

**First Record in Southeastern Anatolia of *Zelus (Diplodacus) renardii* (Kolenati, 1856) (Hemiptera: Reduviidae) and his New Prey *Allantus (s.str.) viennensis* (Schrank, 1781) (Hymenoptera: Tenthredinidae: Allantinae)**

Hakan ÇELİK<sup>1</sup> Paride DIOLI<sup>2</sup> Halil BOLU<sup>1</sup>

<sup>1</sup>Dicle University, Faculty of Agriculture, Department of Plant Protection, TR 21280, Diyarbakır, TURKEY

E-mail: 144061018a@gmail.com, ORCID ID: 0000-0002-2318-3474(HÇ),

E-mail: besni@dicle.edu.tr, ORCID ID: 0000-0001-5488-0056 (HB)

<sup>2</sup>Natural History Museum, Department of Entomology, Milano-ITALY

E-mail: paridedioli@virgilio.it ORCID ID: 0000-0002-4274-0926

**ABSTRACT:** The present study was carried out in Diyarbakır (Kayapınar district) province in Southeastern Anatolia Region of Turkey in 2020. Reduviidae adults and larvae Tenthredinidae family was collected on *Rose* spp in Diyarbakır province of Turkey in November and brought to the laboratory for rearing. The larvae were reared at the temperature of 26±1°C, relative humidity of 65±5, and illumination of 3500 lux for 16 hours per day. As a result of this study, *Allantus (s.str.) viennensis* belonging to Tenthredinidae family and *Zelus (Diplodacus) renardii* belonging to Reduviidae family were obtained. It was determined for the first time that *Z. renardii*, a polyphagous predator, fed on *A. viennensis*. In addition, *Z. renardii* is the first record for Diyarbakır insect fauna.

**KEYWORDS:** *Zelus (Diplodacus) renardii*, new host record, *Allantus (s.str.) viennensis*, Turkey.

**To cite this article:** Çelik, H., Dioli, P., Bolu, H., 2021, First Record in Southeastern Anatolia of *Zelus (Diplodacus) renardii* (Kolenati, 1856) (Hemiptera: Reduviidae) and his New Prey *Allantus (s.str.) viennensis* (Schrank, 1781) (Hymenoptera: Tenthredinidae: Allantinae), *J.Het.Turk.*, 3 (1):31-39

**DOI:**10.5281/zenodo.4823762

**To link to this article:** <https://www.j-het.org/wp-content/uploads/2021/05/V31-A4.pdf>

**Received:** Feb 6, 2021; **Revised:** Apr 13, 2021; **Accepted:** Apr 14, 2021; **Published online:** May 31, 2021

## INTRODUCTION

Heteroptera (Hemiptera), or true bugs, is the most diverse group of paurometabolous insects with incomplete metamorphosis. There are about 40,000 described species worldwide and many more await description (Schuh & Slater, 1995).

The recent Catalogue of the Heteroptera of the Palaearctic Region lists approximately 3000 species for Europe (Aukema & Rieger, 1995-2006). Heteroptera have sucking mouthparts and feed depending on the species-as parasites, predators, or herbivores on different food sources, from blood or

haemolymph to plant sap or the cytoplasm of fungi. Heteroptera -unique among insects- colonize almost the entire planet, including the surface of the ocean and Antarctica (Schuh & Slater, 1995).

Heteroptera includes 9365 species belonging to 1632 genera in Palaearctic Region (Aukema et al., 2013).

The endemic and largest genus *Zelus* Fabricius, 1803 of the New World belongs to the tribe Harpactorini (Reduviidae: Harpactorinae) and is widely distributed from Nearctic and Neotropic Regions.

The genus *Zelus* is represented by 71 species on the New World (Maldonado Capriles, 1990; Zhang et al., 2016). Between these species, *Zelus renardii* (Kolenati) and *Z. tetracanthus* Stål have an high potential for dispersal, expansion and adaptation in various areas of the World with climate similar to that of the areas of origin (Weirauch et al., 2012).

*Zelus renardii*, in particular, is considered an "alien species" in Europe and Asia where arrived after the beginning of the present Century.

This assassin bug is native in North and Central America and introduced into Hawaii, Midway Atoll, Philippines, Samoa (Weirauch et al., 2012) and Chile (Faúndez, 2015). It has recently arrived, probably by passive transport, also in Europe and the Middle East, in particular, in Albania, Crete, European Turkey, France, Greece, Italy, Sardinia, Portugal, Spain, Asian Turkey and Israel (Davranoglou, 2011; Petrakis & Moulet, 2011; Vivas, 2012; Dioli, 2013; Aukema et al., 2013; Çerçi & Koçak, 2016; van der Heyden, 2015, 2017, 2018; Pinzari et al., 2018; Garrouste, 2019; Dursun & Fent, 2020; Kiyak, 2020; van der Heyden & Grosso-Silva, 2020; Rattu & Dioli, 2020).

The causes of the dispersal of *Zelus renardii* to non-native areas (Hawaii, Chile, Asia and Europe) from the New World are unknown; it is also not clear whether the Greek, Italian and Spanish populations followed independent invasions or were based on a single introduction

into Europe (Weirauch et al., 2012). According to these authors. it is more likely that the populations established in the tropical areas of the Pacific may have originated from Central America, while the Chilean and European populations could derive from merchant transport and consequent adaptations to the Mediterranean and Middle Eastern climate, very similar to that of California (Weirauch et al., 2012; Pinzari et al., 2018).

**Distribution in Turkey:** *Z. renardii* was previously found in İstanbul and İzmir (Çerçi & Koçak, 2016), Ankara province (Kiyak, 2020) and Black Sea Region (Dursun & Fent, 2020). The present finding is new for Diyarbakır (Kayapınar district).

## MATERIAL AND METHODS

**Zoophag predator insect: *Zelus (Diplodacus) renardii*** (Kolenati, 1856)

**Material examined:** 1♀, 2♂♂; 20.11.2020, Locality: Diyarbakır (Kayapınar district) (37°57.13'N, 40°10.36'E, at altitude of about 744 m), (Figures. 1-4).

The present study was carried out in Diyarbakır (Sur district) province in Southeastern Anatolia Region of Turkey in 2020. Reduviidae adults and larvae Tenthredinidae family were collected on *Rosa* spp in Diyarbakır province of Turkey in November 2020 and brought to the laboratory for rearing.

The larvae were reared at the temperature of 26±1°C, relative humidity of 65±5, and illumination of 3500 lux for 16 hours per day.

*Zelus renardii* identification was made by the second Author using the dichotomous keys of the genus *Zelus* (Zhang et al., 2016) and the direct comparison with the specimens of the entomological Collections of Milan Museum of Natural History (Italy). *Allantus viennensis* identification was made by Dr. Önder Çalmaşur (Atatürk University, Faculty of Agriculture, Department of Plant Protection, Erzurum,

Turkey).

**Phytophag Host insect:** *Allantus (Allantus) viennensis* (Schrank, 1781) (Hymenoptera: Tenthredinidae: Allantinae), (Fig. 5).

**Material examined:** Larvae number multiple samples 20.11.2020, Locality: Diyarbakır (Kayapınar district) (37°57.13'N, 40°10.36'E, at altitude of about 744 m).

**Host plant:** *Rosa* spp.

**General Distribution:** Native species in Europe: Austria, Belgium Croatia, Czech Republic, French mainland, Germany, Hungary, Italian mainland, Luxembourg, Romania, Sicily, Slovakia, Switzerland, The Netherlands (Fauna europaea, 2020), Records also in the Nearctic region (Fauna europaea, 2020), and Asia: Turkey (Çalmaşur & Özbek, 2003).

**Distribution in Turkey:** Erzincan: Avcılar, Erzurum: Dutçu, İspir, Çayırözü, Gümüşhane: Vauk Geçidi, Kars: Sarıkamış, Karakurt (Çalmaşur & Özbek, 2003). *Allantus (Allantus) viennensis* is the first record for Diyarbakır insect fauna. In addition, it was observed that the larval stage of this species feeds intensively on the leaves, buds and stems of the rose plant.

## RESULTS

As a result of this study, *Allantus viennensis* belonging to Tenthredinidae family and *Zelus renardii* belonging to Reduviidae family were obtained. It was observed, for the first time, that *Zelus renardii*, a general hunter, fed on *A. viennensis*.

In addition, this prey is the first record for Diyarbakır insect fauna.

This fact, related to a generalist predator like *Z. renardii*, presupposes that it can also attack larvae of other species of Tenthredinidae like a wide range of insects, such Lepidoptera eggs and larvae (Noctuidae) including *Helicoverpa* spp., and Coleoptera (Coccinellidae and larvae; Curculionidae adults as *Anthonomus grandis* Boheman) (Dress & Jackman,

1999) and Homoptera as *Aphis gossypii* Glover (Hemiptera: Aphididae) (Kessing & Mau, 1991).

Attacks are recorded also on *Glycaspis brimblecombei* Moore (Hemiptera: Psyllidae) (Garrison, 2001).

Also feeds on Geocoridae (Heteroptera) (Drees & Jackman, 1999), *Chrysoperla carnea* Stephen (Neuroptera: Chrysopidae) (Hodge, 1999) and *Aphytis* spp. (Hymenoptera: Aphelinidae) (Heimpel et al., 1997).

## DISCUSSION

By analogy with the cases mentioned above, the intense predatory action of *Z. renardii* on *Allantus viennensis*, cannot be emphasized without calculating the risks associated with the fact that *Z. renardii* is a randomly introduced alien insect.

In fact, people could think to use this species of assassin bug to combat this or other pests harmful to cultivated or forest plants.

Instead *Z. renardii* is a generalist predator which can also damage other predatory insects and auxiliary spiders such as "chrysopes" or "ladybirds" ("intra-guild predation"), as well illustrated by various researches (Cisneros & Rosenheim, 1997; Weirauch et al., 2012; Pinzari et al., 2018).

Furthermore, it is always advisable to be wary of alien species, accidentally introduced with the goods, because they can exert a strong competition with local assassin bugs. In this sense, the presence of sticky bristles on the anterior tibia, absent in European and Asian species, is eloquent. It could favor *Z. renardii* in the competition for food, thus interfering with the edaphic population dynamics of other assassin bugs (Pinzari et al., 2018).

Therefore, it is also important to control this alien predator population so that it does not constitute a dangerous disturbance of the ecosystem and human health, due to its painful stings.



**Figure 1.** *Zelus renardii* feeding on *Allantus viennensis* larvae



**Figure 2.** Female of *Zelus renardii* feeding on male specimen.





**Figure 3.** View of female specimens from dorsal and ventral parts



**Figure 4.** View of male specimens from dorsal and ventral parts





**Figure 5.** Damage of the larval stage of *Allantus viennensis* on the leaves

### ACKNOWLEDGEMENTS

We are grateful to Prof. Dr. Önder Çalmaşur (Atatürk University, Faculty of Agriculture, Department of Plant Protection, Erzurum, Turkey) for identification of host insect and to Dr. Fabrizio Rigato (Curator of the Entomology Collections of Natural History Museum of Milan, Italy, NHMMI) for allowing examination of the material of the genus *Zelus* under his care.

### REFERENCES

- Aukema, B., Rieger, C. (eds), 1995-2006, *Catalogue of the Heteroptera of the Palearctic Region*. Amsterdam; vol.1 (1995), 222 p.; vol. 2 (1996), 361 p.; vol. 3 (1999), 577 p.; vol. 4 (2001), 346 p.; vol. 5 (2006), 550 pp.
- Aukema, B., Rieger, C., Rabitsch, W., 2013, *Catalogue of the Heteroptera of the Palearctic Region*. Vol. 6. Supplement. Amsterdam, the Netherlands. *Netherlands Entomological Soc.*, 629 pp.
- Çalmaşur, Ö., Özbek, H., 2003, A Contribution to the Knowledge of Tenthredinidae (Symphyta, Hymenoptera) Fauna of Turkey Part II: Subfamilies Blennocampinae, Dolerinae, Nematinae and Selandrinae, *Turkish Journal of Zoology*, 28: 55-71.
- Çerçi, B., Koçak, Ö., 2016, Contribution to the knowledge of Heteroptera (Hemiptera) fauna of Turkey. *Journal of Insect Biodiversity*, 4 (15): 1-18.
- Cisneros, J.J., Rosenheim, J.A., 1997, Ontogenic change of prey preference in the generalist predator *Zelus renardii* and its influence on predator-predator interactions. *Ecological Entomology*, 22(4): 399-407.
- Davranoglou, L.R., 2011, *Zelus renardii* (Kolenati, 1856), a New World reduviid discovered in Europe (Hemiptera: Reduviidae: Harpactorinae). *Entomologist's Monthly Magazine*, 147: 157- 162.
- Dress, B. M., Jackman J., 1999, Field guide to Texas insects. Gulf Publ. Co., (Hemiptera: Reduviidae: Harpactorinae).

- Entomologist's Monthly Magazine*, 147: 157-162.
- Dress, B. M., Jackman J., 1999, Field guide to Texas insects. Gulf Publ. Co., Houston, Texas. Rev. <http://insects.tamu.edu/fieldguide/aimg51.html>. (Access date: 05.04.2021).
- Dursun, A., Fent, M., 2020, First Record of the Alien Species *Zelus renardii* (Kolenati, 1856) (Hemiptera: Heteroptera: Reduviidae) from Black Sea Region of Turkey. *J.Het.Turk.*, 2 (2): 144-147.
- Dioli, P., 2013, *Zelus renardii* (Kolenati, 1856) (Insecta Heteroptera Reduviidae). *Quaderno di Studi e Notizie di Storia Naturale della Romagna*, 38 (133), 232-233.
- Fauna Europaea, 2020, <https://fauna-eu.org/> (Access date: 05.04.2021).
- Faúndez, E., 2015, La chinche asesina *Zelus renardii* (Kolenati, 1856) (Heteroptera: Reduviidae) en Chile: Comentarios después de 15 años de su llegada al país. *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)*, 57, 421-423.
- Garrison, R. W., 2001, Nuevas plagas de la agricultura en el sur de California. Psilido del eucalipto rojo, *Glycaspis brimblecombei*. Agricultural Commissioner of Weights & Measures, Los Angeles Co. in: <http://acwm.co.la.ca.us/pdf/RedGUmLerppssyllidspan.pdf>. (Access date: 05.04.2021).
- Garrouste, R., 2019, *Zelus renardii* (Kolenati, 1856): une Réduve nouvelle pour la France (Hemiptera, Reduviidae, Harpactorinae). *Bulletin de la Société entomologique de France*, 124(3): 335-336.
- Heimpel, G. E., Rosenheim E.A., Mangel M., 1997, Predation on adult *Aphytis* parasitoids in the field. *Oecologia*, 110(3): 346-352.
- Hodge, M. A., 1999, The implication of intraguild predation for the role of spiders in biological control. *J. Arachnology*, 27: 351-362.
- Kessing, J. L. M. Mau R.E.L.. 1991, *Aphis gossypii* (Glover). Crp. Knowledge Master. Melon Aphid. in: [http://www.extento.hawaii.edu/Kbase/crop/Typeaphis\\_g.htm](http://www.extento.hawaii.edu/Kbase/crop/Typeaphis_g.htm). (Access date: 05.04.2021).
- Kiyak, S., 2020, The new record invasive alien species (IAS) *Zelus renardii* (Kolenati, 1857) (Hemiptera: Heteroptera: Reduviidae) in Central Anatolia (Turkey). *J.Het.Turk.*, 2 (1): 47-52.
- Maldonado Capriles, J., 1990, Systematic Catalogue of the Reduviidae of the World (Insecta: Heteroptera). *Caribbean Journal of Science*, Special edition, i-x, 1 -694.
- Petrakis, P.V., Moulet, P., 2011, First record of the Nearctic *Zelus renardii* (Heteroptera, Reduviidae, Harpactorinae) in Europe. *Entomologia Hellenica*, 20: 75-81.
- Pinzari, M., Cianferoni, F., Martellos, S., Dioli, P., 2018, *Zelus renardii* (Kolenati, 1856), a newly established alien species in Italy (Hemiptera: Reduviidae, Harpactorinae). *Fragmenta entomologica*, 50 (1): 31-35.
- Rattu, A., Dioli, P., 2020, Prima segnalazione di *Zelus renardii* (Kolenati, 1856) in Sardegna (Hemipera, Reduviidae). *Revista gaditana de Entomología*, vol.XI (2020): 119-125.
- Schuh, R.T., Slater, J.A., 1995, True Bugs of the World (Hemiptera: Heteroptera). Classification and Natural History. Cornell University Press, Ithaca, New York. xii + 336 pp.
- Van der Heyden, T., 2015, Ein aktueller Nachweis von *Zelus renardii* (Kolenati, 1856) auf Kreta/Griechenland (Hemiptera: Heteroptera: Reduviidae: Harpactorinae). *Biodiversidad News*, 4 (52): 55-59.
- Van der Heyden, T., 2017, First records of *Zelus renardii* (Kolenati, 1856) (Hemiptera: Heteroptera: Reduviidae: Harpactorinae) for Albania. *Arquivos Entomológicos*, 18: 49-50.
- Van der Heyden, T., 2018, First record of *Zelus renardii* Kolenati (Heteroptera: Reduviidae: Harpactorinae) in Israel. *Revista Chilena de Entomología*, 44 (4): 463-465.
- Van der Heyden, T., Grosso-Silva, J.M., 2020, First record of *Zelus renardii* Kolenati, 1856 in Portugal (Heteroptera: Reduviidae: Harpactorinae). *Arquivos Entomológicos*, 22: 347-349.
- Vivas, L., 2012, Primera cita en España de la especie *Zelus renardii* (Kolenati, 1857) (Heteroptera: Reduviidae) que representa la segunda cita en Europa, *BV News*, 1: 34-40.
- Weirauch, C., Alvarez, C., Zhang, G., 2012, *Zelus renardii* and *Z. tetracanthus* (Hemiptera: Reduviidae): biological attributes and the potential for dispersal in two assassin bug species. *Florida Entomologist*, 95 (3): 641-649.



Zhang, G., Hart, E., Weirauch, C., 2016, A taxonomic monograph of the assassin bug genus *Zelus* Fabricius (Hemiptera: Reduviidae): 71 species based on 10,000 specimens. *Biodiversity Data Journal*, 4: e8150. doi: 10.3897/BDJ.4.e8150.