

Cranial morphometry of adult Mediterranean monk seal (*Monachus monachus*) from the Adriatic Sea

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Fig 1. Skull of the adult Mediterranean monk seal (*Monachus monachus*) from Biševo, Adriatic Sea, 1964.

Introduction

The Mediterranean monk seal (*Monachus monachus*)

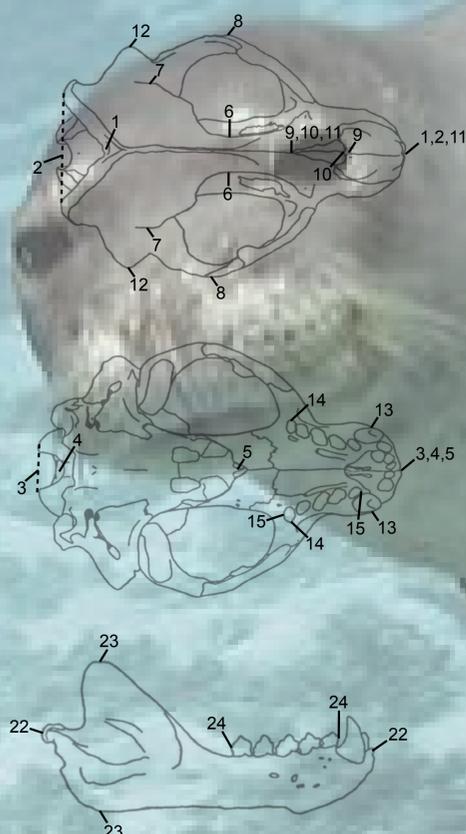
- is one of the most endangered animal species in the world
- was spread along the Adriatic Sea in the past
- is declared extinct in this region since the second half of the 20th century

Materials and methods

- we made cranial morphometry of an adult Mediterranean monk seal skull (Fig. 1)
- skull originated from the year 1964 and it is presumed that the specimen was killed by a fisherman on the small island Biševo, close to the island Vis
- skull is now housed in the marine mammal collection of the Department of Anatomy, Histology and Embryology of the Faculty of Veterinary Medicine, University of Zagreb, Croatia
- twenty-four cranial measurements were taken using digital calipers (Fig. 2)
- DNA was isolated from the tooth for sex determination

Results and discussion

- skull belonged to a female
- craniometrical measurements are presented in Table 1
- craniometrical data of one of the last adult autochthonous specimen of the Mediterranean monk seal from the Adriatic Sea are preserved



1. Total length: from the most caudal point of vertex of the cranium in the median plane - median point of the line joining the most rostral points of incisive bones
2. Length from median point of the line joining the most caudo-dorsal points of the crista nuchae - median point of the line joining the most rostral points of incisive bones
3. Condylbasal length: caudal border of the occipital condyles - median point of the line joining the most rostral points of incisive bones
4. Basal length: from the basal border of the foramen magnum in the median plane - median point of the line joining the most rostral points of incisive bones
5. Palatal length: median point of the line joining the most rostral points of incisive bones - the most caudal point of the horizontal part of the palate in the median plane
6. Least breadth of skull - least breadth caudal of the supraorbital processes
7. Greatest neurocranium breadth - greatest breadth of the braincase
8. Zygomatic breadth;
9. Greatest length of the nasals: from median point of naso-frontal suture - median point of the line joining the most rostral points of the nasals
10. Length of nasal suture;
11. Viscerocranium length: from median point of naso-frontal suture - median point of the line joining the most rostral points of incisive bones
12. Greatest mastoid breadth
13. Breadth at the canine alveoli
14. Width of skull at rostral end of last upper molars;
15. Length of upper molar row;
16. Maxilla-supraorbital height (14);
17. Condylopalatal length (12);
18. Molar-premaxilla length (9);
19. The width of the external nasal openings (17);
20. Interorbital breadth (4);
21. Coronoid height (15);
22. Length of the mandible: from condyle process - most prominent median point at the rostral border of the alveoli of the incisors
23. Height of vertical ramus: basal point of angular process - highest point of the coronoid process
24. Length of the mandible molar row

Table 1. Twenty-four cranial measurements of the adult Mediterranean monk seal skull from the Adriatic Sea with craniometrical data from adult Mediterranean monk seals published by KING (1956).

| Cranial measurement | <i>M. monachus</i> (female), Adriatic Sea, this study | | <i>M. monachus</i> (female), Madeira, KING 1956 | | <i>M. monachus</i> (male), Madeira, KING 1956 | |
|---------------------|---|-------|---|------|---|------|
| | mm | % | mm | % | mm | % |
| 1 | 247,7 | 95,7 | | | | |
| 2 | 263,3 | 101,8 | | | | |
| 3 | 258,7 | 100 | 268 | 100 | 281 | 100 |
| 4 | 237,8 | 91,9 | 251 | 93,6 | 263 | 93,5 |
| 5 | 106,6 | 41,2 | 110 | 41,0 | 117 | 41,6 |
| 6 | 27,7 | 10,7 | | | | |
| 7 | 107,3 | 41,5 | | | | |
| 8 | 178,7 | 69,1 | 176 | 65,6 | 193 | 68,6 |
| 9 | 44,7 | 17,3 | | | | |
| 10 | 43,0 | 16,7 | 53 | 19,7 | 46 | 16,3 |
| 11 | 99,0 | 38,3 | | | | |
| 12 | 159,0 | 61,5 | | | | |
| 13 | 53,1 | 20,5 | 57 | 21,2 | 68 | 24,1 |
| 14 | 72,8 | 28,1 | 60 | 22,3 | 76 | 27,0 |
| 15 | 58,5 | 22,6 | 57 | 21,2 | 60 | 21,3 |
| 16 | 48,0 | 18,6 | | | | |
| 17 | 144,6 | 55,9 | | | | |
| 18 | 75,6 | 29,2 | | | | |
| 19 | 36,2 | 14,0 | | | | |
| 20 | 61,0 | 23,6 | | | | |
| 21 | 82,1 | 31,7 | | | | |
| 22 | 180,2 | 69,7 | | | | |
| 23 | 76,8 | 29,7 | | | | |
| 24 | 60,0 | 23,2 | | | | |

Fig. 2. Cranial measurements of the Mediterranean monk seal. The same ID number was used for the beginning and ending point of the measurement, dorsal view (top), ventral view (middle), mandible (bottom)