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Nota breve | Short note

On teeth of *Otodus megalodon* (Lamniformes: Otodontidae) from Cabo Verde, eastern Atlantic

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The megatooth shark *Otodus megalodon* is one of the most emblematic fossil vertebrates. Its massive teeth, several times larger than those of the largest living sharks, have been recovered from middle Miocene (~13 Ma) to Pliocene formations worldwide (Cappetta 2012, Pimiento *et al.* 2016). The youngest reliable records of *O. megalodon* are early Pliocene (Zanclean), suggesting an extinction at the early/late Pliocene boundary (~3.6 Ma) (Boessenecker *et al.* 2019). With adults reaching over 15 m (possibly up to 20 m, cf. Perez *et al.* 2021) in length and weighting more than 50 tons, *O. megalodon* is thought to have been an apex predator of marine mammals and one of the largest carnivorous animals in the history of Earth (Pimiento & Balk 2015, Shimada 2019, Cooper *et al.* 2020).

Within the eastern Atlantic islands, *O. megalodon* teeth have been reported from the Azores (Avíla *et al.* 2012), the Canary Islands (Betancort *et al.* 2016) and Cabo Verde (Serralheiro 1970, 1976). However, whereas specimens from the Azores and Canary Islands were fully documented, those from Cabo Verde were merely mentioned in passing within the context of geological studies.

During a field trip to Baía dos Barreiros, in the eastern part of the island of São Nicolau, Cabo Verde, in April 2013, Pedro A. Bicudo and JJC found a large shark tooth, apparently eroded from the adjacent limestone beds. Although abraded, it clearly represented a tooth of *O. megalodon* (Fig. 1A). These carbonate deposits crop out near the base of sea cliffs for 2.5 km from Baía dos Barreiros eastwards, constituting a four to five meter evenly thick band (Fig. 1B & C). Based on scant fossil content, Johnson *et al.* (2014) dated these beds as Messinian (late Miocene; 7.2-5.3 Ma). The tooth was deposited at the Museu da Pesca at Tarrafal, São Nicolau, Cabo Verde, where it is registered under collection number DOA/003/1023. In January 2023, another megalodon tooth was found at Fazenda, north of Tarrafal, on the island of Santiago (Fig. 1D).

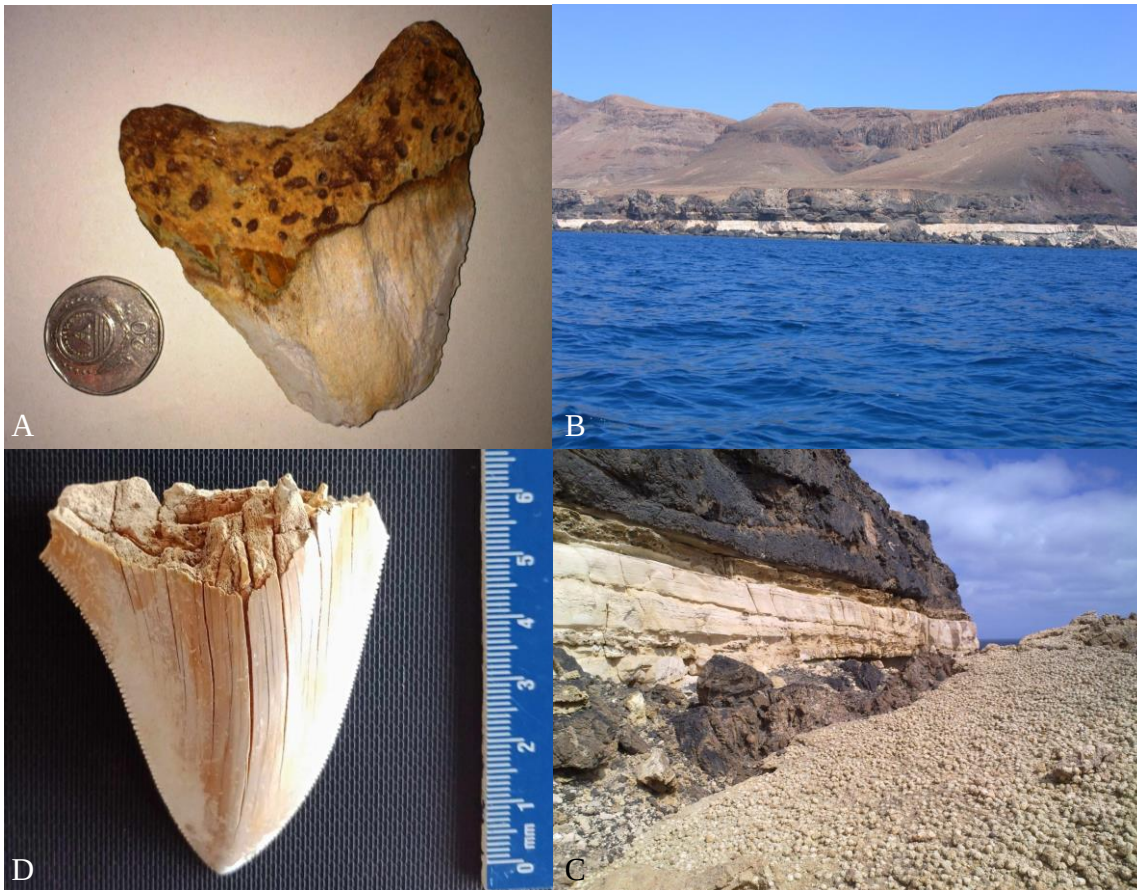

Fig. 1. A) Lingual view of Otodus megalodon tooth collected at Baía dos Barreiros, São Nicolau, Cabo Verde; Ø coin = 2.5 cm. (photo by Pedro A. Bicudo); **B)** The limestone bed (whitish band) at Baía dos Barreiros, São Nicolau, as seen from the sea (photo by José J. Cabral); **C)** A closer view of the limestone bed at Baía dos Barreiros, São Nicolau, from which the megalodon tooth eroded, with accumulation of rhodoliths in front (photo by José J. Cabral); **D)** Lingual view of *Otodus megalodon* tooth collected at Fazenda, Santiago, Cabo Verde (photo by Osvaldo Semedo).

Serralheiro (1970, 1976) mentioned two *O. megalodon* teeth from deposits just south of Porto Inglês on the island of Maio and another one from deposits near Ponta Preta, in the north of the island of Santiago, without, however, providing further details. Although Serralheiro (1970, 1976) stated that specimens had been collected, we have been unable to trace these teeth in any of the institutional geological or paleontological repositories in Lisbon. The specimens reported herein constitute the first fully documented *O. megalodon* teeth from Cabo Verde.

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REFERENCES

Avíla, S.P., Ramalho, R. & Vullo, R. (2012). Systematics, palaeoecology and palaeobiogeography of the Neogene fossil sharks from the Azores (Northeast Atlantic). *Annales de Paléontologie*, 98, 167–189.

Betancort, J.F., Lomoschitz, A. & Meco, J. (2016). Early Pliocene fishes (Chondrichthyes, Osteichthyes) from Gran Canaria and Fuertaventura (Canary Islands, Spain). *Estudios Geológicos*, 72, e054.

Boessenecker, R.W., Ehret, D.J., Long, D.J., Churchill, M., Martin, E. & Boessenecker, S.J. (2019). The Early Pliocene extinction of the mega-toothed shark *Otodus megalodon*: a view from the eastern North Pacific. *PeerJ*, 7, e6088.

Cappetta, H. (2012). *Chondrichthyes. Mesozoic and Cenozoic Elasmobranchii: teeth*. Handbook of Paleoichthyology, Vol. 3E, Verlag Friedrich Pfeil, München. 512 pp.

Cooper, J.A., Pimiento, C., Ferrón, H.G. & Benton, M.J. (2020) Body dimensions of the extinct giant shark *Otodus megalodon*: a 2D reconstruction. *Scientific Reports*, 10, 14596.

Johnson, M.E., Ramalho, R.S., Baarli, B.G., Cachão, M., da Silva, C.M., Mayoral, E.J. & Santos, A. (2014). Miocene–Pliocene rocky shores on São Nicolau (Cape Verde Islands): Contrasting windward and leeward biofacies on a volcanically active oceanic island. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 395, 131–143.

Perez, V.J., Leder, R.M. & Badaut, T. (2021). Body length estimation of Neogene macrophagous lamniform sharks (*Carcharodon* and *Otodus*) derived from associated fossil dentitions. *Palaeontologia Electronica*, 24, 1–28

Pimiento, C. & Balk, M.A. (2015). Body-size trends of the extinct giant shark *Carcharocles megalodon*: a deep-time perspective on marine apex predators. *Paleobiology*, 41, 479–490.

Pimiento, C., MacFadden, B.J., Clements, C.F., Varela, S., Jaramillo, C., Velez-Juarbe, J. & Silliman, B.R. (2016). Geographical distribution patterns of *Carcharocles megalodon* over time reveal clues about extinction mechanisms. *Journal of Biogeography*, 43, 1645–1655.

Serralheiro, A. (1970). *Geologia da ilha de Maio (Cabo Verde)*. Junta de Investigações do Ultramar, Lisbon. 103 pp.

Serralheiro, A. (1976). A geologia da ilha de Santiago (Cabo Verde). *Boletim do Museu e Laboratório Mineralógico e Geológico, Faculdade de Ciências da Universidade de Lisboa*, 14, 157–369.

Shimada, K. (2019). The size of the megatooth shark, *Otodus megalodon* (Lamniformes: Otodontidae), revisited. *Historical Biology*, 33, 904–911.

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