Controlled Choices

This Man's Pill—Reflections on the 50th Birthday of the Pill. Von *Carl Djerassi.* Oxford University Press, Oxford 2001. 308 pp., hardcover $ 22.50.—ISBN 0-19-8508727

Aldous Huxley (Brave New World Revisited; 1958) put the need to limit global birth rates in a nutshell: "We must, with all possible speed, reduce the birth rate to the point where it does not exceed the death rate. We are given two choices—famine, pestilence and war on the one hand, birth control on the other." Huxley was writing about mechanical and chemical methods, with the aid of which the total number of births might be brought under control. Discussion was centered in particular on THE PILL: a highly simple, safe oral contraceptive. It was also noted, however, that "the pill has not yet been perfected". Not yet perfected still means, though, already available, if also in need of further development.

In fact, by 1958 the development of an oral contraceptive was in full swing. Margaret Sanger, who had fought for the emancipation of women for decades, had at the start of the 1950s convinced reproduction biologist Gregory Pincus to begin a search for a perfect contraceptive by biological screening. It appeared reasonable to explore the conformational space of steroids. From the relevant literature (Haberlandt 1921; Makepeace 1937) it was known that the steroid hormone progesterone not only governes pregnancy, but also prevents additional conception during the pregnancy, thus acting as a contraceptive. As progesterone was unsuitable for oral application, Pincus, together with M.C. Chang, looked for steroids that were structurally related to it, approached its functionality as closely as possible, and could be taken orally. The two endocrinologists screened some 200 steroids and found that combinations of a gestagenic and an estrogenic 19-norsteroid displayed the desired effect. Pincus, together with J. Rock and C.R. Garcia, were able to corroborate their findings from animal tests with almost militarily planned and executed clinical studies. In 1957, two combinations were officially approved for—as it was proclaimed—treatment of menstrual disorders. Word soon got round that they could be used as oral contraceptives; a few years later they were then authorized for this purpose. One of the two combinations, soon to become widely accepted, contained as its gestagenic component an unnatural steroid (norethindrone), synthesized by using known synthetic techniques (Birch reduction, Inhoffen aromatization) by Djerassi (at Syntex in Mexico) as early as 1951.

The estrogenic component was 17α-ethynylestradiol, prepared at Schering (Berlin) in the late 1930s. In the most extensive essay in This Man's Pill, Djerassi (not for the first time, incidentally) gives us his perspective on Genealogy and Birth of the Pill. Djerassi's pill, the first-generation pill, was perfected gradually from generation to generation, above all by chemists at Schering AG, to reduce unwanted side effects: with (−)-norethindrone being replaced first with (−)-norgestrel, then with (−)-gestodene, and only very recently with (−)-drospirenone.

Even with a perfect pill, the problem of overpopulation can only be solved if objections to hormonal contraception, which ought to be expected on cultural or psychological grounds, are overcome. Huxley was sceptical about whether this could be achieved at all without loss of individual freedom. In This Man's Pill, Djerassi points to the experience gathered over the past few decades that the Pill has indeed raised individual quality of life (made possible by the separation of sex and reproduction) in the richer countries, but that birth control in the poorer countries is not going to gain acceptance without better education of and greater cultural influence from women. International differences in esteem for democracy (Huxley) and the status of women in society (Djerassi) thus become potential causes of tension in the world's internal affairs.

Acceptance of the different generations of the Pill by wide sections of the population has fluctuated widely over the past few decades. To those responsible for further development of steroidal agents, it steadily became clear that they were working in sociopolitically problematic areas. Commercial decisions could not be based on ethical and economic arguments alone, but had to take account of demonstrations that had already taken place or threats to boycott one's products. Djerassi, as president of Syntex Research, therefore decided in 1972 that to continue to fund research and development of contraceptives under these circumstances was no longer viable. The focus of steroid research switched back from the USA to Europe. In Europe too, though, society was polarized, albeit less strongly than in the USA. In France and Germany, the respective governments actively sought to overturn the decision, reached under pressure, by two pharmaceutical companies to begin supplying already licensed steroid preparations (RU 486 or cyproterone acetate, respectively). In these cases, politics eventually came down on the side of the Life Sciences enterprises. This is not always the case. Quite the reverse.

Djerassi found that the decision makers and politicians of the future scarcely came into contact, as a rule, with the scientific and technological aspects of questions of population policy during the course of their university studies. It was with the intention of changing this that the subject of Human Biology was introduced at

Stanford. Designed to combat the increasing scientific illiteracy of our culture, the course of studies had some very illustrious names (Djerassi, P. Ehrlich, D. Hamburg, D. Kennedy, N. Kretchmer, J. Lederberg) among its founders. Among its students, those whose career goals lay in medicine, public health, law, ecology and political science predominated—exactly the audience that Djerassi needed to reach for informed contraception and population policy.

A committed team effort was made to promote discussion of biosocial aspects of birth control. In order to do justice to the cultural differences between different ethnic groups, it was not viewed as desirable to confine the debate to any particular single method out of the arsenal of contraceptive techniques. Most of these methods rely on the separation of sex and reproduction. The option "sex without reproduction" stands opposite from the option "reproduction without sex". Both cases are measures of family planning. Unlike the former, though, the latter measure is no tool of population control. Quite the reverse; it belongs among the practices of reproductive medicine, as a therapeutic strategy for involuntary childlessness. Both family planning measures are taken account of in This Man's Pill. Thus, references to in vitro fertilization (IVF) as the most important technique of assisted reproduction are to be found in many places in the book. Unlike the German edition, appearing at more or less the same time, the English edition provides an index. This fact is worth mentioning as various techniques of reproductive medicine (cryopreservation of unfertilized eggs, sperm, embryos, or blastocysts; intracytoplasmic sperm injection; preimplantation genetic diagnosis) appear widely throughout the book, with no direct cross-referencing.

This fascinating autobiographically outlined metamorphosis of Carl Djerassi—research scientist, educator, businessman, population policy activist, novelist, playwright, art collector, patron, all with total commitment—captured the keen interest and respect of the reviewer. In conclusion, the credo of "separation of sex and reproduction", touching on private spheres, may be (mis)interpreted as the maxim of a hedonistic society. The evolutionary horizon in front of which progression of the human species is taking place, though, is not going to be affected by the entertaining material in This Man's Pill.

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Membrane Technology in the Chemical Industry. Edited by *Suzana Pereira Nunes* and *Klaus-Viktor Peinemann*. Wiley-VCH, Weinheim 2001. xv + 295 pp., hardcover € 139.00.—ISBN 3-527-28485-0

The first part of this book, the shorter of the two, provides an introduction to membrane materials, methods for preparing them, commercial membranes (with performance data), and the various types of membranes (impermeable, porous,, asymmetrical, composite) including a discussion of their different morphologies and pore types, and ways of controlling these variables. Separate chapters are devoted to commercial membranes for reverse osmosis, nanofiltration, ultrafiltration and microfiltration, and techniques for surface modification of membranes (chemically, by plasma treatments, or by crosslinking of polymers), then there is a fairly detailed chapter on aspects of gas separation using membranes.

The second part of the book is concerned with actual applications of membrane processes and future prospects in various areas, including gas separation, pervaporation, membrane distillation, nanofiltration, membrane reactors, and ion exchange membranes. This part ends with a chapter on likely future developments, including an attempt at forecasting trends in some specific fields during the next 30 years.

The chapters have been written by various authors, and therefore as one expects, they vary in quality. In the second part they at least have a similar structure, with one exception. That is Chapter 4 (on nanofiltration), which is more like a report in a specialist journal, with detailed descriptions and analysis of a series of experiments, rather than a discussion of general principles followed by industrial applications. In this chapter applications are only touched on briefly in the introduction.

The text is illustrated by many figures which show details of actual membranes (especially scanning electron micrographs showing different pore structures in membranes), membrane modules, and flow schemes for separation processes together with diagrams of the equipment used. Some figures are repeated several times, especially that showing a spiral-wound module, although the quality of these differs unaccountably!

In fewer than 300 pages it is, of course, not possible to include much depth of detail. This is not suitable for use as a textbook, and for newcomers to the subject it is certainly not detailed enough to convey an understanding of the principles and relationships involved in the applications that are described. Although the individual chapters contain introductions that deal briefly with the relationships and basic principles, one would need to have some previous knowledge to use that information effectively. However, this is not the aim of the book; instead it is intended to give a survey of the applications of membranes, and it is successful in that aim.

The main strength of the book lies in its descriptions of the applications of membrane methods that have been developed over the years in the chemical industry, in water treatment, in the food industry, and in other areas, as well as in information such as up-to-date market data, material throughputs in the different areas of use, membrane and module costs, and development trends in recent years. Therefore the book is likely to be useful, for example, to university teachers seeking data to use in their lectures for illustrating the growing importance and wide range of uses of membrane separation processes, as an alternative to the unreliable random gathering of information from membrane manufacturers' commercial literature or from conference reports. Readers who are engaged in work on membrane processes will

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