

## Checklist of Dryopidae and Elmidae (Coleoptera: Byrrhoidea) of Turkey

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**Abstract.** The species belong to Dryopidae and Elmidae (Coleoptera: Byrrhoidea) families that known from Turkey were listed. Totally; 11 species belong to 3 genera of family Dryopidae and 29 species belong to 9 genera of family Elmidae were catalogued. The first locality data of *Dryops luridus* (Erichson, 1847) was given from Turkey with this study. Besides, scanning electron microscope (SEM) was employed firstly to take pictures of the aedeagophores of *Dryops luridus* (Erichson, 1847) and *Dryops rufipes* (Krynicky, 1832).

**Key words:** Byrrhoidea, Dryopidae, Elmidae, checklist, Turkey.

### Introduction

The Superfamily Byrrhoidea, in the Suborder Polyphaga, includes members live in various habitats like lotic zones, rivers, riffles, and so on. Dryopidae and Elmidae families, the members of Byrrhoidea, were not studied thoroughly in Turkey. The first records were given by Bollow for Elmidae from Adana (Turkey) in 1938 and for Dryopidae from Tokat (Turkey) provinces in 1940. Thereafter, some new records from Turkey for Dryopidae and Elmidae families were reported (Delève 1963, Olmi 1976, 1981, Berthélemy 1979). Jäch gave many records from Turkey in 1982 and 1984 (a, b) and presented the first checklist with two new species in 1984. Since year of 2010, valuable studies have been carried out about contribution of these families in Turkey (Topkara & Balik 2010, Darilmaz et al. 2012). Furthermore, *Dryops jeanneli*, the second record for Palaearctic region, was reported by Taşar (2014) as the first record from Turkey.

The family Dryopidae Billberg, commonly known as “the long-toed water beetles”, has about 300 species belong to 33 genera worldwide. Dryopids occur in all biogeographical regions, except Australian continent (Jäch & Balke 2008). This family presents great diversity in Oriental and Neotropical regions and live in various types of aquatic, semiaquatic and terrestrial habitats (Kodada & Jäch 1995). They are herbivorous and the adults are usually found in riffle areas of the streams in leaf packs, log jams or other stream substrates (Webster & DeMerchant 2012). Dryopidae was reported with 11 species belong to 3 genera from Turkey (Taşar 2014).

The family Elmidae Curtis, commonly known as “the riffle beetles”, has 1336 species belong to 146 genera worldwide and occur on all continents (Jäch & Balke 2008). Members of this family live in aquatic habitats generally, especially in running waters conventionally; however, some of the species of this family lives on lakeshores (Jäch & Kodada 1995). The adults and larvae of most elmids feed on diatoms, encrusted algae detritus, or submerged decaying wood (Webster & DeMerchant 2012). Elmids have sensitive structures to various pollutants such as agricultural, industrial and domestic waste. Hence, the Elmids are considered valuable indicator organisms for aquatic environment due to their low tolerance to pollutants (Braun et al. 2014). Jäch et al. (2006) reported with 30 species and subspecies belong to 10 genera from Turkey.

The aim of this study was to present distributional data

of the Dryopidae and Elmidae families in Turkey and add new information about these families.

### Materials and methods

The current study is based on investigation of the literature records and the specimens examined in the private collection of the author. Presentation of earlier papers and original data derived from our research induced a checklist generation of Dryopidae and Elmidae families from Turkey. Furthermore, this study presents a topical checklist for these families from Turkey.

The examined specimens were collected from freshwater habitats of Şanlıurfa province (Turkey) with sieves that have 3,15x0,5-1 mm mesh size. The beetles were preserved with ethyl alcohol (96%) and stored in small bottles until identification. Specimens were cleaned with brush to eliminate undesirable impurities. Aedeagophores of collected specimens were dissected under a stereo microscope in the laboratory. The photos of aedeagophores belong to 2 *Dryops* spp. (*Dryops luridus* (Erichson, 1847) and *Dryops rufipes* (Krynicky, 1832) were taken with scanning electron microscope (SEM, Zeiss, Germany) and macroscope (Leica, Switzerland). The identified species have been converted into museum material and deposited in the private collections of the author in Adiyaman University, Turkey.

The text includes information in the following order: Data, i.e. the present name of the taxon; Synonyms, including all available proposed synonyms; Material studied, Distribution of the specimens in Turkey given in literature; Remarks, any additional data regarded as relevant.

### Order COLEOPTERA

#### Suborder POLYPHAGA

#### Superfamily BYRRHOIDEA

#### Family DRYOPIDAE Billberg, 1820

#### Genus *Dryops* A. G. Olivier, 1791

#### *Dryops algiricus* (Lucas, 1846)

**Synonyms.** *Dryops antonii* Doderò, 1919; *Dryops discretus* Bollow, 1936; *Dryops freyi* Bollow, 1939; *Dryops hispanus* Olmi, 1972; *Parnus hydrobates* Kiesenwetter, 1850

**Distribution in Turkey.** In (Kodada & Jäch 2006), Catalogue of Palaearctic Coleoptera volume: 3, the existence of this species was given from Turkey, but the definite locality data has not been published yet.

#### *Dryops caspius* (Ménétriés, 1832)

**Synonyms.** *Parnus caucasicus* Kuwert, 1890

**Distribution in Turkey.** Çanakkale (Olmi 1976).

#### *Dryops jeanneli* Bollow, 1939

**Distribution in Turkey.** Adiyaman (Taşar 2014).

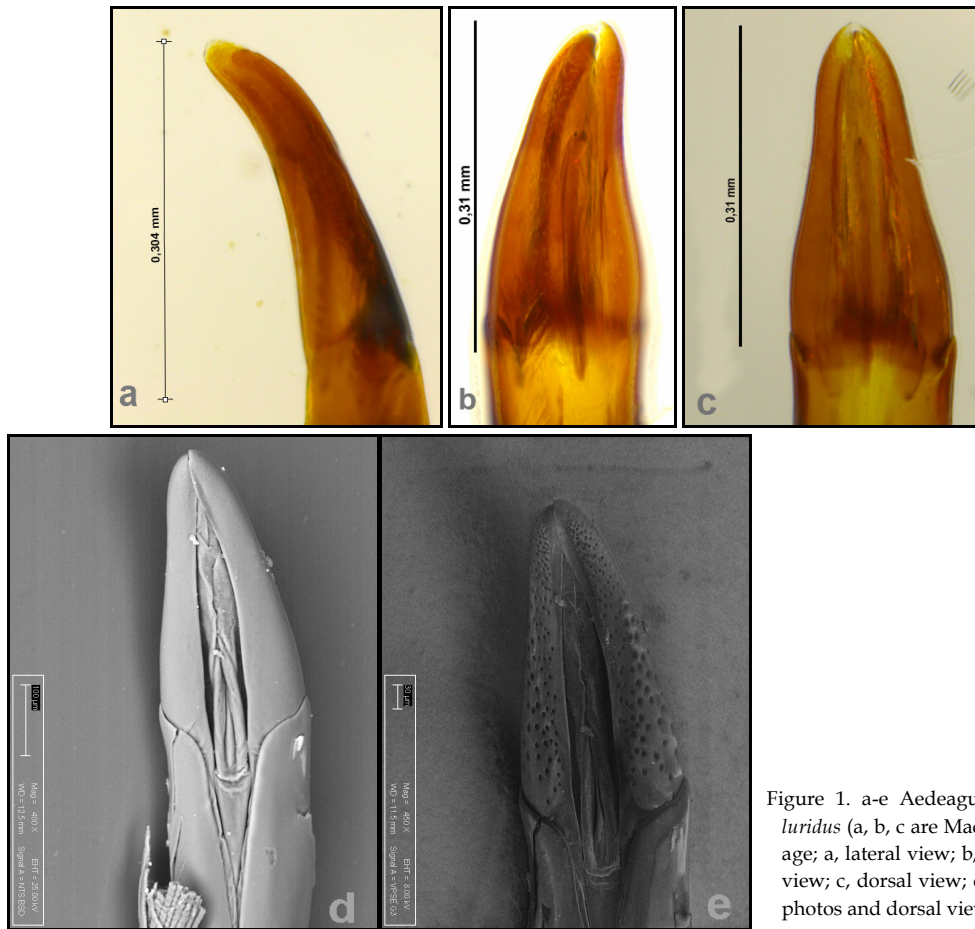


Figure 1. a-e Aedeagus of *Dryops luridus* (a, b, c are Macroscopy image; a, lateral view; b, semi-lateral view; c, dorsal view; d, e are SEM photos and dorsal view).

***Dryops luridus* (Erichson, 1847)**

**Synonyms.** *Parnus fulvago* Rey, 1889; *Parnus fuscipes* Rey, 1889; *Parnus intermedius* Kuwert, 1890; *Parnus pubescens* Walker, 1871; *Parnus subseriatus* Rey, 1889

**Material examined.** Şanlıurfa, Bozova, Arıkök, 37° 23.803'N 38° 26.987'E, 574m, 01.05.2014, 3 ex.

**Short Diagnosis.** Parameres provided with papillae on the inner side. Everted part of the internal sac with short transversal stripes, without mosaic or specks (Fig. 1).

**Distribution in Turkey.** The first detailed locality data were given from Turkey with this study. And also the first record from south-eastern Anatolian region.

***Dryops lutulentus* (Erichson, 1847)**

**Synonyms.** *Dryops complanatus* J. Müller, 1908

**Distribution in Turkey.** Adıyaman, Bartın, Trabzon (Delève 1963, Topkara & Balık 2010, Taşar 2014).

***Dryops nitidulus* (Heer, 1841)**

**Distribution in Turkey.** Adıyaman, Erzincan (Darılmaz et al. 2012, Taşar 2014).

***Dryops rufipes* (Krynicky, 1832)**

**Synonyms.** *Dryops punctatellus* Bollow, 1936; *Parnus corsicus* Kuwert, 1890; *Parnus pilosellus* Erichson, 1847; *Parnus puberulus* Reiche & Saulcy, 1856

**Material examined.** Şanlıurfa, Siverek, 37° 53.249'N 39° 03.796'E, 851m, 26.06.2014, 4 ex.

**Short Diagnosis.** Penis is very small; everted part of the internal sac formed by small spines placed in a single series along the sides of the penis for almost the whole length of the penis; parameres with transversal oblique stripes (Fig. 2).

**Distribution in Turkey.** Adana, Adıyaman (Olmı 1976, Taşar 2014).

**Remark.** First record from Şanlıurfa province.

***Dryops similis* Bollow, 1936**

**Synonyms.** *Dryops omissus* Bollow, 1939

**Distribution in Turkey.** In (Kodada & Jäch 2006), Catalogue of Palaearctic Coleoptera volume: 3, the existence of this species was given from Turkey, but the definite locality data has not been published yet.

***Dryops viennensis* (Laporte, 1840)**

**Synonyms.** *Dryops italicus* Doderö, 1919; *Parnus obscurus* Duftschmid, 1805

**Distribution in Turkey.** Artvin (Olmı 1976).

**Genus *Parahelichus* Löbl & Smetana, 2006**

***Parahelichus angulicollis* (Reitter, 1887)**

**Distribution in Turkey.** Adana, Denizli, Tokat (Bollow 1940, Olmı 1981).

**Remark.** In (Kodada & Jäch 2006), Catalogue of Palaearctic Coleoptera volume: 3, the authors changed the taxonomic status (Genus) of this species from *Pomatinus* to *Parahelichus*.

**Genus *Pomatinus* Sturm, 1853**

***Pomatinus substriatus* (P. W. J. Müller, 1806)**

**Synonyms.** *Dryops dumerilii* Latreille, 1807; *Parnus longipes* W. Redtenbacher, 1842

**Distribution in Turkey.** In (Kodada & Jäch 2006), Catalogue of Palaearctic Coleoptera volume: 3, the existence of this species was given from Turkey, but the definite locality data has not been published yet.

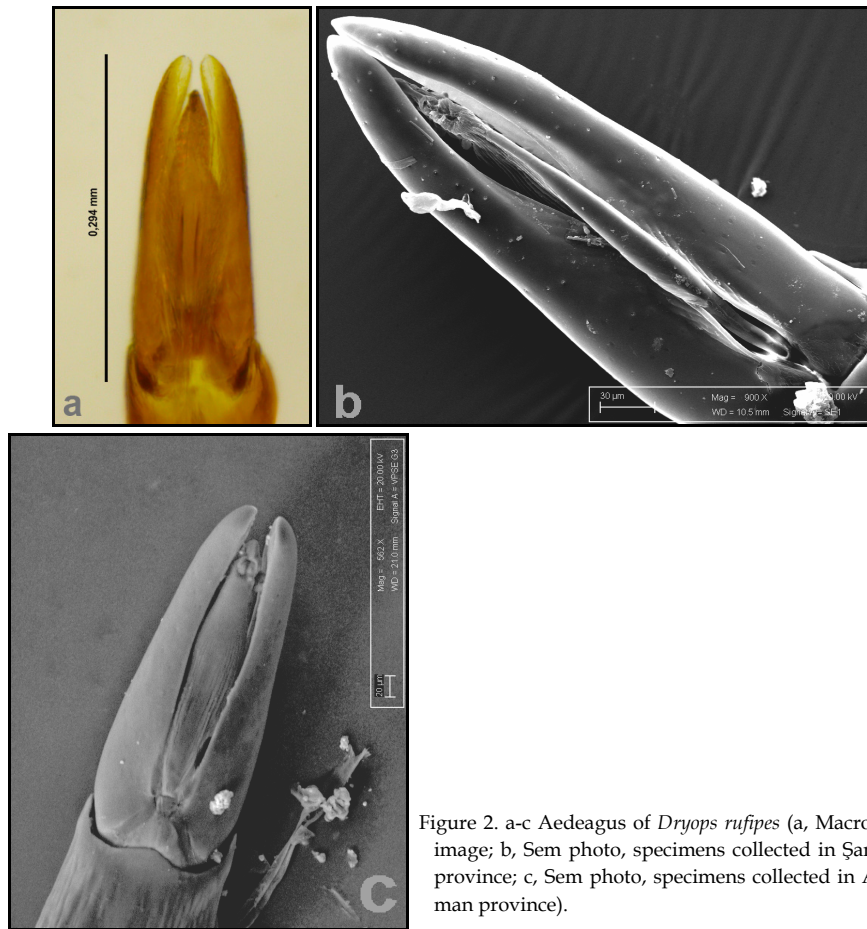


Figure 2. a-c Aedeagus of *Dryops rufipes* (a, Macroscopy image; b, Sem photo, specimens collected in Şanlıurfa province; c, Sem photo, specimens collected in Adıyaman province).

Family **ELMIDAE** Curtis, 1830

Subfamily *Larinae* LeConte, 1861

Genus *Potamophilus* Germar, 1811

*Potamophilus acuminatus* (Fabricius, 1792)

Distribution in Turkey. Adana (Bollow 1938).

Subfamily **Elminae** Curtis, 1830

Genus *Dupophilus* Mulsant & Rey, 1872

*Dupophilus brevis* Mulsant & Rey, 1872

Synonyms. *Limnius gigas* Sharp, 1872; *Latelmis insignis* Reitter, 1885

Distribution in Turkey. Trabzon (Delève 1963).

Genus *Elmis* Latreille, 1802

*Elmis bosnica assyriae* Olmi, 1981

Distribution in Turkey. Adana, Mersin, Niğde, Van (Olmi 1981, Jäch 1984b).

Remark. This species is endemic for Turkey.

*Elmis bosnica bosnica* (Zaitzev, 1908)

Synonyms. *Lareynia longicollis* Kuwert, 1890

Distribution in Turkey. Antalya, Denizli (Berthélemy 1979).

*Elmis bosnica tenuis* Berthélemy, 1979

Distribution in Turkey. Bursa (Berthélemy 1979).

*Elmis maugetii maugetii* Latreille, 1802

Synonyms. *Elmis confuse* Laporte, 1840; *Elmis kirschi* Gerhardt, 1869; *Elmis maugei* Bedel, 1878; *Elmis media* Rey, 1889; *Elmis similis* Flach, 1882; *Philydrus megerlei* Duftschmid, 1805

Distribution in Turkey. Adana, Adıyaman, Bolu, Kastamonu, Niğde (Delève 1963, Jäch 1984b, Topkara & Balık 2010, Taşar 2014).

*Elmis rioloides* (Kuwert, 1890)

Synonyms. *Elmis coiffaiti* Berthélemy & Clavel, 1961; *Elmis minuta* Knie, 1975

Distribution in Turkey. Aydın, Bolu, Çankırı, Muğla, Niğde, Trabzon (Delève 1963, Olmi 1976, Jäch 1984b, Topkara & Balık 2010).

*Elmis robusta* Jäch, 1984

Distribution in Turkey. Bolu, Niğde (Jäch 1984b).

Remark. This species was collected and identified as a new species in Niğde province (Turkey) by Jäch (1984b). According to this literature; Janssens had also been collected this species in 1962 from Bolu province (Turkey).

*Elmis syriaca zoufali* (Reitter, 1910)

Distribution in Turkey. Afyon, Bilecik, Çanakkale, İzmir, Muğla (Jäch 1984a).

Genus *Esolus* Mulsant & Rey, 1872

*Esolus angustatus* (P. W. J. Müller, 1821)

Synonyms. *Esolus carpetanus* Kuwert, 1889; *Esolus galloprovincialis* Abeille de Perrin, 1900; *Esolus solaris* Ganglbauer, 1904

Distribution in Turkey. Trabzon (Delève 1963, Olmi 1976).

*Esolus parallelepipedus* (P. W. J. Müller, 1806)

Synonyms. *Esolus dossowii* Kuwert, 1889; *Esolus kuenowii* Kuwert, 1889; *Esolus nicariae* Kuwert, 1890; *Esolus perparovulus* Kuwert, 1890; *Esolus politus* Kuwert, 1889; *Esolus rugosus* Babington, 1832

Distribution in Turkey. Bolu, Denizli, Kastamonu, Mersin, Niğde, Sinop, Trabzon (Delève 1963, Jäch 1984b, Topkara & Balık 2010).

- Esolus pygmaeus* (P. W. J. Müller, 1806)  
Synonyms. *Esolus maroccanus* Alluaud, 1922; *Esolus subparallelus* Kuwert, 1889  
Distribution in Turkey. Çanakkale, İzmir, Muğla (Jäch 1984a).
- Esolus taurus* Jäch, 1982  
Distribution in Turkey. Mersin (Jäch 1982).  
Remark. This species is endemic for Turkey.
- Genus *Grouvellinus* Champion, 1923  
*Grouvellinus caucasicus* (Motschulsky, 1839)  
Synonyms. *Elmis coyei* Allard, 1869  
Distribution in Turkey. Mersin, Niğde (Jäch 1984a, b).
- Genus *Limnius* Illiger, 1802  
*Limnius colchicus* Delève, 1963  
Distribution in Turkey. Trabzon (Delève 1963).
- Limnius gibbosus* Jäch, 1984  
Distribution in Turkey. Çanakkale (Jäch 1984a).  
Remark. This species is endemic for Turkey.
- Limnius intermedius* Fairmaire, 1881  
Synonyms. *Elmis longior* Pic, 1905; *Elmis palaestinus* Pic, 1901; *Elmis rufiventris* Kuwert, 1890; *Latelmis subcrenatus* Rey, 1889; *Lathelmis horioni* Illies, 1953  
Distribution in Turkey. Kocaeli, Trabzon (Delève 1963).
- Limnius opacus opacus* P. W. J. Müller, 1806  
Synonyms. *Elmis carreti* Pic, 1895; *Elmis lepidopterus* Kuwert, 1890; *Latelmis dissidens* Alluaud, 1922; *Latelmis liouvillei* Alluaud, 1922; *Latelmis subopacus* Ganglbauer, 1904  
Distribution in Turkey. Antalya, Kastamonu, Trabzon (Delève 1963, Topkara & Balık 2010).
- Limnius perrisi perrisi* (Dufour, 1843)  
Distribution in Turkey. Trabzon (Delève 1963).
- Limnius satanus* Jäch, 1982  
Distribution in Turkey. Mersin (Jäch 1982, 1984b).  
Remark. This species is endemic for Turkey.
- Limnius volckmari* (Panzer, 1793)  
Synonyms. *Latelmis ceconii* Reitter, 1906  
Distribution in Turkey. Antalya, Düzce, İstanbul, Mersin, Niğde, Trabzon (Delève 1963, Berthélemy 1979, Jäch 1984b, Topkara & Balık 2010).
- Limnius wewalkai* Jäch, 1984  
Distribution in Turkey. Çanakkale (Jäch 1984a).  
Remark. This species is endemic for Turkey.
- Genus *Oulimnius* Gozis, 1886  
*Oulimnius tuberculatus* (P. W. J. Müller, 1806)  
Synonyms. *Elmis dargelasi* Latreille, 1807; *Elmis variabilis* Stephens, 1828; *Limnius formosus* Kuwert, 1890  
Distribution in Turkey. The existence of this species was given from Turkey, but the definite locality data has not been published yet (Jäch et al. 2006; Löbl & Löbl 2016).
- Genus *Riolus* Mulsant & Rey, 1872  
*Riolus cupreus* (P. W. J. Müller, 1806)  
Synonyms. *Riolus argolicus* E. Janssens, 1959; *Riolus erichsoni* Kuwert, 1889; *Riolus lentzi* Kuwert, 1889; *Riolus mulsanti* Kuwert, 1889; *Riolus senex* Kuwert, 1889; *Riolus steineri* Kuwert, 1889  
Distribution in Turkey. Kocaeli, Mersin (Delève 1963, Jäch 1984b).
- Riolus fontinalis* Jäch, 1984  
Distribution in Turkey. Mersin (Jäch 1984b).  
Remark. This species is endemic for Turkey.

**Table 1.** The situation of endemism of Dryopidae and Elmidae species known from Turkey.

| Species (Dryopidae)                                    | Endemism |
|--|----------|
| <i>Dryops algiricus</i> (Lucas, 1846)                  |          |
| <i>Dryops caspius</i> (Ménétriés, 1832)                |          |
| <i>Dryops jeanneli</i> Bollow, 1939                    |          |
| <i>Dryops luridus</i> (Erichson, 1847)                 |          |
| <i>Dryops lutulentus</i> (Erichson, 1847)              |          |
| <i>Dryops nitidulus</i> (Heer, 1841)                   |          |
| <i>Dryops rufipes</i> (Krynicky, 1832)                 |          |
| <i>Dryops similis</i> Bollow, 1936                     |          |
| <i>Dryops viennensis</i> (Laporte, 1840)               |          |
| <i>Parahelichus angulicollis</i> (Reitter, 1887)       |          |
| <i>Pomatinus substriatus</i> (P. W. J. Müller, 1806)   |          |
| Species (Elmidae)                                      | Endemism |
| <i>Dupophilus brevis</i> Mulsant & Rey, 1872           |          |
| <i>Elmis bosnica assyriae</i> Olmi, 1981               | *        |
| <i>Elmis bosnica bosnica</i> (Zaitzev, 1908)           |          |
| <i>Elmis bosnica tenuis</i> Berthélemy, 1979           |          |
| <i>Elmis maugetii maugetii</i> Latreille, 1802         |          |
| <i>Elmis rioloides</i> (Kuwert, 1890)                  |          |
| <i>Elmis robusta</i> Jäch, 1894                        |          |
| <i>Elmis syriaca zoufali</i> (Reitter, 1910)           |          |
| <i>Esolus angustatus</i> (P. W. J. Müller, 1821)       |          |
| <i>Esolus parallelepipedus</i> (P. W. J. Müller, 1806) |          |
| <i>Esolus pygmaeus</i> (P. W. J. Müller, 1806)         |          |
| <i>Esolus taurus</i> Jäch, 1982                        | *        |
| <i>Grouvellinus caucasicus</i> (Motschulsky, 1839)     |          |
| <i>Limnius colchicus</i> Delève, 1963                  |          |
| <i>Limnius gibbosus</i> Jäch, 1984                     | *        |
| <i>Limnius intermedius</i> Fairmaire, 1881             |          |
| <i>Limnius opacus opacus</i> P. W. J. Müller, 1806     |          |
| <i>Limnius perrisi perrisi</i> (Dufour, 1843)          |          |
| <i>Limnius satanus</i> Jäch, 1982                      | *        |
| <i>Limnius volckmari</i> (Panzer, 1793)                |          |
| <i>Limnius wewalkai</i> Jäch, 1984                     | *        |
| <i>Oulimnius tuberculatus</i> (P. W. J. Müller, 1806)  |          |
| <i>Riolus cupreus</i> (P. W. J. Müller, 1806)          |          |
| <i>Riolus fontinalis</i> Jäch, 1984                    | *        |
| <i>Riolus nitens</i> (P.W.J. Müller, 1817)             |          |
| <i>Riolus somcheticus</i> (Kolenati, 1846)             |          |
| <i>Stenelmis consobrina consobrina</i> Dufour, 1835    |          |
| <i>Stenelmis puberula</i> Reitter, 1887                |          |
| <i>Potanophilus acuminatus</i> (Fabricius, 1792)       |          |

- Riolus nitens* (P. W. J. Müller, 1817)  
Synonyms. *Riolus sauteri* Kuwert, 1889; *Riolus seidlitzii* Kuwert, 1889  
Distribution in Turkey. Mersin (Jäch 1984b).
- Riolus somcheticus* (Kolenati, 1846)  
Synonyms. *Elmis syriacus* Allard, 1869; *Riolus anatolicus* Delève, 1963  
Distribution in Turkey. Adana, Bolu, Kocaeli, Niğde, Trabzon, Van (Delève 1963, Olmi 1981, Jäch 1984b).  
Remark. *Elmis syriacus* Allard, 1869 was changed *Riolus somcheticus* (Kolenati, 1846) as synonym by Löbl & Löbl (2016).
- Genus *Stenelmis* Dufour, 1835  
*Stenelmis consobrina consobrina* Dufour, 1835  
Distribution in Turkey. The existence of this species was given from Turkey, but the definite locality data has not been published yet (Jäch et al. 2006; Löbl & Löbl 2016).
- Stenelmis puberula* Reitter, 1887  
Synonyms. *Stenelmis apfelbecki* Kuwert, 1890; *Stenelmis dam-*

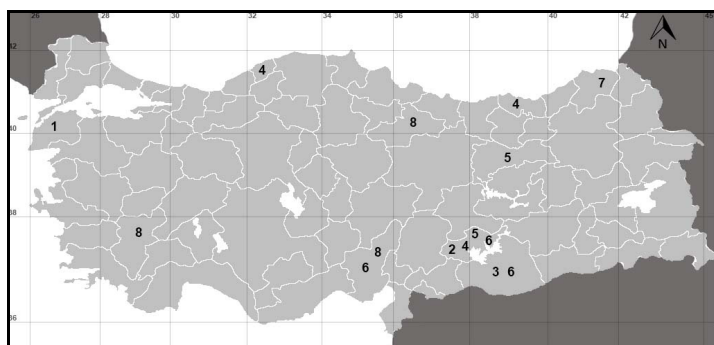


Figure 3. Distributional map of Dryopidae of Turkey. 1, *Dryops caspius*; 2, *Dryops jeanneli*; 3, *Dryops luridus*; 4, *Dryops lutulentus*; 5, *Dryops nitidulus*; 6, *Dryops rufipes*; 7, *Dryops viennensis*; 8, *Dryops angulicollis*.

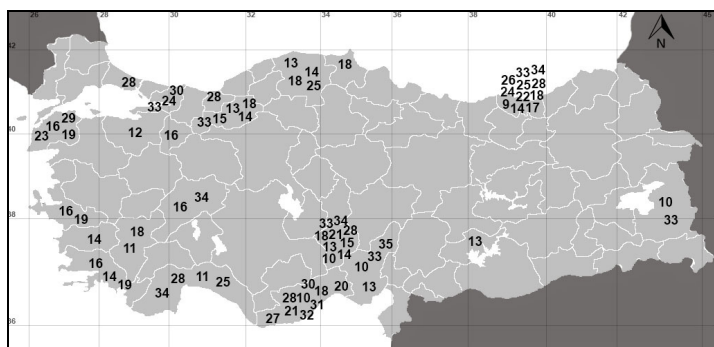


Figure 4. Distributional map of Elmidae of Turkey. 9, *Du-pophilus brevis*; 10, *Elmis bosnica assyriae*; 11, *Elmis bosnica bosnica*; 12, *Elmis bosnica tenuis*; 13, *Elmis maugetii maugetii*; 14, *Elmis rioloides*; 15, *Elmis robusta*; 16, *Elmis syriaca zoufali*; 17, *Esolus angustatus*; 18, *Esolus parallelepipedus*; 19, *Esolus pygmaeus*; 20, *Esolus taurus*; 21, *Grouvelinus caucasicus*; 22, *Limnius colchicus*; 23, *Limnius gibbosus*; 24, *Limnius intermedius*; 25, *Limnius opacus opacus*; 26, *Limnius perrisi perrisi*; 27, *Limnius satanus*; 28, *Limnius volckmari*; 29, *Limnius wewalkai*; 30, *Riolus cupreus*; 31, *Riolus fontinalis*; 32, *Riolus nitens*; 33, *Riolus somcheticus*; 34, *Stenelmis puberula*; 35, *Potamophilus acuminatus*.

ascene Reitter, 1907

Distribution in Turkey. Afyon, Antalya, Niğde, Trabzon (Delève 1963, Jäch 1984a, b).

## Results and discussion

The Dryopidae and Elmidae (Coleoptera: Byrrhoidea) fauna of Turkey has been studied by several domestic and foreign scientists. According to their studies, total number of Dryopidae (11) and Elmidae (29) fauna of Turkey consist of 40 taxa. Furthermore, 6 taxa belong to the family Elmidae are endemic for Turkey (Table 1). There are a total of 81 provinces in Turkey and 27 provinces of them, following as Adıyaman, Adana, Afyon, Antalya, Artvin, Aydın, Bartın, Bilecik, Bursa, Bolu, Çanakkale, Çankırı, Denizli, Düzce, Erzurum, İstanbul, İzmir, Kocaeli, Kastamonu, Muğla, Mersin, Niğde, Sinop, Şanlıurfa, Tokat, Trabzon and Van, were relatively well studied for Dryopidae and Elmidae (Bollow 1938, 1940, Delève 1963, Olmi 1976, 1981, Berthélemy 1979, Jäch 1982, 1984a,b, Topkara & Balık 2010, Darılmaz et al. 2012, Taşar 2014). The other family in superfamily Byrrhoidea is Heteroceridae. The checklist of this family in Turkey was presented by (Taşar & Mascagni 2014).

This is the first checklist to bring out the Dryopidae and Elmidae fauna of Turkey. Distributional map of dryopids of Turkey were shown in Figure 3 and elmids were shown in Figure 4. We think that the number of Turkish aquatic water beetles (Coleoptera) will increase, after all provinces of Turkey will be studied.

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