Contribution to the knowledge on distribution of freshwater mollusc species of İzmir (Turkey)

İzmir’in (Türkiye) tatlısu mollusca türlerinin dağılımı

Gözde Gürelli* • Murat Özbek

1Kastamonu University, Faculty of Science and Art, Biology Department, 37100, Kuzeykent-Kastamonu, Turkey
2Ege University, Faculty of Fisheries, Department of Hydrobiology, 35100, Bornova-İzmir, Turkey
*Corresponding author: ggurelli@yahoo.com

Özet: İzmir’in Tatlısu mollusca türlerini belirlemek amacıyla Mayıs 1994-Mayıs 1996 tarihleri arasında 22 istasyondan mevsimsel olarak örnekleme yapılmıştır. Kaliteli çalışmanın sonucunda toplam 15 takson tespit edilmiş olup, bunlardan 12’si Gastropoda’ya 3’ü Bivalvia’ya aittir. İstasyonlardaki mollusca türleri arasında en yaygın olanları Melanopsis praemorsa (9 istasyon) ve Physella acuta (7 istasyon), en az olanları ise Unio crassus (1 istasyon) ve Theodoxus anatolicus (1 istasyon)’dür.

Anahtar kelimeler: Mollusca, İzmir, Gastropoda, Bivalvia, Türkiye

Abstract: In order to determine the mollusca fauna of some freshwaters of İzmir, samplings were made as seasonal from 22 stations between May 1994 and May 1996. As a result of the qualitative study, totally 15 taxa were determined; of them 12 belong to Gastropoda and 3 to Bivalvia. Among the molluscs species at stations, the commonest ones were Melanopsis praemorsa (9 stations) and Physella acuta (7 stations). The least ones were Unio crassus (1 station), Theodoxus anatolicus (1 station).

Keywords: Mollusca, İzmir, Gastropoda, Bivalvia, Turkey.

INTRODUCTION

Gastropoda and Bivalvia are likely the common group of macrobenthic fauna in aquatic ecosystems. Molluscs are well suited to the recognition of geologic/historical developments. They allow easy distinction of the biotopes: marine, brackish, terrestrial or mountainous. Some molluscs are intermediate hosts of trematodes (Öktener 2004).

There are some studies on mollusca fauna of Western Anatolia Region, Turkey. Bilgin (1967) made ecological and systematical research on the living gastropods in freshwaters in the vicinity of İzmir. Bilgin (1973, 1980) carried out systematics and distributions of Mollusca species and anatomic features of some Prosobranchia species, collected from some freshwaters of Western Anatolia. Ustaoğlu et al. (2001) studied the mollusc fauna of Işıklı Lake (Çivi-Denizli). Balık et al. (2002) made a preliminary research about aquatic fauna of Yelköprü Cave (Dikili, İzmir) and its vicinity. Ustaoğlu et al. (2003) carried out the mollusca fauna of Yuvarlakçay Stream (Köyceğiz-Muğla). Balık et al. (2004) studied the benthic fauna of Buldan Dam Lake (Buldan-Denizli).

The aim of the present study is to contribute to the knowledge on distribution of molluscs species inhabited inland waters of İzmir.

MATERIALS AND METHOD

Field studies were conducted seasonally between May 1994 and May 1996 in the vicinity of İzmir (Figure 1). Their habitat characteristics of different stations were mainly shallow, sludge-sandy ground and sandy ground with aquatic plants. Materials were taken from littoral zones by 0.5 mm mesh-sized hand-net, spatula and oar. The mud and benthic materials were cleaned off on varied mesh sieve with water. Some species were taken out of aquatic plants. Specimens were studied qualitatively.

© Published by Ege University Faculty of Fisheries, İzmir, Turkey
Collected mollusc samples were preserved in 4% formalin solution and stored in glass vials with plastic screw-caps. In identification, the most important diagnostic characters of molluscs, for example general appearance, apex, aperture, helix, were examined. Temperature, salinity and conductivity have been measured with a YSI 30 model SCT meter, pH has been measured with a WTW Oxi 330 model pH meter and dissolved oxygen has been measured with a WTW Oxi 330 model oxygen meter. The following references were reviewed for taxonomical determinations of the specimens: (Bilgin 1967, 1973, 1980; Göler and Meier-Brook 1998; Schütt 1983; Yıldırım et al. 2006; Zhadin 1952).

**RESULTS**

The physico-chemical parameters of the stations were given in Table 1.

| Stat. No. | Locations ad sampling date(s) | Temperature (°C) | pH | Diss. Oxygen (mg/l) | Conductivity (μS25°C) | Salinity (%) |
|-----------|-------------------------------|------------------|----|--------------------|-----------------------|--------------|
| 1         | Sarma Village, Sarma Stream, Muradiye-Manisa, 26.11.1994 | 7.5 | 7.6 | 10.4 | 503.33 | 0.04 |
| 2         | Değirmendere Stream, İzmir, 26.11.1994 | 11 | 8.2 | 12 | 643.45 | 0.04 |
| 3         | Ildır Springs (C), Çeşme-İzmir, 30.10.1994 | 21.5 | 6.9 | 8.6 | 2063.97 | 0.76 |
| 4         | Özbek Village, Pınarlı Stream, Urla-İzmir, 29.10.1994 | 19 | 7.2 | 4.4 | 563.05 | 0.07 |
| 5         | Gülbağçe Village Stream, Muradiye-Manisa, 26.11.1994 | 9.5 | 8 | 10.8 | 648.7 | 0.05 |
| 6         | Balıklıova Spring, Balıklıova-İzmir, 29.10.1994 | 19 | 7.3 | 4 | 2076.69 | 0.65 |
| 7         | Güzelhisar Reservoir, Alağa-İzmir, 27.11.1994 | 8.5 | 8.3 | 14.8 | 515.51 | 0.04 |
| 8         | Urla Mineral Springs, Urla-İzmir, 29.10.1994 | 21 | 6.9 | 6 | 6764.89 | 2.52 |
| 9         | Balçova Hot Spring, Balçova-İzmir, 29.10.1994 | 26 | 6.1 | 6 | 724.88 | 0.03 |
| 10        | Uçpinar Village Trough, Muradiye-Manisa, 26.11.1994 | 10 | 7.3 | 7.6 | 301.25 | 0.07 |
| 11        | Karagöl Lake, Sefenerhisar-İzmir, 30.10.1994 | 21 | 8.6 | 10.4 | 818.44 | 0.08 |
| 12        | Göksu Springs, Muradiye-Manisa, 26.11.1994 | 8 | 7.7 | 9.6 | 722.98 | 0.05 |
| 13        | Yığıltür Stream, Kemalpaşa-İzmir, 22.05.1994 | 17 | 8 | 12 | 333.32 | 0.02 |
| 14        | Gediz River Maltepe Village, Menemen-İzmir, 26.11.1994 | 8 | 7.3 | 2.6 | 2083.34 | 0.12 |
| 15        | Kadiovac Fountain, Çeşme-İzmir, 30.10.1994 | 18 | 6.8 | 8.8 | 643.29 | 0.05 |
| 16        | Kani Fountain, Uçpinar Village, Muradiye-Manisa, 26.11.1994 | 7.2 | 7.3 | 7.2 | 740.89 | 0.07 |
| 17        | Ildır Springs (B), Çeşme-İzmir, 30.10.1994 | 22 | 6.9 | 6.4 | 14063.44 | 6.06 |
| 18        | Bornova Stream, Bornova-İzmir, 19.05.1996 | 19 | 8.1 | 9.2 | 911.49 | 0.043 |
| 19        | Ögliçan köşesi Pond, Menderes-İzmir 17.03.1996 | 17 | 7.3 | 10.2 | 478.73 | 0.03 |
| 20        | Sefenerhisar Reservoir, Sefenerhisar-İzmir, 16.03.1996 | 14 | 7.3 | 11.5 | 519.55 | 0.05 |
| 21        | The stream runs off to the Sefenerhisar Reservoir, Sefenerhisar-İzmir 16.03.1996 | 19 | 8 | 12.3 | 558.55 | 0.07 |
| 22        | A Pond in front of Gümüşsu Sitesi, Gümüldür-İzmir 16.03.1996 | 17 | 8.1 | 12 | 14372.82 | 8.04 |

**Phylum: Mollusca**

**Class: Gastropoda**

**Ordo: Archeagastropoda**

**Familia: Neritidae**

*Theodoxus subthermalis* Issel, 1865

Stations and dates of specimens: Ildır Springs (C), Çeşme-İzmir, 30.10.1994; Gülbağçe Village Stream, Muradiye-Manisa, 26.11.1994; Balıklıova Spring, Balıklıova-İzmir, 29.10.1994; Urla Mineral Springs, Urla-İzmir, 29.10.1994.

*Theodoxus anatolicus* (Récluz, 1844)

Station and date of specimen: Gülbağçe Village Stream, Muradiye-Manisa, 26.11.1994.

**Ordo: Mesogastropoda**

**Familia: Hydrobiidae**

*Potamopyrgus jenkinsi* (Smith, 1889)

Stations and dates of specimens: Ildır Springs (B), Çeşme-İzmir, 30.10.1994; A Pond in front of Gümüşsu Sitesi, Gümüldür-İzmir, 16.03.1996.
Familia: Valvatidae

Valvata piscinalis (O.F. Müller, 1774)

Stations and dates of specimens: Göksu Springs, Muradiye-Manisa, 26.11.1994; Kani Fountain, Üçpinar Village, Muradiye-Manisa, 26.11.1994; Oğlanağası Pond, Menderes-Izmir, 17.03.1996.

Familia: Thiariidae

Melanopsis praemorsa (L., 1758)

Stations and dates of specimens: Sarma Village, Sarma Stream, Muradiye-Manisa, 26.11.1994; Ildır Springs (C), Çeşme-Izmir, 30.10.1994; Gülbahçe Village Stream, Muradiye-Manisa, 26.11.1994; Balıklıova Spring, Balıklıova-İzmir, 29.10.1994; Urla Mineral Springs, Urla-İzmir, 29.10.1994; Oğlanağası Pond, Menderes-Izmir, 17.03.1996; Özbek Village, Pınarlı Stream, Urla-İzmir, 29.10.1994; Görüş Spring, Muradiye-Manisa, 26.11.1994; Yiğitler Stream, Kemalpaşa-Izmir, 22.05.1996.

Subclassis: Pulmonata

Ordo: Basommatophora

Familia: Lymnaeidae

Radix peregra (O.F. Müller, 1774)

Stations and dates of specimens: Güzelhisar Reservoir, Aliağa-İzmir, 27.11.1996; Özbek Village, Pınarlı Stream, Urla-İzmir, 29.10.1994; Karagöl Lake, Seferihisar-İzmir, 30.10.1994; Göksu Springs, Muradiye-Manisa, 26.11.1994; Oğlanağası Pond, Menderes-Izmir, 17.03.1996.

Familia: Planorbidae

Planorbis carinatus O.F. Müller, 1774

Stations and dates of specimens: Güzelhisar Reservoir, Aliağa-Izmir, 27.11.1996; Oğlanağası Pond, Menderes-Izmir, 17.03.1996.

Gyraulus albus (O. F. Müller, 1774)

Stations and dates of specimens: Güzelhisar Reservoir, Aliağa-İzmir, 27.11.1996; Göksu Springs, Muradiye-Manisa, 26.11.1994; Oğlanağası Pond, Menderes-Izmir, 17.03.1996.

Gyraulus laevis (Alder, 1838)

Stations and dates of specimens: Özbek Village, Pınarlı Stream, Urla-İzmir, 29.10.1994; Gülbahçe Village Stream, Muradiye-Manisa, 26.11.1994; Güzelhisar Reservoir, Aliağa-İzmir, 27.11.1996; Üçpinar Village Trough, Muradiye-Manisa, 26.11.1994; Göksu Springs, Muradiye-Manisa, 26.11.1994; Kani Fountain, Üçpinar Village, Muradiye-Manisa, 26.11.1994.

Gyraulus albus (O. F. Müller, 1774)

Stations and dates of specimens: Değirmendere Stream, İzmir, 26.11.1994; Özbek Village, Pınarlı Stream, Urla-İzmir, 29.10.1994; Yiğitler Stream, Kemalpaşa-Izmir, 22.05.1996; The stream runs off to the Seferihidar Reservoir, Seferihisar-İzmir, 16.03.1996.

Familia: Physidae

Physa fontinalis (Linnaeus, 1758)

Stations and dates of specimens: Balçova Hot Spring, Balçova-İzmir, 29.10.1994; Gediz Stream, Maltepe Village, Menemen-İzmir, 26.11.1994.

Physella acuta (Draparnaud, 1805)

Stations and dates of specimens: Güzelhisar Reservoir, Muradiye-Manisa, 26.11.1994; Güzelhisar Reservoir, Aliağa-İzmir, 27.11.1996; Üçpinar Village Trough, Muradiye-Manisa, 26.11.1994; Göksu Springs, Muradiye-Manisa, 26.11.1994; Kani Fountain, Üçpinar Village, Muradiye-Manisa, 26.11.1994; Bornova Stream, Bornova-İzmir, 19.05.1996; Seferihisar Reservoir, Seferihisar-İzmir, 16.03.1996.

Classis: Bivalvia

Subclassis: Eulamellibranchiata

Ordo: Unionoida

Familia: Unionidae

Unio crassus Philipsson, 1788

Station and date of specimen: Sarma Village, Sarma Stream, Muradiye-Manisa, 26.11.1994.

Ordo: Veneroida

Familia: Sphaeriidae

Musculium lacustre (O.F. Müller, 1774)

Stations and dates of specimens: Güzelhisar Reservoir, Aliağa-İzmir, 27.11.1996; Göksu Springs, Muradiye-Manisa, 26.11.1994; Oğlanağası Pond, Menderes-Izmir, 17.03.1996.

Pisidium casertanum (Penn, 1791)

Stations and dates of specimens: Özbek Village, Pınarlı Stream, Urla-İzmir, 29.10.1994; Gülbahçe Village Stream, Muradiye-Manisa, 26.11.1994; Göksu Springs, Muradiye-Manisa, 26.11.1994; Kadıovacık Fountain, Çeşme-Izmir, 30.10.1994; Oğlanağası Pond, Menderes-Izmir, 17.03.1996.

The determined species on the stations were given in Table 2.
Table 2. The determined species according to the stations.

| Species/ Stations                        | T. subthermalis | T. anatolicus | M. praemorsa | P. carinatus | G. laevis | P. fontinalis | P. acuta | U. crassus | M. lacustre | P. casertanum |
|------------------------------------------|-----------------|---------------|--------------|--------------|-----------|--------------|----------|------------|-------------|---------------|
| 1. Sarma Village, Sarma Stream           |                 |               |              |              |           |              |          |            |             |               |
| 2. Değirmendere Stream                   |                 |               |              |              |           |              |          |            |             |               |
| 3. İldr Springs (C)                      |                 |               |              |              |           |              |          |            |             |               |
| 4. Özbek Village, Pınarlı Stream         | *               |               |              |              |           |              |          |            |             |               |
| 5. Gülbahçe Village Stream               | *               |               |              |              |           |              |          |            |             |               |
| 6. Bakıklıova Spring                     |                 |               |              |              |           |              |          |            |             |               |
| 7. Güzelhisar Reservoir                  |                 |               |              |              |           |              |          |            |             |               |
| 8. Urla Mineral Springs                  | *               |               |              |              |           |              |          |            |             |               |
| 9. Balıcova Hot Spring                   |                 |               |              |              |           |              |          |            |             |               |
| 10. Üçpinar Village Trough               |                 |               |              |              |           |              |          |            |             |               |
| 11. Karagöl Lake                         |                 |               |              |              |           |              |          |            |             |               |
| 12. Göksu Springs                        |                 |               |              |              |           |              |          |            |             |               |
| 13. Yiğitler Stream                      |                 |               |              |              |           |              |          |            |             |               |
| 14. Gediz River Maltepe Village          |                 |               |              |              |           |              |          |            |             |               |
| 15. Kadıovacık Fountain                  |                 |               |              |              |           |              |          |            |             |               |
| 16. Kani Fountain, Üçpinar Village       |                 |               |              |              |           |              |          |            |             |               |
| 17. İldr Springs (B)                     |                 |               |              |              |           |              |          |            |             |               |
| 18. Bornova Stream                       |                 |               |              |              |           |              |          |            |             |               |
| 19. Öğlanagası Pond                      | *               |               |              |              |           |              |          |            |             |               |
| 20. Seferhisar Reservoir                 |                 |               |              |              |           |              |          |            |             |               |
| 21. The stream runs off to the Seferhisar Reservoir |                 |               |              |              |           |              |          |            |             |               |
| 22. A Pond in front of Gümuşsu Sitesi     |                 |               |              |              |           |              |          |            |             |               |

**DISCUSSION**

As a result of qualitative study, 12 species belonging to Gastropoda and 3 species belonging to Bivalvia, totally 15 mollusca species were determined. Among the mollusca species at stations, the most common one is *M. praemorsa* (9 stations) and the other is *P. acuta* (7 stations). The least species are *U. crassus* (at 1 station), *T. anatolicus* (at 1 station). Öğlanagası Pond and Göksu Springs are the richest stations. According to Zhadin (1952) *T. subthermalis* inhabits rivers, brooks, springs and the marginal zone of lakes. Bilgin (1973) found it in springs. Ustaoğlu et al. (2003) reported in Yuvarlakçay brook. *T. anatolicus* are mostly found in springs (Bilgin 1980), especially in clean habitats (Bilgin 1967). Similarly, Ustaoğlu et al. (2001) were reported from Işıklı Lake. In this study *T. subthermalis* is mostly reported from springs and *T. anatolicus* is only found in a stream. *P. jenkinsi* lives in brackish waters and marine waters of reduced salinity along the coasts of Western Europe (Zhadin 1952). But this species also adopts freshwaters (Bilgin 1973). Ustaoğlu et al. (2001) were reported it from Işıklı Lake. In present study, it was found in springs and a pond in front of Gümuşsu Sitesi. *V. piscinalis* lives in various freshwaters (Bilgin 1967, 1980). It is distributed in Europe, Northern, Western and Central Asia (Zhadin 1952). In this study, it was determined in a pond, springs and a fountain. *M. praemorsa* lives in springs (Bilgin 1967, 1980) and mountain brooks (Zhadin 1952, Balık et al. 2002) reported it from Yelkörprü Cave and its vicinity. Ustaoğlu et al. (2003) found it in Yuvarlakçay brook. In our study, we mostly observed it from springs and streams. *R. peregra* lives mostly in slow running aquatic habitats (Bilgin 1973, 1980). Ustaoğlu et al. (2001) found it from Işıklı Lake. It was recorded from Yuvarlakçay brook (Ustaoğlu et al. 2003). In present study it was found in a pond, a dam, a lake, a stream and springs. *P. carinatus* lives in lakes and ponds (Bilgin 1980, Zhadin 1952). It was found in a pond and a dam in our study. According to Zhadin (1952), *G. albus* inhabits lakes, ponds and the littoral zones of sluggish rivers. Bilgin (1973) found it from a lake and a pond. Ustaoğlu et al. (2001, 2003) reported it in Işıklı Lake and Yuvarlakçay brook. It was also found in Buldan Dam Lake (Balık et al. 2004). In this study it was reported in a pond, a dam and a stream. *G. laevis* lives in swamps, springs and river floodplains (Zhadin 1952). In present study it was found in streams, a dam, springs, a village trough and a fountain. According to Zhadin (1952) *A. fluviatilis* inhabits in rivers, in brooks and some lakes. Bilgin
Contribution to the knowledge on distribution of freshwater mollusc species of İzmir (Turkey)

(1973) was mostly found it in streams. Ustaoğlu et al. (2001) found it in İşıklı Lake. Ustaoğlu et al. (2003) reported it in Yuvarlakçay. In present study it was reported from streams. P. fontinalis lives in brooks, ponds, lakes, etc., mostly among the marginal vegetation (Zhadin 1952). According to Bilgin (1973, 1980) it inhabits in slow, much and clean lakes and ponds. P. fontinalis was found in a hot spring and a stream in our study. P. acuta inhabits brooks, rivulets, irrigation ditches, submerged ricefields and spring bogs. It adopts readily to life in an aquarium (Zhadin 1952). In present study it was reported from streams, dams, a village trough, springs and a fountain.

U. crassus inhabits in rivers, including channels and backwaters. Usually it is absent from lakes and ponds (Zhadin 1952). According to Bilgin (1980) U. crassus lives in streams. It was only found in a stream in our study. M. lacustre lives in pools, swamps, ponds, brooks and rivers (Zhadin 1952). It was reported from a pond, a dam and springs in this study. According to Zhadin (1952), P. casertanum lives in various types of water bodies, from rivers to swamps. In our study it was found in a pond, streams, springs and a fountain.

REFERENCES

Balık, S., Ustaoğlu, M.R., Özbek, M., Taşdemir, A., Topkara, E.T. 2002. A Preliminary study on the aquatic fauna of Yelköpü Cave (Dikili, İzmir), (in Turkish with English abstract). Ege Journal of Fisheries and Aquatic Sciences, 19 (1-2): 221-225.

Balık, S., Ustaoğlu, M.R., Özbek, M., Taşdemir, A., Yıldız, S. 2004. Benthic fauna of Buldan Reservoir (Denizli, Turkey), (in Turkish with English abstract). Ege Journal of Fisheries and Aquatic Sciences, 21 (1-2): 139-141.

Bilgin, F.H. 1987. İzmir Civarı Tatlı Sularında Yaşayan Gastropodlar Üzerinde Sistemati ve Ekolojik Araştırmalar. Doktora Tezi, Ege Üniversitesi Matbaası, Genel Zooloji Küresi Borova, 54 s.

Bilgin, F.H. 1973. Batı Anadolu İç Sularında Tespit Edilen Mollusk Türlerinin Tanıtılması Ekolojisi ve Dağlırlılı ile Büro Prosobranch'ın Anatomilerinde Görülen Özellikler. Doçentlik Tezi, E.U. F.F. Genel Zooloji Küresi Borno-Izmir, 79 s.

Bilgin, F.H. 1980. Systematic and distribution of molluscs collected from some freshwaters in Western Anatolia, (in Turkish with English abstract). Dıyapdarı Üniversite Fe Kafite Dergisi, 8 (2): 1-64.

Gliör, P., Meier-Brook, C. 1998. Süßwassermollusken. Ein Bestimmungsschüssel für die Bundesrepublik Deutschland.

Öktener, A. 2004. A Preliminary research on mollusca species of some freshwaters of Sinop and Batra. G.Ü. Fen Bilimleri Dergisi, 17(2): 21-30.

Schütt, H. 1983. Die Molluskenfauna der Süwwasser im Einzugsgebiet des Orontes unter Berücksichtigung benachbarter Flussysteme. Archiv für Molluskenkunde: International Journal of Malacology, 113(16), 225-228.

Ustaoğlu, M.R., Balık, S., Özbek, M. 2001. The mollusc fauna of Lake İşıklı (Çivril-Denizli), (in Turkish with English abstract). Ege Journal of Fisheries and Aquatic Sciences, 18 (1-2): 135-139.

Ustaoğlu, M.R., Balık, S., Özbek, M. 2003. The mollusca fauna of Yuvarlakçay (Köyceğiz, Muğla), (in Turkish with English abstract). Ege Journal of Fisheries and Aquatic Sciences, 20 (3-4): 433-438.

Yıldırım, M.Z., Gümüş, B.A., Kebapçı, Ü., Bahadir Koca, S. 2006. The Basommatophoran pulmonate species (Mollusca: Gastropoda) of Turkey. Turkish Journal of Zoology, 30: 445-456.

Zhadin, V.I. 1952. Mollusks of Fresh and Brackish Waters of the U.S.S.R. Academy of Sciences of the Union of Soviet Socialist Republics, Israel Program for Scientific Translations Ltd., 46: 1-368.