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# Feeding ecology of knout goby (*Mesogobius batrachocephalus* Pallas, 1814) from the Romanian Black Sea (Agigea – Eforie Nord area)

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**Abstract**. The present study investigates the variations in the feeding ecology of the knout goby (*M. batrachocephalus*). The index of relative importance indicated opportunistic feeding on macrobenthic fauna. The fish fed mainly on bivalves, fishes, amphipods and isopods. There were differences in diet composition during the years, seasons and sexes. *M. batrachocephalus* exhibited a generalist feeding strategy with a relative broad niche width.
**Key words**: knout goby, feeding ecology, benthos, Black Sea.

**Résumé**. Le régime alimentaire de *M. batrachocephalus* et ses variations ont été étudiés dans le secteur Agigea-Eforie Nord de la Mer Noire. L'index d'importance relative a indiqué un mode généraliste d'alimentation. Cette espèce se nourrit principalement de bivalves, poissons, amphipodes et isopodes. On a observé des variations dans le régime alimentaire liées à l'année d'étude, aux saisons et au sexe des individus. *M. batrachocephalus* a presenté une large niche trophique.
**Mots-clés**: gobie à tête plate, écologie alimentaire, benthos, La Mer Noire.

**Rezumat**. S-a analizat spectrul trofic al speciei *M. batrachocephalus* şi variaţiile acestuia în sectorul Agigea-Eforie Nord al Mării Negre. Indicele de importanţă relativă a indicat un mod de hrănire generalist. Această specie se hrăneşte în principal cu bivalve, peşti, amfipode şi izopode. Au fost observate variaţii ale spectrului trofic în funcţie de anul de colectare, sezon şi sexul indivizilor. *M. batrachocephalus* a prezentat o nişă trofică vastă.
**Cuvinte cheie**: hanos, ecologia hrănirii, bentos, Marea Neagră.

**Introduction**. Food habits and feeding ecology research are a fundamental tool to understand fish roles within their ecosystems since they indicate relationships based on feeding resources and indirectly indicate community energy flux which allows inferring competition and predation effects on community structure (Hajisamaea et al 2003). In aquatic environments food is the main factor and its partition defines functional groups within the community, which get together in guilds according to trophic similarities (Ross 1986).

Fish have the potential for integrating different aspects of their habitat(s) at spatial and/or temporal scales because of their mobility and longevity. Thus, fish diet reflects the available prey and a fish can be considered a sampling tool whereby the stomach contents represent a sample of prey items available in the aquatic environment (Wootton 1990). The study of fish food webs is also essential for the ecosystem approach to fisheries (FAO 2003).

*Mesogobius batrachocephalus* Pallas, 1814 is a gobiid species that occurs around the Black Sea (Pinchuk et al 2004). It is found on sand shell and rocks near cliffs (Miller 1986).This species is distinguished by the following characters: papillae in suborbital area 8-10 vertical rows; total scales in midlateral series 72-85; naked nape. It is found in the south of the Black Sea and in the Sea of Azov (Bănărescu 1964; Oţel 2007). IUCN Red List Status: least concern (IUCN 2010).

There were only a few studies related to the feeding ecology of the knout goby of the Black Sea. Bănărescu (1964) described fishes diets on the Romanian coast, but his results were only qualitative and did not present spatial and temporal variations. The knout goby fed on a large spectrum of prey items like: fishes, decapods, polichets, amphipods, bivalves, gastropods (Porumb 1961; Bănărescu 1964; Mihălcescu 2005; Creţeanu & Papadopol 2006) (Table 1).

Table 1

Diet of *M. batrachocephalus* – scientific literature data

| Food items | Area | Year | Reference |
|---|---|---|---|
| Polichets, *Gobius* sp., *Palaemon* sp. | Black Sea | 1956-1958 | Porumb 1961 |
| Decapods, bivalvs, fishes | Black Sea | 1953-1964 | Bănărescu 1964 |
| Fish, decapods, isopods, bivalvs, amphipods, gastropods | Black Sea | 1996-2000 | Mihălcescu 2005 |
| Fish, decapods, *Mytilus* sp., *Cyclops* sp. | Black Sea | 2003-2005 | Creţeanu & Papadopol 2006 |

**Material and Method**. The present study was carried out in the Agigea-Eforie Nord area (44°05'00" N/28°39'26"E) of the Black Sea. Fish were sampled with a trap net placed at a depth of 9 m (Agigea) and 12 m (Eforie Nord) during the seasons of 2008 and 2009. In the laboratory the sampled fishes were identified, counted, measured and weighed. Sex was determined from external examination and confirmed by gonadal examination. For dietary analysis fishes were dissected and the gastrointestinal tracts were drawn out and immediately preserved in absolute ethyl alcohol in order to prevent tissues damages. Then the gastrointestinal tracts were longitudinally sectioned, the gastrointestinal content of each individual was weighted using the analytical balance and the prey items were identified to the lowest taxonomic level possible using the stereomicroscope. A high level of prey identification (LPI) was reached for most of the items (up to family); niche breadth value could be influenced by such LPI. The use of LPI could underestimate species dietary breadth in the same way those values of dietary overlap could have been overestimated by the LPI (Hansson 1998).

The dietary components were wet-weighed and preserved in 70% ethyl alcohol. The empty gastrointestinal tracts were also counted. In order to determine the importance of each food category to the diet of the knout goby weight percent (%W), frequency of occurrence (%F), number percent (%N) were calculated. Frequency of occurrence: $F = (f_x/f)*100$, where $f_x$ = number of fish with component x in food; f = number of all studied fish. Weight contribution: $W = (w_x/w)* 100$, where $w_x$ = weight of component x of the food; w = total food weight. Number percent: $N= (n_x/n)*100$, where $n_x$ = number of the individuals of the prey x in food; n = total number of analyzed fishes. An index of relative importance (IRI) for all prey items was calculated with the formula: IRI = (%N+%W)*%F (Pinkas et al 1971, Cortés 1997). The IRI of each food item was standardized to %IRI: %IRI = (IRI/ΣIRI)*100. The prey items were separated in three categories: main prey (%IRI>50%), accessory prey (25%<%IRI>50%) and infrequently prey (%IRI<25%) (Rosecchi & Nouaze 1987).

Levins index was calculated for niche breadth: $B = 1/\Sigma p_i^2$, where B = Levins measure for niche breadth; $p_i$ = proportion of individuals that use the resource i or the proportion of diet of each individual composed of i (Gomoiu & Skolka 2001) and then standardized on a scale from 0 to 1 using Hulbert index: $B_A = (B-1)/(n-1)$, where $B_A$ = Levins standardized index, B = Levins index for niche breadth and n = number of the resources from the gastrointestinal content (Gomoiu & Skolka 2001).

**Results and Discussion.** The analyzed individuals had between 16.1 and 22.6 cm in total length and between 42 and 88 g in weight. From all the 227 of gastrointestinal tracts sampled 21.14% were empty. *M. batrachocephalus* is considered to be a real predator feeding mostly on: mussels (Mihălcescu 2005; Creţeanu & Papadopol 2006), fishes (Bănărescu 1964; Mihălcescu 2005), decapods (Porumb 1961; Bănărescu 1964).

Porumb (1961) observed no changes in the gastrointestinal tracts of the knout gobies due to their large size and to the way they feed. The gastrointestinal content of the analyzed fishes included: bivalves (*Mytilus galloprovincialis* Lamarck, 1819, *Mytilaster lineatus* (Gmelin, 1791)), gastropods (*Setia valvatoides* (Milaschewitsch, 1909), *Hydrobia sp., Bittium sp.*), amphipods, isopods (*Idotea balthica* (Pallas, 1772)), decapods (*Xantho poressa* (Olivi, 1792)), fishes (*Mullus barbatus ponticus* Essipov 1927, gobiids), chironomid larvae and algae. There were also some unidentified fragments.

*M. galloprovincialis* represented an accessory prey during the spring (%IRI = 40.1) and the summer (%IRI=40.17) of 2008 and became the main prey during the autumn of the same year. Isopods also represented an accessory prey (%IRI = 31.53) during the summer (Table 2).

*M. batrachocephalus* fed mostly on *M. galloprovincialis* also during the spring (%IRI = 25.21) and summer (%IRI= 29.2) of 2009, but during the autumn preferred isopods (%IRI= 31.49) (Table 3). We can notice also during the summer the presence of the algae (*Ulothrix sp. and Cladophora sp.*) as an infrequently prey (%IRI=0.06). Also during the spring the knout goby fed also on *X. poressa* (%IRI=2.58).

It can be noticed that during the spring of 2008 and 2009 *M. batrachocephalus* fed mostly on *M. galloprovincialis* which represented an accessory prey (%IRI=40.1) for 2008 and the main prey (%IRI=76.87) for 2009. Also it can be noticed a decrease of the index of relative importance for amphipods and isopods from 2008 to 2009.

*M. galloprovincialis* represented an accessory prey during the summer of 2008 (%IRI=40.17) and 2009 (%IRI=29.2). The index of relative importance for isopods is higher during the summer of 2008 (%IRI=31.53) than during the summer of the next year (%IRI=5.37). Also it can be noticed the absence from the fish diet of the gastropods and amphipods during 2008 and of *X. poressa* during 2009.

During the autumn of 2008 knout goby had as the main prey the bivalve *M. galloprovincialis* (%IRI=56.93). The same species become an infrequently prey during the same season of the next year (%IRI=13.77). Isopods represented an infrequently prey in 2008 (%IRI=5.03) and become an accessory prey in 2009 (%IRI=31.49). It was noticed also the absence from the trophic spectrum of the fish, of the gastropods, chironomid larvae and of the decapod *X. poressa* during the autumn of 2008.

The reproductive season of the knout goby is during the spring (Bănărescu 1964). Before the breeding period the feeding process is very intensive. During the reproductive season the whole energy is directed to nest construction, to find a partner, to spawn and to attend them. Therefore, the majority of the individuals do not feed. In some cases at the end of the season the males of round goby die, so they reproduce ones in lifetime. Females have a strong resistance in order to assure the species perpetuation (Mihălcescu 2005). The proportion of the captured males for this study continued to be the same even after the breeding season. There were found 23.91% of empty stomachs for females and 20.68% for males. During this period both females and males fed mostly on bivalves like *M. galloprovincialis* (%IRI=45.52 for females and %IRI=24.18 for males) (Table 4).

Prey availability is the main factor for *M. batrachocephalus* feeding strategy in the Black Sea. Availability of prey affects the diet composition and values of the diet breadth (Table 5).

A small value (<0.5) for the niche breadth shows a specialization of the species for a small number of prey items. Niche breadth values vary between seasons and years of sampling between B = 0.115 during the autumn of 2008 and B= 0.588 during the summer of 2009. *M. batrachocephalus* trophic niche can overlap during the year with the trophic niches of other benthic fishes which inhabits the rocky bottom of the same are, such as: blackscorpionfish (*Scorpaena porcus* Linnaeus, 1758) and round goby (*Neogobius batrachocephalus* Pallas, 1818). It is known that knout goby feds on 35% of the resources of the rocky benthos (Roşca et al 2010). The trophic niches of the 3 species overlap in a high proportion (sometimes more than 90%) which may indicate a high level of interspecific competition (Roşca & Surugiu 2010).

Table 2

Seasonal variations of *M. batrachocephalus* trophic spectrum during 2008

| *2008* | | *Spring* | | | | *Summer* | | | | *Autumn* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Food items* | *Species* | *%W* | *%F* | *%N* | *%IRI* | *%W* | *%F* | *%N* | *%IRI* | *%W* | *%F* | *%N* | *%IRI* |
| Bivalves | *Mytilus* sp. | 23.15 | 56.25 | 25 | 40.1 | 18.25 | 84.84 | 27.27 | 40.17 | 10.21 | 54.83 | 93.54 | 56.93 |
| | *Mytilaster* sp. | 0 | 0 | 21.87 | 0 | 8.9 | 36.36 | 9.09 | 6.8 | 5.14 | 12.9 | 1 | 0.79 |
| | sp. | 3.23 | 6.25 | 18.75 | 2.03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gastropods | sp. | 0.21 | 3.12 | 12.5 | 0.58 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Amphipods | sp. | 22.14 | 25 | 24.37 | 17.21 | 9.1 | 12.12 | 66.6 | 9.54 | 3.12 | 3.22 | 80.64 | 2.69 |
| Isopods | *Idotea* sp. | 8.43 | 50 | 12.5 | 15.49 | 12.15 | 45.45 | 54.54 | 31.53 | 2.15 | 16.12 | 29.03 | 5.03 |
| Decapodes | *Xantho* sp. | 10.14 | 9.37 | 6.25 | 2.27 | 15.18 | 9.09 | 6.06 | 2 | 0 | 0 | 0 | 0 |
| | sp. | 5.67 | 3.12 | 12.5 | 0.83 | 5.42 | 6.06 | 3.03 | 0.53 | 11.34 | 6.45 | 6.45 | 1.14 |
| Fishes | sp. | 17.89 | 18.75 | 9.37 | 7.56 | 22.46 | 21.21 | 3.03 | 5.62 | 45.23 | 32.25 | 19.35 | 20.84 |
| Chironomids | Sp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Algae | sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Unidentified fragments | | 0 | 9.35 | 25 | 28.12 | 13.87 | 17.44 | 12.12 | 12.5 | 3.77 | 22.81 | 25.8 | 25.8 |
| Nsa | | 35 | | | | 38 | | | | 35 | | | |
| Nsp | | 32 | | | | 33 | | | | 31 | | | |

N - number percent, F - frequency of occurance, W - weight percent, IRI - Index of relative importance,
nsa - number of gastrointestinal analyzed tracts, nsp - number of gastrointestinal analyzed tracts which contained prey items.

Table 3

Seasonal variations of *M. batrachocephalus* trophic spectrum during 2009

| *2009* | | *Spring* | | | | *Summer* | | | | *Autumn* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Food items* | *Species* | *%W* | *%F* | *%N* | *%IRI* | *%W* | *%F* | *%N* | *%IRI* | *%W* | *%F* | *%N* | *%IRI* |
| Bivalves | *Mytilus* sp. | 1.23 | 7.4 | 40.4 | 25.21 | 50.75 | 39.28 | 25 | 29.2 | 18.11 | 34.78 | 25 | 13.77 |
| | *Mytilaster* sp. | 22.34 | 74.0 | 40.7 | 1.49 | 11.11 | 21.42 | 17.85 | 6.08 | 5.77 | 21.73 | 28.57 | 6.85 |
| | sp. | 5.67 | 25.9 | 59.2 | 0.53 | 5.92 | 28.57 | 14.28 | 5.66 | 5.73 | 26.08 | 17.85 | 5.64 |
| Gastropods | sp. | 0.22 | 22.2 | 22.22 | 0.15 | 0.36 | 17.85 | 25 | 4.44 | 4.57 | 34.78 | 35.71 | 12.86 |
| Amphipods | sp. | 4.56 | 33.3 | 85.18 | 0.95 | 9.81 | 28.57 | 39.28 | 13.76 | 3.76 | 21.73 | 28.57 | 6.45 |
| | *Idotea* sp. | 8.9 | 14.8 | 70.37 | 0.37 | 7.61 | 25 | 14.28 | 5.37 | 17.82 | 56.52 | 42.85 | 31.49 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isopods | | | | | | | | | | | | | |
| Decapodes | *Xantho* sp. | 25.67 | 7.4 | 22.22 | 2.58 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | sp. | 4.56 | 3.7 | 3.7 | 0.22 | 10.39 | 17.85 | 10.71 | 3.69 | 8.12 | 13.04 | 7.14 | 1.82 |
| Fishes | sp. | 10.34 | 18.5 | 29.62 | 5.39 | 22.48 | 35.71 | 17.85 | 14.13 | 23.72 | 39.13 | 14.28 | 13.65 |
| Chironomids | Sp | 0 | 0 | 0 | 0 | 4.23 | 14.28 | 21.42 | 3.59 | 5.87 | 13.04 | 7.14 | 1.55 |
| Algae | sp. | 0 | 0 | 0 | 0 | 0.03 | 21.42 | 32.14 | 0.06 | 0 | 0 | 0 | 0 |
| Unidentified fragments | | 0 | 16.51 | 37.03 | 25.92 | 11.45 | 5.85 | 17.85 | 35.71 | 14.02 | 4.57 | 17.39 | 32.14 |
| Nsa | | 40 | | | | 39 | | | | 40 | | | |
| Nsp | | 27 | | | | 28 | | | | 28 | | | |

N - number percent, F - frequency of occurance, W - weight percent, IRI - Index of relative importance,
nsa - number of gastrointestinal analyzed tracts, nsp - number of gastrointestinal analyzed tracts which contained prey items.

Table 4

Food spectrum of *M. batrachocephalus* during the reproductive season (spring)

| *Reproductive season* | | *Spring* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | *Females* | | | | *Males* | | | |
| *Food items* | *Species* | *%W* | *%F* | *%N* | *%IRI* | *%W* | *%F* | *%N* | *%IRI* |
| Bivalves | *Mytilus* sp. | 45.82 | 74.28 | 80 | 45.52 | 10.25 | 78.26 | 78.26 | 24.18 |
| | *Mytilaster* sp. | 12.45 | 42.85 | 51.42 | 13.3 | 7.8 | 52.17 | 47.82 | 10.13 |
| | sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gastropods | sp. | 1.56 | 14.28 | 17.14 | 1.3 | 1 | 65.21 | 30.43 | 7.15 |
| Amphipods | sp. | 4.56 | 31.42 | 37.14 | 6.38 | 9.1 | 47.82 | 65.21 | 12.4 |
| Isopods | *Idotea* sp. | 8.12 | 37.14 | 42.85 | 9.22 | 12.15 | 47.8 | 78.26 | 15.08 |
| Decapodes | *Xantho* sp. | 0 | 0 | 0 | 0 | 15.2 | 26.08 | 17.39 | 2.96 |
| | sp. | 0 | 0 | 0 | 0 | 5.42 | 8.69 | 17.3 | 0.68 |
| Fishes | sp. | 20.18 | 34.28 | 91.42 | 18.63 | 22.42 | 78.26 | 39.13 | 16.91 |
| Chironomids | sp. | 2.02 | 8.57 | 74.28 | 3.1 | 0 | 0 | 0 | 0 |
| Alge | sp. | 0.89 | 20 | 8.57 | 0.92 | 0 | 0 | 0 | 0 |
| Unidentified fragments | | 5.08 | 4.4 | 14.28 | 17.14 | 1.49 | 17.44 | 43.47 | 52.17 |
| Nsa | | 46 | | | | 29 | | | |
| Nsp | | 36 | | | | 23 | | | |

N - number percent, F - frequency of occurance, W - weight percent, IRI - Index of relative importance,
nsa - number of gastrointestinal analyzed tracts, nsp - number of gastrointestinal analyzed tracts which contained prey items.

Table 5

Niche breadth of *M. batrachocephalus* during the seasons of 2008 and 2009

| | *2008* | | | *2009* | | |
|---|---|---|---|---|---|---|
| *Species* | *Spring* | *Summer* | *Autumn* | *Spring* | *Summer* | *Autumn* |
| *M. batrachocephalus* | 0.572 | 0.433 | 0.115* | 0.59 | 0.588 | 0.429 |

*the marked values prove a specialization of the black knout goby

**Conclusions**. The gastrointestinal content of the knout goby was represented by: bivalves, gastropods, amphipods, isopods, decapods, fishes, chironomid larvae and algae. Feeding habits of the goby changed seasonally, but was mainly based on *M. galloprovincialis*. Food spectrum varies between males and females during the reproductive season. *M. batrachocephalus* exhibited a generalist feeding strategy with a relative broad niche width.

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## References

Bănărescu P., 1964 Fauna of Romania Socialist Republic. Ed. Acad. R.S.R., Bucharest, XIII, 1: 958 p. [in Romanian].

Cortés E., 1997 A critical review of methods of studying fish breeding based on analysis on stomach content: application to Elasmobranch fishes. *Canadian Journal of Fisheries and Aquatic Sciences* **54**:726-738.

Creţeanu M., Papadopol M. C., 2006 Population structure, nutrition, reproduction of *Mesogobius batrachocephalus* (Pallas, 1811) (Pisces, Gobiidae) (Preliminary Data). Cercetări Marine, INCDM, Constanţa **36**:319-340.

FAO, 2003 The ecosystem approach to fisheries. FAO Tech. Guidel. for Responsable Fisheries, **4**(2):1-112.

Gomoiu M. T., Skolka M., 2001 Ecology. Methodologies for ecological studies. Ovidius University Press, Constanţa. 170 p.[in Romanian].

Hajisamaea S., Choua L. M., Ibrahim S., 2003 Feeding habits and trophic organization of the fish community in shallow waters of an impacted tropical habitat. Estuarine, Coastal and Shelf Science **58**:89-98.

Hansson S., 1998 Methods of studying fish feeding: a comment. Canadian Journal of Fisheries and Aquatic Sciences **54**:729-738.

IUCN, 2010 IUCN Red List of Threatened species, version 2010.1, www.iucnredlist.org.

Mihălcescu A., 2005 Systematic and ecological study of the gobiids (Pisces, Gobiidae) from Dobrudjan waters,Univ. Ovidius Constanţa, 218 p. [in Romanian].

Miller P. J., 1986 Gobiidae, in P. J. P. Whitehead, M. L. Bauchot, J. C. Nielsen and E. Tortonese (eds.), Fishes of the North-Eastern Atlantic and the Mediterranean, Volume 3, UNESCO, Paris: 1019-1085.

Oţel V., 2007 Atlas of fishes from Danube Delta Biosphere Reserve, Edit. Centrul de Informare Tehnologică Delta Dunării, Tulcea, 481 p. [in Romanian].

Pinchuk V. I., Vasil'eva E. D., Vasil'ev V. P., Miller J. P., 2004 *Mesogobius batrachocephalus* (Pallas, 1814). In: The Freshwater fishes of Europe Vol. 8/II – Gobiidae 2, Miller J. P. (ed), pp. 109-131, AULA-Verlag, Wiebelsheim. 478 pp.

Pinkas L., Oliphant M. S., Iverson L. R., 1971 Food habits of albacore, bluefin tuna and bonito in California waters. Fishery Bulletin **152**:1-105.

Porumb I., 1961 Contributions to the gobiids biology (*Gobius batrachocephalus*, *Gobius cephalarges* şi *Gobius melanostomus*) from the Romanian shore of the Black Sea (preliminary data). Hidrobiologia **3**:271-282. [in Romanian].

Roşca I., Novac, A., Surugiu, V., 2010 Feeding selectivity of some benthic fish from the rocky bottom of the Romanian Black Sea coast (Agigea area). Rapp. Comm. Int. Mer. Medit., **39**: 648.
Roşca, I., Surugiu, V., 2010 Feeding ecology of some benthic species of fish from the Black Sea coast (Agigea-Eforie Nord area). Analele Ştiinţifice ale Universităţii „Al. I. Cuza", Iaşi, Secţiunea I, Biologie Animală, **LVI**: 249-256.
Rosecchi E., Nouaze Y., 1987 Comparaison de cinq indices alimentaires utilisés dans l'analyse des contenus stomacaux. Revue des Travaux de l'Institut des Pêches Maritimes **49**:111-123.
Ross S. T., 1986 Resource partitioning in fish assemblages: a review of field studies. Copeia **2**:235-388.
Wootton R. J., 1990 Ecology of Teleost Fishes. Chapman and Hall, UK, 404p.

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