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REVIEW OF THE GENUS *LETHOCERUS* IN PAKISTAN,
WITH NEW CONFIRMED RECORDS OF *L. PATRUELIS* (STÅL, 1854)
(HEMIPTERA HETEROPTERA BELOSTOMATIDAE)

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Ahmed Z., Cianferoni F. - Review of the genus *Lethocerus* in Pakistan, with the first confirmed records of *L. patruelis* (Stål, 1854) (Hemiptera Heteroptera Belostomatidae)

A review of the genus *Lethocerus* in Pakistan is provided. A careful analysis of the records from literature allows us to pre-emptively exclude the presence of *L. indicus* (Lepeletier & Serville, 1825) from the fauna of Pakistan. Three new records, two of which based on examination of male genital features, allow to confirm the occurrence of *L. patruelis* in the country and in the provinces of Balochistan and Sindh.

KEY WORDS: Balochistan, distribution range, *Lethocerus indicus*, Nepomorpha, new record, Sindh.

INTRODUCTION

The giant water bug genus *Lethocerus* Mayr, 1853 (Hemiptera: Heteroptera: Nepomorpha: Belostomatidae: Lethocerinae) includes the largest true bugs and some of the world's largest insects, reaching 12 cm in length in some Neotropical species (PEREZ GOODWYN, 2006; SAREEIN *et al.*, 2019). Two species occur in the Indian subcontinent: *L. patruelis* (Stål, 1854), widespread from Mediterranean to Southeast Asia, and *L. indicus* (Lepeletier & Serville, 1825), ranging from India to Australasia (PEREZ GOODWYN, 2006; SAREEIN *et al.*, 2019). Records of both species exist for Pakistan (e.g., DISTANT, 1906; ALI, 1973; AKHTAR and ALI, 1975; POLHEMUS, 1995; KHAN and BIBI, 1999; PEREZ GOODWYN, 2006; CHATTHA *et al.*, 2018; SAREEIN *et al.*, 2019; HEISS *et al.*, 2021), but the Belostomatidae fauna of this country is inadequately known and the data needs careful review, as well as that of aquatic Heteroptera and other insects (see e.g., CIANFERONI *et al.*, 2020, 2021).

Here the previously published records of *Lethocerus* for Pakistan are reviewed and new records of *L. patruelis*, two of which confirmed through the study of male genitalia, are provided.

MATERIAL AND METHODS

All the available references have been accurately examined and their records interpreted. However, some references are difficult to find or consult even for local researchers and the list provided below may be incom-

plete. Anyway, this should not affect the results and conclusions.

The collected specimens are preserved in the Department of Zoology of the Federal Urdu University of Arts, Science & Technology (FUUAST), Karachi (Pakistan) and in the Natural History Museum of the University of Florence, “La Specola” Museum, Florence (Italy), indicated by the acronym MZUF. Where not specified the specimens have been identified by ZA and confirmed by FC.

RESULTS

Lethocerus patruelis (Stål, 1854) (Figs. I and II)

Belostoma indicum Lepeletier & Serville: DISTANT (1906: 38, “Sind”. Suspected misidentification). MAXWELL-LEFROY (1909: 336, “Sind”. Quotation of DISTANT, 1906). AKHTAR and ALI (1975. Suspected misidentification). SALEEM and BEGUM (1985: 324 and fig. 2, “Sakhakot [...] and [...] Parangai”. Confirmed misidentification with *Diplonychus* sp. - *cf.* description and quoted figure; 329, “Ali (1980-81) [...] various lakes”. Suspected misidentification). KHAN and BIBI (1999: 99, “Multan”. Suspected misidentification).

Lethocerus indicus (Lepeletier & Serville): HAFIZ and RIBEIRO, 1939: 432, “Sind”. Quotation of DISTANT (1906). CHATTHA *et al.* (2018: 4, “fish farms near Qadirabad Barrage”. Suspected misidentification). KAZMI and GHORY (2019: 160, “Ali, 1973 as *Belostoma indica*”. Quotation of ALI, 1973).

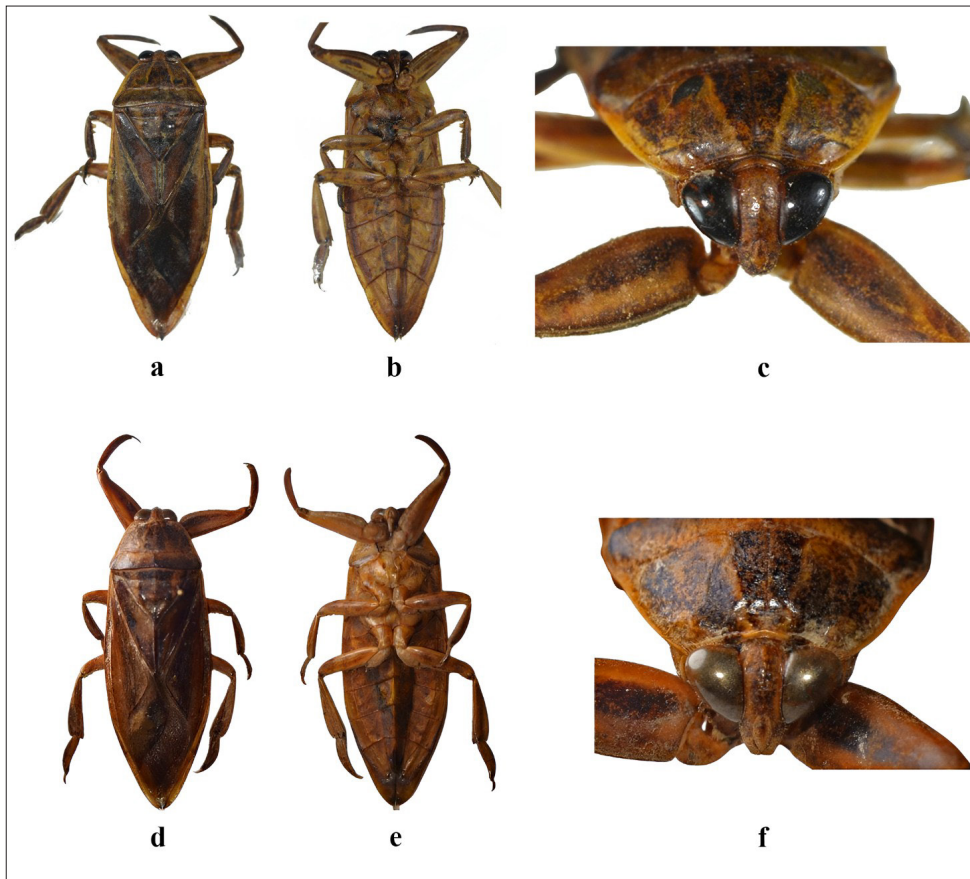


Fig. I – Specimens of *Lethocerus patruelis* (Stål, 1854) from Pakistan. Male from Balochistan in a) dorsal, b) ventral, and c) frontal view. Body length 60 mm. Female from Sindh in d) dorsal, e) ventral, and f) frontal view. Body length 63 mm. Photos by Z. Ahmed.

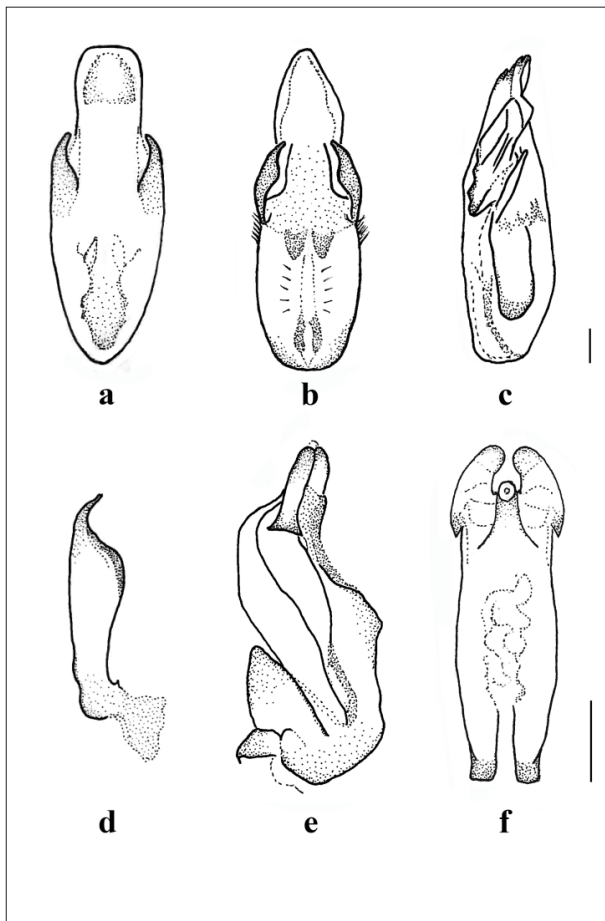


Fig. II – Male genitalia of *Lethocerus patruelis* (Stål, 1854) from Balochistan, Pakistan. Genital capsule in a) dorsal, b) ventral, and c) lateral view. Scale bar = 1 mm. Paramere in d) lateral view; aedeagus in e) lateral and f) ventral view. Scale bar = 1 mm. Original drawings by Z. Ahmed.

Belostoma indica Lepeletier & Serville: ALI (1973: 147, "Rawalpindi and Dera Ismail Khan". Suspected misidentification).

Belostoma sp.: ALI *et al.* (1993: 100, Tab. 2, "Ayub National Park [...] Pond-1". Misidentification).

Lethocerus patruelis (Stål): PEREZ GOODWYN (2006: 63 and fig. 74a, "Pakistan". Record origin or source not specified). SAREEIN *et al.* (2019: "Pakistan". Source not specified, probably PEREZ GOODWYN, 2006). KAZMI and GHORY (2019: 160, "Polhemus, 1995". Wrong quotation perhaps inferred from PEREZ GOODWYN, 2006, see discussion). HEISS *et al.* (2021: 85, "Pakistan, Swat, Nadyan").

Lethocerus indicum (Lepeletier & Serville): KAZMI and GHORY (2019: 160, "Irfan and Bibi, 1999" [sic]. Quotation of KHAN and BIBI, 1999. Wrong name combination).

MATERIAL EXAMINED

Balochistan Province. Turbat, Turbat International Airport, 25.9861° N 63.0300° E, 24.VIII.2018, T. Ahmed leg., 1 ♂ (Figs. I a–c and II). **Sindh Province.** Karachi, XI.1993, F. Cannicci leg., F. Cianferoni det. 2009, 1 ♂, MZUF (Mag. 1520). Ubauro, natural pond, 28.1524° N 69.7346° E, 24.V.2025, Z. Dahar leg., 1 ♀ (Figs I d–f).

REMARKS

These new records, based on the examination of male genitalia, confirm the occurrence of *L. patruelis* in Pakistan, in addition to the generic country occurrence listed by PEREZ GOODWYN (2006) and the record by HEISS *et al.* (2021). Even considering the previously published records of *Lethocerus*, the first record of the genus in the Province of Balochistan and the first confirmed record of *L. patruelis* for the Province of Sindh are provided. Only a record of *L. indicus* was known so far from Sindh (i.e. DISTANT 1906; see above), for which a misidentification is suspected (see details in the Discussion below).

DISCUSSION

PEREZ GOODWYN (2006) in his revision of the subfamily Lethocerinae examined a quite large amount of material of both *L. indicus* and *L. patruelis* and provided distribution maps. According to these results, the only species that could occur in Pakistan is *L. patruelis* (see also the detailed distribution in the Introduction), while the more western records of *L. indicus* reach eastern and southern India, not extending into the interior of the Indian peninsula. PEREZ GOODWYN (2006), in the distribution of *L. patruelis*, listed also Pakistan, citing POLHEMUS (1995) as the sole source. Actually, POLHEMUS (1995) did not list Pakistan for *L. patruelis*. It is therefore unclear where the record originates (literature?) or whether PEREZ GOODWYN (2006) had perhaps inferred the presence in Pakistan from the distribution of *L. patruelis*, having examined specimens of this species from countries bordering Pakistan (e.g., Iran and India).

SAREEIN *et al.* (2019) provided new records and a distribution review of the Lethocerinae, and included Pakistan among the countries, without quoting clarifying sources. The country occurrence almost certainly comes from PEREZ GOODWYN (2006).

Recently, HEISS *et al.* (2021) listed a record of *L. patruelis* from the Ernst Heiss collection, based on three specimens collected in the north of the country (Swat District, Khyber Pakhtunkhwa Province) in 1971.

Therefore, according to the current state of knowledge, *L. patruelis* appears to be the only Lethocerinae species that can occur in Pakistan. As a result, all data reporting *L. indicus* for Pakistan are to be interpreted as probable misidentifications with *L. patruelis*.

In particular DISTANT (1906), in "The Fauna of British India", gives a record ("Coll. Distant") of *Belostoma indicum* [= *L. indicus*] for "Sind", the present-day Pakistani province of Sindh. Although the specimen depicted (country/locality not specified) actually looks like *L. indicus*, the most likely hypothesis remains misidentification.

It should also be remembered that at that time *Belostoma patrule* [= *L. patruelis*], described by STÅL (1854) from Rhodes Island (Greece), and *Belostoma pruinosis* [= *L. patruelis*], described by DUFOUR (1863) from Dalmatia (Croatia), were considered by MAYR (1871) both synonyms of *Belostoma niloticum* [= *L. cordofanus*] (see e.g., MENKE, 1960, 1963; POLHEMUS, 1995; PEREZ GOODWYN, 2006). *Belostoma niloticum* var. *persicum*, the second synonym of *L. patruelis*, was described by MONTANDON (1898) from Iraq, and had not received due attention until KANYUKOVA and KERZHNER (1980) considered *L. patruelis* as a distinct species and added this taxon among its synonyms.

After many years, further records of *L. indicus* were given for Pakistan (under different name combinations, see the synonymic list above), e.g., by ALI (1973), AKHTAR and ALI (1975), KHAN and BIBI (1999), CHATTHA *et al.* (2018), for Punjab and Khyber Pakhtunkhwa. In most cases it is difficult to verify these records, but they can be quite safely attributed to *L. patruelis*. In some cases (e.g., SALEEM and BEGUM 1985), misidentifications with the other smaller-sized genus of belostomatids present in Pakistan, i.e. *Diplonychus* Laporte, 1833 (*cf.* DISTANT, 1906; PRUTHI, 1933; CHATTHA *et al.*, 2018), occurred.

Therefore, we pre-emptively exclude the presence of *L. indicus* (Lepeletier & Serville, 1825) from the fauna of Pakistan, pending further research.

New records confirming the occurrence of *L. patruelis* in Pakistan (Fig. I) are provided here (male specimens verified by the examination of genital features; see e.g., Fig. II). In the female specimen, the genitalia (e.g., the ovispositor) were extracted, but unfortunately, there are no contributions comparing these characters among the species of *Lethocerus* yet. Therefore, we relied on external characteristics (e.g., size of the light stripes of the pronotum and length of the foreleg claw; Fig. I) which still allow for a reliable identification (see SAREEIN *et al.*

2019). Future work should focus on verifying the previously published records (see above) and adding further new reliable records to provide a more comprehensive understanding of the species' distribution in the country. It will be essential to publish only verified data, when possible through the study of male genitalia, the most reliable diagnostic character. The same applies to other species of the Belostomatidae family (*Diplonychus* spp.) whose records will require a careful review as well.

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