

## The Distribution of Three Exotic Fishes in Anatolia

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**Abstract:** Three exotic fish species, *Lepomis gibbosus* (L., 1758), *Pseudorasbora parva* (Temminck & Schlegel, 1846) and *Carassius gibelio* (Bloch, 1782), were recorded in Topçam Dam Lake from a new locality in Asia Minor. The pumpkinseed sunfish, stone moroko and wild goldfish were found as a result of studies performed on the reservoir in Aydın province, Turkey, between June 1999 and June 2000. This study is one of the first records on the distribution of these fishes in Topçam Dam Lake, Anatolia. These 3 species had been recorded from the Thrace region of Turkey, as well as *Pseudorasbora parva* in the Antalya Basin.

**Key Words:** *Lepomis gibbosus*, *Pseudorasbora parva*, *Carassius gibelio*, Asia Minor, exotic fish, distribution

### Üç Egzotik Balık Türünün Anadolu'da Yayılımı

**Özet:** Egzotik türlerden olan 3 tür Güneş balığı, *Lepomis gibbosus* (L. 1758), Çizgili sazancık, *Pseudorasbora parva* (Temminck & Schlegel, 1846) ve Altın Karas Balığı, *Carassius gibelio* (Bloch, 1782) yeni bir lokaliteden kaydedilmiştir. Güneş balığı, Çizgili sazancık ve Altın Karas balığı Haziran 1999-Haziran 2000 tarihleri arasında Aydın ilindeki Topçam Baraj Gölü'nde yapılan düzenli çalışmalar sonucunda belirlenmiştir. Bu çalışma, bu türlerin Anadolu'ya yayılımıyla ilgili olarak, Topçam Baraj Gölü'nden yeni kayıtlardan bir tanesidir. Bu türlerin varlığı Ülkemizden Trakya Bölgesi'nde bilinmesi yanında, ayrıca Antalya Havzasından da *Pseudorasbora parva* bilinmektedir.

**Anahtar Sözcükler:** *Lepomis gibbosus*, *Pseudorasbora parva*, *Carassius gibelio*, Anadolu, egzotik balıklar, dağılımı

### Introduction

Over the last decades, some exotic fish species have been introduced into the inland waters of Europe (Maitland, 1977), such as in Greece (Economidis et al., 2000) and Bulgaria (Grupcheva and Nedeva, 1999). Some of these introductions were planned to take advantage of particular ecological or economical superiorities of the species concerned. Our communication with the State Hydraulic Works (DSİ) revealed that 3 exotic fish species were unintentionally introduced to lakes and dams in Asia Minor while transferring economically important common carp, *Cyprinus carpio*, juveniles from the Thrace region. Some of those unintentional introductions contained exotic species such as those of pumpkinseed sunfish, *Lepomis gibbosus* (L.), and stone moroko, *Pseudorasbora parva* (Temminck and Schlegel). The first records of *Lepomis gibbosus* and *Pseudorasbora parva* in Turkey were reported by Erk'akan (1983) from lakes in Thrace region. In addition, *Pseudorasbora parva* was introduced to the Antalya Basin (Küçük, 1987).

The first records of the species *Carassius gibelio* were given as *Carassius auratus* by Baran and Ongan (1988), and *Carassius auratus gibelio* by Ozulug (1999) from Lake Gala and Büyükçekmece Dam Lake, respectively, from the Thrace region of Turkey.

The purpose of this paper is to identify and describe 3 exotic species collected in Topçam Dam Lake. The paper reports the presence of these 3 exotic species in a new location from Asia Minor. The documentation of exotic species is important in order to track their dispersal and appraise threats to native species and ecosystems.

### Study Area

Topçam Dam Lake, which is fed by Madran Stream and precipitation, was constructed in 1984 for irrigation and flood prevention. The reservoir is located in the Büyük Menderes River Basin, in the southwest of Turkey. The water level of the reservoir decreases every year in the late spring and summer because of irrigational use. When the rainfalls begin in winter, the water level increases again.

The deepest point of Topçam Dam Lake is 49.5 m. This region has a warm climate. During the study water temperatures varied from 7.4 to 28.9 °C. Turbidity was between 65 and 300 cm, pH 7.20–7.98, dissolved oxygen 5.00–10.54 mg/l, and conductivity 118.10–151.50 µmhos/cm.

**Materials and Methods**

We collected 172 *Carassius gibelio*, 125 *Lepomis gibbosus*, and 17 *Pseudorasbora parva* specimens during monthly sampling trips. The specimens were caught from Topçam Dam Lake, which is located in the Büyük Menderes River Basin in the southwest of Turkey.

Specimens of the 3 fish were usually captured during the warmer summer months. Furthermore, the characteristics of 2 samples from each of the 3 specimens were examined as shown in the Table.

The specimens were caught monthly between June 1999 and June 2000 using gill nets and dip nets. Fish were fixed in a 4% formalin solution immediately after capture. They were brought to the laboratory and stored in 70% ethanol for further systematical examinations. Measurements were taken by means of a millimetric ruler (Geldiay and Balık, 1988; Berg, 1962).

The specimens are kept in the Ege University, Fisheries Faculty freshwater fish collection in İzmir.

**Results**

This is the first record in a new locality of Asia Minor for the pumpkinseed sunfish, *Lepomis gibbosus*; wild goldfish, *Carassius gibelio*; and stone moroko, *Pseudorasbora parva*. *Lepomis* and *Carassius* have become fully acclimatized and have built up an important population in Topçam Dam Lake. Fish such as *Carassius gibelio* and *Lepomis gibbosus* were observed in large numbers. In particular, the transfer and introduction of *Carassius gibelio* have had considerable negative impacts on the distribution of economically important fish because of the competition for available food. This also occurs in the case of elevated population density, and they are in competition with other fish such as the chub (*Leuciscus cephalus*), and common carp, (*Cyprinus carpio*) (Şaşı, 2002).

The adverse ecological impacts of *Lepomis gibbosus* and *Pseudorasbora parva* were also reported in several countries as these species may feed on small fish, fish eggs and other vertebrates (Berg, 1965; Scott and Crossman, 1973; Billard, 1997). They are regarded as a pest because they compete with the fry of other economically important species due to their high reproductive rates (Welcomme, 1988; Page and Burr, 1991). These 3 fish species are not economically important for Topçam Dam Lake.

Table. Some meristic and morphometric data on *Lepomis gibbosus*, *Pseudorasbora parva* and *Carassius gibelio*. values in Topçam Dam Lake (Turkey). Head lengths and maximum depths are given as a percentage of the standard length.

Specimen	<i>Lepomis gibbosus</i>		<i>Pseudorasbora parva</i>		<i>Carassius gibelio</i>	
	1	2	1	2	1	2
TL	11.7	8.0	9.6	9.7	31.0	29.5
SL	9.6	6.5	8.0	7.9	25.0	23.5
D	X 11	X 10	III 8	III 7	III 18	III 18
A	III 10	III 9	III 7	III 6	III 6	III 6
Number of scales on lateral line	49	48	44	41	30	30
Head length (%)	29.9	28.8	23.75	25.32	27.76	28.51
Max depth (%)	31.6	33.7	23.75	25.32	37.96	36.60

Abbreviations: TL = Total Length; SL = Standard Length; D = Number of dorsal rays; A = Number of anal rays.

*Lepomis gibbosus* (Linnaeus, 1758)

The characteristics of our specimens: The pumpkinseed is a deep-bodied, slab-sided sunfish with a very small mouth, and the upper jaw does not reach the front margin of the eye when the mouth is closed. The spiny dorsal fin has 10 spines and is broadly connected to the dorsal fin with 10 or 11 soft rays. The pectoral fins are elongated and pointed, reaching entirely across the eye when the fins are bent into a forward position. Head enters 2.6-3.1 times and body depth 2.4-2.9 times in length (without caudal). There are 44-51 scales on the lateral line. This fish is pale olive in color with purplish horizontal bars on the sides. The gill cover is quite small with a light-colored margin and generally has bright red with 6 or more wavy emerald bars interdispersed with gold or copper on the cheeks.

*Pseudorasbora parva* (Temminck & Schlegel, 1846)

The characteristics of our specimens: D III 7-8; A III 6-7; Lin. Lat. 36-44. Body depth slightly exceeding head length, or equal to it, 3.9-4.4 times in body length (without caudal). A distinct narrow dark band running laterally from the tip of the snout to the caudal fin base. Dark speckles covering the dorsal and the anal fin; length up to 9.0-10.0 cm.

*Carassius gibelio* (Bloch, 1782)

The characteristics of our specimens: D III 18, A III 6. The goldfish is distinguished by being slightly less deep in the body and had larger scales than the Crucian carp, *Carassius carassius*, which has been introduced to almost all parts of Turkey (Geldiay and Balık, 1988; Kuru, 1975). The goldfish has strong spines in the dorsal and anal fins, and both are deeply serrated; numbering 29-30 on the lateral line. The color is variable; in the wild the back is olive, the sides are golden and the belly is silvery. The largest specimen had an in fork length of 29.50 cm and a total weight of 702 g in Topçam Dam Lake.

Some meristic and morphometric characteristics of these 3 fish caught in Topçam Dam Lake are given in the Table.

## Discussion

The pumpkinseed sunfish, *Lepomis gibbosus*, is a freshwater native in eastern and central North America (Scott and Crossman, 1973; Page and Burr, 1991). However, this species has been introduced to the

freshwaters of England, France, Germany, Belgium, Holland, Greece, Bulgaria and the Thrace region of Turkey (Maitland, 1977; Erk'akan, 1983; Berg, 1965).

According to McAllister and Coad (1974), the dorsal fin of *Lepomis gibbosus* has 9 or 10 spines and 11-13 soft rays. The anal fin has 3 spines and 10-12 soft rays. There are 35-44 scales in a lateral line. Erk'akan (1983) depicted specimens of the pumpkinseed fish from the Ipsala drainage canals in Edirne. The dorsal fin of these specimens had 10 spines and 11-12 soft rays and 33-36 scales on a lateral line. Other important systematical characteristics are the same as indicated above.

The stone moroko, *Pseudorasbora parva*, is known in northeast Asia; southern and central Japan, Taiwan, Korea, China, the Amur Basin (Berg, 1964; Bogutskaya and Naseka, 1996), and it has been introduced to various other areas in Europe and Asia (Maitland, 1977; Welcomme, 1988). It is found in the Dnieper, Dniester, the Danube basins, in lakes Scutari and Prespa and in the Aliakmon River in Greece (Reshetnikov et al., 1997). It was also introduced to Iran and Turkmenistan (Billard, 1997).

*Pseudorasbora parva* was found in the Antalya Basin. The length of the species ranged between 4.9 and 7.7 cm (Küçük, 1987), which are smaller than those of our specimens.

The wide distribution of the native species, *Carassius gibelio*, in eastern Asia and eastern Europe (Reshetnikov et al., 1997; Kottelat, 1997) is well known. It is present in rich ponds, lakes and slow-flowing rivers in many parts of Europe, to which it has been introduced (Maitland, 1977; Kottelat, 1997). However, some authorities consider that the Prussian carp, *Carassius auratus gibelio*, is native to eastern Europe (Bloch, 1783 - Prussian carp) and it is subspecifically distinct from the Asiatic goldfish, *Carassius auratus auratus* (Wheeler, 1969).

The synonyms of *Carassius gibelio* include *Carassius auratus* and *Carassius auratus gibelio*, which were reported from Lake Gala (Baran and Ongan, 1988) and Büyükçekmece Dam Lake (Ozulug, 1999) respectively.

The transfer and introduction of *Carassius gibelio* had considerable negative impact on economically important species due to competition for food resources (Şaşı, 2002; Andrews, 1987). In several countries, the adverse ecological impact of the introduced *Lepomis gibbosus* and *Pseudorasbora parva* was reported. Since they also feed

on small fishes and other vertebrates, as well as fish eggs, they are regarded as a pest (Berg, 1965; Scott and Crossman, 1973; Bogutskaya and Naseka, 1996). Thus, *Lepomis gibbosus* and *Pseudorasbora parva*, are considered undesirable catch or by-catch.

## References

- Andrews, C. 1987. Fishkeeper's Guide to Fancy Goldfish. Tetra Press, Canada.
- Baran, I. and Ongan, T. 1988. Gala Gölü'nün Limnolojik Özellikleri Balıkçılık Sorunları ve Öneriler. Gala Gölü ve Sorunları Sempozyumu, Doğal Hayatı Koruma Derneği Bilimsel Yayınlar Serisi, İstanbul, pp. 46-54.
- Berg, L.S. 1962. Freshwater Fishes of the USSR and Adjacent Countries. Vol. 1, 4<sup>th</sup> Edition, Israel Program for Scientific Translations Ltd., Jerusalem (Russian Version Published 1949).
- Berg, L.S. 1964. Freshwater Fishes of the USSR and Adjacent Countries. Vol.2, 4<sup>th</sup> Edition, Israel Program for Scientific Translations Ltd., Jerusalem (Russian Version Published 1949).
- Berg, L.S. 1965. Freshwater Fishes of the USSR and Adjacent Countries. Vol. 3, 4<sup>th</sup> Edition, Israel Program for Scientific Translations Ltd., Jerusalem (Russian Version Published 1949).
- Billard, R. 1997. Les Poissons d'eau Dauce des Rivieres de France, Identification, Inventaire et Repartition des 83 Especes. Laboratoire d'Ichthyologie Generale et Appliquee et le Service du Patrimoine Naturel de l'Institute d'Ecologie et de Gestion de la Biodiversite, Museum National d'Histoire Naturelle.
- Bogutskaya, N.G. and Naseka, A. M. 1996. Cyclostomata and Fishes of Khanka Lake Drainage Area (Amur River Basin). An Annotated Check-List with Comments on Taxonomy and Zoogeography of the Region. Zool. Inst. Russ. Acad. Sci., Russia.
- Economidis, P., Dimitriou, E., Pagoni, R., Michaloudi, E. and Natsis, L. 2000. Introduced and Translocated Fish Species in the Inland Waters of Greece. Fisheries Management and Ecology, 7: 239-250.
- Erk'akan, F. 1983. The Fishes of Thrace Region. Hacettepe Bulletin of Natural Sciences and Engineering, 12: 39-48.
- Geldiay, R. and Balık, S. 1988. Türkiye Tatlısu Balıkları. Ege Üniversitesi. Fen Fak. Kitaplar Serisi No: 97, İzmir.
- Grupcheve, G.I. and Nedeva, I.L. 1999. Ichtyofauna of the Zrebchevo Reservoir (Bulgaria). Acta-Zoologica-Bulgarica, 51 : 53-55.

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- Kottelat, M. 1997. European Freshwater Fishes. Biologia 52, Suppl., 5: 1-271.
- Kuru, M. 1975. Do?u Anadolu Bölgesinin Balık Faunası, Atatürk Üniversitesi Yayınları No: 348, Erzurum.
- Küçük, F. 1987. Antalya Körfezine Dökülen Akarsuların Balık Faunası ve Bazı Ekolojik Parametreleri Üzerine Bir Araştırma. Süleyman Demirel Üniversitesi, Fen Bil. Ens., Doktora Tezi, Isparta, 114 p.
- Maitland, P.S. 1977. Freshwater Fishes of Britain and Europe. Hamlyn Publishing, London.
- McAllister, D.E. and Coad, B.W. 1974. Fishes of Canada's National Capital Region, Fisheries Research Board, Otlawa, Special Publication No. 24, pp. 144-145.
- Ozulug, M. 1999. The Taxonomic Study on the Fish in the Basin of Büyükçekmece Dam Lake. Tr. J. of Zoology, 23: 439-451.
- Page, L.M. and Burr, B.M. 1991. A Field Guide to Freshwater Fishes: North America, North of Mexico. Houghton Mifflin and Company, Boston.
- Reshetnikov, Y.S., Bogutskaya, N.G., Vasil'eva, E.D., Dorofeeva, E.A., Naseka, A.M., Popova, O.A., Savvaitova, K.A., Sideleva, V.G. and Sokolov, L.I. 1997. An Annotated Check-List of the Freshwater Fishes of Russia, Journal of Ichthyology, 37: 687-736.
- Scott, W.B. and Crossman, E.J. 1973. Freshwater Fishes of Canada. Bull. Fish Research Board (184), Canada.
- Şaşı, H., 2002. Topçam Baraj Gölü'nün (Çine-Aydın) Balık Faunası ve Bazı Ekonomik Türlerin Biyo-Ekolojik Özelliklerinin incelenmesi. Ege Üniversitesi. Fen Bil. Ens., Doktora Tezi (PhD), 159 pp.
- Wheeler, A. 1969. The Fishes of the British Isles and North West Europe. Macmillan, London.
- Welcomme, R.L. 1988. International Introductions of Inland Aquatic Species, FAO Fish Tech. Pap. No. 294, Rome.