Palynological Studies on the Pleistocene Sediments of Ipponsugi in the Northern Part of Sendai City, Japan

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Sadako Takeuti

(With 1 plate, and 3 text-figures)

INTRODUCTION AND ACKNOWLEDGEMENTS

The Quaternary sediments distributed in and around Sendai City are classified into six units which are, from the older to younger, the Motoisago Gravel, Aobayama Formation, Dainohara Terrace Deposits and Medeshima Volcanic Ash, Sendai Kamimachi Terrace Deposits, Sendai Nakamachi Terrace Deposits, and Sendai Shitamachi Terrace and Coastal Plain Deposits (Nakagawa *et al.*, 1960). Among them, the Pleistocene Aobayama Formation, Dainohara Terrace Deposits and Sendai Kamimachi Terrace Deposits are intercalated with the peaty layers whose pollen floras have been briefly reported by Sohma (1960; Nakagawa *et al.*, 1961). The Pleistocene sediments of Ipponsugi can be correlated to the Sendai Kamimachi Terrace Deposits distributed in Sendai City.

The writer wishes to express her gratitude to Professor Enzo Kon'no of the Institute of Geology and Paleontology, Tohoku University, for his guidance and encouragement during the writer's study. The writer is indebted to Professor Kotora Hatai of the same institute for his valuable advice. She also wishes to extend her hearty thanks to Dr. Hisao Nakagawa of the same institute and to Dr. Kankichi Sohma of the Biological Institute, Tohoku University for their kind help and encouragement.

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GEOMORPHOLOGY AND STRATIGRAPHY

The Pleistocene sediments of Ipponsugi are distributed in the valley heads in the drainage area of the Nanakita River. The altitude of the depositional surface of the sediments is between 50 and 60 meters, being lower than that of the 60–65 meters high Dainohara Terrace, which is developed in the drainage area of the Hirose River, at a few hundreds meters distant. Towards the lower course of the valley, the depositional plain becomes lower and ranges between 30 and 35 meters in altitude in the east of Kuromatsu, though the Dainohara Terrace developed above it maintains an altitude between 60 and 50 meters throughout the same valley. Their relations are shown in Fig. 1.

The Pleistocene sediments of Ipponsugi consist of tuffaceous coarse grained sand and clay intercalated with four lenticular peaty layers, attaining nine meters in total thickness. These sediments are named the Ipponsugi Plant Beds in this paper, and the type locality is Ipponsugi as shown in Fig. 2. The Ipponsugi Plant Beds rest upon the Pliocene Tatsunokuchi Formation with unconformity, and their depositional plane is

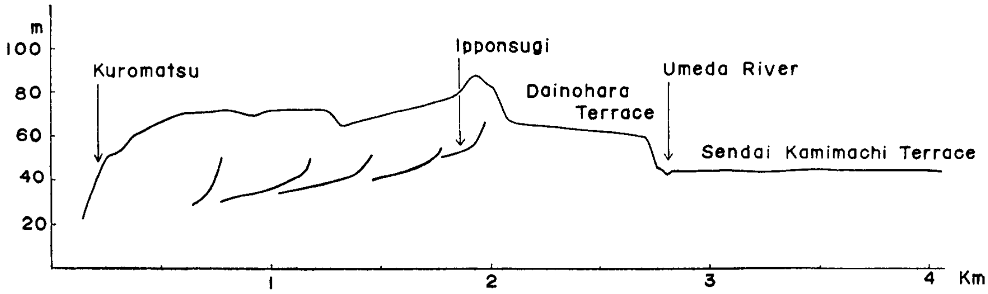

Fig. 1. Topographic profile showing the relation between the Ipponsugi Plant Beds and the Dainohara Terrace.

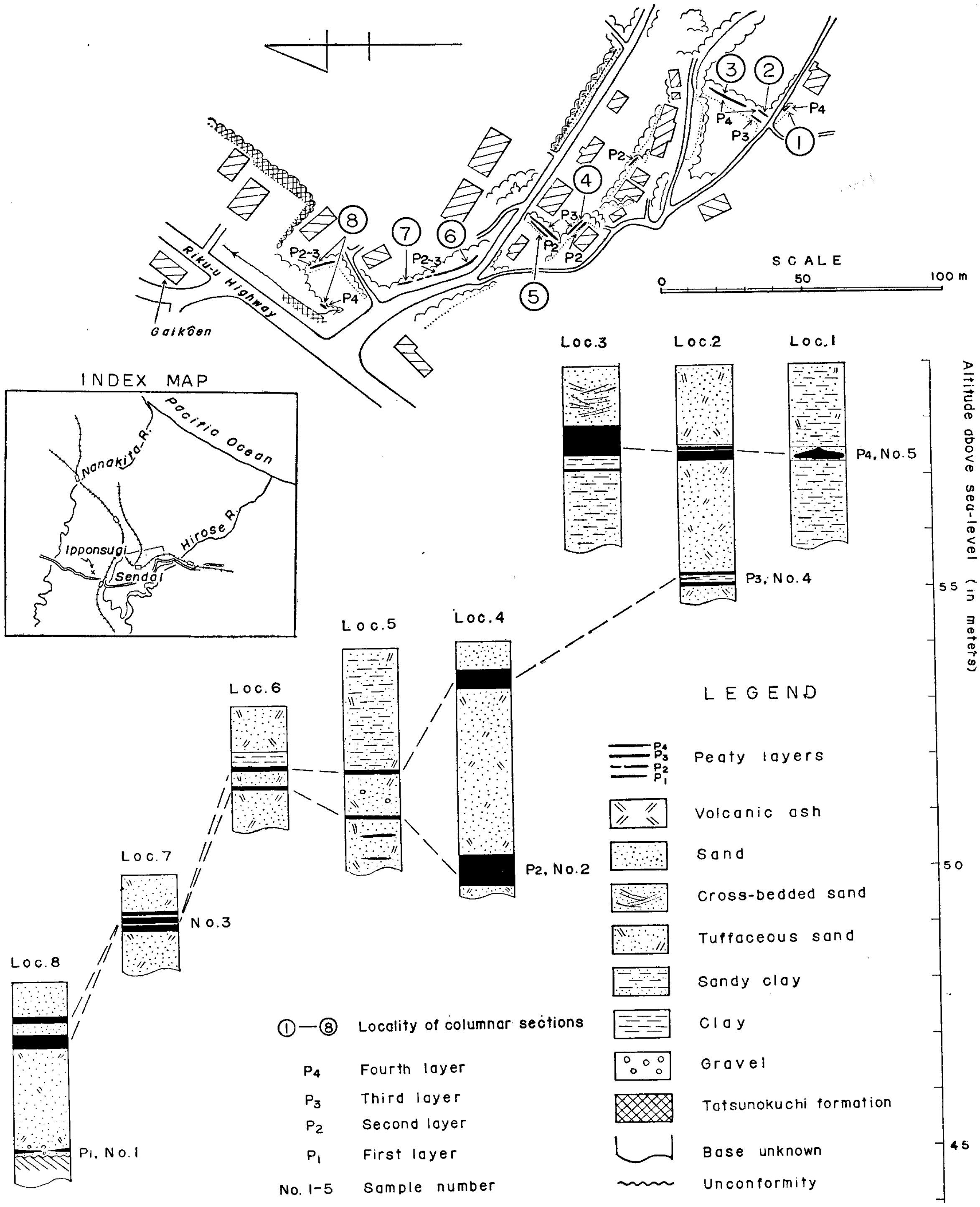

Fig. 2. Geological map and columnar sections of the Ipponsugi Plant Beds.

about 30 meters below the hilltops of the Tatsunokuchi Formation. The peaty layers of the Ipponsugi Plant Beds are named, from the lower upwards, the first, second, third and fourth layers. The mode of occurrence and columnar sections of the Ipponsugi Plant Beds are shown in Fig. 2.

POLLEN ANALYSIS AND DATING

Pollen analysis have been made of five samples. Sample No. 1 is from the first layer, No. 2 from the second layer, No. 3 from the stratigraphically inseparable second and third layers, No. 4 from the third layer and No. 5 from the fourth layer. The analytical results of the pollen are given in Fig. 3. The results from the five samples closely resemble one another. Coniferous pollen, such as *Picea*, *Abies* and *Pinus*, are dominant in all of the samples and *Tsuga*, *Betula* and *Alnus* are found as a frequently concurrent occurrence in small number. Seeds of *Pinus koraiensis* are macroscopically frequently met with in the samples No. 4 and No. 5. (Loc. 2, Loc. 3). Sohma (1960) has reported on the petrified tree trunks and cones of *Larix* from the second layer. The analytical results of the pollen indicate that the environment was swampy and the forests were influenced by cool-temperate climatic condition during the deposition of the Ipponsugi Plant Beds.

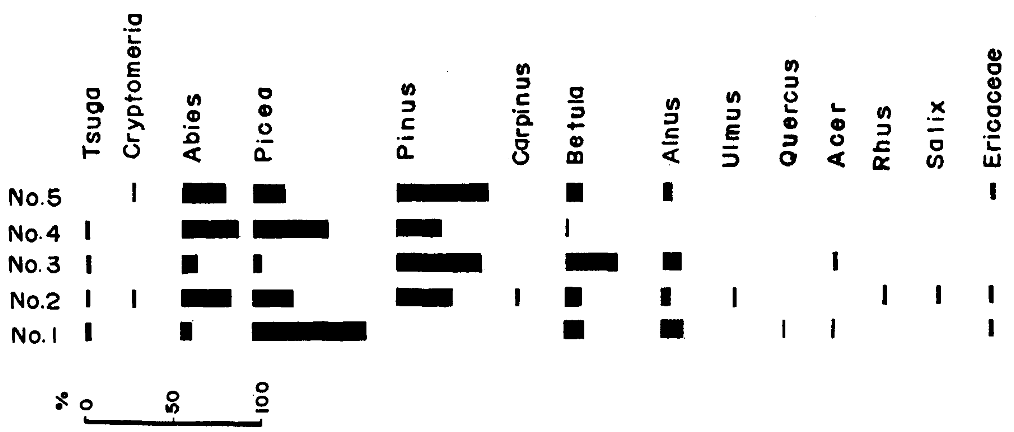

Fig. 3. Percentages of tree pollen of the peaty materials from the Ipponsugi Plant Beds.

Sohma (1960) who has made pollen analysis of the Pleistocene sediments in the environs of Sendai, stated that the forests were influenced by a rather cool temperate condition during the time of the Aobayama Formation, a mild climate at the time of the Dainohara Terrace Deposits and another cool environment during the time of the Ipponsugi Plant Beds. Considering the succession of the terraces and fluctuation of the climate during the late Pleistocene in the environs of Sendai, the Ipponsugi Plant Beds are thought to have been deposited during the Last Glacial Stage. Recently, data were received on the age of the trunk of *Larix* obtained from the second layer of the Ipponsugi Plant Beds by H. Nakagawa and determined by K. Kigoshi by the C14 method. The value is 30,400$\pm$ 1500 years before the present (1961), which is in good correspondence with the stratigraphical consideration and the results of pollen analysis described in the present work.

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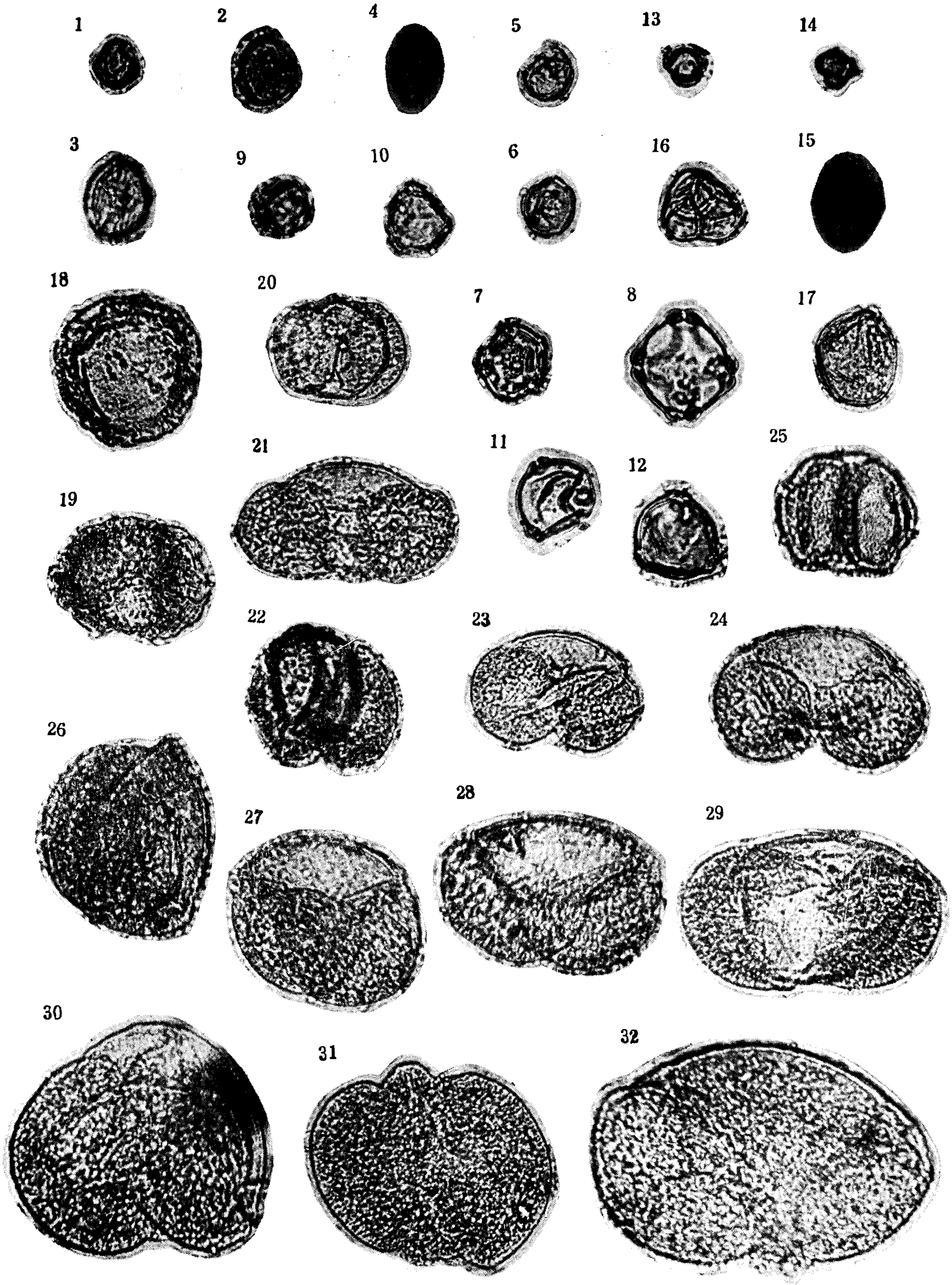
PLATE 43

Fig. 1. *Acer* sp. lateral view ×1200 Loc. 7, second and third layer.
Fig. 2. *Acer* sp. lateral view ×1200 Loc. 7, second and third layer.
Fig. 3. *Acer* sp. lateral view ×1200 Loc. 5, second layer.
Fig. 4. *Rhus* sp. lateral view ×1300 Loc. 7, second and third layer.
Fig. 5. *Alnus* sp. lateral view ×1200 Loc. 8, first layer.
Fig. 6. *Alnus* sp. lateral view ×1200 Loc. 1, fourth layer.
Fig. 7. *Alnus* sp. polar view ×1200 Loc. 8, first layer.
Fig. 8. *Alnus* sp. polar view ×1200 Loc. 8, first layer.
Fig. 9. *Betula* sp. lateral view ×1200 Loc. 8, third layer.
Fig. 10. *Betula* sp. polar view ×1200 Loc. 7, second and third layer.
Fig. 11. *Betula* sp. oblique polar view ×1200 Loc. 8, second layer.
Fig. 12. *Betula* sp. polar view ×1200 Loc. 7, second and third layer.
Fig. 13. *Salix* sp. oblique polar view ×1200 Loc. 8, second and third layer.
Fig. 14. *Cuercus* sp. oblique polar view ×1200 Loc. 8, first layer.
Fig. 15. *Ulmus* sp. lateral view ×1300 Loc. 8, second layer.
Fig. 16. Ericaceae gen. et sp. indet. ×1200 Loc. 5, second layer.
Fig. 17. *Cryptomeria* sp. lateral view ×1200 Loc. 8, second layer.
Fig. 18. *Tsuga* sp. polar view ×1200 Loc. 8, second layer.
Fig. 19. *Tsuga* sp. lateral view ×1200 Loc. 7, second and third layer.
Fig. 20. *Pinus* sp. polar view ×1200 Loc. 5, second layer.
Fig. 21. *Pinus* sp. lateral view ×1200 Loc. 5, second layer.
Fig. 22. *Pinus* sp. oblique polar view ×1200 Loc. 7, second and third layer.
Fig. 23. *Pinus* sp. oblique lateral view ×1200 Loc. 5, second layer.
Fig. 24. *Pinus* sp. lateral view ×1200 Loc. 5, second layer.
Fig. 25. *Pinus* sp. polar view ×1200 Loc. 5, second layer.
Fig. 26. *Picea* sp. oblique lateral view ×1200 Loc. 5, second layer.
Fig. 27. *Picea* sp. oblique lateral view ×1200 Loc. 5, second layer.
Fig. 28. *Picea* sp. oblique lateral view ×1200 Loc. 5, second layer.
Fig. 29. *Abies* sp. oblique polar view ×1200 Loc. 8, second layer.
Fig. 30. *Abies* sp. oblique lateral view ×1200 Loc. 8, first layer.
Fig. 31. *Abies* sp. polar view ×1200 Loc. 8, first layer.
Fig. 32. *Abies* sp. lateral view ×1200 Loc. 8, first layer.



K.Kumagai photo.