Dental Structure of the Giant Lantern Shark, *Etmopterus baxteri* (Chondrichthyes: Squaliformes) and its taxonomic implications

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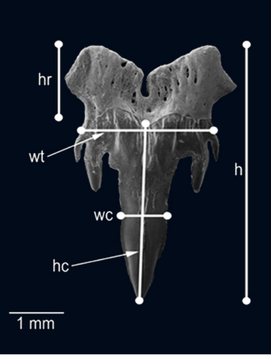
Etmopterus baxteri
1 cm

General information:

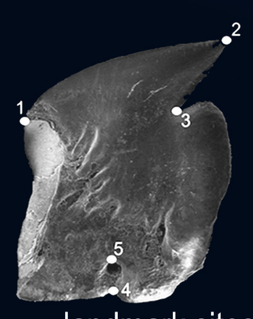
- Etmopteridae, or Lantern Sharks, are the most diverse family among the Squaliformes (42 species in 5 genera)
- *Etmopterus baxteri*: occurs off New Zealand and Tasmania in depths of 200 to 2000 m at continental shelves, insular slopes and seamounts
- females reach sizes up to 88 cm, males grow to 65 cm
- ovoviviparous females give birth to 6 to 16 puppies per litter
- common bycatch in deep sea fisheries for Orange Roughy
- generally, *Etmopterus* species are dignathic heterodont
- upper jaw teeth are multicuspid with 2 to 3 functional rows
- lower jaw teeth are single-cusped with cusps bent towards the rears

Jaws of *E. baxteri*
1 cm

Analyses of teeth:

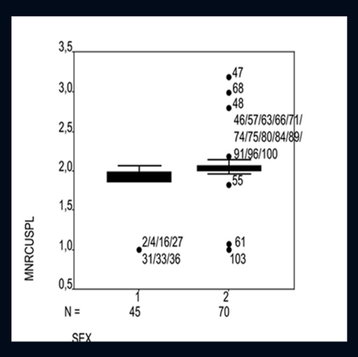


- distance measurements of upper teeth; 3 teeth of 10 specimens of each sex were measured
- hr = height of root; h = height of tooth; wt = width of tooth; wc = width of central cusp; hc = height of central cusp
- the number of lateral cusplets of 115 (70 males and 45 females) specimens in the 1st functional row was determined

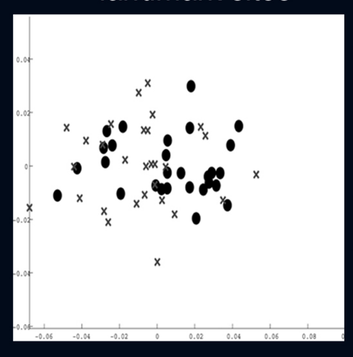


•=landmark sites

- landmarks set on homologuous sites of SEM images of 3 lower teeth of 10 adult male and 10 adult female specimens
- Procrustes superimpositions were calculated from the landmark data for further analyses



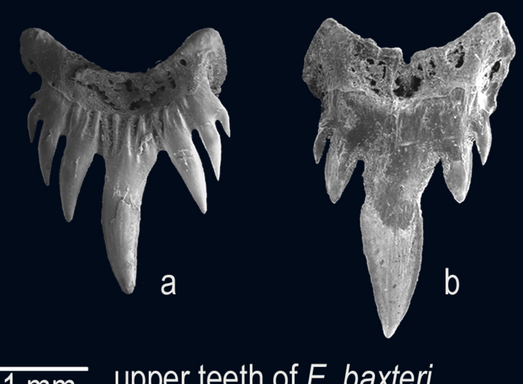
- boxplot showing means of cusplet numbers (mnrcuspl) for the sexes (1 = male, 2 = female specimens)
- N = 115, 45 female, 70 male specimens
- males show a significant wider range in the cusplet numbers of upper teeth than females do



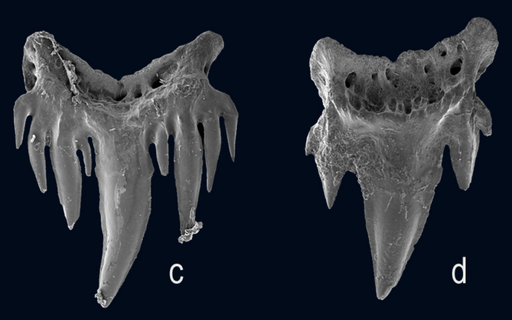
- CVA plot of female (crosses) and male (dots) specimens of *E. baxteri* calculated from landmark- Procrustes superimpositions
- the x- axis shows CV1, the y-axes shows CV2
- both data sets are not spatially separated, but strongly overlap

Results:

- upper teeth of adult males (a) differ from those of adult females (b) in showing more lateral cusplets
- adult males (a) also differ from females (b) in showing higher variations of cusplet numbers next to the central cusp
- measurements of upper teeth supported a strong sexual dimorphism of body sizes between both genders
- the shape of the central cusp is sexually dimorphic as to its shape (wc female significantly bigger than wc male)
- analyses of the lower teeth did not reveal any sexual dimorphism



1 mm upper teeth of *E. baxteri*
(a = male; b = female)



1 mm upper teeth of *E. brachyurus*
(c = male; d = female)

Discussion:

- the characters "number of lateral cusplets" and "shape of the central cusp" give information about the gender
- as to cusplet numbers of upper teeth, the same sexual dimorphic characters found in *E. baxteri,* could be realized for upper teeth of two more species of *Etmopterus*: *E. molleri* and *E. brachyurus* (c, d) from Japan
- additionally to the number of lateral cusplets, adult male specimens of *E. molleri* and *E. brachyurus* (c) also show a first pair of lateral cusplets which is smaller than the following pair of cusplets (c)
- probably several species of *Etmopterus* show sexual dimorphism in upper tooth morphologies
- the upper tooth morphology of *Etmopterus* is not supportive for species identification, but bares informations about the gender
- as to the fossil record, consisting almost solely of single teeth, upper teeth of fossil taxa of *Etmopterus* give information to genus level and gender

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