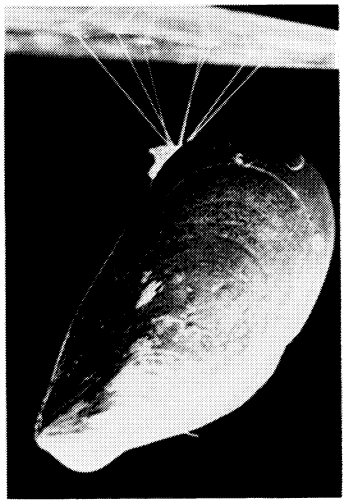
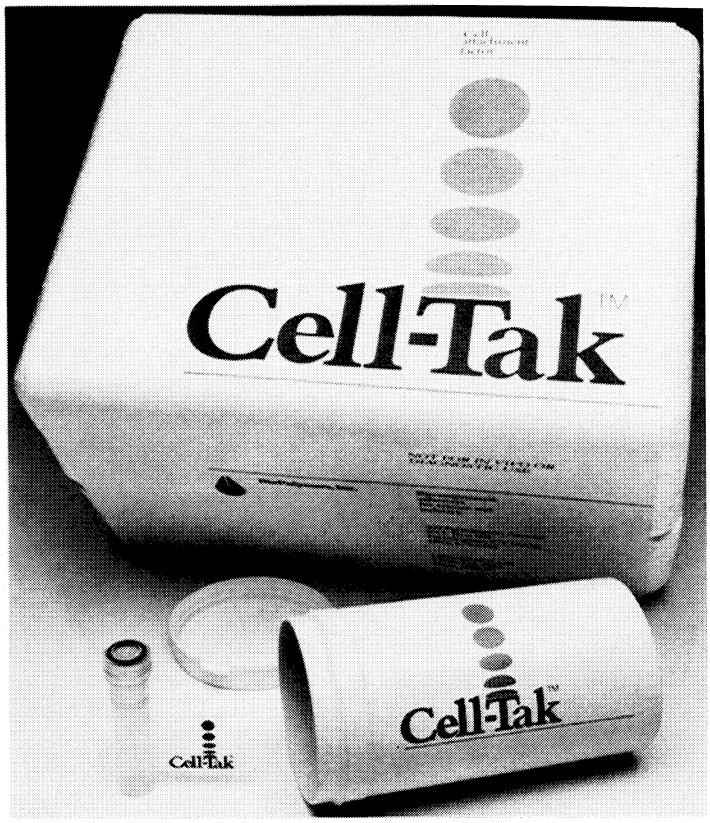
Mussel Glue



Above, a *mytilus edilus*—a common blue ocean mussel—is attaching itself to the underside of a wet glass in a laboratory. It does so by secreting a glue-like substance in the form of multiple threads, which attach to surfaces such as shells, rocks, piers and ships. This natural "superglue" hardens within minutes and keeps the mussel tightly affixed to its selected platform, even in the roughest seas. Its superior adhesive properties suggest many practical applications and one company—Bio-Polymers, Inc., Farmington, Connecticut—has developed a synthetic mussel glue for the commercial market.

A potential early application, says Bio-Polymers president Thomas M. Benedict, is in dentistry as an adhesive between filling material and teeth. Current dental adhesives require etching of the tooth or an almost perfectly dry surface, very difficult to achieve in the moist human mouth—but the synthetic superglue, like its natural counterpart, bonds in moisture. Other possible medical applications include glueing fractured bones together; coating sutures for preventing infection after surgery; closing corneal puncture wounds to prevent astigmatism after ophthalmological surgery; and general tissue culture in research laboratories.

The superglue is not derived from aerospace technology, but the formation of Bio-Polymers and its program for commercializing the product represent an example of how small businesses can benefit from the services of NASA's industrial applications centers. The story begins in 1981 when Dr. J. Herbert Waite, Assistant Professor of Orthopaedics at the University of Connecticut Health Center, successfully isolated the protein the mussel uses to make its adhesive bond and characterized the protein's structure, a breakthrough—after a decade of effort—that ultimately led to development of the synthetic substance. Publication of Waite's findings aroused wide interest among drug companies seeking quantities of the material for further research in their own laboratories. This led to a decision in 1984 to form a company, with Benedict as president and Waite as a consultant, to produce the basic protein for sale as a research chemical and to develop formulations for medical/industrial use.



The company's efforts were aided by NERAC, Inc., Storrs, Connecticut, one of nine NASA-sponsored technology transfer service centers that provide customized search and retrieval services for industrial clients. NERAC was engaged by Bio-Polymers to provide information that would help the company secure federal grants for further research and to identify commercial applications for the product. NERAC conducted searches of several data banks, including NASA's, and was able to supply the requisite information. Says Benedict: "While NERAC helped us meet the Small Business Innovation Research Criteria for companies seeking research grants, even more important were the numerous applications its searches uncovered." Late in 1985, Bio-Polymers succeeded in synthesizing the glue and in October 1986 introduced the first of many planned products: Cell-Tak™ (above), an adhesive anchoring product for cell and tissue research. ▲

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