

## Morphological Description of *Reticulitermes speratus kyushuenesis* Morimoto (Isoptera : Rhinotermitidae) in Southern Part of Korea

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### 남부지방에 분포하는 흰개미인 *Reticulitermes speratus kyushuenesis* Morimoto (Isoptera : Rhinotermitidae)의 형태적 기재

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#### ABSTRACT

A study was carried out to investigate the distribution of termites at the southern part of Korea between 1995 and 1996. During the survey, termite samples were collected from the randomly selected areas. Most of them were collected from the decayed woods in dead trees (usually in pine trees), but some were also collected from wooden walls, floors in houses, or in matured bed logs at the mushroom cultivating areas. Damages by this termite species were also observed by Kim and Hwang (1996) who investigated the insect pests of mushrooms in the southern part of Korea. To control the termites, it is urgent to identify them and to conduct ecological study of termites. Thus, we firstly identified termites which were collected from the sampling areas including houses and mushroom cultivating fields. All termite samples were identified as *Reticulitermes speratus*. However, there were several morphological differences among them according to the collected areas, and the samples were reexamined, identified and divided into subspecies as *R. speratus kyushuensis*.

**Key words** : Isoptera, Termite, *Reticulitermes speratus kyushuensis*, Morphological characteristics

#### INTRODUCTION

There were two opinions on the taxonomy of

the genus *Reticulitermes*. Firstly, two species were proposed by Oshima (1908) based on the taxa from Japan and Taiwan, and supported by Light (1931), Koidzumi (1921) and Snyder (1949).

\* This study was sponsored by the Non-Directed Research Fund, Dong-A University, 1996 and by Korea Research Foundation (KRF) as a part of Post Doctorial Program, 1996.

Secondly, only one species proposed by Yano (1910), Holmgren (1912, 1913), Hozawa (1915) and Ahmad (1958). It was recently re-examined by Morimoto (1968) in "Termites of the genus *Reticulitermes* of Japan and Taiwan," and five subspecies of the genus were confirmed in Japan (Morimoto 1968). There were few studies on the termite taxonomy since 1960, and no description of *Reticulitermes* in Korea. According to the studies, only one species of termites, named *R. speratus kyushuensis* can be found, and there were no other species in this country. However, There should be other species or subspecies of termites in Korea, especially in the west coast or islands which was transferred by woods across the China sea, even though it was not confirmed yet. *R. speratus kyushuensis* is easily affected by dryness and unable to carry water by themselves, so that it is restricted to dampwoods. Colonies of this species include few hundred thousands individuals and generally attain a maximum size within 7 or 8 years (Shimizu 1970). As regards caste differentiation in the genus *Reticulitermes*, Hare (1934) represented the developmental pathway in *R. arenicola*, *R. flavipes* and *R. tibialis*, and Buchli (1956a, b, 1958) in *R. santonensis*.

This study was carried out to establish the taxonomic system for further termite studies, and is the first time to redescribe the morphological characteristics of *Reticulitermes speratus kyushuensis*, which is the common subspecies in Korea.

## DESCRIPTION

### *Reticulitermes speratus kyushuensis* Morimoto, 1968 (九州 흰개미, 新稱)

*Termes speratus* Kolbe, Berl. Ent. Zschr. XXXIX:

147, 1885; Matsumura, Thous. Ins. Jap. I: 24, 1904

*Leucotermes speratus* Oshima, Zool. Mag. XX: 515, 1908; Oshima, Zool. Mag. XXII: 414, 1910; Third Offic. Rep.: 71, 1912 Nawa, Ins. World XIV: 547, 1910; Philipp, Sci. D, VIII: 277, 1913; Holmgren, Svenska Vetensk. Handlingar. 46: 69, 1911

*Leucotermes (Reticulitermes) speratus* Holmgren, Svenska Vetensk. Handlingar. 50: 61, 1913; Hazawa, J. Coll. Sci. Imp. Univ. Tokyo XXXV (7): 62, 1915

*Reticulitermes speratus* Light, Lingnan Sci. J.: 589, 1929; Snyder, Smithson Misc. Coll. 112: 74, 1949; Ahmad, Biologia 4: 71, 72, 1958; (partim): Tsia and Chen, Economic Ins. China VIII Termites: 60, 1964

*Reticulitermes speratus kyushuensis* Morimoto, Bull. For. Res. Ins. Jap. 217: 43, 1968

**Specimen examined.** *Reticulitermes speratus kyushuensis* was collected from several areas (Fig. 1) including mushroom cultivating area, Dongbu-Myun, Tongyoung-Gun, Kyungnam

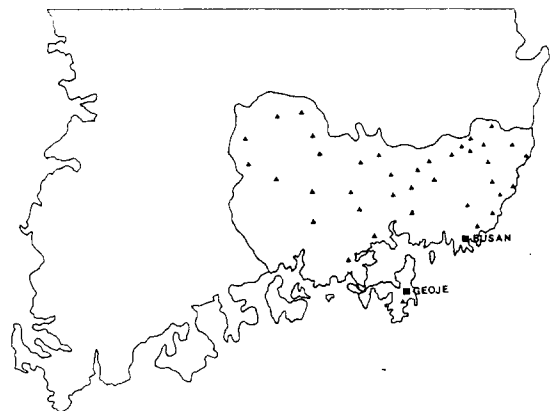


Fig. 1. Map of the sampling area in Kyungnam.

and wooden houses, Sujeong-Dong, Dong-Gu, Busan, Korea. from April 1995 to October 1996.

**Soldier.** Head brownish yellow; labrum brown with yellowish tinge; antennae yellowish white; mandibles dark reddish brown, paler at bases; pronotum white with yellowish tinge; abdominal tergites and legs white with yellowish tinge (Fig. 2).

Head with scattered bristles, labrum with a few long and short bristles on surface, pronotum with small numbers of long and short bristles along anterior and posterior margin in general; abdominal tergites hairy.

Head capsule nearly two-third as wide as long, weakly convex at sides. Antennae with 16 ~ 17 segments.

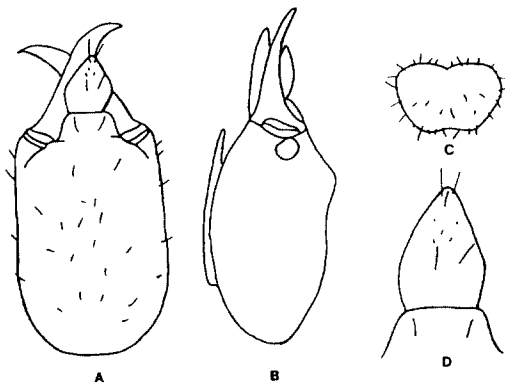


Fig. 2. Diagrams of soldier, *R. speratus kyushuensis*.

- A: Head in dorsal view,  
B: Head in lateral view,  
C: Pronotum, D: Clypeus and labrum

**Size measurements.** Soldier was used for the size measurements, and measurements were made on the specimen fixed with FAA fluid (formalin : acetic acid : 50% alcohol = 1 : 1 : 18). The measurements were made as follows (Fig. 3).

1. Maximum length of head (HL): measured from the base of mandibles to the posterior margin of head.
2. Maximum width of head (HW).

3. Maximum length of gula (GL): measured from the anterior margin to the inner corner of posterior margin.
4. Maximum width of gula (GW).
5. Maximum length of labrum (LL).
6. Maximum width of labrum (LW).
7. Maximum length of pronotum (PL).
8. Maximum width of pronotum (PW).

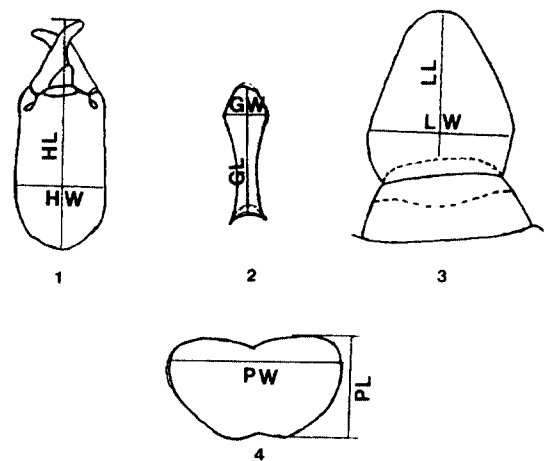


Fig. 3. Measured points of soldier. 1: Head, 2: Gula, 3: Labrum, 4: Pronotum

According to the measurements (Table 1), labrum subpentagonal, subangulate at the broadest point a little behind the middle, labral index was 1.08~1.16, and was less than 1.21 in average. Dorsal setae of labrum and clypeal seta was longer. Some specimen has a somewhat slender shape than the typical one (labral index is more than 1.2 in average of Japanese species).

Table 1. Measurements of taxonomic characters of soldier for *R. speratus kyushuensis*.

Characters	(unit : mm)		
	Min.	Max.	Mean
Length of head (HL)	2.51	2.68	2.57
Width of head (HW)	1.05	1.19	1.11
Length of gula (GL)	1.03	1.28	1.14
Width of gula (GW)	0.32	0.57	0.45
Length of labrum (LL)	0.29	0.38	0.35
Width of labrum (LW)	0.25	0.35	0.29
Length of pronotum (PL)	0.43	0.58	0.49
Width of pronotum (PW)	0.72	0.86	0.79

**Morphological differences.** According to the collecting area, there were morphological differences, such as the features of head, pronotum and labrum among the collected specimen, and it was firstly presumed that there were different species of termites due to the aforementioned morphological differences among the specimen (Fig. 4). However, these specimen were finally identified as *R. speratus kyushuensis*. Even though, the head features were also different within the same collecting area (Fig. 5). These differences of morphological characteristics for soldiers according to the colonies may be associated with the habitat including flora, which is to feed on the resources, and environmental condition, although there were no information on these aspects. In present study, termite samples were only collected within the limited area in southern part of Korea, and some problems associated with taxonomy of subspecies and caste differentiation. Thus, it should be evaluated the biogeographic distribution for termites achieving the correlation among the aforementioned factors in the future.

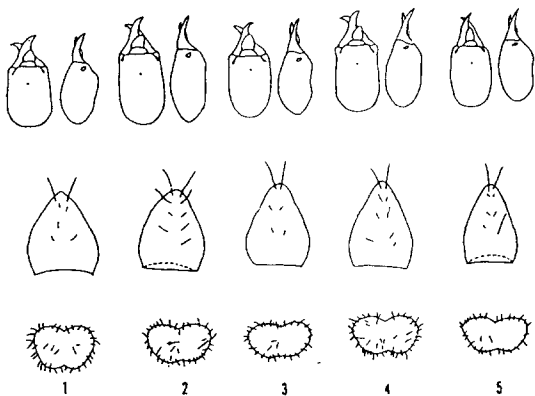


Fig. 4. Different features of soldiers according the collecting areas. Top: Head, Middle: Labrum, Bottom: Pronotum: 1-2: Mushroom cultivating areas, Gerje-Do, Kyungnam, 3: A house, Sujeong-Dong, Busan, 4: Gaya Mt., Kyungnam, 5: Geejang, Kyungnam.

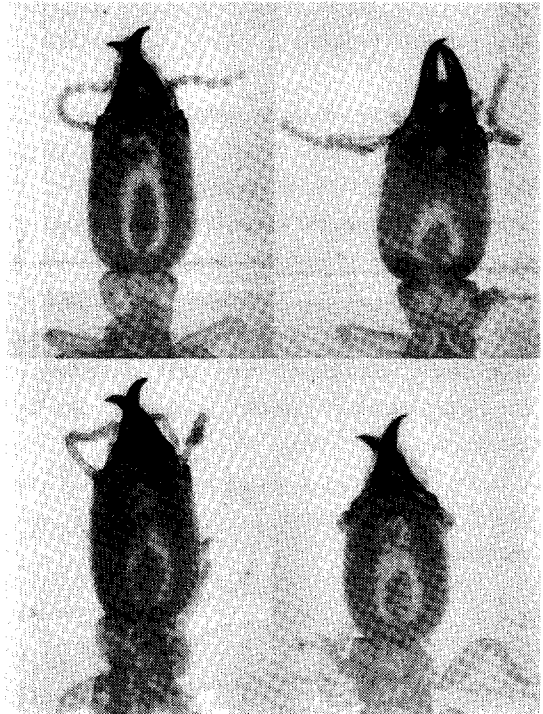


Fig. 5. Different features of soldier heads within the same habitat in Gerje-Do, Kyungnam.

**Key to the genera of the Rhinotermitidae**

**Alates**

- 1. - Large species, head with more than 1.50mm; second marginal tooth of left mandible distinctly longer than first; wings covered with hairs ..... *Coptotermes*
- Small species, head with less than 1.10mm; second marginal tooth of left mandible nearly as long as first; wings without hairs on the surface ..... *Reticulitermes*

**Soldiers**

- 1. - Head pyriform; fontelle prominent, large ..... *Coptotermes*
- Head rectangular, paralle-sided; fontelle

faint ..... *Reticulitermes*

**Key to the species of *Reticulitermes***

**Alates**

- 1. - Pronotum with small number of hairs; less than 25 ..... *speratus*
- Pronotum with many hairs; more than 30 ..... 2
- 2. - Pronotum brownish as head ..... *miyatakei*

**Soldiers**

- 1. - Pronotum with a few hairs; less than 10 ..... (*speratus*) 2
- Pronotum with many hairs; more than 15 ..... 4
- 2. - Labrum with long hairs on surface ..... *s. kyushuensis*
- Labrum with minute hairs or without hairs on surface ..... 3
- 3. - Labrum rounded at tip, wide, labrum index less than 1.30 ..... *s. speratus*
- Labrum more or less pointed at tip, slender, labrum index more than 1.30 ..... *s. leptolabralis*
- 4. - Labrum with paraterminal setae ..... 5
- Labrum without paraterminal setae ..... 6
- 5. - Right mandible with the inner margin gently curved; postmentum with sides concave at narrowest portion ..... *amamianus*
- Right mandible with the inner margin straight and curved inward at tip; postmentum with sides straight at narrowest portion ..... *flaviceps*
- 6. - Postmentum slender; postmentum index less than 0.25 ..... *miyatakei*
- Postmentum wide; postmentum index more than 0.30 ..... 7
- 7. - Head with sides slightly tapering anteriorly, broadest at posterior one third .... *yaeyamanus*

**ACKNOWLEDGEMENTS**

We would like to thanks Prof. J. C. Baek (Suncheon Univ.), Prof. K. Morimoto (Entomological Lab., Kyushu Univ.), Assist. Prof. K. Ogata (Inst. of Tropical Agric., Kyushu Univ.), Prof. T. Abe (Kyoto Univ.) and Ms Y. Takematsu (Entomological Lab., Kyushu Univ.) for their generous advice.

**적 요**

1995년부터 1996년에 걸쳐 남부지방을 중심으로 임의로 선정된 70여곳에서 흰개미를 채집하였다. 흰개미는 대부분 죽은 소나무에서 채집이 되었으며, 오래된 가옥의 마루나 벽에서도 채집되었고, 심지어 거제도 동부면 소재 표고버섯 재배단지내 참나무 묘상에서도 채집이 되었다. 특히, 버섯재배단지에서의 흰개미에 의한 피해는 김과 황(1996)에 의해 보고된바 있다. 흰개미에 의한 피해를 줄이고 예방하기 위해서는 무엇보다도 흰개미의 정확한 동정과 생태학적 연구가 시급하다 하겠다. 따라서, 우선 경남 일대의 가옥 및 표고버섯 재배지를 포함한 조사지역에서 채집된 흰개미를 동정한 결과 이미 국내에서 알려진 대로 *Reticulitermes speratus*로 동정되었으나, 지역에 따라 같은 종임에도 불구하고 다소 형태적인 차이를 보여 재검정한 결과 다시 아종인 *R. speratus kyushuensis*으로 동정하게 되었다. 본 논문에서는 지역에 따른 *R. speratus kyushuensis*의 형태적인 차이를 보고하는 바이다.

검색어: 흰개미목, 흰개미, *Reticulitermes speratus Kyushuensis*, 형태적 특징

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(1997년 5월 28일 접수)