Fleshy Fungi in the Mountain Zone Forest in Japan

By

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Introduction

Japan has small area and extends from 25°N to45° N. The most of islands are covered by colline zone forests. Therefore, this country is rich in edible fungus. Particularly in the forests belonging to colline or mountain zone, the fungus society is composed of *Agari cales, Aphyllophorales* and many other fungi. Fungus is influenced by the biological cnvironment, because the fungus is heterotrophic. Investigations for all the year round show that fungus society is composed of common floristic composition under a habitat.

The authors investigated these fungus societies in Japan and some regions of southeast Asia. We reported previously about the principal fungus societies of Japanese colline zone forests. We deal with the results of our investigation of fleshy fungus societies in the forest of *Betula platyphylla* var. *japonica* of Japanese colline zone in this paper.

Methods of Investigation for Fungus Society

1) All survey area were investigated from the physiognomical and compositional point of view. These regions were devided into several uniform groups. The survey areas were set from the result of abstruction from these groups.

2) As the quantitative survey of fungus society, density, frequency, abundance and coverage were measured. The dispersion of species was calculated from relative density, abundance and frequency (A/F).

3) Coverage is important to calculate the dominancy. Therefore, the latter was calculated from the area of fairy ring of fungus in this paper

4) Fungus grows centrifugally from the point of hyphal mass.
Habitat of a species of fungus can be recognized by accumulation of the data of growth point through the year round. Especially, the habitat of the fungi which form the fruit ring is obvious. The area of this habitat was regarded as coverage.

5) Dominance was calculated from the abundance and coverage by the method of Braun-Blanquet (1964) as a value which indicated collectively the extent of dminancy in fungus community.

6) As the qualitative survey, the sociability was measured by the method of 5-steps of Braun-Blanquet. Namely, plants grow 1: separarely, 2: in groups, 3:

in large groups, 4: in the state of fragmentary mat and 5: cover the stand in the state of a large mat.

7) Species forming mycorrhiza was also surveyed as much as possible.

8) The most important environmental factor, plant society of forest was also investigated.

9) A practical application of a theory of the survey for forest floor plants in the higher plant society was made. Further, calculation of the coverage was carried out by measurement of the fairy ring.

10) These data were arranged into tables of composition, and the unit was determined in accordance with the method of determination of unit for higher plant society.

Plant Society in the Forest in which Fungus Grows

The forests of *Betula platyphylla* var. *japonica* develop, as the secondary forest of mountain zone, under inland climate on the highlands from Hokkaido to the central of Japan. These forests, on the central district of Japan proper, are secondary vegetations which are on the way of succession to the forests of *Fagus crenata, Quercus mongolica* var. *grosseserrata* or *Abies homolepis, Saseto-Beturetum platyphyllae* MINAMIKAWA-1968 Subass. *Miscanetosum* MINAMIKAWA and Subass. *Populetosum* MINAMIKAWA develop under this environment.

In this paper we deal with fungus societies in stable forests of *B. platyphylla* var. *japonica* which develop on relatively damp foot of mountain in Akigami (Asahi v., Gifu Prefecture), Hiwada (Takane v.), Mt. Dando (Aichi Prefecture) and Mennoki pass. Compositions of these forests, as in table 1, belong to *Saseto-Betuletum platyphyllae* MINAMIKAWA in which the characteristic species are *B. platyphylla* var. *japonica, Populus maximowiczii, Q. mongolica* var. *grosseserrata, Prunus grayana. B. grossa, Vibrnum opulus* var. *cadvescens, Sasa kurilensis, Malus toringo* and *Rhododendrron japonicum.*

Fungus Society in *Betula platyphylla* var. *japonica*

Fungus communities in these forest were surveyed by 10 quadrat of 10×10m per one survey area extending from 1967 to 1970. These results are summerized in table 2.

Fungus societies are composed mainly of 25 species belonging to following genera, namely, *Amanita* (*Amanitaceae*, 3 species), *Cortinarius* (*Cortinariaceae*, 5 species), *Russula* and *Lactarius* (*Russulaceae*), *Boletus* and *Leccinum* (*Boletaceae*), and *Tricholoma* (*Tricholomataceae*). This community is dominated by *Amanita muscaria* followed by *Cortinarius armillatus, C. Pholideus, Leccinum scabrum, Russula aerugina, R. cyanoxantha, R. foetens, Lactarius toriminosus, Tricholoma sejunctum, Boletus edulis, C. phoeniceus* and *Lactarius volemus.* The species forming mycorrhiza in these forests are *A. muscaria, C. hemitrichus,*

C. pholideniceus, R. aeruginea, Lactarius torminosus, T. sejunctum and *T. ustale. C. elatior, R. cyanoxantha, R. foetens, Leccinum* and *Boletus edulis* form the mycorrhiza with *B. platyphylla* var. *japonica, Q. mongolica* var. *grosseserrata* and *B. grossa.* As shown in table 3, fungus society is the unit of *Cortinario-Amanitetum muscariae* in which the characteristic species are *A. muscaria, C. armillatus, C. pholideus, C. phoeniceus, C. hemitrichus, C. elatior, R. aeruginea, R. cyanoxantha, R. foetens, Leccinum scabrum, Lactarius torminosus* and *T. sejunctum. Tricholomopsis sasae* and *Hygrophorus coccineus* develop frequently on the forest floor where *Sasa kurilensis* mingles with *B. platyphylla* var. *japonica.*

Table 1 Summarized community table of *Cortinario Amanitetum muscariae*

Species	Density	Frequency	Relative-density	A / F	Coverage	Sociablity
Amanita muscaria	96.3	E	21.6	0.96	4	5
A. rubrovolvata	6.3	C	1.4	0.24	1′	1
A. phalloides	5.6	C	1.2	0.22	1	2
Cortinarius armillatus	53.0	E	11.9	0.53	2	4
C. pholideus	43.2	D	9.7	0.67	2	4
C. hemitrichus	9.6	C	2.1	0.26	1	2
C. phoeniceus	10.6	C	2.3	0.29	1	2
C. elatior	20.5	D	4.6	0.41	1	4
Russula cynoxantha	21.3	D	4.8	0.33	1	4
R. aeruginea	24.6	E	5.5	0.30	1	4
R. foetens	18.8	D	4.2	0.38	1	4
Lactarius torminosus	16.5	C	3.7	0.45	1	4
L. volemus	10.6	C	2.3	0.29	1	4
Leccinum scabrum	29.8	E	6.7	0.36	1	4
Boletus edulis	12.3	C	2.7	0.34	1	3
Leccinum aurantiacum	5.3	C	1.1	0.21	1′	1
Tricholoma sejunctum	15.5	C	3.4	0.43	1′	3
T. ustale	9.0	C	2.0	0.25	1	2
T. flavobrunueum	8.6	C	1.9	0.23	1	2
T. virgatum	6.2	C	1.3	0.17	1′	1
Tricholoma portentosum	3.9	C	0.8	0.15	1′	1
Tricholomopsis sasae	6.0	C	1.3	0.24	1′	1
Rhodophyllus murraii	4.8	C	1.0	0.19	1′	1
Clitopilus prunulus	3.9	C	0.8	0.15	1′	1
Rozites caperatus	6.2	C	1.3	0.24	1′	1

Frequency class A : below 20% B : 21～40% C : 41～60% D : 61～80% B : 81～100%

Summary

As one of the fungus sociological investigations of fleshy fungus growing on mountain zone in japan, forests of *Betula platyphylla* var. *japonica* were surveyed with a practical application of a theory of the survey for forest floor plants

Table 2 Asummerized association table of *Saseto-Betuletum platyphyllae*

Locality		I						II		III			
		A		B		C		D	E	F		G	
Altitude(m)		763		1110		625		620	760	1120		1109	
Exposition		S E 13°		W S 11°		S E 11°		W S 15°	S E 18°	W S 13°		W S 30°	
Steepness		7°		10°		8°		6°	4°	10°		12°	
Percentage of vegetational cover (First tree layer)m/%		12	70	15	90	14	70	13 50	12 70	15	85	16	90
(Shrub layer)m/%		3	20	2	10	2	20	2.5 15	3 10	4	20	3	30
Numbers of quadrat		96	99	90	93	104	105	95	102	107	109	120	121
Numbers of species		31	29	30	28	30	31	35	34	31	33	29	30
Belula platyphylla var. *japonica*	stairs B-1.2	3・4	4・4	5・5	5・5	4・4	4・4	3・3	3・3	3・4	4・4	4・4	5・5
Quercus mongolica var. *grosseserrata*	B-1,2	1・1	1・1	1・1	2・2	1・2	1・2	1・1	1・1	1・1	+	1・1	1・1
Betura grossa	B-1,2	1・1	1・1	1・1	1・1	1・1	1・1	+	+	+	1・1	1・1	+
Prunus grayana	B-1,2	1・1	1・1	1・1	1・1	1・1	+	1・1	1・1	1・1	+	1・1	1・1
Viburnum furcatum	B-2,5	1・1	1・1	+	+	1・1	1・1	1・1	1・1	+	+	1・1	1・1
Malus toringo	S	+	+	+	+	+	+	+	+	+	+	1・1	+
Viburnum opulus var. *cadvescens*	S	+	+	+	+	+	+	+	+	+	+	+	+
Ligustrum tschonoskii	S	+	+	+	+	+	+	+	•	+	+	+	+
Rhododendrron japonicum	S	+	+	+	+	+	+	1・1	1・1	•	+	•	•
Sasa kurilensis	S	2・2	1・1	2・2	1・1	2・2	3・3	1・1	+	+	1・1	+	1・
Miscanthus sinensis	K	•	•	•	+	•	+	2・2	2・3	•	+	+	•
Pteridium aquilinum var. *latiusculum*	K	•	•	•	+	•	•	+	+	•	•	•	•
Solidago virgaurea asiatica	K	•	+	•	+	+	•	+	+	+	+	+	•
Polygonum cuspidatum	K	•	•	+	+	•	+	+	+	•	•	+	+
Hydrangea paniculata	S	•	+	•	•	•	•	+	+	+	•	+	•
Potentilla freyniana	K	•	+	•	•	•	+	+	+	•	•	•	•
Haloragis micrantha	K	•	+	•	•	•	+	+	+	•	•	•	•
Arundinella hirtta	K	•	•	•	+	•	•	+	+	•	•	+	•
Populus maximowiczii	B-1,2	•	•	+	•	•	+	+	•	2・2	2・3	3・3	2・2
Alnus hirsuta var. *sibirica*	B-1,2	•	•	+	•	•	+	•	•	1・1	+	1・1	+
Dryopteris crassirhizoma from. *maackii*	K	+	•	+	•	+	•	•	•	+	1・1	+	+
Geum japonicum	K	•	•	•	+	•	•	•	•	+	+	+	+
Elatostema involucralum	K	•	•	•	•	•	•	•	•	+	+	+	+
Swertia bimaculata	K	•	•	•	•	•	•	•	•	+	−	+	+
Tiarella polyhylla	K	•	•	+	•	+	•	•	•	+	−	+	+

A・E : Ôhara, B・F・G : Akigami, C : Hiwaba, D : Nagano

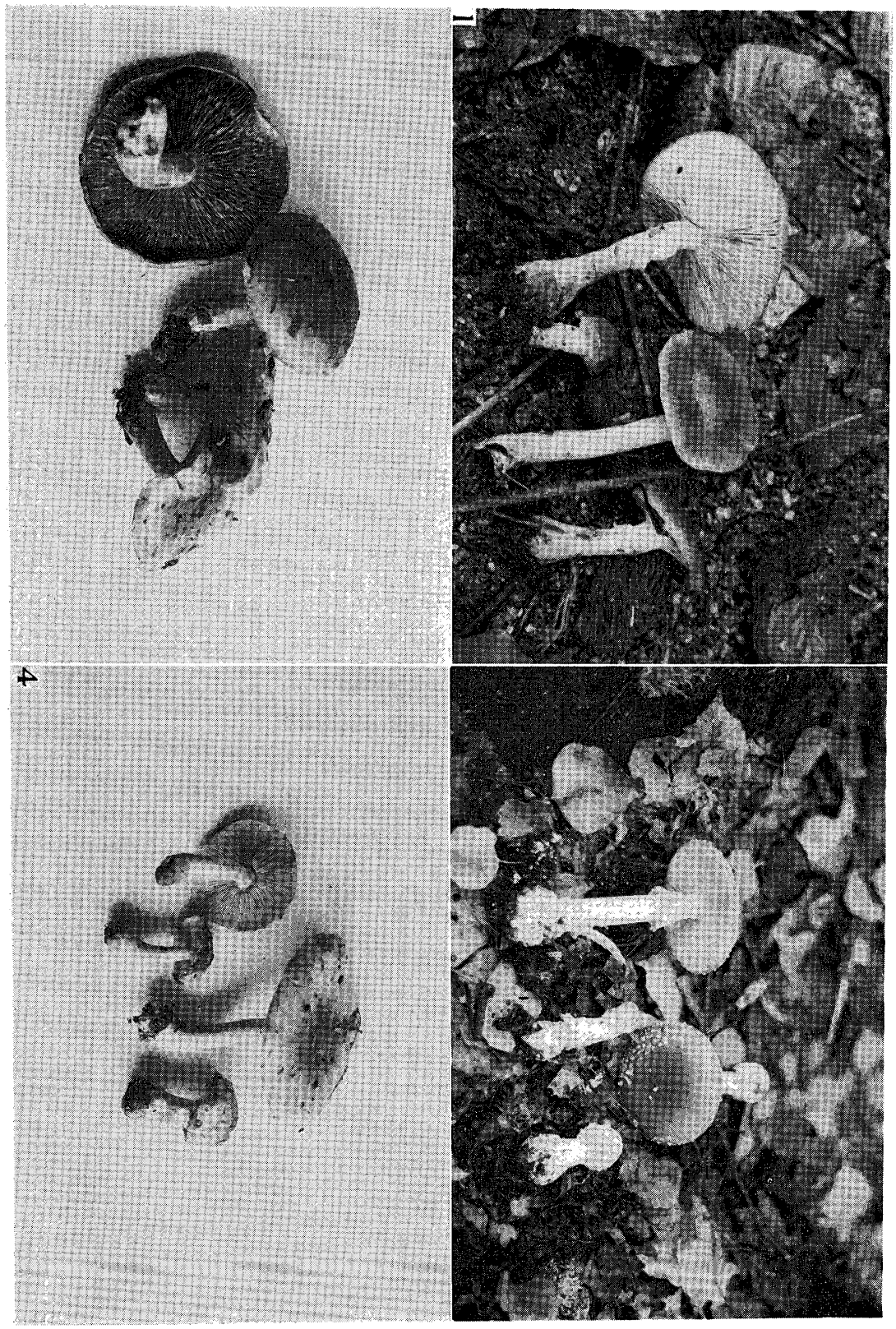
extending from 1967 to 1970. Coverage was measured with fairy ring as a new method, and the unit of fungus society was classified from this result.

1) Mainly 25 species of fungus compose societies in *Betula platyphylla* var. *japonica*.

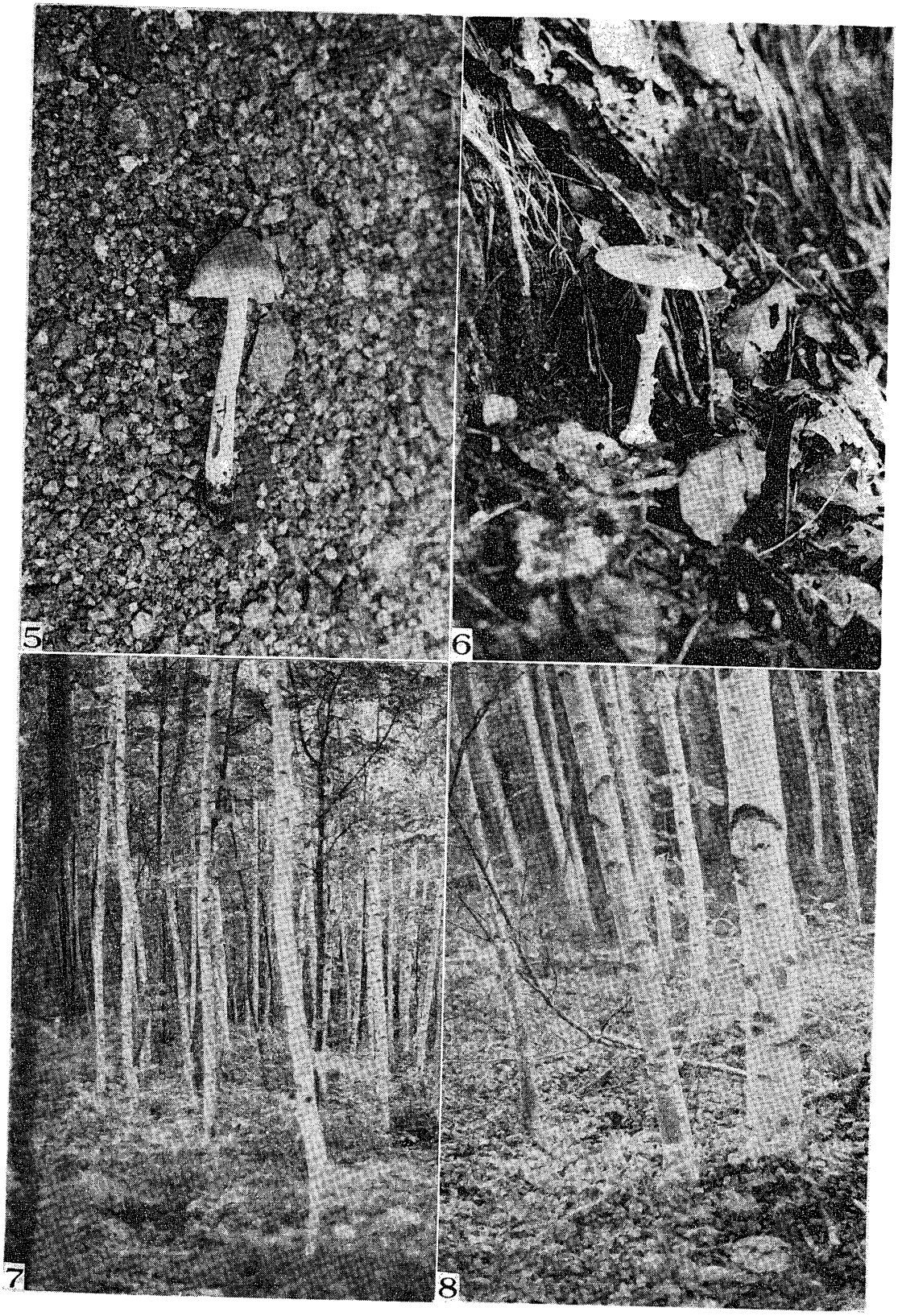
2) Most of the characteristic species form the mycorrhiza with *B. grossa* or *Quercus mongolica* var. *grosseserrata*.

3) The unit can be classified into *Cortinario-Amanitetum muscariae* in which the characteristic species are *Amanita muscaria* and other 11 species.

4) *Tricholomopsis sasae* are observed frequently on the forest floor abundant in *Sasa kurilensis*.



1) *Russula foetens*
2) *Amanita muscaria*
3) *Cortinarius armillatus*
4) *Fricholoma flavovirens*



5) *Rhodophyllus murraii*

6) *Amanita rubrovolvata*

7•8) View of the Vegetation in *Betula platyphylla* forest