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SIXTH INTERNATIONAL CONGRESS OF BIORHEOLOGY
SYMPOSIUM ON CELLULAR AND MOLECULAR BASIS
OF MUCUS RHEOLOGY

PREFACE

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If, along the lines of A. C. Burton's ideas (1), mucus was designed by the Celestial Committee, this group certainly must have included: a polymer physicist versed in the natural laws that govern the interaction of polymer molecules in a gel; a polymer chemist to formulate a prototype sample; a biochemist to design a pilot reactor; a cell biologist to put the reactor in the cell; a biophysicist to make sure that the product functions according to specifications; and a physiologist to install the system in the various organs of different species.

Judging from the breadth of applications in which nature has used mucus, the Committee did an excellent job. It remains to be explained, however, how the Celestial specialists were persuaded to work on a material that brings so much embarrassment, specially to the children of investigators working on the subject (2).

This issue of Biorheology reports the work presented last year in Vancouver B. C. at the Sixth International Congress on Biorheology, in the Symposium on Cellular and Molecular Basis of Mucus Rheology. This Symposium brought together a wide spectrum of scientists to learn from one another, to share progress, and to identify promising new directions in mucus research. The meeting opened with a lecture by Professor Sam Edwards on the physics of polymer gels (3). The sessions that followed examined a wide range of subjects including the chemistry and physicochemistry of the mucin polymer; molecular modeling of the mucus polymer network; cellular mechanisms of mucin release and hydration; control of the transepithelial transport of water and electrolytes; cell biology of secretory cells; evaluation of the rheological and physicochemical properties of mucus in different organ systems and in different species; and the application of new research methods and experimental models to investigate mucus structure and function.

Among the most promising beacons for future direction is the recognition that mucus production results from the concerted function of not one but several cellular types: secretory cells that produce the raw materials and other epithelial cells which are responsible for the post-secretory conditioning that ends in the formation of a hydrogel. Recent observations indicate that defects in post-secretory conditioning might be responsible for some of the most conspicuous pathology of mucus, such as cystic fibrosis. These findings are giving new impetus to the study of the mechanisms that control mucin hydration, and the physiologic mechanisms that regulate the transepithelial movement of water and electrolytes.

An important implication of these ideas is the urgent need to identify the specific roles of each of the different cell types involved in mucus production, and to investigate the physiologic mechanisms that control their particular functions. Another promising undertaking is the recent application of polymer gel physics to the molecular mechanisms that control the condensation of mucins in secretory granules, their expansion upon release from the cell, and their final hydration and annealing to form the mucus gel.

I thank my friends Professor Alex Silberberg for the encouragement to arrange this Symposium, Professor Sam Edwards for joining us in a subject that can be awfully disgusting for a physicist, and to my friends and colleagues who came from different corners of the world to share their ideas. I also thank Ms. Martha Mathiason for her patience with my 'spanglish' and the type setting of this issue of *Biorheology*. I apologize to all of you, and particularly to the Editors Professors A.L. Copley and H.L. Goldsmith, for the unavoidable delay in the publication of this material. Mucus once again failed to perform properly, making this associate editor readily and urgently available to the gastric surgeon.

REFERENCES

1. BURTON, A. C. Physiology and Biophysics of the Circulation. Chicago, Year Book Medical Publishers Inc., 1972.
2. NADEL, J. A. Personal communication, 1985.
3. EDWARDS, S.F. The theory of macromolecular networks. Biorheol., 23, 589-603, 1986.