elastin. He pointed out that nuclear magnetic resonance studies show that the polymer chains of this macromolecule are in rapid and continuous motion, like the chains in rubber, suggesting a common mechanism of elasticity. Elastin appears to be degraded by a family of elastases. Three different enzymes capable of degrading synthetic elastase substrates and insoluble elastin have been purified from human granulocytes by Aaron Janoff (Health Science Center, Stony Brook, New York). Ordinarily these enzymes appear to degrade bacterial constituents after phagocytosis, but are capable of damaging connective tissue elastin if they leak out of the cells. Kjell Ohlsson (University of Malmo, Sweden) also found and has successfully separated three elastases, with a molecular weight of 30,000, from extracts of human granulocytes. These enzymes are inhibited by both $\alpha 1$ antitrypsin and $\alpha 2$ macroglobulin. Ohlsson was also able to isolate from granulocytes two species of collagenase that were inhibited by these serum proteins. Burleigh reported that all endopeptidases tested, from all four proteinase classes, are inhibited by $\alpha 2$ macroglobulin on a mole for mole basis. She suggested that proteinases cleave a peptide bond in a sensitive region of the macroglobulin and that this results in a conformational change in the $\alpha 2$ macroglobulin molecule that traps the enzyme irreversibly. Access of substrates to the active site of the enzyme becomes sterically hindered, causing inhibition that is most pronounced with large substrate molecules.

Neutral proteinase extracted from rabbit skin appears to be capable of degrading structural connective tissue proteins. Gerald Lazarus (Albert Einstein College of Medicine, New York) reported that injection of the partially purified proteinase into rabbit skin resulted in a wheal and flare within 15 minutes and migration of granulocytes within 20 hours. He suggested that this proteinase might be released during tissue injury and could instigate the inflammatory cascade. Gerald Weissmann (New York University Medical Center, New York) described experiments in which secretion of lysosomal proteinases was inhibited by cyclic AMP. Secretion of lysosomal proteinases was induced by cyclic guanosine monophosphate, cholinergic agents, and aggregation of microtubules.

Irma Gigli (Harvard Medical School, Boston) discussed the pathology of activation of the complement system and its implications in connective tissue degradation through the elicitation of acute inflammatory responses. The role of delayed hypersensitivity in connective tissue degradation in general and periodontal disease specifically was evaluated by Stephen Mergenhagen (National Institute of Dental Research, Bethesda, Maryland). Lymphocytes from patients with periodontal disease undergo blast transformation when they are incubated with dental plaque antigens. Such a phenomenon results in the elaboration of a lymphotoxin, which kills gingival fibroblasts and also results in the production of an osteoclast activating factor. Transformed lymphocytes also appear to elaborate a material capable of inducing macrophages to produce a specific collagenase. Thus, a biological basis is emerging which could account for the connective tissue destruction seen in chronic periodontal disease.

At the conclusion of the workshop, promising areas for future research were identified. First, the structure of connective tissue substrates and factors that alter their susceptibility to degradative enzymes should be characterized. Second, the enzymes responsible for connective tissue degradation should be precisely identified, and the cellular control mechanisms governing synthesis, secretion, and action of these enzymes should be elucidated. Third, the role of connective tissue enzymes in normal turnover of connective tissue macromolecules and the balance between synthesis and degradation should be defined. Fourth, the role of disease states in altering enzyme activity should be probed. Such studies may offer a means by which connective tissue degradation could be manipulated in order to prevent destruction of connective tissue structures.

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Insecticides for the Future: Needs and Prospects

"Insecticides for the future: needs and prospects" was the theme of an international conference held 22 to 27 April 1974 at the Bellagio (Italy) Conference Center. Insecticides now are, and in all likelihood will continue to provide, the backbone of applied pest control in the developed countries of the world. Their use at present is somewhat limited in most of the developing countries, but in a real sense the future shape of agriculture (W. R. Furtick, Food and Agriculture Organization) and public health (J. W. Wright, World Health Organization) in the entire world will depend largely on the availability of the proper kinds of insecticides in adequate quantities. According to R. F. Smith (University of California, Berkeley) the pesticide "crisis" that many of the developing countries face at present may more properly be defined in terms of shortages of these compounds than their excessive use or misuse.

Current trends indicate that the organophosphorus (E. Y. Spencer, London, Ontario, Canada) and carbamate (T. R. Fukuto, University of California, Riverside) insecticides will continue to bear the burden as pest control agents in the immediate future. A great need remains for such compounds with more selective properties, both between species of insects and between insects and mammals (G. T. Brooks, University of Sussex, England). Where insect species specificity is involved, however, the already high—and accelerating—cost of evaluating and registering insecticide compounds looms as a serious obstacle to the desired specificity.

Long-range planning to overcome insect control problems must include the development of strategies based on exploiting those aspects of insect biochemistry and behavior for which there exists no counterpart in vertebrates. Particularly promising avenues worth exploring include insect endocrinology, with special emphasis on (i) juvenile hormone antagonists (W. S. Bowers, New York State Agricultural Experiment Station, Geneva), (ii) peculiar characteristics of insect cuticle and a greater understanding of the ways insecticides penetrate this barrier (M. Locke, University of Western Ontario, Canada), (iii) a deeper knowledge of insect nerve membranes and transmitter substances in insect synapses and neuromuscular junctions (T. Narahashi, Duke Univer-

sity Medical Center), and (iv) pheromone systems in insects (W. Roelofs, New York State Agricultural Experiment Station, Geneva).

J. E. Casida (University of California, Berkeley) observed that various screening tests have been used in the search for new insecticidal natural products from plants, microorganisms, insects, annelids, and other organisms. A great variety of naturally occurring insecticidal materials is now known. Modifications of these toxicants have provided major new insecticides in a few cases; the best example of these are the pyrethroids, based on pyrethrins, which very well may be the next of the important classes of insecticides (M. Elliott, Rothamsted Experimental Station, England). Most natural insecticidal products are complex structures, and the toxic moiety is not defined. Simple analogs maximizing the critical portion of the molecule may provide improved activity, especially with structure optimization to obtain suitable polarity and physiochemical properties. These natural products should be subjected to more intensive study as a source of new insecticides, and increased attention should be focused on finding new naturally occurring insecticides by reexamination of available literature, directed screening, and structure optimization.

This meeting was sponsored by the Rockefeller Foundation, and was attended by 22 invited participants from institutions in Japan, England, West Germany, Canada, the Netherlands, the United States, and the U.N. Food and Agriculture Organization and World Health Organization. Cochairmen of this conference were R. L. Metcalf (University of Illinois) and J. J. McKelvey, Jr. (Rockefeller Foundation).

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Forthcoming Events

December

9–11. **Hydrodynamical Numerical Models for Coastal and Open Ocean Areas,** American Geophysical Union, Monterey, Calif. (AGU, 1707 L St., NW, Washington, D.C. 20036)

11–13. **Nuclear Science and Scintillation and Semiconductor Counter** Symp., Inst. of Electrical and Electronics Engineers, Washington, D.C. (D. C. Cook, Code 6603C, Naval Research Lab., Washington, D.C. 20390)

11–15. American **Psychoanalytic** Assoc.,