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Age determination of sperm whales (*Physeter macrocephalus*) from the west coast of Jutland, Denmark

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Introduction

Age determination of sperm whales (*Physeter macrocephalus*) by counting growth layer groups (GLG's) in the teeth is to some extent considered to be subjective and only relative, due to: 1) Limited validation of GLG counts to "known age" of the individual; 2) Variation in methods for preparation of teeth e.g. acid (pH) and duration of etching; 3) Difference in interpretations of GLG's between readers^{1,2}. Bearing in mind these challenges, the age of three sperm whales stranded in Denmark in 2012 and 2014 were determined by counts of GLG's in the erupted teeth from the lower jaw and comparing these with the number of GLG's obtained from rudimentary teeth in the upper jaw.

Materials and methods

Teeth were obtained from 3 adult male sperm whales; MCE 1642, stranded at Nr. Lyngby Strand, Denmark in 2012; and MCE 1644 and MCE 1645, who stranded at Henne Strand, Denmark in 2014. From each whale one non-erupted tooth from the maxilla and one erupted mandibular tooth was cut longitudinally in two half's with a diamond blade saw and grained with sandpaper gain 800. One half of each tooth was etched in 10% acetic acid for 7 hours and the other half was etched in 15% acetic acid for 3.5 hours. The GLG's were counted several times by two readers.

Results

Based on counting of GLG's the average estimated ages of the three sperm whales were between 29 and 39 years. However, some deviation due to intra- and inter reader differences was observed. The number of GLG's in the rudimentary teeth did not differ significantly from the GLG's of the mandibular teeth. Pulp stones were seen in both erupted and non-erupted teeth from all three whales.

Conclusion

Further studies are needed to develop the current preparation techniques to make clear and more easily readable GLG's to obtain more accurate age determination of sperm whales.










Whale ID and length	Tooth		GLG's reader 1	GLG's reader 2	Comment
MCE 1642 12.8 m	Rudimentary non-erupted maxillary tooth		36	31	Pulp stones Average GLG's: 33.5
	Erupted mandibular tooth A B		27	31	Enamel and outer dentine layers worn Average GLG's: 29.5
			29	31	
MCE 1644 14.5 m	Rudimentary non-erupted maxillary tooth		34	33	Average GLG's: 33.5
	Erupted mandibular tooth A B		37	31	Enamel and outer dentine layers worn Pulp stones Average GLG's: 36
			43	33	
MCE 1645 12.8 m	Rudimentary non-erupted maxillary tooth A B		38	38	Pulp stones Average GLG's: 39
			41	38	
	Erupted mandibular tooth		-	-	Not sectioned (damaged due to vandalism)



Figure 1
Sperm whale (MCE 1644) stranded at Henne Strand, Denmark 2014. Photo: Mette Sif Hansen



Figure 2
The jaws of MCE 1645, stranded at Henne Strand 2014. Sperm whales usually only have lower teeth, albeit rudimentary upper teeth (insert) can exist like in this whale. Photo: Jørgen H. Hansen

References

¹ Evans et al., 2002. Factors affecting the precision of age determination of sperm whales (*Physeter macrocephalus*). J. Cetacean Res. Manage, 4, 193-201
² Evans et al., 2001. Age determination of marine mammals using tooth structure. Handbook from workshop 22-25 August 2007, at South Australian Museum