroalkyl substance pollutants is reducing. So, count that as some good news in AD2020.

But just how special is a harbor seal anyway? This specific seal’s other common name is rather prosaic, called the “common seal” in Great Britain. Yet the bioengineering wonders that God installed within this ocean-going pinniped are far from common, as a few features prove.

Vikings noted their swimming skills in ancient sagas.



Harbor Seals are the world's most common temperate-water seal, often found along the temperate water coastlines (and continental shelves) of the Northern Hemisphere – in both the northern Atlantic and northern Pacific Oceans, and in coastal estuaries, and sometimes even as far south as Portugal! One subspecies (*Phoca vitulina mellonae*) lives only in freshwater.

Seals were well-known for their swimming skill, as is illustrated by the following quotation from an old Viking saga: “There was a man whose name was Gunnar [Hamondsson] ... a tall man in growth, and a strong man – best skilled in arms of all men. He could cut or thrust or shoot if he chose, as well with his left as with his right hand, and he smote so swiftly with his sword, that three [swords] seemed to flash through the air at once. He was the best shot with the bow of all men, and his arrows never missed their mark. ... He could swim like a seal [*emphasis added*], and there was no game in which it was any good for anyone to strive with him; and so it has been said that no man was his match...

[Quoting from Chapter 19, **NJAL'S SAGA**. See, accord, Magnus Magnusson & Hermann Pálsson, *NJAL'S SAGA* (New York: Penguin Classics, 1982), page 73.]

Vikings, including Gunnar's Icelander contemporaries, were obviously impressed with the superlative swimming skills of seals!

As a marine mammal, the Harbor Seal is a “pinniped” – i.e., it has fins, not feet. Also, it is earless (i.e., bearing no external ears) and carnivorous (eating animals of the sea). Being mammals, the seal mothers (“cows”) breastfeed their children (“pups”), as do mothers of all mammal species. Regarding size, the adult Harbor Seal ranges from 5 to 6 feet long, with bulls (males) a bit larger than cows). Body weight can approach 375 pounds!



The Harbor Seal's four flippers are ideal for swimming (as well as for diving and surfacing), and are not designed for a lot of “shore duty” walking, so seals move on land by undulating, like a caterpillar. These flippers have webbed digits – like finders or toes blended together – which can be used to scratch, groom, or provide defensive movements – and they stroke powerfully for precision swimming. But daily life, for a harbor Seal, is not all about swimming – they often “haul out” on shoreline or harbor-water rocks (or sandy beaches), to rest, to bask, to molt, to nurse babies, to give birth, and even to congregate with other seals for defense (e.g., against predators who cannot leave the seawater, such as orcas, a/k/a killer whales). Mother seals usually nurse their suckling pups at low tide. Ironically, seal reproduction occurs at sea. Like humans, seal gestation lasts for about nine

months; after birth, on shore, lactation lasts for about 4 to 6 weeks, with the birth weight of baby pups (as much as 35 pounds) doubling (i.e., to as much as 70 pounds) by the time they are weaned off their mother's fat-rich milk. Within hours of being born the seal pups can dive and swim – and their future lives will continue that habit for years to come.



When it comes to life at sea – and the Harbor Seal's true home is the water – the pinnipeds display their Creator's design-bioengineering to imagination-stretching levels (or depths!). Although Harbor Seals sometimes sleep on land, they can even sleep in the water, subconsciously surfacing for air as needed. Diving, and

swimming, underwater, is a seal's quintessential element – whether that be in the ocean, or an estuarial bay (i.e., “harbor”), or some freshwater river flowing into the sea. These seals can dive even more than a half-mile deep, when searching for food, and can remain underwater for about 40 minutes (though most dives last only around 5 minutes) – then they must return to the surface, to replenish their air for breathing. When seals dive into the ocean, their God-given interactive sensor-systems (which measure oxygen levels) and pre-programmed instincts adjust their physiology to their underwater diving needs.

When the seal's face is submerged, it automatically holds its breath, its heartbeat slows by up to 90% and its blood circulation is reduced, except to the most vital organs, the heart and brain. ... The dive reflex is responsible for the seal's ability to remain submerged for long periods. The harbor seal breathes out before diving, reducing its buoyancy. Also, the harbor seal has a very high blood / volume ratio, about 1.5 times that of a human. This allows a large amount of oxygen to be carried in the bloodstream instead of the lungs. The harbor seal has high myoglobin levels, allowing high levels of oxygen to be carried in the bloodstream and tissues, about 2.5 times that of a human.

[Quoting from **AquaFacts: Harbour Seals** (*Phoca vitulina*), posted by Vancouver Aquarium Marine Science Center, 2005, pages 1-4, citing Steve Kleene's “A Medical Marvel: the Diving Seal”, **SEA FRONTIERS**, 35:370-374 (Nov.-Dec. 1989).



Even the seal's whiskers help – the nerves inside seal whiskers help sense underwater pressure changes; the whisker nerves trigger internal physiology

adjustments that are needed to optimally respond to those changing underwater pressures. Scientists are now learning how super-sensitive seal whiskers are!

When waters are murky, how do seals find fish? They don't have a sonar apparatus like whales, and yet they somehow hunt successfully in the dark. It turns out that the seals follow fish trails by sensing very subtle water pressure changes with their whiskers. In a study published in the *Journal of Experimental Biology*, investigators trained harbor seals to give a visual signal indicating the direction of a "swimming" rubber fin that mimicked a fish. They then blindfolded and placed headphones on the seals to test their ability to hunt without sight or sound cues.

Not only were the seals able to detect the "fish's" movements, their whiskers may be able to distinguish even more precise information than just their prey's whereabouts. Senior author Wolf Hanke of the Marine Science Centre at the University of Rostock, Germany, told *BBC News*, "They seem to be able to discriminate between different shapes, which might even mean they discriminate between different species of fish."



The authors found evidence that the seals track the direction that a fish swims by sensing its underwater wakes, or trails of slightly disturbed water, that linger for up to 35 seconds. To do this, seals detect and

interpret "the structure and spatial arrangement of the vortices" that spin off from a fish's underwater trail. Not only can seals detect the vortices, but they can sense the "high water velocities" behind a swimming fish even after the fish is long gone. Water that trails a fish flows just a little faster than the surrounding waters. Somehow, the seal must automatically subtract the resistance caused by its own motion through the water in order calculate the exact location of its moving dinner. ...

The best explanation for the origin of these complex creatures remains the one presented in Genesis--that on the fifth day of creation, God said, "Let the waters bring forth abundantly the moving creature that hath life," and it was so [**Genesis 1:20**].

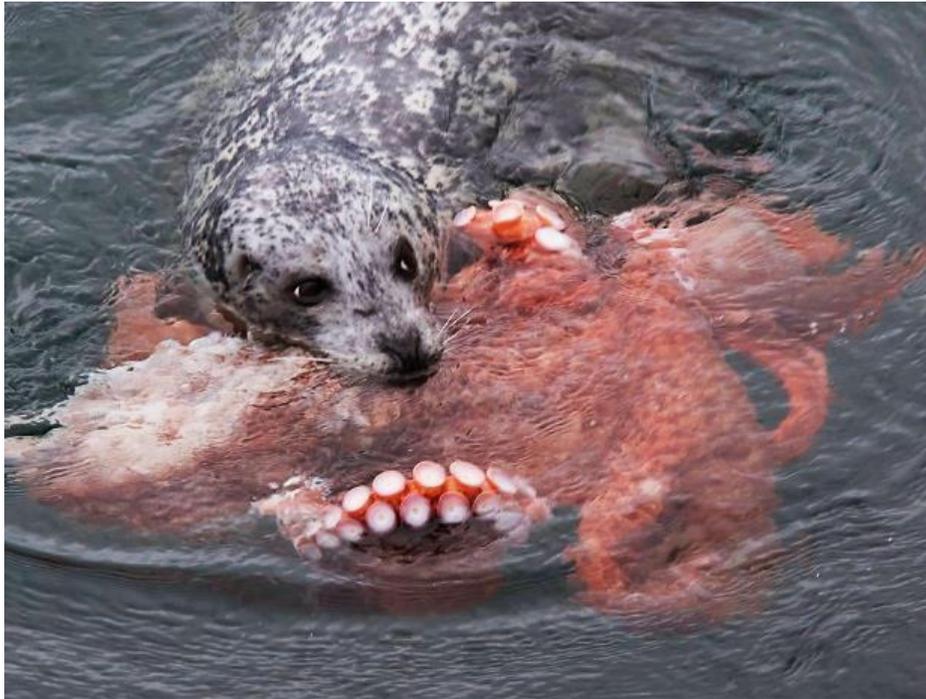
[Quoting Brian Thomas, "Seal Whiskers Track Fish Trails", *Creation Science Update* (June 22, 2010), citations omitted here, posted at <http://www.icr.org/article/seal-whiskers-track-fish-trails> .]

As warm-blooded mammals, Harbor Seals need to burn food energy to keep warm. Blubber helps to insulate the seal's core but food energy is a must, constantly! So, to maintain their body temperature, especially while they swim in super-frigid seawaters, they must eat a lot – and they are habitually hungry!



Harbor Seals frequently feast on cod, sea bass, mackerel, anchovy, whiting, herring, hake, sole, flounder, some crustaceans (including crabs and shrimps), small-sized octopus or squid, sometimes salmon or trout, or maybe even a sea-duck – eating about 5% of their body weight each day! Humans (like me) can enjoy a similar

“marine platter”, but not in the large portions that adult seals voraciously consume, to fuel their minimum daily nutrition requirements! (To compare seal appetites to your own metabolic habits, multiple your own body weight by 5%, then imagine eating that much each day!)



Harbor Seals don't really “chew” their food, though – rather, they bite and tear, crush with their molars, then quickly swallow whatever meat they eat. Perhaps a fitting greeting to a Harbor Seal would be “*Bon appetit!*”

But seals have a right to be hungry, and to eat a lot, because God made them to operate that way – they have a lot of work to do, as they eat and swim and dive, whisker-sensing where the next fish (meal) swam to, always displaying God's marvelous bioengineering!

O LORD, how manifold are thy works! In wisdom hast thou made them all: the earth is full of thy riches. So is this great and wide sea, wherein are things creeping innumerable, both small and great beasts. (Psalm 104:24-25)

[This article, prepared for a Norwegian Society of Texas event, incorporates content from the author's earlier studies, with an earlier report thereof appearing in *Viking History & Heritage Review*, Jan. AD2005, pages 4-6.] >< JJSJ profjjsj@aol.com