

Late Pleistocene pollen assemblages from the Thimi Formation, Kathmandu Valley, Nepal

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Abstract The Thimi Formation, constituting the upper part of the sedimentary sequence of the Kathmandu Valley, is characterized by alternation of fine- to medium-grained sand, silt, silty clay and clay deposited by a distal fluvial system in the Late Pleistocene. Palynostratigraphy based on 40 samples revealed the dominance of gymnosperm taxa over angiosperms and herbaceous members. As the different species *Pinus* and *Quercus* grow at different altitudes in Nepal today, an attempt was made to identify these taxa up to species level for climate interpretations. Gymnosperms, such as *Pinus wallichiana*, *Pinus roxburghii*, *Abies spectabilis*, *Tsuga dumosa* and *Picea smithiana*, were dominant over the woody angiosperms, such as *Quercus lanata*, *Quercus lamellosa*, *Quercus leucotrichophora*, *Quercus semecarpifolia*, *Betula*, *Juglans*, *Myrica*, *Castanopsis* and *Symplocos*. The pollen diagram of the Thimi Formation shows only minor fluctuations in assemblage. The pollen assemblages indicate the prevalence of a cool and temperate climate during the late Pleistocene. This is confirmed by the high percentages of Poaceae and other herbaceous plants, with very few woody angiosperms.

Key words: Kathmandu Basin, late Pleistocene, paleoclimate, pollen record, Thimi Formation.

Introduction

The Kathmandu Intermontane Basin is filled with fluvio-lacustrine to fluvial sediments of LatePliocene–Holocene age. These sediments have been subdivided into older stage deposits (Lukundol Formation), middle stage deposits (Pyangaon, Chapagaon and Boregaon terrace deposits) and younger stage deposits (Gokarna, Thimi and Patan Formations) (Yoshida & Igarashi 1984; Igarashi *et al.* 1988; Yoshida & Gautam 1988). The Lukundol Formation represents the oldest lake sediments. Because of the prominent uplift of the Kathmandu Valley along its southern margin, the original lake was shifted northward, thereby creating a new environment favorable for the deposition of the younger sediments of the Gokarna, Thimi and Patan Formations.

The type section of the Thimi Formation is exposed in a suburb of Madhyapur Thimi (27°40'23.022"N, 85°23'23.022"E, 1300 m a.s.l.) along the left side of the Arniko Highway (Fig. 1). An exposure of the Thimi Formation approximately 23 m thick exhibits an alternation of fine- to mediumgrained sand, silt, silty clay and clay deposited by a distal fluvial system (Fig. 2). The sand and silt layers consist of planar laminae and trough- and convolute-type cross-bedding. In addition to this, ball and pillow structures, microfolds and faults, sand dykes, and rip-up mud clasts are common in the Thimi Formation. The distortions in the crossbedded structures were interpreted as synsedimentary deformation features (seismites) that developed as a result of paleoearthquakes (Gajurel *et al.* 1998). The present palynological investigation is based on a total of 40 samples collected from the exposed section of the Thimi Formation.