

# THE FAUNISTIC AND BIOLOGICAL CHARACTERISTICS OF FISH PARASITES OF THE ABSHERON PENINSULA COASTAL WATERS OF THE CASPIAN SEA

S.N. MAMEDOVA  
Azerbaijan Medical University

*The analysis of the biological characteristic of fish parasites fauna in the water bodies has a big theoretical and practical significance because it gives a data for identification of parasites' life circles and their ecological peculiarities in a specific condition of any water body, adaptive responses of parasites to impacts of different ecological factors, patterns of distribution within the water area, and assists in the preparation of measures against fish diseases.*

*123 fish species were found in the Caspian Sea and deltas of its basin's rivers up to date. The fauna of Caspian ichthyoparasites were investigated in many areas of the sea by specialists of Azerbaijan [4, 6], Russia [1, 2, 5, 7] and Iran [8, 9, 10], and more than 390 species of parasites were found in (on) Caspian fishes. However before our investigation, there was no any literary data about the parasites of fishes of the Absheron Peninsula coastal waters, so the ichthyoparasite fauna of this sea area was not analyzed.*

## Material and methods

In 2002-2006 in the Caspian Sea near the coast of the Absheron Peninsula 678 fishes of 23 species, including *Huso huso*, *Acipenser gueldenstadtii*, *A. stellatus*, *Clupeonella delicatula caspia*, *C. engrauliformis*, *Alosa caspia caspia*, *A. kessleri kessleri*, *Salmo trutta caspicus*, *Rutilus rutilus caspius*, *R. frisii kutum*, *Chalcalburnus chalcoides*, *Cyprinus carpio*, *Syngnathus nigrolineatus*, *Liza auratus*, *L. saliens*, *Atherina mochon caspia*, *Neogobius bathybius*, *N. kessleri gorlap*, *N. melanostomus affinis*, *N. fluviatilis pallasi*, *N. caspius*, *Bentophilus magistri abdurahmanovi*, and *B. macrocephalus* were investigated by the method of full parasitological dissection [3]. The parasites of all taxonomic groups were collected, identified and studied.

## The research results and their discussion

Following 76 species of the fish parasites were found as a result of our researches: *Cryptobia borelli*, *Eimeria rehimaie*, *Glugea bychowskyi*, *G. schulmani*, *Pleistophora schulci*, *P. tuberifera*, *Myxidium rhodei*, *Sinuolinea sakinachanumae*, *Sphaerospora caspialosae*, *S. donecae*, *Chloromyxum truttae*, *Myxosoma branchiale*, *M. circulus*, *Myxobolus bramae*, *M. cyprini*, *M. diversicapsularis*, *M. exiguus*, *M. muelleri*, *M. musculi*, *M. pseudodispar*, *Trichodina caspialosae*, *Trichodina jadranica*, *T. partidisci*, *Polypodium hydriforme*, *Dactylogyrus chalcalburni*, *D. crucifer*, *D. frisii*, *D. nybelini*, *D. turaliensis*, *Ligophorus heteronchus*, *L. szidati*, *L. vanbenedenyi*, *Nizschia sturionis*, *Diclybothrium armatum*, *Mazocraes alosae*, *Paradiplozoon chazaricum*, *P. homoion*,

Amphilina foliacea, Eubothrium acipenserinum, E. crassum, Bothrimonus fallax, Proteocephalus gobiorum, Aspidogaster limacoides, Bunocotyle cingulata, Monovitella cyclointestina, Saccocoelium obesum, S. tensus, Dicrogaster contracta, Asymphylogora kubanica, Skrjabinopsolus emiarmatus, Sphaerostoma bramae, Pronoprymna ventricosa, Diplostomum chromatophorum, D. gobiorum, D. paraspathaceum, D. rutili, D. spathaceum, Tylodelphys clavata, Posthodiplostomum cuticola, Clinostomum complanatum, Ascocotyle coleostoma, Capillaria gobionina, Thominx tuberculata, Cystoopsis acipenseris, Eustrongylides excisus, Capillarospirura ovotrichuria, Cyclozone acipenserina, Cucullanus sphaerocephalus, Cucullanellus minutus, Anisakis schupakovi, Porrocoecum reticulatum, Contraeaecum microcephalum, C. spiculigerum, Corynosoma capsicum, Leptorhynchoides plagicephalus, and Pseudotrachealiastes stellatus.

The list of the parasites named above consisting of 1 species of Flagellata, 1 species of Coccidia, 4 species of Microsporidia, 14 species of Myxosporrea, 3 species of Ciliata, 1 species of Coelenterata, 13 species of Monogenea, 1 species of Amphilinida, 4 species of Cestodes, 1 species of Aspidogastrea, 18 species of Trematoda, 12 species of Nematoda, 2 species of Acanthocephala, and 1 species of Crustacea.

Though the Absheron Peninsula coastal waters are brackish (approximately 13‰), only 25 species (*Eimeria rehimae*, *Glugea bychowskyi*, *G. schulmani*, *Pleistophora tuberifera*, *Sinuolinea sakinachanumae*, *Sphaerospora caspialosae*, *S. donecae*, *Trichodina caspialosae*, *Ligophorus heteronchus*, *L. szidati*, *L. vanbenedenyi*, *Nizschia sturionis*, *Mazocraes alosae*, *Proteocephalus gobiorum*, *Bunocotyle cingulata*, *Monovitella cyclointestina*, *Saccocoelium obesum*, *S. tensus*, *Dicrogaster contracta*, *Pronoprymna ventricosa*, *Capillaria gobionina*, *Cucullanellus minutus*, *Anisakis schupakovi*, *Corynosoma caspicum*, *Pseudotrachealiastes stellatus*) from 76 species, which were found here, are typical marine. Other 19 species (*Cryptobia borelli*, *Pleistophora schulci*, *Chloromyxum truttae*, *Polypodium hydriforme*, *Amphilina foliacea*, *Eubothrium crassum*, *Sphaerostoma bramae*, *Diplostomum chromatophorum*, *D. gobiorum*, *D. paraspathaceum*, *D. rutili*, *D. spathacum*, *Tylodelphys clavata*, *Posthodiplostomum cuticola*, *Clinostomum complanatum*, *Eustrongylides excisus*, *Porrocoecum reticulatum*, *Contraeaecum microcephalum*, *C. spiculigerum*) are typical freshwater, and 32 species (*Myxidium rhodei*, *Myxosoma branchiale*, *M. circulus*, *Myxobolus bramae*, *M. cyprini*, *M. diversicapsularis*, *M. exiguus*, *M. muelleri*, *M. musculi*, *M. pseudodispar*, *Trichodina jadranaica*, *T. partidisci*, *Dactylogyrus chalcaburni*, *D. crucifer*, *D. frisii*, *D. nybelini*, *D. turaliensis*, *Diclybothrium armatum*, *Paradiplozoon chazaricum*, *P. homoion*, *Eubothrium acipenserinum*, *Bothrimonus fallax*, *Aspidogaster limacoides*, *Asymphylogora kubanica*, *Skrjabinopsolus semiarmatus*, *Ascocotyle coleostoma*, *Thominx tuberculata*, *Cystoopsis acipenseris*, *Ca-*

*pillarospirura ovotrichuria*, *Cyclozone acipenserina*, *Cucullanus sphaerocephalus*, *Leptorhynchoides plagicephalus*) are euryhaline.

Typical marine species of parasites can infect fishes only in brackish waters of the Caspian Sea, euryhaline species of parasites can infect them both in brackish and fresh waters, but typical freshwater species can infect the fishes only in fresh waters. The freshwater parasites infect fishes in freshwater and just after that are carried by infected fishes to coastal waters of the Absheron Peninsula. This supposition is corroborated by the fact that all the freshwater species, which we found are endoparasites, they live only in fish organism and have no direct contact with external environment.

Some parasites, including coccidians, microsporidians, infusorians, monogeneans, also round worm *Cucullanellus minutes* and crustacean *Pseudotracheliastes stellatus*, use only one host in their life cycle, i.e. they have simple life cycle. Some endoparasites (coccidians and microsporidians) have spores, these parasites penetrate fish when it stochastically swallows their spores. The nematode *C. minutus* infects fish when it swallows eggs of this worm. For reliable penetration of fish, these kind of parasites produce a lot of spores and eggs.

Ectoparasitic infusorians and crustaceans actively search the appropriate hosts and settle on the surface of their body, fins, and gills. This group of parasites is adapted to catch their hosts better than endoparasites, therefore they are less productive.

Reproduction processes of all ichthyoparasites with simple life cycle, which we found, take place on (or in) organisms of their hosts. They comparatively have a short life cycle and multiply very fast, they can rest very big abundance in favourable environmental condition and infect their hosts very intensively.

The species of fish parasites, which we found in the Absheron Peninsula coastal waters, circulate in nature by 14 ways, which are shown below. The development stages of parasites in external environment (EE) and their reproduction phases, and the names of parasites, which use any circulation way, are also shown.

First way of circulation is “- EE - fish (reproduction) -“. It is typical for flagellate *Cryptobia branchialis*, coccidian *Eimeria rehimae*, microsporidians *Glugea bychowskyi*, *G. schulmani*, *Pleistophora sulci*, and *P. tuberifera*, ciliates *Trichodina caspialosae*, *T. jadranica*, and *T. partidisci*, coelenterate *Polypodium hydriforme*, monogeneans *Dactylogyrus chalcalburni*, *D. cruciser*, *D. frisii*, *D. nybelini*, *D. turaliensis*, *Ligophorus heteronchus*, *L. szidati*, *L. vanbenedenyi*, *Nizschia sturionis*, *Diclybothrium armatum*, *Mazocraes alosae*, *Paradiplozoon chazaricum*, and *P. homoion*, crustacean *Pseudotracheliastes stellatus*.

II way of circulation is “- EE - oligochaete - fish - (reproduction) -“. It is typical for round worm *Capillaria gobionina*.

III way of circulation is “- EE - oligochaete (reproduction) - fish - (reproduction) -”. It is typical for myxosporeans *Myxidium rhodei*, *Sinuolinea sakinachanumae*, *Sphaerospora caspialosae*, *S. donecae*, *Chloromyxum truttae*, *Myxosoma branchiale*, *M. circulus*, *Myxobolus bramae*, *M. cyprini*, *M. diversicapsularis*, *M. exiguus*, *M. muelleri*, *M. musculi*, and *M. pseudodispar*.

IV way of circulation is “- EE - amphipode - fish - (reproduction) -”. It is typical for amphilinida *Amphilina foliacea*.

V way of circulation is “- EE - copepod - fish (reproduction) -”. It is typical for tape-worms *Eubithrium acipenserinum*, *E. crassum*, and *Proteocephalus gobiurum*.

VI way of circulation is “- EE - bivalve mollusk (reproduction) - fish (reproduction) -”. It is typical for aspidogastrea *Aspidogaster limacoides*.

VII way of circulation is “- leech (reproduction) - fish (reproduction) -”. It is typical for blood flagellate *Cryptobia borelli*.

VIII way of circulation is “- EE – oligochaete - nonpredatory fish - fish-eating bird (reproduction) -”. It is typical for round worm *Eustrongylides excisus*.

IX way of circulation is “- EE - copepoda - fish - fish-eating bird (reproduction) -”. It is typical for round worms *Contraecaecum microcephalum* and *C. spiculigerum*.

X way of circulation is “- EE - crustacean - fish - seal (reproduction) -”. It is typical for round worm *Anisakis schupakovi* and proboscis worm *Corynosoma caspicus*.

XI way of circulation is “- EE - gastropod mollusk (reproduction) - EE - leech - fish (reproduction) -”. It is typical for fluke *Sphaerostoma bramae*.

XII way of circulation is “- EE - gastropod mollusk (reproduction) - EE - gastropod mollusk - fish (reproduction) -”. It is typical for fluke *Asymphylo-dora kubanica*.

XIII way of circulation is “- EE - gastropod mollusk (reproduction) - EE - copepoda - fish (reproduction) -”. It is typical for flukes *Bunocotyle cingulata* and *Pronoprymna ventricosa*.

XIV way of circulation is “- EE - gastropod mollusk (reproduction) - EE - fish - fish-eating bird (reproduction) -”. It is typical for flukes *Diplostomum chromatophorum*, *D. gobiurum*, *D. paraspathaceum*, *D. rutili*, *D. spathaceum*, *Tylodelphys clavata*, *Posthodiplostomum cuticola*, *Clinostomum complanatum*, and *Ascocotyle coleostoma*.

23 species of fish parasites, which were found in the Absheron Peninsula coastal waters, circulate by first way, 14 species – by third way, 9 species – by 14<sup>th</sup> way, 3 species – by 5<sup>th</sup> way. All other ways are used by 1 or 2 species of ichthyoparasites. 23 species circulate without intermediate host and all them realize they reproduction only on (or in) fish.

We could not show circulation ways of 14 species, because their life circles are not known. These species are *Bothrimonus fallax* tape worm, *Mono-*

*vitella cyclointestina*, *Saccocoelium obesum*, *S. tensum*, *Dicrogaster contracta*, and *Skrjabinopsolus semiarmatus* flukes, *Thominx tuberculata*, *Cystoopsis acipenseris*, *Capillariospirura ovotrichuria*, *Cyclozone cipenserina*, *Cucullanus sphaerocephalus*, *Cucullanellus minutes*, and *Porrocoecum eticulatum* round worms, *Leptorhynchoides plagicephalus* proboscis worm.

In all circulation ways of Caspian fish parasites in the coastal waters of the Absheron Peninsula there can be shown 21 manners of environment transition, which are small parts of a transition from one phase of life circle to another. These manners of environment transition are: “EE - fish”, “fish - EE”, “EE - oligochaete”, “oligochaete - fish”, “EE - amphipode”, “amphipode - fish”, “EE - copepode”, “copepode - fish”, “EE - bivalve mollusk”, “bivalve mollusk - EE”, “EE - gastropod mollusk”, “gastropod mollusk - EE”, “gastropod mollusk - fish”, “leech - fish”, “fish - leech”, “fish - fish-eating bird”, “fish-eating bird - EE”, “EE - crustacean”, “crustacean - fish”, “fish - seal”, “seal - EE”.

### Conclusion

The parasitological research of fish was carried out in the coastal waters of the Absheron Peninsula in 2002-2006 and 76 species of parasites were found.

The Absheron Peninsula coastal waters are brackish (approximately 13%), but among of all ichthyoparasite species, which were found here, only 25 species are typical marine, other 19 species are typical freshwater, and 32 species are euryhaline. Freshwater parasites infect fishes in fresh waters and just after that carried by infected fishes to coastal brackish waters of the Absheron Peninsula. So all freshwater species, which were found, are endoparasites and they have no direct contact with external environment. The ichthyoparasites of this area circulate in nature by 14 ways. In all the ways of circulation of Caspian fish parasites in Absheron Peninsula coastal waters there are 21 manners of a transition from one phase of life circle to another.

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## **XƏZƏR DƏNİZİNİN ABŞERON YARIMADASI SAHİLLƏRİ BOYUNCA BALIQ PARAZİTLƏRİNİN FAUNİSTİK VƏ BİOLOJİ XARAKTERİSTİKASI**

**S.N. MƏMMƏDOVA**

2002-2006-cı illərdə Abşeron yarımadası boyunca Xəzər dənizində 23 növdən olan 678 balıq tam parazitoloji yarma üsulu ilə tədqiq olunmuş, nəticədə 76 növ parazit tapılmışdır. Bunlardan 25-i tipik dəniz, 19-u tipik şirin su növləri, 32-si isə evriqalin növlərdir. Bu parazitlər təbiətdə 14 yolla dövr edirlər, bunlardan 23 növü aralıq sahibsiz inkişaf edir və ətraf mühitdə deyil, balıqda çoxalır. Parazitlərin öz mühitini dəyişməsinin bir neçə üsulu müəyyən edilmişdir ki, bunlardan balıqdan birbaşa xarici mühitə keçmə üsulundan daha çox istifadə olunur.