FIRST INVESTIGATION ON THE REPRODUCTIVE TRAITS OF *TRACHINUS RADIATUS* CUVIER, 1829

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Abstract
Reproductive traits of the exploited stock of *Trachinus radiatus* were studied for the first time in the Gulf of Tunis; results are also new for all its area of distribution. The global sex-ratio was biased towards females. No significant difference between mean size of males and females was found. The sexual activity period was between May and September. Best condition was in spring and summer and worst was in autumn and winter. Length at first maturity was estimated as LT_{50} = 21.9 cm.

Keywords: Gulf of Tunis, Fishes, Reproduction

Introduction
Trachinus radiatus is a by-catch species in the Gulf of Tunis. In recent years, the decline of fish resources and the high demand of fishery products increased interest in a greater variety of other stocks as the starry weever one. The only available work focusing on this species, on a local and global scale, was done by the present authors, and gives data on its morphometric characteristics and population structure in the Gulf of Tunis [1]; this have prompted a first investigation on some of the reproductive traits of *T. radiatus* in the same area. Sex-ratio, gonadosomatic index (GSI), hepatosomatic index (HSI), sexual activity period, condition factor (K_C) and length at first maturity (LT_{50}) were then studied.

Material and methods
A total of 214 specimens of *T. radiatus* were collected monthly between February 2014 and January 2016; they were caught by trawlers in the Gulf of Tunis. For each individual, sex identification was based on the macroscopic observation of the gonads and was further used to evaluate the sex-ratio. Sexual activity and spawning periods were delimited using monthly variations of the gonadosomatic index ($GSI=100GW.EW^{-1}$, where GW= gonad weight and EW= eviscerated weight) and the hepatosomatic index ($HSI=100LW.EW^{-1}$, where LW= liver weight and EW= eviscerated weight). Changes in body condition were expressed using Clark's condition factor [2]: $KC=100000EW.TL^{-3}$ where EW= eviscerated weight (g) and TL= total length (mm). Length at first maturity (LT_{50}) was estimated using the formula [3]: $P=1/(1+e^{-b(TL-LT_{50})})$, where P= proportion of mature individuals, b= the slope, TL= total length and LT_{50}= length at which 50% of the individuals of the population are mature.

Results and discussion
Global sex-ratio of male to female fish was 1:1.42, it was biased toward females with a significant difference between the two sexes ($Chi^2>3.84$, $p<0.05$). Total length varied between 11 and 50.7 cm for the total sample, between 17.8 and 43.4 cm for males and between 16.5 and 50.7 cm for females. However, mean total lengths of males (31.1±0.687) and females (31.6±0.611) were not significantly different (Mann-Whitney, $p>0.05$). Mean GSI increased between May and September, with a peak in June (Males, 0.979 ± 0.132; Females, 4.685 ± 0.808); mean GSI slight decrease in July and August is rather related to the more reduced size range of specimens collected during that period; this was clearly demonstrated when studying the monthly mean size variations. Mean GSI values for males (0.472 ± 0.042) and females (1.956 ± 0.239) were significantly different (Mann-Whitney, $p<0.05$) with a greater investment of the females in the reproductive effort. The monthly mean values of the hepatosomatic index varied in the same way as the gonadosomatic ones; their highest values were observed between June (GSI, males: 0.979 ± 0.132, females: 4.685 ± 0.808; HSI, males: 1.248 ± 0.224, females: 1.828 ± 0.171) and September (GSI, males: 0.653 ± 0.069, females: 3.485 ± 0.515; HSI, males: 1.286 ± 0.155, females: 2.084 ± 0.192), then they decreased both from October. These HSI variations are classically linked in fishes to the use of the hepatic lipid reserves for the needs of reproduction. The total sample condition was the best between June and September (KC, June: 1.029 ± 0.011, September: 1.048 ± 0.015) which is probably related to the increase of temperature and to the better availability of food in the Gulf of Tunis during that period. However, condition has recorded its lowest values in winter, between December and February (K_C, December: 0.955 ± 0.025, February: 0.947 ± 0.031). Regarding the evaluated length at first sexual maturity (LT_{50}), it was 21.9 cm for *T. radiatus* in the Gulf of Tunis.

References
1 - Hamed O. and Chakroun N., 2016. Caractérisation des Trachinidae du golfe de Tunis. Caractéristiques morphométriques, structure démographique et croissance. Editions universitaires européennes, 120p.
2 - Clark F.N., 1928. The weight-length relationship of the California sardine (*Sardina coerulea*) at San Pedro. *Fish bulletin*, 12: 1-59.
3 - Saila S.B., Recksiek C.W. and Prager M.H., 1988. Basic fishery science programs: a compendium of microcomputer programs and manual of operation. *Developments in aquaculture and fisheries science*, 18: 1-230.