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A Word from the Editor

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I A Word from the Editor

It is our great pleasure to congratulate Professor J. Herbert Waite on his receipt of *The Adhesion Society Award for Excellence in Adhesion Science, Sponsored by 3M*, given during the Society's Annual Meeting in Savannah, Georgia, USA, 15–18 February 2009. We also present, in this issue, Part 1 of a Collection of papers honoring him on his receipt of the Award.

There follows an Appreciation of Professor Waite by Professor Manoj K. Chaudhury of Lehigh University, Bethlehem, PA, USA.

Louis H. Sharpe
Editor in chief

AN APPRECIATION OF PROFESSOR J. HERBERT WAITE

Professor Waite has made several original contributions to the understanding of the chemistry and mechanics of bioadhesion. He is indeed one of the quintessential leaders of a research field that now routinely attracts hundreds of young investigators from various fields of chemistry, physics, engineering, materials science, and biology. One unique aspect of his research has always focused on the relationship between molecular structure and mechanical properties in load bearing biomolecular materials. His research projects in this vein involve underwater cements and adhesives of various marine organisms, in which Herbert and his team contributed immensely to the understanding of the mechanical and physical properties, the biochemistry of the molecular constituents, and their hierarchical inter-relationships—at rest and under tension. There are other labs that study the mechanics and structural architectures of adhesive proteins, but few, if any, have pursued the biochemistry to any degree in conjunction with mechanics as has been done by Herbert Waite's group.

His research has also opened new doors to the field of biomimetics that meticulously exploits the design principles of nature. Some of his research that has led to such novel design paradigms are outlined below:

- a. Herbert Waite realized long ago that underwater adhesion is routine for various marine organisms, such as sessile mussels and sandcastle worms. Herbert's research elucidated that many

of the underwater marine proteins contain a large fraction of such exquisite molecules as DOPA, Pc3B, and phosphoserine that hold the key to underwater adhesion. These molecules have been mimicked with sensational results by Herbert and others as artificial bioadhesives.

- b. Herbert and his group showed the surprising result that in the jaws and beaks of polychaetes and squids hardness and wear resistance are achieved without minerals. Instead, histidine-rich proteins, melanins, chitin, and metal ions are recruited to do the job with the appealing advantage that jaw density/weight is significantly reduced.
- c. When complex systems are assembled from different components, contact deformation often occurs where different components meet. This rarely occurs in biology because of the prevalence of molecular gradients with mechanical consequences. Herbert Waite and his group studied two gradients in some depth: a stiffness gradient involving stiff and soft blocks in a collagenous block copolymer from mussel byssal threads, and a hardness gradient in Nereis jaws that is templated by a Zn binding histidine-rich protein.

The above list provides only a small subset of immense accomplishments of Professor Waite. He has also enriched the field of bioadhesion with excellent publications. Herbert Waite is an immensely dedicated scientist with tremendous integrity. He is a well-deserving recipient of *The Adhesion Society Award for Excellence in Adhesion Science, Sponsored by 3M*.

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