

EXPERIMENTAL PETROLOGY

FACULTY

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STUDENTS

Shelly J. Fain, Trinity University
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David Tinker, Carleton College

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During the period from September 1991 through November 1991, three students spent from three to five days at Smith College. They were Shelly Fain from Trinity University, Tori Swarmer from Beloit College, and David Tinker from Carleton College in Northfield, Minnesota; John Brady of Smith College served as their advisor.

This workshop was designed to provide these students access to a piston cylinder furnace in order to supplement the experimental data which they had collected during their Summer research projects. Summer work had been hampered by equipment failure.

Shelly Fain and Tori Swarmer both carried out high pressure experiments on iron-doped samples from the system anorthite-diopside. These experiments were designed to investigate the diffusion rate of oxygen in the system at elevated temperatures and pressures.

David Tinker carried out high pressure experiments designed to determine the viscosity of melts in the system anorthite-diopside by means of the falling sphere method.

THE TEACHING OF MINERALOGY AND PETROLOGY

PARTICIPANTS

Shelby Boardman, Carleton College
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Lori Bettison-Varga, Pomona College
Stephen Weaver, Beloit College
John Winter, Whitman College
Reinhard Wobus, Williams College
Henry H. Woodard, Beloit College

GUESTS

Charles W. Burnham, Harvard University
Steven R. Dunn, Mt. Holyoke College

Keck Workshop on the Teaching of Mineralogy and Petrology
Amherst College
17-18 January 1992

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Sixteen faculty members, fourteen from ten Keck Geology Consortium colleges and two guests, gathered at Amherst College on 17-18 January 1992 to share over two hundred years of experience in teaching mineralogy and petrology. The principal goals of the workshop included: (1) an exchange of information concerning the content and approaches of mineralogy and petrology courses, (2) an exchange of teaching materials used by the participants, (3) the identification of common instructional goals, and (4) the development of strategies to improve the attainment of those goals. Based on written evaluations by the participants, the workshop was a valuable experience that achieved at least some of these goals.

Prior to the workshop, participants submitted course materials: class handouts, lecture notes, problem sets, laboratory exercises, and exams that they felt might be valuable to others in the group. In all, perhaps 1000 pages of mineralogy and petrology course "ammunition" were collected, duplicated, and distributed to the group. These materials provide fascinating reading and, as one participant put it, "they will be quite helpful to me in organizing my courses in the future and in gaining new ideas for labs, demonstrations, homework, etc." Members of the group plan to share additional materials as they become available.

The workshop itself was organized as a round-table discussion. There were no formal presentations. A plan for the discussion was prepared in advance and generally followed, but the orchestra was ready and able to play without a conductor. After struggling alone with the teaching of mineralogy and petrology many collective years, all present were active contributors and eager listeners. Evaluations included comments like, "...the workshop was valuable to me in that it allowed me to have concentrated, in-depth discussions with other teachers of mineralogy and petrology about how we ply our trade" and "...I found this meeting profoundly thought-provoking, not so much as to the content of the courses we discussed, but in terms of pedagogical methods and styles" and "One of the most important things I think we all gained was validation of our struggles and successes by our peers."

The discussion of mineralogy courses occupied more than half the workshop and was terminated, not so much because a conclusion was reached, but rather because participants were anxious to include discussion of petrology courses. Many felt that additional time was needed for petrology and a future gathering for this purpose was suggested. A significant discovery was the broad similarity, in outline at least, of the many mineralogy courses represented. Although somewhat more diversity in teaching methods was evident, much common ground was identified on topics ranging from textbook dissatisfaction to symmetry shock to optics overload. Petrology courses appear to be more variable, depending on the needs and resources of the particular college and on the interests and goals of the particular instructor.

There was general agreement that students are most responsive to activities and assignments that compel them to engage directly the material. A number of intriguing examples of approaches that had been used successfully were described. Examples include: (1) using 2-dimensional, pattern-creation software to develop an appreciation of symmetry and crystal structures, (2) using optical diffraction of a laser beam by sieves and gratings to teach about x-ray diffraction, (3) determining the chemical composition of olivine from the data of an x-ray diffraction experiment. It was agreed that by joining forces we might be able to create new instructional modules in mineralogy that would lead to additional, stimulating hands-on activities. To this end, specific topics were identified for attention and small groups of volunteers agreed to work together to create new teaching materials over the coming months. If we are successful in this endeavor, we plan to share more widely the materials created, perhaps through the *Journal of Geological Education*.

Finally, the group agreed to remain in close contact to continue the interchange of ideas, methods, and resources. A group meeting at the Keck Symposium in April is planned. Electronic mail addresses were exchanged. And the course module working groups made plans for their projects. Participants left Amherst with renewed enthusiasm for teaching, an agenda for action, and a sense that their weekend was well spent.