



Obituary

In memoriam: James Allen Olson, 1924–2000

September 22nd, 2000 marked the passing of one of the most remarkable men that international nutritional science has ever known, and been known for: Professor James Allen Olson, Distinguished Professor of Biochemistry at Iowa State University. The state of Iowa in the United States, famed for its flat plains and expansion of maize cultivation, is the paradigm for ‘provincial’ in the minds of the rest of the US population. Professor Olson combined the tranquil and gentlemanly qualities of the heartland of America with an interest and personal investment that projected his influence and reach around the world. I was in Europe, on the shore of Italy near Genoa, when the news reached me of his sudden and unexpected death while undertaking his morning constitutional exercise. In my travel briefcase, I had the notes of my (overdue) draft of the chapter on ‘Vitamin A and carotenoids’ for the forthcoming 8th edition of *Present Knowledge in Nutrition*; I was under the publishers’s pressure to submit it, but I was looking forward to passing it before Jim’s eyes to make sure that I had ‘gotten it right.’ The sense of personal and professional loss was poignant and overwhelming.

James Allen Olson was a unique giant—a gentle giant—in our nutrition community. His interests bridged and spanned the chemistry, biology and public health interests of both retinoids and carotenoids, dominated both topics, and assumed leadership. *Present Knowledge in Nutrition*, (ILSI Press, Washington) and *Modern Nutrition in Health and Disease*, (WB Saunders, Philadelphia) are undoubtedly the two most widely used general nutrition texts in the English language. Jim’s impact on both, and hence on the world’s readership, was profound, having authored the chapter on vitamin A in *PKN* through the 7th edition and having initiated a chapter on carotenoids (as distinct from Vitamin A) in the 9th edition of *MNHD*.

The chronology of insights and achievement is revealed by surveying the 200 plus citations listed by *Index Medicus* from 1964–2000. In 1964 and 1965, the story opens with papers on the biosynthesis of cholesterol, effects of bile salts on uptake and cleavage of B-carotenes and on the biosynthesis of carotenoids and retinol; one can see the ‘isoprenoid-factor’ as the common spark to his career. Of course, the crown jewel of his achievements, in my view, came with the paper: ‘Olson and Hayaishi, (1965) The enzymatic cleavage of beta-carotene into vitamin A by soluble enzymes of rat liver and intestine,’ a classic among classics, published contemporaneously with a confirmatory study from Columbia University. The 15–15’ dioxygenase

enzyme, which inserts molecular oxygen to derive two molecules of retinaldehyde from the parent carotenoid, would be the molecular link between retinoid and carotenoid chemistry, and its applications, for the 35 years to come.

With respect to the retinoid side, he labored in human health and disease, and in animal models in the area of morphological changes from vitamin A deficiency and metabolism of retinoids. His research laboratory mastered the analytical and synthetic chemistry, enterohepatic physiology, and internal metabolism of this class of compounds. On a sabbatical tour in northeastern Brazil in the late 1970s, another seminal publication was conceived: ‘Olson JA, (1979) Liver vitamin A reserves of neonates, preschool children and adults dying of various causes in Salvador, Brazil,’ a twenty-four page paper! In the 1980s, his research turned to some of the toxicological aspects of retinoids, and analogues and from the early studies on bile he became a champion of the chemistry of the glucuronides of retinoids, and later retinamides. He even delved into the issue of why polar bears are not intoxicated by the high vitamin A concentrations in their own livers.

Understanding and rationalizing the diagnostic assessment of human vitamin A nutriture was another important thrust. He developed and promoted the conceptual gradation of nutriture through deficient, marginal, adequate, excessive and toxic states. He then confronted the limitations and caveats in establishing the marginal-state diagnosis for vitamin A in humans. In a 1984 review in the *Journal of the National Cancer Institute*, he provided a crystalline explanation of why retinol concentrations, *per se*, fail to do the job. This led him to follow-up Barbara Underwood’s work with the relative-dose response (RDR) test, a functional assessment involving oral retinol challenges, to a chemical modification with dihydroretinol as a tracer in the modified RDR test. This was more precise and sensitive, and required less blood extraction. In various lectures, he championed the application in field settings of dilution tests using stable-isotope labeled retinol to allow for non-invasive individual diagnosis of human vitamin A status, when others thought it overly expensive and fanciful. What greater pride could my Boston and Guatemalan co-investigators and I have experienced than in seeing the title of his editorial, ‘Olson JA, (1979) Vitamin A assessment by the isotope-dilution technique: good news from Guatemala,’ and receiving his praise for going where others feared to tread.

With respect to carotenoid chemistry and biology, his insights into the cleavage enzyme left a legacy. An expert panel of the Food and Agricultural Organization, in 1967, had botched the job of harmonizing the older expressions of 'International Units' (IU) as a measure of dietary vitamin A in defining 'Retinol Equivalents' (RE) as they referred to food composition tables. No one more clearly and eloquently has illuminated the error and allowed us to work within the contradictions than he. Thank you Jim! He returned in the 1990s to focus on the other carotenoids, including lutein and lycopene, and the various isomers of β -carotene, when the non-vitamin actions of these compounds achieved emerging interest as antioxidants, immuno-modifiers, and anti-carcinogens. A classic review is Olson JA, (1993) 'Molecular actions of carotenoids,' and a more jocular one is Olson and Krinsky, (1995) 'The colourful, fascinating world of the carotenoids: important physiologic modulators.' His group initiated an important field of research on the potential for intraluminal competitive interactions among carotenoids and important analytical techniques for separation and identification of carotenoid and xanthophyll compounds.

The first decade of my independent professional career was devoted to the intestinal physiology of carbohydrates and trace elements. It was only in 1985 when I co-founded the Center for Studies of Sensory Impairment, Aging and Metabolism (CeSSIAM) as the research center for the Guatemalan National Committee for the Blind and Deaf, that I ventured into vitamin A research. Nutritional blindness was an interest of the Committee, and part of our *raison d'être* to be headquartered in the Eye and Ear Hospital was to support vision-related research. It was then that the magnificent contributions of James Allen Olson began to become our daily fare. Over the ensuing years, Dr Olson's group and ours had our professional debates and differences, including discrepancies on just how much impairment of bioconversion was produced by the vegetable matrix of edible fruits, vegetables and green leaves and on how reproducible were the RDR tests within a given subject. But the discussions were always conducted with the highest degree of courtesy, respect and mutuality.

From his base in Iowa, Jim Olson was a force in the international domain in a very active, participatory way. He had established, as mentioned, collaborations in Brazil. Also, working with members of his research group, his MRDR methods reached Indonesia. Jim also co-authored many of the guideline books from the International Vitamin A Consultative Group (IVACG), and had been a member of the US–Japan Panel on Malnutrition. I think Dr Olson attended at least every IVACG meeting that I was privileged to attend. When we hosted the IVACG in Guatemala in 1997, he provided a brilliantly synthetic lecture on bioconversion and bioavailability of provitamin A. The quality moments for me of the South African IVACG meeting in Durban in 1999 were a pair of evening satellite sessions on β -carotene bioavailability attended by an

intense and select few of us who shared the passion of its relevance to human nutrition.

On the scientific and policy scene of his own nation, Professor Olson cast a long and productive shadow. He became convinced in the mid 1980s that the prevailing estimations for human vitamin A requirements were too high; as part of the expert panel for the 1989 US *Recommended Dietary Allowances* 10th edition process, his recommendations were for a reduction. For reasons that cannot be described as other than political (ie, not scientific), the full Food and Nutrition Board 'hijacked' and 'overturned' their own panel's report. In an act of both courage and conscience, Jim joined others on the panel in 1986 to go forth to the public with the 'RDIs,' (Recommended Dietary Intakes), which argued for the actual recommendations set by the internal panel, itself. In 1999, as a subsequent panel wrestled with recommendations for the Daily Reference Intakes (DRIs) for the fat-soluble vitamins (A and K) in a public meeting at the Institute of Medicine in Washington, Jim had been invited to discuss the bioconversion issue. However, what I most appreciated at that gathering were his lucid insights of analogies to retinoid and carotenoid chemistry to guide understanding of the much less charted waters of human vitamin K biology, a field totally outside of his personal research experience. A true master of biologic logic can contribute in any domain.

Also on the US national front, Jim Olson never missed an annual meeting of the Federation of Societies of Experimental Biology (FASEB). He believed in students, in the forefront of scientific discovery, and was a refreshing presence in the sessions of this organization. Some years back, he had convinced one of the presidents of the American Institute of Nutrition (now the American Society for Nutritional Sciences) to lend his hotel suite for a social hour for the FASEB attendees interested in vitamin A and retinoids. It was called the Vitamin A Interaction Group or VARIG social hour. (One wonders whether his flights to Brazil had led Jim to the 'VARIG' acronym for this social event). What I can attest to is the fact that some of the contacts and discussions over beer, pretzels and chips have fostered invaluable collaborations for CeSSIAM over the years. He was scheduled to chair the Mini-Symposium on Retinoids in Orlando at Experimental Biology 2001, had he lived.

In the late 1980s, Jim Olson joined with a small group of nutritionists to form a satellite body to the FASEB process, the Carotenoid Research Interaction Group (CARIG). This was the era of optimism that carotenoids were the phytochemicals that would prevent chronic degenerative diseases. He brought so much insight to this new departure! His legacy of the 15-15' dioxygenase was ever present wherever he was; for those, like myself, whose interest in carotenoids centered on their provitamin A potential, he was an inspiration and an ally when all eyes turned to cancer prophylaxis. When the news of the lung cancer prophylaxis fiasco hit the carotenoid community, he stood

steadfast as a beacon of interest and enthusiasm, leading us back to the primacy of carotenoids as precursors of an essential nutrient.

Dr Olson had joined Maurice Shils as co-editor of *Modern Nutrition in Health and Disease* with its 8th edition, published in 1994. The connection of Jim as co-Editor of *MNHD* provided me with a rare insight into another dimension of his talents and genius. I was invited to contribute a chapter on 'Nutritional priorities for less-industrialized countries' for the 9th edition of that textbook. As a testimony to his prowess and agility with the written word, he worked wonders as a copy-editor, adding a word here, turning a phrase there, and maximizing the clarity of the text.

Two of the last contributions from Jim Olson's word-processor are especially close to my heart, as they were published in the major nutritional periodical of the Latin American region, *Archivos Latinoamericanos de Nutrición*. They are part of the proceedings of a September 1998 symposium on carotenoids convened in Campinas, Sao Paulo. Jim had once again made his presence felt in Brazil. He wrote the keynote address, 'Carotenoids and human health,' and a second contribution on 'Bioavailability of carotenoids.' These served me enormously with invaluable orientation for my writing of my *PKN* chapter.

Iowa, the nation of the United States, the developing world, and Europe: James Olson's outreach and involvement spanned them all. Having been appointed to the Board of this *Journal* in July by the Editor-in-Chief, it was only when I saw the masthead in the September issue that I realized that the *EJCN* would have been yet another venue of our mutual interaction. But, tragically, there would be no real overlap, as this great servant to nutritional biochemistry, and clinical, human and public health nutri-

tion had just left as I arrived. Fortunately for all, this quiet and modest gentleman did not leave without leaving us a legacy of inspiration, dedication and achievement that will be difficult to match in the 'Hall of Fame' of the larger-than-life figures of our profession. The *Journal* shares its loss with all the rest of the constituency that either gained from his intellect in the academic domain or benefited from the practical application of his insights at the patient's bedside or on the ground in hypovitaminosis A-endemic zones of the developing world.

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References

- Olson JA (1979): Liver vitamin A reserves of neonates, preschool children and adults dying of various causes in Salvador, Brazil. *Arch. Latinam. Nutr.* **29**, 521–545.
- Olson JA (1984): Serum levels of vitamin A and carotenoids as reflectors of nutritional status. *J. Natl. Cancer Inst.* **73**, 1439–1444.
- Olson JA (1993): Molecular actions of carotenoids. *Ann. N. Y. Acad. Sci.* **691**, 156–166.
- Olson JA (1996): Vitamin A. In *Present Knowledge in Nutrition*, eds. EE Ziegler, JL Filer Jr, pp 109–119. Washington, DC: ILSI Press.
- Olson JA (1998): Carotenoids. In *Modern Nutrition in Health and Disease*, eds. ME Shils, JA Olson, AC Ross, M Shike, pp 525–541. Philadelphia: WB Saunders.
- Olson JA (1999): Vitamin A assessment by the isotope-dilution technique: good news from Guatemala. *Am. J. Clin. Nutr.* **69**, 117–118.
- Olson JA & Hayaishi O (1965): The enzymatic cleavage of β -carotene into vitamin A by soluble enzymes of rat liver and intestine. *Proc. Natl. Acad. Sci. USA* **54**, 1364–1370.
- Olson JA & Krinsky N (1995): The colourful, fascinating world of the carotenoids: important physiologic modulators. *F.A.S.E.B. J.* **9**, 1547–1550.