Rapid Communication

First record of Chinese sleeper *Perccottus glenii* Dybowski, 1877 (Gobiiformes: Odontobutidae) in Siverskyi Donets river basin

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Abstract

This report highlights the first recorded occurrence of the Chinese sleeper fish *Perccottus glenii* (Osteichthyes, Odontobutidae) in the Siverskyi Donets river basin. This invasive species was not historically present in the region but has now established a foothold in the nearby Dnipro river basin. The expansion of the species’ range is believed to have been influenced by both intentional and accidental fish stocking. Additionally, evidence suggests that the species is capable of reaching maturity at a relatively small size, which may have contributed to its successful colonization.

Key words: invasive fish species, range expansion, new findings, Eastern Ukraine

Introduction

Over the past five decades, there has been a significant increase in the global detection of new occurrences of non-indigenous aquatic species, with a rate of one new occurrence every 8.4 days on average, and arthropods, molluscs and fishes being the most commonly reported (Bailey et al. 2020).

One of these species, the Chinese sleeper, is a small (75–250 mm) fish native to North Korea and far eastern Russia (Berg 1949).

It is now one of the most widespread and successful invasive fish species in European inland waters (European Commission 2020). Since the end of the 20th century, the Chinese sleeper has spread rapidly in Eastern and Central Europe, including Belarus (Lukina 2011), Bulgaria (Jurajda et al. 2006), Croatia (Horvatić et al. 2022), Germany (Nehring and Steinhof 2015), Latvia (Pupina et al. 2015), Lithuania (Rakauskas et al. 2021), Poland (Nowak et al. 2008), Romania (Nastase et al. 2019) and Slovakia (Koščo et al. 2003). The most recent finds confirm the presence of Chinese sleepers in the Elbe river basin in the Czech Republic (Šmejkal et al. 2023) and in a small pond in southwestern part of Finland (Pihlström et al. 2022).

The Chinese sleeper is a voracious predator, preying on other aquatic organisms, including juvenile fishes (Szczerbik et al. 2023) and amphibians (Pupins et al. 2023). Therefore, it is considered harmful to the native fauna (Grabowska et al. 2009; Kati et al. 2015), alongside interference competition for food with native fishes (Grabowska et al. 2019; Szczerbik et al. 2023).
Chinese sleepers typically inhabit still water bodies such as lakes, ponds, and marshes with abundant underwater vegetation while avoiding sections of rivers with both fast and slow currents (Kottelat and Freyhof 2007). In certain areas, this species could be found in sections of fluvial rivers along with floodplains and bays (Kutsokon 2017).

Sometimes, in low-production waterbodies like Latvian marshes, the species may consist of monospecific fish communities, as Kutsokon et al. (2021) suggested.

As for Ukraine, comprehensive study (Kutsokon 2017) provides data on the historical and geographical distribution of *Percottus glenii*. The study indicates that the Chinese sleeper was present in the Vistula, Danube, Dniester, Southern Buh and Dnipro river basins as of 2016, except for the entire basin of the Siverskyi Donets river.

No samples from the Siverskyi Donets river basin were included in the study on the genetic structure of the Chinese sleeper population in Europe, which analyzed samples from 17 locations in Ukraine’s Southern Bug, Dnipro and Dniester rivers’ drainages as well as the Shatsk lakes (Grabowska et al. 2020).

Several new findings were recently recorded in the Budjak area of the Lower Danube basin and in the Sasyk Lagoon and Gulf of Yahorlyk in the Black Sea, as reported by Kvach et al. (2021, 2022). All of these occurrences are located in South-Western Ukraine, far from the Siverskyi Donets river basin.

Concerning the entire basin of the Don river, also known as the Ecoregion Don, ID 427 according to FEOW (Abell et al. 2008; Freshwater Ecoregions of the World 2023), the Chinese sleeper, initially recorded in the mid-1980s, has exclusively been observed in the upper flow of the river. It has been found in the Don channel, as well as in the Voronezh, Sosna, Snova, Vyazovka, Skvirnya, Matrenka, Stanovaya Ryasa, and Khavenka rivers, as well as in many ponds located in the Lipetsk region. No evidence of its presence has been discovered in other parts of the basin (Ivanchev et al. 2013).

**Materials and methods**

On 18 May 2023, the first specimen of the Chinese sleeper, measuring approximately 30 mm in length, was caught with a dip net in a small lake during a survey of the batrachofauna. Subsequent surveys on 21 and 24 May 2023 yielded a further 18 specimens. These live specimens were taken to the Laboratory of Ichthyology of V.N. Karazin Kharkiv National University for further identification and examination.

The small lake (about 600 m², Figure 1) is located in the floodplain of the small river Zhykhorets, 10 m from the river bank and connected to the river by small inflow and outflow channels. The Zhykhorets river is a left tributary of the Udy river, which in turn is a right tributary of the Siverskyi Donets river. The site is located within the city limits of Kharkiv, and the coordinates of the centre of the small lake are 49.9284356N; 36.321298E (Figure 2).
The lake is a small natural floodplain water body with a depth of about 1.5 m, about half of which is silt. Many emergent (hornwort *Ceratophyllum* sp.) and submergent (common reed *Phragmites australis*) macrophytes and unidentified green hair algae were in the water column.

Preliminary species identification was confirmed by reference to the descriptions in Kottelat and Freyhof (2007). Total length, standard length and head length were measured in millimetres using electronic calipers, and mass...
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Figure 3. Male (above) and female (below) specimens of *Perccottus glenii* from the small lake in the Siverskyi Donets river basin (Kharkiv, Ukraine). Scale – 10 mm. Photographs by H. Honcharov.

was measured in grams using electronic scales. The number of branched and unbranched rays was counted separately for the first dorsal fin, the second dorsal fin and the anal fin with a dissecting microscope. The number of transverse scale rows was also counted. Sex was determined by gonad morphology after dissection.

Results

All 18 captured individuals were identified as Chinese sleepers (*Perccottus glenii* Dybowski, 1877) (Figure 3) as those with two dorsals, the first with 5–8 simple rays, the second with 1–2 simple and 9–13 branched rays, first dorsal with no spines, no barbels, pelvic not fused into a disc, no lateral line canals.

Key morphometric and meristic characters were calculated for 13 specimens: 7 males, 3 females and 3 juveniles (Table 1), the other 2 adults and 3 juveniles were preserved alive in aquaria.

Five specimens, 2 males with a standard length of 45.8 and 48.3 mm and 3 females with a standard length of 41.6–48.6 mm, exhibited mature gonads and sexual dimorphism.

Two juvenile northern pike *Esox lucius* and about 10 juvenile *Carassius* sp. were caught in the lake along with Chinese sleepers.

Discussion

The Siverskyi Donets river is a main tributary of the Don river in the Azov Sea basin; it ranks fourth among the largest rivers in Ukraine and serves as the major water supply for Eastern Ukraine (Demchenko 1971).
Our finding represents the first occurrence of the Chinese sleeper in the river basin and the second way of its invasion into the Don river basin and the Ecoregion Don. While the species is well known to anglers and citizen scientists in eastern Ukraine from fishermen’s online resources and their own experience in the other river basins, there was a complete lack of information on its occurrence in the Siverskyi Donets. The species had been recorded in the neighbouring Dnipro basin, so its invasion into the Siverskyi Donets basin was an expected event (Figure 4).

Both the small lake’s location within a large city and reports from local residents suggest that fish stocking from aquaria or ponds within the Dnipro basin probably facilitated the invasion. Spreading by local residents was also considered the most reliable vector of invasion in other European regions (Pupina et al. 2015; Kvach et al. 2022; Pihlström et al. 2022).

We consider natural migration from the upper Don much less likely, as the hypothetical route would have included almost the entire length of the Don (downstream) and Siverskyi Donets (upstream). There is no information

Table 1. Morphological features of Chinese sleeper (*Perccottus glenii*), n = 13, from the small lake in the Siverskyi Donets river basin

<table>
<thead>
<tr>
<th>Features</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body mass, g</td>
<td>1.47</td>
<td>0.89</td>
<td>0.5–3.1</td>
</tr>
<tr>
<td>Total length, mm</td>
<td>46.92</td>
<td>7.85</td>
<td>34.9–58.3</td>
</tr>
<tr>
<td>Standard length, mm</td>
<td>38.5</td>
<td>6.75</td>
<td>28.3–48.6</td>
</tr>
<tr>
<td>Head length, % of standard length</td>
<td>32.07</td>
<td>1.87</td>
<td>29.61–34.62</td>
</tr>
<tr>
<td>Total number of rays (unbranched) in the first dorsal fin</td>
<td>6.69</td>
<td>0.75</td>
<td>5–8</td>
</tr>
<tr>
<td>Number of unbranched rays in the second dorsal fin</td>
<td>1.85</td>
<td>0.38</td>
<td>1–2</td>
</tr>
<tr>
<td>Number of branched rays in the second dorsal fin</td>
<td>10.31</td>
<td>1.11</td>
<td>9–13</td>
</tr>
<tr>
<td>Number of unbranched rays in anal fin</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Number of branched rays in anal fin</td>
<td>9.92</td>
<td>0.76</td>
<td>9–11</td>
</tr>
<tr>
<td>Number of cross-section rows of scales</td>
<td>38</td>
<td>1.78</td>
<td>35–41</td>
</tr>
</tbody>
</table>

Figure 4. Map of *Perccottus glenii* occurrences in the nearest river basins (taken from GBIF; https://www.gbif.org/ru/species/2390064) and the first record in Siverskyi Donets basin, Ukraine.
on the presence of the species in the Middle and Lower Don. Furthermore, our ichthyological surveys in recent years, following the last thorough review of the local fish population (Shandikov and Honcharov 2008), have not found any evidence of the species’ presence in the water bodies of the Kharkiv, Donetsk and Lugansk regions. Stocking from the Upper Don region also seemed impossible in recent years due to trade isolation from Russia.

Regarding size at maturity, our results are consistent with those of D.V. Zaloznykh, who reported a range of 40–50 mm in water bodies in the Gorky region of Russia. The research was published in 1982 and we cited it here after Grabowska et al. (2011). Generally, populations such as those found in the Drava River in Croatia (Horvatić et al. 2022) or the Włocławski reservoir in Poland (Grabowska et al. 2011) show maturation at a standard length exceeding 55 mm.

The presence of juvenile northern pike in the lake suggests a viable link between the lake and the Zhykhorets river, supporting the further possibility of Chinese sleeper dispersal to and from the lake. The simultaneous presence of adults and juveniles during the spring season suggests that the species is reproducing in the small lake, at least last year.

**Authors contribution**

The first sample was collected by M.D., further samples were collected with participation of M.D., the laboratory investigation was carried out by H.H. All the authors equally contributed in writing the paper.

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