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The invasive Nearctic wasp *Isodontia mexicana* (Hymenoptera, Sphecidae) now established in Türkiye

İlyas Can[1]

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Abstract — The genus *Isodontia* Patton, 1880, consisting of grass-carrying wasps belonging to the family Sphecidae, has 62 described species distributed worldwide. Two are native to the Western Palaearctic and occur in Türkiye: *Isodontia paludosa* (Rossi, 1790) and *Isodontia splendidula* (A. Costa, 1858). *Isodontia mexicana* (de Saussure, 1867) and *Isodontia nigella* (F. Smith, 1856) are non-native species recorded in the Western Palaearctic. Former is the North American species of the genus, accidentally introduced into Europe and spread to many countries. This study reports for the first-time presence of *Isodontia mexicana* in Türkiye. The present record from near the western edge of Asia Minor constitutes the second locality where the species was detected in the Asian continent after Iran. Differential morphologic characters for the species are provided and illustrated. This new species record brings the number of Sphecidae fauna of Türkiye to 80.

Subject Classification (2020):

1. Introduction

The genus *Isodontia* Patton, 1880 contains 62 described species distributed worldwide [1]. A characteristic feature of most species belonging to this genus is that females use pieces of grass stem to make partitions between their brood cells and plug the entrance holes with dry grass leaves; hence the name “grass-carrying wasps” [2]. Unlike other fossorial species of the subfamily Sphecinae, *Isodontia* spp. builds its nests in various cavities such as hollow plant branches and stems, abandoned bee holes, crevices in building walls, and metal shutters around houses. They choose numerous species of Orthoptera as their prey, especially from the families Gryllidae and Tettigoniidae [3,4]. In Western Palaearctic fauna, this genus is represented by two native species, *Isodontia paludosa* (Rossi, 1790) and *Isodontia splendidula* (A. Costa, 1858), and two invasive species, *Isodontia mexicana* (de Saussure, 1867) and *Isodontia nigella* (F. Smith, 1856), both native species present in Türkiye [5].

Isodontia mexicana, commonly known as the Nearctic grass-carrying wasp, is native to Central and North America. It was accidentally introduced to Europe and some Pacific islands around the middle of the 20th century [4]. After being first detected in France, it has rapidly spread to many European countries in Western, Southern, and Eastern Europe, Great Britain, and Iran [1]. The species was recorded in 2017 and 2018 in Bulgaria (Sofia) [6], Greece (Peloponnes) [7], and Romania (Bucharest) [8], which are closest to the Turkish borders. Considering the direction of its expansion within the continent, the species was expected to reach Türkiye eventually.

[1]ilyascan41@gmail.com (Corresponding Author)
[1]Department of Biology, Faculty of Arts and Sciences, Tokat Gaziosmanpaşa University, Tokat, Türkiye
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Thus, the current contribution aims to report the first record of *Isodontia mexicana* in Türkiye and present its important diagnostic characteristics. With this study, a species was added to the Sphecidae fauna of Türkiye, and the number reached 80.

2. Materials and Methods

Detecting a female specimen of the species was done incidentally rather than as a result of a planned study or regular monitoring. The author saw the female specimen carrying grass to the hole in the metal railing in front of the settlement (Figure 1). After the detected specimen entered the hole, the mouth of the hole was covered with a bottle, and the specimen was captured. The specimen has been identified based on the keys and diagnoses provided by Bitsch et al. [9], Pagliano and Negrisolo [10], and Notton [11]. The material studied is deposited in the Entomology Research Laboratory, Department of Biology, Tokat Gaziosmanpaşa University (Tokat, Türkiye). The photographs of the specimens were taken using a Leica M205C stereomicroscope controlled by the Leica Application Suite 3 software.

Figure 1. Nesting area and nest entrance (indicated with red arrow) of *Isodontia mexicana* specimen in Türkiye.

3. Results and Discussion

Family Sphecidae Latreille, 1802

Genus *Isodontia* Patton, 1880

***Isodontia mexicana* (de Saussure, 1867) (Figure 2)**

Material examined: One female collected from its nest entrance, 65 m above sea level, 40°43'04.6"N, 29°59'12.4"E, Başiskele district, Kocaeli province, 17 June 2024, collected and determined by İlyas CAN.

Figure 2. Lateral habitus of *Isodontia mexicana* (♀) (Scale bar: 2 mm).

Global Distribution. Europe, Iran, USA, Türkiye (new record in this study) [1,8] (Figure 3)

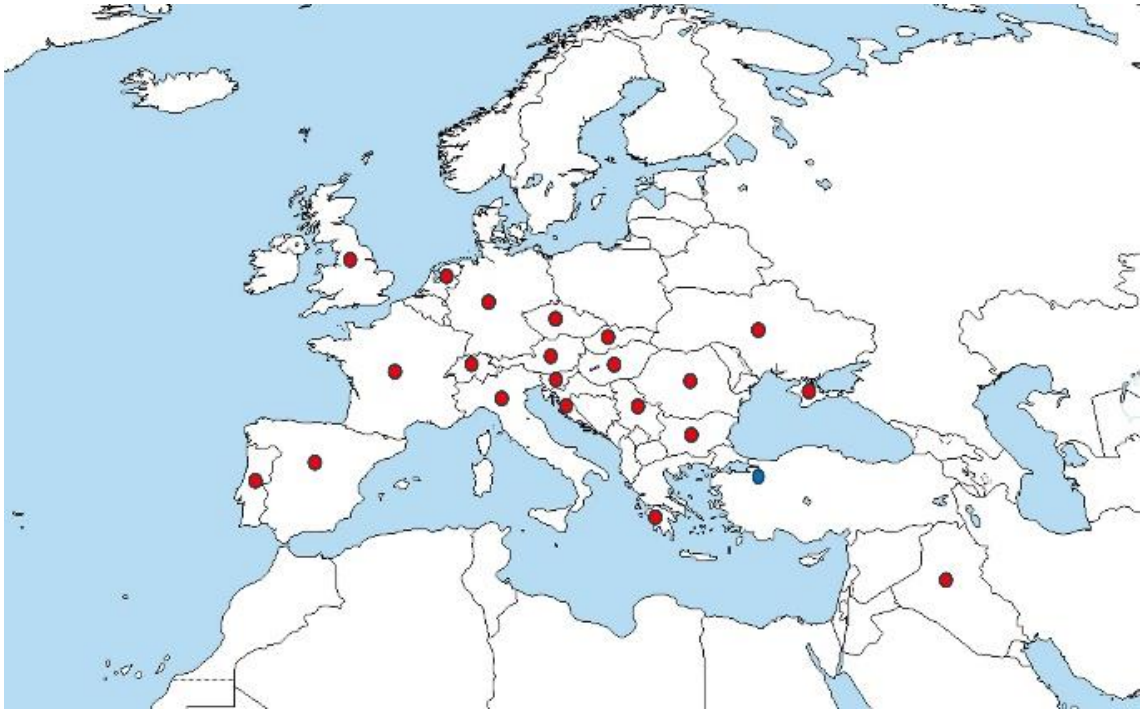

Figure 3. Distribution map of *Isodontia mexicana* in the Palaearctic region (red circle: previous records; blue circle: new record)

Differential diagnosis of female: Body length 16.8 mm. *Isodontia mexicana* can be easily distinguished from other native genus representatives as follows: it differs from *Isodontia splendidula* by the black metasoma (partly reddish in *Isodontia splendidula*). It differs from the closely related native species *Isodontia paludosa*

by the following characteristics: a smaller body size (larger in *Isodontia paludosa*); petiole strongly curved in profile, as long or longer than foretibia (petiole straight, clearly shorter than the foretibia in *Isodontia palludosa*) (Figures 4a and 4e); clypeus and lower frons with long erect black hairs (without black hairs in *Isodontia paludosa*) (Figures 4b and 4f); anterior clypeal margin of female with a small deep median notch (straight in *Isodontia paludosa*) (Figures 4c and 4g); wings smoky, darker along apical margin (wings tinged yellow in *Isodontia paludosa*) (Figures 4d and 4h) [11].

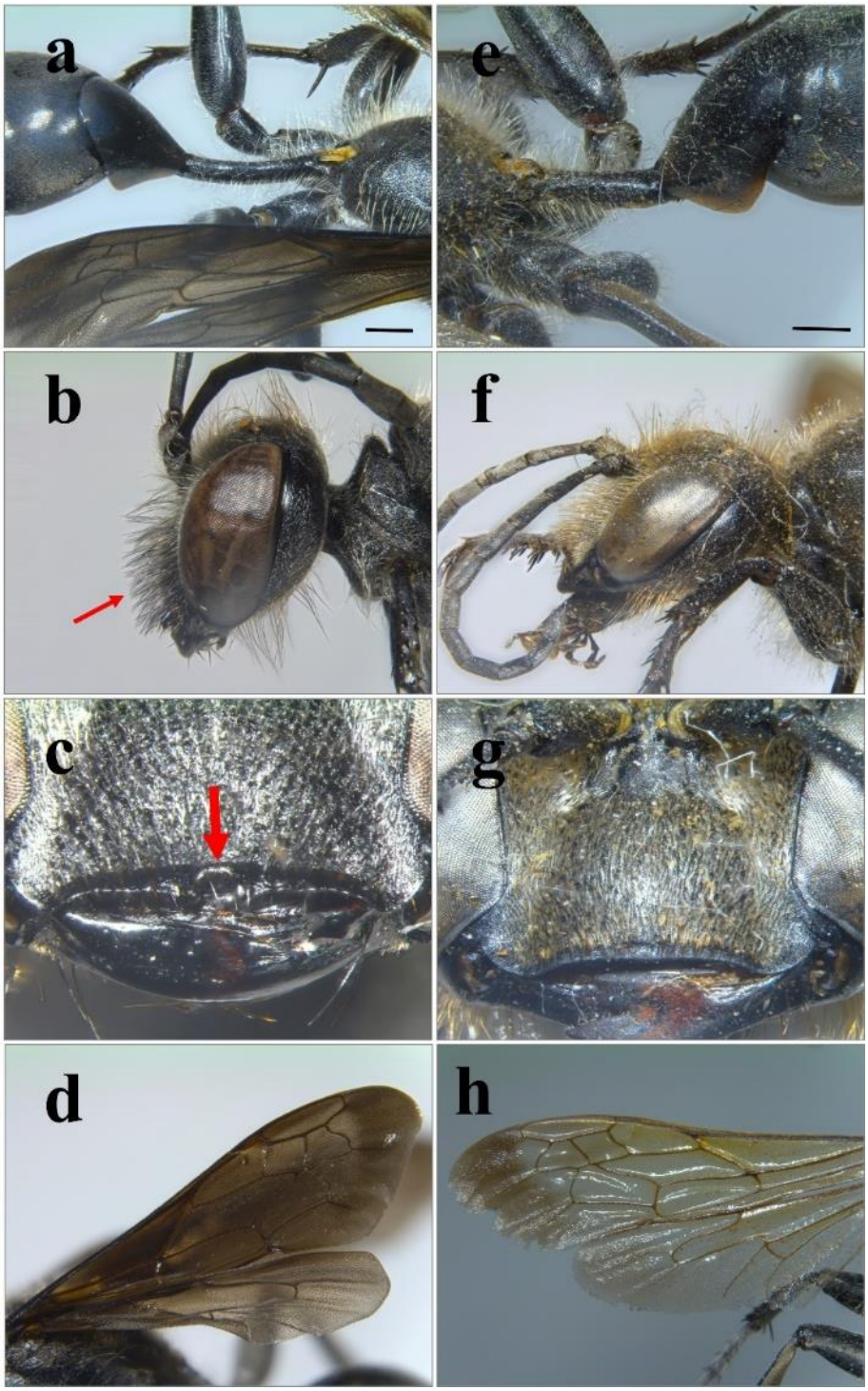

Figure 4. *Isodontia mexicana* ♀ (a - d) and *Isodontia paludosa* ♀ (e - h). a, e) Lateral view of the petiole (Scale bars: 2 mm); b, f) lateral view of head (erect black hairs indicated with red arrow); c, g) dorsal view of clypeus (deep median notch in the anterior border of the clypeus indicated with arrows); d, h) wings

In this study, *Isodontia mexicana* is reported for the first time in the Turkish fauna. This is the second invasive wasp species from the family Sphecidae to be introduced to Türkiye after *Sceliphron curvatum* (Drury, 1773) was discovered in 2015 [12]. So far, eight non-native species of Sphecidae have been successfully established in the Western Palaearctic fauna: Oriental *Chalybion bengalense* (Dahlbom, 1845), Nearctic *Chalybion californicum* (de Saussure, 1867), Palaearctic *Chalybion turanicum* (Gussakovskij, 1935), Nearctic *Chalybion zimmermanni* Dahlbom, 1843, Nearctic *Sceliphron caementarium* (Drury, 1773), Asian *Sceliphron curvatum* (F. Smith, 1870), Asian *Sceliphron deforme* (F. Smith, 1856), and Nearctic *Isodontia mexicana* [2]. *Sceliphron caementarium*, *Sceliphron deforme*, and *Chalybion turanicum* are relatively more common species than others, and their probability of being found in Türkiye is relatively high.

Isodontia mexicana was first recorded in Asia, in the Fars Province of southern Iran, in 2004 [13]. According to Ćetković et al. [3], the species was introduced to Western Asia in the early 1990s, and this occurrence seems likely to be a result of the import of equipment and cargo intended for American military units during the Gulf War. In this study, the species was detected in the Kocaeli Province of Türkiye, near the western edge of Asia Minor, one of the country's most important industrial cities. This city is located a great distance from the previously known localities of *Isodontia mexicana* in the surrounding regions: about 530 km, 600 km, and 750 km from Romania (Bucharest), Bulgaria (Sofia), and Greece (Peloponnese), respectively. There are geographical barriers between the detection point in Türkiye and these places, such as the sea and the Balkan Mountains. According to Polidori et al. [14], *Isodontia mexicana* could have spread further within Europe through active dispersal but could only have reached other continents through human trade. Since Kocaeli is a city with intensive imports due to industrial activities, the species may have reached the country through man, as in Iran.

4. Conclusion

In the future distribution projections of *Isodontia mexicana* prepared by Polidori et al. [14], the area invaded by the species is predicted to expand towards the North and East through active dispersal. The first discovery of the species in the Türkiye and its second record in the Asian continent show a tendency to further expand the species' range from Europe to the East. There are many suitable habitats in Türkiye for this wasp, which prefers to live in low-altitude regions with moderate temperatures and rainfall in the northern hemisphere. In this case, it can be predicted that *Isodontia mexicana* may spread eastwards soon in regions of Türkiye with this climate and geographical features, especially along the Black Sea coast.

Author Contributions

Drafted and wrote the manuscript, experimented, and result analysis. The author read and approved the final version of the paper.

Conflict of Interest

The author declares no conflict of interest.

Ethical Review and Approval

No approval from the Board of Ethics is required.

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