volumes. Volume 1 presents authoritative articles on specific aspects of law and administration relating to the nuclear-energy programs of the United States, the United Kingdom, Euratom, the International Atomic Energy Agency, and Israel. Volume 2 presents the texts of nuclear-energy legislation and regulations in effect in 25 countries, together with succinct commentaries on the history and status of atomic-energy control in each country.

Each chapter in volume 1 is written by a recognized authority. These chapters present a distillation of the history, conflicts, compromises, and status of the new legal and administrative arrangements that have evolved, primarily in the United States and Britain, as governments respond to the new nuclear technology. John Palfrey's opening chapter is an excellent "legal chronicle" of the United States federal statute, while William Krebs' chapter on state activities and Casper Ooms' chapter on patents are clearly indicative of the authors' deep understanding of the subject matter. I wish that chapters had been included on the new administrative arrangements evolving out of AEC-contractor relationships, or that there had been more specific material concerning the growing federal-state-local problem of licensing and control of private atomic-energy facilities. These are minor criticisms, however, of a noteworthy treatise.

Volume 2, except for the commentaries, is a reference source on foreign legislation and procedures—clearly of limited interest to all but the specialist. The commentaries are useful summaries.

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The Emergence of the German Dye Industry. John Joseph Beer. University of Illinois Press, Urbana, 1959. vii + 168 pp. Cloth, $4.50; paper, $3.50.

This detailed account of the German dye industry begins with Perkin's discovery of mauve dye (analine purple) and terminates with the formation of the I. G. Farbenindustrie. It is less a history of the scientific and technical development of the industry than an analysis of the social, economic, and scientific factors which brought about that most spectacular chapter in the extraordinary history of the chemical industry in the 19th century.

It is surprising that this story has not previously been recounted in English, especially since the German dye industry has been celebrated in the United States as an example of commercial and scientific iniquity. It is the more surprising inasmuch as a considerable number of general histories, company histories, and personal memoirs on the subject in German have long existed.

From this account, the *bête noire* appears to be little worse or better than the rest of us. In fact, while the influence of the chemical industry on German technical education and the patent system was instrumental in securing the initial advantage Germany enjoyed in World War I, Beer concludes that the failure of the German chemical industry consciously to prepare for war in 1914 constituted a limitation on that initial advantage. His conclusions are drawn from published data, plus a few unpublished German sources.

The extent to which Beer brings the German dye industry into the realm of the familiar is illustrated by his remark that "the only reason all the dye companies continued to spend heavily on dye research was for prestige reasons very similar to those which impel the American auto industry to change models every year" (page 123). He emphasizes the role of capitalistic enterprise as a factor in the spectacular growth of the dye companies and notes that Carl Duisberg (later board chairman of I. G. Farbenindustrie) credits to his observations of the American trusts in 1903 some of the ideas which led to the formation of the German combine. The detailed history of the I. G. Farbenindustrie is not a part of this book, however.

Having reduced the story of the German dye industry from the mysterious to the familiar, Beer points out that the factors cited point to the inevitable emergence of the institutional research activities represented by that industry. But he also points out that the coincidences of time and circumstance revealed by an analysis of a specific example such as this are often of the greatest importance in the world as it is. The truth of this is quite evident in the fascinating case history that he has written.

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Family Planning, Sterility, and Population Growth. Ronald Freedman, Pascal K. Whelpton, and Arthur A. Campbell. McGraw-Hill, New York, 1959. xi + 515 pp. Illus. $9.50.

A quarter of a century ago, voluntary parenthood seemed inconsistent with population maintenance. Demographers forecast declining populations with reasonable surety, for birth rates had been moving downward for more than a century. Then birth rates increased in practically all social and economic groups except the lowest, where the decline continued. Moreover, the increases were generally greatest in the groups where the birth rates had been lowest. Voluntary parenthood was consistent not only with childlessness and disappearance of ethnic differences but with a familistic orientation of life that would sustain continuing increase of the population. The assessment of the future population of the nation became a topic of wide conjecture.

The studies made by P. K. Whelpton of the Scripps Foundation for Research in Population Problems had shown that the measurement of trends in fertility should be based on the life-time performance of cohorts of women rather than on the levels of general or age-specific birth rates in specific time periods. However, the past childbearing record of cohorts of women did not provide an empirical basis for estimating future childbearing. These future estimates required knowledge of the wishes and anticipations of families, and of the probable relationship between the numbers of children that were expected and the numbers that would be born. It is these new dimensions of population research that were the goals of the study reported in *Family Planning, Sterility, and Population Growth.*

The Survey Research Center of the University of Michigan and the Scripps Foundation for Research in Population Problems cooperated in this study of family planning and fertility. The 2713 white, married women who were interviewed represented a probability sample of the national population of some 17 million white wives aged 18 to 39 in 1955. The trained interviewers of the Survey Research Center met with unexpected frankness and cooperation in the responses to queries concerning attitudes toward, and practices of, family limitation. Interviews were secured

with 91 percent of the women in the sample and less than ½ percent of those interviewed were unwilling to answer questions about contraception.

Summary that does not risk overgeneralization is difficult, for the questionnaire was elaborate and the classifications were intricate. There are analyses of sterility and fecundity, the use of contraceptives, and attitudes toward family limitation, methods of limitation, and expected family size; each of these categories is analyzed in relation to the others and to the actual and the desired numbers of children. In addition, all variables are related to such factors as religion, education, income, occupational status, the work of wives, and community background, and again they are considered separately and in relation to each other. Throughout the findings are striking, and they are consistent.

The ghost of biological interpretations of declining fertility is banished by the results of this study. There were no evidences of consistent differences in fecundity (the ability to bear children) between women of the various social and economic strata. The influence of impairments on fertility (actual childbearing) was limited by the fact that couples desired only a few children anyway. However, there are surprising findings in this report. Nine percent of all the women interviewed had been sterilized, many of them for contraceptive purposes. One in four of the wives who had ever been pregnant had had at least one fetal death. And approximately 13 percent of all completed pregnancies had been terminated with a fetal death rather than a live birth.

The fundamental finding of this study of a group of white, married women who constituted a probability sample of the national population was that most couples had a fairly specific idea of how many children they wanted, used contraceptives to space their children and to prevent conception when they had the desired number, and were reasonably successful in limiting the number of children if not always in precise spacing of the children. There were differences among subgroups in the dynamics of family formation, in attitudes toward and use of contraceptives, and in size of the completed family. Religion and educational level were more closely related to fertility variables than were income, occupational status, or community background, but a majority of the couples in all groups used some control method, and the predominant family in all groups was small. There was nationwide convergence toward the two-, three-, or four-child family as the ideal, the expected, and the fact.

Forecasts of future births utilized the past experience of cohorts of women, the marriage rates and the birth rates of ever-married women in the various cohorts, and the expectations expressed by wives in the study about the size of their completed family. In specific terms:

"The medium fertility projections for ever-married women assume a rise in family size to about 3 births per woman, with a timing pattern similar to that being developed by cohorts of the 1930s. The low series is based on a return to the small families (averaging about 2.5 births) of the cohorts of 1906-15 and a partial return to their older ages at marriage and childbearing. The high series allows for births per ever-married woman to rise to 3.3 (the maximum expectation of the wives interviewed) and for some continuation of the recent tendency to marry and have babies at younger ages" (page 372).

The three series of estimates of births were utilized in combination with conservative assumptions of future declines in mortality and continued net immigration in preparing three series of projections about future populations. The population used as a base was 171 million for the year 1955. The populations as of 1980 were 215 million for the low projection, 239 million for the medium projection, and 262 million for the high projection. The medium projection is the most interesting model, for it assumes a continuation of the marriage and birth-timing patterns of the women born in the 1930's with a completed family size of three births per ever-married woman. This is a small family pattern, and it yields an annual rate of population growth of only 1.3 percent a year in the last quarter of the century. Yet the continuation of the three-child family under the assumed conditions of early marriage and early childbearing within marriage would produce a population of 312 million by the year 2000 and a population of 600 million by the year 2500.

Let me add quickly that the authors stress again and again the implications of their study for continuing and wider research. The swift development of the two- to four-child family as a nationwide ideal and the almost nationwide achievement of a correspondence between the number of children desired and the actual number of children is incontrovertible evidence that values and behavior in family formation are not static. Repetitive surveys are needed to determine the patterns of correspondence between stated expectations and performance and to ascertain shifts in expectations as they occur. There is the further vast field of research on those factors that are associated with shifts in expectations as they relate to completed fertility, and with the timing of the actual births that lead to a rough equivalence of expectations and completed family size at given levels of expectations.

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Ten Steps into Space. Monograph No. 6, *Journal of the Franklin Institute.* Franklin Institute, Philadelphia, Pa., 1958. x + 202 pp. Illus. $4.

The ten *steps* of this small paperback book consist of ten lectures (by as many experts) given in a series at the Franklin Institute in the spring of 1958. Although intended for engineers and scientists, most of the material is not highly technical, and much of it is definitely on the popular level. The success of the lecture series led to the decision to attempt to reach a wider audience by publication in book form.

In the first lecture, Ley describes the story of space travel from the earliest speculations to the successes of today, and discusses vividly and simply many of the books, both scientific and science-fiction, that have appeared on the subject. Stehling's lecture, concerned with the fundamental components of rockets and their operation, is carefully developed in nontechnical terms. Richey compares solid, liquid, and nuclear fuels and discusses their characteristics in rather complete technical detail. Singer covers the various kinds of information, such as radiation and magnetic fields, that can be obtained from satellite flights, as well as the experimental techniques involved. Herget succeeds in describing celestial mechanics in a way that involves practically no mathemat-