SOME SPECIAL ASPECTS OF THE BIOLOGY OF TERMITES OF *Hospitalitermes* spp. IN SOUTHERN VIETNAM

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1. INTRODUCTION

The nasuti- termite genus *Hospitalitermes* (Termitidae: Nasutitermitinae), along with the genera *Bulbitermes* and *Lacessititermes*, is considered entirely oriental, with the exception of one species *Hospitalitermes papuanus* Ahmad, 1947 from Papua, and includes more than 30 species and forms. It is most widely represented in Borneo, Sumatra and Java (14 species); two species are found in Burma and the Philippines and 5 species in Malaya.

In Vietnam, this genus was known only from one species - *Hospitalitermes luzonensis* (Oshima, 1916) [1] from North Vietnam (Bakthai, Vinfu), which is also found in the Philippines, and also three species described in "Animals of Vietnam, vol. 15, termites, order Isoptera, 2007" (*Hospitalitermes damenglongensis* He and Gao, 1984, *H. medioflavus* (Holmgren, 1913), *H. jepsoni* (Snyder, 1913). Information about the Vietnamese *H. luzonensis* is rather modest. It is known to live most often at the base of iron tree trunks. And also nests are often located at a height of 1-2 m from the ground. Workers and soldiers are black. They forage openly, like ants [1].

Termites of the genus *Hospitalitermes* differ from the overwhelming number of representatives of the order Isoptera in that they lead an open lifestyle, emerging on the daytime surface almost at any time of the day. This feature is associated with the dark, almost black coloration of their bodies and the strong sclerotization of the covers of workers and soldiers. Such covers are typical for species that come out onto the day surface not under the cover of soil galleries (moldings). The genus *Lacessititermes*, which is close to *Hospitalitermes*, leads a very similar way of life (it is represented in North Vietnam - Vinh Phuc - by one species *Lacessititermes holmgreni* Light, Wilson, 1936 [1]. For example, representatives of the Macrotermitinae subfamily from the Termitidae family - *Macrotermes carbonarius* (Hagen, 1858) and *Hypotermes obscuriceps* (Wasmann, 1902) - often forage on an open surface during daylight hours. Another feature that distinguishes these termites from most species is related to nutrition. They feed on lichens, algae and molds, which are collected in the crowns of trees, they are classified as lichenophages.

The caste composition of termites of the genus *Hospitalitermes* includes mono-, di- and trimorphic workers and soldiers, as well as a royal couple and in many cases a large number of substitutes. However, unfortunately, there is very little information about the habits of life and biological characteristics of the species included in this genus. In the Runwal's summary [2] on termites in the Oriental Region, a small section is devoted to the genus *Hospitalitermes*, which lists several species (7) and briefly describes the distribution of the species, location and structure of the nest, caste composition, time when the winged individuals fly out and sometimes some features of foraging behavior, constantly it is emphasized that

they move freely on the surface in daylight. The most detailed descriptions of the species *H. diurnus* Kemner, 1934, *H. monocerus* (Koenig, 1779), *H. umbrinus* (Haviland, 1898), found in Java, Indonesia, Ceylon, because quite a few termitologists worked in these places. The main publications date back to the first half of the 20th century [3-13]. These works contain brief information about the collection sites and very fragmentary observations of the habits of life of some species. For example, article [14], rather extensive, describes in detail the observations of *H. monoceros* in Ceylon, *H. umbrinus* and *H. hospitalis* (Haviland, 1898) in Borneo, Malaya, Sumatra and Java. But all these observations concern mainly the daily activity of these species, foraging paths (their length) and food carried by workers in mandibles; there are references to the structure of the nest. The articles [15, 16] briefly describe the foraging activity and nesting places in the forests of Malaysia of the termites of the genus *Hospitalitermes*, more precisely, unfortunately, not defined. A detailed article on *Hospitalitermes umbrinus* [17] provides extensive information not only on the foraging activity of this species, food structure, but also on the composition of the family, flyout habits of the winged individuals, etc. But all this information concerns species that are absent in Vietnam.

Very little is known about the Vietnamese species *H. luzonensis*. The family is said to be composed of winged individuals, soldiers, and dimorphic workers. Nests were found in forked trees, the walls of their chambers have a dark lining, sometimes these termites settle in *Termes rostratus* Haviland, 1898 nests, and during the foraging period they come to an open surface. Foraging columns of termites of this species can stretch for several hundred meters, such a column of workers from the flanks are guarded by soldiers, scaring off enemies (mainly ants) with a secret with an unpleasant smell [1, 2].

Our main task of work in Vietnam and, in particular, in various reserves and forestry enterprises, was to clarify and study the termite fauna, but along with this, constantly, in parallel, work was carried out to monitor the biological and ecological characteristics of termites. This article concerns our observations of one of the mysterious termites of the genus *Hospitalitermes*.

The main attention while observing these termites was payed to their daily activity, the formation of foraging columns, the speed of movement on vertical and horizontal surfaces, the movement of the entire population from one nest to another, the type of the nests and the amount of food carried by an individual.

2. MATERIAL AND METHODS

We observed two types of *Hospitalitermes* in 1989-96, 2005, 2014 and 2016 during route surveys in the forests of South and Central Vietnam: at Ma Da forestry station and Cat Tien National Nature Park (both sites in Dong Nai province); at Binh Chiau Nature Reserve and Forestry (Xuyen Moc, Ba Ria-Vung Tau province); on the Tay Nguyen plateau (Kon Tum, Gia Lai province): Buon Luoi and Kon Ha Nung. Also, single observations were made in La Nga forestry and Tay Ninh (forest-park to the right from the Cao Dai temple).

Characteristics of gathering and observation sites

Southern Vietnam. Ma Da forestry: an area of 4 km2 of primary dipterocarp forest, not affected by selective felling, is located in the west part of Dong Nai province. The Tri An reservoir adjoins the southern border of the forest ares; the urban zone is located 75 km away, as well as the water areas of the Dong Nai, Ho Chi Minh city and Mekong rivers. The relief is mostly flat, gently undulating, 30-90 m above sea level. The climate is monsoon. This territory is home to 350-400 tree species from 49 families, 100-120 species are the background, the families Anacardiaceae, Dipterocarpaceae, Elaeocarpaceae, Irvingiaceae, Lauraceae, Meliaceae dominate [18].

Cat Tien National Park: one of the few tracts of slightly disturbed monsoon forests, located at the southwestern foot of the Da Lat plateau at altitudes of 120-350 m above sea level, the relief is medium hilly, with a large number of low rocky ridges and lowlands, flooded during the wet season. The climate is monsoon, with a pronounced seasonality. There are more than 150 tree species in the park, the first layer is usually dominated by Lagerstroemia spp. (family Lythraceae), as well as representatives of the families Dipterocarpaceae, Rubiaceae, Fabaceae, Datiscaceae, Ebenaceae, etc. Typical and distinctive forest formations of the lowland part of the national park are described in detail [19, 20].

The longest observations were carried out at these two spots, since they were the main places of expeditionary work.

Xuyen Moc forestry - Binh Chau nature reserve: forested area in the coastal strip. The reserve is located in the form of a strip of forest stretching along the coast of the sea on the coastal sand dunes. The relief is slightly wavy with a slight gradual decrease towards the sea. The forest grows on sandy soils with low natural fertility. Primary and secondary forest with clearings and burnt areas. The upper layer is represented by Dipterocarpus, Shorea, and Hopea. Although reserved, however the forest was damaged by felling and tapping of Dipterocarpus trees, the latter leading to the emergence of ground fires. Two sites were selected for observation: site 1 - sandy soil, the forest is very thin, traces of fires are visible, there are practically no large trees, there are areas of the savanna type - high dense grassy cover and rarely standing trees, represented by one species of acacia; section 2 - the forest is also on sandy soil, but more dense and varied, with dense undergrowth, all the trees are intertwined with lianas, heavily cut down, there are many stumps and debris from tree felling, also there are large clearances.

La Nga forestry is situated close to Ma Da.

Central Vietnam. Tay Nguyen plateau - Buon Luoi village and Kon Ha Nung (Kon Tum, Gia Lai province): 700-1200 m above sea level, the relief is relatively smooth, polydominant foothill and mountain forests with dominating tree species from families Fabaceae, Fagaceae, Lauraceae, Meliaceae, Moraceae, Sapindaceae and single representatives of Dipterocarpaceae [18]. Buon Luoi is a village located in the upper reaches of the Ba river which is 40 km to the north from An Khe town.

Kon Ha Nung village is located in 12 km to the north. It is an area encompassing a mountain range bordering the Pleiku basalt plateau from the east. The height above sea level in Buon Luoi is 650-700 m, in Kon Ha Nung - 750-800 m. The region is characterized by a hot subequatorial climate with a predominant influence of the endotropic monsoon (southeast Asian and southwestern Asian). Initially, the entire area was covered with forests belonging to two types - semi-deciduous tropical monsoon forests and deciduous tropical forests of low humidity. Now the forests are heavily disturbed by intensive felling. As a result secondary open woodlands and large-grass thickets appear.

The morphological and morphometric description of the *Hospitalitermes* species in the listed areas was made and the species were identified according to [21].

While observing the marching foraging columns, the length of the column stretched from the source of food to the nest was recorded; the speed of movement of the column, both along the horizontal and the vertical surfaces (when workers descended along the tree trunk), was measured using a stopwatch. All the measurements and records were made both in Ma Da and Buon Luoi. In the first case, two observations of the velocity were carried out on the horizontal (3 and 5 replicates) and vertical (3 and 5 replicates) surfaces. At the same time, the amount of food carried by an individual was taken into account. Toward this goal, balls of food were taken from a random amount of workers and placed into one of test tubes, while the workers - into another. In the laboratory, food and workers were weighed separately, and the weight of the food lump per individual was calculated.

When describing the nests, measurements were made of the nest itself, and, if possible, of the plant it was placed on. The structure of the nest was established visually during its excavation.

To determine the total number and caste composition of termites in the nest, a complete sampling of termites from the nests was carried out.

3. RESULTS AND DISCUSSION

So, we have detected two species of *Hospitalitermes*. For the first time in Vietnam we discovered a species *Hospitalitermes bicolor* (Haviland, 1898), which is most common in the Oriental region. Second, North Vietnamese species *H. luzonensis* was discovered - also for the first time - in Central Vietnam on the Tay Nguyen plateau.

As a result of observations, it was found that termites of these two species live in two types of nests: nests arranged in tree hollows (*H. bicolor*) and separate, clearly defined, isolated nests located on tree trunks at a distance of 1-1.5 m from soil surface (*H. luzonensis*). Nests in tree hollows, sometimes even living ones, were located at a height of up to 3 m from the soil surface, their size along the length of the hollow was about 20-25 cm. The chambers in such nests had thin, fragile, cardboard-like walls, and the population of the nest was represented only by workers individuals and soldiers, neither larvae, nor eggs, nor molting individuals and substitutes were found.

Two nests of *H. luzonensis* were investigated in Buon Luoi. They were small paper nests located on the thin tree trunks. Inside the paper nests there are many fragile chambers with thin separation walls. The first nest was located along the stem and was 11 cm long and 17 cm in circumference; the second nest was located on a tree 109 cm high, the height of the nest above the ground was 67 cm, the length along the stem was 22 cm, and the circumference was 33 cm.

In many cases, we could not establish the presence of permanent nests in *H. bicolor* and it looked like most often they do not have them. So, observing for several days running how the termites went into the nest under the roots of *Irvingia* sp. and after that having excavated it, we did not find any termites in the nest. Although traces of termite activity were presented by numerous thin-walled chambers filled with a mixture of soil with termites' waste products. At Xuyen Moc, at slightly elevated above the sandy savanna marge of the forest, a huge accumulation of *H. bicolor* was found. Among the small and medium undergrowth there stood a tall rotten stump (the height of the stump is 128 cm, in girth - 111 cm); only the outer cover of its bark remained, and everything inside was filled with soil and dust. Towards him from different directions, rather quickly, columns of termites were moving; these columns consisted of workers, soldiers, substitutes and individuals that had just molted, but had not darkened completely yet. The territory within a radius of about 2-3 m from the stump had been almost completely covered with termites; they densely had covered the nearby bush as well. As soon as the observer approached the stump, all the termites began to move and began to hide in the stump quickly. The next day, no termites in this stump-nest were found. Another similar nest, but much smaller, was found in the hollow of a living tree. The outer margin of the nest had a ribbed structure, almost black in color, the walls of the chambers were thin and fragile; the length of the nest in the hollow is 20-25 cm. The chambers are very densely populated, but only workers and soldiers, no royal couple, no substitutes, no larvae and eggs were found. During the observation period of the *Hospitalitermes* termites, we repeatedly found such abandoned nests, which were completely filled with the termites' waste products, as well as huge moving columns, consisting in the overwhelming majority of workers who carried eggs and larvae in their jaws, substitutes, soldiers accompanied the column from the flanks. The impression was like it was a huge termite family moving to a new place, because the old nest was filled with waste. A similar picture was observed by Abe [16], when, within two days, the columns of *Hospitalitermes* returned to the same nest up to 3-4 times, but after that, when the nest was excavated, it turned out to be uninhabited. Most likely, this species tends to have a nomadic habits of life.

In addition, a huge nest of *H. bicolor* was found in Ma Da in the walls of a bungalow, and in Cat Tien - in a separate room, a kind of a barn-like space next to the laboratory building where the eklectors were located. In the latter case, it was possible to calculate the number of individuals roughly: for a dry weight of 172.8 g, there were a total of 215,072 termites, of which 155,558 were workers, 43,186 soldiers, and 16,328 larvae and molting individuals (report and calculations by S.M. Tsurikov). Perhaps these were temporary nests also.

To count the number of individuals in the nest accurately was possible only in two separate nests of *H. luzonensis*: in the first nest there were only 1,462 individuals, of which 111 were soldiers, 1,134 were workers, and 217 larvae. In the second nest there were a total of 1,426 individuals, of which 162 were soldiers, 1,115 workers, 149 larvae, a royal couple, eggs. An approximate amount of *H. bicolor* individuals in the nest found in a barn in the Cat Tien showed: for a dry weight of 172.8 g of termites, there were a total of 215,074 individuals, of which 155,558 workers, 43,186 soldiers and 16,328 larvae, 2 individuals with long wing buds.

At any of observation spots, the behavior of foraging worker termites is approximately the same. Since the food for *H. bicolor* and *H. luzonensis* is located high in the crowns of trees, termites have to make foraging trips not only on a horizontal surface, but also along vertical trunks. During the excursions, we regularly observed the marching of termites. Usually they moved in a wide (3-5 to 8 cm) column, the length of which could reach more than a hundred meters. It was possible to observe ranks of 4-6 workers in each column, and on the flanks of the column there were soldiers who protected the workers from enemies, mainly ants. The soldiers moved with the column. In addition, relatively few groups of soldiers were located at some distance from the column (10-15 cm), taking place somewhere on the higher ground, turning their heads in all directions, or ran along the column to and fro, probably performing the functions of sentinels who must warn the main group of soldiers walking with the workers about the danger. Such increased protection is necessary since a column of openly foraging termites is usually stalked by the groups of ants. As soon as the ant approaches a dangerous distance, the soldier from the frontal gland, like from a spray bottle, shoots out an odorous sticky secret, which can be seen with the naked eye, and the ant instantly runs away. It was not always possible to trace the entire route of the column from the start to the finish point, both in time and in direction; most often, an already formed and intensively moving column of foragers was observed. Nevertheless, once we witnessed the beginning of the movement of the column. A small group of workers, accompanied by soldiers, first emerged from a hole in the ground (probably a nest). The workers remained near the exit from the nest, and the soldiers scattered in all directions for a short distance, and each of them separately scouted a small area around. As a result they patrolled a rather large area. After that the returning soldiers accompanied the first group of workers there. In place of the departed workers, a new group appeared from the nest. The soldiers from the first explored territory moved to the next and, having scouted it out, accompanied the first group of workers there, and the second group moved to the place of the first, and so on, until the soldiers led the column of foragers to the food item. The route may not be correctly laid out right away, there may be some deviations, returns. In such cases the workers are grouped in one place and await further information from the accompanying guard of soldiers.

During our work at the Ma Da ecological station we were able to record the movement of *H. bicolor* along the trunks of *Dipterocarpus dyeri* over and over again. Here is the pattern the termites climbed into the crown: first, several (2-3) small columns were forming on the soil surface. When formed, these columns climbed up to the middle of the trunk approximately, then they merged into one powerful column, which could be traced through binoculars to the first skeletal branches (35-40 m from the ground), after that it became invisible inside of the crown. The descent of the column returning with food was traced along the same tree. It was a wide stream of workers with balls of food in their jaws. The food was exactly formed into roughly shaped balls, it was not just random-shaped pieces torn from the bark of a tree. During the descent, the workers collide and touch each other with antennas. There were some individuals that moved in the opposite direction with food. Transfer of food in both directions was observed quite often. Descending along the trunk, the termites went into a hole (crack) in the ground at the foot of the tree, possibly it was a nest. A few days later, during the excavation of this nest, it was found that it belongs to one of the *Macrotermes* species, and no traces of *H. bicolor* were found in it. Most often, the nests were located under the roots of trees and it was almost impossible to excavate such nests.

The speed of marching *H. bicolor* termites on the horizontal and vertical surfaces was slightly different. Two measurements of speed were carried out: horizontal surface - path length 13.5 cm, average speed of movement 1.9 cm / sec; vertical surface - path length 10 cm, average speed 0.96 cm / sec.

At Cat Tien Nature Reserve the foraging columns of *H. bicolor* were regularly observed on *Lagerstroemia* and *Afzelia* trees. The behavior of foraging termites was much the same. In some case the groups of workers and soldiers were observed by the sides of the main column before the termites went into the nest. The workers were without food. At one moment during the observation it was noted that the column stretched between 3-4 trees, three trees were nearby, the fourth was 15-20 m away from them. Some of the termites gathered in rather large groups, in which there were termites, both with and without food. Chains of workers moved from these groups and past them. In these groups there was one worker who gathered small lumps of food from the other workers, and as a result, this worker, after having formed a rather large lump of food, carried it away.

The termite marching phenomenon draws attention to the fact that the termites do not straighten their path, but repeat all the bends and curves of the plants along which they move (tree roots, lianas), although if they headed to the forage plant straight ahead it would be much closer.

Termite foraging was observed at various times of the day, starting at 6.30 am, and it was not possible to establish a definite rhythm of termite activity. Columns of termites with and without food, climbing up and descending from tree trunks, could be seen at any time of the day, it is possible that they were active at night too (personal report from I. Semenyuk). Moreover, the column could move both under the canopy of the forest, and in a completely open space, illuminated by the sun.

In case of *H. luzonensis*, the speed was taken into account only when descending from a tree, i.e. on a vertical surface, but the workers were both carrying the food (path length 8 cm, average speed 1.30 cm / sec) and without food (path length 8 cm, average speed 1.36 cm / sec).

We have not only recorded the speed of marching of separate individuals in the convoy; also we collected termite workers, which descended along the trunk with food, and estimated the average weight of the worker and the average weight of the food carried by each worker. One *H. bicolor* worker weighed on average 4.10 mg and could carry a load of 1.45 mg. One *H. luzonensis* worker weighed on average 6.45 mg and could carry a load of 3.6 mg. The difference in weight between the two species can probably be attributed to the different age of the foraging workers, which could weight differently themselves also.

Large groups of termites were observed in some areas on the vertical tree trunk. The phenomenon of such "stops" or "staging posts", where termites practically did not move, cannot be explained yet.

4. CONCLUSION

- Two species of *Hospitalitermes* have been found in South and Central Vietnam: *H. bicolor* and *H. luzonensis*. The first species has not been previously recorded in Vietnam. Area of distribution of the second species is considerably clarified.

- Thus, observations of two types of termites of the genus *Hospitalitermes* - *H. bicolor* and *H. luzonensis* - showed that these termites tend to have an open life habits, they are active throughout the year and at any time of the day. Termites are ideally adapted to life on the open surface, with dark, chitinized covers and reliable guards carried out by soldiers.

- Termite nests of these species can be in hollows or attached to the tree trunks.

- Probably, *H. bicolor* tends to have nomadic life habits, and the following facts support this assumption: the caste and age composition of the nest depends on the season; eggs, larvae and molting individuals are present in the nest only during certain periods, whereas larvae and molting individuals can be found in the nests of most other types of termites throughout the year; the presence of sex substitutes in *H. bicolor*, which are more mobile than the royal couple, provides greater family mobility; the outer walls of the nest and the chambers inside it are thin, fragile, short-lived, which indicate that the nest is temporary, and the accumulation of huge amounts of waste products in the nest forces the termites to leave the nest and to move to another; regular observations of columns of nomadic termites, in which workers carry eggs, larvae, and molts in their mandibles, also attest to the fact of the nomadic life habits of these species.

REFERENCES

1. Nguyễn Đức Khảm, *Mối ở Miền Bắc Việt Nam*, Nxb. Khoa học và Kỹ thuật, Hà Nội, 1976, 219 p.
2. Roonwal M. L., *Termites of the Oriental region, in: Biology of termites*, eds. Krishna K., Weesner F. M., 1970, N. Y. L., **2**:402-467.
3. Bugnion E., *Le termite noir de Ceylon Eutermes monoceros Koen*, Ann.Soc. entomol. France, 1909, LXXVIII.
4. Bugnion E., *La biologie des termites de Ceylon*, Bull. Mus. Nat. Hist., 1914, **20**(4):170-204.
5. Green E. E., *Catalogue of Isoptera recorded from Ceylon*, Spolia Zeylanica, 1913, **9**(33):7-15.
6. John O., *Notes on some Termites from Ceylon*, Spolia Zeylanica, 1913, **9**(34):102-116.
7. John O., Termiten von Ceylan, der Malayischen Halbinsel, Sumatra, Java und den Aru-Inseln, Treubia, 1925, **6**:360-419.
8. Petch T., *Black termite of Ceylon (Eutermes monoceros Koen.)*, Ann. Roy. Botan. Gardens, Peradeniya, 1913, **5**:395-400.
9. Kemner N. A., *Some termites from Ceylon*, Bull.Ent.Res., 1926, **16**(4):379-392.
10. Kemner N. A., *Aus der Biologie der Termiten Javas*, Comptes Rendues de X Congres a Budapest, 1927, 1929, **2**:1097.
11. Kemner N. A., *Systematische und biologische Studien uber die Termiten Javas und Celebes*, Kungl. Svenska Vetensk. Akad. Handl., 1934, Ser. 3, **13**(4):1-241.
12. Ghidini G. M., *Su alaeni Termitidae di Sumatra raccolti da E. Jacobson*, Atti Soc. Ital. Sci. nat., Mus. Civico, Milano, 1937, **76**:318-330.
13. Ahmad M., *New termites from Indo-Malayan and Papuan regions*, Amer. Mus. Novit., 1947, **1342**:1-7.
14. Kalshoven L. G. E., *Observations on the black termites, Hospitalitermes spp.,* of Java and Sumatra, Isectes sociaux, 1958, **5**:9-30.
15. Abe T., *Studies on the distribution and ecology role of termites in a lowland rain forest of West Malaysia*, *1. Faunal composition, size coloration and nest of termites in Pasoh forest reserve*, Jap. J. Entomol., 1978, **46**(2):273-290.
16. Abe T., *Studies on the distribution and ecology role of termites in a lowland rain forest of West Malaysia, 2. Food and feeding habits of termites in Pasoh forest reserve*, Jap. J. Ecol., 1979, **29**:121-135.
17. Collins N. M., *Observations on the foraging activity of Hospitalitermes umbrinus (Haviland), (Isoptera: Termitidae) in the Gunong [sic] Mulu National Park, Sarawak*, Ecological Entomology, 1979, **4**:231-238.

18. Кузнецов А. Н., *Б тропический дипterокарповый лес*, М., Геос, 2003, 138 с.

19. Vandekerhove K., De Wulf R., Chin N. N., *Dendrological composition and fores structure in Nam Bai Cat Tien National Park, Vietnam*, Silva Gandavensis, 1993, **58**:41-83.

20. Blanc L., Maury-Lechon G., Pascal J. P., *Structure, floristic composition and natural regeneration in the forests of Cat Nien National Park, Vietnam: an analysis of the successional trends*, 2000, **27**:141-157.

21. Ahmad M., *Key to the Indomalayan termites*, Reprinted from Biologia, 1958, **4**(1, 2):33-198.

SUMMARY

SOME SPECIAL ASPECTS OF THE BIOLOGY OF TERMITES OF *Hospitalitermes* spp. IN SOUTHERN VIETNAM

Two species of the genus *Hospitalitermes* (*H. bicolor* and *H. luzonensis*) were discovered as new inhabitants in South Vietnam. Observations on these two species have shown their open activity during the year cycle at any time of the day/night. *H. luzonensis* build paper nests of average size, while *H. bicolor* prefers nomadic life activity and does not build long-term nests. Termite activity on the open surface is provided by the dark color of their bodies, strongly chitinized. An enormous amount of the soldiers provide absolute security for the workers during the open foraging. The article contains data on the composition of termite colony. The population of the two nests of *H. luzonensis* is calculated, the average amount of individuals in *H. bicolor* nest is estimated.

Keywords: *Hospitalitermes bicolor, H. luzonensis; complete sampling of nest population, termite nest types, foraging.*

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