ASSESSMENT OF MORPHOMETRIC PARAMETERS OF TUNA *THUNNUS THYNNUS* (LINNAEUS, 1758) BASED ON MUSEUM EXHIBITS, DUBROVNIK NATURAL HISTORY MUSEUM

Marija Crncevic 1, Marijana Cukrov 2 * and Katarina Ivanišin-Kardum 1
[1] Dubrovnik Natural History Museum, Androviceva 1, 20000 Dubrovnik, Croatia - mcrncevic@dubrovnik.hr
[2] Croatian Biospeleological Society, Demetrova 1, 10000 Zagreb

Abstract
The natural objects of the Dubrovnik Natural History Museum, such as the head and the caudal fin of tuna *Thunnus thynnus* (Linnaeus, 1758.), which as species is listed on the Red list of threatened plants and animals of Croatia, are a valuable source of data of this threatened species in the Adriatic Sea. These Museum objects, as well as the relevant existing written historical documents and existing scientific knowledge regarding tuna were used to assess the morphometric characteristics. The parameters will be used in construction of a credible complete model of tuna that will form part of the Museum permanent collection, with emphases on its educational aspects.
Keywords: Adriatic Sea, Pelagic, Fishes

Introduction
The dermoplastic preparations of the head (Figure 1) and the caudal fin of tuna *Thunnus thynnus* (Linnaeus, 1758) belong to the particularly valuable natural objects of the Dubrovnik Natural History Museum. According to the written data it was caught near the small town Ston in 1897 and it weighed around 275 kg [1].

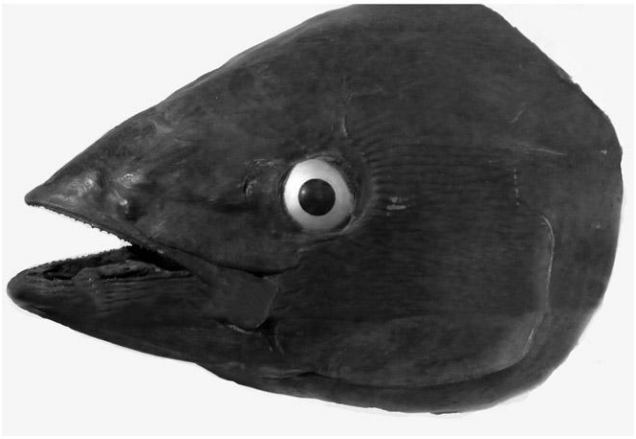

Fig. 1. The dermoplastic preparation of the head of tuna *T. thynnus*, Dubrovnik Natural History Museum

Tuna is a large and high migratory species. Usually they school by size. This fast swimming bony fish occurred in almost whole Adriatic Sea: along the coast, in channels and especially in open sea, rare along the Istria coast [2]. Tuna fishing have a long tradition in Croatia.

Due to its economic value the population of tuna in the Adriatic Sea has been significantly reduced. According to the IUCN categorisation, these species have been included in the Red book of sea fishes of Croatia [2]. In line with the legislation of the Republic of Croatia, tuna is a protected species [3], and fishing is regulated by the catch quotas in accordance with recommendations of the International Commission for the Conservation of Atlantic Tunas [4].

Material and Methods
On the basis of morphometric characteristics of the Museum exhibits: diameter of the eye, length of the head and the preorbital length, as well as on the information supplied on the weight of the caught tuna and the scientific knowledge of tuna, mathematical methods were used to calculate its overall morphometric values and to define its meristic properties (Table 1) [2, 5, 6]. The same data will be used for construction of the model of life size tuna that will, as a Museum exhibit, form part of the Museum permanent collection.

Results and Discussion

Tab. 1. Morphometric and meristic characteristics of tuna *Thunnus thynnus*

Morphometric characteristics	**Length (cm)**
Total length	258.0
Standard length	230.0
Fork length	235.0
Pre-anal length	146.5
Pre-dorsal length	71.2
Pre-pelvic length	78.1
Pre-pectoral length	71.9
Body depth	74.0
Head length	66.5
Eye diameter	10.6
Pre-orbital length	18.6
Wide caudal fin	67.2
Meristic characteristics	**Number**
D_1 first dorsal fin	XIII
D_2 second dorsal fin	I + 13
A anal fin	II + 12
V pelvic fin	I + 5
dorsal finlets	10
ventral finlets	9

Construction of the complete Museum object and accompanying, organised educational programmes, will contribute to indication of the status of these threatened species: the need for preservation and the necessity for enforcement of measures of the protection and the economy.

References
1 - Mušin D., 1989. Ichtiological collection (Cyclostomata, Selachii, Osteichthyes) of the Natural History museum of the Biological Institute, Dubrovnik. *Zbornik Matice srpske za prirodne nauke* 76: 137-168.
2 - Jardas I., Pallaoro A., Vrgoc N., Jukic-Peladic S. and Dadic V., 2008. Red book of sea fishes of Croatia, Zagreb, Ministry of Culture, State Institute for Nature Protection, 396 pp. (in Croatian).
3 - Regulation on Protection of Wild Taxa (Official Gazette No. 99/09)
4 - Regulation on authorized catch, farming and trade Thunnus thynnus (Official Gazette No. 123/07, 69/08, 13/09).
5 - Sinovcic G., Franicevic M., Zorica B. And Cikeš-Kec V., 2004. length-weight and lenght-lenght relationships for 10 pelagic species from the Adriatic Sea (Croatia). *J. Appl. Ichtiol*. 20 (2): 156-158.
6 - Ricker W.E., 1975. Computation and intrepretation of biological statistic of fish population. *Bull. Fish. Res.* Board Can., 191: 382 pp.