COSMIC SPHERULES IN GLACIO-LACUSTRINE SEDIMENTS: AN UNDERGRADUATE RESEARCH ENDEAVOR. Funk, A.E.; Wallin, L.B.; Ricke, M.B.; Annexstad, J.O.; and Melchior, R.C.; Dept. of Geology, Bemidji State University, Bemidji, MN 56601-2699.

Cosmic spherules have been found in such environments as deep-sea sediments, Antarctic ice, and Greenland ice. In 1997, Annexstad and Melchior [1] proposed examining glaciogenic sediments in the Leech Lake area of northern Minnesota as another source of cosmic material. This work began as an undergraduate research project at Bemidji State University. Information gained in the initial phase of the project resulted in the conclusion that late to middle Wisconsinan glacial deposits of north central Minnesota were most productive. Sampling was limited to those sites where lacustrine and fluvial environments dominated. In the current phase of the project the most active sampling sites are found in glacial outwash, stagnation moraine, and lake deposits [2].

Gravel pits and road cuts with good surface exposure were selected as sampling sites because these allowed convenient access to older glaciogenic material and ready identification of layers of fluvial origin. Samples were also collected in some areas of lacustrine deposition that were characterized by poor vertical exposure. These samples were obtained from relatively unweathered material beneath the topsoil, or other unaltered surfaces.

Site location was determined using GPS with latitude and longitude noted on a regional base map. Field notes include location and date of sample acquisition as well as a preliminary assessment of color, sorting, facies association, and probable provenance from selected ice tongues such as Itasca (northwestern), or Rainy (northeastern) lobe.

In the laboratory, sample aliquots are weighed and examined by binocular microscope for identification of possible cosmic spherules. Criteria for selection of suspect particles are similar to those used by Toft el al, [2]. Black spherical grains with high luster were chosen for further examination by SEM analysis at Macalaster College in St. Paul . A high concentration of magnetite in the spherules was found but equipment limitations precluded any confirmation of cosmic origin.

This project involves a general understanding of different types of glaciogenic deposits, the identification of best concentration terrain within these deposits, the use of both field and laboratory procedures, and the analysis of select spherules. Accordingly, we feel that this project is an excellent tool for undergraduate students with interests in geology and planetology. We suggest that search efforts in glaciated regions be confined to well sorted meltwater deposits. Our project will continue as long as there is sufficient undergraduate interest in learning about field sampling techniques and laboratory investigations. We hope to initiate a collaborative effort with other Space Grant Universities in Minnesota during the coming year to enable us to increase our analytic capabilities with facilities at larger universities.

References: [1] Annexstad, J.O. and Melchior, R.C., (1997) Meteoritics & Planetary Sci., 32, Supp, A7. [2] Toft B. et al, (1998) LPSXXIX