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**The Ant Fauna of the Tomakomai Experiment Forest,
Hokkaido University (Hymenoptera : Formicidae)
with Notes on the Nuptial Season**

By

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北海道大学苫小牧地方演習林のアリ相

附：交尾時期について

市瀬克也*

Abstract

From 1983 to 1988, 31 species of ants (Ponerinae 1, Myrmicinae 12, and Formicinae 18) were collected in the Tomakomai Experiment Forest, Hokkaido University (TEF), of which eight were newly recorded: *Camponotus yessensis*, *Formica lemani*, *F. yessensis*, *Lasius crispus*, *L. teranishii*, *Leptothorax* sp. C, *Formica* sp. and an unidentified species (Gn. sp.), the last three species being new to Hokkaido. From comparison of the above result with ant faunas of other areas in Hokkaido, the following three species, *Aphaenogaster famelica*, *Camponotus quadrinotatus* and *Hypoclinea sibirica*, are expected to be discovered by further surveys in TEF. The expected species number, three, well corresponds to the species saturation curve drawn from previous successive surveys.

Keywords: Ant, Fauna, Tomakomai, Hokkaido.

Introduction

The knowledge on the local faunal make-up is helpful or often indispensable for any ecological studies of ants in the given area. Precise local surveys were, however, relatively scarce in Japan. Outside of Hokkaido, SONOBE (1977, Miyagi Pref.) and OKAMOTO (1952-1966, Shikoku Is.) are outstanding, and within Hokkaido, HAYASHIDA (1960-1972), KOGURE (1953-1971) and some other studies given in References are consulted. Evidently much more local surveys should be carried out to clarify the entire ant fauna of Japan.

During May, 1983-September, 1988, I had opportunities to collect ants in the Tomakomai Experiment Forest (TEF). Obviously the result must be still incomplete, but

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the number of species remaining undiscovered could be approximated from the species saturation curve. Further, the species which will be discovered in future could be predicted from comparison of the obtained result with previous records in other areas of Hokkaido. I applied these two procedures to the obtained result. Notes on the season of nuptial flight in certain species are also added to.

Methods

I collected ants, both workers and sexuals, by digging soil with a trowel or a shovel, or by sweeping off shrubs. The species were identified by keys in the following papers: IMAI (1971, *Aphaenogaster*), KOGURE (1971, general), SONOBE (1971, *Formica*; unpubl., *Myrmica*), YAMAUCHI (unpubl., species in Hokkaido). Except *Myrmica*, most scientific names correspond to those in the check list by KUBOTA (1971). Sexuals were also casually collected on shrubs or ground in the daytime, or under mercury lamps at night.

Results

Table 1 compiles the species collected, involving one species of Ponerinae, 12 of Myrmicinae and 18 of Formicinae. The following eight species were newly recorded from the Experiment Forest (TEF): *L. sp. C*, *C. yessensis* and *L. crispus* in 1983, *L. teranishii* in 1984, Gn. sp. in 1985, *F. lemani* and *F. sp.* in 1986, and *F. yessensis* in 1988.

Table 1 also shows the incidence of nuptial flights by ponerine and myrmicine species only in September while that by formicine species in June (*Camponotus* spp., *Formica japonica* and *Paratrechina flavipes*) and August (*Lasius* spp.), probably reflecting the phyletic relation in the evolution of life histories (ICHINOSE, 1987).

Discussion

The cumulation of successive surveys in TEF from IMAMURA (1976), via TODA et al. (1987) to the present study shows a saturation curve (Fig. 1), of which upper limit is about 34 species, hence the number of species remained undiscovered is about three. This assumption is untenable if the local extinction of some species occurred, but such situation is not much likely in TEF as various habitats have been well conserved there.

I will infer the species which might be added to the ant fauna of TEF on the basis of specific distribution in Hokkaido. The species which are expected to occur in TEF must have the distributional range, of which northern and southern limits respectively exist north or south of TEF. There are five species as such candidates: *Aphaenogaster famelica*, *Camponotus quadrinotatus*, *Crematogaster matsumurai*, *Hypoclinea sibirica* and *Lasius sakagamii*. However, *C. matsumurai* is very rare, has been recorded only from Shikotan Island (TERANISHI, 1931) and Fukushima (MORISITA, 1945). *L. sakagamii* prefers bare or sandy habitats (YAMAUCHI and HAYASHIDA, 1970) which are virtually absent in TEF.

Excluding these species, the other three are rather widely distributed (Fig. 2) as recorded by HAYASHIDA (1960, 1963, 1964, 1971, 1972), KOGURE (1953, 1958, 1959,

Table 1. List of ant species in the Tomakomai Experiment Forest

Subfamily Species	Relative abundance	Preferred habitats	Nuptial flight observed
Ponerinae			
<i>Ponera japonica</i> WHEELER	+++	f, g	September
Myrmicinae			
<i>Aphaenogaster japonica</i> FOREL	+++	f, g	September
<i>Leptothorax congruus</i> SMITH	++	g	?
<i>L. spinosior</i> FOREL	+	g	?
<i>L. sp.</i> B ⁽¹⁾	+++	f	September
<i>L. sp.</i> C**	+	f	September
<i>Myrmecina graminicola</i> WHEELER	+++	f, g	September
<i>Myrmica jessensis</i> FOREL	++	g	September
<i>M. ruginodis</i> NYLANDER	+++	f, g	September
<i>M. sp.</i> ⁽²⁾	+++	b, g	September
<i>Pheidole fervida</i> SMITH	++	f, g	September
<i>Stenamamma nipponense</i> YASUMATSU & MURAKAMI	++	f, g	September
Unknown species**	—	g	?
Formicinae			
<i>Camponotus japonicus</i> MAYR	+++	g	June
<i>C. obscuripes</i> MAYR	++	f, g	June
<i>C. yessensis</i> TERANISHI*	—	g	?
<i>Formica fukaii</i> WHEELER	+	g	?
<i>F. japonica</i> MOTSCHULSKY	+++	b, g	June
<i>F. lemani</i> BONDROIT*	++	f	?
<i>F. sanguinea</i> LATREILLE	+	g	?
<i>F. yessensis</i> FOREL* ⁽³⁾	—	f	?
<i>F. sp.</i> ** ⁽⁴⁾	—	f	June
<i>Lasius crispus</i> WILSON*	+	g	August
<i>L. flavus</i> (FABRICIUS)	+++	g	August
<i>L. fuliginosus</i> (LATREILLE)	+	f	August
<i>L. hayashi</i> YAMAUCHI & HAYASHIDA	+++	f	August
<i>L. niger</i> (LINNAEUS)	+++	b, g	August
<i>L. spathepus</i> WHEELER	+	f	August
<i>L. teranishii</i> WHEELER*	+	f	August
<i>L. umbratus</i> (NYLANDER)	++	f	?
<i>Paratrechina flavipes</i> (SMITH)	+++	f, g	June

Relative abundance: +++ abundant, ++ common, + rare, — very rare.
Habitat: b bare land, g grassland, f forest. Single asterisk indicates new records from the Tomakomai Forest, and double asterisks new records from Hokkaido.

Notes

- (1) Corresponding to *L. sp.* in Toda et al. (1987).
- (2) Japanese name=Shigakushike-ari.
- (3) Found only in a reforestation of *Larix kaempferi*.
- (4) Japanese name=Hayashikuroyama-ari.

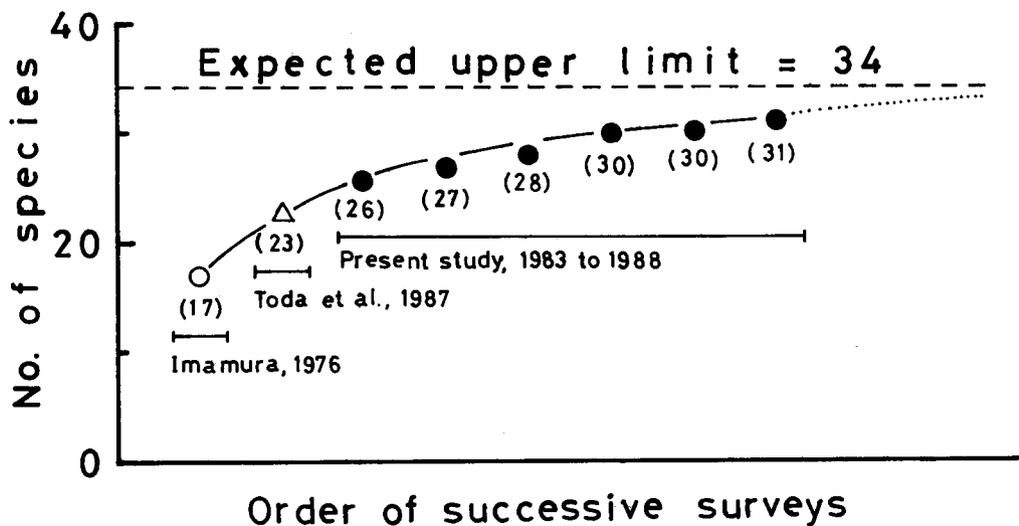


Fig. 1. The upper limit of the cumulative number of ant species to be discovered in the Tomakomai Experiment Forest (broken line), estimated from the successive results by IMAMURA (1976), TODA et al. (1987) and the present study.

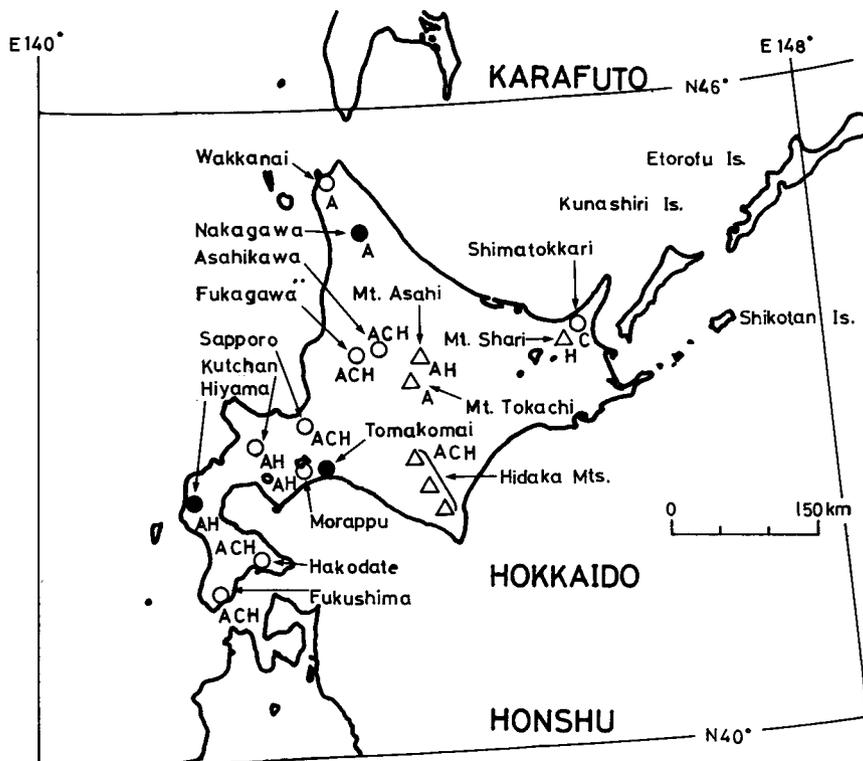


Fig. 2. Distribution of three ant species, *Aphaenogaster famelica* (A), *Camponotus quadrinotatus* (C) and *Hypoclinea sibirica* (H), in three Experiment Forests compared, (closed circle), other (open circle), and mountainous areas (open triangle).

Table 2. Lists of ants from the Hiyama (HEF), Tomakomai (TEF) and Nakagawa (NEF) Experiment Forests of Hokkaido University

Subfamily Species	HEF	TEF	NEF
Ponerinae			
<i>Ponera japonica</i>		+	
Myrmicinae			
<i>Aphaenogaster famelica</i> (SMITH)	+		+
<i>A. japonica</i>	+	+	+
<i>Leptothorax congruus</i>		+	
<i>L. spinosior</i>		+	
<i>L. sp. A</i>	+		
<i>L. sp. B</i>		+	
<i>L. sp. C.</i>		+	
<i>Myrmecina graminicola</i>		+	
<i>Myrmica jessensis</i>	+	+	+
<i>M. ruginodis</i>	+	+	+
<i>M. sp.</i>		+	+
<i>Pheidole fervida</i>	+	+	
<i>Stenamma nipponense</i>	+	+	
<i>S. owstoni</i> WHEELER	+		
Unknown species		+	
Dolichoderinae			
<i>Hypoclinea sibirica</i> (EMERY)	+		
Formicinae			
<i>Camponotus japonicus</i>	+	+	
<i>C. obscuripes</i>	+	+	+
<i>C. yessensis</i>		+	
<i>Formica fukaii</i>		+	+
<i>F. japonica</i>	+	+	+
<i>F. lemani</i>		+	+
<i>F. sanguinea</i>		+	
<i>F. yessensis</i>	+	+	
<i>F. sp.</i>		+	
<i>Lasius crispus</i>		+	
<i>L. flavus</i>	+	+	+
<i>L. fuliginosus</i>	+	+	+
<i>L. hayashi</i>	+	+	+
<i>L. niger</i>	+	+	+
<i>L. sakagamii</i> YAMAUCHI & HAYASHIDA	+		
<i>L. spathepus</i>	+	+	
<i>L. teranishii</i>	+	+	+
<i>L. umbratus</i>	+	+	+
<i>Paratrechina flavipes</i>	+	+	
Total species number	22	31	15

1960), MIZUTANI (1978), MORISITA (1945), SONOBE (1971).

Since *A. famelica* is widespread in Hokkaido (Fig. 2, A) despite of its relative rarity (YAMAUCHI, unpubl.), its occurrence in TEF is likely. The same possibility exists for *C. quadrinotatus* and *H. sibirica* (Fig. 2, C and H). Thus these species may be the best candidates for three species probably to be added to the ant fauna of TEF.

Table 2 presents the ant faunas of three Experiment Forests, Hokkaido University studied by HAYASHIDA (1971, Nakagawa E. F.=NEF northern Hokkaido), MIZUTANI (1978, Hiyama E. F.=HEF, southern Hokkaido) and the present result (=TEF). The order NEF-TEF-HEF approximately corresponds to the north-south climatic gradient. To compare the ant faunas of the three forests, I calculated the NOMURA-SIMPSON'S coefficients between each pair of forests. The values are arranged in the descending order of $0.93(\text{TEF}/\text{NEF}) > 0.80(\text{HEF}/\text{NEF}) > 0.77(\text{HEF}/\text{TEF})$. This indicates the relatively isolated position of HEF compared with TEF and NEF, possibly reflecting a skewed north-south inclination in ant distribution, i. e., most northern species attain southward Honshu whereas few southern species reach northward central Hokkaido (KOGURE, 1953, 1971; KUBOTA, 1971). In fact all species found in NEF are distributed also either HEF or TEF, or both but several species found in the latter two are absent in NEF. For further precise comparison more local surveys are requested.

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要 約

1983年より1988年にかけてのアリの採集により、ハリアリ亜科1, フタフシアリ亜科12, ヤマアリ亜科18の計31種が苫小牧演習林から記録された。このうち次の8種は同演習林からの新記録である。ケブカクロオアリ (*Camponotus yessensis*), ヤマクロヤマアリ (*Formica lemani*), エゾアカヤマアリ (*F. yessensis*), フシボソクサアリ (*Lasius crispus*), テラニシケアリ (*L. teranishii*), さらにムネボリアリの1種 (*Leptothorax* sp. C), ヤマアリの1種 (*Formica* sp.) 及び所属不明の1種 (Gn. sp.) でこのうち *F.* sp., *L.* sp. C 及び Gn. sp. の3種は北海道からの新記録でもある。

本演習林のアリ相を北海道各地の既往の調査結果と比較した結果、今後本演習林から新たに記録される可能性のある種としてアシナガアリ (*Aphaenogaster famelica*), ヨツボシオオアリ (*Camponotus quadrinotatus*) 及びシベリアカタアリ (*Hypoclinea sibirica*) の3種が推定された。この種数3は本演習林において過去に行われたアリ相調査より得られた種数飽和曲線からの期待数とよく一致する。