

## Presentation of the Mineralogical Society of America Award for 1984 to Bernard J. Wood

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*Mr. President, Ladies and Gentlemen:*

When Bernie Wood wrote to me and asked if I would present him to you, Dr. Prewitt, for the Mineralogical Society of America Award, I wrote to him immediately and accepted his invitation. Only in the weeks following and after having read the citations for previous recipients of this award did I realize that, without exception, the citationists had themselves made very significant contributions to our science and had usually been among the most influential teachers of the recipient. I'm sorry to have to tell you that I can make no claim to have been responsible for Bernie Wood being before you today except for our friendship and mutual respect.

It was Roger Strens who first realized Bernie's potential as a first class researcher and if it had not been for Roger's untimely death a few years ago he would surely have had the privilege of presenting Bernie Wood to you today.

I first met Bernie Wood when he sauntered into my office in Manchester where he had been awarded an NERC Postdoctoral Fellowship. I think I have used the correct verb because Bernie's walk is that of a cricketer rather than that of a baseball player—in short he does not appear to be a person in a hurry but I can assure you that he is.

He had studied at three British Universities already—London for his Bachelor's degree, Leeds for a Master's degree and Newcastle on Tyne for his doctorate. The topic of his Ph.D. thesis was "Electronic spectra and thermodynamic properties of some solid solutions" and this was carried out under the supervision of Roger Strens.

Bernie had had no experience on our experimental equipment in Manchester but he knew what experiments he wanted to do and we had recently set up a Boyd and England apparatus. After doing a few experiments and getting results which were crazy, Bernie began to wonder why this was so—he had used a new batch of Pt 13% Rh thermocouple wire but the spool labelled Pt 13% Rh was of a completely different alloy and so the temperatures recorded were quite wrong. We all learned a lesson from this which is that despite the manufacturer's impressive certificate accompanying the thermocouple wire, it is essential to calibrate it oneself since in this case it was not even a Pt alloy.

I attended a second year undergraduate course on thermodynamics which Bernie taught in the Manchester department. British undergraduates are not much better or worse than undergraduates elsewhere in the world and they sometimes don't take kindly to even elementary mathematics. Bernie asked the class, "How do you differentiate

$y = \sin x$ ?" only to be met with a complete silence. Possibly someone knew the answer but certainly no-one was going to admit to knowing it. He then declared that although many of them had passed examinations in high-school mathematics whereas he himself had failed, he was going to have to teach them to differentiate simple functions. Thermodynamics as a subject is feared by students of physics and of chemistry and more so by many geology students: many of us think that if we ignore it, it will go away or we may even claim that since our main interests are with real rocks, particularly in the field, we have no need of theoretical petrology. These kinds of people presented and still present a challenge to Bernie Wood and when, in collaboration with Don Fraser, he produced an elementary text on thermodynamics for geology students, his philosophy was described in the preface viz. that the average student could use the language of thermodynamics without necessarily appreciating the details of the grammar. In this way the students could overcome their initial, largely unjustified fear of the subject and so eventually appreciate the beauty of the language. Anyhow, I think they were very successful in this aim because Bernie soon attracted a number of graduate students both from Britain and abroad when it was clear that not only was he a first-class researcher but he was an excellent teacher also.

After about a year and a half as a post-doctoral fellow, a faculty position became available and Bernie was appointed as a lecturer in metamorphic petrology. It could have been predicted that he would not stay with us for very long because all those who have held this post in Manchester have moved on to other places: the names of most of them will be familiar to you—R. A. Howie, D. Turner, W. L. Brown, Derrill M. Kerrick, A. B. Thompson and B. W. D. Yardley. Bernie was promoted to the status of Reader at the very early age of 32 but despite this, the attractions of working in the United States were very great and he has been in the USA for the past five years. He had previously worked for short periods at the University of Chicago, the University of California in Berkeley and at the Geophysical Laboratory.

He spent a year with Rockwell Hanford Operations and from there he went to Arizona State University and then to Northwestern University where he is at present. I think he has worked in more departments than most persons of his age.

His first published paper was on "The crystallization of lunar basalts" written with Roger Strens, but his second was on "The orthopyroxene geobarometer" also written

with Strens. This latter paper was the first of a series of papers which were concerned with geothermometry and geobarometry and two years later his paper written with Shohei Banno, then a visitor to Manchester, appeared. This paper described how it was possible to calculate the pressures of garnet-orthopyroxene assemblages if a temperature was known and that a temperature of equilibrium could be obtained from natural clinopyroxene-orthopyroxene pairs by using a model which allowed for the other elements present in both diopside and enstatite. This paper was very widely quoted and a number of refinements have been suggested. There followed papers on the application of these geobarometers and geothermometers to the South Harris granulites of Scotland and to the Ivrea zone of the Alps. In collaboration with Cressey and Schmid, he developed a method of determining a univariant equilibrium using a divariant solid solution assemblage—this may be useful when the reaction is very sluggish and is made possible by determining the change in composition of an additional phase. Another geothermometer was developed in collaboration with his student, Hugh O'Neill, based on Fe/Mg partitioning between garnet and olivine.

A fairly recent short paper by Wood and Walther on reaction rates in hydrothermal systems reveals the remarkable result that reaction rates of all silicates are very simply temperature dependent, certainly up to 700°C and from this the authors suggest that a dehydration reaction at

500°C could go to completion in 330 years if the crystals are 2 mm diameter and only 1°C in temperature above the reaction boundary. This rapid reaction rate gives strong support to the idea that prograde metamorphic reactions attain equilibrium rather rapidly. The finding that the rate constants for reactions were equivalent to the rate of dissolution of material from the surface of the minerals is to me rather surprising. The most recent paper by Wood and Yuen shows that Bernie is applying his specialized knowledge to large scale problems and in this paper the authors suggested a petrological explanation for the uplift of the ocean floor with increasing age being greater than expected.

It is now thirty-three years since the first recipient of this award, O. F. Tuttle was presented to the Society by N. L. Bowen. Among Bowen's many attributes was his gift for the use of words and I hope that I may be forgiven for repeating the quotation used by Bowen on that occasion:

"What are garlands and crowns to the brow that is wrinkled? 'Tis but as a dead flower with May-dew besprinkled." Bowen added his own comment to describe the recipient of the award:

"The dew falls on a bud full of life and vigor, and ready to expand into a fine bloom." I believe that these words may also be applied to today's recipient of this award.

Mr. President, it is with much pleasure that I have the honor to present to you Bernard J. Wood for the Mineralogical Society of America Award for 1984.