OUR STOLEN FUTURE: *Are we threatening our Fertility, Intelligence, and Survival? - A Scientific Detective Story*, by Theo Colborn, Dianne Dumanoski, and John Peterson Myers

(Dutton, Penguin Books, 375 Hudson St, New York NY 10014, USA. xii + 306 pp U S $24.95)

Reviewed by Richard G Foulkes BA MD

Opening, as it does, with a compelling Foreword by US Vice-President Al Gore, this book is obviously intended to provoke more than casual notice. Its three authors, environmental zoologists Theo Colburn and John Peterson Myers, and science journalist Dianne Dumanoski, are well qualified by education and experience to write such an extremely timely and thought-provoking book that is far more that just "a scientific detective story".

Although written with the general reader in mind, the book is also vitally important for scientists, since it encompasses an enormous amount of well-documented information with an excellent index. It is a book that traces many unforeseen and highly disturbing effects of the widespread use and global distribution of certain modern synthetic chemicals which, even in exceedingly small amounts, can seriously disrupt and impair normal hormone function. Hormones, as we know, are the vital chemical messengers in our bodies that orchestrate crucial stages of growth and development, from features of sexual differentiation to brain organization and maturation.

These synthetic chemicals include such familiar ones as chlordane, 2,4-D + 2,4,5-T ("Agent Orange"), DDT and DDE, diethylstilbestrol (DES), dioxins (especially 2,3,7,8-TCDD), and polychlorinated biphenyls (PCBs), plus less familiar ones like dieldrin, furans, lindane, pyrimidine carbinols, and vinclozolin. At relatively low levels of contamination, most of these chemicals have no observable effects on adults, but they can have devastating consequences to the unborn. In animals they cause disorientation of nesting and mating, and in humans they have been linked to low sperm counts and learning and behavioral disorders.

A prime example of what the authors call these synthetic "hand-me-down poisons" is diethylstilbestrol (DES), whose tragic consequences have "toppled the notion that birth defects have to be immediate and visible to be important." Long prescribed with the mistaken idea that it would help prevent miscarriages, maternal exposure to DES at critical stages in pregnancy has been found to cause severe deformities and cancer in the reproductive tract of female offspring as well as other long-term after effects in males as well as females.

The authors also recount how the DES story illustrates how dangerous it is to overlook implications of earlier animal studies. Laboratory investigations at Northwestern University Medical School in the 1930s showed that estrogens administered to rats during pregnancy produced offspring with "disrupted sexual development." The female pups exposed to extra natural or synthetic estrogen in the womb suffered structural defects of the uterus, vagina, and ovaries; males had stunted

Dr Richard G Foulkes, Box 278, Abbotsford BC, Canada V2S 4N9.

penises and other genital deformities." But only years later was the widely-held belief that the placenta is "an impenetrable shield protecting the developing baby from harmful outside influences" finally and forever exploded by the thalidomide tragedy that came to light in 1962, just as Rachel Carson's conscience-shaking book *Silent Spring* was being serialized before publication.

Moreover, even though large-scale double-blind studies showed that DES does not prevent miscarriages, it continued to be prescribed for this purpose for a further 20 years! The US Food and Drug Administration took no action to curb such use, even though evidence of any provable benefit was lacking. Fear of litigation also made it difficult to obtain medical records of DES usage.

A further point the authors emphasize about DES is its "inverted U" or "paradoxical dose response curve" discovered by Frederick vom Saal of the University of Missouri: administering high doses to animals fails to elicit many of the effects that show up at lower doses. Equally important is that timing of the dose is usually more critical than the amount of the dose in producing adverse effects. Recognising this fact, the authors offer the following as the "simple prescriptive message" of the book:

". . . we must move beyond the cancer paradigm. Until we do, it will be impossible to grapple with the challenges of hormone-disrupting chemicals and the threat they pose to the human prospect . . . We need to bring new concepts to our consideration of toxic chemicals. The assumptions about toxicity and disease that have framed our thinking for the past three decades are inappropriate and act as obstacles to understanding a different kind of damage."

In their effort to keep the book within the grasp of the general reader, the authors make good use of several excellent line drawings that illustrate and enhance key points in the text. Thus the figure on page 72 showing receptor effects of synthetic chemicals depicts the normal process by which a natural hormone locks into a receptor to produce the expected response. This situation is contrasted to two abnormal ones: the first when a synthetic (or a natural) "estrogen-like" chemical *mimics* the actions of a normal hormone to produce a response; the other when an "anti-androgen" chemical blocks the receptor to *inhibit* response. An impressive illustration of biomagnification of PCBs in Lake Ontario is given on page 27, while neat drawings on pages 104-105 show how a PCB molecule can work its way from its source in Alabama to the far reaches of the Arctic Ocean to affect reproduction in polar bears.

In addressing the question posed in the book's subtitle, the authors do not hesitate to consider the grave social consequences of lowered fertility and intelligence. They argue that mankind is gambling with its ability to reproduce over the long term and that "what we fear most immediately is not extinction, but the insidious erosion of the human species ... an invisible loss of human potential." They are deeply worried about "the power of hormone-disrupting chemicals to undermine and alter the characteristics that make us uniquely human - our behavior, intelligence, and capacity for social organisation." They go on to paint a very dark picture of what an average IQ drop of just five points would mean for society.

The problem that this reviewer has with this book is its limited definition of the term "chemical environment". Although the authors refer to chlorofluorocarbons (CFCs) and their destructive effect on the protective upper ozone layer, they nowhere mention fluoride as a ubiquitous environmental contaminant. Much of what they write concerning adverse effects of synthetic chemicals in regard to infertility and brain dysfunction also applies to systemic fluoride. The mechanism of interference may be different, but the end results are similar. As a proven enzyme inhibitor, fluoride interferes with the timely operation of such hormones as testosterone by impeding its synthesis in addition to blocking its end-organ response, thereby affecting both reproductive ability and brain function.

Our Stolen Future, like Rachel Carson's *Silent Spring*, is focused entirely on an "Administration-acceptable" cause of major environmental pollution and human afflictions, *i.e.* manufactured (synthetic) chemicals. Without question the issues raised in this book must be addressed. At the same time, one has to ask: "Is this a diversionary tactic to draw attention away from the embarrassing questions that must be asked regarding the effects of introducing fluoride into our drinking water over the past fifty years, as well as the consequences of continued fluoride pollution by industries?"

In today's climate, is it possible that a similar book about fluoride, including an endorsement by the vice president, would be published? If the US Administration is gearing up to tackle problems created by the dispersal of synthetic hormone-disrupting chemicals into the environment, and is endorsing *Our Stolen Future* to assist in making that decision, why does it not, finally, also include the introduction of fluoride into drinking water?. Now rejected by most European health authorities, water fluoridation has remained unjustifiably accepted as "revealed truth" by every US Administration since that of President Harry Truman.

Hopefully, publication of this book will spur a closer look at the "fluoride connection", *i.e.* the possible role of ingested fluoride in decreasing fertility and impaired brain function and to shift from the "cancer paradigm" to investigating possible paradoxical effects of small doses of fluoride delivered *in utero* to the fetus.