SURVEY AND STUDY ON ECOLOGY AND DIVERSITY OF TERMITES IN EASTERN AND WESTERN THAILAND; CHANTABURI AND KANCHANABURI PROVINCE

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Abstract

Random surveys were made in three forest types; moist evergreen forest (MEF), dry evergreen forest (DEF) and hill evergreen forest (HEF) in Chantaburi (eastern Thailand) in 1999-2000, and in secondary dry dipterocarp forest (DDF) in Kanchanaburi (western Thailand) in 2001. From 650 specimens collected 3 families, 7 subfamilies, 18 genera, 34 species were identified from moist evergreen forest (MEF), 3 families, 6 subfamilies, 15 genera, 27 species from dry evergreen forest (DEF), 3 families, 5 subfamilies, 13 genera, 23 species from hill evergreen forest (HEF) and 2 families, 5 subfamilies, 13 genera, 35 species from secondary dry dipterocarp forest (SDDF). Apart from 3 species of 2 newly recorded genus (*Angulitermes sp, Lacessititermes sp$_1$, and Lacessititermes sp$_2$)* 1 species each of genera *Coptotermes, Odontotermes, Euhamitermes, Speculitermes* and *Pericapritermes*, 2 species of *Hospitalitermes*, 3 species each of *Bulbitermes* and *Glyptotermes* and 5 species of *Nasutitermes* from Chantaburi together with 15 species from Kanchanaburi, of which 9 species of genus *Odontotermes*, 3 species of *Pericapritermes* and 1 species each of *Microcerotermes, Speculitermes* and *Bulbitermes* will need further taxonomic investigation down to species level.

Introduction

Termites are soil animals, which are super-abundant in the tropical and subtropical regions. They can also be found widely spread in some areas of temperate and occasionally occur in semi-arid environment (Lee and Wood 1971; Wood and Sands 1978; Swift *et al.*1979; Brian 1983; Josens 1985; Wilson 1990;. This extraoridary abundance of termites is the result of their highly developed social organization (Myles 1988; Noirot 1990; Wilson 1990; Nalepa 1994) and symbiosis with microorganism (Martin 1987; Wood and Thomas 1989; Breznak and Brune 1994).Termites play an important role of super-decomposer (Matsmoto & Abe 1979; Collin 1981,1983) and carbon-nitrogen balancer in the tropical terrestrial ecosystems of which they are a biotic constituent (Higashi *et al*.1992), thus forming the basis for a large food web (Lapage 1981; Deligne *et al.*1981).

Termites are also named as ecosystem engineers (Jones *et al*.1994; Lawton 1994) that modify the soil structure by constructing mounds and subterranean nests (Lee and Wood 1971; Wood 1998) providing many species of animals and plants with diverse habitats (Glover *et al.*1964).

Thailand is the tropical country; consisted of various types of forest ecosystem that is suitable for termite growth and development. However, only limited information on termite in Thailand has been published, especially on the ecological of termites in various forest ecosystem. The main objective of this survey is to study the morphological characteristies of collected specimen in order to determine the genera or species abundance of termites in Thailand in four different types of forest ecosystem (DEF, MEF, HEF and SDDF) in Chanthaburi and Kanchanaburi forest reserve areas, eastern and western Thailand, to study their feeding habitats and the function of each feeding group for further understanding of their role in decomposing process, and, finally their activity in relation to seasonal changes in each forest type.

Objectives

1. To assess termite diversity.
2. To investigate their morphological characteristics compare to their molecular phylogyny.
3. To determine particular role of termites base on their habitat and food sources.

Study sites

Chantaburi Province (December 1999 – April 2000) 360 specimen
- Khao Kitchagut National Park
  1. Moist Evergreen Forest (MEF) 300 MSL
  2. Hill Evergreen Forest (HEF) 1089 MSL
- Khao Soi-Dao Wildlife Sanctuary
  1. Dry Evergreen Forest (DEF) 270 MSL

Kanchanaburi Province (April 2001 – December 2001) 410 Specimen
- Sri Nakarin Dam National Park
  - Secondary Dry Dipterocarp Forest (SDDF) 320 MSL

Survey Method

Sixty percents of 100 sub-plots (10m x 10m each) used for the study of termite diversity and other ecological data were randomly surveyed for termites during cool-dry season (December-January) and hot-dry season (April). Intensive observations were made on ground, trees, branches, twigs and dead stumps for presence of termites. Tunnels, foraging trials on ground, trees or under leaves and debris were also searched. Information in relevant to the specimen collected were recorded in writing and also photographed. Specimens were preserved in 80 % alcohol. Details on taxonomy, Size and shape of nest, food sources and other relevant information were computerized as database for further study.

Results and Discussion

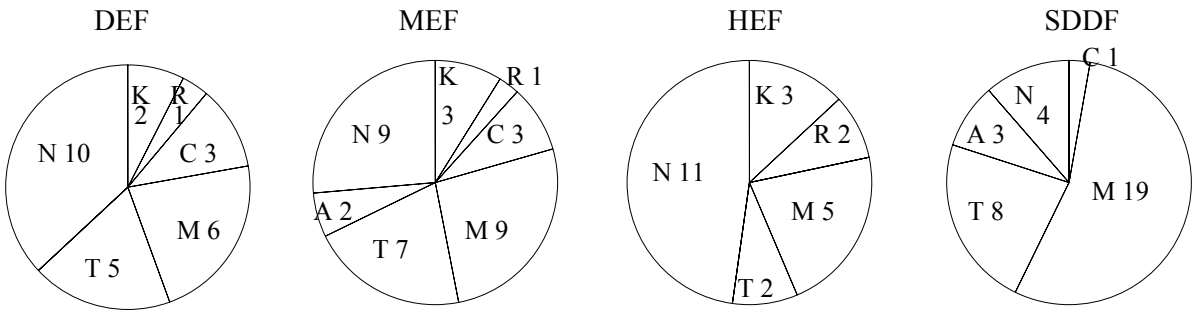
Number of sub-families, genera and species of termites found in the studied forest were not obviously different (Table 1 and Figure 1). In DEF and SDDF forests where moisture content in soil and in the air is lower than MEF and HEF, no termites which belong to lichen feeder were collected (Figure 2).

TABLE 1 Termite genera and species recorded in four different forest types: DEF, MEF, DEF and SDDF.

Termite Genus and Species	Eastern			Western
(3F, 7SF, 22G, 78SP)	DEF	MEF	HEF	SDDF
1. F. Kalotermitidae (2G, 5SP)				
1.1 SF. Kalotermitinae				
1. *Cryptotermes thailandis*	+	-	+	-
2. *Glyptotermes brevicandatus*	-	-	+	-
3. *Glyptotermes* sp.1	-	+	-	-
4. *Glyptotermes* sp.2	+	+	+	-
5. *Glyptotermes* sp.3	-	+	-	-
2. F Rhinotermitidae (2G, 7SP)				
2.1 SF Rhinotermitinae (1G, 2SP)				
6. *Schedorhinotermes medioobscurus*	+	+	+	-
7. *Schedorhinotermes rectangularis*	-	-	+	-
2.2 SF Coptotermitinae (1G, 5SP)				
8. *Coptotermes* sp.1	+	-	-	-
9. *Coptotermes gestroi*	+	+	-	-
10. *Coptotermes havilandi*	-	+	-	+
11. *Coptotermes premrasmii*	-	+	-	-
12. *Coptotermes curvignathus*	+	-	-	-
3. F Termitidae (18G, 66SP)				
3.1 SF Macrotermitinae (5G, 24SP)				
13. *Macrotermes annandalei*	+	+	+	-
14. *Macrotermes gilvus*	-	-	-	+
15. *Macrotermes chaiglomi*	-	-	-	+
16. *Macrotermes maesodensis*	-	+	-	-
17. *Microtermes obesi*	+	+	-	+
18. *Ancistrotermes pakestanicus*	+	+	+	+
19. *Hypotermes makhamensis*	+	+	+	-
20. *Odontotermes* sp.1	-	+	-	-
21. *Odontotermes sp.2*	-	-	-	+
22. *Odontotermes sp.3*	-	-	-	+
23. *Odontotermes sp.5*	-	-	-	+
24. *Odontotermes sp.8*	-	-	-	+
25. *Odontotermes sp.10*	-	-	-	+
26. *Odontotermes sp.11*	-	-	-	+
27. *Odontotermes sp.12*	-	-	-	+
28. *Odontotermes sp.13*	-	-	-	+
29. *Odontotermes sp.16*	-	-	-	+
30. *Odontotermes proformosanus*	+	+	+	+
31. *Odontotermes formosanus*	+	+	+	+
32. *Odontotermes longignathus*	-	-	-	+
33. *Odontotermes feae*	-	-	-	+
34. *Odontotermes takensis*	-	-	-	+
35. *Odontotermes maesodensis*	-	-	-	+
36. *Odontotermes oblongathus*	-	+	-	-

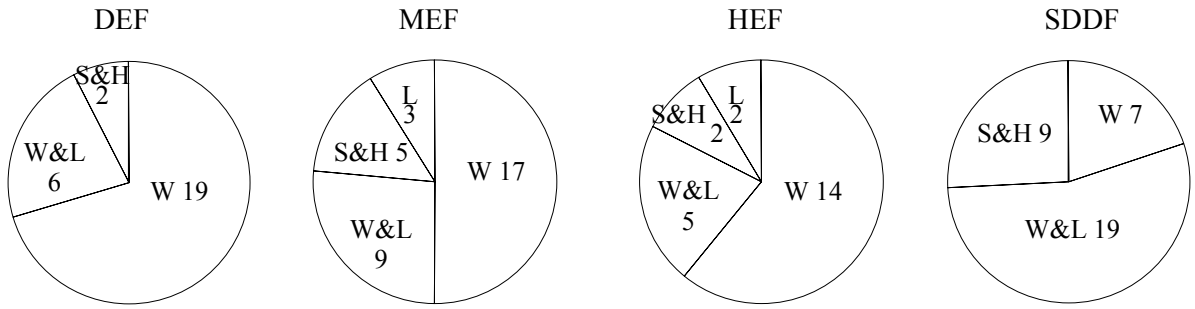
TABLE 1 (cont.) Termite genera and species recorded in four different forest types: DEF, MEF, DEF and SDDF.

Termite Genus and Species	Eastern			Western
(3F, 8SF, 21G, 51SP)	DEF	MEF	HEF	SDDF
3.2 SF Termitinae (7G,16SP)				
37 *Microcerotermes crassus*	+	+	-	-
38. *Microcerotermes distans*	+	+	-	-
39. *Microcerotermes annandalei*	-	+	-	+
40. *Microcerotermes minutus*	-	-	-	+
41. *Microcerotermes sp.1*	-	-	-	+
42. *Globitermes sulphureus*	+	+	-	+
43. *Dicuspiditermes garthwaitei*	-	-	-	+
44. *Termes cosmis*	+	+	-	-
45. *Pericapritermes* sp.C	+	-	-	-
46. *Pericapritermes* sp. E	-	-	-	+
47. *Pericapritermes* sp. F	-	-	-	+
48. *Pericapritermes* sp.G	-	-	-	+
49. *Pericapritermes semarangi*	-	-	+	-
50. *Pericapritermes latignathus*	-	-	+	+
51. *Mirocapritermes concaveus*	-	+	-	-
52. *Angulitermes* sp.	-	+	-	-
3.3 SF Apicotermitinae (2G,4SP)				
53. *Euhamitermes* sp.	-	+	-	-
54. *Euhamitermes hamatus*	-	-	-	+
55. *Speculitermes macrodentatus*	-	-	-	+
56. *Speculitermes* sp.	-	+	-	-
3.4 SF Nasutitermitinae (4G, 22SP)				
57. *Nasutitermes johoricus*	+	+	-	-
58. *Nasutitermes matangensiformis*	+	-	-	-
59. *Nasutitermes dimorphus*	-	-	-	+
60. *Nasutitermes perpavus*	-	-	-	+
61. *Nasutitermes* sp.1	+	+	+	-
62. *Nasutitermes* sp.2	+	-	-	-
63. *Nasutitermes* sp.3	+	-	-	-
64. *Nasutitermes* sp.4	+	-	+	-
65. *Nasutitermes* sp.5	+	+	+	-
66. *Bulbitermes prabhae*	-	-	-	+
67. *Bulbitermes parapusillus*	+	+	+	-
68. *Bulbitermes laticephalus*	+	+	+	-
69. *Bulbitermes sp.*	-	-	-	+
70. *Bulbitermes* sp.1	-	-	+	-
71. *Bulbitermes* sp.2	+	+	-	-
72. *Bulbitermes* sp.3	-	-	+	-
73. *Hospitalitermes ataramensis*	-	+	-	-
74. *Hospitalitermes jepsoni*	-	-	+	-
75. *Hospitalitermes* sp.3	-	+	+	-
76. *Hospitalitermes* sp.4	-	+	-	-
77. *Lacessititermes* sp.1	-	-	+	-
78. *Lacessititermes* sp.2	-	-	+	-



K = Kalotermitinae R = Rhinotermitinae C = Coptotermitinae M = Macrotermitinae
T = Termitinae A = Apicotermitinae N = Nasutitermitinae

Figure 1 Taxonomic group components of 4 different forest types and number of species in each group.



W = Wood feeder W&L = Wood & leave feeder
S&H = Soil & Humus feeder L = Lichen feeder

Figure 2 Functional group components of 4 different forest types and number of species in each group.

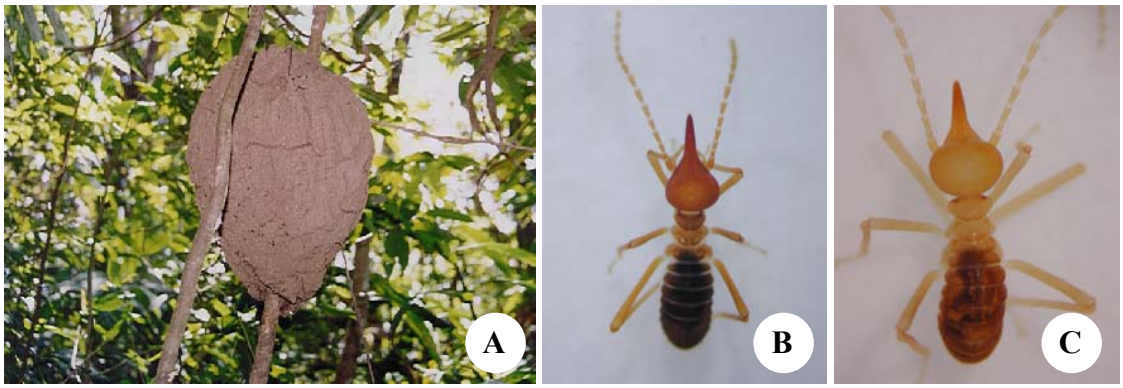


Figure 3 a: Arboreal nest of *Lacessititermes* one of new termite genera firstly recorded in Thailand in hill evergreen forest (1,080 m. alt.) Khao Kitchagoot, Chanthaburi.
b: *Lacessititermes* sp.1
c: *Lacessititermes* sp.2

Figure 4 Soil feeding termite: *Angulitermes* sp.one of new termite genera firstly recorded in Thailand in moist evergreen forest (300 m. alt.) Khao Kitchagoot, Chanthaburi. A: Whole body of soldier from above; B: Whole body of soldier from side.

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