

Ptychodus shark fossils—indirect evidence for antediluvian longevity?

Jake Hebert

New research shows that giant fossil sharks in the genus *Ptychodus* had a morphology similar to that of the extant porbeagle shark, *Lamna nasus*.^{1,2} Previous research showed that *Ptychodus* likely experienced delayed maturation compared to extant sharks.³ This clarification of the *Ptychodus* body shape strengthens the argument for a prolonged growth interval, as explained below. This may be of interest to creationists because there is evidence that prolonged growth intervals and giantism are positively correlated with greater longevity in living animals.⁴⁻⁶

Giantism, delayed maturation, and longevity

Patten (1982) and Beasley (1990) suggested that larger adult body sizes and delayed maturation would accompany the extreme longevity of pre-Flood organisms, including humans.^{7,8} Studies of living animals have shown that larger adult body masses are positively correlated with longer lifespans, as are greater ages at sexual and skeletal maturity. Most of these examples cut across genera, but some are intrageneric and intraspecific.^{4,5} Moreover, biologists have long noted that lifespan and age at sexual and skeletal maturity tend to be proportional to adult body mass raised to the $\frac{1}{4}$ power, even in creatures with determinate growth. West *et al.*



Figure 1. A complete *Ptychodus* shark fossil from Late Cretaceous strata in northeastern Mexico

provided a theoretical justification for this latter relationship.⁹

Hence, the prolonged maturation and giantism of *Ptychodus* may be indirect evidence of greater longevity than that found in extant sharks. This could be partial confirmation of the greater longevity of the antediluvian patriarchs, as one might expect any non-supernatural cause for this longevity to affect animals as well as humans.

New fossil data

Paleontologists recently described fossil specimens of Cretaceous *Ptychodus* sharks from northeastern Mexico, two of which were articulated and complete (figure 1).^{1,2} Previous fossil material showed these were very large sharks, with estimated body lengths of 10 m or more and teeth indicating a likely durophagous lifestyle. However, the lack of a complete articulated fossil meant there was considerable uncertainty as to *Ptychodus*' morphology and size. This new research has removed some of that uncertainty, showing that the morphology was like that of a porbeagle shark. These researchers revised the maximum body length downward slightly to 9.7 m.¹

A recent paper summarized evidence that a number of fossil sharks, including *Ptychodus*, were characterized by giantism and

delayed maturation compared to today's sharks.³ Although most shark fossils are teeth, calcified vertebrae are occasionally found. Within the vertebrae are growth rings or bands similar to tree rings. Paleontologists count growth bands within these vertebrae to estimate a fossil shark's age at time of death. These age estimates are uncertain, because some sharks show evidence of twice-yearly growth rings during at least parts of their lives, and even in vertebrae from the same shark, the number of growth rings can vary from one vertebra to another. Nevertheless, researchers generally assume the growth bands are annual as a first approximation. Given an assumed morphology, researchers can use allometric equations to estimate the shark's body length as a function of age.

Yet, the rate of growth slows and growth bands become thinner as a shark matures. A 2020 paper by paleontologists P.L. Jambura and J. Kriwet discussed a Cretaceous fossil *Ptychodus*, from Spain, with 30 growth rings.¹⁰ They concluded, due to the near constant thickness of the growth rings, that it was still a rapidly growing juvenile, despite its age. Jambura said: "Based on the model, we calculated a size of 4–7 meters and an age of 30 years for the examined [*Ptychodus*] shark. It's astonishing that this shark was not yet mature when it died despite its rather old

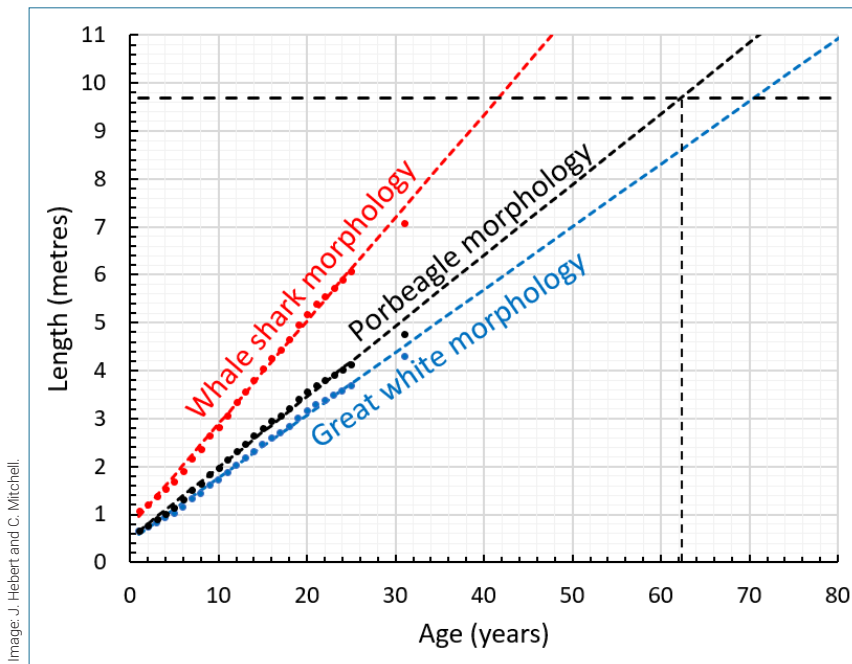


Image: J. Hebert and C. Mitchell.

Figure 2. Estimated juvenile growth trajectories for a *Ptychodus* shark, based on a body morphology like that of a whale shark (red), porbeagle shark (black), and great white shark (blue). Under the assumption of one growth band per year, an adult body length of 9.7 m, and a porbeagle-like morphology, age at skeletal maturity exceeded 62 years.

age ... this shark doesn't show any signs of flattenings or inflections in the growth profile, meaning that it was not mature—a teenager, if you want. This suggests that these sharks even grew much larger and older.”¹¹

The suggestion that this was an ‘old’ teenage shark should ‘resonate’ with creation researchers, because this phenomenon seems to also have characterized pre-Flood humans. The youngest age at which a Genesis 5 patriarch is listed as having a son is 65. We don't know if these were all first-born sons, but it seems likely that at least some of them were. And it is difficult to imagine humans reaching puberty at 13 years of age, but then waiting 50 years to have sexual relations! The Genesis 5 data *strongly* suggest that pre-flood humans were experiencing both delayed maturation and extreme longevity, as suggested by Patten and Beasley.

Methodology and results

These new fossils remove some of the uncertainty for a prolonged maturation interval in *Ptychodus* sharks. The length estimate of 4 m mentioned in the above quote was obtained under the assumption that *Ptychodus* had a morphology similar to that of a whale shark (*Rhincodon typus*). Likewise, the body length estimate of 7 m was obtained under the assumption that *Ptychodus* had a morphology similar to that of a great white shark (*Carcharodon carcharias*). Now that we know the *Ptychodus* morphology was more like that of a porbeagle shark, *Lamna nasus*, it is possible to convert growth-ring thicknesses to lengths using allometric equations relating porbeagle vertebral diameter to body length.¹² These relations imply that the Spanish fossil *Ptychodus* described by Jambura and Kriwet would have been about 4.76 m long at time of death (figure 2).

I extrapolated the rapid, straight-line juvenile growth to obtain estimated minimum times for this juvenile to reach a body length of 9.7 m under all three assumed morphologies. The slow-down in growth as the shark matured could only have *increased* this time to maturity.

I originally calculated that a *Ptychodus* would need a minimum of 43–73 years to attain a body length of 10 m.³ However, the updated growth trajectory (black dashed line in figure 2) shows that this time would have been closer to 73 years than 43 years, removing much of the uncertainty ‘spread’ in the previous estimate. Under the above assumptions, *Ptychodus* took more than 62 years to attain a body length of 9.7 m.

Other examples

Evidence for delayed or prolonged maturation in fossil sharks is not limited to *Ptychodus*. A similar methodology was used to estimate age at maturity in the megalodon (*Megalodon otodus*). Under the assumptions of a morphology like that of a great white shark, an adult body length of 15.9 m, and one growth band per year, the absolute minimum estimated skeletal maturation time for megalodon was 89 years.³ Likewise, Amalfitano *et al.* estimated that the Cretaceous shark, *Cretodus crassidens*, took 64 years to reach 95% of its maximum attainable length of between 9.6 to 11.3 m.^{3,13}

Moreover, some fossil snaggletooth shark (genus *Hemipristis*) teeth are much larger than those of extant snaggletooths.³ The same is true of teeth from fossil thresher and bluntnose sixgill sharks.^{3,14}

I encourage creationists to be alert for additional possible paleontological evidence for fossil giantism and delayed maturation, as these could be indirect evidence of greater antediluvian longevity.

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