

65. *Palynological Study of a 200-meter Core Sample  
from Lake Biwa, Central Japan. II*

*Palaeoclimate during the 100,000–300,000 Years B.P.\*)*

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**Introduction.** The present writer reported on the outline of the palaeoenvironmental, especially palaeovegetational and palaeoclimatic, changes around Lake Biwa during the last 600,000 years on the basis of the palynological analysis of samples taken at intervals of 5 m on a 200-meter core (Fuji and Horie, 1972; Fuji and Horie, 1977) drilled in 1971 at the bottom of 65 m below the present lake water level of Lake Biwa. In addition, the writer stated on the detailed palaeovegetation and palaeoclimate during the present –100,000 years B.P. on the basis of the palynological analysis of samples taken at intervals of 25 cm over the upper 55 m of the same core (Fuji, 1976a).

In this article, the writer will debate minutely on the palaeoclimatic change during an age from 100,000–300,000 years B.P. from the view point of a palynology. The samples analysed for this investigation were used about 200 samples which were taken at intervals of about 25 cm throughout the middle part from 55–110 m of the 200-meter core.

**Palynological study.** The samples for the palynological study were treated by the HF-KOH-acetolysis method, and by a saturated solution of  $ZnCl_2$ .

For the reconstruction of palaeovegetation on the basis of the pollen analysis, the writer depends upon two methods, namely, (1) pollen spectra of the modern samples collected throughout the Japanese Islands (Fuji, 1976b); and (2) the classification of plants by the warmth index (Kira and Iida, 1958), that is, the Subpolar or Subalpine plants, the Cool Temperate plants, the Cool Temperate-Temperate plants, plants in the middle area of the Cool Temperate zone and in the Warm Temperate zone, and plants in the southern area of the Temperate zone and in the Warm Temperate zone.

According to the writer's palynological study, the middle part,

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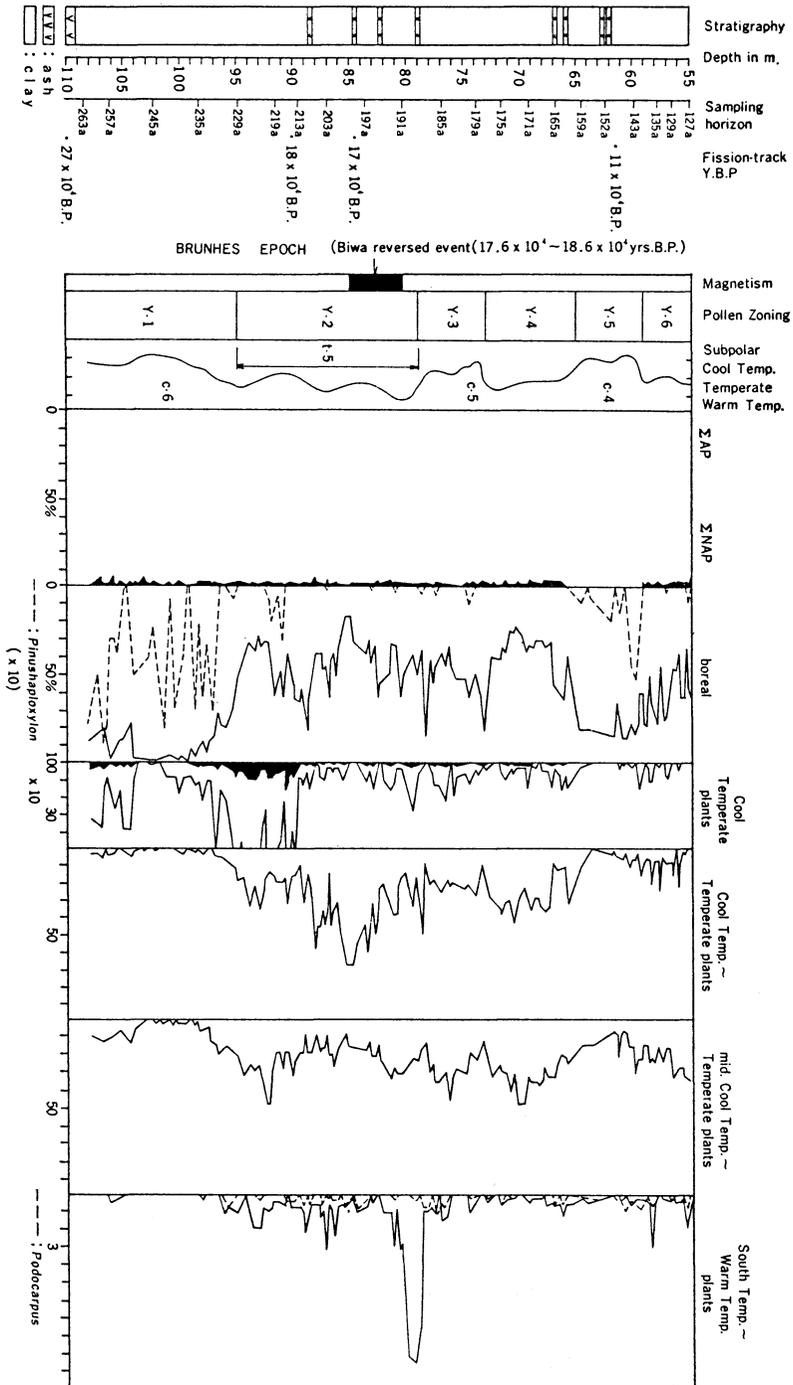


Fig. 1. Summary pollen diagram and palaeoclimatic curve during the about 100,000-300,000 years before the present (palaeomagnetism date: Kawai *et al.*, 1972. Fission-track data: Nishimura *et al.*, 1975).

55–110 m in the depth, of the core is divided into six pollen zones by differences of pollen assemblage, namely, Y-1, Y-2, Y-3, Y-4, Y-5 and Y-6 zones.

Pollen zone Y-1 (110–97 m in the depth of the core; the estimated year: 270,000–220,000 y.B.P.) is characterized by a high percentage of the boreal conifers (reaching about 90% on average). In contrast, the other plants are very few. The main element of this zone is *Abies-Tsuga-Picea-Pinus haploxylon*-type. Therefore, judging from such assemblage, the climate at the time of this zone might have been similar to that in the northern part of the Cool Temperate zone, and corresponds to the “C-6” of the writer’s previous paper (Fuji, 1976b).

The pollen assemblage of the lowermost part (about 220,000–200,000 y.B.P.) of Pollen Zone Y-2 (97–79 m, 220,000–155,000 y.B.P.) is shown by the Subpolar or Subalpine plants (1.0%), the boreal conifers (50%), the Cool Temperate plants (6%), the Cool Temperate-Temperate plants (24%), and the southern area of the Temperate-Warm Temperate plants (1%). As this zone is characterized by a drastic decrease of the boreal conifers, and by the abundance of plants of the Cool Temperate-Temperate zones, the climate of this zone may have been corresponded to that of the southern area of the Cool Temperate-Temperate zones.

The lower part (about 200,000–180,000 y.B.P.) of Pollen Zone Y-2 is featured by an abundance of the plants thriving in the Cool Temperate zone. The climate suggested by the pollen assemblage from this pollen zone may have been cooler than that of the lowermost part of Pollen Zone Y-2.

The middle part (about 180,000–162,000 y.B.P.) of Pollen Zone Y-2 is characterized by the smallest value of the Subpolar-type plants and the largest amount of the plants growing in the Cool Temperate-Temperate zones.

In the upper part (about 162,000–155,000 y.B.P.) of Pollen Zone Y-2, the plants in the southern area of the Temperate-Warm Temperate zones have the highest value, and in contrast, the plants of the Subpolar and the Cool Temperate zones show a smaller value. Therefore, the climate at the time of this pollen zone was perhaps similar to the climate of the southern area of the Temperate-Warm Temperate zones.

This Y-2 Pollen Zone is correlated with the “t-5” mentioned in the present writer’s previous paper (Fuji, 1976b).

Pollen Zone Y-3 (79–73 m, 155,000–135,000 y.B.P.) is characterized by a decrease of the plants in the southern area of the Temperate-Warm Temperate zones and by an increase in the value of

the boreal conifers. Accordingly, the climate at the time of this pollen zone may have been climatic condition as the middle area of the Cool Temperate zone.

Pollen Zone Y-4 (73–65 m, 135,000–115,000 y.B.P.) is characterized by a decrease of the boreal conifers and the plants of the Cool Temperate zone. The climate at the zone may have been same to that of the northern area of the Temperate zone.

Pollen Zone Y-5 (65–59 m, 115,000–100,000 y.B.P.) is characterized by a drastic increase of the boreal conifers and by an increase of the plants of the Cool Temperate-Temperate zones. The climate of this zone may have been as climate of the northern area of the Cool Temperate zone, and corresponds to the “c-4” of the writer’s previous investigation (Fuji, 1976b).

Pollen Zone Y-6 (59–55 m, 100,000–90,000 y.B.P.) shows a drastic increase of the plants in the Cool Temperate-Temperate zones and in the middle area of the Cool Temperate-Temperate zones, also an abrupt decrease of the boreal conifers. The climate at that time may have been similar to that of the middle area of the Cool Temperate zone or that of the northern area of the Temperate zone.

### References

- Fuji, N. (1973): Proc. Japan Acad., **49**, 737.  
— (1976a): Paleolimnology of Lake Biwa and the Japanese Pleistocene, **4**, 316.  
— (1976b): *ibid.*, **4**, 357.  
Fuji, N., and S. Horie (1972): Proc. Japan Acad., **48**, 500.  
— (1977): *ibid.*, **53**, 139.  
Kawai, N., K. Yaskawa, T. Nakajima, M. Torii, and S. Horie (1972): *ibid.*, **48**, 186.  
Kira, T., and K. Iida (1958): *Seibutsu to Kankyo* (ed. Tamiya *et al.*). Kyoritsu-shuppan K.K., Tokyo, 231 pp.  
Nishimura, S., and T. Yokoyama (1975): Paleolimnology of Lake Biwa and the Japanese Pleistocene, **3**, 138.