Cases of teeth concrescence in the Pacific walrus (Odobenus rosmarus divergens)

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ABSTRACT. Three cases of concrescence of the fourth premolar with the first molar and one case of concrescence of the third and the fourth premolars are described in the Pacific walrus, Odobenus rosmarus divergens (Illiger, 1815). These cases represent 0.3% of the total number of inspected teeth (n = 1206) from 307 animals. All individuals (n = 3) were adult males aged 22–26 years old. The beginning of concrescence was found in animals ranging from 7 to 23 years old. The sections of concrescent teeth showed them to be joined by newly deposited layers of cementum.


KEY WORDS: dental anomalies, concrescence, Pacific walrus.

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Material and Methods

Maxillae and/or mandibles from dead and harvested walruses were examined in three areas: Retkyn Spit (Bering Sea) in 2007 and 2008, Vankarem Cape, Kolyma Island, and the area of the Chegitun River (Chukchi Sea) in 2010 and 2011. In addition, maxillae and/or mandibles of the Pacific walrus from several museums (Zoological Museum of Moscow University, Zoological Institute of the Russian Academy of Sciences, Museum of the Russian Federal Research Institute of Fish-
Fig. 1. Pacific walrus (O. rosmarus divergens), Vankarem Cape, Chukotka, Russia (personal collection of the author), male 24 years old. Concrescence of left maxillary third premolar (P3) with the adjacent fourth premolar (P4) in the 2nd individual (A — photo, B — section).

Results and discussion

In the examined material (n = 1206), joined teeth were detected in only four cases in three adult walruses, from the Vankarem Cape region (Chukchi Sea). In one individual (1st male, age 26 years), both rudimentary (vestigial) teeth were joined in the maxilla: fourth premolar and first molar (Fig. 2). In the remaining cases, there was a union of a functional tooth with a rudimentary tooth: in one individual (2nd male, age 24 years) this occurred in the maxilla between the maxillary third premolar and fourth premolar (Fig. 1), and in another individual (3rd male, age 22 years) in the mandible between the mandibular fourth premolar and the first molar (Fig. 3).

Teeth dimensions were measured as following: maxillary third premolar (total tooth length is 2.4 cm; maximum width, 1.25 cm), maxillary fourth premolar, n = 3, (total tooth length, 0.85–1.55 cm; maximum width, 1.25–1.5 cm), maxillary first molar, n = 2, (total tooth length, 0.5–0.7 cm; maximum width, 0.5–0.55 cm), mandibular fourth premolar (total tooth length, 3.4 cm; maximum width, 2 cm), mandibular first molar (total tooth length, 1 cm; maximum width, 0.6 cm).

In all four pairs of joined teeth, one tooth was smaller than the other. The area of union of the teeth was along the root surfaces and was effected by cementum. In one pair, the smaller tooth joined the larger tooth at the middle; in the other three pairs the small tooth joined with the upper part of the large tooth, near the attrition surface (the crown) of the tooth.

The union of teeth by cementum which occurred without the union of dentin is shown in Figure 1. According to the classification described by Neville et al. (2016), this is a concrescence type of joined teeth. Prior
to the concrescence of teeth, normal annual cement layers were deposited around the root surface of each tooth. When concrescence begins, the annual cement layers join the root area of both teeth. At the same time new layers were not formed in the contact area between the two teeth. As a result, in the root area of joined teeth, we found a higher number of annual cement layers than in the same teeth along the contact area. Our results show that the age of the beginning of teeth concrescence in the 1st animal was 11 years (1st pair of teeth) and 20–23 years (2nd pair of teeth). In the 2nd animal, concrescence occurred at 12 years, and at 7 years in the 3rd animal. In some teeth the cement on external surface of root was partly resorbed. This occurred in both pairs of the rudimentary teeth of the 1st individual, and in the first molar of the 3rd individual.

There are several factors potentially affecting this process as a tooth pair developing in close proximity, local trauma, systemic disease, lack of vitamins, and genetics (Knežević et al., 2002; Gunduz et al., 2006). Trauma or disease could partly destroy the cement of the tooth, and subsequent repair of the damaged area by cement layers could lead to teeth union, especially if an adjacent tooth is close (Neville et al., 2016).

In our study it was shown that teeth are joined by newly deposited layers of cementum. The particular causes of the described cases of teeth concrescence are unclear and need more investigations.

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References


