BIOTECHNOLOGY DIRECTORY

***Biotechnology International* Edited by Carmel Barnard. Three volumes. Vol. 1, 200 Pp., $400.00; Vol. 2, 252 Pp., $400.00; Vol. 3, 114 Pp., $400.00. $1000.00 for all three volumes. (IMS World Publications, Ltd., York House, 37 Queens Square, London WC1 N3BL, U.K.) 1982**

During the past few years two to three hundred "biotechnology" companies have formed in the U.S. alone. The number, of course, depends in a large part on the definition of biotechnology. *Biotechnology International* takes a broad view, listing 257 companies and 137 institutions in the U.S. In addition, about four hundred other companies are listed worldwide including public and private institutions.

Biotechnology International consists of three softcover volumes (whose covers unfortunately tear easily). Part I covers Europe and includes Israel; Part II covers North America—the U.S., Canada, and Mexico; Part III, Asia, Australasia and Japan. Each volume has an identical format, and starts with the same two sections: a preface describing the volume, and a general global summary, discussing the field of biotechnology with paragraph summaries of each country covered.

In each appropriate volume, a second country summary is given, emphasizing individual institutions and government involvement. The bulk, and the most helpful part, is the directory, listing each company or institution with a profile. Genex in Rockville, MD, has a profile of three pages; University Genetics (Norwalk, CT) has a comprehensive listing of its involvement in biotechnology. ARMOS (South San Francisco) is listed by activity, and its listing mentions that they declared bankruptcy in 1982. Unfortunately, as is inevitable in such a rapidly moving and secretive field, some of the profiles are already out of date, abbreviated, or inaccurate. Some are very thorough and have information useful to a competitor, seller, buyer, or investor.

A most helpful section is a list of companies by product area. It is hoped that the publisher will expand this section in the next edition.

As I read the profiles and the product list, I kept thinking how difficult it must be for a publisher to obtain information from these companies. It would probably be necessary for the reader to supplement the information in these volumes with material from his or her own files.

The main drawback of these volumes is the price: $400 per volume, or $1,000 for all three. To justify the price, the publisher might consider adding to the next edition a survey of present and potential markets for the products and services offered by the biotechnology firms. Another useful feature would be financial status and penetration into the market.

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BIOTECHNOLOGY FOR ANIMAL BREEDING

***New Technologies in Animal Breeding*. Edited by Benjamin G. Brackett, George E. Seidel, Sarah M. Seidel. Pp. 268. ISBN 0-123450-9 (Academic: 1981.) $37.50**

This book provides readers with the current status of animal breeding technology. The introductory chapter deals with animal breeding in its general aspects, its aims and applicability. The following chapter brings together the present knowledge and experience in artificial insemination, an established method now in general use in cattle breeding. Thus, it does not belong to the new technologies in animal breeding. A comprehensive review of embryo transfer and its applications in animal breeding is given in chapter 3. Even though embryo transfer, or egg transplantation, was first reported as early as nearly a century ago and has been used as a laboratory technique ever since, it was not developed into a breeding tool until about ten years ago.

The technology of embryo transfer—including superovulation, embryo recovery, estrus synchronization, short-term *in vitro* culture of embryos, deep freezing of embryos, and embryo transfer—is presented and discussed, with speculations on future development. Among other things, it is concluded that embryo transfer is not a very efficient genetic tool in comparison with artificial insemination, and that its long-term value lies in its potential as a way of removing gametes or embryos from the reproductive tract for manipulation and to return them to the reproductive tract for gestation to term.

The chapters covering the developing technologies (chap. 6–11) deal with sex determination and sex selection, fertilization *in vitro*, production of identical twins, cloning, and gene transfer in mammalian cells. If these methods could be developed and put into large-scale operation they would have a tremendous impact on the efficiency of animal breeding. However, at present they are far from reaching that stage.

Sperm separation has been attempted since the early 1970s by methods based on presumed differences between X and Y spermatozoa in mass, electrical charge, mobility, or presence/absence of the histocompatibility H-Y antigen on the surface of male/female cells. However, none of the techniques has yet been sufficiently developed to be used as a method of sex determination.

In vitro fertilization can be regarded as an established method in man, but not in domestic animals. Thus, this method has been successful in cattle in only a few cases. With further development, *in vitro* fertilization could become an efficient tool in animal breeding when combined with other reproductive and genetic engineering technologies.

Cloning makes it possible to produce exact genetic copies of outstanding individuals. Identical twins are natural examples of cloning, but it has also been possible to produce them in cattle, sheep, and horses by separating blastomeres at an early stage of the embryonal development and, after a series of operations, finally transferring the blastomere sections to the uterus of a recipient for gestation to term.

Homozygous diploid individuals (only females in mammals) can be produced by microsurgical removal of sperm from ova after activation, followed by treatment with cytochalasin B to prevent cell division but not