POLLEN ASSEMBLAGE OF PEAT INTERCALATED IN THE SHADAI AND THE MORINO VOLCANIC GROUP, PLEISTOCENE IN AGE

by

Sumio KUMANO and Yaeko IGARASHI

(with 3 tables, 1 text-figure and 1 plate)

(Contribution from the Department of Geology and Mineralogy, Faculty of Science, Hokkaido University, No. 1238)

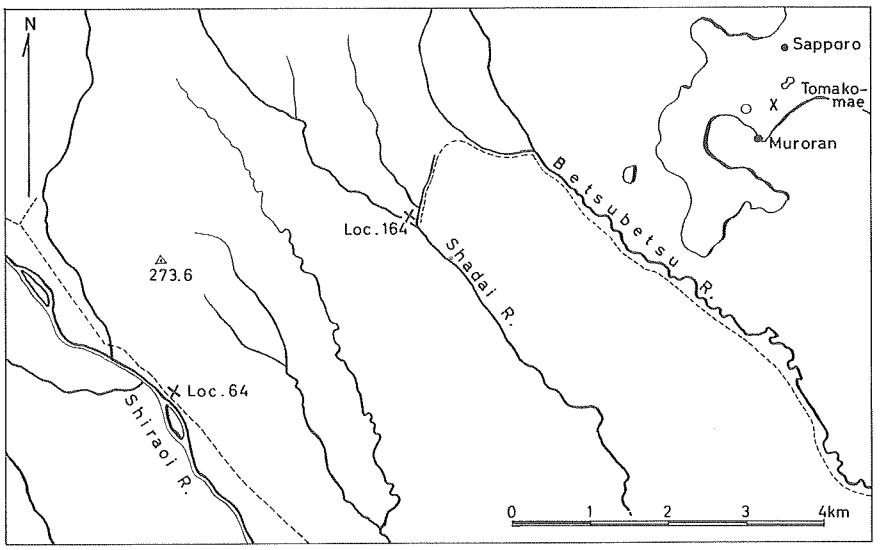
The samples treated in this study have been collected from peat layers in the Shadai pumiceous gravel (S3) belonging to the Shadai volcanic group and from the base of the pumice fall deposit (M1b) belonging to the Morino volcanic group respectively, both typically developed in the Upper reaches of rivers in the province around the Shiraoi town facing the volcanoe bay in Hokkaido (Fig. 1). The stratigraphical position* of these samples will be shown in the table 1.

Table 1. Pleistocene pumiceous volcanic complexes developed in the Shiraoi town in descending order

The Shikotsu volcanic group	
The Morino volcanic group	
Morino pumiceous gravel M 3	
Morino pumice flow M 2	
Morino pumice fall M 1d	Morino pumice fall M 1
Morino pumice fall M 1c	
Morino pumice fall M 1b*	
Morino pumice fall M 1a	
Morino pyroclastics M O	
Shadai pumiceous gravel (S 3)*	
Shadai pumice flow (S 2)	
Shadai pumice fall (S 1)	
The Ponayoro volcanic group I and II	
The Noboribetsu volcanic groups	

As to the correlation of the volcanic groups listed up in the table 1, it is described in detail in the paper to be presented in the same number of this volume by M. MINATO, S. HASHIMOTO, Y. FUJIWARA, S. KUMANO and S. OKADA. Briefly speaking, the Shadai volcanic group may be presumably correlated to certain ice age, while the Morino volcanic group may be roughly estimated to represent either the sub-interstedial during the Riss ice age or the younger Riss ice age. Namely, the horizon of the Shadai volcanic group, from which the samples were collected (specimen no. 164) is now believed to be some time during the lower Riss ice age. The horizon of peat in the Morino volcanic group actually lies at the base of white ash with pisolites, having been grouped as M1b.

Sampled localities are shown in the text-fig. 1.



Text-fig. 1: Localities for sampling.
Loc. 64: Peat at the base of the Morino pumice fall with pisolites (M1b) in the Morino volcanic group. Specimen number: 64.
Loc. 164: Peat in the Shadai pumiceous gravel (S 3) of the Shadai volcanic group Specimen number: 164.

Result of pollen analysis

The authors have carried out palynological studies on the samples collected from those two localites and different horizons. Percentage of pollen of each forest tree observed under microscope will be shown in the table 2, although there are also present non-arboreal pollen, and spores as will be listed in the table 3.

In the horizon of the Shadai volcanic group (S3), pollen bellonging to

Table 2. Association of pollen of the forest trees.

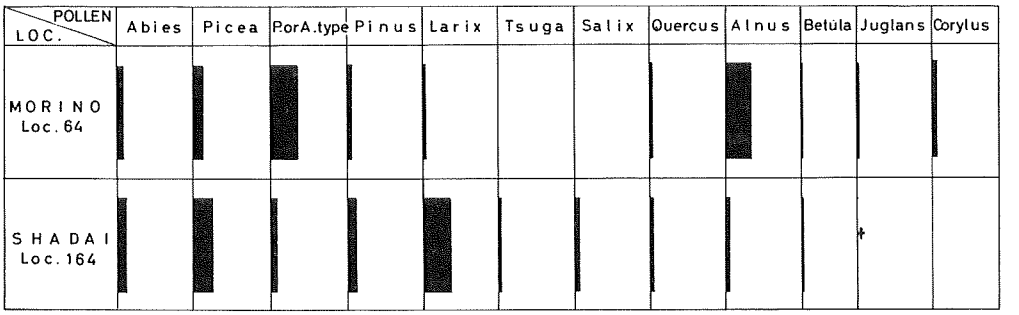
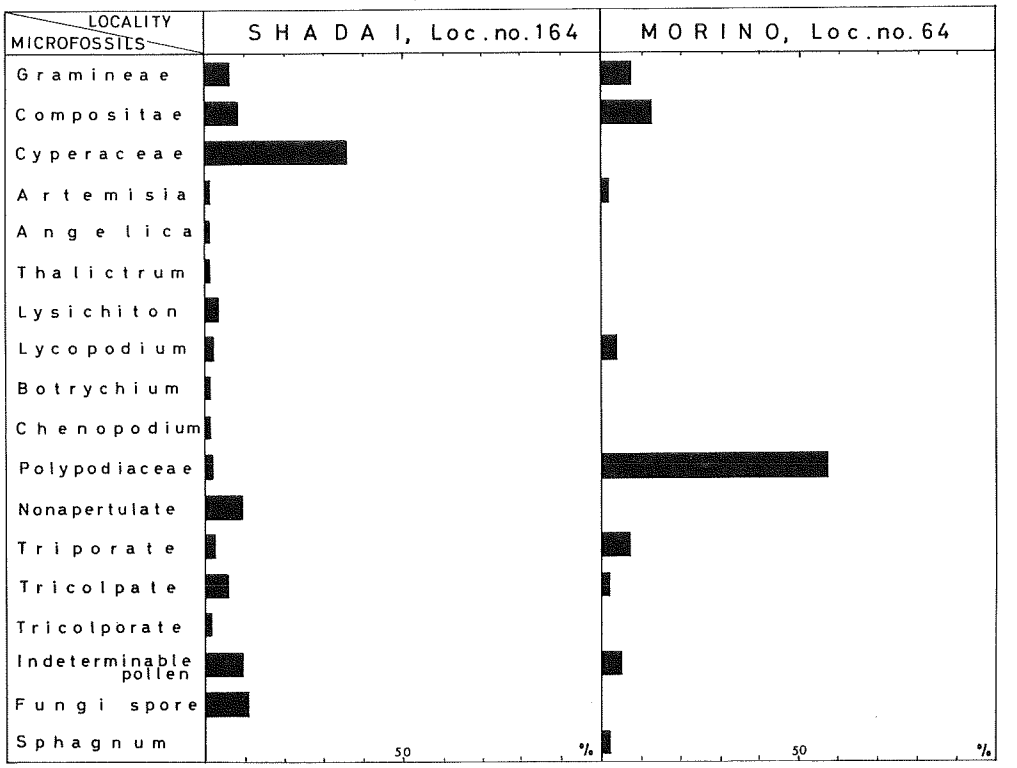


Table 3. Non-arboreal pollens and spores.



conifers among the entire forest trees reach 85%; amongst conifers, *Larix* occupies about 35%; and *Picea* a little exceeds than *Abies* in number of pollen. Temperate forest trees such as *Juglans* and *Quercus* are less in amount amongst broad leaf trees. From an association of pollen above stated, the genus *Larix* is supposed to represent *Larix Gmelinii* GORDON, *Picea* may be *Picea jezoensis* CARRIÉRE, while *Abies* must be *Abies sachalinensis* MASTERS. Further, pollen

identied as *Pinus* is supposed to be chiefly consisting in dwarf pine tree, *Pinus pumila* REGEL in origin. Such being the case, forest composed of such trees stated in the foregoing lines should be greatly different in association of trees, from the present forest now observable in the province, where the samples were collected.

As a matter of fact, a forest inferred by pollen analysis is belonging to the type of forest represented by *Picea* > *Abies* with *Larix Gmelinii* GORDON, which is now extensively developed in the Kurile islands, and south Sachalien near the Schmidt's line. Accordingly the fossil forest should indicate very colder climate than the present. For the sake of estimation of the difference of climatic condition between the age of the Upper Shadai group and the present, the authors compared the climate between the middle Sachalien and the Tomakomai city not far from Shadai in the Shiraoi town, which will be shown below.

	January	August	Mean Temp.	Pre-cipitation
Poronaysk (Middle Sachalien)	−17.1°C	16.1°C	0.3°C	604.9mm
Tomakomai city	−6.8°C	19.4°C	6.0°C	1350.5mm

As a result, in the past climate of the upper Shadai age it might be about 10°C lower in winter, 3°C lower in summer, 6°C in annual mean than the present while it might be remarkably less in precipitation.

As to the result of pollen analysis of the lower horizon of the Morino volcanic group, conifers a little exceeds than 50% of the entire forest trees, *Picea* is larger than *Abies* in number of pollen; further *Alnus* pollen reach about 31%, and temperate forms as *Quercus* and *Juglans,* are present besides *Corylus.* Such temperate forms a little exceed than in the case of Shadai volcanic group. Accordingly it is quite evident, that the climate of the Morino age(age of M1b) was far warmer than that of the Shadai age (age of S3). However, conifers are eventually larger in amount than the broad leaf trees and *Larix* is evidently accompanied with the forest of the Morino age. Hence, the forest reconstructed from the pollen analysis, may indicate the climate of the Morino age (M1b) to have been comparable to the northern part of Hokkaido at present. Amongst pollen of *Picea* in the Morino pumice fall, two species seem to have been in origin: *Picea Glehnii* and *Picea jezoensis,* while *Larix* pollen may be *Larix Gmelinii.*

In comparison between the climate of the northern part of Hokkaido and

the sampled locality (the Otoineppu town and the Tomakomai city), past temperature in January, might be about 3. 6°C lower than the present, about 0.8°C lower in the annual mean; but in summer time. it might be probably 0.9°C higher than the present. In addition to this, it might be far larger in precipitation during the age of the base of M 1b.

Such being the case, climatic condition of the lower Morino age, (to speak more precisely, the base of the M1b) seems to have been not greatly different from the present day in the province, now in concern, although it might be slightly colder than the present at least so far as annual mean and winter temperature is concerned.

Before closing this short note, the authors wish to thank Mr. T. TAKAHASHI for his help in sampling. They are also very much obliged to Professor M. MINATO, for his help in field work and in preparation of this paper.

References

IGARASHI, Y. and KUMANO, S (1971): Zoning of the Horokayanto formation by Pollen Analysis. Science Report of Historical Museum of Hokkaido, 1, p. 63-70. (In Japanese with English Summary)

SAROBETSU RESEARCH GROUP (1960): Quaternary Deposits in the Wakkanai-Sarobetsu Basin, Northern Hokkaido. Quaternary Research, vol. 5, no. 1. (In Japanese with English Summary)

TATEWAKI, M. and IGARASHI T. (1971): Forest Vegetation in the Teshio and the Nakagawa District Experiment Forests of Hokkaido University, Prov. Teshio, N. Hokkaido, Japan. Research Bulletins of the College Experiment Forests, College of Agriculture, Hokkaido University, vol. 28, no. 1.

YAMAZAKI, T. (1951): Studies on the Changes of the Forests and the Climate in Southern Sachalien and Hokkaido, based on Pollen Analysis. Bulletin of the Kyoto University Forests, no. 21. (In Japanese).

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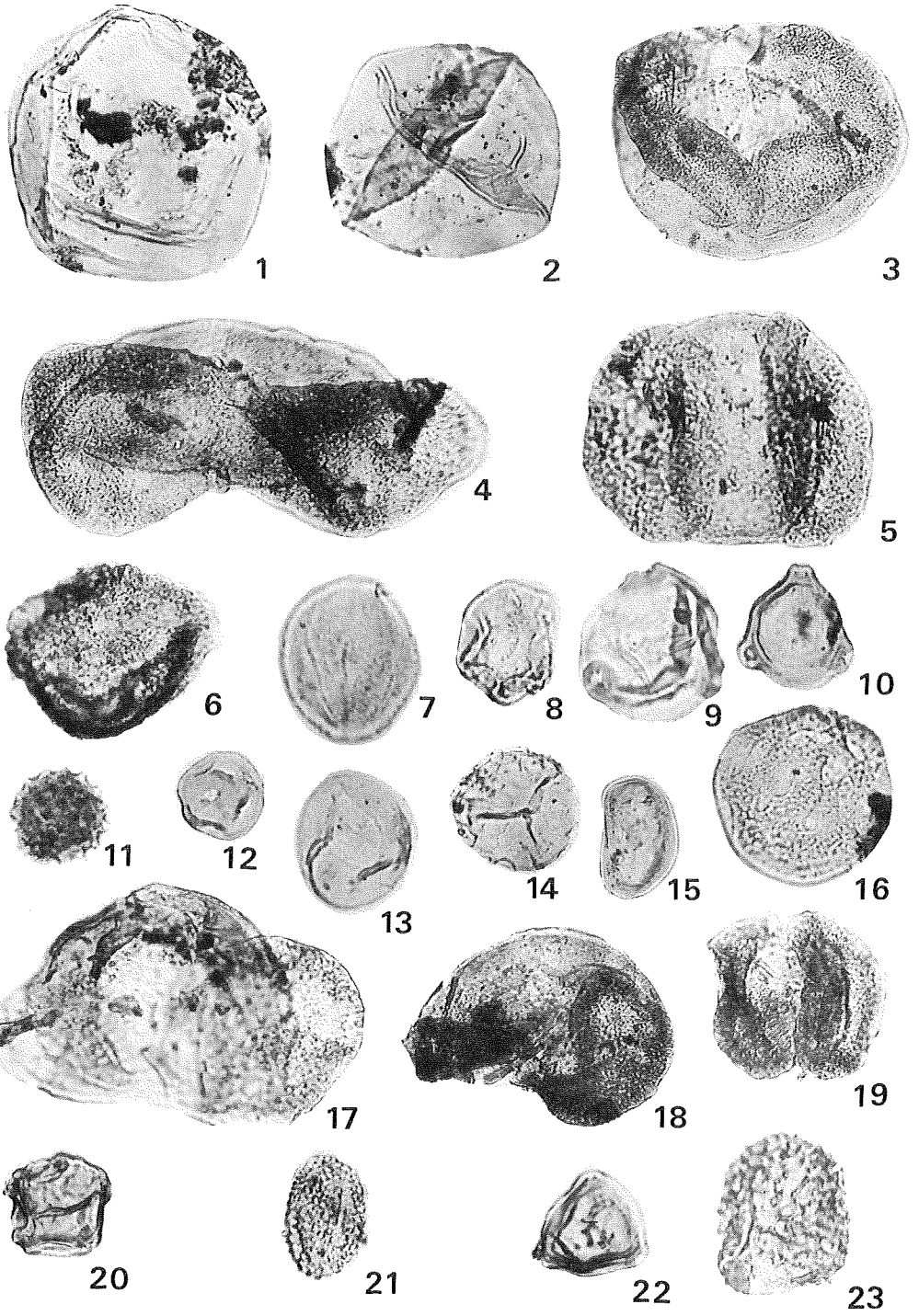
Explanation of Plate 1

Fig. 1.	*Larix*	400X	106X98μ	Loc. 164 (Shadai)
Fig. 2.	*Larix*	400X	89X89μ	Loc. 164 (Shadai)
Fig. 3.	*Picea*	300X	142X91μ	Loc. 164 (Shadai)
Fig. 4.	*Abies*	400X	125X60μ	Loc. 164 (Shadai)
Fig. 5.	*Pinus*	600X	60X45μ	Loc. 164 (Shadai)
Fig. 6.	*Tsuga*	400X	76X	Loc. 164 (Shadai)
Fig. 7.	*Quercus*	600X	40X35μ	Loc. 164 (Shadai)
Fig. 8.	*Alnus*	600X	25X31μ	Loc. 164 (Shadai)
Fig. 9.	*Betula*	600X	40X	Loc. 164 (Shadai)
Fig. 10.	*Betula*	600X	30X	Loc. 164 (Shadai)
Fig. 11.	Compositae	400X	35X	Loc. 164 (Shadai)
Fig. 12.	*Thalictrum*	600X	22X	Loc. 164 (Shadai)
Fig. 13.	Gramineae	600X	20X30μ	Loc. 164 (Shadai)
Fig. 14.	*Lycopodium*	400X	49X	Loc. 164 (Shadai)
Fig. 15.	Polypodiaceae	400X	47X17μ	Loc. 164 (Shadai)
Fig. 16.	indet.	600X	42X	Loc. 164 (Shadai)
Fig. 17.	*Abies*	400X	101X85μ	Loc. 64 (Morino)
Fig. 18.	*Picea*	300X	110X80μ	Loc. 64 (Morino)
Fig. 19.	*Pinus*	400X	42X56μ	Loc. 64 (Morino)
Fig. 20.	*Alnus*	400X	40X	Loc. 64 (Morino)
Fig. 21.	*Salix*	600X	28X21μ	Loc. 64 (Morino)
Fig. 22.	*Betula*	400X	40X	Loc. 64 (Morino)
Fig. 23.	*Lycopodium*	600X	41X	Loc. 64 (Morino)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