

## HARVESTMEN RECORDS FROM THE KÖPRÜLÜ CANYON NATIONAL PARK, ANTALYA (ARACHNIDA: OPILIONES)

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**ABSTRACT:** In this study, a total of 91 harvestmen specimens were collected from various localities of the Koprulu Canyon National Park between 2005 and 2006. Adult individuals as a result of a systematic evaluation of the collected and bioecological aspect, four species in four genera in two families were determined. Description, morphology, habitat, ecology and geographical distribution of the species were examined. At the end of this study, in Phalangidae, *Lacinius ephippiatus* (CL Koch, 1835), *Odiellus lendli* (Soerensen 1894), *Zacheus crista* (Brulle, 1832), and in Dicranolasmatidae, *Dicranolasma scabrum* (Herbst, 1799) have been identified. Among the species *Odiellus lendli* is a new record for the opilionid fauna of Turkey. Together with *Odiellus lendli* the species number that recorded from Turkey raised to 70.

**KEY WORDS:** The Köprülü Canyon National Park, Fauna, Turkey, Opiliones, Harvestmen.

Harvestmen live in different ecosystems such as forests, mountains, caves, fields, steppes and moist places (Hillyard & Sankey, 1989; Snegovaya & Chemeris, 2004). They feed mostly on soft bodied arthropods in crops, including aphids, caterpillars, beetle larvae, leafhoppers, mites and tiny slugs. Harvestmen may help to reduce pest density in crops (Adams, 1984; Dixon & McKinlay, 1989; Drummond et al., 1990). Despite low potential, the use of harvestmen in pest control may be valuable for ecological investigations. Also, harvestmen do not prefer polluted places. For this reason ecologists point out their peculiarities being indicator species in ecosystem (Sunderland & Sutton, 1980; Adams, 1984).

Over 6.000 species were found on the world in Opiliones, up to now. Harvestmens consists of four Suborders: Cyphophthalmi, Laniatores, Dyspnoi and Eupnoi (Hillyard & Sankey, 1989). Studies on harvestmen are especially on hunting, feeding ecology, morphological and taxonomic characteristics and geographical distribution (Gruber, 1968, 1979; Mitov, 1988, 1992, 1996). Also, there are some light and electron microscopic studies with related to different anatomical, morphological and histological structures of harvestmen (Hillyard & Sankey, 1989; Yiğit et al., 2007).

In the last 50 years, many researches were performed on harvestmen in the Palearctic region. Gruber has worked on harvestmen in Central Europe and Turkey (1968, 1969, 1976, 1979, 2001). Chevrizov has studied harvestmen of Eastern Europe and Russia (1979). Martens has worked on fauna of harvestmen of the Balkan Peninsula, the Mediterranean and the Aegean Sea islands (1965, 1978, 1986). Mitov has investigated harvestmen fauna of Bulgaria and Albania

(1986-1988, 1992, 1995-1997, 2000, 2002, 2008). Snegovaya has examined harvestmen fauna of Azerbaijan (1999, 2004-2008).

In Turkey, studies on harvestmen were started first by foreign researchers in previous years, but in recent years, local researchers have begun to do studies on this group arachnids (Çorak, 2004; Kurt, 2004; Bayram & Çorak, 2007; Çorak et al., 2008; Kurt et al., 2008; Bayram et al., 2010). In Turkey, one species (*Cyphophthalmus duricorius* Joseph 1868) in Sironidae in Cyphophthalmi Suborder, 27 species in four families (Trogulidae, Nemastomatidae, Dicranolasmatidae, Ischyropsalididae) in Dyspnoi Suborder, 41 species in two family (Phalangiidae, Sclerosomatidae) in Eupnoi Suborder were determined. Laniores Suborder is not yet registered from Turkey. *Odiellus lendli* that found in this area is a new record for the opilionid fauna of Turkey. Together with *Odiellus lendli* the species number of harvestmen recorded from Turkey raised to 70.

### THE KÖPRÜLÜ CANYON NATIONAL PARK

This national park is situated in Antalya in the Mediterranean Region (southern part) of Turkey. In the region, the Taurus Mountain Chain lays parallel to the Mediterranean Sea. The characteristic vegetation type is maqui, and the climate type is the mediterranean. Antalya has got the most productive soil of Turkey, and citrus trees, cotton fields, greenhouses are widespread in it.

The national park is on southern mountainside of the Taurus, 65 km far from Side. A twisting road crisscrosses over mountain streams and passes through virgin forests. A valley of wild beauty rich in flora and fauna is remarkable in the park. The canyon stretches for 15 km along the Koprü River and is 400 meters deep in some places. It is the most famous rafting area of Turkey. The highest peak in this mountain range is Dedegol at 2,992 meters. The densest Mediterranean cedar (*Cedrus libani* A.Rich) of the world is in this national park forest.

In the national park's flora, red pine (*Pinus brutia*), black pine (*Pinus nigra*), cedar, fir (*Abies cilicica*), cypress (*Cupressus sempervirens*), ash (*Fraxinus excelsior*), ilex oak (*Quercus ilex*), sessile oak (*Quercus petraea*), wild olive (*Olea europaea*), Sandal (*Arbutus andrachne*), Big Fruit (*Arbutus unedo*), Gum (*Pistacia lentiscus*), Goat Horn (*Ceratonia siliqua*), Laurel (*Laurus nobilis*), Mersin (*Myrtus communis*), Hawthorn (*Crataegus*), oleander (*Nerium oleander*), Laden (*Picea orientalis*), wild rose (*Rosa canina*), Funda (*Galluna*), thyme (*Thymus*), blackberry (*Rubus*), fern (*Pteridium*) are remarkable. Within the National Park fauna, deer (*Cervus*), mountain goat (*Capra*), pig (*Sus*), bear (*Ursus*), fox (*Vulpes*), wolf (*Canis lupus*), rabbit (*Lepus*), marten (*Martes*), partridge (*Alectoris*), woodcock (*Scolopax*), turtle dove (*Streptopelia*), eagle (*Aquila*), falcon (*Falco*), carp (*Cyprinus*) are found.

### MATERIALS AND METHODS

A total of 57 adult (8 males, 49 females) and 34 immature harvestmen specimens were collected from various localities in the Koprulu Canyon National Park (Antalya) in 2005 and 2006. The specimens were handled with pens, aspirator and hand pots, preserved in tubes that containing 70 % ethanol, and received tag information written on the tubes. The harvestmen specimens examined in the zoological laboratory at the University of Kırıkkale. The identification was made with a SMZ10A Nikon Stereo microscope, and the keys of Silhavy (1966a-b), Gruber (1969), Chevrizov (1979) and Hillyard & Sankey (1989),

Snegovaya (1999) were used. The specimens were stored in the Zoological Laboratory of Çankırı Karatekin University.

## RESULTS

In this study, *Lacinius ephippiatus* (C.L.Koch 1835), *Odiellus lendli* (Soerensen 1894), *Zacheus crista* (Brulle, 1832) in Phalangidae, *Dicranolasma scabrum* (Herbst, 1799) in Dicranolasmatidae were recorded from different localities of the Koprulu Canyon National Park. Within these species *Odiellus lendli* is the new records for the Turkish harvestmen fauna. The descriptions of the species are given below:

### ***Lacinius ephippiatus*** (Koch, 1835)

*Opilio ephippiatus* C.L.Koch 1835, Faunae Inseca, Germany, init, 128: p. 17.

*Acantholopus ephippiatus* C.L.Koch 1848

**Description:** Body length: Male 3.5-4.5 mm, female 4.5-5.5 mm. Body has a pale brown or gray colored dorsum. Saddle is marked on male, with females is unclear. Ocular area slightly more than the length of the width. There are 4-6 short tubercle on each row. In front of the head, a gear tooth length of the overhang of three are equal and 75° upright called "trident". Scent gland openings is conspicuously. Ventrums pale in color with white spots. Chelicera is pale yellow in color. Basal ventral segment has a ventral spur which is not very significant. Pedipalps are pale yellow in color, with dark brown spots. The ventral surface of the femur has a large number of pointed tubercle. The legs are pale yellow in color, and have the rings darker than. The second leg length is 16.0 to 20.0 mm. Femur, patella and tibia are angled cross-section of the femur pointed tubercles on the corners is very striking, and partly steepened. Broad base of the corpus penis, the dorsal or ventral deeper look upward from the narrow middle ground. At the head of the spike is short, short and thick compared to other species (Figures 1-5).

**Material examined:** The Koprulu Canyon National Park: Altinkaya (1250 m), forest, 18.05.2005, 1♂, 3♀♀; Beşkonak (60 m), corn-field, 19.05.2005, 2♂♂, 5♀♀; Sağırin (40 m), steppe, 21.05.2005, 3♀♀; Akpaş (220 m), forest, 22.05.2005, 2♀♀.

**Habitat, ecology and distribution:** Stable zone of forest soil in leaves, branches, stones, under logs, among moss and weeds. At night they migrate between forest and fields. This species has also been recorded in Australia, Britain, Bulgaria, Poland, Scandinavia and the Alpine mountains.

### ***Odiellus lendli*** (Soerensen, 1894)

*Odiellus lendli* Martens 1978.

*Odiellus bieniaszi*, Snegovaya N. Contribution to the Harvest Spider (Arachnida, Opiliones) Fauna of the Caucasus. Turkish Journal of Zoology. 23: 453-459, 1999.

**Description:** Body length: female 7.0-11.0 mm. The body is great and yellowish gray to dark grayish brown in colour. Saddle are marked and in black color by the center of saddle is blackish. Almost as a rectangular. In addition, the rear part of the saddle is flat. Ocularium is smaller. Size of prosoma is nearly 1/3 of the body. The top of the ocularium is pale in color, and it is covered with uncertain tubercles. The pale colored saddle area is expanding from ocularium to trident.

Tridentes are quite robust and almost equal in length and has an angle of 10 degrees between them. There are tubercles in several number and importance side edges of the prosoma. Each small tubercles on abdominal tergite are arranged, and there are protrusions in brown colour in the middle of the tubercles. Has unclear odoriferous gland, and ventrum pale in color. Chelicera is pale yellow in colour. The ventral spur draws attention on the basal segment. Pedipalp is pale yellowish or brown in colour and there are dark-colored dots and lines on. Femur contains a large number of prominent spine ventral tubercles. There are black, dense tooth on tarsus of the male. The second leg length is 20.0 - 28.0 mm. The legs are short and strong. Femur cylindrical, patella and tibia is angled. There is prominent tubercles on the coxa and trochanter (Figures 6-8).

**Material examined:** The Koprulu Canyon National Park: Beşkonak (60 m), corn-field, 18.05.2005, 4♀♀; Beşkonak (60 m), forest, 17.06.2006, 3♀♀; Sağırın (40 m), forest, 20.05.2005, 2♀♀; Akpaş (220 m), steppe, 21.06.2006, 2♀♀.

**Habitat, ecology and distribution:** Forest, field, bush, old building and abandoned areas. This species has also been recorded in the United Kingdom, the Netherlands, Germany, Italy, Yugoslavia, Bosnia, Azerbaijan, Serbia, Poland, Bulgaria, Russia, Georgia, Romania.

***Zacheus crista*** (Brulle, 1832)

*Phalangium crista* Brulle 1832, Exp. Moree, 3 I (2): p. 60.

*Zacheus crista*, C.L.Koch 1839

*Zacheus crista*, Roewer 1923

*Zacheus crista*, Gruber 1963

**Description:** Body length: male 4.0-5.0 mm, female 4.5-6.0 mm. Prosomal saddle is in the form of "u", and the back edge is more pronounced. Opisthosomal saddle is in the form of "n", partially flat, central location expands and then shrinks, and then expands again. Front center of prosoma is brown in colour. There are 7-8 pieces spicules on each of the rows of ocular area. Odoriferous gland openings is evident. Tubercles in opisthosoma is creates a parallel transverse lines. As with many kinds of chelicera, cheliceral basal segment of the mid-dorsal aspect has an overhang. The sides of the distal segment transverse, black bands takes place. Moving quotes is in beak shape. Pedipalp looks like thin and long leg. Tarsus of the Pedipalp is nearly twice as long as the tibia. Tarsus length also slightly higher than femur. Length of second leg 15-28 mm. The legs are thin and long. Femora angular, short spines present at corner. Tarsus is the longest second walking leg of segment. Metatarsus and femur follows it. Tarsus is composed of many parts Penis is flat in ventral view, but the base and the ends of the base are a little broader. It is curved in lateral view. Penis head is triangularous, spine makes inward curve (Figures 9-13).

**Material examined:** The Koprulu Canyon National Park: Çataltepe (45 m), forest, 18.05.2005, 1♂, 1♀; Beşkonak (60 m), forest, 18.05.2005, 2♀♀; Beşkonak (60 m), forest, 17.06.2006, 1♂, 2♀♀; Karabük (140 m), steppe, 19.06.2006, 2♀♀; Akpaş (220 m), steppe, 21.06.2006, 2♀♀.

**Habitat, Ecology and Distribution:** This is a Mediterranean species. According to the records of literature they are mostly found under stones and trunks in forests, fields and grasslands. Recorded from Denmark, Norway, Sweden, Belgium, the Netherlands, Germany, Switzerland, Austria, Czech Republic, Hungary, Slovakia, Poland, Slovenia, Balkan Peninsula, Crete, Rhodes, Kos, Lesbos, Naxos, Paros (in the Mediterranean Sea), Apsheron Peninsula in the Caucasus, Azerbaijan and Lenkoran Regions, Turkey (Kurt et al., 2008).

***Dicranolasma scabrum*** (Herbst, 1798)

*Trogulus scabrum* Herbst 1798, Naturgeschichte der Insekten – Gattung *Opilio*, Natursystem der Ungeflügelten Insekten. Zweytes Heft, 1-26, Berlin.

*Dicranolasma scabrum*, C.L.Koch 1839

*Dicranolasma scabrum*, Roewer 1940

**Description:** Body length: male 3.5-4.5 mm, female 4.0-6.0 mm. interior of Cucullus is plain and do not have teeth. Eyes are placed on the middle of cucullus. There is no pattern in the form of saddle but on the middle section there are dark transversal and parallel spots on dorsum. Rows of tubercles are prominent. The distal part of cheliceral basal segment is weak; a few small spines are noticeable on dorsum which is in this segment. Coxa of pedipalp is narrow on proximal and femur is curve on proximal. Dorsal and ventral tubercles of the femur pointed attract attention. Stronger and thicker tubercles are in the ventral. In addition, tubercles on the patella dorsum form a smooth line. The patella is flat. Tibia and tarsus lengths are close to each other. Tarsus is thicker than the other segments. Lengths of second leg are 10.0-14.0 mm. Acute tipped tubercles are found on trochanter, femora and patella. Tarsus is half of tibia, and has a claw. All segments except tarsus are angular in cross section. Base of penis is flat; proximal of corpus is wider than distal (Figures 14-17).

**Material examined:** The Koprulu Canyon National Park: Beşkonak (60 m), forest, 18.05.2005, 4♀♀; Beşkonak (60 m), forest, 18.06.2006, 3♀♀; Karabük (140 m), steppe, 20.05.2005, 3♀♀; Sağırin (40 m), forest, 19.06.2006, 2♀♀; Akpaş (220 m), steppe, 20.06.2006, 4♀♀.

**Habitat, Ecology and Distribution:** This species lives under stones in soil zone on sides of rivers and moist places. It is distributed in Rhodes, Greece, Yugoslavia, Austria, Hungary, Bulgaria, Anatolia and the Caucasus.

## DISCUSSION

In the present study, we determined only four harvestmen species in the Koprulu Canyon National Park. *Lacinius ephippiatus* (C. L. Koch 1835), *Odiellus lendli* (Soerensen 1894), *Zacheus crista* (Brulle, 1832) in Phalangidae, *Dicranolasma scabrum* (Herbst, 1799), in Dicranolasmatidae were determined. In this study, which was diagnosed *Odiellus lendli* is a new records for Turkey. *Odiellus lendli* distributed in United Kingdom, Netherlands, Germany, Italy, Yugoslavia, Bosnia, Azerbaijan, Serbia, Poland, Bulgaria, Russia, Georgia, Romania.

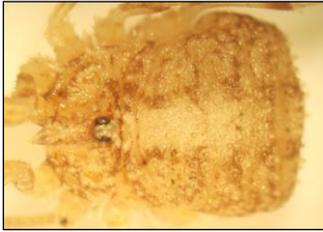
Köprülü Canyon National Park is located in the province of Antalya, and so natural beauties, rich cultural and historical sources have. This national park does not have a very large area because it has interesting and remarkable for richness of biodiversity we hope that we find more harvestmen species. However, only four harvestmen species have been recorded in this national park. Only adult harvestmen individuals investigated in this study. For some harvestmen specimens whom we collected were immature individuals, they could not be identified because their genital operculums were not opened. Moreover, in some instances some harvestmen species of specimens were collected only the female individuals has been very difficult for being diagnosed.

In addition, the harvestmens preferred the clean environments as a living area. Therefore they play a role in the nature as a biological indicator. In this study we could collect only clean and intact area.

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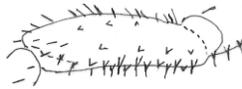
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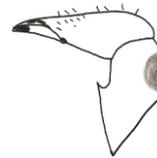


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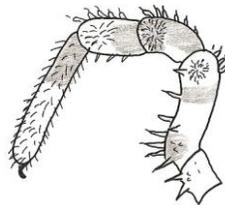
Figures 1-5. *Lacinius ephippiatus*; 1. Body, dorsal view; 2. chelicera, lateral view; 3. Pedipalp, lateral view; 4. Pedipalp, femur view; 5. Glans of penis, lateral view.



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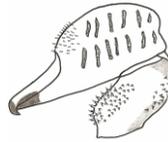


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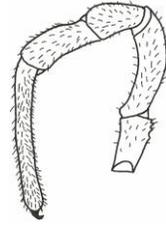
Figures 6-8. *Odiellus lendli*; 6. Body, dorsal view; 7. chelicera, lateral view; 8. Pedipalp, lateral view.



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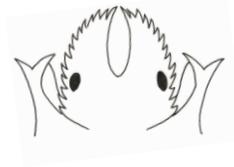


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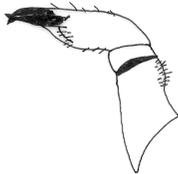
Figures 9-13. *Zacheus crista*; 9. Body, dorsal view; 10. chelicera, lateral view; 11. Pedipalp, lateral view; 12. Glans of penis, lateral view; 13. Glans of penis, ventral view.



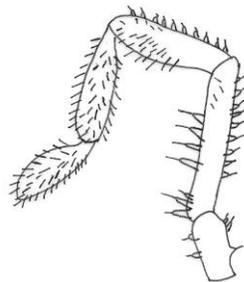
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Figures 14-17. *Dicranolasma scabrum*; 14. Body, dorsal view; 15. cucullus, dorsal view; 16. chelicera, lateral view; 17. Pedipalp, lateral view.