

## Obituary

### Minor J. Coon (1921-2018)

Minor Jesser (“Jud”) Coon was born in Englewood, Colorado on July 29, 1921 and died on September 5, 2018. At the University of Colorado he was introduced to biochemical research by Professor Reuben Gustavson. In 1943 he left to study biochemistry at the University of Illinois under William C. Rose, who came from a long line of scientists tracing back to Lafayette Mendel, Russell Chittenden, and eventually to J. J. Berzelius (1). Rose is known for discovering threonine and for defining the essential amino acids. Jud and his fellow graduate students did two things— (i) they synthesized amino acids and derivatives, and (ii) they consumed synthetic diets lacking one amino acid for weeks. Jud remembered these studies with mixed emotions, mostly bad. At one point he looked so ill that someone, phrasing a line from the musical Oklahoma, said “Pore Jud is daid” — the name stuck.

Doing nutritional experiments on your own graduate students with non-GMP diets would not be allowed today, but Jud said none of them suffered any long-term effects other than the disgusting taste. Jud finished his Ph.D. thesis in 1946, remained in the Rose lab briefly, and then in 1947 left for a faculty position at the University of Pennsylvania. The graduate studies had given Jud ideas, and he worked on the metabolism of amino acids. Leucine catabolism leads to  $\beta$ -hydroxy- $\beta$ -methylglutaryl CoA, now best known because of statin drugs that inhibit cholesterol synthesis. Short chain acids, derived from some of the amino acids, have some unpleasant olfactory issues. Jud told me one was the pure essence of dirty tennis shoes and that he got a lot of disgusting looks on the train home at night in Philadelphia.

In 1955 Jud accepted an offer in the Department of Biological Chemistry at the University of Michigan, where he was to remain for the rest of his life. He took two sabbatical leaves with Nobel Laureates, first in 1952 with Severo Ochoa at New York University and then in 1961-1962 with Vladimir Prelog at the ETH in Zürich.

Jud had already received the Pfizer Award in Enzyme Chemistry from the American Chemical Society in 1959. After the sabbatical with Prelog, Jud’s interest in oxidation of hydrocarbons developed, particularly bacterial  $\omega$ -hydroxylation. Jud hoped to extend the research to mammalian systems.  $\omega$ -Oxidation was NADPH-dependent and resided in the microsomal fraction. In the late 1960s the technology of handling intrinsic membrane proteins was not developed. Anthony Lu succeeded, in what might be the greatest *tour de force* from Jud’s lab, in separating three components—using glycerol for stabilization and deoxycholate as a detergent— and combining them to reconstitute lauric acid  $\omega$ -hydroxylation (2, 3). The three fractions were a cytochrome P450 (P450), NADPH-P450 reductase, and phospholipid (4). Anthony related to me that they did not even know they were working with a P450 until they took a spectrum one evening in a neighboring lab when that professor was not around. However, none of these components were pure. The reductase was purified to homogeneity by Jud’s student Janice Vermilion (5). Any of several simple phospholipids could be used for that component (6). Later efforts led to the purification of multiple rabbit liver P450s to homogeneity (7). The difficulties in purifying enzymes from tissues are not always appreciated today—these are not only intrinsic membrane

proteins but they had no affinity tags, and many closely-related P450s are present in the crude tissues.

The separation and purification of P450s dramatically changed the landscape of drug metabolism and took it from pharmacology into biochemistry. No longer were catalytic activities alone used to describe reactions, but individual enzymes could be characterized in terms of their roles. The pharmaceutical industry is very different and better off today, in part because of Jud's contributions.

Purification of an enzyme is not a scientific end but only a beginning. In the 1970s-1990s Jud continued to do research in multiple aspects of P450-related science. He characterized an ethanol-inducible P450 in rabbits, resolving some of the controversies about ethanol oxidation systems (8). He also contributed much to our understanding of the catalytic mechanisms of both P450 and NADPH-P450 reductase, involving his colleagues John Groves and Vincent Massey. Jud published 91 papers in *The Journal of Biological Chemistry* alone.

From 1970-1990 he was Chair of the Department of Biological Chemistry at Michigan. He served as ASBMB Secretary (1981-1984) and President (1991-1992). He also headed the advisory committees for the biennial international meetings on Microsomes and Drug Oxidations and also Cytochrome P450 for nearly 20 years. Jud was elected to the National Academy of Sciences in 1983. In 1979 he received the ASBMB William Rose Award and in 1980 the Brodie Award (Drug Metabolism) from the ASPET. He received an Honorary Doctor of Medicine from the Karolinska Institute, and in 1988 he was named Scientist of the Year in the State of Michigan.

He was a mentor in the true sense of the word. Many of the leaders in the P450 field trained in his group, both in academia and the pharmaceutical industry. I was fortunate to be a postdoc in his group (1973-1975). I am not sure I appreciated it all then, but I learned many lessons from Jud: (i) Hard work pays off eventually. (ii) Appreciate science. (iii) Treat your students and postdocs fairly and with respect. (iv) Focus on things that your lab does well. (v) Do not neglect your family. (vi) Respect individuals you do not agree with; be courteous. (vii) Contribute to your scientific community, e.g. department or a society. (viii) Be philosophical; you cannot digest everything at every meeting. (ix) Don't worry about lack of lab space; there is always room for another body or piece of equipment. (x) Write well! He was a real stickler on writing. I thought he hated everything I ever wrote. Years after I left, he told me he thought my papers were well-written. I even became an editor, and now I am as hard on my students' writing as Jud was.

Jud also had another side. He was humorous, witty, and enjoyed art and music, as well as his family. Jud was married for 52 years to Mary Lou(ise) (Newbern), whom he met at Illinois. She passed away in 2000, and sadly his son Larry also died in the same year. Jud is survived by his daughter Susan Coon and her family and daughter-in-law Linda Coon and her family. They both deserve thanks for all their help and care of Jud in recent years, and a number of former students and colleagues maintained close contact with him.

Jud Coon had a long and successful career and we will miss him. Those of us who trained with him feel a common bond, and I have tried to develop my own laboratory like this. I can pay

him no higher compliment as a mentor than this: it was from him that I learned how to be a professor.

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