

PRESENTATION OF THE ROEBLING MEDAL OF THE
MINERALOGICAL SOCIETY OF AMERICA TO
NORMAN L. BOWEN

ARTHUR F. BUDDINGTON, *Princeton University, Princeton, New Jersey.*

Mr. President, Fellows and Members of the Mineralogical Society of America, and guests:

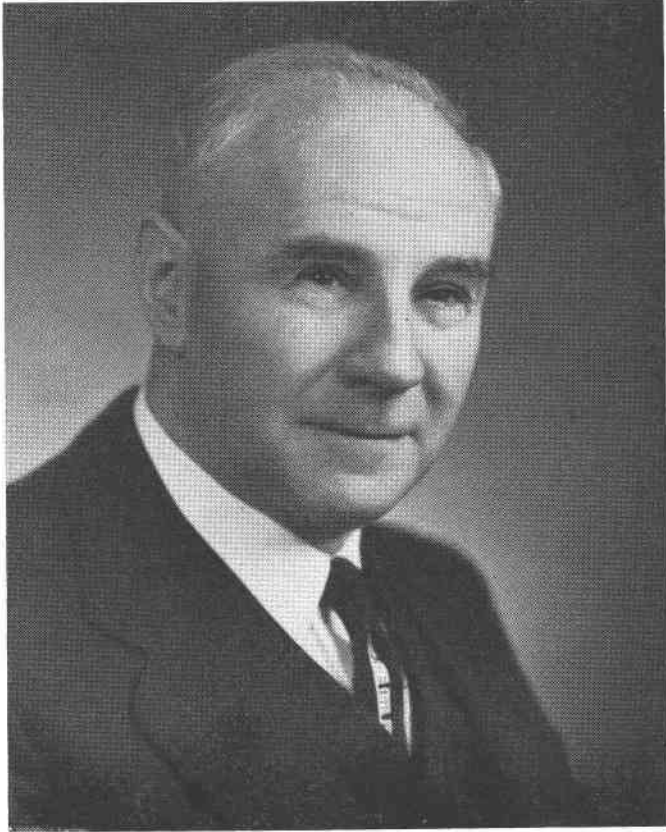
The Roebling medal is for meritorious achievement in the fields of the Mineralogical Sciences and is the highest honor awarded by the Mineralogical Society of America.

The award this year is the tenth since the initial one in 1937. For the first time it goes to a physicochemical petrologist and mineralogist, Dr. N. L. Bowen, whose researches have been based preeminently on *systematic quantitative* experimental physicochemical work, a field which has been exclusively developed in the present century. Dr. Bowen also further exemplifies a peculiarly significant 20th century development, a Canadian in the tradition of A. C. Lawson and R. A. Daly who has crossed to the United States and in addition to so outstandingly advancing the science has also helped to educate our students.

Before considering further the serious side of our medallist, I shall digress to speak of certain lighter matters. Professor Palache in telling something of the life and character of Colonel Roebling referred to his keenly developed sense of humor. Certainly, the Colonel would most highly approve of Dr. Bowen. May I quote some excerpts from his writings. The following is from an essay on "The Granite Problem and the Method of Multiple Prejudices"; "we hurl epithets, we hurl them back. We are most thankful that we are not as other men are. It may be that the mutual conflicts of prejudices will dull the rabid edge of each, and that the communal petrologic mind can eventually reach the truth by this sorry method," again "Pushed to its logical consequences for a large mass, that corollary of wet granitization, the 'basic front' is thus a basic affront to the intelligence of the geologic fraternity." In discussing the lack of significance of the eutectic relationships for magmatic differentiation he writes "whatever the conditions, the eutectic is the goal of all liquids; all attain it; none pass it; it is a fen of stagnant waters," and finally from his presidential address before the Geological Society of America "We can indeed for rough purposes, separate petrologists into the "pontiffs" and the "soaks." The pontiff bears the stigma of magma. The magma gives rise to emanations which yield a liquor. The difference between the "pontiff" and the "soak" is that the latter must have his liquor in lavish quantities on all occasions but the former handles his

liquor like a gentleman; he can take it or leave it according to the indications of the individual occasion."

As is the usual case with brilliant scientists, Bowen became recognized as a leader early in his career. In 1912 he entered the Geophysical Labo-



NORMAN L. BOWEN

Recipient of the Roebling Medal of the Mineralogical Society of America

ratory and in 1915 at the age of 28 years he established an international reputation by the publication of "The Later Stages in the Evolution of the Igneous Rocks." In 1928 he developed and expanded this into his book on "The Evolution of the Igneous Rocks," a work which is still a standard and a necessity for all students of this subject. In these works he has expounded the role of fractional crystallization as the major explanation for the diversity of origin of igneous rocks, he has brought for-

ward an overwhelming mass of experimental data developed by himself and his colleagues of the Carnegie Geophysical Laboratory, and has exercised the greatest of ingenuity and skill in showing how the data and principles might apply in support of his thesis. He is recognized as a most doughty opponent in the continuing warfare between certain interpretations based upon laboratory data and conflicting interpretations based on field data.

One of the great ideas developed by Bowen is the significance of the reaction principle in petrogenesis. Pentti Eskola of Finland has called it the most important contribution to petrology in the present century. Bowen has graphically portrayed the principle in a diagram which shows the reaction relation of the mafic minerals as one side of a V and of the plagioclases as the other side of a V, the two sides joining in potash feldspar, muscovite and quartz. This diagram has found application in the relative susceptibility of minerals to weathering and has gone winging through the literature in repeated quotation. I use the term winging deliberately for the reason that the diagram always reminds me of the pattern made by a flock of Canadian geese in their flights during migration.

Other great fundamental contributions have been a quantitative discussion of the heat relationships and the quantitative possibilities of incorporation to be expected where magmas intrude and react with country rock, the succession of mineral assemblages to be expected at successively higher temperatures in the metamorphism of impure carbonate rocks, and in association with Greig the discovery of the mineral mullite as a compound of major importance for the ceramic industry.

One of the great merits of his work and one for which all petrologists are profoundly grateful is the effort which he has made to give examples of the application of the experimental physio-chemical data and principles to petrological problems. In this connection he has diligently sought to visit the classic localities for problems of igneous rocks. He has personally studied the Bushveld of South Africa, the alkalic lavas of East Africa, the peridotites of Skye, the Adirondack and Canadian anorthosites, and there are but few noted petrologic localities in the United States which Bowen has not visited in continuing his own education.

Dr. Bowen has served as Professor of Mineralogy at Queens University (Canada) for 2 years, as Charles L. Hutchinson distinguished service professor of petrology at the University of Chicago for 10 years, and as petrologist with the Carnegie Geophysical Laboratory for 26 years. It is eminently fitting that the award by his own specialistic society should take place in Washington where he has for so long carried on his work.

Dr. Bowen has been the recipient of many distinguished honors includ-

ing the Penrose medal of The Geological Society of America, the Willet G. Miller medal of the Royal Society of Canada, and the Wollaston medal of the Geological Society of London.

An incident may serve to emphasize the modesty of the man to whom today we award the Roebling medal. When the International Geological Congress met in the United States in 1933, I was a member of the trans-continental excursion. One day I casually introduced one of the most distinguished European petrologists to Bowen who was seated in a group in the smoking room of the pullman car. Conversation was general for some time. Shortly after we returned to our regular seats the European petrologist came over to me and in a tone of wonderment and awe said "Was that *the Bowen*, the great petrologist?" I replied, yes that was *the Bowen*, the great petrologist.

Mr. President, it is a personal satisfaction and an honor to present to you "*the Bowen*," a past-president of this society, for the award of the Roebling medal of the Mineralogical Society of America.

PRESENTATION

President George Tunell handed the medal to Dr. N. L. Bowen with the words:

Norman Levi Bowen, in recognition of the new conceptions of the crystallization processes of igneous rocks and the recrystallization processes of metamorphic rocks that you established by precise physico-chemical experiments and field studies in areas of critical exposures, and also in recognition of your determinations of the chemical compositions, stability fields, and physical properties of many minerals, I have the honor to present you with the Roebling Medal of the Mineralogical Society of America.