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THE GIANT WATER BUG *LETHOCERUS* (HEMIPTERA HETEROPTERA
BELOSTOMATIDAE) IS SPREADING IN ITALY:
THE FIRST RECORD FOR CAMPANIA

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Cianferoni F., Mazza G. - The giant water bug *Lethocerus* (Hemiptera Heteroptera Belostomatidae) is spreading in Italy: the first record for Campania.

Lethocerus patruelis (Stål, 1854) is the only member of the Belostomatidae family in Europe. During the last decades, records of this giant water bug have become frequent in south-eastern Italy, but with no evidence about its origin (man-mediated unintentional introduction or a natural westward spread). The status of this species in Italy is still uncertain, but the man-mediated unintentional introduction seems the most probable, even through multiple introductions.

The first record of *Lethocerus* cf. *patruelis* for the Campania region (the first one on the Tyrrhenian side of Italy) is here reported, suggesting the already registered tendency of this species to expand, at least in Europe. Several topics need to be evaluated, in the light of its status in Italy and its management.

KEY WORDS: aquatic insect; distribution; Heteroptera; Nepomorpha; new record.

INTRODUCTION

Lethocerus patruelis (Stål, 1854) is an Indo-Mediterranean species of giant water bug (Hemiptera: Heteroptera: Belostomatidae) and is the only species of this genus reaching Europe (cf. PEREZ GOODWYN, 2006; SAREEIN *et al.*, 2009), where it is recorded from Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Hungary (doubtful), Montenegro, North Macedonia, Romania, Serbia, Turkey, and recently also from Italy (POLHEMUS, 1995; CIANFERONI and NARDI, 2013; GROZEVA *et al.*, 2013).

Most recent records seem to suggest the tendency of this species to expand westwards (see e.g., CIANFERONI and NARDI, 2013; LO PARRINO and TOMASI, 2021) and northwards (see e.g., GROZEVA *et al.*, 2013), at least in Europe.

In Italy the species was detected in Apulia at least from 1997 (with some doubts on the date) and subsequently confirmed from 1998 up to present (CONVERTINI, 2008, 2009; SUSINI, 2008; OLIVIERI, 2009; CIANFERONI and NARDI, 2013; ESPOSITO *et al.*, 2017; CASTIGLIONE *et al.*, 2021; LO PARRINO and TOMASI, 2021; unpublished observations on the web). However, the first published record for Italy was provided by BACCHI and RIZZOTTI

VLACH (2005) based on a specimen from Abruzzo dated 2000 (where it has not been recorded again). Then the species was also recorded in 2015 from Basilicata (LO PARRINO, 2019), in 2018 from northern Calabria and in 2019 from southern Calabria as *L. cf. patruelis* (CASTIGLIONE *et al.*, 2021).

In this note, we provide the first occurrence record for Campania and the Tyrrhenian side of Italy, updating the distribution of this species in the country.

MATERIAL AND METHODS

The observation from Campania was uploaded on the Citizen Science Web-App M.ORGAN.A. (Monitoraggio ORGANismi Nocivi in Agricoltura) developed by CREA-DC (Research Centre for Plant Protection and Certification), upon request of the Central Phytosanitary Service (Servizio Fitosanitario Nazionale) of the Ministry of Agricultural, Food and Forestry Policies (Ministero delle Politiche Agricole, Alimentari e Forestali – MIPAAF).

For the material examined the following information is provided: region, municipality (and province), locality, coordinates, date, number of specimens, photographer. Geographical coordinates are in decimal degrees (*datum* WGS84). The uncertainty of data (in metres) was indica-

ted according to the point-radius method (WIECZOREK *et al.*, 2004).

RESULTS

Lethocerus cf. patruelis (Stål, 1854)

MATERIAL EXAMINED - CAMPANIA: Minori (Salerno), Minori beach, 40.64889° N 14.62790° E (uncertainty = 140 m), 23.VIII.2023, 1 adult specimen (Fig. I), three photos by Vincenzo Coppola.



Fig. I – Adult specimen of *Lethocerus cf. patruelis* (Stål, 1854) from the beach of Minori (Salerno). Photo by Vincenzo Coppola.

An updated distribution map of *L. cf. patruelis* in Italy at regional scale is provided with indication of year of the first record for each region (Fig. II).

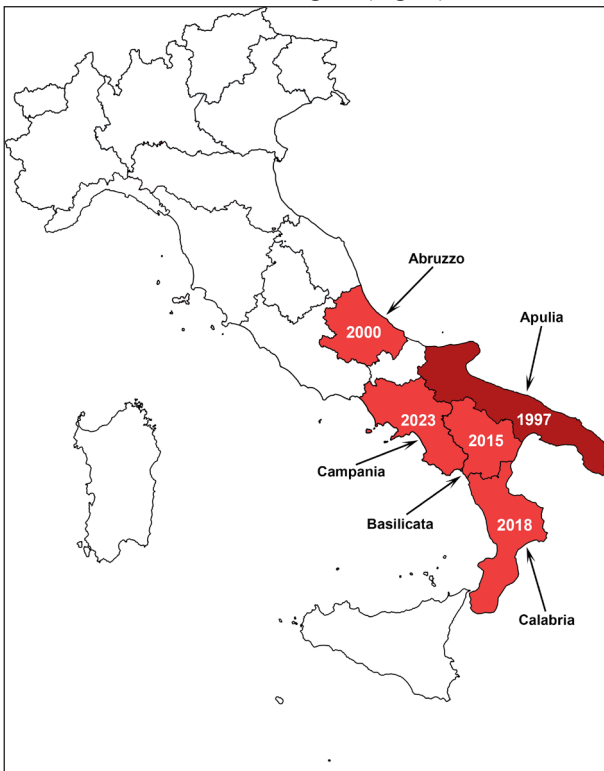


Fig. II – Occurrence of *Lethocerus cf. patruelis* (Stål, 1854) in Italy at regional scale, with indication of year of the first record for each region. In dark red regions with more than 50 occurrence records, in light red regions with less than 5 occurrence records.

NOMENCLATURE REMARKS - MENKE (1963) reported “1855” as year of description of this taxon, “*Lethocerus patruelis* (Stål), 1855”, and the same was supported by CIANFERONI and NARDI (2013) for this taxon and for *Bestostoma niloticum* Stål (= *Lethocerus cordofanus* Mayr, 1853) since the eleventh volume (1854) of the journal “*Öfversigt af Kongliga Vetenskaps-Akademiens Förhandlingar*” including C. Stål’s publication was published the following year, according to the last line of the cover page of the whole volume. Actually, on closer inspection, only from the issue no. 9 the parts were printed in 1855, whilst the issue no. 8, including Stål’s article, was separately printed in Stockholm in 1854 (see footer in the end of eighth issue, p. 269).

Therefore, this species (and at least the other taxa described in the same issue) must be reported as “1854” (see STÅL, 1854 in bibliography for further information), as indicated in other contributions (e.g., POLHEMUS, 1995; PEREZ GOODWYN, 2006). As far as possible, FC managed to warn some colleagues and suggested the correct year concerning some their recently published articles dealing with this giant water bug (e.g., CASTIGLIONE *et al.*, 2021; DAVRANOGLU and KARAOUZAS, 2021).

DISCUSSION

The status of this species in Italy is still uncertain since its presence can be related to a recent man-mediated unintentional introduction or a natural westward spread. The first case seems the most probable, since this species and others of the same family show a high positive phototropism, are attracted by artificial lights, and can be accidentally transported by ferries or different types of boats from the Balkans to the Italian coasts (see CIANFERONI and NARDI, 2013 for a more detailed analysis), perhaps even through multiple introductions. In this case, supposedly the most probable, it would be considered alien in Italy and its possible impact, especially on the populations of amphibians and reptiles, should be seriously considered. Indeed, Lethocerinae water bugs are predators of vertebrates such as fish, turtles, snakes, and larval and adult amphibians. Moreover, a predation event by an adult of *L. patruelis* was recently confirmed in Greece, on a subadult Balkan water frog *Pelophylax kurtmuellei* (Gayda, 1940) (CHRISTOPOULOS *et al.*, 2022). Another possible impact may concern the medical interest of these insects. Specimens of *Lethocerus* are able to bite humans with their rostrum and can possibly injure also with their robust legs, especially the front raptor ones equipped with large claws (F. Cianferoni, pers. obs.). The intense pain experienced after bites is probably related to the salivary enzymatic action, which can liquefy tissues. Though bites are painful and cause local reactions, they appear to resolve within few hours and without permanent sequelae (HADDAD *et al.*, 2010). However, this kind of observations refers to different species of *Lethocerus* (e.g., EWING, 1928) and should be verified in *L. patruelis*. The first case of bite by a *Lethocerus* specimen in Italy was reported by CIANFERONI and NARDI (2013).

Going back to discussing the arrival, an expansion of the range cannot be excluded, with individuals reaching Italy independently from the Balkans, perhaps influenced by the presence of lights on the Italian coast, visible from Albania separated by a sea strait (about 75 km) or by active westward spread of the species (CIANFERONI and NARDI, 2013) although it could probably be affected by climate change. In the latter case, the species would not be considered alien and its management should be completely different.

Most recent records seem to suggest that the species' range is expanding at least in Europe (see e.g., GROZVA *et al.*, 2013), also given the apparent increase in recent years of records of *L. patruelis* in some areas of the Balkans, where there were only a few old records (e.g., DULČIĆ *et al.*, 2015; CORSINI-FOKA *et al.*, 2019; DAVRANOGLU and KARAOUZAS, 2021). This expansion could be connected to climate change, as already hypothesized for other nepomorphans (e.g., CIANFERONI, 2013; REDUCIENDO KLEMENTOVÁ and SVITOK, 2014; CIANFERONI and CIANFANELLI, 2015).

Unfortunately, ascertaining the pathway of introduction or possible autonomous arrival is very difficult. Therefore, to date, the status of this species must be maintained as “uncertain” in Italy.

Another significant problem is the identity of the various specimens. The morphology of the aedeagus is the only character that allows certain identification at a specific level (CIANFERONI and NARDI, 2013). However, the paler overall colour and other details in the colour pattern could be useful in the identification especially with the African closely related species *L. cordofanus* Mayr, 1853 (PEREZ GOODWYN, 2006). Prosternal keel is quite variable within the two species and it is not a feature to be relied on (F. Cianferoni, pers. obs.; see also CASTIGLIONE *et al.*, 2021).

Most of the specimens collected in Italy are female and were attributed to *L. patruelis* on the basis of their *habitus* (see e.g., CIANFERONI and NARDI, 2013; ESPOSITO *et al.*, 2017; LO PARRINO and TOMASI, 2021), strongly supported also by the proximity of most Italian observations to the Balkan peninsula, representing the western border of previously known range of the species.

In some cases this attribution was more uncertain, and the specimens were prudently attributed to *Lethocerus* cf. *patruelis*, as suggested by FC for the records from Calabria (CASTIGLIONE *et al.*, 2021). However, considering the *habitus* of the specimens photographed in ideal conditions, there is currently no evidence to hypothesize that it is not *L. patruelis*.

Almost all the specimens collected in Italy which were possible to verify are adult females (CIANFERONI and NARDI, 2013; LO PARRINO, 2019; CASTIGLIONE *et al.*, 2021; LO PARRINO and TOMASI, 2021), with a few exceptions: two adult males from two different localities in Apulia, and the one male from Basilicata (LO PARRINO, 2019; LO PARRINO and TOMASI, 2021).

To date there is still no evidence of reproduction of *Lethocerus* in Italy but, based on the available data and the presence of both sexes, it can reasonably be assumed that the species is breeding in this country and formed established populations, at least in Apulia. As a matter of fact, only from one to three findings have been recorded for the other Italian regions (see LO PARRINO and TOMASI, 2021), the same for Campania. The case of Abruzzo is emblematic: its record is the first published finding for Italy (BACCHI and RIZZOTTI VLACH, 2005) although not the oldest (see introduction for further detail) but no further specimens have subsequently recorded for this region. Even considering the lack of dedicated research, this suggests an isolated individual, unlike Apulia where the numerous records that occurred over the years up to now (LO PARRINO and TOMASI, 2021; unpublished observations on the web) suggest one or more stable populations in the region. However, only the detection of immature stages will be able to confirm the reproduction of the species in the areas where it was recorded.

As already assumed by CIANFERONI and NARDI (2013) the low number of males recorded may be related to the exclusive male parental care occurring in this genus (*cf.* SMITH, 1997), which might not favour the dispersal of males (see also ESPOSITO *et al.*, 2017).

The specimen from Campania was photographed in the pebble and sand beach of Minori, in the municipality of Salerno. Unfortunately, the specimen was wet and therefore darker than its original colour (even if some lighter areas can be seen). However, the colour pattern is not an unfailing character, and some details are difficult to compare with other specimens from the available documentation. So even in this case we need to consider this record as *L. cf. patruelis*, pending further research. In any case, this is the most probable species given that, as anticipated, there is currently no evidence of possible other species occurring in Italy. It is also true that there are no further elements to hypothesize how the specimen reached that site. Considering its discovery on the beach, both the arrival of the specimen from nearby areas (being present in neighbouring regions) and accidental transport (for example by boats) appear equally possible at the moment. It is useful to remember that this species seems able to survive in sea water, at least temporarily (SCHUMACHER, 1917; CIANFERONI and NARDI, 2013) and it is an excellent flier (DULČIĆ *et al.*, 2016). Interestingly, the report in Campania overlaps with the peak of observations (September–October) for this species occurring on the web (<https://www.inaturalist.org/taxa/541422-Lethocerus-patruelis>; last access 20th October 2023), but this topic needs to be evaluated in depth too.

In conclusion, this finding represents the first record for the Campania region and it is even the first discovery on the Tyrrhenian side of Italy. It will be important to observe how the expansion of this species will change in the future and above all to delve deeper into its status for the purpose of its correct management.

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