

EXAMINATION OF SELECTED MICROPARTICLES FROM THE SENTIK GLACIER CORE, LADAKH HIMALAYA, INDIA

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ABSTRACT. Several characteristics and interpretative comments are reported for microparticles from selected samples in the Sentik Glacier core. Four basic morphologic groups are defined: platy, angular, biogenic, and anomalous.

RÉSUMÉ. Étude de certaines microparticules de la carotte du glacier Sentik, massif du Ladakh, Himalaya, Inde. On présente plusieurs caractéristiques des microparticules provenant d'échantillons de la carotte du glacier Sentik ainsi

que leur interprétation. Quatre groupes morphologiques sont distingués: applaties, anguleuses, biogéniques et anormales.

ZUSAMMENFASSUNG. Prüfung ausgewählter Mikro-Partikel vom Bohrkern des Sentik-Gletschers, Ladakh-Himalaya, Indien. Einige charakteristische und interpretatorische Bemerkungen für Mikro-Partikel aus ausgewählten Proben des Bohrkerns vom Sentik-Gletscher werden mitgeteilt. Es lassen sich vier Gruppen von Grundformen feststellen: platte, eckige, "biogene" und unregelmässige.

As an addendum to glaciochemical interpretations resulting from our studies in the Indian Himalaya (Lyons and Mayewski, 1983; Mayewski and others, 1983, 1984), we present an account of Scanning Electron Microscope (SEM) and Energy Dispersive Atomic X-ray (EDAX) analyses conducted on seven randomly distributed samples from our 16.6 m core from Nun Kun, Ladakh Himalaya (Mayewski and others, 1984).

Approximately 16 ml was removed from each sample and filtered through a 20 cm² Millipore T.M. filter system using 0.5 µm Millipore membrane filters. Each filter was then put in a covered petri dish and stored at 60°C for several days. Approximately 2 cm² from each filter was mounted on aluminum viewing studs and coated with 0.2 nm of a gold and palladium combination. A total of 46 pictures and 37 EDAX scans were finally produced from the samples, from which four basic morphological groups are differentiated (platy, angular, biogenic, and anomalous). A description and interpretation by morphology follows:

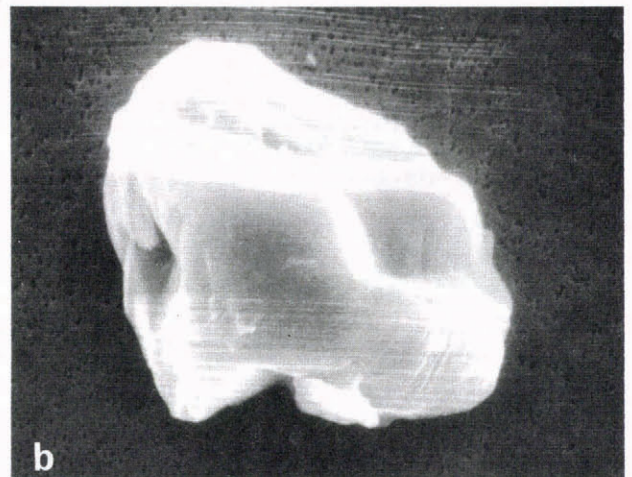
1. *Platy* (Fig. 1a) – characterized by length (range 13–160 µm) and width (range 13–83 µm) much greater than thickness, and "flaky" cleavage. A majority of the particles in this group had EDAX scans dominated by Si, Al, and K, and for some particles associated Fe and Mg in place of K. They probably consist of sheet silicates

(clays) derived from crustal weathering. The size range of the particles would suggest a local source (Mayewski and others, 1984).

2. *Angular* (Fig. 1b) – characterized by length (range 9–296 µm), width (range 11–130 µm), and an apparently equal range in thickness with 90° or 60–120° cleavages. A majority of the particles had EDAX scans of Si, Al, and K with in some cases K replaced by Ca and Mg. These particles are probably feldspars derived from a relatively local crustal weathering source (Mayewski and others, 1984).

3. *Biogenic* – characterized by a wide range in size from 7 µm to 140 µm in diameter. EDAX scans suggest a composition with few if any elements having atomic numbers greater than 10. By qualitative inspection, these particles comprise approximately 5% of the total number of particles observed in this study. Examples include diatoms (Fig. 1c) and pollen (Fig. 1d). These particles have potential for future study as both source indicators and as seasonal stratigraphic markers.

4. *Anomalous* – characterized by a wide variety of size ranges and EDAX scans. This group is a composite of all particles that do not fit in other groups. They comprise



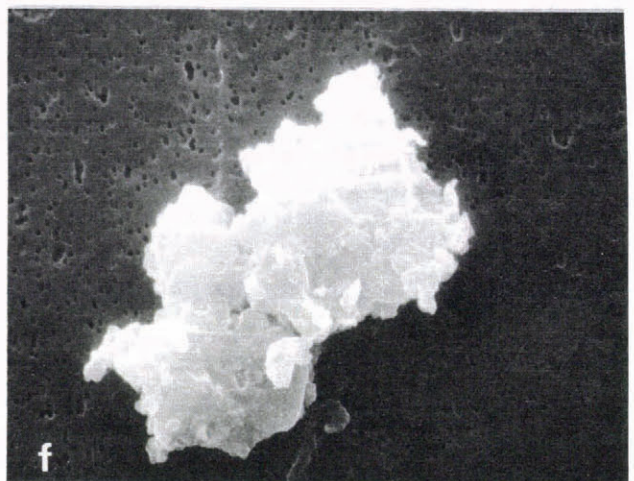
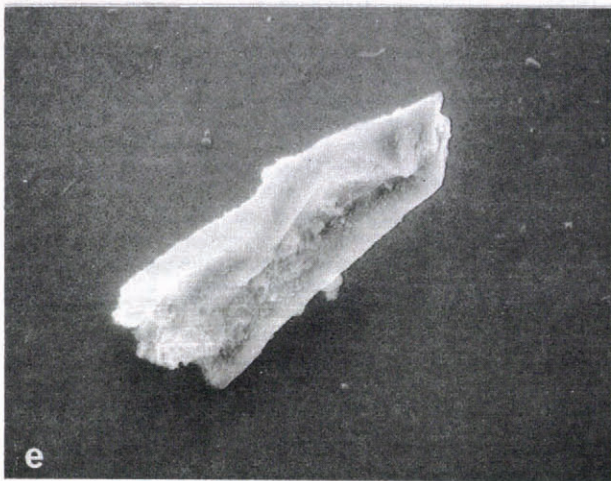
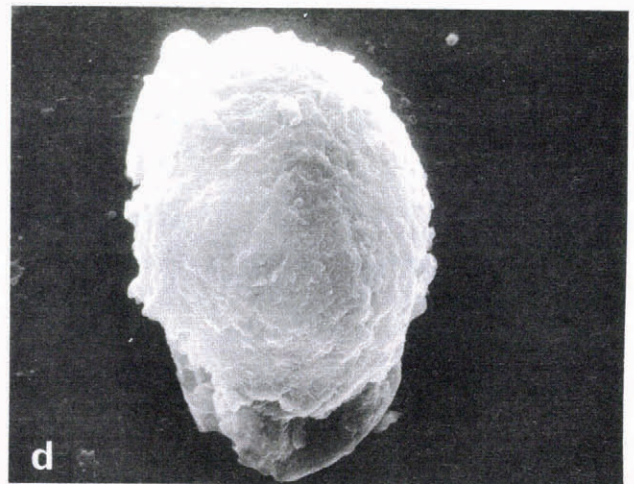
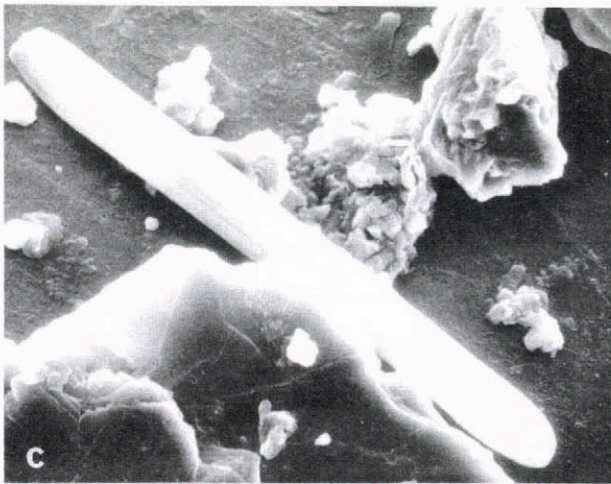


Fig. 1. a. Example of platy group; $160\ \mu\text{m} \times 83\ \mu\text{m}$, $\times 337$.
 b. Example of angular group; $9\ \mu\text{m} \times 11\ \mu\text{m}$, $\times 4235$.
 c. Example of diatom; $8\ \mu\text{m} \times 90\ \mu\text{m}$, $\times 948$.
 d. Example of pollen grain; $43\ \mu\text{m} \times 52\ \mu\text{m}$, $\times 827$.
 e. Example of anomalous group; Ca-rich, $7\ \mu\text{m} \times 11\ \mu\text{m}$, $\times 4554$.
 f. Example of anomalous group; Ti-rich, $38\ \mu\text{m} \times 11\ \mu\text{m}$, $\times 1301$.

approximately 15% of all particles viewed. Examples include a particle with a distinctly high Ca concentration (Fig. 1e) and one with a high Ti concentration (Fig. 1f). These particles have the potential for being useful in uniquely defining source areas.

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