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Author(s)	HAYASHIDA, Kazuo
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Ecological Distribution of Ants in Sapporo and Vicinity (Preliminary Report)¹⁾

By

Kazuo Hayashida

(Zoological Institute, Hokkaido University)

(With 2 Text-figures)

On the ecological distribution of ants, extensive studies have been carried out in Europe (Gösswald '32, Goetsch '37) and in North America (Talbot '34, Dennis '38), but not so many have been made in Japan, especially in Hokkaido. In the present paper, some observations made by the writer during 1956 will be described as a preliminary report with regard to the relation of ants to their habitats about Sapporo.

Species collected

Sapporo City is situated in the Ishikari Plain, which was originally covered with coniferous and deciduous forests. In the course of exploitation during past 80 years, the plain has now been almost entirely covered into urban districts and cultivated land chiefly consisting of crop fields. The writer divided the area into the following categories which are used subsequently in Tables 1 and 2: W: woods (co: coniferous, d: deciduous), S: scrub and wood margins, H: herbaceous or grassy lands and B: bare areas. Moreover, in order to indicate minor local differences, the following abbreviations are employed in combination with the above symbols: c: crop field and road sides, m: mountain sides and hilly areas, p: pasture, sa: sandy area and su: summit. From these areas, the writer collected 24 spp. of ants as listed in Table 1, including more than a half of all ant species recorded up to the present from Hokkaido.

Environmental conditions and distribution

The species collected are arranged in the order of relative abundance and listed in Table 1, together with the degree of co-existence with five dominant species and the habitats preferred by each species. The habitat-preference is further subdivided into four items and shown as a tentative list in Table 2, from which the preference of each species for various factors can be more clearly recognized. For example, *Leptothorax congruus spinosior* and *Myrmica ruginodis* stand on opposite sides with respect to the optimum humidity. Even the commonest

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Table 1. Species collected about Sapporo

	Specific name (abbrev.)	Degree of co-existence with dominant species(%)					Habitat preferred
		F	L	M	Lg	Ph	
Dominant spp.	<i>Formica fusca japonica</i> Motschulsky (F)	—	96	42	46	58	B(c,sa,su) H(p,m,sa)
	<i>Lasius niger niger</i> Linné (L)	100	—	37	54	62	B(c,su) H(p,m), S
	<i>Myrmica lobicornis</i> var. <i>jessensis</i> Forel (M)	100	82	—	36	36	B(c,su), Hp
	<i>Lasius fuliginosus</i> (Latreille) (Lg)	92	100	31	—	77	S, W(co,d)
	<i>Pheidole fervida</i> Smith (Ph)	100	100	27	67	—	H(p,m), S
Less abundant spp.	<i>Paratrechina flavipes</i> (F. Smith) (Pa)	100	92	50	58	67	Bc, Hp
	<i>Myrmica ruginodis</i> Nylander (Mr)	100	100	36	55	91	Bsu, H(p,m), S
	<i>Camponotus herculeanus ligniperda</i> var. <i>obscripes</i> Mayr (C)	100	100	36	82	82	S, Hm, W(co,d)
	<i>Aphaenogaster famelica</i> (F. Smith) (A)	100	91	36	82	64	H(p,m), S
	<i>Camponotus herculeanus japonicus</i> Mayr (Cj)	100	100	50	40	60	B(c,su), S
	<i>Formica truncorum yessensis</i> Forel (Fi)	86	71	71	14	43	Bsu, Hsa, W(co,d)
	<i>Camponotus caryae</i> var. <i>quadrinotatus</i> Forel (Cc)	100	100	37	62	88	S, Wd
	<i>Lasius brunneus</i> (Latreille) (Lb)	85	100	43	86	71	Wd
	<i>Lasius flavus</i> (Fabrisius) (Lv)	87	100	25	62	75	Bc, Hp, S
	<i>Formica sanguinea</i> var. <i>fusciceps</i> Emery (Fs)	86	71	71	14	43	Bsu, Hsa, W(co,d)
Relatively rare spp.	<i>Leptothorax congruus spinosior</i> Forel (Lc)						B(sa,su)
	<i>Dolichoderus quadripunctatus sibiricus</i> Emery (D)						S
	<i>Vollenhovia emeryi</i> Wheeler (V)						S
	<i>Solenopsis fugax</i> Latreille (S)						Bsa
	<i>Camponotus herculeanus vagus</i> var. <i>yessensis</i> Teranishi (Cv)						S
	<i>Lasius umbratus</i> (Nylander) (Lu)						S
	<i>Tetramorium caespitum iacoti</i> Linné (T)						Hsa
	<i>Crematogaster laboriosa</i> Smith (Cr)						W(co,d)
<i>Ponera scabra</i> Wheeler ¹⁾ (P)						S	

1) New record to Hokkaido.

species, *Formica fusca japonica*, shows a distinct positive preference for light and hence does not enter deeply into the woods. On the other hand, *Formica truncorum yessensis* prefers a certain degree of shade; the writer observed the migration of an entire colony of this species from a pasturage to an about 30 m distant pile of weeds, caused by a sudden change of conditions due to the cropping out. As the cultivation proceeds, many species may lose suitable habitats and disappear as a local population or migration gradually in seeking more suitable localities.

Generally speaking, the habitats most preferred by the ants are the wood margins, and the least one is the sandy bare areas. The following 3 species only, *F. fusca japonica*, *L. niger niger* and *M. lobicornis jessensis*, were collected from the stony river-side of the River Toyohira, running through Sapporo City.

Under a certain combination of environmental factors, the distribution of

Table 2. Habitat preference of ant species

		Bc	Bsa	Bsu	Hp	Hsa	Hm	S	Wd	Wco	No. of spp.
Light intensity	high	M, F, L Pa, Cj	S, F Lc	M, Lc, Cj	Ph, L Pa, F	F	L, F	Cj, Fs F, D			10
	moderate			F, L, Ft Mr, Fs	Mr, A	Ft	Ph	Lb, Lg, A. Cc, Ln, L	Lg, Lb Cc, Ft	Ft	11
	low				Lv	T	A, C Mr	P, V, C Lv, Ph	Cr, C	Cr, C	9
Moisture conditions	low	M, F Cj	S Lc	M, Cj, Lc Fs, Ft	Ph, F	Ft, F	L, F	D, C, F, L Cj, Fs, Cc	Cc, Ft		12
	moderate	Pa, L	F	Mr, L, F	A, L, F Mr, Pa	F, T	A, C, F Mr, Ph	Ph, Lv, Lg P, Lu, Lb	Cr, Lg Lb, C	Cr, C Ft	14
	high			Mr	Lv, A			Mr, V			4
Nest sites	in soil	M, Pa F, Cj	Lc F	Mr, M, Lc, F Ft, Cj, Fs	A, L, F Ph, Pa	T, F Ft	A, F Ph	Ph, Lu, F Fs, Cj	Lb, C	Ft, C	15
	under stones	Pa, L Lv	S		Lv		L	Lv, Lg			5
	under piled matters	L	S	Mr, L	Mr, Pa	T	Mr, L Ph	P, Mr A, Ph	Ft	Ft	10
	in living trees							D, Lg C, Cc	Cr, Lg Lb, C	C, Cr	6
	in fallen wood & stumps						L, C	Mr, V, A Cj, L, C	C	C	6
Foraging areas	ground	M, L, F Pa, Cj	Lc F	Mr, M, L, F Ft, Fs, Lc	Mr, L Ph, F Pa, A	T, F Ft	Mr, A Ph, L F, C	P, Lu, F C, Fs, Mr Cj			16
	flower tops				Pa, L Cj, F	F	F				4
	trees							Lb, Cr, F Lu, Lg, L Cc, D, C	Cr, Lg Cc, Ft Lb, C	Cr Ft C	10
No. of species		5	4	8	7	3	6	16	6	3	24 in total

each species shows a fairly clear pattern. Three examples will be described herewith.

(1) There is a small wood, about 50×60 sq m, consisting of elm plus maple and its surroundings in the campus of our University. The wood forms a shade, has bamboos and grasses growing as sparse undergrowth and is surrounded by

crop-fields and scrubby growths. The following five species are found within the wood, viz., *Camponotus herculeanus ligniperda* var. *obscripes*, *C. caryae* var. *quadri-notatus*, *Lasius fuliginosus*, *L. niger niger* and *Ponera scabra*; in the surrounding area there are found *Formica fusca japonica*, *Pheidole fervida*, *Lasius umbratus*, *L. niger niger*, *Myrmica ruginodis* and *M. lobicornis* var. *jessensis* (Fig. 1). The segregation of habitat seems to be due to food and light.

(2) At the top of Mt. Maruyama (226 m) in Sapporo City there is a small rocky cliff which is surrounded by trees south- and westwards. The cliff is frequently visited by humans. In this small area of about 5×10 sq m, the following species are recorded (Fig. 2). *Formica fusca japonica* and *F. truncorum yessensis* are dominant inhabitants, while *Myrmica ruginodis* and *Leptothorax congruus spinosior* can live in safety in the *Formica*-territory. *Camponotus herculeanus japonicus* seen during spring and summer, disappears in autumn, probably attacked by *Formica fusca japonica*. In the surrounding wood, there are found two species, *Camponotus herculeanus ligniperda* var. *obscripes* and *Dolichoderus quadripunctatus sibiricus*, which do not approach to the open area. The distribution seems to be

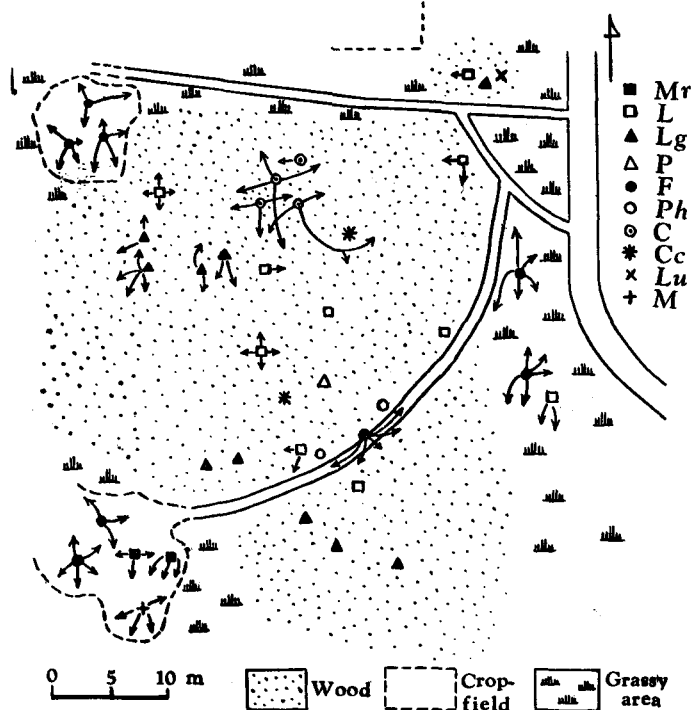


Fig. 1. Ants in a small wood and its surroundings in the University

due to the light and secondarily to humidity and interspecific interference.

(3) Along the beach of Garugawa, near Sapporo, a shelter belt of oak woods is formed about 100 m back from the beach. In the wood, *Formica truncorum yessensis* alone is found. On the sand beach, *Formica fusca japonica* inhabits most exclusively. This clear segregation is very impressive when one counts the relative abundance of each species from the beach towards the wood. In this case, light and interspecific relation influence the distribution.

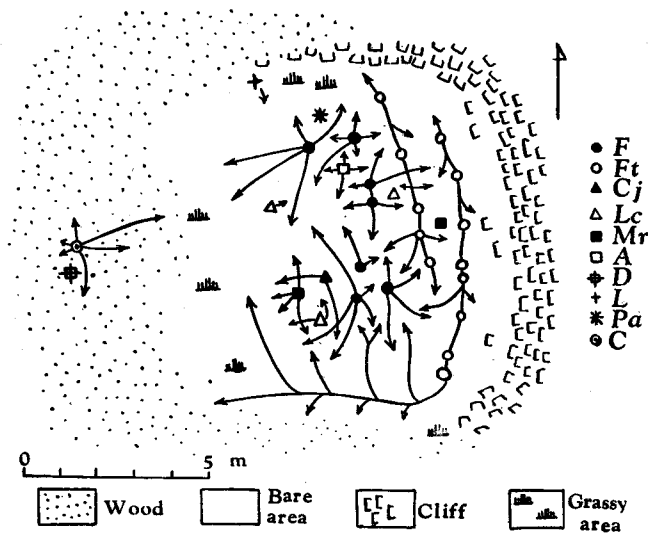


Fig. 2. Ants on the top of Mt. Maruyama

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