



## Contribution to the water mite (Acari, Hydrachnidia) fauna of Turkey

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**ASBTRACT:** This study provides new records of water mites from Erzincan, Gümüşhane and Tunceli provinces (Turkey). Thirteen species have been registered as new for the hydrachnid water mite fauna of the study area. *Parathyas colligera* (K. Viets, 1923) is a new record for the fauna of Turkey. So far, no water mite records have been given from the provinces of Tunceli and Gümüşhane. Including the new data, the total number of taxa recorded from Erzincan province tallies 81 species in 17 families.

**Keywords:** *Parathyas*, moist moss, new record, Turkey.

**Zoobank:** <http://zoobank.org/E71298D2-82DA-46C1-AC9E-DC876D174D0B>

### INTRODUCTION

Turkey is very rich in terms of freshwater mite diversity and to date, 336 species in 62 genera and 25 families of water mites have been reported from Turkey (Erman et al., 2010, 2019; Esen, 2021). Although there have been many studies on this group in the last two decades, new records and new species are given from Turkey and the water mite fauna is still far from complete. Therefore, faunistic studies on water mites should continue for a while.

The family Hydryphantidae is third species-rich family with 39 species (in 12 genera) after families Arrenuridae (58 species) and Hygrobatidae (56 species). Up to now, only one species has been described belonging to genus *Parathyas*. *P. palustris* (K.Viets, 1923) recorded previously from Erzurum Province (Özkan and Erman, 1999).

The aim of this paper is to contribute to the knowledge of the diversity of Turkish hydrachnid water mites by studying the newly collected materials from Erzincan, Gümüşhane and Tunceli.

### MATERIALS AND METHODS

Mites were collected from moss samples using Berlese-Tullgren funnels. Sampling studies were carried out after obtaining legal permissions from the General Directorate of Agricultural Research and Policies (50411936-604.02-E.2200901) and from the General Directorate of Nature Conservation and National Parks (72784983-488.04-44455 and 21264211-288.04-E.2187926), two units of TR Ministry of Agriculture and Forestry. Mite specimens were preserved in vials containing 70% ethanol. The specimens mounted in Hoyer's medium and dissected as described elsewhere (e.g., Gerecke et al., 2007). The specimens are deposited in the research collection of the Department of Biology, Bingöl University, Bingöl, Turkey.

The composition of the material is given as: (males/females/deutonymphs). All measurements are given in micrometers.

The following abbreviations are used: a.s.l. = above sea level, IV-L-6 = Fourth leg, sixth segment, Ac-3 = third acetabulum, dL = dorsal length, L = length, P-1 = palp, first segment, vL = ventral length, W = width.

### RESULTS

Family: Hydrovolziidae Thor, 1905

Genus: *Hydrovolzia* Thor, 1905

*Hydrovolzia cancellata* Walter, 1906

Material examined: Moist moss on the river bank, Pülümür Valley, Tunceli, 39°15'40"N, 39°52'25"E, 1443 m a.s.l., 13.10.2018 (2/1/0).

Records from Turkey: Afyon, Muş and Rize (Erman et al., 2010).

Distribution: Central and Eastern Mediterranean, Iran (Gerecke et al., 2007; Pešić and Saboori, 2007).

Family: Hydryphantidae Piersig, 1896

Genus: *Paninus* Koenike, 1896

*Paninus michaeli* Koenike, 1896

Material examined: Wet mosses, Harşit Valley, Gümüşhane, 40°36'26"N, 39°32'14"E, 2280 m a.s.l., 21.06.2014 (0/1/0).

Records from Turkey: Konya (Boyacı and Özkan, 1994), Antalya (Boyacı et al., 2012), Burdur (Gülle et al., 2017) and Isparta (Durucan and Boyacı, 2020).

Distribution: Europe, Turkey, Iran (Pešić and Saboori, 2007; Di Sabatino et al., 2010a; Erman et al., 2010).

*Panisus torrenticolus* Piersig, 1898

Material examined: Moist moss, Harşit Valley, 40°56'35"N, 38°51'13"E, 100 m a.s.l., 21.03.2014 (1/0/0); Moist and grassy soil on the river bank, Sansa, Erzincan, 39°33'30"N, 40°07'11"E, 1418 m a.s.l., 21.10.2020 (0/3/0); moist moss and grassy soil on the river bank, 39°34'16"N, 40°06'03"E, 1664 m a.s.l., 28.11.2020 (1/1/0).

Records from Turkey: Afyon, Erzurum (Erman et al., 2010), Antalya (Boyacı et al., 2012) and Isparta (Durucan and Boyacı, 2020).

Distribution: Europe (except Fennoscandia), Turkey, Iran (Pešić and Saboori, 2007; Di Sabatino et al., 2010a; Erman et al., 2010).

Genus: *Panisopsis* K. Viets, 1926

*Panisopsis thori* (Walter, 1907)

Material examined: Moist and grassy soil, Ahmetli, Erzincan, 39°52'49"N, 39°23'46"E, 2210 m a.s.l., 09.09.2014 (1/0/0).

Records from Turkey: Erzurum, Van (Erman et al., 2010) and Burdur (Gülle et al., 2017).

Distribution: Mediterranean, Alps, Central Europe, Turkey (Di Sabatino et al., 2010a; Erman et al., 2010).

*Panisopsis setipes* (K. Viets, 1911)

Material examined: Moist mosses on the river bank, Pülümür Valley, Tunceli, 39°15'40"N, 39°52'25"E, 1443 m a.s.l., 13.10.2018 (1/0/0).

Records from Turkey: Isparta (Aşçı and Boyacı, 2016; Durucan and Boyacı, 2020) and Burdur (Gülle et al., 2017).

Distribution: Western Palaearctic: Northern, Central and Southern Europe, Turkey (Di Sabatino et al., 2010; Erman et al., 2019).

Genus: *Tadjikothyas* Sokolow, 1948

*Tadjikothyas connexa schwoerbeli* Özkan, 1988

Material examined: Moist moss, Pülümür Valley, Tunceli, 39°33'28"N, 39°33'28"E, 1634 m a.s.l., 27.04.2019 (0/1/0); moist moss and grassy soil on the river bank, Sansa, Erzincan, 39°34'16"N, 40°06'03"E, 28.11.2020 (3/7/0); 39°34'16"N, 40°07'11"E, 1334 m a.s.l., 17.08.2020 (1/1/0).

Records from Turkey: Kayseri, Muş (Erman et al., 2010) and Burdur (Boyacı et al. 2013).

Distribution: Turkey (Erman et al., 2010).

Genus: *Thyopsis* Piersig, 1899

*Thyopsis cancellata* (Protz, 1896)

Material examined: Wet moss on the river bank, Pülümür Valley, Tunceli, 39°24'28"N, 39°51'15"E, 1491 m a.s.l., 09.09.2014 (0/1/1); 39°41'59"N, 39°37'39"E, 30.01.2019 (0/2/0); Erzincan Province, Ekşisu Marshes, 39°43'15"N, 39°36'46"E, 1130 m a.s.l., 12.05.2015 (0/1/0).

Records from Turkey: Erzurum (Boyacı and Özkan, 2007).

Distribution: Western Palaearctic (Di Sabatino et al., 2010a; Erman et al., 2010).

Genus: *Trichothyas* K. Viets, 1926

*Trichothyas (Lundbladia) petrophila* (Michael, 1895)

Material examined: Moist moss, Harşit Valley, 40°56'35"N, 38°51'13"E, 100 m a.s.l., 21.03.2014 (1/0/0); wet moss, 40°36'N, 38°30'E, 2423 m a.s.l., 21.06.2014 (0/1/0); moist mosses on the river bank, Pülümür Valley, Tunceli, 39°15'40"N, 39°52'25"E, 1443 m a.s.l., 13.10.2018 (0/2/0).

Record from Turkey: Afyon Erzincan and Muş, (Erman et al., 2010; Esen et al., 2013).

Distribution: Southern and Western Europe, England, Balkan, Iran, Asia Minor (Pešić and Saboori, 2007; Di Sabatino et al., 2010; Erman et al., 2010).

Genus: *Parathyas* Lundblad, 1926

*Parathyas palustris* (Koenike, 1912)

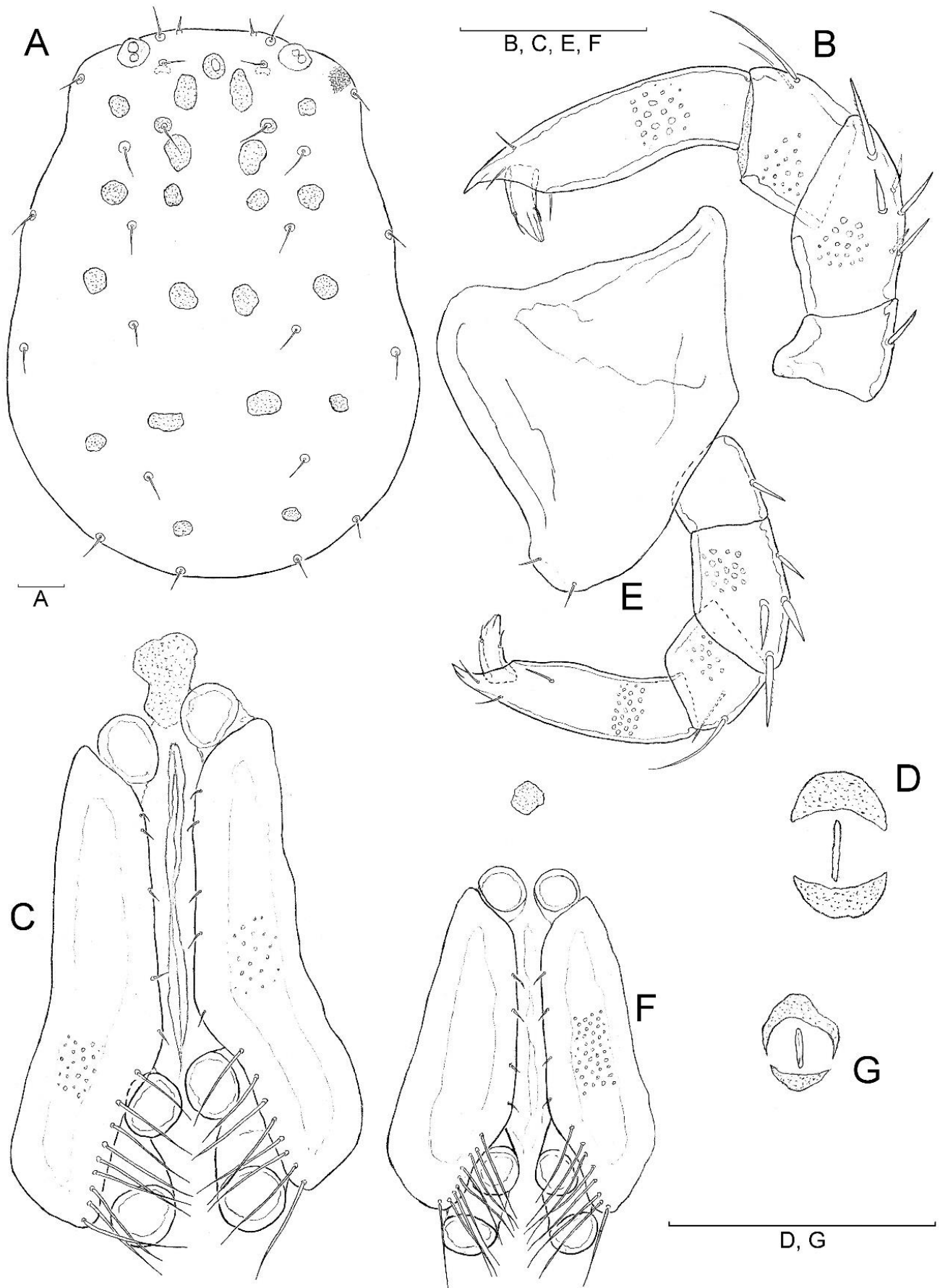
Syn. *Thyas palustris* Koenike, 1912

*Thyas rivalis* Koenike, 1912

Material examined: Moist moss, Ahmetli, Erzincan, 39°57'25"N, 39°21'11"E, 2088 m a.s.l., 23.04.2014 (1/1/1).

Description: *Male* Idiosoma L/W 1005/743, integument papillate, frontale diameter 40, dorsal plates larger, pre- and postfrontale fused. Gnathosoma without short rostrum (Fig. 1E), vL 158. Palp segments dL and setation (in parenthesis) P-1 50 (1), P-2 84 (6), P-3 51 (2), P-4 140 (3-4) P-5 39 (2). Chelicera total L 226. Genital field L/W 220/141, genital flap L/W 173/70, posterior margins of genital flap bearing 8-9 setae, pregenital sclerite round and separate (Fig. 1F). Ac-3 located posterior Ac-2, their basal sclerites forming less elongated stalks. Excretory pore with anterior and posterior sclerites, anterior sclerite crescent shaped (Fig. 1G).

*Female* Idiosoma L/W 1230/940, frontal eye plate large (diameter 55), pre- and postfrontale fused (Fig. 1A). Palp segments setation same as male (Fig. 1B), palp segments dL and setation (in parenthesis) P-1 53 (1), P-2 105 (6), P-3 62 (2), P-4 170 (3-4), P-5 40 (2). Chelicera total L 320. Genital field L/W 298/200, genital flap L/W 272/96, posterior margins of genital flap bearing 8-9 setae, pregenital sclerite fused with anterior genital sclerite (Fig. 1C). Excretory pore with similar anterior and posterior sclerite (Fig. 1D).



**Figure 1.** *Parathyas palustris*, female: **A.** Idiosoma, dorsal view, **B.** Palp, medial view, **C.** Genital field **D.** Excretory pore; Male: **E.** Gnathosoma, **F.** Genital field, **G.** Excretory pore (Scale bars = 100  $\mu$ m).

Records from Turkey: Erzurum (as *Thyas rivalis*) (Özkan and Erman, 1999).

Distribution: Holarctic (in Europe not recorded from the Iberian Peninsula); North America, Turkey (Di Sabatino et al., 2010a; Erman et al., 2010).

*Parathyas colligera* (K. Viets, 1923)

Syn. *Thyas distinctus* Tuzovskij, 2007

Material examined: Wet moss, Ahmetli, Erzincan, 39°52'54"N, 39°20'31"E, 2048 m a.s.l., 08.05.2014 (1/2/0).

Description: *Male* Idiosoma L/W 1106/910, integument papillate, frontale diameter 50, dorsal plates smaller, pre- and postfrontale fused (Figs. 2A, 4A). Gnathosoma vL 220. Palp segments dL and setation (in parenthesis) P-1 50 (3), P-2 106 (6), P-3 60 (3), P-4 152 (3), P-5 32 (2). Chelicera total L 295. Genital field L/W 238/161, genital flap L/W 170/78, posterior margins of genital flap bearing 9-10 setae, pregenital sclerite round and separate (Fig. 2B). Ac-3 located posterior Ac-2, their basal sclerites forming more elongated stalks. Excretory pore with anterior and posterior sclerites, anterior sclerite crescent shaped, posterior sclerite small and roundish (Fig. 2C).

*Female* Idiosoma L/W 1442/1160, frontal eye plate large (diameter 50), prefrontale and postfrontale not fused (Figs. 3A, 4B-C). Palp segments setation same as male (Figs 3B, C), palp segments dL and setation (in parenthesis) P-1 60 (3), P-2 112 (6), P-3 65 (2), P-4 163 (3-4), P-5 33 (2-3). Gnathosoma with short rostrum, vL 250, chelicera total L 351. Genital field L/W 297/208, genital flap L/W 240/100, posterior margins of genital flap bearing 8-9 setae, pregenital sclerite separate with anterior genital sclerite (Fig. 3E). Excretory pore with large anterior and small posterior sclerite (Fig. 3F).

New record for Turkey

Distribution: Germany, The Netherlands, Russia (Di Sabatino et al., 2010a).

Family: Anisitsiellidae Koenike, 1910

Genus: *Bandakia* Thor, 1913

*Bandakia concreta* Thor, 1913

Material examined: Moist moss, Ahmetli, Erzincan, 39°57'25"N, 39°21'11"E, 2088 m a.s.l., 23.04.2014 (0/1/0); wet moss on the river bank, Pülümür Valley, Tunceli, 39°24'28"N, 39°51'15"E, 1491 m a.s.l., 09.09.2014 (0/1/0).

Records from Turkey: Isparta (Boyacı and Özkan, 2004; Durucan and Boyacı, 2020) and Antalya (Boyacı et al., 2012).

Distribution: Europe, Turkey (Di Sabatino et al., 2010a; Erman et al., 2010).

Genus: *Nilotonia* Thor, 1905

*Nilotonia (Dartia) vietsi* Bader & Sepasgozarian, 1980

Material examined: Moist and grassy soil, Ahmetli, Erzincan, 39°52'49"N, 39°23'46"E, 2210 m a.s.l., 09.09.2014 (0/1/0); wet moss, Harşit Valley, Gümüşhane, 40°36'N, 38°30'E, 2423 m a.s.l., 21.06.2014 (0/3/0).

Records from Turkey: Erzurum, Muş (Erman et al. 2010) and Isparta (Durucan and Boyacı, 2020).

Distribution: Iran, Turkey (Pešić and Saboori, 2007; Erman et al., 2010).

*Nilotonia (Dartonia) rizeensis* Oezkan & Bader, 1988

Material examined: Wet mosses, Harşit Valley, Gümüşhane, 40°43'28"N, 39°02'40"E, 730 m a.s.l., 23.11.2013 (0/1/1).

Records from Turkey: Rize (Oezkan and Bader, 1988).

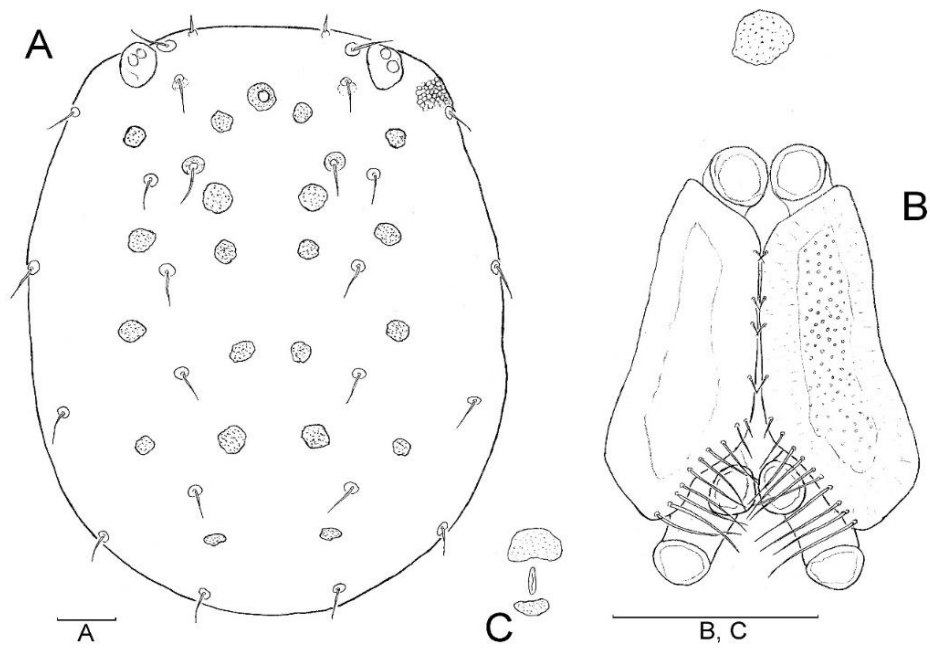
Distribution: Turkey (Erman et al., 2010; Esen et al., 2017).

Remark: This is the second record from Turkey except the type locality. To date, only the female of *Nilotonia (Dartonia) rizeensis* is known from Rize Province. In the collected specimens from Gümüşhane Province, a female and a deutonymph were found. The dorsal plates of deutonymph are similar with adults. There are two pairs of genital acetabulae in the genital field. Bearing a ventrodistally projection on pedipalp femur and three setae on the tip of the last segment of fourth leg are the most important characteristic features of adults. Although the general palp shape of deutonymph is similar to adults, there is no projection on P-2. Further, unlike adult individuals, there are two setae on the tip of the last segment of the fourth leg. Figure 5A-G show some morphological details of female and deutonymph from Gümüşhane Province.

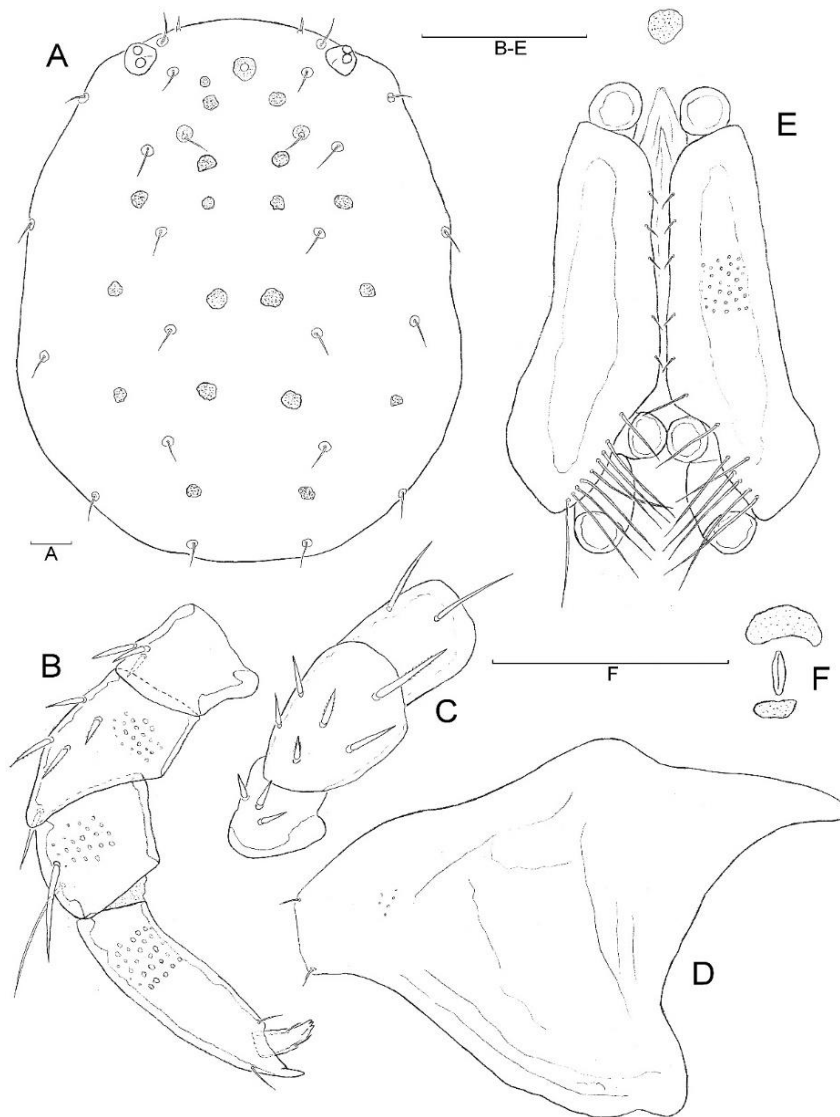
## DISCUSSION

In this study totally thirteen species belonging to families Hydrovolzidae, Hydryphantidae and Anisitsiellidae recorded from Erzincan, Gümüşhane and Tunceli provinces. All species are new for study area. *Parathyas colligera* (K. Viets, 1923) is newly recorded from Turkey. *P. palustris* (as *Thyas rivalis*) is previously recorded from Erzurum province by Özkan and Erman (1999). They stated that *T. rivalis* and *T. palustris* are very similar species, and whether they are synonymous or not can only be decided by examining more specimens of both species.

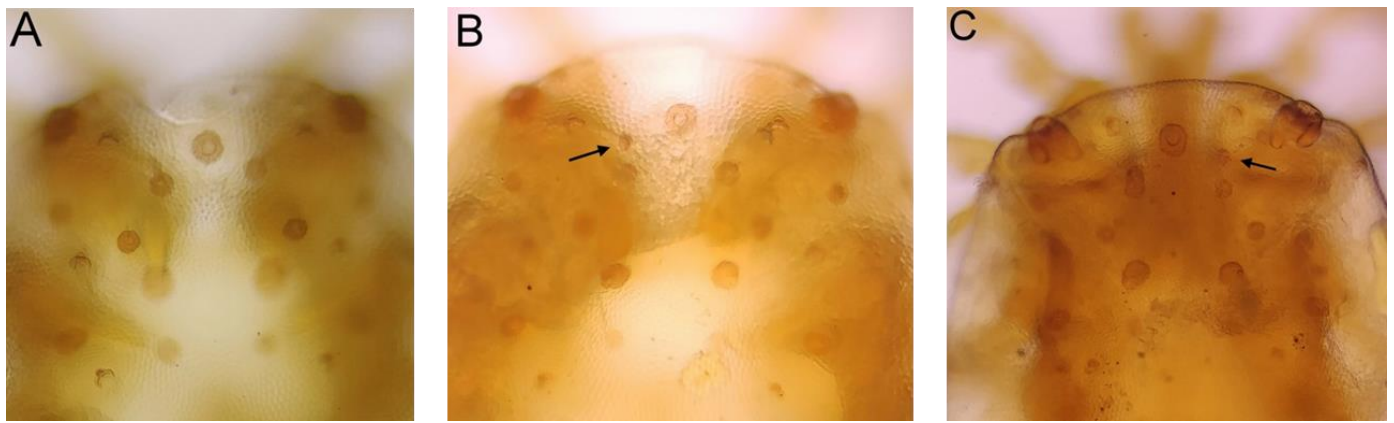
*Thyas* Koch, 1836, *Todothyas* Cook, 1974 and *Acerbitas* Özdikmen, 2006 are synonymized with *Parathyas* Lundblad, 1926 by Di Sabatino et al. (2010b). Previously, Tuzovskij (2007) proposed to synonymize *Parathyas* Lundblad, 1926 with *Thyas*, Koch. There are not significant differences between the type species of *Parathyas* and the character states diagnostic for *Thyas*. Thus, Di Sabatino et al. (2010b) refused the former subdivision of



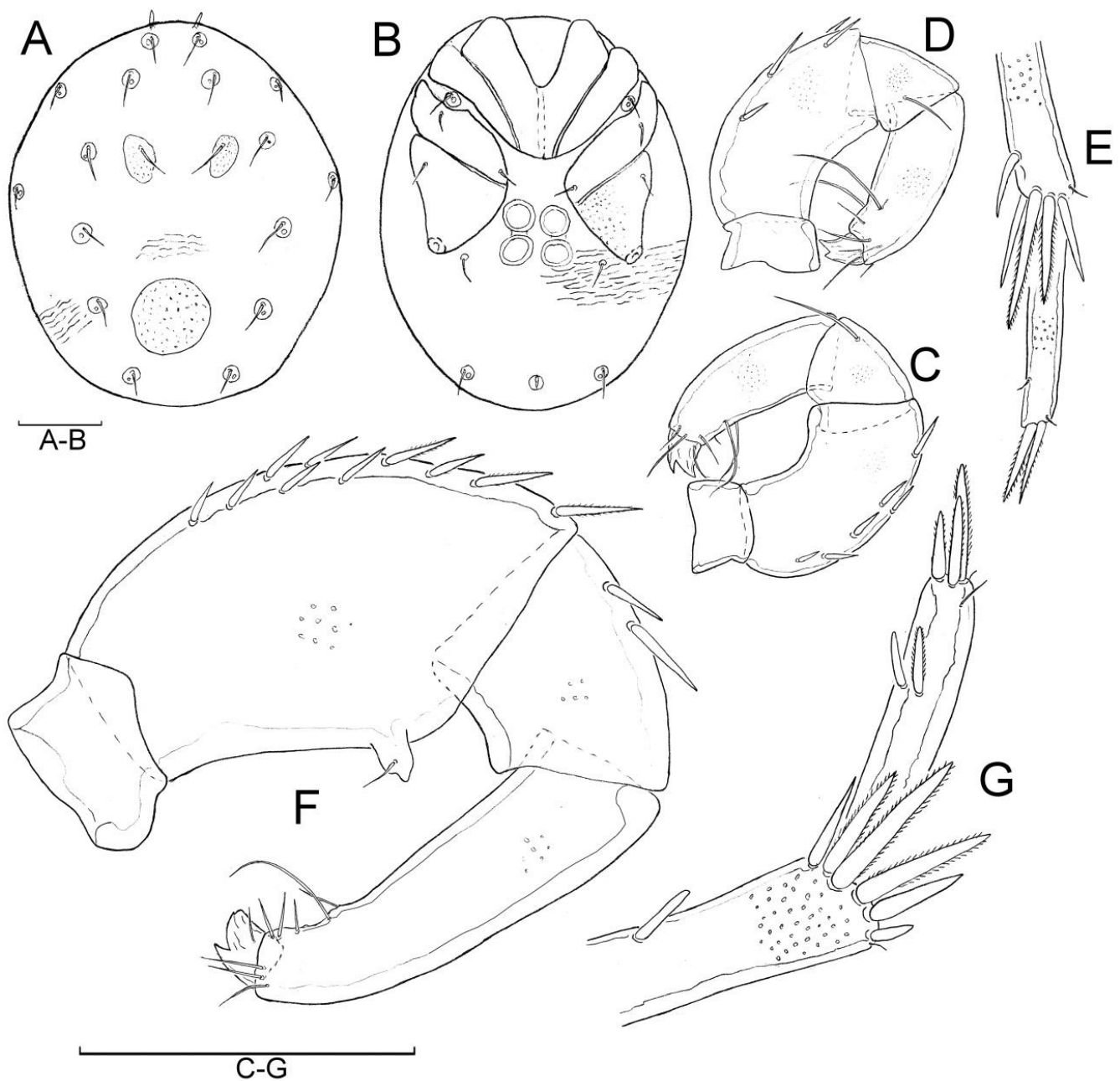
**Figure 2.** *Parathyas colligera*, male: **A.** Idiosoma, dorsal view, **B.** Genital field, **C.** Excretory pore (Scale bars = 100  $\mu$ m).



**Figure 3.** *Parathyas colligera*, female: **A.** Idiosoma dorsal view, **B.** Palp, lateral view, **C.** Palp, dorsal view, **D.** Capitulum, lateral view, **E.** Genital field, **F.** Excretory pore (Scale bars = 100  $\mu$ m).



**Figure 4.** *Parathyas colligera*, **A.** Frontal area of male, **B-C.** Frontal area of female (arrows indicate prefrontale variability in females).



**Figure 5.** *Nilotonia (Dartonia) rizeensis*, deutonymph: **A.** Idiosoma, dorsal view, **B.** Idiosoma, ventral view, **C.** Palp medial view, **D.** Palp, lateral view, **E.** IV-L-6; Female: **F.** Palp, medial view, **G.** IV-L-6 (Scale bars = 100  $\mu$ m).

the genus into subgenera and all species formerly placed in *Thyas* transferred to *Parathyas*.

*Parathyas colligera* (K.Viets, 1923) is very similar to *P. palustris* Koenike, 1912 by the gnathosoma with longer rostrum and diameter of frontal eye platelet approximately equal to length of lateral eye capsule. *P. colligera* can be easily distinguished from *P. palustris* due to the P-1 with three setae, dorsal plates smaller, Ac-3 basal sclerites forming more elongated stalks, pre- and postfrontale separated. The specimens of *P. colligera* collected from Erzincan province differs in having shorter rostrum, P-3 with two setae (in European specimens P-3 with four setae - see Di Sabatino et al. (2010a)) and male pre- and postfrontale fused (Fig. 4A). In females, prefrontale is shown variability in absence to right or left side (Figs 4B, C). In addition, the pregenital sclerite fused with the anterior genital sclerite in females of *P. palustris* (Fig. 1C).

### Statement of ethics approval

Not applicable.

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### Conflict of interest

No potential conflict of interest was reported by the author.

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