

# 琉球大学学術リポジトリ

## 琉球列島に於ける白蟻相とその経済的意義 (3) (薩南諸島)

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## THE TERMITE FAUNA OF THE RYUKYU ISLANDS AND ITS ECONOMIC SIGNIFICANCE (III)

(Satsunan-shoto)

Sadao IKEHARA

### Introduction

In earlier papers of this series the writer published notes (1957, 1958) on termite studies of the Yaeyama and Okinawa-gunto. The present paper deals with the termite study conducted in the Satsunan-shoto. The Satsunan-shoto (fig. 1) consists of seven main islands, vis., Tanega-shima, Mage-shima, Yaku-shima, Kuchino-erabu-shima, Take-shima, Iwō-shima and Kuro-shima. These islands lie between Amami-ōshima and southernmost part of Kyushu. All of the islands are surveyed by the writer with the exception of Mage-shima.

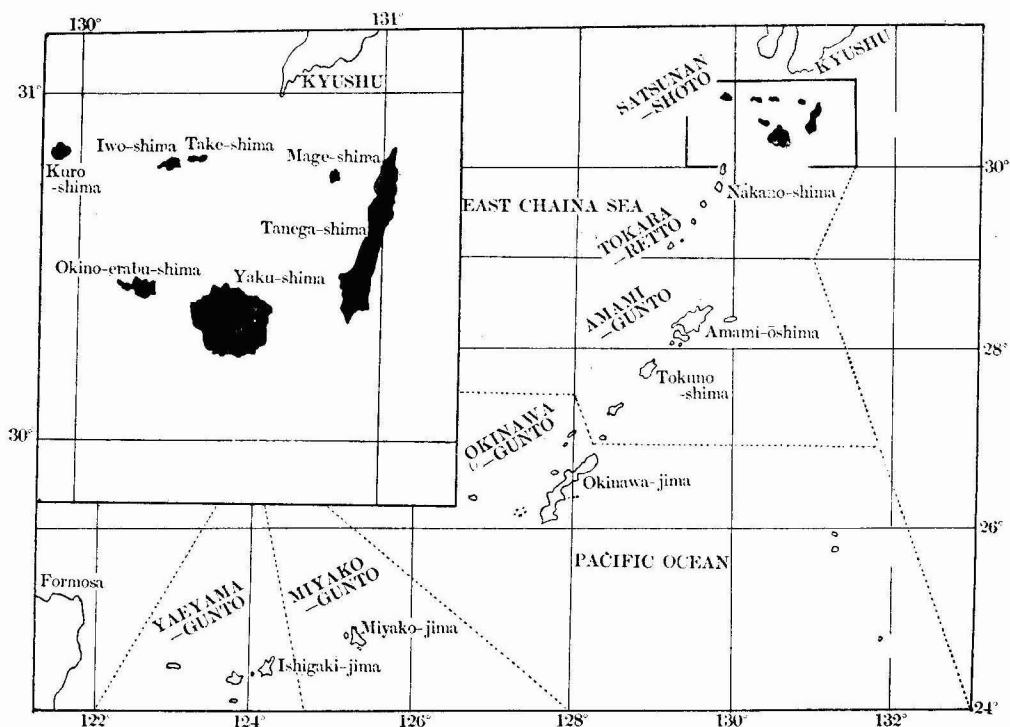


Fig. 1. Map showing the Satsunan-shoto (solid black).

Both Tanega-shima and Mage-shima, being a part of the outer arc of the Ryukyu Curve, are composed of tertiary and younger rocks. Yaku-shima belongs to the central arc which includes the larger of the Ryukyu Islands, and composed of palaeozoic and igneous rocks. The remainder of the Satsunan-shoto, namely Kuchino-erabu-shima, Take-shima, Iwō-shima and Kuro-shima are located in the inner arc,

and are therefore of volcanic origin. Table 1 gives some geographical informations about the six main islands in the Satsunan-shoto.

Table 1. Geographical informations about the six main islands of the Satsunan-shoto.

Islands	Location	Area (km <sup>2</sup> )	Maximum elevation (m)
Tanega-shima	N. 30°21', E. 130°52' N. 30°50', E. 131°05'	447	237.9
Yaku-shima	N. 30°13', E. 130°22' N. 30°28', E. 130°41'	539.37	1935.3
Kuchino-erabu-shima			649
Take-shima	N. 30°49', E. 130°23'	8.85	228
Iwo-shima	N. 30°48', E. 130°14'	11.71	717
Kuro-shima	N. 30°50', E. 129°56'	15.6	621

Due to the Japanese Current (Kuroshio) the Satsunan-shoto has a favorable climate with relatively high and equable temperature all year round. The annual average air temperature on Tanega-shima (at Nishinootote) is about 19°C and on Yaku-shima (at Ittsuso) is about 20°C. January and February are the coolest months, averaging 10.2°C at Tanega-shima and 11.5°C at Yaku-shima. In the warmest season from July to August the temperature is about 29°C over the entire area. The annual average relative humidity of the area is high, being 76 per cent. Rainfall is heavy in the Satsunan-shoto. At Nishinootote in Tanega-shima the mean annual precipitation is about 2,700 millimeters, and at Anbo in Yaku-shima it reaches about 3,528 millimeters. There is, however, considerable variation in the amount of rainfall from island by island. The reason for heavy rainfall on Yaku-shima is due to the fact that the island is situated more squarely in the path of the warm Japanese Current than any of the other islands, with the result that the winds blowing over this area contain considerably more moisture than is the case elsewhere in the Ryukyu Islands. Another reason for heavy rainfall here is the presence of many mountains, 30 of which have peaks exceeding 1,000 meters above the sea-level.

#### Acknowledgements

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#### Discussion of the species

There are quite a few reports concerning Isoptera in the Satsunan-shoto. The present paper is the results of two surveys; one covering Tanega-shima, Yaku-shima,

Take-shima, Iwō-shima and Kuro-shima from February to March, 1957, and the other covering Tanega-shima, Yaku-shima and Kuchino-erabu-shima from August to September, 1958. The Satsunan-shoto has four species of termites. They are as follows:

- 1) *Hodotermopsis Japonicus* HOLMGREN
- 2) *Kaloterme* (*Glyptoterme*) *fuscus* (OSHIMA)
- 3) *Leucoterme* (*Reticuliterme*) *speratus* (KOLBE) [= *Reticuliterme speratus* (KOLBE)]
- 4) *Coptoterme formosanus* SHIRAKI

1. Family: Hodotermitidae Sjöstedt 1925

1) *Hodotermopsis japonicus* HOLMGREN

(Japanese name: Ō-shiroari)

Specimens obtained:-

U. R. Spec. No.	Caste	Locality	Collector	Date
184	S. W.	Kosugidani, Yaku-shima	Ikehara	Mar. 4, '57
185	S. W.	Kosugidani, Yaku-shima	Ikehara	Mar. 4, '57
190	S. W.	Miyanoura, Yaku-shima	Ikehara	Mar. 6, '57
197	Ny. S. W.	Ittsuso, Yaku-shima	Ikehara	Mar. 8, '57
417	S. W.	Huruta, Tanega-shima	Ikehara	Aug. 27, '58
421	S. W.	Hirokake, Tanega-shima	Ikehara	Aug. 27, '58
431	S. W.	Nagata, Yaku-shima	Ikehara	Sept. 3, '58

Ny ..... Young nymph, S ..... soldier, W ..... worker

*Hodotermopsis japonicus* was established by HOLMGREN in 1912. The winged form of this species was precisely described by Dr. T. ESAKI (1956) from specimens obtained on Yaku-shima by Y. KUROSAWA of the National Science Museum of Tokyo. During the writer's survey of Yaku-shima in 1957 and 1958, a number of soldiers (plate 1, A-a) and workers (plate 1, A-b) of a large termite were collected, but no dealates and alates were found. In August, 1958, the writer also collected a number of soldiers and workers of the species in the forest near Huruta, Tanega-shima. From the external appearance of these specimens, it seems fairly certain that they also belong to *Hodotermopsis japonicus*, as their characteristics coincide with those described by HOLMGREN (1912), HOZAWA (1915) and EMERSON (1933). Thus distribution of this species includes Tokuno-shima, Amami-ōshima, Nakano-shima, Yaku-shima and Tanega-shima.

This species inhabits rotten wood in forests and does not build a large colony. There is no record of damage by this termite to any man-made structure or cultured plants. It seems therefore not to be a species of economic importance.

2. Family: Kalotermitidae BANKS 1920

2) *Kaloterme* (*Glyptoterme*) *fuscus* (OSHIMA)

(Japanese name: Katan-shiroari)

Specimens obtained:-

U. R. Spec. No.	Caste	Locality	Collector	Date
171	Nr.	Anbo, Yaku-shima	Ikehara	Mar. 1, '57
172	A. Ny. S.	Anbo, Yaku-shima	Ikehara	Mar. 1, '57
174	Nr. Ny. S.	Kurio, Yaku-shima	Ikehara	Mar. 2, '57
176	Nr. Ny. S.	Onoaida, Yaku-shima	Ikehara	Mar. 2, '57
193	Nr. Ny. S.	Miyanoura, Yaku-shima	Ikehara	Mar. 6, '57
195	Nr. Ny. S.	Nagata, Yaku-shima	Ikehara	Mar. 7, '57
426	Nr. Ny. S.	Nagata, Yaku-shima	Ikehara	Aug. 31, '58
430	Nr. Ny. S.	Mt. Nagata, Yaku-shima	Ikehara	Sept. 3, '58

A ..... Alate, Nr ..... reproductive nymph

This species was first described by OSHIMA (1912) under the name of *Glyptotermes fuscus* based on specimens obtained from Formosa. In 1957 and 1958, the writer collected a wood-dwelling termite on Yaku-shima. Upon careful observations of these specimens, it was found that their characteristics follow of *Kalotermes (Glyptotermes) fuscus* (OSHIMA) by HOLMGREN (1912), OSHIMA (1913), HOZAWA (1915), etc. Therefore it seems fairly certain that these specimens belong to *Kalotermes (Glyptotermes) fuscus* (OSHIMA). This species is very rare in the Satsunan-shoto, and is confined to only Yaku-shima. No specimens were collected on other islands in this area.

This termite lives in logs, stumps, dead portion of trunks, fallen trees, etc., and prefers to build narrow tunnels in undecayed portions of wood rather than in decayed portions. It is therefore not a species of economic importance in the Satsunan-shoto.

### 3. Family: Rhinotermitidae LIGHT 1912

#### 3) *Leucotermes (Reticulitermes) speratus* (KOLBE)

(Japanese name: Yamato-shiroari)

Specimens obtained:-

U. R. Spec. No.	Caste	Locality	Collector	Date
146	Ny. S. W.	Huruta, Tanega-shima	Ikehara	Feb. 24, '57
147	W.	Huruta, Tanega-shima	Ikehara	Feb. 24, '57
148	Ny. S. W.	Hirokake, Tanega-shima	Ikehara	Feb. 24, '57
149	S. W.	Shikanomine, Tanega-shima	Ikehara	Feb. 24, '57
150	S. W.	Kurazami, Tanega-shima	Ikehara	Feb. 24, '57
151	S. W.	Jusanban, Tanega-shima	Ikehara	Feb. 24, '57
152	Ny. S. W.	Nishinoomote, Tanega-shima	Ikehara	Feb. 26, '57
153	Ny. S. W.	Nakame, Tanega-shima	Ikehara	Feb. 26, '57
154	Nr. Ny. S. W.	Sakurazono, Tanega-shima	Ikehara	Feb. 26, '57
155	Nr. Ny. S. W.	Kunikami, Tanega-shima	Ikehara	Feb. 26, '57
156	Ny. S. W.	Kunikami, Tanega-shima	Ikehara	Feb. 26, '57
157	Ny. S. W.	Urakami, Tanega-shima	Ikehara	Feb. 26, '57
158	Nr. Ny. S. W.	Kubota, Tanega-shima	Ikehara	Feb. 26, '57
159	Nr. Ny. S. W.	Oku, Tanega-shima	Ikehara	Feb. 26, '57
160	Nr. Ny. S. W.	Kaminaka, Tanega-shima	Ikehara	Feb. 27, '57

U. R. Spec. No.	Caste	Locality	Collector	Date
161	Nr. Ny. S. W.	Kaminaka, Tanega-shima	Ikehara	Feb. 27, '57
163	Ny. S. W.	Shimonaka, Tanega-shima	Ikehara	Feb. 27, '57
164	Nr. Ny. S. W.	Tashiro, Tanega-shima	Ikehara	Feb. 27, '57
165	Nr. Ny. S. W.	Motomura, Tanega-shima	Ikehara	Feb. 27, '57
167	Ny. S. W.	Nakanishime, Tanega-shima	Ikehara	Feb. 27, '57
168	Nr. Ny. S. W.	Ishido, Tanega-shima	Ikehara	Feb. 28, '57
169	Nr. Ny. S. W.	Anno, Tanega-shima	Ikehara	Feb. 28, '57
170	Ny. S. W.	Guniwa, Tanega-shima	Ikehara	Feb. 28, '57
173	S. W.	Anbo, Yaku-shima	Ikehara	Mar. 1, '57
175	Ny. S. W.	Kurio, Yaku-shima	Ikehara	Mar. 2, '57
177	Nr. Ny. S. W.	Nakama, Yaku-shima	Ikehara	Mar. 2, '57
178	Ny. S. W.	Yudomari, Yaku-shima	Ikehara	Mar. 2, '57
179	Ny. S. W.	Kojima, Yaku-shima	Ikehara	Mar. 2, '57
180	Nr. Ny. S. W.	Onoaida, Yaku-shima	Ikehara	Mar. 2, '57
181	Nr. Ny. S. W.	Kosugidani, Yaku-shima	Ikehara	Mar. 3, '57
183	Nr. Ny. S. W.	Kosugidani, Yaku-shima	Ikehara	Mar. 3, '57
186	Ny. S. W.	Kosugidani, Yaku-shima	Ikehara	Mar. 4, '57
187	Ny. S. W.	Miyanoura, Yaku-shima	Ikehara	Mar. 6, '57
188	Ny. S. W.	Miyanoura, Yaku-shima	Ikehara	Mar. 6, '57
189	Nr. Ny. S. W.	Miyanoura, Yaku-shima	Ikehara	Mar. 6, '57
191	Ny. S. W.	Miyanoura, Yaku-shima	Ikehara	Mar. 6, '57
192	Nr. Ny. S. W.	Nagata, Yaku-shima	Ikehara	Mar. 7, '57
194	Ny. S. W.	Nagata, Yaku-shima	Ikehara	Mar. 7, '57
198	Nr. Ny. S. W.	Ittsuso, Yaku-shima	Ikehara	Mar. 8, '57
203	Ny. S. W.	Katadomari, Kuro-shima	Ikehara	Mar. 17, '57
205	Ny. S. W.	Katadomari, Kuro-shima	Ikehara	Mar. 17, '57
206	Ny. S. W.	Katadomari, Kuro-shima	Ikehara	Mar. 17, '57
207	Ny. S. W.	Katadomari, Kuro-shima	Ikehara	Mar. 18, '57
208	Ny. S. W.	Katadomari, Kuro-shima	Ikehara	Mar. 18, '57
209	Nr. Ny. S. W.	Katadomari, Kuro-shima	Ikehara	Mar. 18, '57
210	S. W.	Katadomari, Kuro-shima	Ikehara	Mar. 18, '57
211	Nr. Ny. S. W.	Katadomari, Kuro-shima	Ikehara	Mar. 18, '57
212	Ny. S. W.	Ōzato, Kuro-shima	Ikehara	Mar. 19, '57
213	Ny. S. W.	Ōzato, Kuro-shima	Ikehara	Mar. 19, '57
214	Nr. S. W.	Ōzato, Kuro-shima	Ikehara	Mar. 19, '57
215	Ny. S. W.	Ōzato, Kuro-shima	Ikehara	Mar. 20, '57
216	Nr. Ny. S. W.	Ōzato, Kuro-shima	Ikehara	Mar. 20, '57
217	Ny. S. W.	Ōzato, Kuro-shima	Ikehara	Mar. 20, '57
218	Ny. S. W.	Ōzato, Kuro-shima	Ikehara	Mar. 20, '57
220	Nr. Ny. S. W.	Iwō-shima	Ikehara	Mar. 21, '57
221	Ny. S. W.	Iwō-shima	Ikehara	Mar. 21, '57
222	Nr. Ny. S. W.	Iwō-shima	Ikehara	Mar. 21, '57
223	Ny. S. W.	Iwō-shima	Ikehara	Mar. 21, '57
225	Ny. S. W.	Take-shima	Ikehara	Mar. 22, '57
226	Ny. S. W.	Take-shima	Ikehara	Mar. 22, '57

U. R. Spec. No.	Caste	Locality	Collector	Date
227	Nr. Ny. S. W.	Take-shima	Ikehara	Mar. 22, '57
418	Nr. Ny. S. W.	Huruta, Tanega-shima	Ikehara	Aug. 26, '58
420	Nr. Ny. S. W.	Takenoda, Tanega-shima	Ikehara	Aug. 27, '58
423	Ny. S. W.	Motomura, Kuchino-erabu-shima	Ikehara	Aug. 30, '58
424	Nr. Ny. S. W.	Motomura, Kuchino-erabu-shima	Ikehara	Aug. 30, '58
428	Ny. S. W.	Nageta, Yaku-shima	Ikehara	Aug. 31, '58
433	Ny. S. W.	Nageta, Yaku-shima	Ikehara	Sept. 3, '58
434	Ny. S. W.	Nageta, Yaku-shima	Ikehara	Sept. 3, '58

The subterranean termite, *Leucotermes (R.) speratus*, is the most common species of all the termites occurring in the Satsunan-shoto. Not only does it have wider distribution but also occurs in higher altitudes. In fact, this species was found on all islands surveyed, and was even found on elevation of 1,150 meters above the sea-level.

This termite requires a constant source of moisture and therefore is usually found in decayed or rotten wood. Consequently, in general, the main area of its greater frequency is the dense or shady forests, although the clear and sunlit area with good water-supply, also have large populations. *Leucotermes (R.) speratus* is of economic importance in the Satsunan-shoto, due to its damage to house timber and man-made structures which maintain moisture derived from the soil, and due to its occasional attacks on cultured plants.

#### 4) *Coptotermes formosanus* (SHIRAKI)

(Japanese name: Ie-shiroari)

Specimens obtained:-

U. R. Spec. No.	Caste	Locality	Collector	Date
162	S. W.	Kaminaka, Tanega-shima	Ikehara	Feb. 27, '57
166	Nr. S. W.	Shimonaka, Tanega-shima	Ikehara	Feb. 27, '57
196	S. W.	Nagata, Yaku-shima	Ikehara	Mar. 7, '57
204	S. W.	Katadomari, Kuro-shima	Ikehara	Mar. 17, '57
219	Ny. S. W.	Iwō-shima	Ikehara	Mar. 21, '57
224	S. W.	Take-shima	Ikehara	Mar. 22, '57
419	Ny. S. W.	Huruta, Tanega-shima	Ikehara	Aug. 27, '58
422	S. W.	Motomura, Kuchino-erabu-shima	Ikehara	Aug. 30, '58
425	Ny. S. W.	Nagata, Yaku-shima	Ikehara	Aug. 31, '58
427	Ny. S. W.	Nagata, Yaku-shima	Ikehara	Aug. 31, '58
429	S. W.	Nagata, Yaku-shima	Ikehara	Sept. 1, '58
430	A. S. W.	Nagata, Yaku-shima	Ikehara	Sept. 3, '58

This soil nesting termite, *Coptotermes formosanus*, is widely distributed in the Satsunan-shoto, being found on all the islands. Although the writer did not collect specimens of this species in the northern part of Tanega-shima, there were many evidences of attacks on stumps, fence-posts, houses, etc.

In the Satsunan-shoto, *Coptotermes formosanus* is the economically important termite, ranking with *Leucotermes (R.) speratus*. In general this termite is somewhat larger, apparently develops more rapidly, and in larger colonies, and does more rapid damage than *Leucotermes (R.) speratus*, however in comparable areas the colonies of *Coptotermes formosanus* are less abundant than those of *Leucotermes (R.) speratus*. Only one case of injury to sugar-cane was found at Yudomari, Yaku-shima.

### Distribution according to altitude

On Yaku-shima the writer carried out two termite surveys on the distribution at different altitudes. The first survey was carried out at the beginning of March, 1957, and the second at the beginning of September, 1958. Due to snowdrifts, the first survey could not be carried out on locations higher than 1,000 meters above the sea-level.

As shown in figure 2 *Leucotermes (R.) speratus* was found at altitudes up to 1,150 meters. *Hodotermopsis japonicus* is also found at high altitudes (about 950m) but not

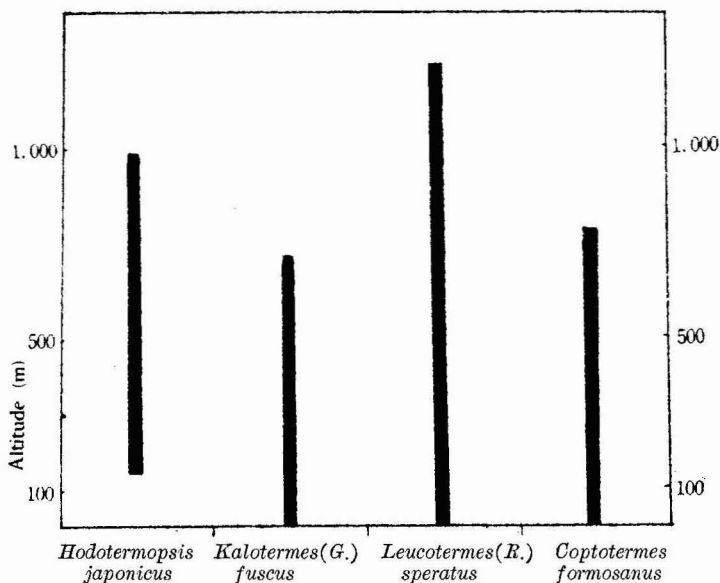


Fig. 2. Distributions of four species of termites according to altitude on Yaku-shima.

as high as *Leucotermes (R.) speratus*. Known altitudinal distributions of both *Coptotermes formosanus* and *Kalotermes (G.) fuscus* are nearly the same; the former, however, is somewhat higher to the latter. Maximum elevation of both *Coptotermes formosanus* and *Kalotermes (G.) fuscus* is about 750 and 700 meters respectively. The termite distribution according to altitude on Yaku-shima seemingly depends upon the temperature decreasing as the altitude increases, and also depends upon the changing of vegetation which covers the mountain. Detailed discussions will be given in later papers as further investigations are carried out.



**Economic significance**

The economic significance of each species of termites occurring in the Satsunan-shoto has already been mentioned. The writer intends to determine the types of damage caused by termites in the whole area of the Satsunan-shoto. In the accompanying table (table 2), 620 cases of termite attacks in the Satsunan-shoto have been classified to determine their economic significance. The data used in the table have based upon the writer's observations in 1957 and 1958. All cases observed by the writer during two surveys are included in these data.

Table 2. Classification of 620 cases of termite attacks in the Satsunan-shoto.

Species	<i>Hodotermopsis japonicus</i>	<i>Kalotermes (G.) fuscus</i>	<i>Leucotermes (R.) speratus</i>	<i>Coptotermes formosanus</i>	Total
Things attacked					
Residences, schoolhouses Warehouses & their contents					
wood frames .....	—	—	56	26	82
Mats .....	—	—	—	1	1
Books or papers .....	—	—	—	2	2
Shelves .....	—	—	1	2	3
Others .....	—	—	11	3	14
Subtotal	0	0	68	34	102
Man-made structures in the open air					
Bridges .....	—	—	28	5	33
Fence posts .....	—	—	29	11	40
Electric poles .....	—	—	8	3	11
Wooden stakes .....	—	—	24	15	39
Cartons or boxes .....	—	—	12	7	19
Timber .....	—	4	21	4	29
Others .....	—	3	17	2	22
Subtotal	0	7	139	47	193
Objects in nature					
Stumps .....	4	3	69	31	107
Logs .....	—	2	23	6	31
Fallen trees .....	—	1	55	12	68
Standing dead trees.	1	7	26	23	57
Dead portions of living trunks	2	5	8	1	16
Dead branches of living trees	—	6	1	—	7
Others .....	—	—	14	17	31
Subtotal	7	24	196	90	317
Cultured plants					
Sugar-cane .....	—	—	—	1	1
Sweet potato .....	—	—	1	—	1
Citrus trees .....	—	—	3	—	3

Species	<i>Hodotermopsis japonicus</i>	<i>Kaloterme (G.) fuscus</i>	<i>Leucotermes (R.) speratus</i>	<i>Coptotermes formosanus</i>	Total
Things attacked					
Peach trees .....	—	—	2	—	2
Others .....	—	—	1	—	1
Subtotal	0	0	7	1	8
Total	7	31	400	172	620

Table 2 shows that the greatest frequency of attacks was carried out by *Leucotermes (R.) speratus*, and the second greatest frequency by *Coptotermes formosanus*. Each case in the table, however, does not indicate the degree of damage: in some cases, the degree of damage done by *Coptotermes formosanus* was more intensive than any other termite. No attacks on residences, schoolhouses, cultured plants, etc. by *Hodotermopsis japonicus* or *Kaloterme (G.) fuscus* have been observed during the surveys.

On the 4th of September, 1958, the writer investigated the principal cases of termite damage to fifteen wooden bridges along the highway from Nagata to Ittsuso, Yaku-shima.

The results of this investigation are summarised in table 3.

Table 3. Summary of principal cases of termite damages to wooden bridges investigated by the writer on 4th of September, 1958, at the northern district of Yaku-shima.

Names of bridges	Date constructed	Timbers used	Species	Note
Mukae-bashi	Mar. '54	<i>Fagaceae</i>		No attack.
Hamanode-bashi	Dec. '51	<i>Cryptomeriaceae</i>	<i>Leucotermes (R.) speratus</i>	Considerable damage and decay to all wooden parts.
Hamanota-bashi	Nov. '51	<i>Cryptomeriaceae</i>	<i>Leucotermes (R.) speratus</i>	Railings, girders and sills damaged and decayed.
Nakanokawa-bashi	Nov. '51	<i>Cryptomeriaceae</i>	<i>Leucotermes (R.) speratus</i> <i>Coptotermes formosanus</i>	Considerable damage and decay to all parts. Floor-boards have been replaced with <i>Fagaceae</i> .
Chizogashita-bashi	Mar. '51	<i>Fagaceae</i>	<i>Leucotermes (R.) speratus</i> <i>Coptotermes formosanus</i>	One sill damaged by <i>C. formosanus</i> , another by <i>L. (R.) speratus</i> . Floor-boards partially replaced with <i>Cryptomeriaceae</i> .
Kozoegawa-bashi	June. '54	<i>Fagaceae</i>	<i>Leucotermes (R.) speratus</i>	One sill slightly damaged. Floor-boards partially replaced with <i>Cryptomeriaceae</i> .
Takahira-bashi	Mar. '53	<i>Fagaceae</i>	<i>Leucotermes (R.) speratus</i>	One sill damaged. Floor-boards partially replaced with <i>Cryptomeriaceae</i> .
Kotsugo-bashi	June. '53	<i>Fagaceae</i>	<i>Coptotermes formosanus</i>	Railing slightly damaged.
Kuratani-bashi	July. '53	<i>Fagaceae</i>	<i>Leucotermes (R.) speratus</i>	Railing slightly damaged.
Nameless	Unknown	<i>Fagaceae</i> <i>Cryptomeriaceae</i>	<i>Leucotermes (R.) speratus</i> <i>Coptotermes formosanus</i>	All portions intensively damaged and decayed.
Nameless	Unknown	<i>Fagaceae</i>	<i>Leucotermes (R.) speratus</i>	Railing damaged, and girder intensively decayed.
Yoshidagawa-bashi	?	<i>Fagaceae</i>	<i>Leucotermes (R.) speratus</i>	No attack.
Kochiyako-bashi	May, '56	<i>Fagaceae</i>	<i>Leucotermes (R.) speratus</i>	No attack.
Nameless	Unknown	<i>Fagaceae</i>	<i>Leucotermes (R.) speratus</i>	One sill slightly damaged.
Ittsuso-bashi	Mar. '52	<i>Fagaceae</i>	<i>Leucotermes (R.) speratus</i>	Girder slightly damaged.

Judging from table 4, *Leucotermes (R.) speratus* damaged wooden-bridges more often and more intensively than did *Coptotermes formosanus*. It seems that the *Fagaceae* is more resistant against termite attacks than the *Cryptomeriaceae*. On Yaku-shima the wooden-bridges presumably begin to suffer from the termite attacks five years after construction.

Termites occasionally attack cultured plants here. Sweet potatoes stored in "Imogama" (plate 2, A)—a hole made in the ground for storing harvested sweet potatoes—are damaged by *Leucotermes (R.) speratus*. Injury to sugar-cane by *Coptotermes formosanus* is probably rare and not serious in the Satsunan-shoto.

### Summary and Conclusion

The Satsunan-shoto supports a termite fauna rich in numbers of colonies, but not in numbers of species. Only four species are known belonging to three families and four genera. Species and distributions of termites occurring in the Satsunan-shoto are shown in table 4. *Kalotermes (G.) fuscus* seems to be confined only to Yaku-shima, and *Hodotermopsis japonicus* is confined to Yaku-shima and Tanega-shima, so far as the Satsunan-shoto is concerned. The other two species, *Leucotermes (R.) speratus* and

Table 4. Species and distributions of termites known from the Satsunan-shoto.

Islands	Family	Family	Family	
	Hodotermitidae	Kalotermitidae	Rhinotermitidae	
	<i>Hodotermopsis japonicus</i>	<i>Kalotermes (G.) fuscus</i>	<i>Leucotermes (R.) speratus</i>	<i>Coptotermes formosanus</i>
Tanega-shima	○	—	○	○
Yaku-shima	○	○	○	○
Kuchino-erabu-shima	—	—	○	○
Take-shima	—	—	○	○
Iwo-shima	—	—	○	○
Kuro-shima	—	—	○	○

*Coptotermes formosanus*, are known to occur on all the islands. Concerning their distribution according to altitude, *Leucotermes (R.) speratus* is found as high as 1,150 meters, *Hodotermopsis japonicus* as high as 950 meters, and both *Kalotermes (G.) fuscus* and *Coptotermes formosanus* can occur as high as 800 meters. In addition to temperature it is highly probable that distributions according to altitude depend on variations of vegetation from the foot of the mountain to the peak, so far as Yaku-shima is concerned. These species ranked according to altitudinal distribution from highest to lowest are as follows:

*Leucotermes (R.) speratus* > *Hodotermopsis japonicus* > *Coptotermes formosanus* ≥ *Kalotermes (G.) fuscus*.

From the standpoint of economic significance, *Leucotermes (R.) speratus* and *Coptotermes formosanus* are the most important species in the Satsunan-shoto. According to the results of the writer's investigation, however, it seems that *Leucotermes (R.) speratus* is more economically important than *Coptotermes formosanus* in this area. *Hodotermopsis japonicus* and *Kalotermes (G.) fuscus* are probably of minor economic importance. Injury

to the cultured plants by termites is occasionally observed. Sweet potatoes which are buried in the ground for storage, are attacked by *Leucotermes (R.) speratus*, probably also by *Coptotermes formosanus*.

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### Explanation of plates

#### Plate 1.

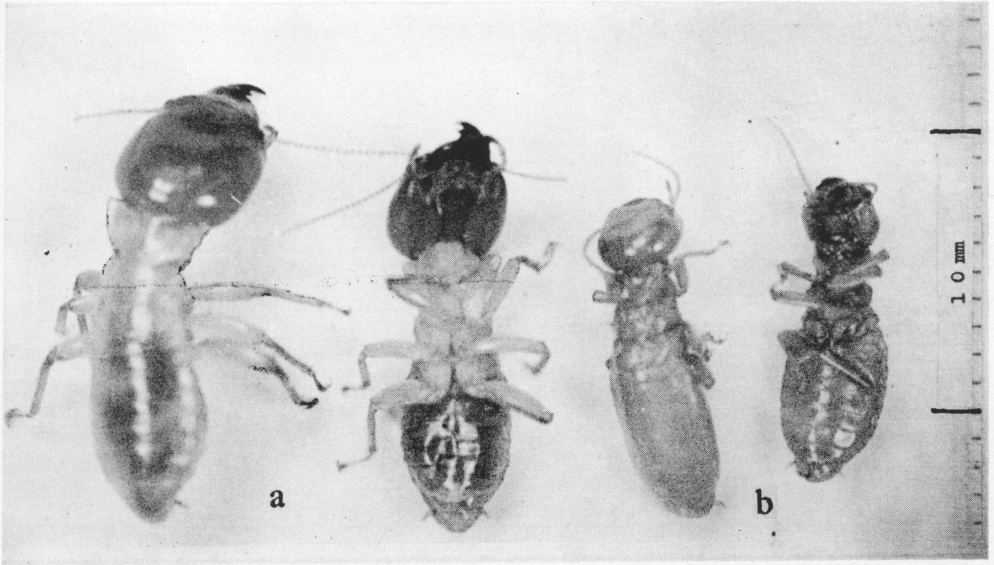
- A. Soldiers (a) and workers (b) of *Hodotermopsis japonicus* HOLMGREN obtained from Kosugidani, Yaku-shima by the writer.
- B. Soldiers (a) and reproductive nymphs (b) of *Kalotermes (Glyptotermes) fuscus* (OSHIMA) obtained from Kurio, Yaku-shima.

#### Plate 2.

- A. "Imogama" infested with *Leucotermes (Reticulitermes) speratus* (KOLBE) at Shimonaka, Tanega-shima.
- B. A tree infested with *Coptotermes formosanus* SHIRAKI at Nagata, Yaku-shima.

Plate 1

A



B

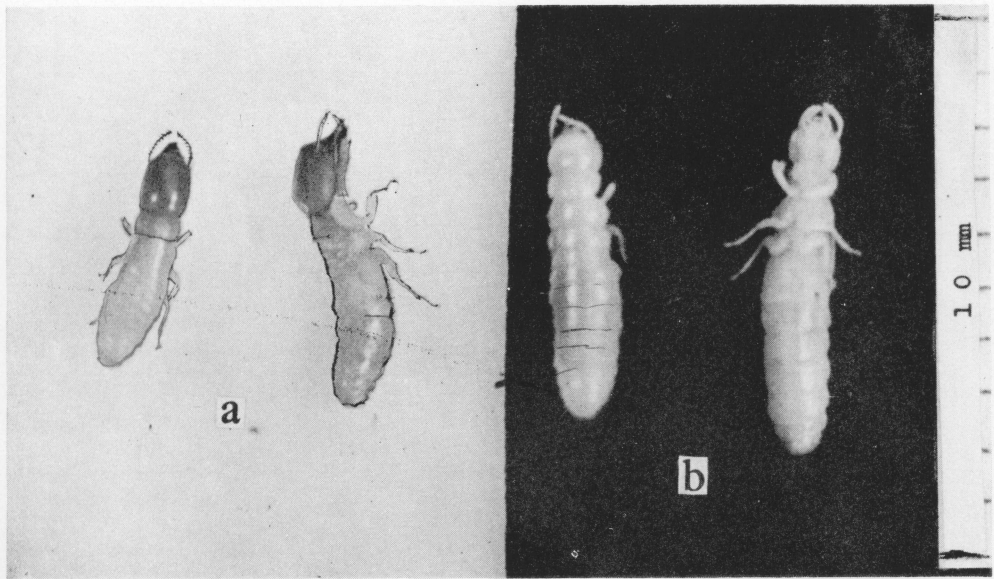
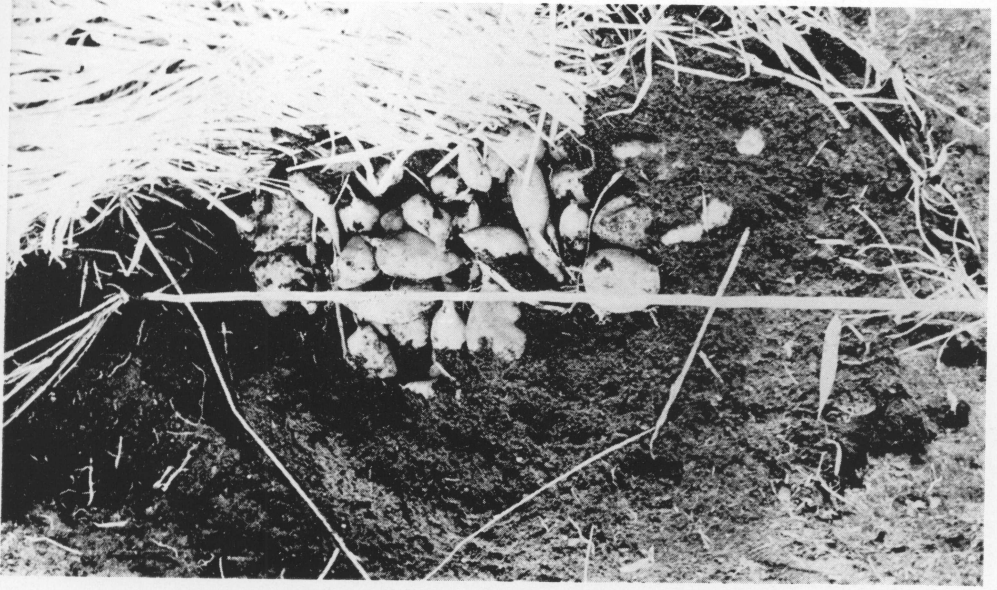


Plate 2

A



B

