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SCIENCE

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BIOSYSTEMS UPDATE

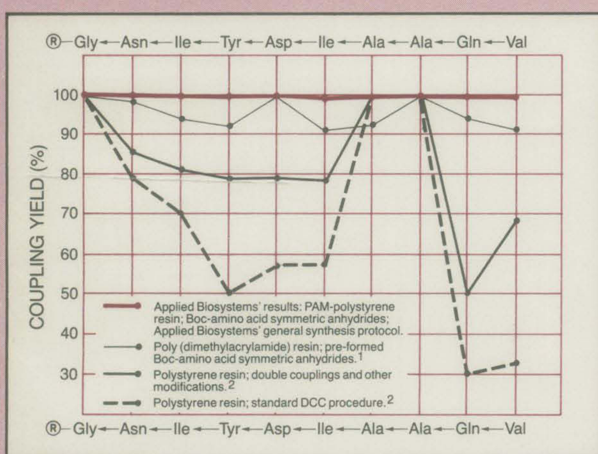
A New Approach to Automated Peptide Synthesis

Applied Biosystems is pleased to announce the first instrument designed for high efficiency peptide synthesis. The key to the high coupling yield of the Model 430A Peptide Synthesizer is an activation unit which converts the amino acid to a very efficient acylating species immediately prior to the coupling step. The defined protocol has been optimized for general peptide synthesis, but the fully programmable system allows straightforward adaptation to other chemistries.

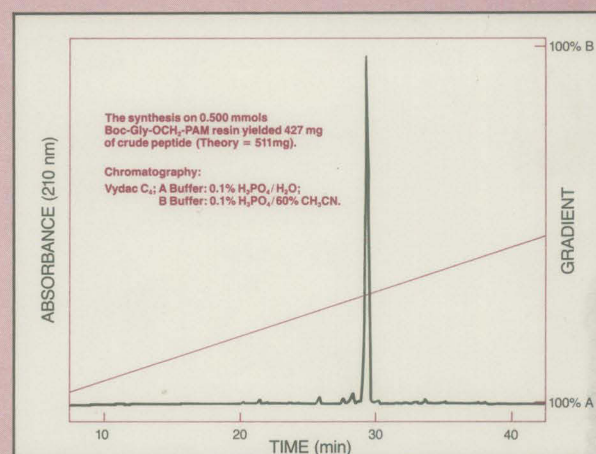
Cycle times with the general synthesis protocol are approximately one hour. A single loading of protected amino acids, reagents, and solvents will give up to 50 synthesis cycles. To insure high coupling yields, Applied Biosystems manufactures and supplies all synthesis reagents.

The data below summarize the results of the synthesis of the decapeptide Acyl Carrier Protein (65-74). These results illustrate the combined capabilities of the novel automated synthesis procedure and the high quality peptide synthesis reagents and loaded resins.

The new Model 430A Peptide Synthesizer is being introduced in the U.S. at FASEB and in Europe at Analytica. Write or phone if you'd like more information.



Amino acid incorporation during assembly of Acyl Carrier Protein residues 65-74.



HPLC chromatogram of crude, HF cleaved Acyl Carrier Protein (65-74).

ANALYTICAL METHOD	STEP YIELD (%)									
Quantitative Ninhydrin Monitoring[3].	—	99.9	99.6	99.5	99.4	99.1	99.2	99.2	99.1	98.9
Preview Quantitation by Solid Phase Sequencing of Protected, Resin Bound Peptide[4].	—	—	99.4	—	99.3	99.1	99.2	—	98.9	98.7
	RELATIVE AMINO ACID EQUIVALENTS									
Amino Acid Analysis of HF Cleaved, Deprotected Peptide	1.00	0.97	0.90	0.94	0.97	0.90	0.96	0.96	0.94	0.98
Amino Acid Residue	Gly←	Asn←	Ile←	Tyr←	Asp←	Ile←	Ala←	Ala←	Gln←	Val

Step yield quantitation and amino acid analysis results for Acyl Carrier Protein (65-74) chain assembly using Applied Biosystems' general synthesis protocol. Only single couplings were used throughout the synthesis (except for Gln).

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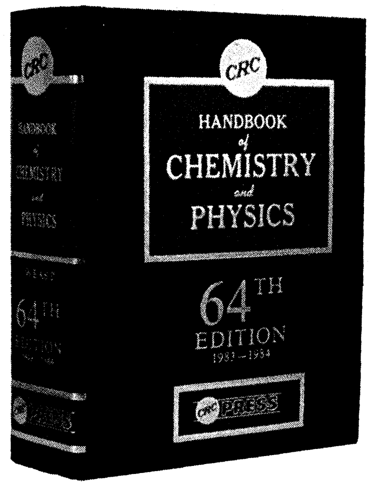

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COVER

An equal area (Aitoff) projection in galactic coordinates of the infrared emission from the entire sky with one-half degree resolution. The bright band running from top to bottom is the plane of the Milky Way galaxy with the center of the galaxy at the center of the picture. The colors represent three of the IRAS wavelengths bands (blue is 12 microns; green is 60 microns; and red is 100 microns). Thus, hotter material appears blue or white while the cooler material appears red. Visible in the picture are molecular clouds and regions of star formations in the constellations Ophiucus (center) and Orion (bottom, left). See page 14. [Jet Propulsion Laboratory, California Institute of Technology, Pasadena 91109]

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SCIENCE

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The Cultures of Science and Technology

In her editorial (10 February, p. 543), Anna J. Harrison succinctly differentiates among the processes of science, engineering, and technology. This is a valuable first step in clarifying the problems that the government faces in developing policies relevant to these areas. But policy-making efforts also require that we examine the cultures involved in the three processes and their constituencies. While, as Harrison points out, scientists are increasingly acting as engineers and engineers as scientists, that phenomenon is one of personal and intellectual mobility. When scientists act as problem-solvers, they adopt the engineering-technology culture and serve the engineering-technology constituency. The reverse is also true. Thus, it is appropriate here to ignore that mobility.

Science has as its constituency the general public. Within the science culture, the results of the science process are considered free goods. While secrecy may be observed to ensure priority, once results are in, publication is the rule. Institutions that fund the major work in science, universities, and fellow scientists measure scientists, among other things, by how well and quickly they disseminate results. Science is among the most open of activities. The output is knowledge and understanding, and this output is most often embodied in publications and in the process of teaching.

Engineering and technology are very different from science. There are, of course, engineering scientists engaged in engineering science—just as there are biological scientists and nuclear scientists—and they follow the science culture and leave as their legacy public scientific knowledge. Almost all engineering, as is the case with technology, however, reaches its expression in things and services. Only incidentally does engineering or technology result in a legacy of knowledge. That such knowledge is a by-product does not demean its importance; it merely identifies it as irrelevant to the driving forces in the culture and the constituency.

Because of this commonality in output, I shall use "technology" for both engineering and technology. Technologists strive to solve problems at a price that makes the public willing to select and use their solutions. Cost and price, reliability, and other attributes that lead to that selection are as much parts of the technologist's calculus as are stress, resistance, and friction. In our competitive, relatively capitalist society, the efforts of the technologist are mediated by companies that expect to profit from the public's adoption of the technologist's solution. In other societies the rewards to the mediating enterprises range from social status to political power.

Regardless of the society, the rewards go to the organization (and through it to the technologist) that most successfully achieves public adoption of the technology. Thus, while the public may be the technologist's ultimate constituency, the existence of this intermediary organization—and its rewards—set the technologist's culture. Technology is developed in secret. Publication is anathema, and the final test of validity is public use. Indeed, so strong is the drive for secrecy that early public policy created the U.S. patent system. Society went so far as to grant a monopoly to the technologist in exchange for revealing the technical knowledge embodied in the patent's disclosure. Engineers and technologists often work in teams and share knowledge within the host organization, but outside lie the competitors. Technologists work very hard to prevent the spread of their new knowledge. Thus, the legacy of technology is the material advancement of society.

The cultures of science and technology are thus almost opposites—a fact we either ignore or deny when we establish agencies under the rubric of "science and technology." If we are to make and implement sound public policy regarding science and technology, we must understand these differences and capitalize on them rather than deny them. Indeed the linking of science and technology that we do routinely may be the first hurdle of denial that we must overcome.—JORDAN J. BARUCH, *President, Jordan J. Baruch Associates, Washington, DC 20036*

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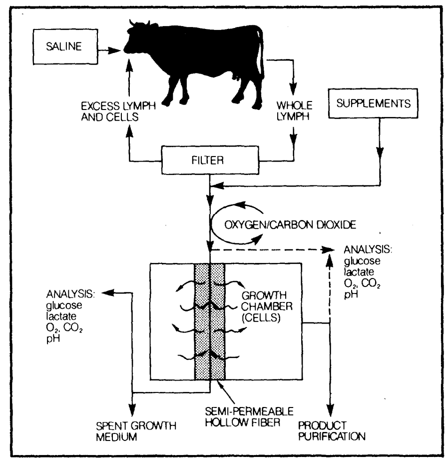

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