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**NEOGOBIOUS MELANOSTOMUS (PALLAS 1811),
A NEW IMMIGRANT SPECIES
IN THE BALTIC SEA**

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ABSTRACT

A new immigrant benthic fish species, *Neogobius melanostomus* (Pallas 1811) has been recorded in the Gulf of Gdańsk starting from 1992. Standard ichthyological data on this new goby population caught recently in the Gulf are presented. Hypothetical routes of transfer of this Ponto-Caspian species to the Baltic area are discussed.

KEY WORDS: immigrant fish *Neogobius melanostomus*, Gulf of Gdańsk, Baltic Sea

INTRODUCTION

In the recent three years (from 1991) in the Gulf of Gdańsk there was noted the presence of three fish species new for this area: *Trigla hirundo* (Skóra, unpubl. data), *Solea solea* (Skóra 1993), and *Neogobius melanostomus* (Skóra & Stolarski 1993). Although the first two species occurred incidentally, the presence of the third (Fig.1) points to its permanent character.

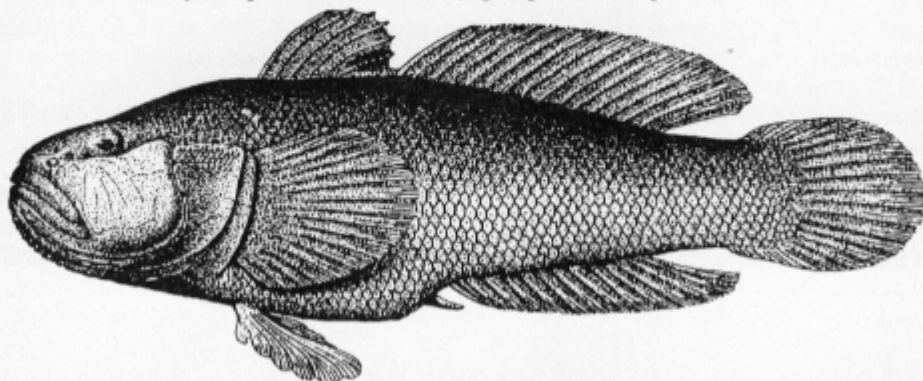


Fig.1. *Neogobius melanostomus* (Pallas 1811) from the Gulf of Gdańsk. Other names: in English - round goby (Miller 1986); in German - Schwarzmundgundel (Muller 1983); in Russian - bychok kruglak, kuzniec, chorny bychok, buc; in Romanian - babca negra, guvid, negrar, stronghil (Berg 1949; Svetovidov 1964; Lindberg et al. 1980); the proposed names in Polish - babka bycza or babka obla.

In its natural areas of occurrence (Sea of Marmara, Black Sea, Sea of Azov, Caspian Sea) *N. melanostomus* is a coastal species with great tolerance towards salinity change. It had been introduced to the Sea of Aralsk (Berg 1949, Svetovidov 1963, Muller 1983, Miller 1986). It inhabits sandy-gravel bottom covered with mollusc shells usually down to a depth of 20 m, in winter to 60 m. The spawning lasts from April to August, reaching its peak at a temperature of 15°C (Lindberg 1983). Males reach maturity at the age of 3-4 years, females a year earlier. Males usually perish after spawning. During the spawning period their body is dark brown, almost black. They take care of their eggs which are placed under or among stones. Like the adult specimens, the larvae live near the bottom. The colour of the specimens is generally dark-brown or black of changeable pigmentation intensity. Fish live not longer than four years and attain a length of 18-20 cm (maximum 25 cm). Molluscs constitute their main food. They also consume Crustacea (*Corophiidae*, Amphipoda, Decapoda) and Polychaeta, *Chironomidae* larvae as well as small fish (Muller 1983; Miller 1986).

At the Hel Marine Station of the University of Gdańsk gathering all information concerning the growing Baltic population of *N. melanostomus* began in 1993.

MATERIAL AND METHOD

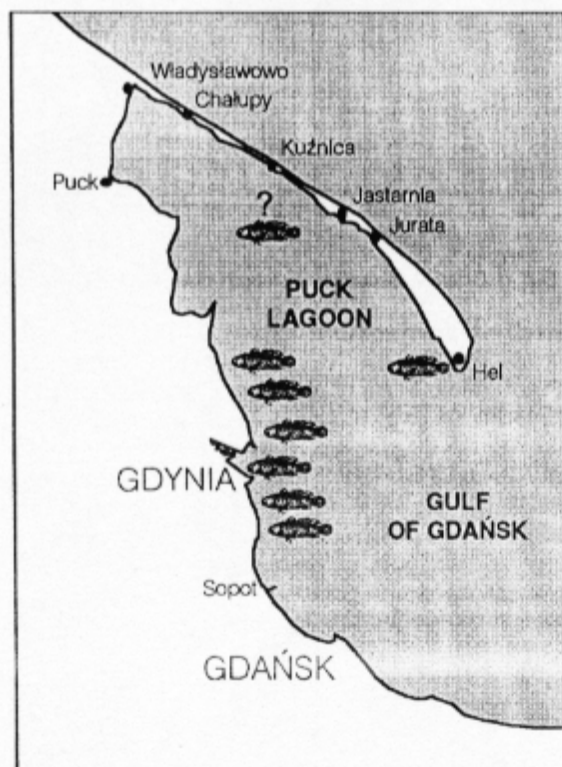
In order to determine the distribution range of specimens belonging to this species, a leaflet was circulated containing detailed information about this fish, its drawn picture and instruction on what to do with the specimens captured. The leaflets were sent to all Maritime Offices inspectorates and fishery bases along the Polish coast. Several articles appeared in local and national newspapers and similar information was also broadcast on radio and tv. At the sites of abundant occurrence of this fish, fyke net catches were carried out. The first analyses of collected material were aimed at gathering basic data on the structure and the territorial range of the local population. The material collected was preserved in formalin. The fish were measured and weighed; their sex and gonad maturity were determined. Scales were collected for age reading.

RESULTS

Despite the fact that first specimens of this species were captured near Hel, the site of their mass occurrence and easy catch was the area near Gdynia, at the Redlovo-Orlovo cliff (Table 1, Fig. 2). Unconfirmed oral information about the capture of *N. melanostomus* was obtained also from the area of Kuznica (Fig. 2). In other places this species was not observed and was caught by an angler. It was impossible to determine its wet weight because as a dried specimen it constituted only a part

Table 1. Number of fish captured, site and way of fishing.

sample no	dates yyyy, mm, dd	site	specimen no	way of fishing
1	1990.09.09	Hel	1	fyke net
2	1992.05.26	"	1	"
3	1992.09	Gdynia	1	angler
4	1992.09.10	"	18	fyke net
5	1992.10	"	18	"
6	1993.04.15	"	26	"
7	1993.05.07	"	15	"
8	1993.06.12	"	74	"
9	1993.06.12	"	38	"
10	1993.07.11	"	14	"
11	1993.08	"	5	"



of the anglers' harvest. The largest, 246 mm male was caught with a fyke net at the vicinity of Gdynia and weighed 322 g.

The size (length) distribution of collected fish caught by fyke nets near Gdynia in different years have been compared. The length distribution of fish from 1992 differed from those observed in 1993 (Fig. 3). It may have been so due to the different seasons in which the catches were carried out. The samples of 1992 were collected in September and October while those of 1993 in April-July. Males attained greater size than females whose length did not exceed 209 mm.

The age of the fish caught ranged from two to five years. Fish from the age group II and III predominated,

Fig. 2. Chart depicting sites of confirmed occurrence of *N. melanostomus* in the Gulf of Gdańsk.

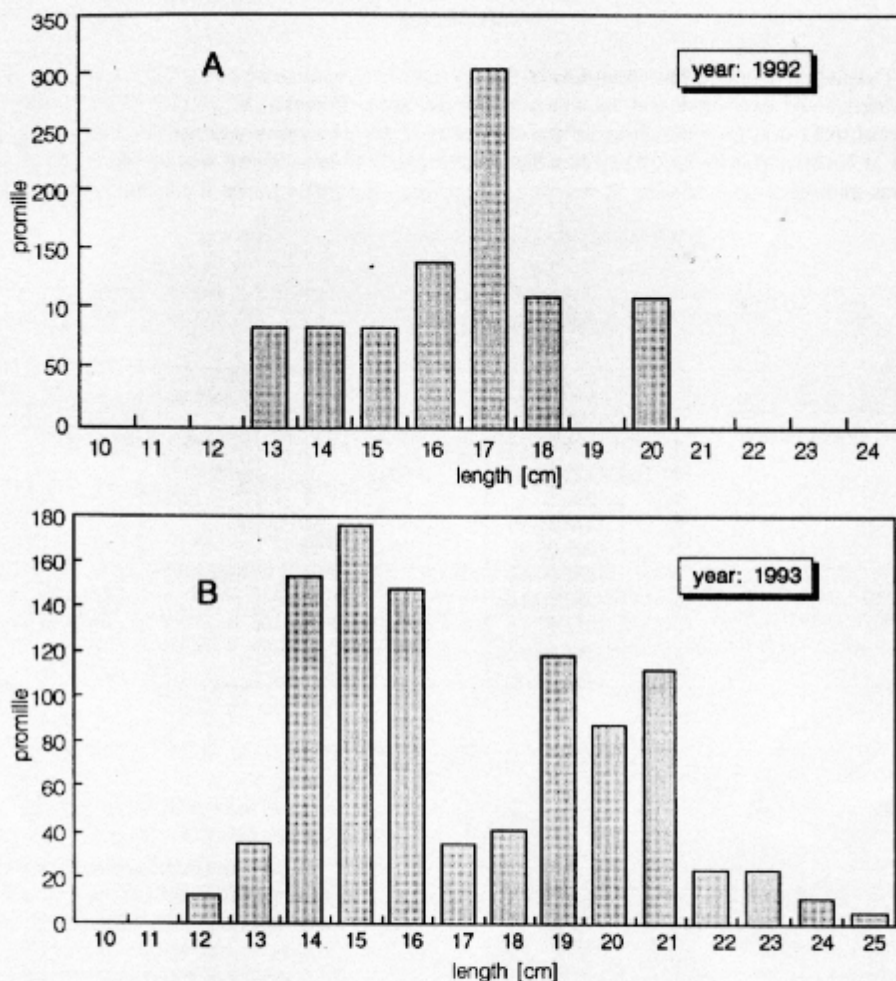


Fig.3. *N. melanostomus* from the Gulf of Gdańsk: frequency in length classes (A: fish of 1992; B: fish of 1993).

constituting almost 90% of the material (Fig. 4). Mean length of *N. melanostomus* inhabiting the Gulf of Gdańsk was 15.2 cm in age group II, 18.2 in age group III, and 21.2 cm in age group IV (Lt).

The scales seem to be a satisfactory material for reading the age. However, an interpretation of the first rings creates certain difficulties; they are much less legible than the remaining ones.

The length-weight relationship was determined using the all fish caught with the fyke nets. It was observed that sex determines the course of the curve depicting this relationship (Fig.5, Table 2). In population inhabiting the Gulf of Gdańsk the males of *N. melanostomus* are characterized by lower weight than the females of the same length.

The sex ratio (4:1) reveals a considerable numerical prevalence of males over females. The spawning period extends probably from April to July. Ripe gonads were encountered in this entire period. Observations of 1993 indicate that peak of spawning takes place in mid-spring.

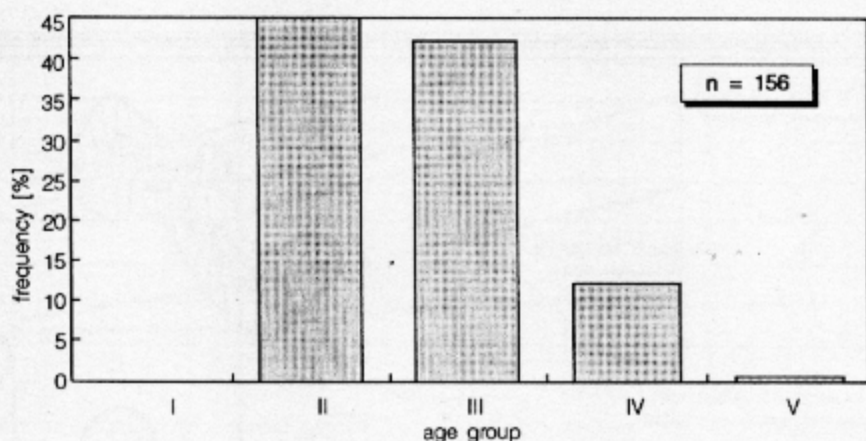


Fig. 4. *N. melanostomus* from the Gulf of Gdańsk: frequency in age classes.

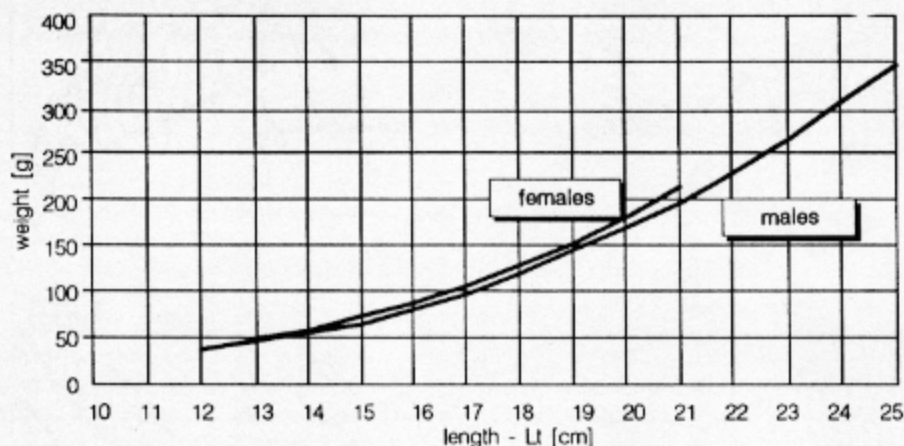


Fig. 5. *N. melanostomus* from the Gulf of Gdańsk: length-weight relationship. (see also Table 2).

Table 2.

Parameters of the length-weight relationship calculated from the formula $W = k \times Lt^n$ for both sexes and all the fish jointly

parameter	males	females	males & females
mean weight	120.4 g	105.7 g	116.5 g
mean length	17.2 cm	16.5 cm	17.1 cm
k	0.0094	0.0090	0.95
n	3.2714	3.3113	3.2449

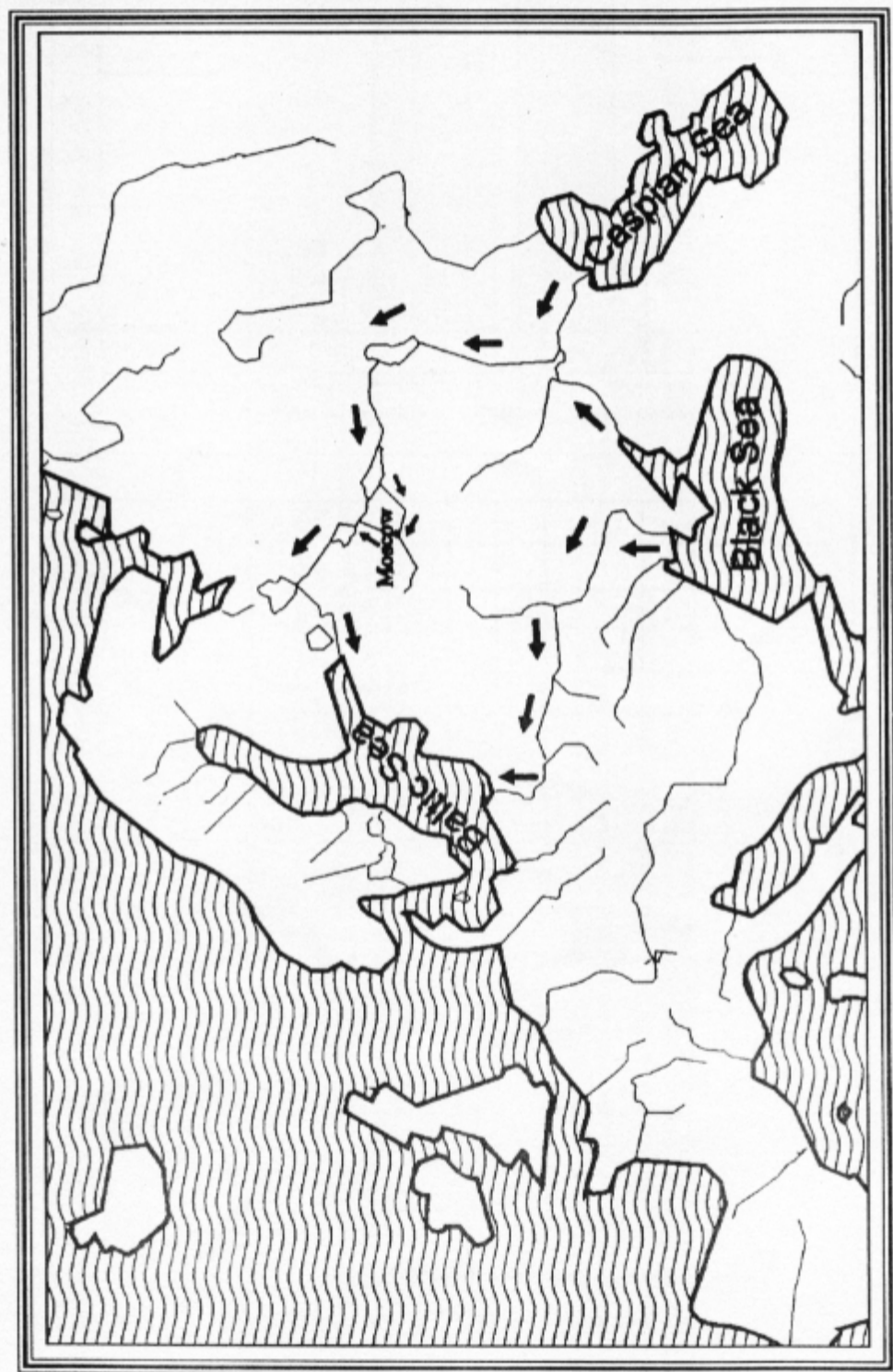


Fig. 6. Hypothetical route of *N. melanostomus* transfer from its original habitats into the Gulf of Gdansk.

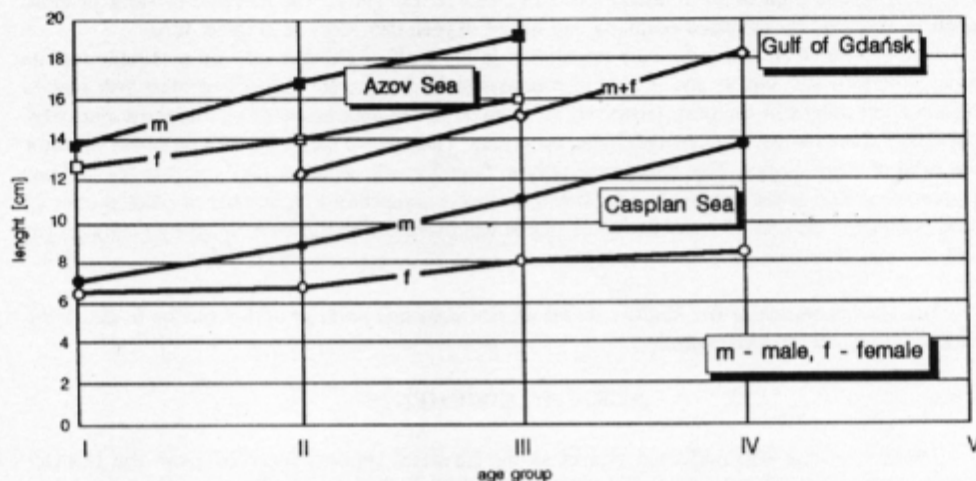


Fig. 7. Comparison of growth rate expressed in length (Lt) of *N. melanostomus* from: the Baltic Sea (Gulf of Gdańsk), the Sea of Azov and the Caspian Sea.

DISCUSSION AND CONCLUSIONS

The Baltic Sea is not the original habitat of the mentioned species. *N. melanostomus* could have found its way into the Gulf of Gdańsk in the ballast ship water of ships sailing from the Black Sea and Caspian Sea or directly through the riverine routes, going to the north (Fig. 6). This latter supposition is supported by the fact that *N. melanostomus* has been recorded in the river Moskva (Sokolov et al. 1989).

So far the presence of that species in other parts of the Baltic has not been noted - the Gulf of Gdańsk seems to be its only habitat. Accidental transfer of eggs or larvae with ballast water seems more likely than the active migration of fish. These fish are not good swimmers and it is rather difficult to imagine the fish covering actively such a long distance leading mostly upstream.

It was revealed that this species has found adequate living conditions in the Gulf of Gdańsk. Its maintenance in our waters is aided by the proper food base rich in molluscs (Wiktor 1993) which are the main food component for this species. In the areas of its original occurrence the molluscs constitute from 46 to 98% of *N. melanostomus* diet (Svetovidov 1969). Not without significance is also its optimal breeding strategy: care for eggs and absence of pelagic phase in the life of larvae, well protecting the embryos and juveniles against predation by the stickleback *Gasterosteus aculeatus*, a dominant fish in the coastal zone of the Baltic. Besides, the observed disappearance or strong reduction of large predators like cod, pike and eel from the polluted coastal zone of the Gulf nullifies the threat to adult specimens. Another factor perhaps influencing favourably the ability of this Ponto-Caspian species to settle in the Baltic are symptoms of warming-up climate which are observed recently.

As regards the growth rate, the Baltic *N. melanostomus* is not inferior to specimens living in other areas (Fig. 7). Its growth is slightly slower than in the Sea of Azov (Berg 1949) and distinctly better than in fish from the Caspian Sea (Nikolski acc. to Kulichenko 1970). It is worth noting that in the waters of the Gulf of Gdańsk, the presence of 25 cm long specimens has been recorded and this length is believed to be a maximum for this species (Berg 1949; Muller 1983).

N. melanostomus in the area of its origin was a species of great commercial importance. It played particularly great role in the fishery of the Black Sea and the Sea of Azov. Before the World War II

three to four thousand tons were harvested annually from the Black Sea and catches in the Sea of Azov in 1950s were as high as 50 thousand tons (Svetovidov 1964). The decrease of stock in those areas is explained by increased pollution and linked oxygen deficiency in summer time.

The growth of *N. melanostomus* population in the Gulf of Gdańsk may be profitable for the local fishermen and anglers and is able to compensate for the present absence of other fish species traditionally caught in the past. However, an increase in the abundance of *N. melanostomus* may also bring about far-reaching changes in the ecosystem. This species may become a serious competitor for food of other species. This refers especially to flounder with which it may compete for mollusc resources. Predating also on crustaceans it will become a competitor to a number of other species of ichthyofauna in the coastal zone. Its hiding places will overlap with those occupied by *Gobius niger* and *Zoarces viviparus*.

The Marine Station at Hel kindly asks for all new data and findings of this species in the Baltic area to be sent to its headquarters.

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