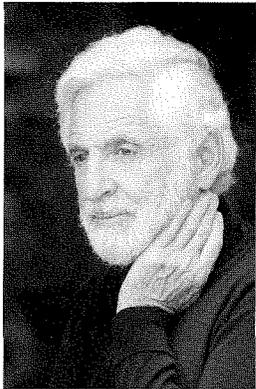


The Need for Birth Control: Why and What Kind?

by Carl Djerassi



The world population will reach 10 billion—perhaps even 15 billion—by the middle of the next century, according to the World Bank. We can make a difference between 10 billion essentially unavoidable births (most of whose future parents are already born) and an additional 5 billion possibly preventable ones through some form of family planning. Russell Mittermeier described the developed and the less developed nations as the temperate and the tropical worlds. I would rather divide them into geriatric and pediatric countries. In the pediatric nations, nearly half the population is below the age of 15; in the geriatric ones, like Japan and the U.S., up to one-fourth of the population is above age 60. The geriatric countries have all the money, all the technology, and most of the trained manpower; they apply most of it to solving geriatric problems—geriatric diseases, like cancer, for example. There is little left to solve the problems of pediatric societies, and that, I think, is our real dilemma.

Just 12 nations contain two-thirds of the world's population, as shown in the table on page 22. Only four of these countries—the ex-Soviet Union, the U.S., Japan, and Germany—are “developed” countries, and one of them—the former Soviet Union—may soon lose that distinction. Germany will remain on the list for a few more years and will then disappear permanently, because its population takes 7,000 years to double, compared, for example, to 24 years for Pakistan or Nigeria. Egypt is not on the list yet, but, with a population of around 55 million, and a doubling time of about 24 years, it soon will be.

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Japan will probably drop from the list within a couple of decades.

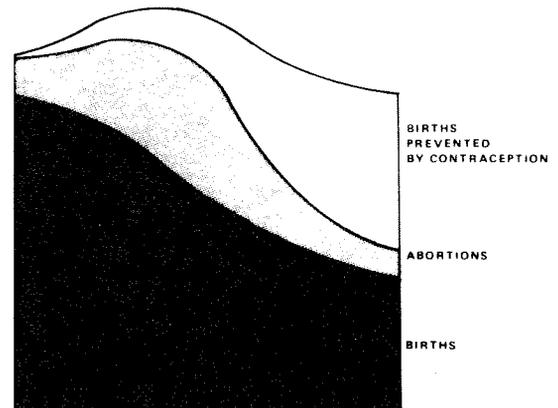
At present, the world population is doubling every 39 years—a growth rate of about 1.8 percent per annum, which is a poor return on one's bank account but a spectacular one in terms of people. This growth is not evenly distributed, and the only reason that the world situation does not appear to be as bad as it really is is because of China's massive population-control efforts. (China has one-fifth of the world's population.) For a good look at the problem, take Bangladesh—an economic basket case whose population continues to increase at an unsustainable rate. In 25 years, Bangladesh's population may approach that of the U.S. today, yet Bangladesh isn't even among the top 50 countries in land area.

One component, though by no means the only one, of the solution is more and better birth control. I would like to divide the latter into “software” and “hardware.” Hardware refers to the actual methods people use—pills, condoms, sterilization, IUDs, abortion, or even nontechnological methods like withdrawal. The software is much more complex—social, political, legal, religious, economic, and cultural factors. The software issue was summarized in 1974 by Bernard Berelson, former president of the Population Council, in a plan to reduce India's growth rate. His key point was that if women enter the work force in appreciable numbers, it will be more difficult to sentence them permanently to the kitchen and the bedroom. (This has actually happened in eastern Europe since World War II, where many women now work outside the

Country	Population (millions)	Population doubling time (yrs.) at 1990 rate	Rank by area (square miles)
China	1,220	49	3
India	853	33	7
ex-U.S.S.R.	291	80	1
U.S.	251	92	4
Indonesia	189	38	15
Brazil	150	36	5
Japan	124	175	>50
Nigeria	119	24	31
Bangladesh	115	28	>50
Pakistan	115	23	35
Mexico	89	29	14
Germany	80	7,000	>50

Above: The 12 most populous nations on Earth, in decreasing order of population, as of 1990. (Data from the Population Reference Bureau, Inc.)

Right: As prosperity—plotted from left to right on this graph—increases, the birth rate decreases and the number of births prevented by contraception increases. At the same time, the abortion rate rises briefly and then declines as people become more sophisticated about birth-control methods.



home.) He also proposed universal education for both sexes, outlawing child labor, cutting infant mortality to below 25 per thousand, and introducing a functional system of social security. That way, one need not depend on one's children for survival in old age, and at the same time one need not have many offspring to overcome high infant mortality. Interestingly, in the early 1970s this was already official policy in the People's Republic of China as part of the Cultural Revolution, even though this was not yet known in the West.

My area of competence is contraceptive hardware issues. We need a contraceptive supermarket, where one can pick and choose from among many different methods, because there is no ideal contraceptive—not for populations, not even for individuals. The proper choice depends on the time of life—on health, on lifestyle, and on professional and family priorities. The table opposite shows contraceptive choices in Europe, which has essentially “solved” its population problem, leveling out at about half a billion people. Of these five large European countries, some, like Italy, don't go in much for technology—57 percent of Italians either use no birth control whatsoever, or use *coitus interruptus*, or the “rhythm” method. But even if we examine the portion of the population that uses technological methods, the preferred method varies from country to country. Essentially no one uses sterilization for birth control in Italy, yet 23 percent do in the U.K.

The only advanced industrialized country that surpasses the U.K. in sterilizations is the U.S. In the last ten years, we have reached the point

where more married couples get sterilized than use reversible methods of contraception. The Pill still predominates in the U.S. among the reversible methods. Pill use went into decline in the mid-1970s because of the public's concern about widely publicized side effects, but is now at an all-time high. It is extremely likely—in fact, it's unavoidable—that the U.S. will continue to depend on these methods for at least the next couple of decades. The shelves of our supermarket are very poorly stocked.

I would now like to discuss a political hot potato—abortion as birth control. If one sums up the number of births, births prevented by contraception, and abortions, and plots them versus standing on the socioeconomic scale, the number of abortions is found to be highest among the poor. As people move up on the socioeconomic-cultural scale, family size drops, as couples presumably start having only the number of children they really want to raise. At first, there is a bulge in abortions, because people need a degree of sophistication before they consider preventive methods for reducing the number of births; only gradually does contraception (i.e., preventive methods) come into play. Eventually the ideal is reached, when contraception predominates and relatively few abortions occur—primarily for health reasons, or because a good contraceptive method failed. The problem is that abortion is the only postcoital birth-control method we have. Every other commonly used method is pre-coital. RU486 is actually a method of abortion. (This is really how one should divide birth-control methods—just as I prefer “pediatric” and “geriatric”

	Italy	Spain	U.K.	France	W. Ger.
No method	30	26	10	33	19
"Natural" methods (rhythm, withdrawal)	27	16	4	3	24
SUBTOTAL	57	42	14	36	43
Pill	6	19	38	31	33
Condom and other barriers	23	23	17	9	7
IUD	14	13	8	19	10
Sterilization	1	3	23	5	7

Contraceptive methods used in western Europe vary from country to country. The figures refer to percentages of sexually active women between ages 15 and 45. (After F. E. Riphagen, 1987.)

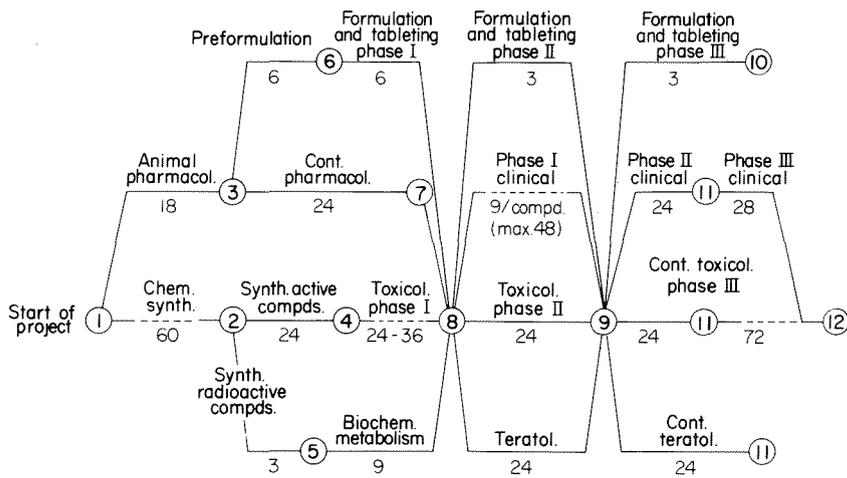
countries, I find "precoital" and "postcoital" more useful.) We need to develop postcoital methods, and yet the U.S. has decided to do nothing at all in this area—not that we are doing much in the others, either.

My desiderata for an ideal contraceptive, if I can have only one, are these: First, I would focus on women, not because I'm a man, but because, by definition, a liberated woman is in charge of her own fertility. And, if one considers the interruptible steps in human reproduction, all the postcoital steps necessarily involve the woman. Hence my emphasis on female contraceptives. Second, birth control has to be separate from coitus to be truly effective—this has been the single most important lesson we have learned from the Pill and IUDs. Third, if it is a systemic agent, it should be something that one need only be exposed to briefly—not like the Pill, which must be taken daily, or for three weeks every month. Fourth, it should need no sophisticated medical backups, so that it can be used anywhere in any country. Fifth, it should be easy for anyone, including teenagers, to understand and use. Finally, for obvious reasons, literacy should not be required.

In 1989, I published a paper in *Science*, entitled "The Bitter Pill," which listed, in order of feasibility, six methods of birth control that could be developed if the will and the support were there. The biggest impact, particularly in the pediatric countries, would be number six on the list—an anti-fertility vaccine. This would represent a fundamental change. An individual—either all men or all women, depending on which sex the

vaccine was developed for; only one would be needed—would get vaccinated at intervals after puberty, and then would have to do something deliberate in order to become fertile—the reverse of what we are doing now. Unfortunately, the chances of that happening within the next two decades are essentially zero, not for scientific but for other reasons, such as potential liability suits in a litigious society and—even more important—the total lack of interest, on the part of pharmaceutical companies, in such methods.

What about more likely methods? First, if one could find a spermicide that is also effective against AIDS under ordinary conditions of human coitus, it would certainly be accepted in the Western world and eventually in other countries. But I think that the single most important advance would be the second on my priority list: a once-a-month menses-inducing pill. A woman would take such a pill only when she expected her period, and had been sexually active during that month. The woman would not know if the egg ejected with the menstrual flow was fertilized or not. Such a pill would fulfill almost all the criteria I listed before. Thus, a woman would only have to take, at most, 12 pills a year, compared to the 250 or more she takes now. While not very attractive economically to pharmaceutical companies, such a postcoital approach would have an enormous impact worldwide. Such a pill could be developed in 10–17 years, which is about par for the course for getting a new pharmaceutical onto the market, and would cost on the order of \$150–200 million. Wide use of such a postcoital pill would make conventional abor-



Timeline for the development of a male contraceptive pill. Times are shown in months.

tion disappear fairly rapidly, assuming, of course, that one's definition of life is not the one that the last two American presidents have held—that life exists the moment the egg is fertilized, and that a five-second fertilized egg is already termed “a baby.” But for the hundreds of millions of people in the world who do not subscribe to such an unprovable assumption—at least as far as the first few days after fertilization are concerned—such a pill would represent an enormous advance.

The third method is a reliable ovulation predictor based on much more convenient home methods than currently available for determining fluctuations in hormone levels associated with ovulation, which would provide a much more reliable indicator of the “safe” period in a woman's cycle. Fourth comes a reliable method of reversible male sterilization. Right now, the millions of men who have vasectomies are usually people who have had their families, and are giving up procreation. For young men to consider vasectomy, it has to be reversible. Option number five, a male contraceptive pill, is essentially impossible in this century. Its development would easily take 20 years, as shown in the figure above. For a male contraceptive pill to be available in the year 2000, the product would have to be in advanced clinical and toxicological trials right now, which, of course, is not the case. How would we otherwise answer a man's question: “What happens if I take my pill for 40 years?” Whether we shall have a male Pill in the first decade of the next century depends very much on what we do now, and we're doing virtually nothing, for a very simple reason. In 1970, when

I first drew that figure—for a talk at Caltech, incidentally—there were 13 major pharmaceutical companies worldwide that had contraceptive-development programs. Nine were American. In the early 1980s, only four large companies were left—one of them American. I suspect that even this number will be smaller by the end of this decade.

In 1980, a British trade organization, in a survey of the pharmaceutical industry's research priorities, found contraception to be absent from among the first 35. Even nose drops ranked higher. That tells you something of how the market has spoken. But without action by the international pharmaceutical industry, there is no way to stock the contraceptive supermarket. Thus all the pediatric countries that have decided to do something about birth control—and most of them have in some way decided to do something—will have to depend on existing hardware. Their emphasis is now on improvement in contraceptive software, most importantly by combining responsible family planning with maternal and child health care.

I would like to conclude with a statement, posed in my 1989 article (when the Ayatollah Khomeini was still alive), that made good dinner conversation: “What do Iran and the U.S. have in common?” The answer was that these were the only two countries in the world that had successfully moved the contraceptive clock backward in the last decade. No other country had done so. Some, like the United Arab Emirates and Saudi Arabia, had done nothing, but most of the others had moved forward. And the U.S. had moved backward on both the hardware and software fronts.

Today, only one country is left—the U.S. Since Khomeini's death, Iran has again started to move forward on the birth-control software front. This is not the case in the U.S. Our obsession to make abortion illegal, which includes a lot of additional baggage that has nothing to do with birth control, is really responsible for our national retrogression. Rather than making abortion illegal, our rallying cry should be, “Make abortion unnecessary!” Such an aim can only be realized by improvements in sex education and in improved and universally accessible contraception—two approaches that are now very much on the national back burner. □

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