

Data Sheets on Forest Pests

Anacanthotermes turkestanicus

IDENTITY

Name: *Anacanthotermes turkestanicus* Jacobson

Synonym: *Hodotermes turkestanicus* Jacobson
Acanthotermes turkestanicus Jacobson

Taxonomic position: Insecta: Isoptera: Hodotermitidae

Common Name: Turkestan termite (English); Туркестанский термит (Russian).

Bayer computer code: ANKTTU

HOSTS

A. turkestanicus attacks all available kinds of wood (both coniferous and deciduous) including manufactured wood, paper and cardboard, as well as cotton textile and other materials containing cellulose; it also may damage some plastic materials: peno-polyurethane, polyethylene, foam plastic, glass-fibre plastics, etc. (Luppova, 1958; Gornostaev and all, 1970). *A. turkestanicus* has been known to damage seeds and live plants of, for example, *Salsola* sp., *Alchagi persarum*, *Morus*, *Vitis*, *Malus*, *Gleditsia*, *Gramineae*, cotton. Young larvae often feed on fungi which are grown inside hives. In cities and towns, the pest attacks mainly construction wood (Luppova, 1958; Kakaliev, 1968; Luppova & Luppov, 1968).

GEOGRAPHICAL DISTRIBUTION

EPPO region: Tajikistan (potential EPPO member), Turkmenistan (potential EPPO member), Uzbekistan (potential EPPO member).

Asia: Iran, Tajikistan, Turkmenistan, Uzbekistan (Gornostaev *et al.*, 1970; Ghayourfar, 1996).

EU: Absent.

BIOLOGY

A. turkestanicus lives mainly in deserts and semi-deserts at altitudes from 250 to 1000 m. Its flight occurs usually after rainfall, from March until the beginning of May (earlier than the flight of the related species *A. ahngerianus* in the same geographic area). Thousands of winged adults leave the mother colony and spread usually using the wind. Pairs containing a male and a female try to find a suitable place, then break their wings, enter into the soil and establish a new colony (Fig. 1). The female develops into a “true queen”, the male – into a “true king”, the mating is repeated many times each year. In the mother colony, after the flight of winged adults, the “queen” begin to lay eggs and continues this until the end of the warm period (September - October). First larvae appear at the beginning of June. The pest lives in big colonies (nests), which construct hives (cities) in the soil. In human towns, nests are situated under constructions and in walls. The above-ground part of the hive is represented by a mound (hill). The size of the mound depends on the age of the hive and may reach from 0.5 to 20 m in diameter and from 5 to 15 cm in height. The height of a mound increases when pieces of clay are transported by termites to the surface from the underground parts of the hive. The annual increase does not exceed 1 mm. Thus, a mound of 10 cm height can cover a hive of more than 100 years old. Some hives are several centuries old. The cavities in the mound are small, 8–12 mm high, with a surface area of the floor of 5–50 cm². Underground cavities are much higher and their floor surface may reach 60–100 cm². The mound and the underground part of the hive consist of numerous cavities and tunnels. The underground part of a hive may be several meters deep. There are no clear borders of a hive. The structure of the hive helps to maintain suitable temperature and humidity for the survival and development of the species in desert conditions. The temperature inside (at a depth of 30–50 cm) never exceeds +30°C (in August) even if the temperature on the surface exceeds 40–50°C and never falls to less than +5°C (in January) even during frosts outside. The number of colonies may reach 40 per hectare.

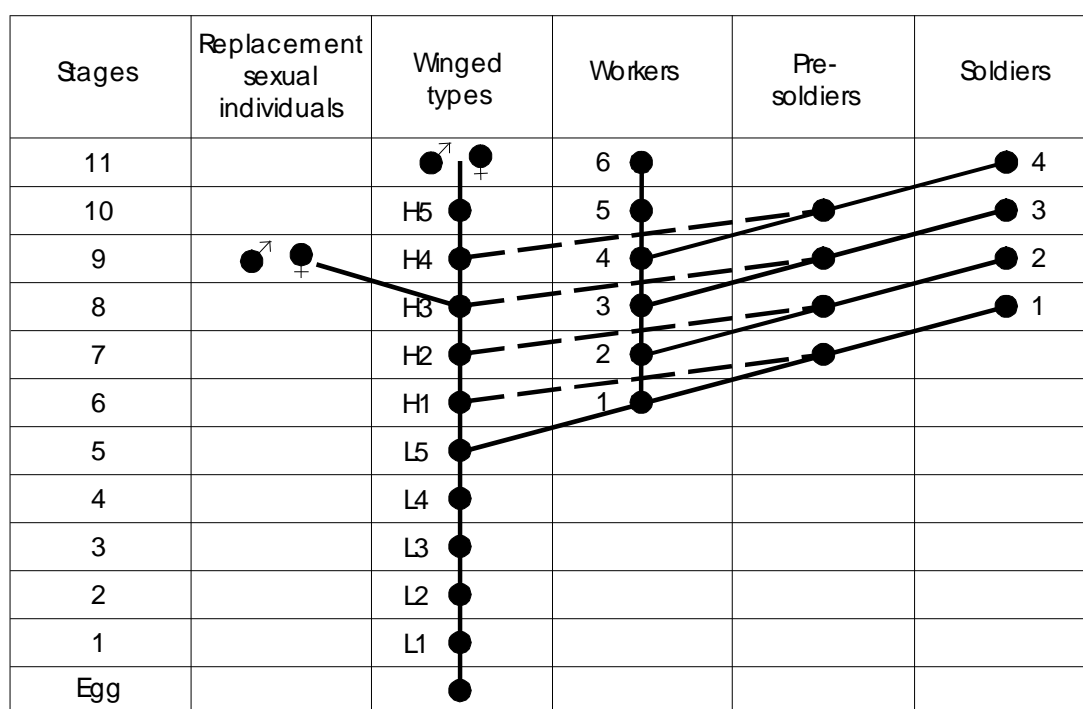


Table 1. Stages of *Anacanthotermes* spp. (after Artemiev, 1968).

According to their morphology and functions in the hive, individual insects are subdivided into true queen and true king, as founders of the hive, and the following types derived from eggs laid by the true queen: larvae, nymphs, workers, pre-soldiers, soldiers, one or two replacement queens and replacement kings, winged males and females (see table 1).

During warm periods (usually, from the beginning of May until the end of October), workers collect pieces of food (wood, plants, fungi, etc.) and fill underground cavities (Luppova, 1958; Kakaliev, 1968; Gornostaev *et al.*, 1970; Luppova *et al.*, 1971; Luppova & Kakaliev, 1972; Zhuzhikov, 1979; Kakaliev & Soyunov, 1977; Kakaliev *et al.*, 1977).

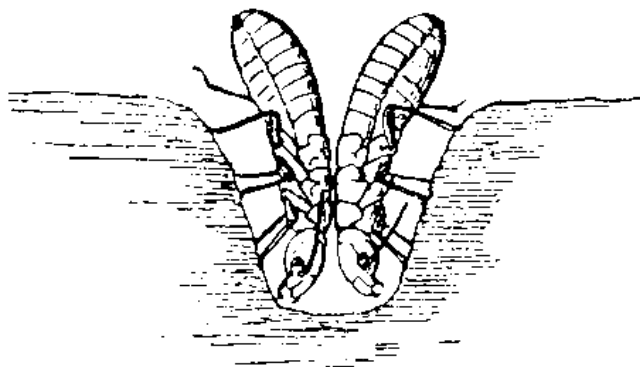


Fig. 1. A male and a female of *Anacanthotermes turkestanicus* founding a new colony (Jacobson, 1913).

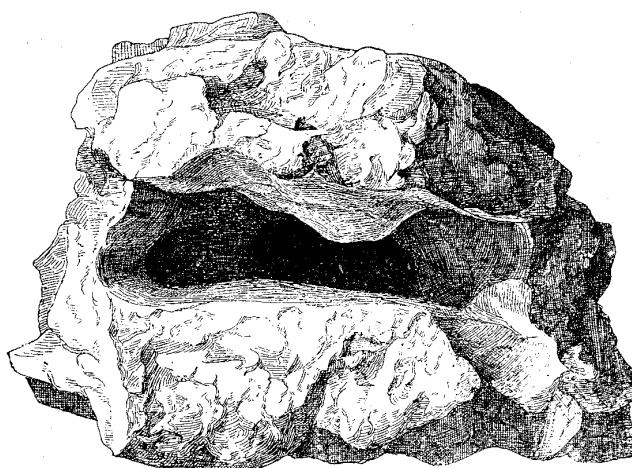


Fig. 2. Cavity in a piece of wood made by *Anacanthotermes turkestanicus* (Jacobson, 1913).

DETECTION AND IDENTIFICATION

Symptoms

Characteristic symptoms are: mound of termite hives, holes in soil or wood, presence of termites.

Morphology

Eggs

Eggs of *A. turkestanicus* are white, cylindrical, with rounded ends. They increase in size after being laid.

Larvae

Larvae of *A. turkestanicus* have 5 instars. They are white, without rudiments of wings. Their eyes and mandibles become darker from the 1st to the 5th instar. The 5th instar has a yellowish head and there are two forms of this instar. One of the forms gives rise to nymphs, and the other to workers. The antennae have a reduced number of segments (Jacobson, 1913).

Nymphs

Nymphs of *A. turkestanicus* have five instars. They are yellowish-white, with brownish-yellow heads and pronotum and black-brown eyes, with long and wide rudiments of wings developing from the 1st to the 5th instar (Fig. 3). The body is covered by rather dense, short, light-orange hairs. On average, the body is 8 mm long, the head is 2.5 mm long and 2.3 mm wide, and the wing rudiments are 3.0 mm long. The antennae have 24 segments, the 3rd segment is very short. The head is slightly wider than the pronotum (Jacobson, 1913).

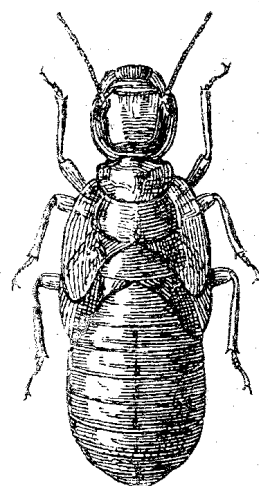


Fig. 3. A nymph of *Anacanthotermes turkestanicus* (Jacobson, 1913).

Winged adults

Winged adults of *A. turkestanicus* develop from nymphs of the 5th instar. They are, in general, dark brown, but the head, the tergites of the abdomen, the pronotum, mesonotum and postnotum are all darker (Fig. 4, 5). The underside of the body is lighter. The antennae, mouth parts (except the top of the mandibles) and legs are light brown. Inter-segmental membranes of the abdomen and the lateral membrane are milk-white. The wings are grey-brown and

slightly transparent. The eyes are black. The head is big, oval, with transverse fissures in the front part; it is shiny, covered by rare brown bristles coming from light brown points. The antennae are covered by dense, very small hairs and rarer long hairs. They usually have 24 segments, but sometimes 23 or 25 segments (Fig. 7). The length of 3rd, 4th and 5th antennal segments is usually almost equal. The 1st segment is the biggest. The 2nd segment is wider than the 4th, and longer than wide. The 4th and the 5th segment are wider than long. The 6th–19th segments are as long as wide, the 20th–24th segments are longer than wide. The length of the body from the end of mandibles to the end of folded wings is 21–26 mm; the length without wings is 11–15 mm. The head is 3.2–3.4 mm long by 2.6–2.7 mm wide. The front wing is 18–22 mm long by 4.0–5.0 mm wide. The pronotum is narrower than the head, and covered by rare dark hairs. It is more than twice as wide as long, and its transversal fissure is situated slightly frontward of its middle. The abdomen is covered by rare brown hairs and differs between males and females (Fig. 6) (Jacobson, 1913; Luppova, 1958).

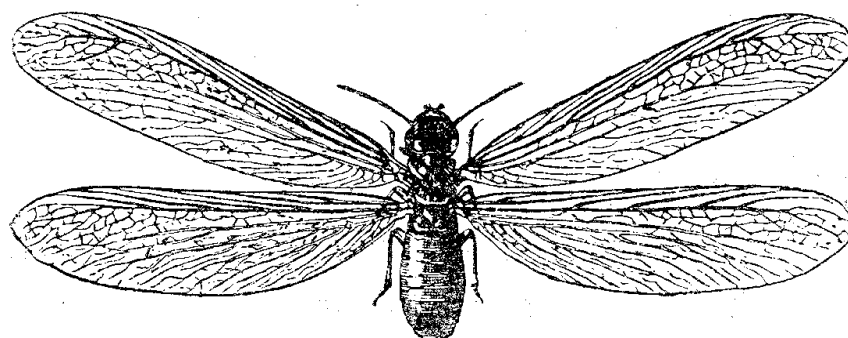


Fig. 4. Winged adult of *Anacanthotermes turkestanicus* (Jacobson, 1913).

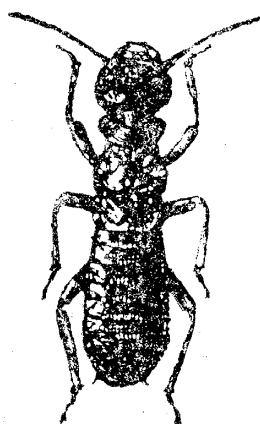


Fig. 5. Adult of *Anacanthotermes turkestanicus* after breaking wings (Jacobson, 1913).

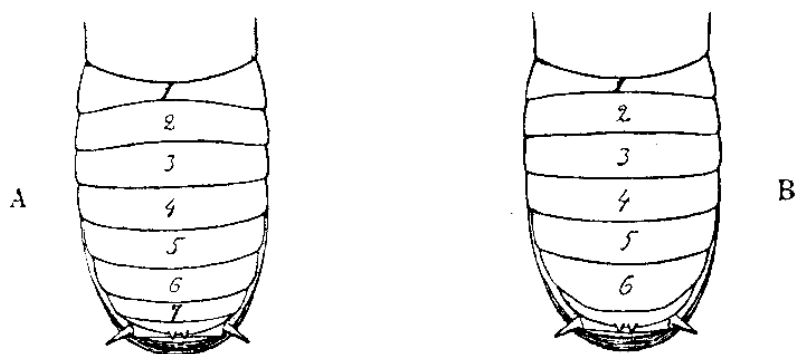


Fig. 6. Abdomen of a male (A) and a female (B) of *Anacanthotermes turkestanicus* (1–7 - sternites) (Jacobson, 1913).

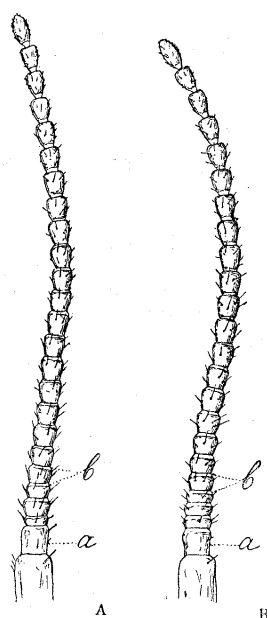


Fig. 7. Antennae of *Anacanthotermes ahngerianus* (A) and *A. turkestanicus* (B) (a – 2nd segment, b – ends of 5th and 6th segments) (Jacobson, 1913).

Workers

Workers of *A. turkestanicus* develop from the form of 5th larval instar having a smaller head (the form of 5th larvae instars having a larger head develops into nymphs). Their body is bright, covered by rare hairs (Fig. 8). The antennae have 23–25 segments, with the 3rd segment being very short. The head is brownish-yellow, almost round. Eyes are brown and small, thorax and legs are yellowish-white. The pronotum is milk-white and half as wide as the head. The workers have 6 instars. The body is 8–11 mm long. The head is 2.4–3.6 mm long and 2.3–3.2 mm wide (Jacobson, 1913; Luppova, 1958).

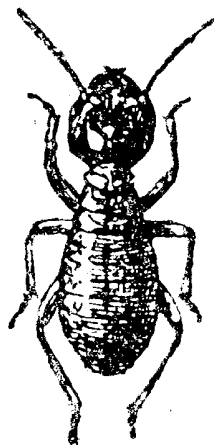


Fig. 8. A worker of *Anacanthotermes turkestanicus* (Jacobson, 1913).

Soldiers

Soldiers of *A. turkestanicus* develop from workers and/or nymphs. They have 4 instars. Their body is 7–14 mm long, shiny, covered by rare hairs (Fig. 9). Their head is large, 3.6–6.7 mm long and 2.3–3.7 mm wide, shiny, yellow-brown, with well-developed, brown-black mandibles (except light brown bases) which are 2.4 – 2.6 mm long. The mandibles are as long as half the length of the head, and the left mandible is longer than the right. The antennae are pale-yellow to brownish-yellow and have 23–24 segments. Eyes are black and small, thorax and legs are milk-white and more developed than those of workers. The pronotum is not narrower than the head. The abdomen is milk-white to yellowish-white (Jacobson, 1913; Luppova, 1958).

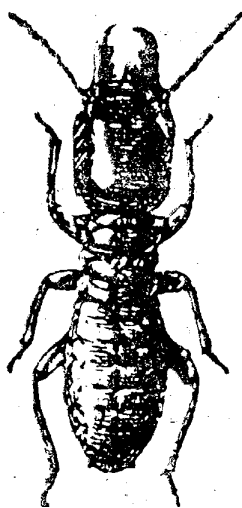


Fig. 9. A soldier of *Anacanthotermes turkestanicus* (Jacobson, 1913).

True queen

The true queen of *A. turkestanicus* develops from the winged female, which originally established the colony together with the winged male which developed into the true king. Its head and thorax are morphologically similar to those of winged females, but they are more sclerotised and there are only scales instead of wings. The antennae are often underdeveloped.

The abdomen is well developed, 10.0–16.0 mm long and 5.0–7.5 mm wide, with brown tergites and sternites and with darker, irregular spots and milk-white inter-segmental membranes. The 8th and 9th sternites are more pigmented than the others. The abdomen is more than twice as long as the head and the thorax together. The true queen is 18.0–23.0 mm long (Luppova, 1958).

True king

The true king of *A. turkestanicus* develops from the winged male, which originally established the colony together with the winged female which developed into the true queen. Its head and thorax are morphologically similar to those of winged males. The antennae are often underdeveloped. The abdomen is well developed, 7.0–8.0 mm long and 4.0–4.5 mm wide, with brown tergites and sternites (darker at the end of the abdomen) and milk-white to yellowish inter-segmental membranes (Luppova, 1958).

Replacement queen

The replacement queen of *A. turkestanicus* develops from the 3rd instar nymphs. Its body is generally brownish-white, 10.0–12.8 mm long, and shiny. The head is light-brown, 2.7–2.8 mm long and 2.2–2.3 mm wide, elongated-round with narrowed front part. The eyes and tops of the mandibles are black-brown. The antennae are light-brown and underdeveloped. The pronotum is light yellowish-brown, as wide as the head. The abdomen is well developed, 7.0–8.0 mm long, 4.7–6.3 mm wide and 3.0–3.8 mm high, with brown and irregularly spotted tergites and sternites and milk-white inter-segmental membranes. Rudiments of wings are 2.2–2.3 mm long. The head, legs and the top of the abdomen are covered by rare hairs (Jacobson, 1913).

MEANS OF PEST MOVEMENT AND DISPERSAL

The winged adults are not very strong fliers, but, when they are airborne, they may be carried long distances (several kilometres) by wind. Parts of the termite colonies may be transported by human activity with soil or wooden structures adjoining the hive, and may contain a sufficient proportion of the social structure (e.g. eggs, replacement queen and king, workers) to enable a new colony to be established. Worker termites that are foraging for food in various types of wood commodities may also be transported over greater distances but would be unable to establish new colonies.

PEST SIGNIFICANCE

Economic Impact

A. turkestanicus is one of the most common termites in central Asian countries. There, they are considered as pests of grasslands and desert plants including shrubs and trees. The termite hives may also interfere with the construction of irrigation systems. They destroy wooden poles. But the main damage occurs in houses where the pest may destroy wood and other cellulose containing materials during the whole year (Jacobson, 1913; Luppova, 1958; Gornostaev *et al.*, 1970; Kakaliev & Soyunov, 1977; Kakaliev *et al.*, 1977).

Outside human constructions and houses, *A. turkestanicus* may play a positive role in protecting sands and improving soils by fertilising and aerating them and bringing up particles

from deep (down to 15 m) layers of soil (Luppova, 1958; Luppova, Kakaliev, 1972).

Environmental Impact

The environmental impact of *A. turkestanicus* is mainly positive apart from the negative influence on irrigation systems. But social impact on human constructions and materials may be very important.

Control

Control efforts consists mainly of fumigation and chemical impregnation of wood and other materials susceptible to be attacked by the pest (Jacobson, 1913; Luppova & Kakaliev, 1972).

Natural enemies of *A. turkestanicus* may considerably reduce its populations, especially predator ants *Cataglyphis foreli* Em. and *Cataglyphis altisquamis forely* Ruzs. as well as some vertebrates, such as the lizard *Eremias velox* Pall., hedgehogs and birds. Some fungi may cause the death of termites and even of colonies, especially *Termitaria* sp., *Aspergillus* sp., *Syncephalis* sp. *Metarrhizium* sp., *Beauveria* sp., and some others (Luppova, 1958; Kakaliev, 1968).

Phytosanitary risk

A. turkestanicus is not a quarantine pest for any individual country (as far as is known) or any regional plant protection organization. It is considered as a serious pest of wood and cellulose containing materials in areas where it occurs and it would be likely to establish in dry and hot areas in the south of the EPPO region. However, the possibilities for transfer of viable colonies from the area of origin to the EPPO region are limited. Most commodities of wood are unlikely to act as pathways. However, waste wood that may have been in contact with a hive for some time could conceivably carry a part of a colony

PHYTOSANITARY MEASURES

The major risk of spreading of *A. turkestanicus* is with soil or waste wood in which eggs, larvae, and other stages and forms may occur. Soil should be inspected for the presence of live insects or eggs, and wood should be inspected for cavities hollowed out by a termite colony.

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