

# Pollenanalyses from Two Pliocene Beds in Shikoku.

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(With 2 Tables and Figures)

In Shikoku district there are many beds including plant remains, but their palaeontological characteristics are not fully known.

Among them the Mitani clay bed (40 m above the sea level) situated 1 km, south of Mishima-machi, Pref. Ehime, is 40 cm thick, lying between the upper gravel layer and the lower shale.

The Ananai bed (60 m above the sea level), 2 km west of Akimachi, Pref. Kochi, is 50 cm thick, lying in the grey shale. Its geological age has been believed to correspond with the Nahari lignite beds reported in the previous paper.

In this paper these two beds were studied palinologically.

The method of analysis is the same as in the previous paper.

## RESULTS

Results obtained are shown in the following tables and pollen diagrams.

Table 1 Pollen frequencies from the Mitani bed.

Pollen types \ Depth, cm	0	10	30	30	40
<i>Metasequoia</i>	30.0	35.8	48.0	49.7	46.0
<i>Pinus</i>	14.7	15.0	11.0	6.7	9.2
<i>Picea</i>	20.6	1.3	4.5	10.8	10.5
<i>Abies</i>	14.0	7.8	1.5	1.7	7.0
<i>Taxodium</i>	4.0	9.8			1.0
<i>Tsuga</i>	2.0		1.5	1.7	9.8
<i>Sciadopitys</i>	0.5		1.5	1.1	
<i>Glyptostrobus</i>	7.9	8.8		1.6	1.2
<i>Larix</i>	0.5			0.6	0.4
<i>Fagus</i>	0.5	9.1	22.5	17.3	8.3
<i>Quercus</i>	1.0	2.0	3.0		0.4
<i>Alnus</i>	2.9	2.7	3.0	3.3	2.6
<i>Carpinus</i>		0.7			0.8
<i>Ulmus</i>	0.5	2.6		3.8	0.8
<i>Nyssa</i>		2.0	2.0		0.4

<i>Celtis</i>			0.4
<i>Magnolia</i>			0.8
<i>Fraxinus</i>	0.5		0.6
<i>Betula</i>		0.7	
<i>Rhus</i>		0.7	
<i>Ericaceae</i>		1.5	
<i>Gramineae</i>	0.5		1.1 0.4

Table 2 Pollen frequencies from the Ananai bed.

Pollen types	Depth, cm				
	0	15	30	40	50
<i>Metasequoia</i>	3.6		2.9	1.3	
<i>Pinus</i>	9.3	7.0	6.9	5.3	7.2
<i>Picea</i>	13.9	13.4	17.9	10.0	9.6
<i>Abies</i>	2.7	3.2	3.4		0.8
<i>Taxodium</i>	9.3	8.3	6.3	8.0	8.8
<i>Tsuga</i>	0.9	1.2	2.9		3.2
<i>Larix</i>		0.6	0.5		0.8
<i>Fagus</i>	41.7	33.9	37.1	58.9	54.4
<i>Quercus</i>	5.5	6.4	9.2	8.7	5.6
<i>Carpinus</i>	0.9	5.1	3.4	1.3	1.6
<i>Ulmus</i>			0.5	1.3	1.6
<i>Nyssa</i>	0.9	2.5	0.5		0.8
<i>Betula</i>		0.6			
<i>Pterocarya</i>		0.6	0.5		0.8
<i>Tilia</i>		0.6			
<i>Rhus</i>	8.3	7.6	5.8	3.3	4.0
<i>Sorbus</i>		0.6			
<i>Ilex</i>			0.5	0.7	0.8
<i>Ericaceae</i>	0.9	1.2			
<i>Gramineae</i>	9.3	11.5	5.2	4.6	4.8

1) The Mitani bed: *Metasequoia* is the most predominant species throughout the layers, but it declines in amount in the upper layers. While *Pinus*, *Picea* and *Abies* increase upwards, *Fagus* which is considerably abundant in the middle layers, decrease remarkably in the upper ones. Other broad-leaved trees are scarce and are of less importance excepting *Nyssa* the presence of which is worth noting.

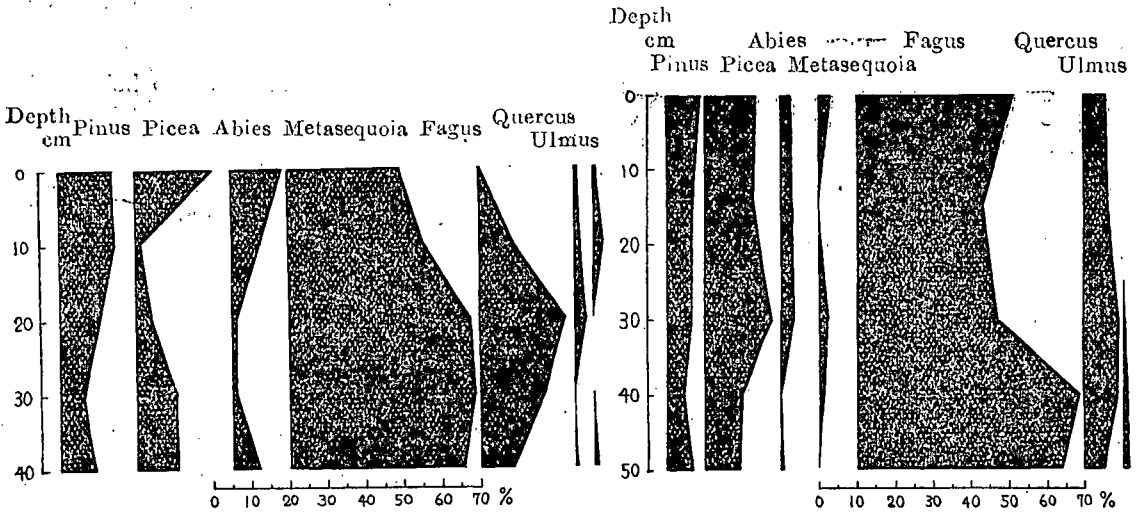


Fig. 1 Pollendiagram from the Mitani bed

Fig. 2 Pollendiagram from the Ananai bed

2) The Ananai bed: *Fagus* is predominating throughout, diminishing in the upper layers. While *Quercus* remains rather constant, *Pinus*, *Picea* and *Taxodium* which are relatively abundant tend to increase in the upper layers. *Tsuga*, *Abies*, *Metasequoia*, *Nyssa* and *Pterocarya* are identified discontinuously in low percentage.

From the results of investigation of both beds we find an interesting fact that the decrease of deciduous forests in the upper parts of both beds denotes a climatic deterioration and that their floral composition shown in both beds is similar to that of the present community at the height of about 1000 m in this district.

The presence of *Metasequoia* and *Nyssa* which have become extinct since the Pliocene indicates that both beds may correspond with the Pliocene. But some warmth loving species such as *Liquidambar*, *Caryx* and *Cunninghamia* found in the Nahari lignite are not seen already in these beds.

From this fact it may be inferred that they were deposited in cooler climate and in younger stages than in the Nahari lignite beds.

Furthermore in the comparison between the two beds the Mitani bed shows a dominance of conifer forest in all the layers, while the Ananai bed a dominance of deciduous forests mixed with some pine and spruce, so their ages of deposition seem to be different from each other. But more detailed correlation of these beds still remains for the future when many more analytical results have been obtained.

### SUMMARY

Two Pliocene beds including fossil plants, the Mitani clay bed and the Ananai bed, were studied palinologically.

As the results of pollen analysis, the former bed shows a *Metasequoia* forest stage and

the latter a *Fagus* forest stage, throughout. But the deciduous forest tends to decrease upward in both beds.

Their floral composition is similar to that of the present community at the height of about 1000 m in Shikoku district.

These two beds are younger than the Nahari lignite beds in geological age.

In conclusion many thanks are due to Mr. T. Yamanaka and other colleagues for their assistance in collecting materials.

#### LITERATURE CITED

J. Nakamura (1951) Fossil pollen in the Nahari lignite. *Reports of the Kochi University, Natural Science, 1.*

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