

VEGETATIONAL HISTORY AND PALAEOENVIRONMENT OF NINGLE NULLAH, LOWER KAREWA, KASHMIR

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Abstract

The pollen spectra have revealed uniform vegetation pattern except for the minor variations. The arboreal vegetation is predominated by *Juniperus*, *Picea*, *Abies*, *Quercus* and *Populus*. The nonarboreals are relatively low but for Cyperaceae which has high values in the upper lignitic samples. Aquatics are chiefly dominated by *Nymphaea* and *Potamogeton* but *Typha* is present in moderate values. Ferns are abundant denoting the high precipitation. It is, thus, inferred that the vegetation enjoyed temperate and humid climate.

Introduction

The sediments exposed at Ningle Nullah, 34°04' N, 74°19' E at a height of 2940 m, about 72 km S-W of Srinagar, are bedded in vertical cliffs along the small streams. Lithology at Ningle Nullah shows a great degree of variability comprising lignites, clays and sands in different thickness and colours.

Floristically, the area is characterised by transition zone of temperate and alpine vegetation. The vegetation is marked by scrubs and grasses. Asteraceae predominates the grassy meadows. *Potamogeton*, *Lemna* and algae grow profusely in the ponds and water depressions. Further up on the hill slope comes the alpine zone where at the base *Picea smithiana* grows and above that *Juniperus* occurs which becomes stunted till it reaches the tree-line zone. At places there are pure forests of *Picea* which could be seen at Lien Marg. Descending down to Gulmarg, *Picea* forest is replaced by *Pinus wallichiana* and further down it decreases.

Palynological information from Ningle Nullah so far available comes from random samples (Vishnu-Mittre & Robert, 1973) where they have recorded high frequencies of *Quercus* pollen. Puri (1957) reported a large number of megafossil remains belonging to Betulaceae, Aceraceae, Ulmaceae, Cornaceae, Salicaceae and suggested the prevalence of temperate climate during the time of deposition of these sediments.

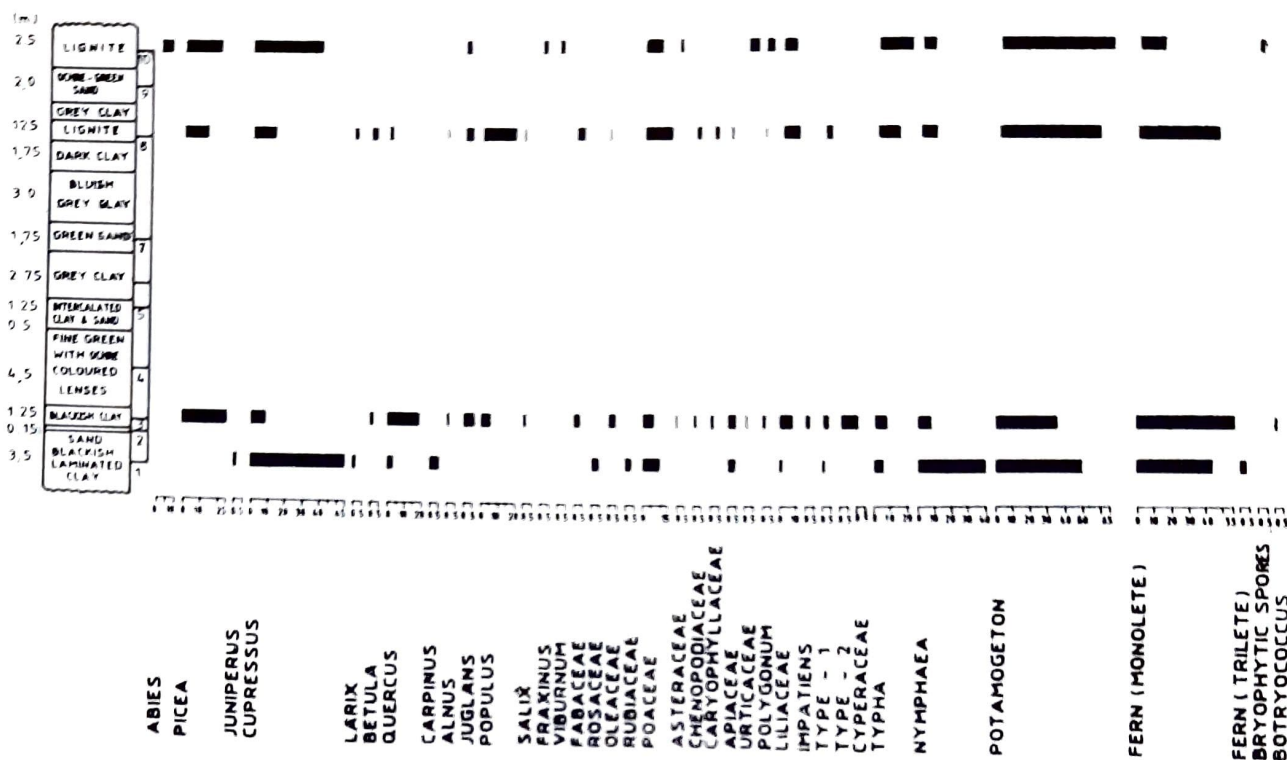
Palynology of Ningle Nullah sediments is in sequel of our palynological investigations of Karewa sediments exposed at Hirpur (Gupta *et al.*, 1984a & b; Gupta & Sharma, 1989; Sharma & Gupta, 1984; Sharma *et al.*, 1984). The object of this study is two-fold: (1) to have the proper superimposition of various lithologs exposed in the valley (2) to work out the palaeovegetation and palaeoenvironment.

Pollen diagram and its composition

Nine samples from different lithofacies at Ningle Nullah section have been palynologically investigated but only four samples, two each from lignite and blackish clay, yielded pollen and spores while rest of the samples from sand and mud facies turned unproductive (Text-fig. 1). In general, pollen spectra show almost uniform pattern in the palaeovegetation and an overall dominance of arboreals over nonarboreals.

The arboreal vegetation is dominated by temperate and subalpine taxa such as *Picea*, *Cupressus*, *Quercus* and *Populus*. Amongst other taxa *Abies*, *Juniperus*, *Larix*, *Betula*, *Alnus*, *Juglans* and *Carpinus* are low to sporadic in this assemblage. The shrubby vegetation is marked by discontinuous values of Fabaceae, Rosaceae and Oleaceae. *Salix*, *Fraxinus* and *Viburnum* are sporadic.

Herbage is relatively poor. Poaceae attains maximum values followed by Apiaceae, Cyperaceae, Liliaceae and *Impatiens*.



Text figure 1—Pollen diagram from Ningle Nullah, Lower Karewa, Kashmir (Percentages calculated in terms of terrestrial pollen).

Other herbaceous members such as Rubiaceae, Asteraceae, Chenopodiaceae, Caryophyllaceae, Urticaceae, *Polygonum* etc. are either lowly present or sporadic. *Arcicolpites hirpurensis*. (Gupta *et al*, 1989) is present in high frequencies in the lower sample which declined upward and vanished from succeeding samples.

The aquatics are dominated by *Potamogeton* followed by *Nymphaea*. *Typha* is relatively low. Ferns are predominated by monolete spores. Trilete spores and bryophytic spores are sporadic.

Discussion and conclusion

Palynological studies from Ningle Nullah, Lower Karewa, Kashmir have revealed the existence of *Picea-Juniperus* forest with sporadic presence of *Cupressus*, *Larix*, *Betula* *Carpinus* and *Quercus*. The rosaceous plants flourished at the forest margins and *Salix* in the depression bordering lakes.

The high values of submerged aquatics (*Potamogeton*) followed by free-floating plants

(*Nymphaea*) and moisture loving plants (ferns) and low values of marshy plants (*Typha*, *Liliaceae*, *Polygonum*, etc.) tips towards the high precipitation resulting into the expansion of the lake margins encouraging the luxuriant growth of submerged and free-floating plant community.

The palynological results depict temperate to subalpine climate with humid conditions during the course of deposition of Ningle Nullah sediments. Palynological interpretation of palaeoclimate corroborates Puri's (1945) interpretation on megafossil studies. Although the two data do not have complete coherence in determination of taxa but both reflect temperate to subalpine climate.

The occurrence of *Arcicolpites hirpurensis* Gupta *et al.* (1989) in the lower samples and absence from the subsequent samples, enables to correlate them with the basal part of the Hirpur Loc. III. In other words we may, on the basis of marker pollen, envisage that the Ningle Nullah sediments are contemporaneous in age with the basal sediments at Hirpur Locality III, i. e., Methovoin member (Bhatt, 1989).

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