Acta Biologica Sibirica
Vol 10 (2024): Acta Biologica Sibirica, 1185–1197
Articles

Amitermes rhizophagus Belyaeva, 1974 – a new genus and species of termites (Blattodea: Termitidae) in the fauna of Uzbekistan

Kakhramon D. Rustamov	Republican Scientific and Production Center for Termite Control at the Institute of Zoology, Academy of Sciences of Uzbekistan, Tashkent, Uzbekistan
Gulnara S. Mirzaeva	Republican Scientific and Production Center for Termite Control at the Institute of Zoology, Academy of Sciences of Uzbekistan, Tashkent, Uzbekistan; Institute of Zoology of the Academy of Sciences of Uzbekistan, Tashkent, Uzbekistan
Bakhtiyor R. Kholmatov	Republican Scientific and Production Center for Termite Control at the Institute of Zoology, Academy of Sciences of Uzbekistan, Tashkent, Uzbekistan; Institute of Zoology of the Academy of Sciences of Uzbekistan, Tashkent, Uzbekistan
Vakhidjon N. Akhmedov	Republican Scientific and Production Center for Termite Control at the Institute of Zoology, Academy of Sciences of Uzbekistan, Tashkent, Uzbekistan
Natalya I. Lebedeva	Republican Scientific and Production Center for Termite Control at the Institute of Zoology, Academy of Sciences of Uzbekistan, Tashkent, Uzbekistan; Institute of Zoology of the Academy of Sciences of Uzbekistan, Tashkent, Uzbekistan
Zumrad A. Ganieva	Republican Scientific and Production Center for Termite Control at the Institute of Zoology, Academy of Sciences of Uzbekistan, Tashkent, Uzbekistan
Mukhabbat Kh. Khashimova	Republican Scientific and Production Center for Termite Control at the Institute of Zoology, Academy of Sciences of Uzbekistan, Tashkent, Uzbekistan

Turkmenistan is considered to be the habitat of termites of the genus *Amitermes* Silvestri, 1901 in the CIS countries. In Uzbekistan, as it turned out, they are very rare and were found for the first time for the fauna of the republic in 2024 in the south of the republic. A single species *Amitermes rhizophagus* Belyaeva, 1974 is registered within the genus *Amitermes*. Morphological features of nymphs, soldiers and workers with corresponding illustrations are described. A map of the place where the species was found is presented.

Acta Biologica Sibirica 10: 1185–1197 (2024) doi: 10.5281/zenodo.13937888

Corresponding author: Gulnara S. Mirzaeva (mirzayeva.gulnora@mail.ru)

Academic editor: R. Yakovlev | Received 10 June 2024 | Accepted 27 September 2024 | Published 19 October 2024

http://zoobank.org/1B4C19E9-3CD4-40E8-995E-614EEF689D76

Citation: Rustamov KD, Mirzaeva GS, Kholmatov BR, Akhmedov VN, Lebedeva NI, Ganieva ZA, Khashimova MKh (2024) *Amitermes rhizophagus* Belyaeva, 1974 – a new genus and species of termites (Blattodea: Termitidae) in the fauna of Uzbekistan. Acta Biologica Sibirica 10: 1185–1197. https://doi.org/10.5281/zenodo.13937888

Keywords

Fauna, Blattodea, new species, *Amitermes rhizophagus*, Uzbekistan

Introduction

Termites are community pests that inhabit colonies in numerous populations and feed on dead plant material (wood, dry grass, plant debris) containing cellulose, thus playing an important ecological role in nature. However, by settling in and destroying buildings, the termites' role becomes destructive and economically damaging, in particular for historical architecture objects and sites, the loss of which is often irretrievable (Kakaliev 1983; Belyaeva 2005; Khamraev et al. 2005; Khamraev et al. 2008; Lebedeva et al. 2017).

There are more than 2,900 known species of termites belonging to 6 families, distributed mainly in the tropics (Krishna et al. 2013). There are 7 known species of termites in the CIS countries, 4 species in Central Asia, and 2 species in Uzbekistan (Belyaeva and Zhuzhikov 1974; Zhuzhikov 1979; Khamraev 2006).

Only two species of termites, *Anacanthotermes turkestanicus* Jacobson, 1904 and *A. ahngerianus* Jacobson, 1904, were recorded in Uzbekistan in the last 50 years of the ninth century and at the beginning of the twentieth century (Marechek 1951, 1956; Davletshina et al. 1979; Khamraev 2006; Khamraev et al. 2016), although another species, *Anacanthotermes vagans septentrionalis* Jacobson (1904), was also mentioned in the literature. These termites from the genus *Anacanthotermes* belong to the family Hodotermitidae – harverster termites and are found in the Palearctic: from North Africa to Central Asia and India (Zhuzhikov 1979). Termites of the genus *Anacanthotermes*, eating dead wood and settling in populated areas, become dangerous insects that damage wooden structures of premises and buildings (Marechek 1956; Luppova 1971; Kakaliev 1983; Khamraev et al. 2008, 2016). It is therefore very important to continuously monitor the situation and not to miss the first occurrences of new infestation sites or invasive species in order to be able to take measures in time to prevent their establishment in the new territory and further spread.

The aim of this work was to identify and study small forms of termites *Amitermes rhizophagus*, first identified in southern Uzbekistan (Kashkadarya Province).

Materials and methods

Termite specimens (nymphs, soldiers, workers) were collected in Vori village, Mirishkor district, Kashkadarya region, from a part of the colony that settled in the rootstock of rotten wood of high moisture content platan (38°42'29.0 "N, 65°11'11.1 "E) located in the south of the republic. A distribution map of the species was created using QGIS software (Fig. 1).

The work material was collected on May 27-30, 2024. Habitat photographs were taken with Redmi Not 12 camera (Fig. 2).

When collecting the work material, an exhauster or eye tweezers were used, specimens were preserved in 70% ethanol, according to standard entomological techniques (Fasulati 1971). Preparations and measurements of nymphs, soldiers and workers were carried out in 70% ethanol

under stereoscopic and biological microscopes MEIJITECHNO in the Laboratory of Entomology of the Institute of Zoology of the Academy of Sciences of the Republic of Uzbekistan. Termite photographs were taken using a Canon EOS 1200D 18-55 IS II camera with 600 mm f/2.8 macro lens.

Figure 1. *Map of Amitermes rhizophagus termite finding in Mirishkor district, Kashkadarya region, Uzbekistan, 2024.*

Figure 2. *Collection site of Amitermes rhizophagus termites in the root part of a rotten tree trunk, Uzbekistan, May 2024.*

The following sources were used to identify and clarify the taxonomic position, biology and

distribution of termites: Belyaeva 1974, 2004; Zhuzhikov 1979; Sands 1992. The studied specimens are kept in the collection of the Republican Scientific and Production Center for Termite Control at the Institute of Zoology of the Academy of Sciences of the Republic of Uzbekistan.

Results

As a result of morphological studies of collected specimens of termites of different castes in the south of Uzbekistan, one new genus and one new species for the Blattodea fauna of Uzbekistan were established for the first time.

Termites of the genus *Amitermes* belong to the Termitidae family - True or superior termites, globally widespread, of which the bulk are found in Australia and Ethiopia. These termites inhabit a variety of environments including deserts and rainforests. The genus *Amitermes* includes more than 106 species (Zhuzhikov 1979; Scheffrahn, Su 1987).

In the CIS countries, according to literature sources, from the genus *Amitermes* only 1 species of termites was previously identified in Central Asia – in Turkmenistan (List of termites ... 2020) and for a long time was considered to be a representa- tive of the *Amitermes vilis* species (Hagen, 1858). Nevertheless, a detailed study of their morphology by N.V. Belyaeva (1974) demonstrated that the specimens collected in Turkmenistan are not identical to the above species. These termites inhabit old nest cells in termitaries of the large Transcaspian termite or are found in dead roots of trees and shrubs (saxaul, ephedra, etc.), where they build their own nests and feed on the same wood. There are no special royal and fodder cells in the nest. They do not make sculptures on the surface of the earth. The flight occurs in April–May (Belyaeva 1974).

In this study, the genus *Amitermes* and the *A. rhizophagus* species, new to the Blattodea fauna of Uzbekistan, are exemplified based on morphological features of termites (soldiers, nymphs, workers).

Genus *Amitermes* Silvestri, 1901

Amitermes soldier is characterized by a convex head capsule and sickle-shaped mandibles, each with one tooth of different shape on the inner margins (Zhuzhikov 1979) (Fig. 3).

***Amitermes rhizophagus* Belyaeva, 1974**

= *Amiterme svilis* (Hagen, 1858)

Material. Uzbekistan, Kashkadarya Region, Mirishkor District, Vori Village, under the bark in the root zone of a felled platan tree in rotten wood with high moisture content (38°42'29.0"N, 65°11'11.1"E, 200-400 m above sea level), April 24, 2024; 1500 specimens (50 nymphs, 35 soldiers, 1415 workers; winged females and males not found).

Areal. Central Asia, Turkmenistan (Zhuzhikov 1979). Not previously reported in Uzbekistan.

Habitats. In Turkmenistan it inhabits the part of the nest cells of the large Transcaspian termite, feeding on its food stocks, and progressively occupying the whole nest. These small termites on sandy soil are common in dead parts of trees and shrubs (saxaul, kandym, ephedra, etc.), where they gnaw out their own cells and passages, feeding on wood. Numerous passages and chambers are also found around the roots in the sand (Zhuzhikov 1979).

We collected termites on the territory of the village under the bark in the root zone of the trunk of a rotten sawn plane tree (Fig. 2).

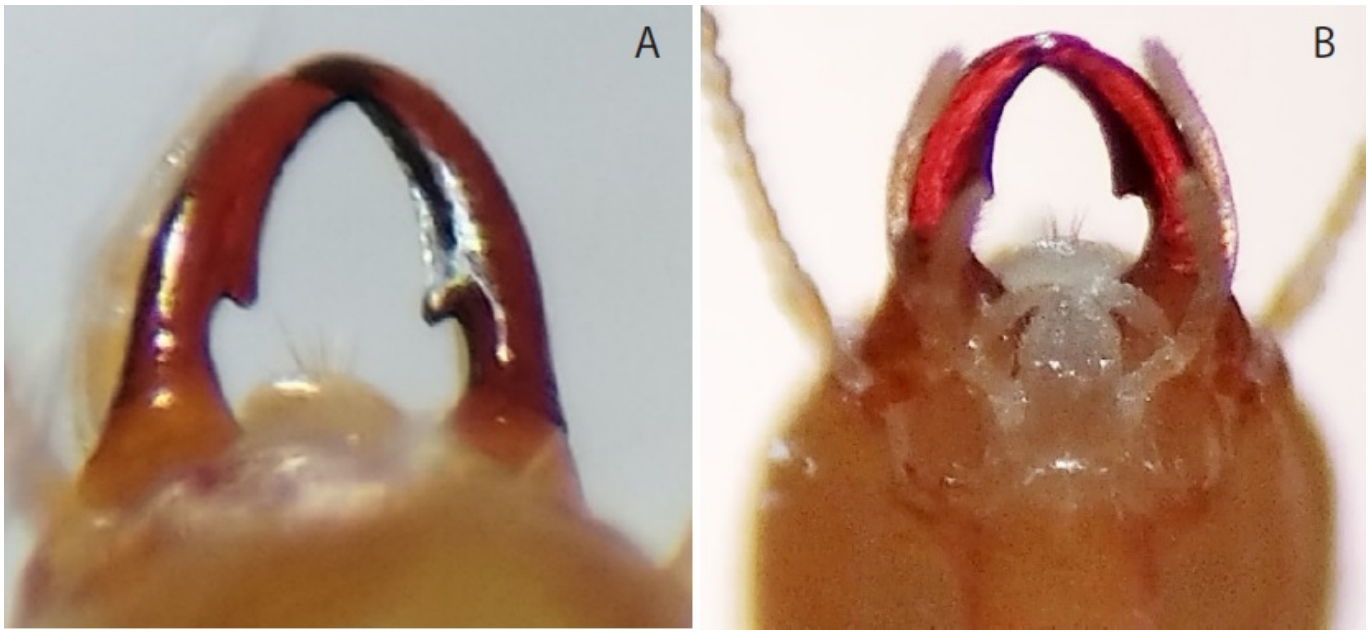

Figure 3. *Mandibles of the Amitermes rhizophagus soldier: A – top general view; B – bottom general view.*

Biological features. Winged specimens were not found in our collections. Special royal and fodder chambers were not identified in the decaying stump of the oriental plane tree. Additionally, no shelter tubes of termites were detected on the ground surface or around the stump.

Morphological features. The most distinctive morphological features of different castes of *Amitermes rhizophagus* termites, except for winged individuals, are shown below.

Description. The body of termites is light, yellowish, and densely covered with long villi and short spinules; the coverts are transparent, the intestinal system is dark. Head is big, loose. The antennae are clear-shaped, 14-segmented, attached to the sides of the head. Daedal round eyes are not common for all castes (not found in soldiers and laborers). Abdomen is of 10 segments. Legs – 3 pairs, with 4-segmented legs, short, running (Fig. 4).

Figure 4. *Appearance of Amitermes rhizophagus soldier (left), nymph (right) and worker (top).*

The soldier (Fig. 5). The body is elongated, narrow, slightly expanding in the abdomen (Fig. 5). Body length – 4.5-5.5 mm, head length with mandibles – 1.55 to 1.93 mm, without mandibles – 1.03 to 1.45 mm; head width – 0.95 to 1.05 mm; length of postmentum – 0.53 to 0.73 mm, width – 0.30 to 0.38 mm; length of hind tibia – 0.88 to 0.99 mm (Belyaeva, Zhuzhikov 1974, Zhuzhikov 1979).

In our specimens, the body length is 4.25 (4.0-4.5) mm, the head length with mandibles – 1.8 to 1.9 mm, without mandibles – 1.2 to 1.4 mm; the head width – 1.0 to 1.2 mm; postmentum length – 0.3 to 0.4 mm, width – 0.5 to 0.6 mm; hind tibiae length – 0.8 to 0.9 mm.

The head capsule is yellow, brownish yellow, elongate in length, posterolateral corners are broadly rounded, the lateral sides are almost linear (Fig. 6A). The forehead is slightly elevated, hollow to clypeus (Fig. 6B).

Mandibles are elongate, sickle-shaped with acute apex, reddish-brown from apex to marginal tooth, then to base are brownish yellow; in middle of each mandible there is one straightly cupped marginal tooth directed slightly backwards to base (Fig. 3, 6C). Maxillary palpus is longer than maxillae. Antennae are brownish-yellow, 14-segmented, third segment is the smallest, terminal segment is ovate; bases of segments are light-colored. Eyes absent. Pro-, meso- and metanotum of dorsum are light, pale yellow, narrower than head width. Pronotum is saddle-shaped, slightly wider than the head base and slightly covering the occiput; its anterior margin is flat, the posterior margin is with barely visible notch (Fig. 7).

According to D.P. Zhuzhikov (1979) all three pairs of legs differ greatly from each other. The femurs and tibiae of the anterior pair are thick and long, the middle legs are thin and short, the hind legs are the longest, their femurs are thickened, and their tibiae are very thin, with thick short spines on the inner side.

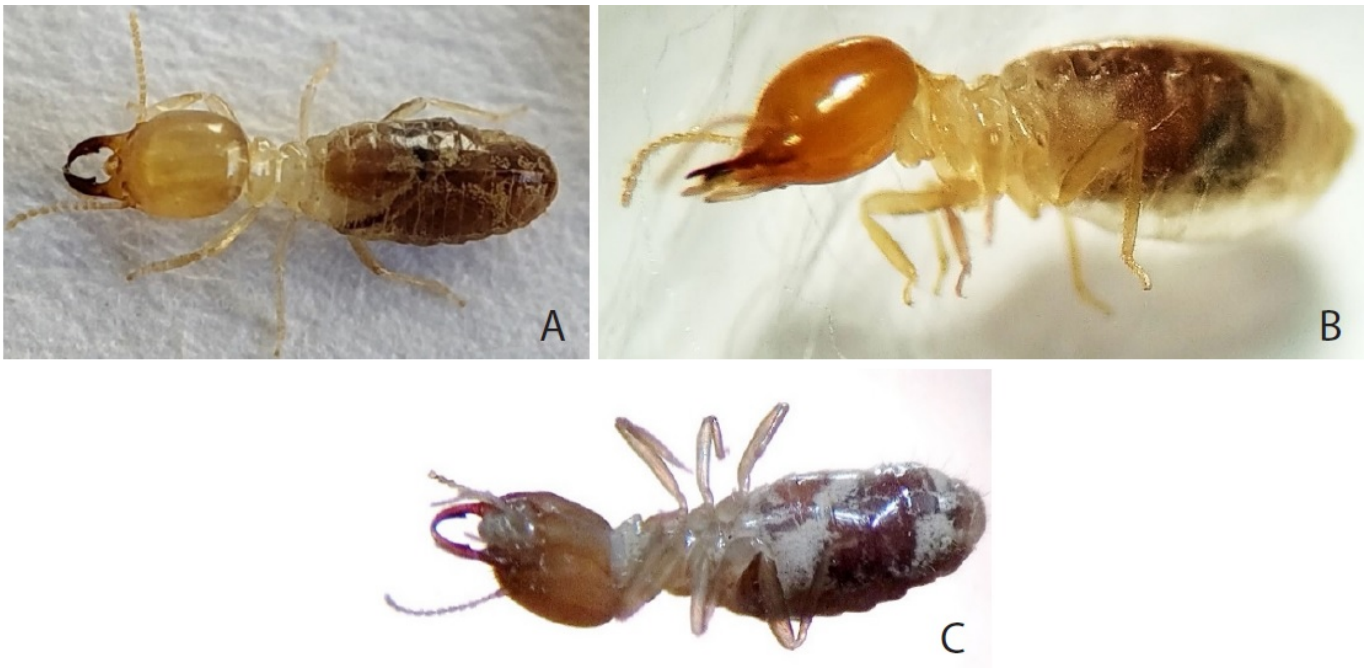

Figure 5. *Amitermes rhizophagus Soldier: A – top general view; B – side general view; C – bottom general view.*

Figure 6. *The head capsule of the Amitermes rhizophagus soldier: A – general view from the top; B – general view from the side; C – general view from the bottom*

In our specimens, femora of anterior, middle and hind pair of legs are thin, slightly thicker than tibiae; tibiae are thin and long; middle legs are slightly shorter than anterior ones, hind legs are the longest (Fig. 8).

The nymph (Fig. 9). The body is elongated, narrow, slightly expanding in the abdomen. The body length is 5.3 (5.0 to 5.8) mm.

The head capsule is light, pale yellow, almost circular, posterior margin semicircular; eyes are large, almost circular, slightly convex; simple ocelli are sharply distinguished and located at approximately three ocular diameters from each other (Fig. 10A); antennae are light yellow,

distinct, 14-segmented, their third segment is the smallest, the terminal segment is ovate; the bases of the segments are light-colored (Fig. 10B).

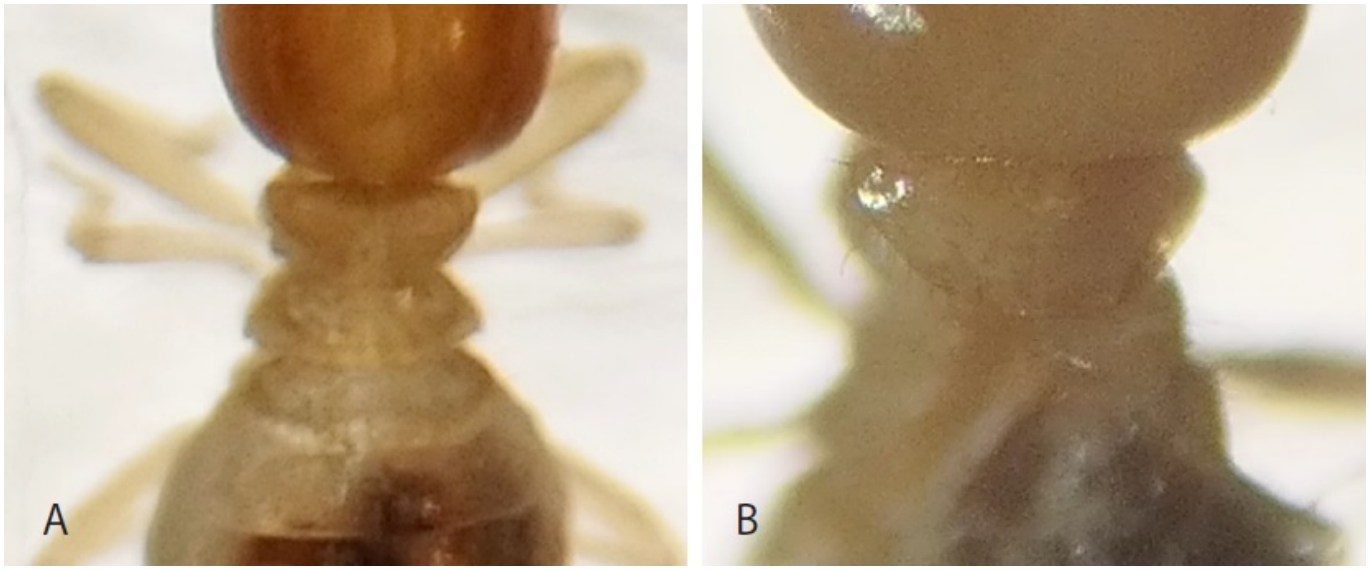

Figure 7. *Dorsum of the Amitermes rhizophagus soldier: A – pro-, meso- and metanotum; B – pronotum.*

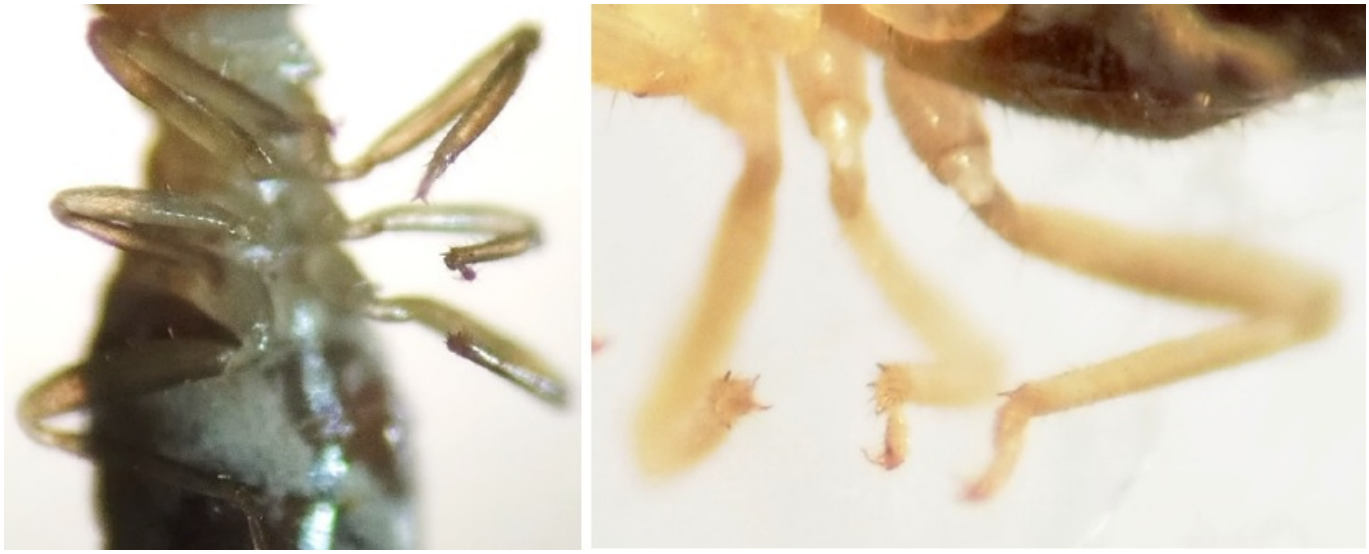

Figure 8. *The legs of the Amitermes rhizophagus soldier.*

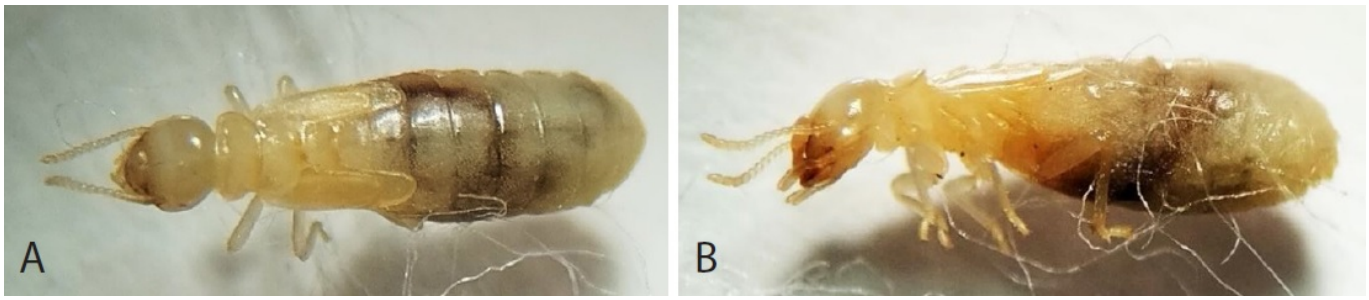

Figure 9. *Appearance of the Amitermes rhizophagus nymph: A – top view, B – side view.*

Figure 10. *Amitermes rhizophagus nymph: A – head capsule (top view), B – antennae (side view).*

Mandibles are short, in middle of each mandible there is one straightly cut marginal tooth directed backwards to base. Pro-, meso- and metanotum of dorsum are light, head-colored, pale yellow, almost as wide as head, trapezoid-shaped with broadly rounded corners (Fig. 9A). Anterior margin of pronotum is wider than posterior margin, the edges are smooth. Anterior, posterior and lateral edges are slightly roll-raised (Fig. 11A). Legs are short, running, light, pale yellow with brownish-yellow feet with 2 short claws (Fig. 11).

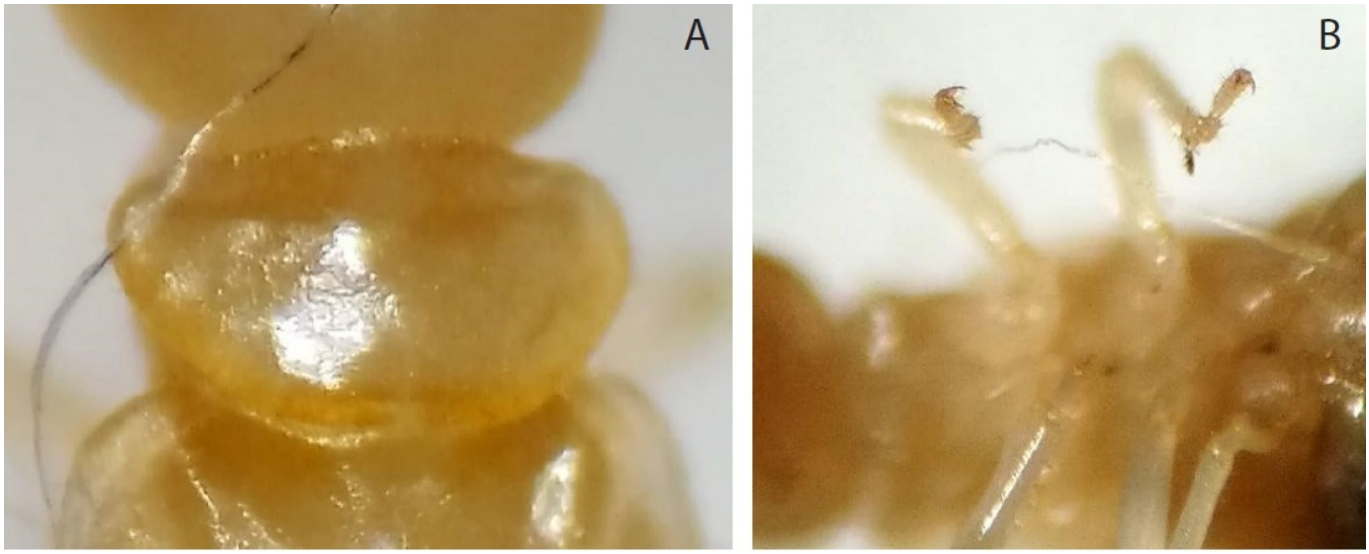

Figure 11. *Amitermes rhizophagus nymph: A – pronotum (top view), B – legs (bottom view).*

The wing rudiments are light, pale yellow, transparent, densely covered with elongated bristles and very small spinules (Fig. 9A). The abdomen of nymphs is light-colored, pale yellow, transparent, with a dark intestine showing through the covers (Fig. 9). The whole body is densely covered with elongated bristles.

The worker (fig. 12). The body is elongate, narrow, slightly widening in abdomen (Fig. 12). The body length is 3.78 (3.0 to 4.5) mm.

The head capsule is light, pale yellow, almost round, the posterior edge is semicircular. The eyes are absent. Antennae are light yellow, distinct, 14-segmented, the third of them is the smallest, the terminal segment is ovate; the bases of the segments are light-colored (Fig. 13A, B). Mandibles are short, with a single straight-circumcised marginal tooth in the middle of each mandible, directed backwards towards the base (Fig. 13C). The pronotum is narrower than the head, pale, light yellow;

saddle-shaped, slightly wider than the base of the head; its anterior edge is smooth, the posterior one with a barely noticeable notch (Fig. 13D). The legs are light, pale yellow with brown-yellow paws with 2 short claws (Fig. 12A, B).

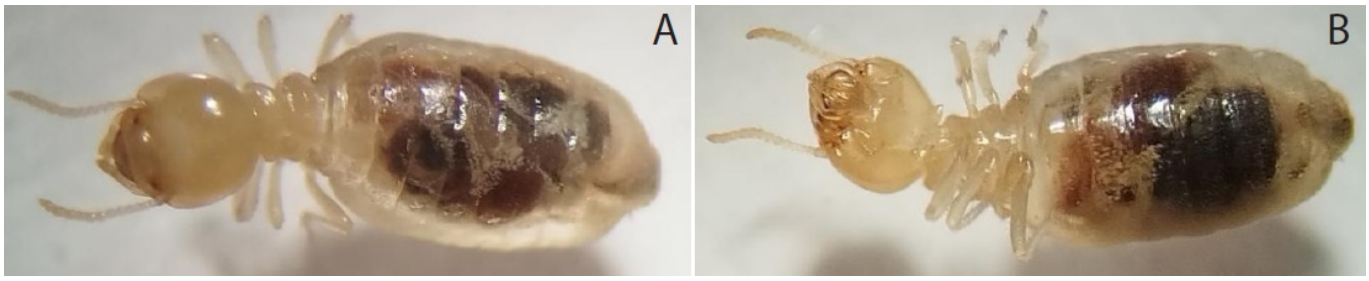

Figure 12. *Amitermes rhizophagus worker: A – top general view; B – bottom general view.*

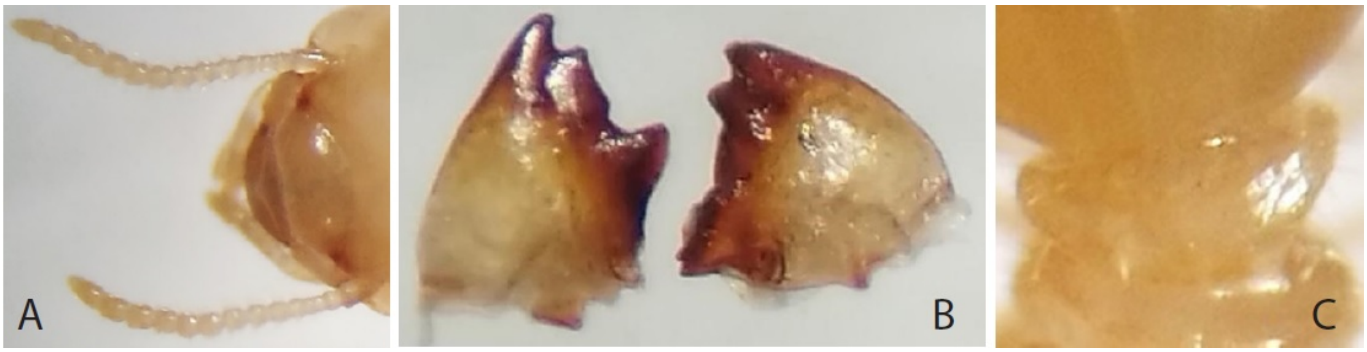

Figure 13. *Amitermes rhizophagus worker: A – antennae; B – mandibles; C – pronotum.*

Discussion

Based on this morphological study of the collected termites, we have found for the first time that termites *Amitermes rhizophagus* Belyaeva, 1974 are widespread in the territory of the Republic of Uzbekistan, in particular, in the southern region - Mirishkor district of Kashkadarya Region.

Food. Along with cases of damage to dead roots of trees and shrubs (saxaul, ephedra, etc.) known from the published literature (Zhuzhikov 1979), damage to synthetic materials, felts, fabrics (when testing samples at the experimental site in Nebit-Dag) was also noted. We noted the *Amitermes rhizophagus* infestation in the root zone of rotten chinara in the territory of the settlement, as well as the attack of a worker termite on an ant (Fig. 14).

Areal. Within the CIS countries it is found in natural habitats in Turkmenistan and in anthropogenic zone in Uzbekistan. The species has not been previously recorded in any sources for Uzbekistan.

Figure 14. *An ant attacked by an Amitermes rhizophagus worker and soldier.*

Conclusions

A new genus of *Amitermes* Silvestri, 1901 and a new species of *Amitermes rhizophagus* Belyaeva, 1974 of termites were found for the first time in Uzbekistan.

The analysis of species finding in Uzbekistan indicates a natural advance of termites from northern Turkmenistan to southern Uzbekistan.

The occurrence of termites in Mirishkor district is an example of the possible penetration and establishment of the species in new territories and advancement of the range boundary 40 km to the north.

Acknowledgement

The study was conducted in compliance with termite monitoring plans on the territory of the Republic of Uzbekistan by the Republican Scientific and Production Center for Termite Control at the Institute of Zoology of the Academy of Sciences of the Republic of Uzbekistan. The authors are grateful to anonymous reviewers for valuable comments that allowed to improve the paper.

References

Alimdjanov RA (1971) Instruction on termite control damaging residential and economic premises. Institute of Zoology and Parasitology of the Academy of Sciences of the Uzbek SSR, Inform. № 51. Tashkent, 14 pp. [In Russian]

Belyaeva NV (1974) On the species belonging of termites of the genus *Amitermes* from Turkmenistan: *Amitermes rhizophagus* sp. n. (Isoptera: Termitidae). Proceedings of the Entomological Sector. Problem Research Laboratory for the Development of Methods to Combat Biological Damage to Materials. Department of Biology, Moscow State University 5: 62–73. [In Russian]

Belyaeva NV (2004) Termites of Russia and adjacent territories (within the borders of the former USSR) RET-info 3: 32–35. [In Russian]

Belyaeva NV (2005) Harmful activity of termites (message 3). RET-info 1: 17–20. [In Russian]

Belyaeva NV, Zhuzhikov DP (1974) Materials on the fauna and distribution of termites of the USSR. Proceedings of the Entomological Sector. Problem Research Laboratory for the Development of Methods to Combat Biological Damage to Materials. Department of Biology, Moscow State University 5: 7–61. [In Russian]

Davletshina AG, Avanesova GA, Mansurov AK (1979) Entomofauna of Southwestern Kyzylkum. FAN, Tashkent, 128 pp. [In Russian]

Zhuzhikov DP (1979) Termites of the USSR. Publishing House of Moscow University, Moscow, 225 pp. [In Russian]

Kakaliev K (1983) Instructions for anti-termite prevention and control of termites. Ashgabat, 52 pp. [In Russian]

Lebedeva N, Khamraev A, Rustamov K (2017) Termite population control and protection of historical monuments of Uzbekistan from termites. Materials of the VI Research and Practical Conference "Rational use of natural resources of the Southern Aral Sea region", Nukus, 23–24 June, 2017. Nukus: 51–54. [In Russian]

Luppova AN (1971) Termite control: instructions for the anti-termite construction of residential buildings, industrial and other structures and the control of termites in buildings infected with them. Ylym, Ashgabat, 34 pp. [In Russian]

Marechek GI (1951) Termites damaging building in Uzbekistan and methods of termite control. Tashkent, 29 pp. [In Uzbek]

Marechek GI (1956) Instructions on measures to control the Turkestan termite – a pest of buildings in Uzbekistan. Academy of Sciences of the Uzbek SSR, Tashkent, 11 pp. [In Russian]

Fasulati KK (1971) Field study of terrestrial invertebrates. Vysshaya Shkola, Moscow, 386 pp. [In Russian]

Khamraev ASh (2006) Termites of Central Asia: problems and solutions. Bulletin of the Karakalpak Department of the Academy of Sciences of RUz 4: 20–23. [In Russian]

Khamraev ASh, Lebedeva NI, Khokhlacheva VE, Zhuginisov TI, Abdullaev II, Nurzhanov AA, Kuchkarova LS (2008) *Anacanthotermes* termites are dangerous biodegraders of structures in Uzbekistan and development of methods and means of control regulating their numbers. Best practice in protecting plants from pests (collection of articles). TALQIN, Tashkent, 102–114. [In Russian]

Khamraev ASh, Lebedeva NI, Rustamov KJ, Zhuginisov TI, Mirzayeva GS (2016) Instruction in termite control. Tashkent, 12 pp. [In Russian]

Khamraev ASh, Lebedeva NI, Zhuginisov TI, Rakhmatullaev A, Abdullaeva DR, Ergashev NE, Raina AK (2005) Food preferences of *Anacanthotermes turkestanicus* and use of this information for the development of baits for termites. Abstracts of reports International Workshop Termites of Central Asia: Biology, Ecology and Control. 16–22 October, 2005. Tashkent, 1–62. [In Russian]

Krishna K, Grimaldi DA, Krishna V, Engel MS (2013) Treatise on the Isoptera of the World. Bulletin of the American Museum of Natural History 377: 200–623. https://doi.org/10.1206/377.2

Sands WA (1992) The termite genus *Amitermes* in Africa and the Middle East. Natural Resources Institute Bulletin 51: 1–140.

Scheffrahn R, Su N-Y (1987) A world list of species in the genus *Amitermes* (Isoptera: Termitidae). Sociobiology 13: 183–190.