Aquatic Mammals 2015, *41*(2), 198-202, DOI 10.1578/AM.41.2.2015.198

Short Note

Potential Morphological Contributions to a Live Stranding: Abnormal Snout and *Conchoderma auritum* Infestation in a Bottlenose Dolphin (*Tursiops truncatus*)

Fernando R. Elorriaga-Verplancken,[1] Susana Tobar-Hurtado,[1]
Marco A. Medina-López,[2] Daniela Bárcenas de la Cruz,[1] and Jorge Urbán R.[2]

[1]*Departamento de Pesquerías y Biología Marina, Centro Interdisciplinario de Ciencias Marinas,*
Instituto Politécnico Nacional, Avenida IPN s/n, Colonia Playa Palo de Santa Rita, 23096, La Paz, Baja California Sur, México
E-mail: felorriaga@ipn.mx
[2]*Departamento Académico de Biología Marina, Universidad Autónoma de Baja California Sur, Carretera al Sur, km 5.5,*
Apartado Postal 19-B, CP 23080, La Paz, Baja California Sur, México

On 19 April 2014, an adult male bottlenose dolphin (*Tursiops truncatus*) measuring 2.68 m in length and exhibiting good body condition was found stranded alive (Figure 1) on a sandbar (24° 8.500' N, 110° 21.127' W) at La Paz Cove, Baja California Sur, Mexico (Figure 2). The specimen, identified as *Tt-190414-LAP*, was relocated to the shore to facilitate the rescue operation conducted by staff from different institutions, including the Procuraduría Federal de Protección Ambiental (PROFEPA; Attorney General for Environmental Protection, Mexico). During the initial general examination, two abnormalities were observed: (1) barnacle infestation around and inside the oral cavity (Figure 3a), and (2) the absence of about 50% of the snout, specifically the tip of the upper jaw (Figure 3b). Furthermore, barnacles were also found on the edges of both lobes of the caudal fin. To our knowledge, this is the first published record of these two anomalies for bottlenose dolphins, factors that may have ultimately contributed to the stranding of this individual.

Figure 1. Stranded bottlenose dolphin (*Tursiops truncatus*) identified as *Tt-190414-LAP*

A sample of the organisms attached to the oral cavity was taken. During a procedure that lasted approximately 1 h—following protocols to ensure the safety of the dolphin and the workers—rescuers were able to remove most of the barnacles using knives, scalpels, and pliers. Aside from the condition mentioned above, the snout showed no other signs of recent injury or infection. We did not observe any direct evidence of anthropogenic, interspecies, or intraspecies interactions that could have led to the absence of the tip of the upper jaw. A significant weakening was observed in the dolphin after several hours of being stranded. However, after the removal of the barnacles and administration of an intramuscular dose of protein complexes (40 mL, amino-lite, Boehringer Ingelheim), a significant improvement was observed (Figure 4), and the animal was released in deeper waters. Following its release, the dolphin was monitored by boat for approximately 30 min until it was out of our sight to ensure normal behavior. While it is not possible to determine that the animal survived or will not become re-infested, our group belongs to the Mexican Stranding Network of the Mexican Society of Marine Mammalogy (SOMEMMA, AC), and, as members of this network, we have not received any news on a new stranding of this individual on any beach in the region (as of 1 March 2015).

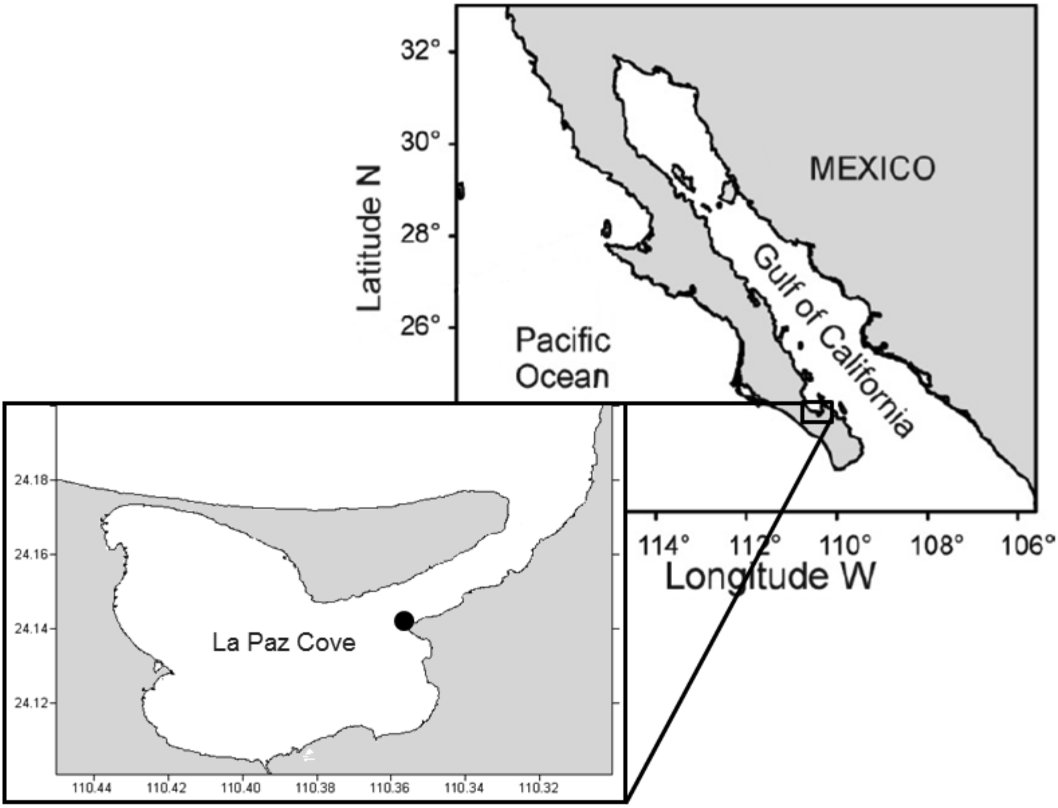

Figure 2. Bay of La Paz, Baja California Sur, México, the location of the bottlenose dolphin *Tt-190414-LAP* stranding

Conchoderma auritum Infestation

Barnacles removed from the oral cavity of *Tt-190414-LAP* were subsequently identified as rabbit-ear barnacles (*Conchoderma auritum*; Linnaeus, 1767), and the ones removed from the edges of the caudal fin were identified as *Xenobalanus globicipitis* (Steenstrup, 1851). Both barnacle species belong to the infraclass Cirripedia. Around 20 species of barnacles have been found attached to marine mammals, primarily cetaceans (Newman & Ross, 1976). Barnacles do not feed on their hosts, but, rather, they attach themselves and feed on other resources like plankton; thus, they are not considered parasites (Fertl & Newman, 2008). However, in large quantities, barnacles can cause injuries and affect the hydrodynamics of their host, reducing mobility and other activities (Fontaine, 2007). The number of barnacles reported for different individuals varies greatly, ranging from one to about 100 barnacles per individual, depending upon the cetacean species. In contrast to baleen whales, relatively few barnacle infestations in odontocetes have been reported (e.g., Aznar et al., 2005; Toth-Brown & Hohn, 2007). Although it was not possible to count the number of barnacles attached to *Tt-190414-LA*, we estimate there were more than 100 individuals of the species *C. auritum* inside and around the oral cavity, and approximately 15 *X. globicipitis* over the caudal fin.

X. globicipitis are commonly observed on the edges of cetacean fins, flukes, and flippers (Kane et al., 2008); only in rare cases has the species been observed on the rostrum and between the teeth (Samaras, 1989). This barnacle has been reported for 34 species of cetaceans (including *T. truncatus*) from both temperate and tropical distributions (Kane et al., 2008). This barnacle becomes embedded under the skin of bottlenose dolphins, forming calcareous plates that cause a thickening of the epidermis (Pugliese et al., 2012).

Unlike *X. globicipitis*, *C. auritum* is not a cetacean specialist. This barnacle species attaches itself to hard surfaces, both living and inanimate (Fontaine, 2007; Fertl & Newman, 2008). They have been observed in the baleen of several whale species (Clarke, 1966; Christensen, 1986). They have also been observed in the naturally exposed teeth of Baird's beaked whales (*Berardius bairdii*) (Rice,

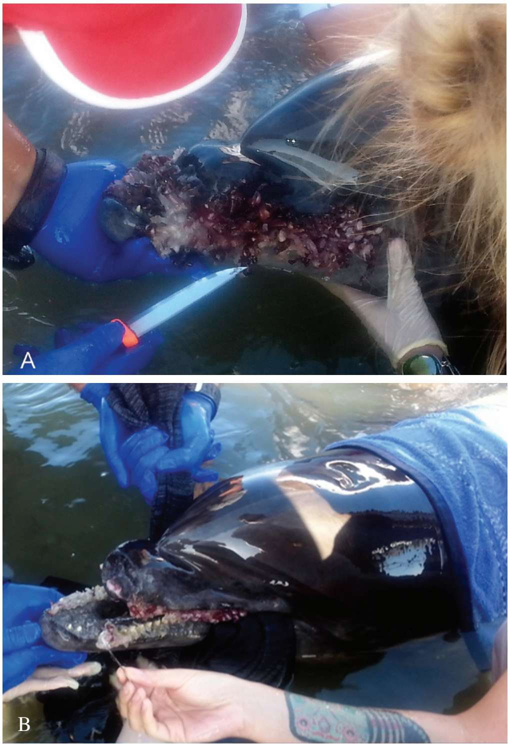

Figure 3. Stranded bottlenose dolphin *Tt-190414-LAP* showing the *Conchoderma auritum* barnacle infestation (A) and the absence of around 50% of the snout (B)

Figure 4. Stranded bottlenose dolphin *Tt-190414-LAP* after removing the barnacle infestation; the section missing from the snout is evident.

1963), and in odontocetes with malformations or lesions, including sperm whales (*Physeter macrocephalus*) (Clarke, 1966; Ramírez, 2001), spotted dolphins (*Stenella attenuata*) (Perrin, 1969), striped dolphins (*Stenella coeruleoalba*) (Aznar et al., 1994), and melon headed whales (*Peponocephala electra*) (Van Waerebeek et al., 2008). The common denominator in all of these cases is the presence of exposed teeth. The teeth of the bottlenose dolphin discussed herein were exposed due to the absence of the tip of the upper jaw, which may have promoted the attachment and growth of this barnacle species. The teeth exhibited some wear, and barnacles were also observed attached to the gums and skin (Figure 3B). These Cirripedia infestations of the oral cavities of odontocetes are unusual, but several factors may be responsible, including intrinsic (e.g., swimming speed, age, exposed hard structures, immunosuppression) and extrinsic (e.g., upwelling, water temperature and pressure, distance from the coast) factors (Aznar et al., 1994, 2005; Toth-Brown & Hohn, 2007; Kane et al., 2008; Bearzi & Patonai, 2010).

This is one of the few recorded cases of this type of infestation in odontocetes and, to our knowledge, the first published for *T. truncatus*.

Abnormal Snout

After careful and thorough examination of *Tt-190414-LAP*'s snout, we suggest two possible scenarios to explain the absence of approximately 50% of this structure: (1) traumatic injury due to interaction with fisheries and (2) malformation.

Traumatic injuries to marine mammals derive from one of two sources of interaction: (1) intra/interspecific or (2) anthropogenic. The snout did not exhibit typical rake marks or teeth marks (Dierauf & Gulland, 2001); therefore, the abnormality of the snout was not caused by aggressive behavior or depredation. Even though the snout appeared to have a "clean cut" on its tip, we were also able to reject the scenario of the upper jaw being fractured because of a vessel collision, as observed in some stranded mysticetes and sperm whales. Unlike the elliptical markings created by predators, propellers can cut bone cleanly. However, such accidents generally result in multiple deep, parallel cuts of the same size on other body parts; this was not the case with the lesion reported herein. Moreover, if the snout had been cut by the propeller of a boat (or some other acute injury), the individual would have likely bled to death (Byard et al., 2001; Dierauf & Gulland, 2001; Van Waerebeek et al., 2006; Van Bressem et al., 2007).

On the other hand, marine mammals can become entangled in fishing lines and nets. In addition to causing the drowning of many marine animals, gillnets can also cause chronic injuries. As the animal grows or drags the net or line, these fishing debris tighten and constrict the body of the entangled animal. Particularly in the case of monofilament nets, if an entangled animal is not rescued or cannot free itself of the fishing debris, they may deform or mutilate their body (Byard et al., 2001; Dierauf & Gulland, 2001).

It is fairly common to find bottlenose dolphins with mutilated fins, flukes, and flippers, as well as individuals with remnants of fishing nets and lines (Kiszka et al., 2008). To our knowledge, snout mutilations derived from interactions with fisheries have not been reported; however, fractured bones (skull and humerus) have been observed in some entangled pinnipeds (Spraker, in press). Fractured jaws due to interactions with fisheries have also been reported for short-finned pilot whales (*Globicephala macrorhynchus*) (Oremland et al., 2010). If this was the origin of the observed abnormality, it is possible that a monofilament net or debry became entangled around *Tt-190414-LAP*'s snout, gradually constricting and ultimately fracturing and amputating the upper jaw as the animal grew. Research on *T. truncatus* indicates that major injuries penetrating skin, fat, muscle, and bone can heal within 6 to 7 mo, leaving affected areas deformed and devoid of pigmentation, as observed in Figure 3B (Lockyer & Morris, 1990).

Malformations affecting the maxilla, pre-maxilla, mandible, sternum, and ribs, as well as the occipital, thoracic, and cervical vertebrae, have been observed in several species of cetaceans. It is not yet clear whether these defects are genetic or derived from other factors (Dierauf & Gulland, 2001). Malformations of the beak (e.g., diverted snout, prognathism, and brachygnathia) have been reported for *Lagenorhynchus obscurus*, *Delphinus capensis*, and *T. truncatus*; such abnormalities are benign and likely do not interfere with feeding or other life activities (Van Bressem et al., 2006, 2007). The abnormality of the snout observed in *Tt-190414-LAP* has not been specifically reported as a malformation for *T. truncatus*, although we cannot rule out this possibility given the previous records of beak malformations in other dolphins.

To our knowledge, *Tt-190414-LAP* has not been reported in the study area before. Since adult males usually do not travel and feed in groups, it is possible that the dolphin reported is either a transient that just recently started frequenting La Paz Cove or a resident of the cove with a relatively recent abnormality, thus ruling out malformation as the origin of the condition. *C. auritum* is a barnacle species mainly found in pelagic cetaceans (Clarke, 1996), supporting the idea that *Tt-190414-LAP* is a transient dolphin. Typically, oceanic bottlenose dolphins feed primarily on offshore prey, while their coastal counterparts feed in shallower waters (Reeves et al., 2002). However, this dolphin may have been feeding in the shallow waters of the cove, leading to its beaching in these mud banks. We must acknowledge that visual evidence was insufficient to clearly define *Tt-190414-LAP* as an oceanic ecotype *Tursiops*.

In summary, based on (1) the abnormal condition of the snout and the barnacle infestation in the oral cavity, which impeded the proper prehensile function of the mandible; (2) the good body condition of the animal, indicating that *Tt-190414-LAP* was able to feed; (3) the shallow area where this individual was found stranded; and (4) the dolphin's reaction upon release, we suggest that an interaction between its physical state and the characteristics of the location facilitated its stranding.

Acknowledgments

We thank the Procuraduría Federal de Protección Ambiental (PROFEPA; Attorney General for Environmental Protection) of La Paz, Baja California Sur, and PROFEPA representative Roberto Robles; Francisco Gómez, Diego Ruiz, and Claudia Ballinez, members of the Museo de la Ballena y Ciencias Marinas, A. C. (Whale and Marine Sciences Museum); Carlos Alberto López, Sergio Martínez, and Hiram Rosales of the Programa de Investigación y Conservación de Mamíferos Marinos from UABCS (Marine Mammal Research and Conservation Program at the Autonomous University of Baja California Sur); Casandra Gálvez, Aurora Paniagua, and Ana Nader of the Centro Interdisciplinario de Ciencias Marinas (CICIMAR-IPN; Interdisciplinary Center for Marine Sciences at the National Polytechnic Institute); and Alfredo Benítez, for their assistance in rescuing *Tt-190414-LAP*, as well as the Sociedad Mexicana de Mastozoología Marina (SOMEMMA; Mexican Society of Marine Mammalogy) and its Stranding Network. We also thank Francisco, the fisherman who helped to transport the animal to deeper waters for its release. FREV thanks the Instituto Politécnico Nacional (IPN; National Polytechnic Institute) for funding received through the Programa de Contratación por Excelencia (Contracting Excellence Program).

Literature Cited

Aznar, F., Balbuena, J., & Raga, J. (1994). Are epizoites biological indicators of a western Mediterranean striped dolphin die-off? *Diseases of Aquatic Organisms*, *18*, 159-163. http://dx.doi.org/10.3354/dao018159

Aznar, F., Perdiguero, D., Pérez del Olmo, A., Repulles, A., Agusti, C., & Raga, J. (2005). Changes in epizoic crustacean infestations during cetacean die-offs: The mass mortality of Mediterranean striped dolphins *Stenella coeruleoalba* revisited. *Diseases of Aquatic Organisms*, *67*(3), 239-247. http://dx.doi.org/10.3354/dao067239

Bearzi, M., & Patonai, K. (2010). Occurrence of the barnacle (*Xenobalanus globicipitis*) on coastal and offshore common bottlenose dolphins (*Tursiops truncatus*) in Santa Monica Bay and adjacent areas, California. *Bulletin* *of the Southern California Academy of Sciences*, *109*(2), 37-44. http://dx.doi.org/10.3160/0038-3872-109.2.37

Byard, R., Gilbert, J., & Kemper, C. (2001). Dolphin deaths: Forensic investigations. *Medical Journal of Australia*, *175*(11-12), 623-624.

Christensen, I. (1986). First record of gooseneck barnacles (*Conchoderma auritum*) on a minke whale (*Balaenoptera acutorostrata*). *Fauna Norvegica Series A*, *7*, 15-16.

Clarke, R. (1966). The stalked barnacle *Conchoderma*, ectoparasitic on whales. *Norsk Hvalfangsttidende*, *55*(8), 153-168.

Dierauf, L. A., & Gulland, F. M. D. (2001). *Marine mammal medicine* (2nd ed.). Boca Raton, FL: CRC Press.

Fertl, D., & Newman, W. (2008). Barnacles. In W. F. Perrin, B. Würsig, & J. G. M. Thewissen (Eds.), *Encyclopedia of marine mammals* (2nd ed., pp. 89-91). New York: Elsevier Press.

Fontaine, P. (2007). *Whales and seals: Biology and ecology*. Atglen, PA: Schiffer Press.

Kane, E., Olson, P., Gerrodette, T., & Fiedler, P. (2008). Prevalence of the commensal barnacle *Xenobalanus globicipitis* on cetacean species in the eastern tropical Pacific Ocean, and a review of global occurrence. *Fishery Bulletin*, *106*(4), 395-404.

Kiszka, J., Pelourdeau, D., & Ridoux, V. (2008). Body scars and dorsal fin disfigurements as indicators of interactions between small cetaceans and fisheries around the Mozambique Channel Island of Mayotte. *Western Indian Ocean Journal of Marine Science*, *7*(2), 185-193. http://dx.doi.org/10.4314/wiojms.v7i2.48276

Lockyer, C., & Morris, R. (1990). Some observations on wound healing and persistence of scars in *Tursiops truncatus*. *Reports of the International Whaling Commission*, *Special Issue 12*, 113-118.

Newman, W., & Ross, A. (1976). *Revision of the balanomorph barnacles, including a catalog of species* (Memoirs of the San Diego Society of Natural History, No. 9).

Oremland, M., Allen, B., Clapham, P., Moore, M., Potter, C., & Mead, J. (2010). Mandibular fractures in short-finned pilot whales, *Globicephala macrorhynchus*. *Marine Mammal Science*, *26*(1), 1-16. http://dx.doi.org/10.1111/j.1748-7692.2009.00334.x

Perrin, W. F. (1969). The barnacle, *Conchoderma auritum*, on a porpoise *Stenella graffmani*. *Journal of Mammalogy*, *50*, 149-151. http://dx.doi.org/10.2307/1378651

Pugliese, M., Böttger, S., & Fish, F. (2012). Barnacle bonding: Morphology of attachment of *Xenobalanus gloicipitis* to its host *Tursiops truncatus*. *Journal of Morphology*, *273*(4), 453-459. http://dx.doi.org/10.1002/jmor.20006

Ramírez, P. (2001). *Cachalotes (*Physeter catodon *L.) con mandíbula deformada, cazados en Paita, Período 1959-1963* (Sperm whales [*Physeter catodon* L.] with deformed jaw, hunted in Paita, period 1959-1963) (Report No. 136). Chucuito Callao: Instituto del Mar del Perú.

Reeves, R., Brent, S., Clapham, P., & Powell, J. (2002). *Guide to marine mammals of the world*. Woodstock, VT: National Audubon Society, Chanticleer Press.

Rice, D. (1963). Progress report on biological studies of the larger Cetacea in the waters off California. *Norsk Hvalfangst-Tidende*, *52*, 181-187.

Samaras, W. (1989). New host record for the barnacle *Cryptolepas rhachianecti* Dall, 1872 (Balanomorpha: Coronulidae). *Marine Mammal Science*, *5*(1), 84-87. http://dx.doi.org/10.1111/j.1748-7692.1989.tb00216.x

Spraker, T. (In press). *Pathological findings in northern fur seals from the Pribilof Islands, 1986-2000* (NOAA Technical Memorandum). Seattle, WA: National Marine Mammal Laboratory.

Toth-Brown, J., & Hohn, A. (2007). Occurrence of the barnacle, *Xenobalanus globicipitis*, on coastal bottlenose dolphins (*Tursiops truncatus*) in New Jersey. *Crustaceana*, *80*(10), 1271-1279. http://dx.doi.org/10.1163/156854007782321137

Van Bressem, M., Reyes, J., Felix, F., Echegaray, M., Siciliano, S., Di Beneditto, A. P., . . . Fragoso, A. B. (2007). A preliminary overview of skin and skeletal diseases and traumata in small cetaceans from South American waters. *Latin American Journal of Aquatic Mammals*, *6*(1), 7-42. http://dx.doi.org/10.5597/lajam00108

Van Bressem, M., Van Waerebeek, K., Montes, D., Kennedy, S., Reyes, J. C., Garcia-Godos, A., . . . Alfaro-Shigueto, J. (2006). Diseases, lesions and malformations in the long beaked common dolphin (*Delphinus capensis*) from the Southeast Pacific. *Diseases of Aquatic Organisms*, *68*(2), 149-165. http://dx.doi.org/10.3354/dao068149

Van Waerebeek, K., Hazevoet, C. J., Suarez, P. L., Rodrigues, M. S. D., & Gatt, G. (2008). *Preliminary findings on the mass strandings of melon-headed whale* Peponocephala electra *on Boavista Island in November 2007, with notes on other cetaceans from the Cape Verde Islands*. Technical Report presented to the Fondation Internationale du Banc d'Arguin.

Van Waerebeek, K., Baker, A., Felix, F., Gedamke, J., Iñiguez, M., Sanino, G. P., . . . Wang, Y. (2006). *Vessel collisions with small cetaceans worldwide and with large whales in the Southern Hemisphere: Building a standardized database* (Scientific Committee Document SC/58/BC6). Gland, Switzerland: International Whaling Commission.