Antibacterial Agents

Chemistry and Functions of Colicins. Proceedings of a conference, Philadelphia, May 1972. LOWELL P. HAGER, Ed. Academic Press, New York, 1973. xiv, 138 pp., illus. $7.50.

The resurgence of interest in colicins began in the early 1960's with the finding from Nomura's laboratory that the killing action of different colicins was exerted by a variety of biochemical mechanisms and was probably membrane-associated. To date the colicins isolated and purified appear to be simple proteins composed solely of amino acid residues. Recently, as reported in this volume, Nomura and his colleagues have shown that colicin E3 acts, in vivo and in vitro, as an extremely specific nuclease, cleaving a small fragment near the 3′ terminal end of the 16*S* RNA of the 30*S* ribosomal subunit, but only in intact ribosomes. The mechanism of action of no other colicin is known in as much detail, although the closely related molecule E2 has been studied extensively by Almendinger and Hager, who report that it appears to cleave DNA through the intermediate action of endonuclease I.

An immunity mechanism, apparently involving a specific inhibitor, protects colicinogenic cells from the killing action of the colicin that they produce. The in vitro E3 assay system has permitted a start on the isolation of this very specific inhibitory material, which appears to be a protein. Konisky has shown that colicins Ia and Ib have very similar amino acid compositions and that antiserums prepared against the two isolated colicins show almost total cross-reactivity, indicating very similar three-dimensional structures. Yet cells producing one of these two colicins are not immune to the other.

The genetic determinants of colicins, col factors, are stable extrachromosomal elements. Helinski summarizes his studies on the replication of these elements. A variety of closed circular forms are found or can be induced, and particularly intriguing is the implication of covalently linked RNA inserted as a primer in the DNA replication process.

Perhaps the most fascinating aspect of colicins is their close association with the cell membrane. They must be transported across the membrane during secretion from the colicinogenic cell. The target cells appear to have clearly defined receptors. Sabet and Schnaitman report on the isolation of E3 receptor protein, which binds the colicin extremely tightly and appears to be located in the outer membrane of the cell and possibly not at all on the inner plasma membrane. Since E3 must come in direct contact with the 30*S* ribosomal subunit, the colicin molecule itself must at least penetrate completely through the inner membrane even if it is not released internally into the cytoplasm. In the case of E2, if it is working through an intermediate protein, its entire action could, of course, occur in a membrane-bound form. Luria *et al.*, using tryptic action on membrane-bound colicins K and El, suggest their probable role in affecting amino acid transport. A clear-cut demonstration that colicins exert their influence by action in the cytoplasm or, conversely, while bound to the membrane has yet to be made. These substances provide remarkably interesting model systems for membrane action in general, with all the possibilities for genetic and biochemical manipulation that are available in *Escherichia coli* and other bacteria.

The subject matter of this book is fascinating. The chapters are not uniform but all are worth reading. The offset printing is good and the typographical errors are minimal (almost zero). The half-time for its usefulness will be short in this rapidly moving field and is measured by the date of the next symposium on colicins, which may already have occurred. The papers were presented in May 1972. It is too bad that the book could not have lived up to its trade description "Academic Press Rapid Manuscript Reproduction."

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Books Received

Advances in Biophysics. Vol. 4, 1973. Masao Kotani, Ed. University Park Press, Baltimore, and University of Tokyo Press, Tokyo, 1973. x, 234 pp., illus. $14.50.

Advances in Electronics and Electron Physics. Vol. 34. L. Marton, Ed. Academic Press, New York, 1973. x, 362 pp., illus. $29.50.

After Suicide. Samuel E. Wallace. Wiley-Interscience, New York, 1973. xvi, 270 pp. $9.95.

Agents of Bacterial Disease. Albert S. Klainer and Irving Geis. Harper and Row, New York, 1973. xviii, 168 pp., illus. Paper, $15.

Aliens from Space. The Real Story of Unidentified Flying Objects. Donald E. Keyhoe. Doubleday, New York, 1973. xiv, 322 pp. $7.95.

Alpha-Fetoprotein and Hepatoma. Papers from a symposium, Tokyo, Dec. 1971. Hidematsu Hirai and Toru Miyaji, Eds. University Park Press, Baltimore, 1973. viii, 320 pp., illus. $29.50. GANN Monographs on Cancer Research, No. 14.

Assessment of Sexual Function. A Guide to Interviewing. Vol. 8, Report No. 88. Group for the Advancement of Psychiatry, New York, 1973. pp. 755–850. Paper, $3.50.

Automation Theory and Modeling of Biological Systems. M. L. Tsetlin. Translated from the Russian edition (Moscow, 1969) by Scitran (Scientific Translation Service). Academic Press, New York, 1973. xvi, 288 pp., illus. $23.50. Mathematics in Science and Engineering, vol. 102.

The Backyard Astronomer. Alan E. Nourse. Watts, New York, 1973. vi, 118 pp., illus. $7.95.

Basic Physics. A Linear Approach. Joseph W. Straley. Prentice-Hall, Englewood Cliffs, N.J., 1974. xiv, 354 pp., illus. $11.95.

Biochemical Engineering. Shuichi Aiba, Arthur E. Humphrey and Nancy F. Millis. Academic Press, New York, ed. 2, 1973. xviii, 434 pp., illus. $28.50.

Biochemistry of Catecholamines. The Biochemical Method. Toshiharu Nagatsu. University Park Press, Baltimore, 1973. xx, 362 pp., illus. $24.50.

Bioelectric Recording Techniques. Part A, Cellular Processes and Brain Potentials. Richard F. Thompson and Michael M. Patterson, Eds. Academic Press, New York, 1973. xviii, 412 pp., illus. $24. Methods in Physiological Psychology, vol. 1-A.

Biological Effects of Drugs in Relation to Their Plasma Concentrations. Proceedings of a symposium, London, Jan. 1972. D. S. Davies and B. N. C. Prichard, Eds. University Park Press, Baltimore, 1973. xiv, 254 pp., illus. $19.50.

Biological Oscillators. Their Mathematical Analysis. Theodosios Pavlidis. Academic Press, New York, 1973. xiv, 208 pp., illus. $19.

Biomechanics III. Proceedings of a seminar, Rome, Sept. 1971. S. Cerquiglini, A. Venerando, and J. Wartenweiler, Eds. University Park Press, Baltimore, 1973. xii, 512 pp., illus. $39.50. Medicine and Sports, vol. 8.

Biostatistical Analysis. Jerrold H. Zar. Prentice-Hall, Englewood Cliffs, N.J., 1974. xvi, 620 pp., illus. $15.95. Prentice-Hall Biological Sciences Series.

Characterization Problems in Mathematical Statistics. A. M. Kagan, Yu. V. Linnik, and C. Radhakrishna Rao. Translated from the Russian by B. Ramachandran. Wiley-Interscience, New York, 1973. xii, 500 pp., illus. $22.50. Wiley Series in Probability and Mathematical Statistics.

Cluster Analysis for Applications. Michael R. Anderberg. Academic Press, New York, 1973. xiv, 360 pp., illus. $25. Probability and Mathematical Statistics, No. 19.

Connections, Curvature, and Cohomology. Vol. 2, Lie Groups, Principal Bundles, and Characteristic Classes. Werner Greub,

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