PALYNOLOGICAL STUDIES ON A PEAT LAYER IN KAKITU MOUNTAIN, NORTHEASTERN QINGHAI-XIZANG PLATEAU

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I. INTRODUCTION

During the Chinese-W.German Joint Expedition to the Northeastern Qinghai-Xizang Plateau 1981, Prof. Hövermann (University of Göttingen) discovered a fossil peat layer in Kakitu Mountain, 4,620 m a.s.l.. This peat layer was exposed by a small river and consisted of 2.5 m of peat. Dr. Hövermann removed three complete vertical sections from different localities along this exposed peat layer. Profile 1 and 3 contain a very compact and pure fen peat in their middle part and silty layers intercalated with silt, sand and gravel above and below as shown in Figure 1 for profile 1.Profile 2 was expected to contain younger material than the main profile. Profile 2 contains 0.5 m and profile 3 about 0.15 m peat.

In this paper, a preliminary report will be given about pollen analytical studies so far completed on profile 1. A series of 26 samples have been investigated covering the sequence at 10 cm intervals on the somewhat inclined section.

II. PRESENT VEGETATION

After Rongfu (personal communication), Kakitu Mountain shows a belt with a subnival cushion vegetation between 4,300 and 4,600 m a.s.l.. Between 4,600 and the snow-line at about 5,100 m, the cushion vegetation becomes very sparse. Below 4,300 m, the cushion vegetation gives way to a so-called Paramos steppe-desert. In lower elevations and to the south, steppe communities, hemi-shrub deserts and Dasiphora fruticosa shrubs occur. A forest belt does not exist between deserts and steppes at lower elevations and the subnival belt in this higly

arid region. In the subnival zone, there are species of the genera

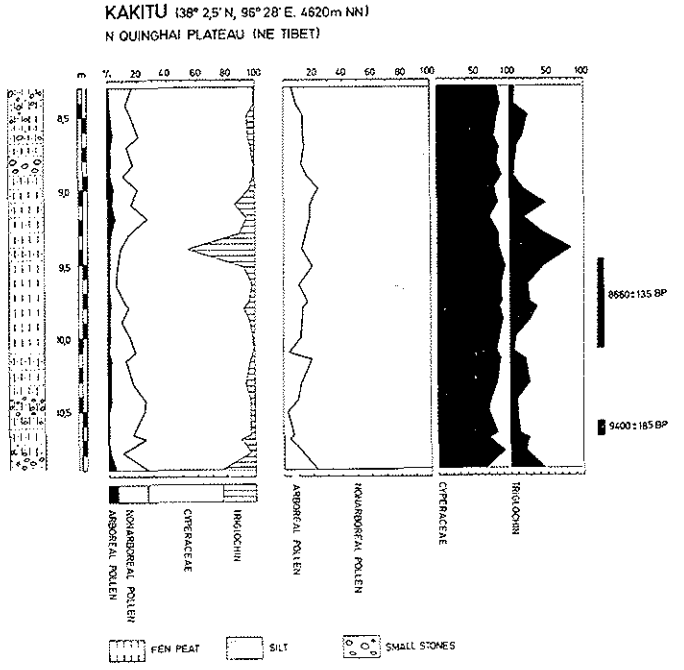

Figure 1 Palynological studies on a peat layer in Kakitu Mountain.

Saussurea, Thylacospermum (Compositae), Arenaria, Androsace, Saxifraga and Leontopodium among others. In the Paramos steppe-desert, species of the genera Kobresia, Carex, Festuca, Stipa, Meconopsis and Potentilla are represented as are Thalictrum alpinum, Polygonum viviparum and Rheum pumilum.

III. AGE OF THE PEAT LAYER

The peat layer represents a fossil peat bog. As indicated in Figure 1, there is no peat-forming plant cover on top. Radiometric data, made available by the Hannover 14C laboratory, indicate that the

peat layer was formed between about 9,500 and 6,200 B.P.. The following data are available:

Profile 1	9.5—10.1m depth	peat	8660±135B.P.	Hv 11102
	10.6—10.7m depth	sandy peat	9400±185B.P.	Hv 11761
Profile 2	3.0m depth	peat	6385± 90B.P.	Hv 11098
Profile 3	1.0—1.1m depth	peat	7680± 65B.P.	Hv 11100

IV. PALYNOLOGICAL RESULTS

All samples were treated as usual with KOH, HF and acetolysis. All samples contain well preserved pollen grains in rather low but sufficient quantities.

In the pollen spectra, Cyperaceae represents the majority of the sporomorphs (60—90% of the total sum). In addition, pollen grains of Triglochin occur in remarkable quantities. A single sample checked for macro-fossil remains contained fruits of Carex and seeds of Juncus. There is little chance to distinguish between pollen grains of Cyperaceae which mainly come from the local bog vegetation (Carex) and those from the regional vegetation outside the bog (steppe-like alpine Kobresia meadows). Two Triglochin species occur in NE Xizang and the upper limit for T. palustre here is at about 4,500 m and for T. maritimum at about 4,700 m. Both species occur on bogs, moist meadows and along rivers. For more detailed informations about flora and vegetation see Zhang (1981), Schmucker (1942), Wang (1961) and Wu (1980).

The left-hand portion of the pollen diagram (Figure 1) is a summary percentage diagram based on a sum that includes all pollen types. In the center, Cyperaceae and Triglochin are excluded. Arboreal pollen (AP) and nonarboreal pollen (NAP) sum together 100% and Cyperaceae and Triglochin are calculated separately after the formula AP+NAP+Cyperaceae or Triglochin = 100% (right side).

The amount of AP seems to have a slight minimum near to the bottom of the sequence. The curves, however, do not display major fluctuations or general trends (Figure 1). Only the Triglochin curve shows a peak

just after the change in stratigraphy from a pure to a more humified fen peat with sand and intercalated layers of sand.

The division into NAP and AP is a provisional one following more conventional principles in constructing pollen diagrams. The percentages of AP and NAP are based on at least 200 pollen grains (without cyperaceae and Triglochin). NAP and AP contain 55 different pollen types. Only a small quantity of pollen grains remained unidentified at present, for example the "type A" in Figure 2.

The detailed pollen diagram (Figure 2) contains 25 curves of selected pollen types. On the left are the tree genera Quercus, Pinus, Alnus and Picea. It is reasonable to assume that the presence of pollen grains of these taxa is due to long distance transport. Most of them must have travelled through the air more than 500 km. There was even a single pollen grain of Cedrus blown to NE Xizang from the Himalayas. The area of distribution of Quercus and Pinus is also far distant. Picea was more common in the samples than the other tree genera. There are several spruce species in Central Asia. Picea Schrenkiana occurs closest to NE Xizang forming forests in parts of the Xinjiang.

There is a group of pollen types produced by shrubs which, in contrast to the first group, are true members of the NE Tibetan regional vegetation. These include Hippophae, Salix, Juniperus and two types of Ephedra. Both Ephedra types reach 5—10% each. In Xizang, 3 species belong to the E. distachya type (E. monosperma, E. intermedia and E. equisetina). The E. fragilis type that is represented by higher values than the E. distachya type, is produced by E. gerardiana and E. przewalskii. From the region under study, E. gerardiana occurs up to 3,900—4,500 m a.s.l. (Wu, 1980) and hence, the E. fragilis type is better represented in the fossil pollen spectra. In the present vegetation, Dasiphora fruticosa plays a certain role as a shrub or a small tree. Unfortunately, Dasiphora shows a pollen type which is quite common in nonarboreal Rosaceae (Potentilla type).

Curves for the NAP (Figure 2) include Thalictrum, Artemisia, Chenopodiaceae, Gramineae, several Compositae groups (e.g. Saussurea type), Rosaceae, Ranunculaceae, Cruciferae, Caryophyllaceae, Rheum and the Polygonum viviparum type. In the present vegetation, Thalictrum

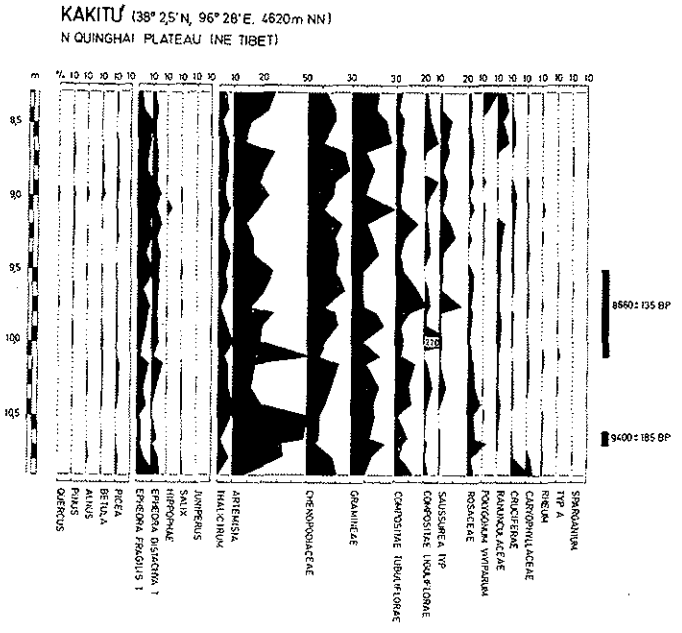

Figure 2 Palynological studies on a peat layer in Kakitu Mountain.

alpinum is frequent and Polygonum viviparum occurs together with some closely related species. The genus Saussurea is represented by several species up to the subnival zone. Several Artemisia species occur obove 4000 m. The most important source for Artemisia pollen is probably be expected in steppe communities and desert-like environments of lower elevations. Here, Artemisia welbyi is important. The grass pollen values as found in the Kakitu peat layer are not as high as one would expect given that steppe communities are growing nearby. The high Chenopodiaceae values may derive to a certain extent from Ceratoides compacta which at least in some areas form a zone together with Carex moorcraftii between the steppe and the subnival zone.

V. CONCLUSIONS

There is a great similarity between pollen types which occur in the early Holocene NE Tibetan pollen spectra and those which are commonly considered to be typical for the Würm Late Glacial period in Central Europe and for the Würm Pleniglacial period in Southern Europe. Evidently, this similarity is due to a remarkable general conformity of plant taxa growing in cold-arid regions of the northern hemisphere (inspite of the diversity at the species level if one compares European with Asiatic floras).

Due to the lack of surface pollen spectra from the Kakitu region, it is difficult to give a paleoecological interpretation of the fossil pollen spectna. The fossil pollen spectra represent a treeless environment. Considering the composition of the pollen spectra, the climatic situation and the formation of the vegetation belts during the early Holocene could not have been substantially different from present day conditions. The same can be assumed for the snowline during 9500—6400 B.P.. This leads to the conclusion that the improvement of the climate and the retreat of the glaciers that commenced at the end of the Würm period had already terminated definitely before 9,500 B.P.. In addition, the climatic situation as well as the vegetation belts must have remained rather constant during the following 3,000 years, e.g. through most parts of the climatic optimum of the Holocene.

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