

Terrestrial snails that are parasitologically important of Turkey

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ABSTRACT

Up to now, 12 snail species have been determined as an intermediate host *Helicella candicans* (Ziegler, 1841), *Xeropicta krynickii* (Krynicky, 1833), *Trochoidea pyramidata* (Draparnaud, 1805), *Monacha cartusiana* (O. F. Müller, 1774), *Cochlicella acuta* (O. F. Müller, 1774), *Helicella itala* (Linnaeus, 1758), *Ceruellula virgata* (Da Costa, 1778), *Helicopsis protea* (O. F. Müller, 1774), *Helicella obvia* (Menke, 1828), *Helix aspersa* O. F. Müller, 1774, *Helix lucorum* Linnaeus, 1758, *Chondrus tournefortianus* (A. Ferussac, 1821) in Turkey. Unfortunately, classification mistakes are made by the fact that the host, intermediate host and parasites are from separate groups of animals. Particularly in relation to intermediate hosts, these are: *Helicella candicans* is synonym of *Xerolenta obvia*. Probably the researchers have noted snail belong to this species from old and invalid literatures. Its same for the *Helicella obvia*, its synonym of the *Xerolenta obvia*. *Helicopsis krynickii*, Its synonym of the *Xeropicta krynickii*; *Monacha cartusiana* is also synonym of *Monacha claustralis*. Also *Helicella obvia* is synonym of *Xerolenta obvia*. *Helicella itala* and *Helicopsis protea* never has been found in Turkey. Probably reason of only morphological description. Because this species distributing in western Europe (from Italia and Austria till whole Britania).

Türkiye'nin parazitolojik öneme sahip olan kara salyangozları

Öz

Türkiye de şimdiye kadar yapılan çalışmalarda 12 salyangoz türü ara konak olarak belirlenmiştir (*Helicella candicans* (Ziegler, 1841), *Xeropicta krynickii* (Krynicky, 1833), *Trochoidea pyramidata* (Draparnaud, 1805), *Monacha cartusiana* (O. F. Müller, 1774), *Cochlicella acuta* (O. F. Müller, 1774), *Helicella itala* (Linnaeus, 1758), *Ceruellula virgata* (Da Costa, 1778), *Helicopsis protea* (O. F. Müller, 1774), *Helicella obvia* (Menke, 1828), *Helix aspersa* O. F. Müller, 1774, *Helix lucorum* Linnaeus, 1758, *Chondrus tournefortianus* (A. Ferussac, 1821)). Maalesef, konakçı, ara konakçı ve parazitlerin ayrı hayvan gruplarından olması nedeniyle ciddi sınıflandırma hataları yapılmaktadır. Özellikle ara konaklarla ilgili olarak, bunlar: *Helicella candicans*, *Xerolenta obvia*'nın sinonimidir. Muhtemelen araştırmacılar, ara konak salyangozların tanımlamalarını eski ve geçersiz literatürden yararlanarak yapmışlardır. *Helicella obvia*, *Xerolenta obvia*'nın sinonimi; *Helicopsis krynickii*, *Xeropicta krynickii*'nin sinonimi; *Monacha cartusiana* da *Monacha claustralis*'in sinonimidir. Ayrıca *Helicella obvia*, *Xerolenta obvia*'nın sinonimidir. *Helicella itala* ve *Helicopsis protea* türleri Türkiye'de yayılış göstermemektedir. Bu iki tür İtalya ve Avusturya'dan Biritanya dahil tüm Batı Avrupa'da yayılış göstermektedir. Muhtemelen araştırmacılar sadece morfolojik tanımlama yapmışlardır.

INTRODUCTION

The Mollusca, one of the largest phyla of living creatures, includes gastropod species able to colonise every humid corner of the planet. Given their adaptability to a range of diverse ecosystems, molluscs have been long known to serve as ideal hosts for a number of parasites, including nematodes and trematodes. Indeed, gastropods act as intermediate hosts for a range of helminth parasites of medical and veterinary concern, including more than 18,000 digenean trematodes and about roundworm species ranked into the superfamily Metastrongyloidea (1).

There are several studies on this large group of parasites and snails but there is a few studies to determine the relationship on the intermediate host. Till now, it has been determined that 245 terrestrial snail species have been determined

in malakofauna of Turkey (2, 3). While to be host potentially of these species are known, there are few studies on which parasite uses the snail as an intermediate host.

In a study around the Keban Region of Elazığ, 20 snails (*Helix lucorum*) samples were examined interm of endohelminthes and *Paragonimus* sp. (Trematoda; Digenea) and *Protostrongylus* sp. (Nematoda; Metastrongyloidea) were determined in the intestine of snails. The abundance, prevalence and mean intensity for *Paragonimus* sp. were found 20%, 5% and 4 parasites per snail respectively. These values for *Protostrongylus* sp. were also found 30%, 5% and 6 parasites per snail respectively (4).

Unlu et al (2017) have found *H. lucorum* snails as a intermediate hosts for *Dicrocoelium* trematodes with a prevalence of 22% (5).

Gürelli and Göçmen (2007) have found *H. aspersa* as an

intermediate host in the life cycle of Dicrocoeliidae and it had a prevalence of 0.97 % (6).

Gürelli et al (2014) have studied the prevalence of Dicrocoeliid larval stages in *Helix lucorum* Linneus 1758 in the vicinity of Kastamonu and founded prevalence as 27.6% (7).

Soykan and Öge (2012) have studied on the prevalence of liver trematodes in equines in different cities of Turkey and found percents 5.1% with liver flukes. And also Infection rates were found to be *Fasciola hepatica* 2.6%, in donkeys (8).

Gürelli and Alay (2016) have first record of the natural infection of *Chondrus tournefortianus* by Dicrocoeliidae larval stages in Kastamonu. They have found prevalence of the infection in Kastamonu, was 2.27%, with the highest value occurring in October. Also they have given a list about comparison of the prevalence in different land snail species infected with Dicrocoeliidae larval stages. These species and prevalence in Turkey: *Helicella candicans* 4.0, *Helicopsis krynickii* 2.6, *Trochoidea pyramidata* 0.2, *Monacha carthusiana* 2.8, *Cochlicella acuta* 0.4, *Helicella itala* 5.68, *Cerņuella virgata* 1.0, *Helicopsis protea* 0.8, *Helicella obvia* 26.8, *Helix aspersa* 0.97, *Helix lucorum* 27.6, *Chondrus tournefortianus* (9).

Kartal, K., et al.(2015) have studied on the prevalence of liver trematodes in *Helix lucorum* Linnaeus, 1758, and found as 4,9 % in vicinity Afyonkarahisar (10).

Balkaya et al (2009) have found *Dicrocoelium dendriticum* infection around 31.1% ratio in Erzurum vicinity (11). Cengiz et al (2010) have found a human infection with *Dicrocoelium dendriticum* in Turkey (12). All these studies show that there is a widespread trematod and nematode infection in our country. It is clear evidence that the same type of infection was found in the high-rate Dicrocelias in Erzurum and also in a human. However, there are very few studies of how these parasites develop at the intermediate host level. For this reason, it is necessary to understand the life cycle of common parasites and the intermediate hosts. Because the information will be the most important step in protecting against such diseases.

The aim of this study was to determine the distribution of the snail intermediate host which have taken place in Turkey as well. To know their distribution will be a source of knowledge for those working with such parasites.

MATERIAL and METHODS

The snail samples given in the study have collected from all regions of Turkey by the first author since 1994. All materials are kept in the personal collections in Burdur Mehmet Akif Ersoy University Faculty of Science and Arts and the Museum. These species: *Xerolenta obvia* (Menke, 1828) from Istranca Mountain (June, 1994); *Xeropicta krynickii* (Krynicki, 1833) from Silivri, Istanbul (July, 2016) and Tekirdağ (July, 2016); *Trochoidea pyramidata* (Draparnaud, 1805); from Antalya (September, 2014) and Tekirdağ (July, 2016); *Monacha (Monacha) claustralis* (Mousson, 1859) from Akdağ Isparta (June, 2014), Karakent village (June, 2014); *Cochlicella acuta* (Müller, 1774) from Nazilli (June, 2008), Çandır Isparta (June, 2014); *Cryptopmbalus aspesus* (O.F. Müller, 1774) from Hevsel Gardens, Diyarbakır (April 1994) and Bodrum, Fethiye (June, 2008); *Helix (Helix) lucorum* (Linnaneus, 1758) from Keçiborlu Kap-

lanlı Village (August 1998), Gümüşgün Burdur (2001), Dereçine village Afyon (2001); *Chondrus tournefortianus* (A. Ferussac, 1821) from Bayburt Castle (June, 1996), Çoruh Valey, Artvin (June, 1996).

Samples were included in the collection collected by standard methods and techniques. Fechter & Falkner 1990, Gittenberger 2000, Hausdorf 2000, Schütt 2010 were used to differentiate species (2, 3, 13, 14).

RESULTS

Up to now, 12 snail species have been determined as a intermediate host (*Helicella candicans*, *Helicopsis krynickii*, *Trochoidea pyramidata*, *Monacha carthusiana*, *Cochlicella acuta*, *Helicella itala*, *Cerņuella virgata*, *Helicopsis protea*, *Helicella obvia*, *Helix aspersa*, *Helix lucorum*, *Chondrus tournefortianus*) in Turkey.

The general characteristics and distributions of these species are briefly given;

1. *Helicella candicans*

The name of species has used by Schileyko in 1978. After this articles, Fechter & Falkner and Schutt have changed as *Xerolenta obvia* (2).

2. *Xerolenta obvia* (Menke, 1828)

1828 *Helix obvia*, MENKE, Synopsis Methodica Molluscorum. (1): 13. NOM.

1978 *Helicella candicans*, - Schileyko, Helicoidea: 224-225, F.252-254

1989 *Xerolenta obvi*, -Fechter & Falkner, Weichtiere, 208,209.

2010 *Xerolenta obvia*, - Schutt, Turkish Land Snails, p: 456

The information given under these two species names, as seen in the synonym list, is probably misleading because of the morphologically-based description. Because the shell morphology of these taxons given as synonyms is very similar. Probably the researchers have noted snail belong to this species. As typically the background color is whitish with not interrupted dark brown spiral bands. It is known from only the west parts of Trakya region. Members of this species prefer dry and open habitats and calcerous grassland. So its possible to pass of the trematodes larveas easily in these habitats. Materials: Dry and open grasslands around Istranca Mountain (June, 1994).

3. *Helicopsis krynickii*

Its synonym of the *Xeropicta krynickii* (2).

4. *Xeropicta krynickii* (Krynicki, 1833)

1960 *Helicopsis (Xeropicta) krynickii*, - Zilch in Wenz, Hdp, Pal.6(2,4): 672

1989 *Xeropicta krynickii*, -Fechter & Falkner, Weichtiere, 206,207.

2010 *Xeropicta krynickii*- Schutt, Turkish Land Snails, p: 452

As typically this species has an irregularly developed pattern of interrupted more or less broad spiral bands. This species distributed in Marmara and Black Sea regions in Turkey and also Black Sea Basin conturies, Bulgaria and Greece (2,3). They

live at open habitats on dampish and cultivated areas, herbage, in forests. Materials: from Silivri, Istanbul (July, 2016); from Tekirdağ (July, 2016).

5. *Trochoidea pyramidata* (Draparnaud, 1805)

Shell typically conic and with 7 regularly increasing convex whorls. They live on dry vegetation, usually in coastal vicinity distributed in West, Mediterranean and Trakya part of Turkey. Materials: from Antalya (September, 2014), from Tekirdağ (July 2016).

6. *Monacha carthusiana*

Since long time *Monacha* samples collected from West Anatolia has accepted as *M. cartusia* reason of big conologic similarity. This species distributing in Western Europe and America (Naturalist). Hausdorf (2000) examined the genital anatomy of these specimens and identified them as *Monacha claustralis* (2, 3, 14, 15).

7. *Monacha (Monacha) claustralis* (Mousson, 1859)

1967 *Monacha (Monacha) carthusiana*, -Hudec, Casopis Narodn, Mus., 136(2):89, F. 5.

1996 *Monacha (Monacha) carthusiana*, -Schütt, Landschnecken Turkey:382 (part)

2000 *Monacha (Monacha) claustralis*, - Haudorf, Arch. Molluskkunde, 128(1/2): 80-82.

2010 *Monacha (Monacha) claustralis*, - Schütt, Turkish Land Snails, 424 p.

This species widespread in Western Turkey. Materials: from Akdağ Isparta (June, 2014), Karakent village (June 2014).

8. *Cochlicella acuta* (O.F. Müller, 1774)

Shell turrated, 8-10 slightly convex. They have seen in Marmara, Aegean, Mediterranean and Blacksea regions. Generally in coastal areas from the Atlantic islands to Caspian coastlands (3). They live on dry places, coastal grassland, abundant shrubs or low trees. Materials: from Nazilli (June, 2008), Çandır, Isparta (June, 2014).

9. *Helicella itala* (Linnaeus, 1758)

This species lives in western Europe (in Scotland, northern England, Wales, Cornwall and northern Ireland, but not Shetlands), in the north to southern Scandinavia, in the east to central Germany and Austria (western Niederösterreich) to France and northern Spain (15). It never has been found in Turkey. Probably the examples gathered because of similarity to other species are given this name.

10. *Helicopsis protea* (Haas, 1933)

It never has been found in Turkey. Probably the examples gathered because of similarity to other species are given this name. There is a controversy over the existence and classification of this taxon. For the first time, Haas gave it as a subspecies and Gittenberger gave it on the synonym list of the *Xeropicta ledereri mavromoustakisi* taxon in his work in Cyprus and mentioned the distributing in Cyprus (13).

11. *Helicella obvia*

This taxon is listed on synonym list of *Xerolenta obvia* (Menneke, 1828) previously.

12. *Helix aspersa*

Its synonym of *Cryptopmbalus aspesus* (O.F. Müller, 1774).

13. *Cryptopmbalus aspesus* (O.F. Müller, 1774)

1774 *Helix aspersa* O.F. Müller, Verm. Terr.fluv. hist., 2: 59

1989 *Cryptopmbalus aspesus* Fechter & Falkner, Weichtiere, 244, F. 1, 245

2010 *Cryptopmbalus aspesus* Schütt, Turkish Land Snails, 501.

In Turkey nearly everywhere in natural and cultivated habitats. In the vicinity Mediterranean, Aegean and Black Sea coasts. Its and edible snail also there alots of farms in EU. Recently it has started farming activities in Turkey. Materials: from Hevesel Gardens, Diyarbakır (April, 1994), from Bodrum, Fethiye (June, 2008).

14. *Helix lucorum* (Linnaeus, 1758)

1758 *Helix lucorum* Linnaeus, Syst. Nat., 10: 773

This species distribution all over the Turkey. Its known Turkish snail and gathering for export. Materials: from Keçiborlu Kaplanlı Village (August, 1998), Gümüşgün Burdur (2001), Dereçine village Afyon (2001).

15. *Chondrus tournefortianus* (A. Ferussac, 1821)

1998 *Chondrus tournefortianus*, - Schileyko, Ruthenica, Supp. 2: 224

1998 *Chondrus tournefortianus*, - Schütt, Turkish Land Snails, 128.

Shell sinistral coiled spindle shaped. It has distributed Marmara, Middle and North Anadolu Regions. Materials: from Bayburt Castle (June, 1996), Çoruh Valey, Artvin (June, 1996).

DISCUSSION

Turkey is a country with high biological diversity. There is also a rich variety of snails. Animal husbandry is common and takes place in the form of small family farms. Exterior grazing is also common. All of this is necessary for the parasite loop. Therefore, we are expecting a parasitic fauna rich in both qualitative and quantitative in our country. This is undoubtedly a negative influence for livestock. Therefore, one of the first steps in the struggle against parasites is to know the parasites life cycle well.

In Turkey has not been adequately studied in this regard. However, in the last few years, good work has begun to take place. Parasites, hosts and intermediate hosts are composed of very diverse animal groups. It is therefore a necessity for these different groups of animals to be well known. As a matter of fact, few studies have made mistakes on intermediate hosts. These are: *Helicella candicans* (8) is synonym of *Xerolenta obvia*. Probably the researchers have noted snail belong to this species from old and invalid literatures. Its same for the *Helicella obvia*, its synonym of the *Xerolenta obvia*. *Helicopsis krynickii*, Its synonym of the *Xeropicta krynickii*; *Monacha carthusiana* is also synonym of *Monacha claustralis* (2, 3). *Helicella itala*, never has

been found in Turkey. Probably reason of only morphological description. Because this species distributing in western Europe (15). *Helicopsis protea* never has been found in Turkey. Probably reason of only morphological description (13). *Helicella obvia* is synonym of *Xerolenta obvia* (2, 3).

REFERENCES

1. Giannelli A, Cantacessi C, Colella V, Dantas-Torres F, Ot-ranto D, Gastropod-Borne Helminths: A Look at the Snail-Parasite Interplay. Trends in Parasitology. Volume 32, Issue 3, p255-264, 2016.
2. Fechter R, Falkner G. Weichtiere.1-111 Meeresmollusken, 112-286 Binnenmollusken, München, Mosaic Verlag. 1990.
3. Schütt H. Turkish Land Snails. Verlag Natur & Wissenschaft Solingen, 2010.
4. Sağlam N, Gökhan, H. B. Elazığ, Keban Yöresinde Yaşayan Salyangoz (*Helix lucorum* Linnaeus, 1758)'da Endohelminthlerin Araştırılması. E.Ü. Su Ürünleri Dergisi Cilt/Volume 23, Ek/Suppl. (1/2): 287-289. 2006.
5. Unlu AH, Bilgic HS, Eren H, Karagenc T. Prevalence of Larval-Stage Dicrocoeliidae (Digenea) trematodes in *Helix lucorum* (Mollusca: Pulmonata) in Van Province. Türkiye Parazitoloji Dergisi 41: 204-7, 2017.
6. Güreli G, Göçmen B. Natural Infection of *Helix aspersa* (Mollusca: Pulmonata) by Dicrocoeliidae (*Digenea*) Larval Stages in Izmir, Turkey. Türkiye Parazitoloji Dergisi, 31 (2): 150-153, 2007.
7. Güreli G, Alay M, Koymalı S. The prevalence of Dicrocoeliid (Trematoda: Digenea)larval stages in *Helix lucorum* Linnaeus 1758 (Mollusca: Pulmonata) in the vicinity of Kastamonu. Türkiye Parazitoloj Derg. 38(1): 37-40. 2014.
8. Soykan E, Öge H. have The Prevalence of Liver Trematodes in Equines in Different Cities of Turkey. Türkiye Parazitoloj Dergisi; 36: 152-5, 2012.
9. Güreli G, Alay M. First record of the natural infection of *Chondrus tournefortianus* (Mollusca: Pulmonata) by Dicrocoeliidae (*Digenea*) larval stages in Kastamonu, Turkey North-Western Journal of Zoology 12 (1): 188-191, 2016.
10. Kartal K, Köse M, Eser M. Afyonkarahisar Yöresi'nde Birinci Ara Konak *Helix lucorum* Linnaeus, 1758 (Mollusca: Pulmonata)'da Küçük Karaciğer Kelebeği *Dicrocoelium dendriticum*'un Larval Safhalarının Yaygınlığı. Kocatepe Veteriner Dergisi, Cilt 8, Sayı 1, 2015.
11. Balkaya İ, Asena K., Küçükkalem ÖF. *Dicrocoelium dendriticum* ile Enfekte Koyun Karaciğerleri Üzerinde Parazitolojik ve Patolojik İncelemeler Atatürk Üniversitesi Vet. Bil. Derg., 4 (3): 169-175, 2009.
12. Cengiz ZT, Yılmaz H, Dülger AC, Çiçek M. Human infection with *Dicrocoelium dendriticum* in Turkey. Ann Saudi Med. 2010 Mar-Apr; 30(2): 159-161.
13. Gittenberger E. On Cyprian Helicellinae (Mollusca: Gastropoda Pulmonata: Helicidae), making a new start. Zool. Mededelingen, 65/7, Leiden, 2000.

14. Hausdorf, B. The genus *Monacha* in Turkey (Gastropoda: Pulmonata: Hygromiidae). Arc. Molluskunde, 128(1/2): Frankfurt, 2000.

15. <http://www.iucnredlist.org/details/156313/0>, 2018.