

CRAYFISH IN EUROPE AS ALIEN SPECIES

*How to make the best of
a bad situation?*

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The American spiny-cheek crayfish, *Orconectes limosus*, in the fauna of Belarus

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ABSTRACT

The crayfish *Orconectes limosus* was first found in the Grodno province of Belarus in June, 1997. It has immigrated from Poland and at present has become established in the rivers Shlyamitsa, Marykha, and Chernaya Gancha, and the Avgustovsky Channel. It is thought to have been in this region for about 6-10 years. Along these rivers, *Orconectes limosus* has penetrated into the Neman River draining to the Baltic Sea. A stable population of the intruder is known in the Shlyamitsa. The single trap catch per day amounted to 22 individuals. Mean sizes were 7.49 ± 0.76 cm for females and 7.42 ± 0.74 cm for males. *Orconectes limosus* has been found in the diet of the perch (*Perca fluviatilis*), burbot (*Lota lota*), and mink (*Mustela vison*).

1 INTRODUCTION

In Belarus, two native crayfish species are found, the noble crayfish *Astacus astacus* and the narrow-clawed crayfish, *A. leptodactylus*. The noble crayfish occurs preferentially in the north of Belarus, in the basin of the Baltic Sea and in rare cases only in waters of the Black Sea basin. The narrow-clawed crayfish is more numerous, being widely distributed in waters of the Black Sea basin and is frequently found in lakes and rivers of the Baltic Sea basin. In 1997, a third species has been revealed in Belarus, the spiny-cheek crayfish, *Orconectes limosus*. The goal of this study was to reveal the spread and the possible migration routes of the latter species in the province of Grodno in Belarus.

2 MATERIALS AND METHODS

The study was performed in October, 1997 in the province of Grodno in the west of Belarus. Crayfish were caught with traps and manually with hoop-nets. Traps were of the eel fyke-net type with 18 mm of mesh size. Traps were not baited. Crayfish were measured from the tip of the rostrum to the end of the telson.

The River Shlyamitsa is a tributary of the R. Marykha, which is in turn a tributary

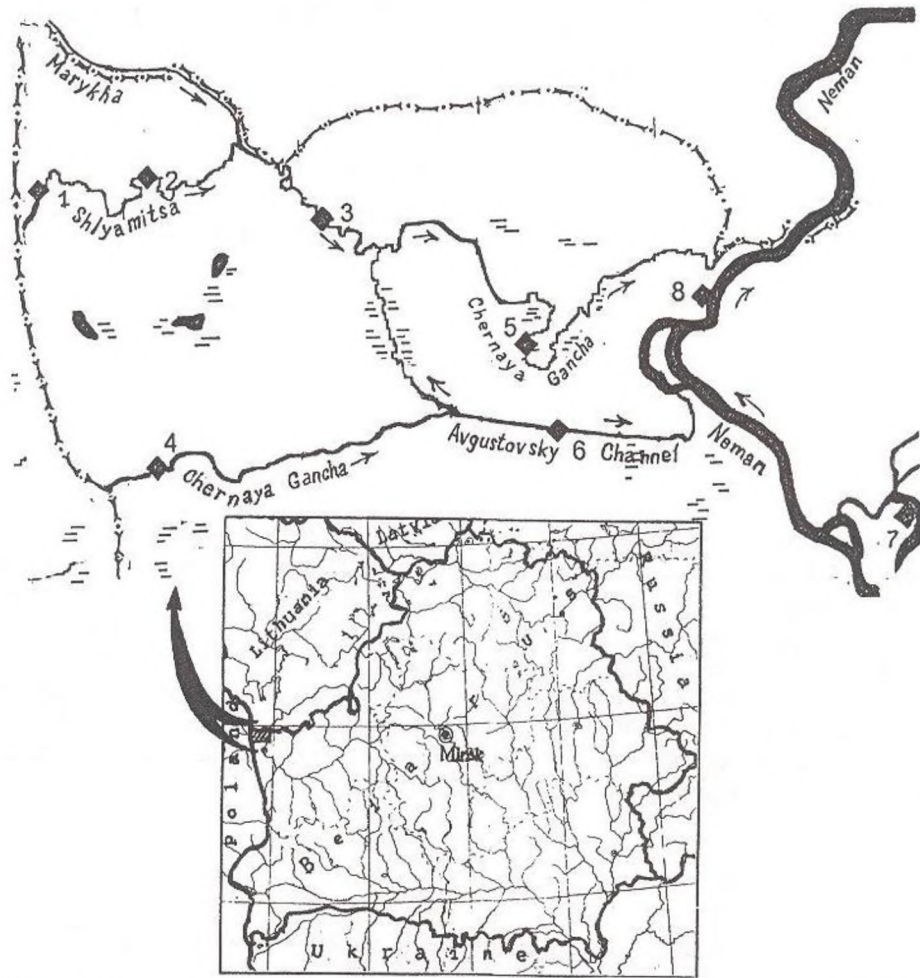


Figure 1. The distribution of the spiny-cheek crayfish, *Orconectes limosus*, in Belarus. 1-8: stations where the samples were taken.

Table 1. Hydrological characteristics of rivers in the area of distribution of *Orconectes limosus* in Belarus.

Rivers	Length* (km)	Width (m)	Depth (m)	Bottom	Flow rate (m/sec)
Shlyamitsa	8	5-10	0.2-1.0	Sand, silt	0.3-0.8
Marykha	5	5-10	0.2-1.0	Sand, silt	0.3-0.8
Chernaya Gancha	35	5-12	0.2-1.0	Sand, silt	0.1-0.5
Avgustovsky Channel	6	5-10	1.2-2.0	Sand, silt	0.1-0.3
Neman	459	110-240	0.7-3.0	Sand, silt, stones	0.7-0.8

*Within the borders of Belarus.

of the R. Chernaya Gancha. The Chernaya Gancha originates in Poland and enters into the Neman River. The Avgustovsky Channel connects the Vistula (Poland) and Neman (Belarus) rivers (Fig. 1). The Neman River is navigable and drains into the Baltic Sea. All other rivers are small and meandering. Banks are preferentially high, in some places low and swampy. The hydrological description of the rivers is given in Table 1.

3 RESULTS

The spiny-cheek crayfish was found in western Belarus not far from the borders with Poland and Lithuania in the Shlyamitsa, Marykha, and Chernaya Gancha rivers, and in the Avgustovsky Channel and the Neman River (Fig. 1).

The rivers are frozen in the middle of December, become clear in the middle of March. However, the ice-cover is unstable, the rivers becoming clear repeatedly in winter and during warm winters the solid ice-cover does not form. The climate is a temperate continental one.

The spiny-cheek crayfish has not been found in isolated lakes of the same region (lakes Endrene, Kavenya, Charne). This situation indicates that the spiny-cheek crayfish has entered the territory of Belarus recently by rivers and has so far become acclimatized in rivers only. According to some personal communications, the spiny-cheek crayfish first appeared in rivers of this region 6-10 years ago. The maximum number of spiny-cheek crayfish has been registered in the Shlyamitsa river, immediately after its outflow from Lake Shlyamy. In some places, crayfish numbered up to 5 individuals per m². In contrast to the noble and narrow-clawed crayfish, the spiny-cheek crayfish is very active in full daylight.

In the Shlyamitsa river, a single trap catch per day amounted to 22 individuals. In trap catches, crayfish lengths ranged from 6 to 12 cm. Mean female sizes were 7.49 ± 0.76 cm, male sizes 7.42 ± 0.74 cm (Fig. 2). The trap net mesh (18 mm) allowed crayfish less than 6 cm to escape. At manual harvesting using hoop-nets, individuals from 3 cm were caught. Average individual sizes when harvesting manually have amounted to 7.26 ± 0.8 cm in females and 6.93 ± 1.03 cm in males (Fig. 3). The size structure of spiny-cheek crayfish by different catching methods in different localities is given in the Table 2.

Due to its high numbers in the Shlyamitsa River, the spiny-cheek crayfish has become a food item for many predators. In analyzed stomachs of burbot (*Lota lota*), perch (*Perca fluviatilis*), and mink (*Mustela vison*), only crayfish 3 to 5 cm long were found. In other rivers studied, the number of estimated crayfish as catch per trap per day was approximately 10 times lower than in the Shlyamitsa River. Evidently due to its low density, it was not revealed in stomachs of fish.

October is the mating time for the spiny-cheek crayfish, when we observed mating pairs and females with spermatophores.

4 DISCUSSION

The spiny-cheek crayfish has penetrated into Belarus probably during the last 6-10

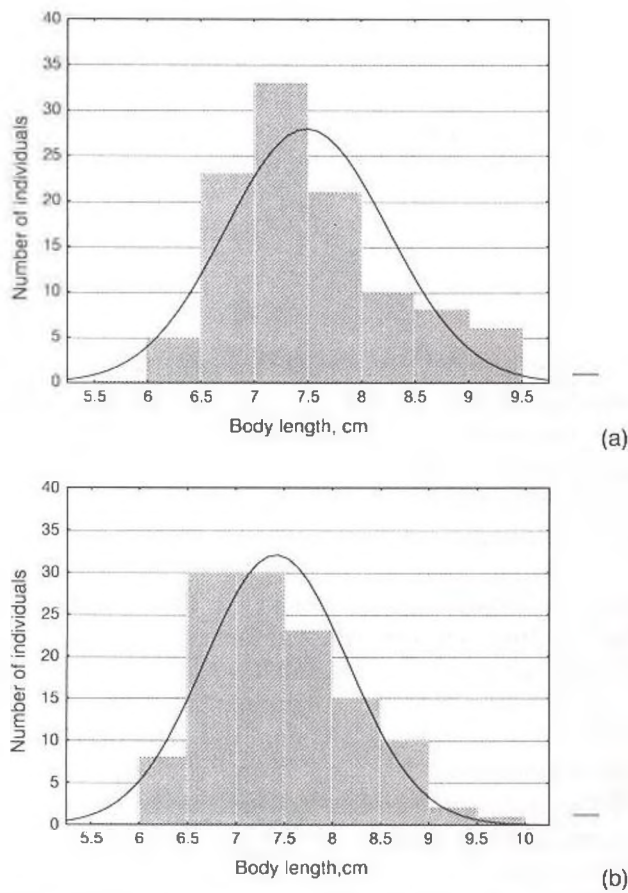


Figure 2. The size structure of females (a), and males (b) of *Orconectes limosus* in trap catches in the Shlyamitsa River.

Table 2. The size structure of spiny-cheek crayfish at different catching methods in different localities of the area of distribution in Belarus.

N of Station*	Locality	Trap catch			Hoop-net catch		
		Ind./day	Mean size		Ind./hour	Mean size	
			Male	Female		Male	Female
1	Shlyamitsa	—	—	—	150	6.6	7.2
2	Shlyamitsa	9.4	7.4	7.5	160	6.9	7.3
3	Marykha	—	—	—	8	7.8	7.6
4	Chernaya Gancha	—	—	—	20	7.3	6.5
5	Chernaya Gancha	0.5	8.6	7.1	—	—	—
6	Avgustovsky Channel	—	—	—	7	6.8	7.5
7	Neman	—	—	—	40	6.6	6.3
8	Neman	0.5	8.6	10.2	—	—	—

*The numbers of the stations follow those seen in Figure 1.

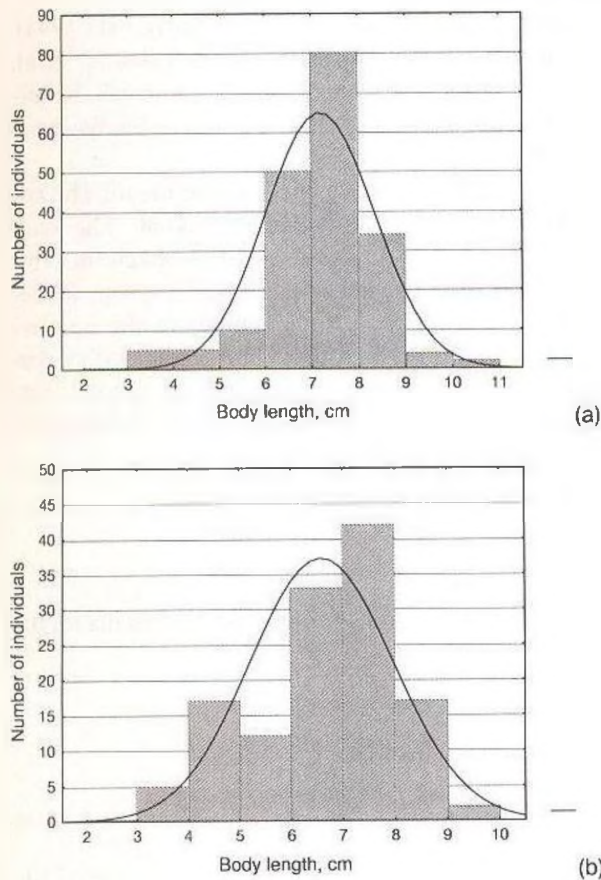


Figure 3. The size structure of females (a), and males (b) of *Orconectes limosus* at manual harvesting with hoop-nets in the Shlyamitsa River.

years from the Polish territory through the Avgustovsky Channel system. The spiny-cheek crayfish migrates along river flows and is still not found in lakes. It seems to be an important source of food for predatory fish and mammal species and according to our data is actively harvested by the local population.

In Europe, this species appeared in 1890 when 100 individuals of spiny cheek crayfish were delivered from the Delaware River (Pennsylvania, USA) to a fishing farm near the Myslya River, the eastern tributary of the Oder (within the territory of modern Poland). In 1911-1913, the spiny-cheek crayfish has acclimatized in the Loire River and was found already in 1925 in both the Seine and the Rhone, and in some lakes in the French Alps. Since then, this species has undergone its extensive expansion throughout European water systems (Boettger 1938, Momot 1988). The area of distribution is still growing. For example, in the Netherlands the spiny-cheek crayfish was registered in 1992, but it penetrated there earlier along the Loire River (Geleen 1978). At present, in that country it occupies practically all the waters. The same situation occurs in Germany, except Bavaria. In Poland, *O. limosus* is a common species now being recorded in more than two-thirds of its territory except the south-

eastern part and amounting to 70 individuals m⁻² in some biotopes (Struzynski 1994). The spiny-cheek crayfish have recently invaded Lithuanian waters (Skurdal et al. 1997). Obviously it has taken 100 years for the spiny-cheek crayfish to reach the territory of Belarus. Approximately at the same time the spiny-cheek crayfish has been found in Italy as well (Gherardi et al. 1997).

In the basin of the Neman River, two species of native crayfish are found: The noble crayfish listed in the Red Data Book, and the narrow-clawed crayfish. The latter is thought to gradually outcompete the former one (Cukerzis 1968, Holdich this volume), but as far as we know the real mode of the replacement is still unclear. In Belarus, there are on the one hand some waters with a high number of the narrow-clawed and a low number of noble crayfish, and on the other hand waters with a predominance of noble crayfish. Although it is not known whether this species will outcompete the native one, its recent appearance in Belarus is likely to lead to changes in the aquatic ecosystem.

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