

# THE CANADIAN MINERALOGIST

Journal of the Mineralogical Association of Canada

Volume 12

November 1974

Part 7

## PREFACE

Sub-greenschist metamorphism, first identified and long studied in other parts of the world, has received relatively little attention in eastern Canada and eastern North America in general. Although local occurrences of zeolites and prehnite in pre-Mesozoic rocks of the Appalachian fold belt have been known for some time, their regional significance was either not recognized or not reported; only four years ago, one of the pioneers in the field of low-grade metamorphism, D. S. Coombs, could still express polite amazement that "low-grade mineral facies had not been described from the Appalachian belt". (Coombs, Horodyski & Naylor 1970, *Amer. J. Sci.* **268**, p. 143). Although a few papers dealing with sub-greenschist mineral assemblages from the Appalachian region have appeared since Coombs and his co-workers first identified prehnite-pumpellyite metamorphic facies in northern Maine (e.g. Mossman & Bachinski 1972, *Can. J. Earth Sci.* **9**, 1703-1709), the subject, vigorously pursued west of the Rocky Mountains, remained somewhat neglected in the east.

In the meantime, at the northeasterly extremity of the Appalachian belt in Newfoundland, the combination of excellent exposures and the gentle prod by Coombs and his co-authors resulted in several discoveries of mineral assemblages characteristic of sub-greenschist metamorphic facies. Both prehnite and pumpellyite were reported from the Bay of Islands ophiolite complex on the west coast of the island (Williams & Malpas 1972, *Can. J. Earth Sci.* **9**, p. 1223); pumpellyite was found in the Ordovician pillow lavas of the Springdale peninsula (Catherine Patey, pers. comm., 1973)

and in the Hare Bay ophiolite complex at the northern tip of the Great Northern Peninsula (by R. K. Stevens in 1973); prehnite was discovered in Late Precambrian sandstones near St. John's (Papezik, 1972, *Can. J. Earth Sci.* **9**, 1568-1572), and both prehnite and pumpellyite were identified in the Late Precambrian volcanic rocks of the Avalon Peninsula (reported in this Special Issue). By early 1973, it became clear that large parts of the Appalachian belt in Newfoundland, previously considered to be either unmetamorphosed or belonging to the greenschist metamorphic facies, were actually good examples of sub-greenschist regional metamorphism, particularly of the prehnite-pumpellyite facies.

At that time, Newfoundland geologists were engaged in detailed planning for the Annual Meeting of the Mineralogical Association and the Geological Association of Canada, which was to be held in May 1974 in St. John's. This seemed to be a good opportunity to draw attention to the field of low-grade metamorphism and its many problems, to share the new discoveries, and to learn from others of similar work done in other parts of the Appalachians and in the rest of the country. Preliminary discussions led to a proposal of a Symposium on Low-Grade Metamorphism, sponsored by the Mineralogical Association of Canada. (I believe the original suggestion came from R. K. Stevens; for this he deserves our thanks). The Symposium in its final form was held on May 20th, 1974, at Memorial University in St. John's, and consisted of two invited papers by W. S. Fyfe and E-an Zen, both early pioneers in this field of research, and ten submitted papers describ-

ing occurrences, origin and significance of low-grade metamorphic assemblages from British Columbia to Maine and Newfoundland, in rocks ranging in age from Archean to Upper Cretaceous and in composition from basic volcanics to iron-formations. Most of the papers are included in this Special Issue of the Canadian Mineralogist.

The papers presented at the Symposium helped to emphasize several points that should be kept in mind in future work:

1. Mineral assemblages of the zeolite and prehnite-pumpellyite facies are much more common than realized previously, and greater attention should be paid to those parts of orogenic belts and adjacent areas which do not show evidence of penetrative deformation and thus have been considered "unmetamorphosed" in the past.

2. Systematic petrographic studies have proved the preservation of sub-greenschist metamorphic belts in rocks as old as Archean and have demonstrated their value in solving regional tectonic problems in the Shield.

3. Only three of the ten regional papers presented at the Symposium dealt specifically with the Appalachian belt. In the northern part of the Appalachians, sub-greenschist metamorphic as-

semblages are now known from New England, New Brunswick and Newfoundland; although research now in progress will undoubtedly reveal other occurrences, large gaps still exist in our knowledge of the distribution of metamorphic belts in the Appalachian region.

4. Descriptive regional studies are a necessary first step towards greater understanding of the distribution and origin of low-grade metamorphic assemblages; however, greater attention should be paid to the position of sub-greenschist metamorphic belts in the general tectonic framework, and to their tectonic significance.

On behalf of the Mineralogical Association of Canada and of the Organizing Committee of the 1974 Annual Meeting, I wish to express our thanks to all contributors to the Symposium; to Dr. J. L. Jambor, without whose labours this Special Issue would not have been possible, and to the many geologists and mineralogists who by their attendance and their contribution to the discussions helped to make the Symposium a success.

V. S. Papezik  
M.A.C. Program Chairman  
1974 Annual Meeting

St. John's, Newfoundland  
August 13, 1974