History of Contraception

Malcolm Potts and Martha Campbell
Vol. 6, Chp. 8, Gynecology and Obstetrics, 2002

INTRODUCTION

The factors controlling human fertility and the development of rational therapies to limit births are not necessarily more difficult to understand than the isolation and cure of bacterial diseases. The surgery of voluntary sterilization or early abortion is intrinsically simpler than the treatment of appendicitis or the forceps delivery of a baby. Yet fertility regulation has diffused less rapidly through society than the means to cure disease and prevent death. This imbalance has generated an explosion in global population that is difficult to accommodate, and it has contributed to great inequalities in wealth and untold personal misery. Useful insights into current problems can be gained by looking at the history of contraceptive practice.

The aim of this chapter is to document the historical diapause between the acquisition and the application of relevant biologic knowledge to birth control; to analyze the historical factors affecting the delay; and to suggest that early 19th and 20th century attitudes toward contraception in the West are still palpable and cast their shadows over global events in the 21st century.

IN THE BEGINNING

Homo sapiens evolved to be a slowing breeding animal. Prehistoric societies, like the few preliterate societies that remain, probably had total fertility rates of 4 to 6.[1] Approximately half the children who were born died before they could reproduce, and population grew slowly. Puberty was in the upper teens, babies were breastfed for 3 to 4 years, and pregnancies were therefore naturally spaced by long intervals of amenorrhea. With the first urban civilizations and settled agriculture, puberty began at an earlier age and breastfeeding was often shortened or supplementary food introduced earlier than in hunter-gatherer societies. Fertility went up. In the modern world, if a couple initiates sexual intercourse when the woman is 20 years old or younger and continues at least until her menopause, without artificially limiting fertility, she can expect to conceive and carry to term an average of 10 live-born children.[2] Sooner or later, all human societies have to adopt restraints on family size.

Contraception

Scattered references to fertility regulation exist in many historical records.[3] Himes's work is the prime referral text.[4] Written records of contraceptive remedies and abortion techniques survive from the Egyptian Ebers Papyrus (1550 BC), the Latin works of Pliny the Elder (23 to 79 AD) and Dioscofides (*De materia medica,* c 58 to 64 AD), and the Greek writings of Soranus (*Gynecology,* c 100 AD). During the flowering of Arabic medicine in the 10th century, a variety of contraceptive recommendations were detailed, particularly in the works of Al-Razi (Rhazes, d 923 or 924 AD, *Quintessence of Experience*), All ibn Abbas (d 994 AD, The Royal Book), and Avicenna (Ibn Sina, d 1037 AD).

The methods to which the ancient scholars refer fall into three general categories: (1) those that seemed reasonable at the time but are now known to be ineffective (e.g., wiping out the vagina after intercourse [Soranus]); (2) the reasonable and perhaps effective (e.g., using honey, pepper, alum, or lactic acid as pessaries and barriers [Ebers Papyrus, Dioscorides, and Soranus]); and (3) the unreasonable, manifestly ineffective, such as the woman holding her breath at the time of ejaculation or jumping backward seven times after coitus. The manufacture of vaginal pessaries from the dung of animals, such as crocodiles (Petri Papyrus), elephants (Rhazes), or mice (Pliny), perhaps reflects Freudian more than pharmacologic concerns, although as Himes points out, most animal dung is alkaline. Among descriptions that come close

to certain modern methods of contraception are Jewish references to "cohabit with a sponge."

Most societies are aware that withdrawal of the penis before ejaculation reduces the possibility of pregnancy. Although the prevalence of coitus interruptus in historical and modern societies varies, both early and contemporary references are relatively common in Jewish, Christian, and Islamic texts.[5] The single biblical reference to coitus interruptus (Genesis 38:7 to 10) is ambiguous: God struck Onan dead, but it is not clear if it was because he "spilled his seed on the ground" or because he disobeyed his father. It is the sole foundation of one of the most important theological teachings in the contemporary world. The later Jewish writers in the Talmud describe coitus interruptus as "threshing inside and winnowing outside."[6]

By the time of the Early Fathers of the Church, the use of withdrawal (onanism), other contraceptive practices, and abortion begin to receive increasing condemnation. Mohammed, however, approved of the use of *al-azl* (or coitus interruptus), mentioning that the man's wife should also give her permission. Nonvaginal intercourse as a contraceptive measure is rarely discussed, but it appears to have been used in the Moche culture of Peru (500 AD to 800 AD); some ceramics show a husband having anal intercourse with his wife when there is an infant in bed with the parents (Fig. 1).[7]

Fig. 1. Heterosexual anal coitus, perhaps practiced impartially to avoid pregnancy.(From Moche NMAA and Larco Herrera Museum R, reprinted from Kauffmann-Doig F: Sexual Behavior in Ancient Peru. Lima, Kompaktos S.C.R.L., 1979.)

Abortion

Herbal remedies for bringing on delayed menstruation abound in history and in contemporary folk culture. One ancient method of unusual interest was the use of an herb called silphion exported from the ancient Greek city of Cyrene in North Africa. The plant was said to be worth its weight in silver. It is not clear whether it was an oral contraceptive or oral abortifacient, although extracts of related living species prevent implantation in mice. Efforts were made to grow the plant in other parts of the Mediterranean, but they failed, and the herb was harvested to extinction in classical times. Silphion was portrayed on the Cyrene coins.[8]

Embryotomy to save the mother's life during labor is mentioned in ancient Jewish writings. Rhazes describes such a method:

If … the semen has become lodged, there is no help for it but that she insert into her womb a probe or stick cut into the shape of a probe, especially good being the root of the mallow. One end of the probe should be made fast to the thigh with a thread that it may go no further. Leave it there all night, often all day as well…. Some people screw paper up tight into the shape of a probe and after binding it securely with silk smear over it ginger dissolved in water.[4]

In 1958 to 1959, archaeologists excavating the skeleton of a young woman (20 to 25 years old) from a Gallo-Roman site in The Netherlands found a bone stylet 105-mm long in the pelvis. The grave was interpreted as that of a woman who died as the result of an attempt to induce a mechanical abortion.[9]

Massage abortion is a technology that has been described in Burma, Thailand, Malaysia, the Philippines, and Indonesia.[10,11] The procedure is usually attempted when the woman is 12 to 20 weeks pregnant. She lies on her back with her knees drawn up and the traditional birth attendant attempts to fix the uterus and then presses as hard as possible with her fingers, the heel of her bare foot, or even the wood pestle used to grind rice. The great temples of Ankor Wat in Cambodia are decorated with long bas reliefs depicting a

variety of military and domestic scenes. In one series illustrating heaven, earth, and the underworld, a group of women have been consigned to hell (Fig. 2). They are approximately 20 weeks pregnant; a demon holds the woman's legs on his shoulder and pounds her abdomen with a mallet. This practice still occurs tens of thousands of times a year in this part of Asia. The temples were completed under the reign of Suryavarman II in 1150, and the sculptures are the oldest visual representation of abortion.

Fig. 2. Bas relief in the Ankor Wat temple showing massage abortion (circa 1150 AD).(Photograph by Stanley Lanzano.)

The word *miscarriage* appears only four times in the authorized version of the Old Testament, mostly in a veterinary context or as part of a curse. The only reference to the morality of abortion (Exodus 21:22 to 25) regards such an intervention as a crime punishable by a fine, but not as murder punishable by death.[12] The Koran describes human embryology in biologically accurate epigenetic terms (i.e., new structures appear as development proceeds) rather than adopting the preformatist doctrine implied in Christian theology. The Koranic verses (23:12 to 14) read:

> We placed him as a drop of seed
>
> In a safe lodging firmly affixed;
>
> Then fashioned we the drop into a clot
>
> Then of the clot we developed a [fetus] lump; then
>
> We developed out of the lump bone,
>
> And clothed the bones with flesh.

Some theologians interpret abortion as licit during the first 120 days of pregnancy.[5]

THE USERS

Medieval Europe

The earliest insight into fertility regulation at the personal level dates back to the 13th century. The Cathar (or Albigensian) sect celebrated the sacrament shortly before death (the *perfecti,* or *heretication,* hence the word *heretic*). The Albigensians were persecuted mercilessly. Among the last remnants of the sect was a group in the Pyrenean village of Montaillou. Between 1318 and 1325, the local bishop, an obsessive man who later became Pope of Avignon, had record the confessions of suspected heretics verbatim to uncover incriminating evidence. The local priest, Pierre Clergue, had a particularly active sex life.[13] One mistress, Beatrice, asked him,

> "What shall I do if I become pregnant by you? I shall be ashamed and lost."'I have a certain herb," answered the priest. "If a man wears it when he mingles his body with that of a woman he cannot engender, nor she conceive."'What sort of herb? Is it the one the cowherds hang over a cauldron of milk in which they have put some rennet to stop the milk

from curdling?"

The woman was referring to a theme in sympathetic magic that can be traced back to Dioscorides. Certainly, the sexually active society of Montaillou seemed to have exercised some check on fertility. Perhaps coitus interruptus was used. Most women had four or five children. (Beatrice had four children by her husband but none by Pierre.)

Some idea of medieval attitudes toward contraception can be obtained from the Penitentials-the religious compilations used by many priests as a framework for their work in the confessional. Sexual sin exceeded all others in the Penitentials. Noonan[14] has categorized the sexual content of Penitentials from the 6th to 11th centuries. A nocturnal ejaculation warranted 7 days' fasting, while contraception, fellatio, and anal intercourse attracted penances from 3 to 15 years. Religious records are supplemented by civil cases from 14th and 15th century Venice. Men guilty of homosexual anal intercourse were being burned alive between the Columns of Justice in St. Mark's Square. But anal intercourse in marriage was also sometimes prosecuted with exile for a few years. Ruggiero[15] concluded anal intercourse was a form of birth control that was practiced by some people at every social level, from nobility to humble fishermen. In the Penitentials, the punishment for abortion was sometimes less than that for contraception and was similar to that for coitus interruptus, although St. Jerome was particularly uncharitable in describing women who died from attempting an abortion as a "threefold murderess: as suicides, as adulteress to their heavenly bridegroom Christ and as murderess of their still unborn child."

Early Modern Europe

Shakespeare's numerous references to love, while artistically brilliant, are socially misleading. Juliet's courtship at age 14 was in no way representative of the life of 16th century European peasants. The work of historical demographers shows that the mean age of marriage in 16th century England was in the 20s and sometimes in the late 20s, particularly among the poor. In the village of Colyton, Devon, where English parish records have been most meticulously assembled, the mean age of marriage for women for the years 1560 to 1647 was 27; for the years 1647 to 1719, the age rose to 30.[16]

In a world where the expectation of life at birth was 37 years (although, of course, for a woman of 30, it could be more than 7 years), more than half of a woman's fertile life could be spent unmarried. Late marriage was more common among poor peasants than rich aristocrats. Illegitimacy was unusual and, in some communities, exceptionally rare. Quaife[17] has analyzed depositions presented to the civil and ecclesiastical courts in Somerset, England, for the years 1601 to 1660 related to paternity suits, adultery, and prostitution. In one Somerset village in the 16th century, four fifths of the women aged 20 to 24 years were unmarried or widowed, and half those aged 25 to 29 years were not living in a marital union. Yet, only one in 200 unplanned pregnancies was to girls aged 17 or younger. The average age of unmarried women involved in court cases relating to paternity and seduction never fell below 25.5, while sometimes it rose as high as 27. The record of baptism of illegitimate children (although it may be incomplete) also attests to a chaste society with a late sexual debut. The ratio of illegitimate births to births in wedlock fell to an all-time low of 0.5% in the 1650s. By contrast, 20% to 30% of first baptisms occurred in less than 9 months of marriage. It was a continent but pragmatic society, and a promise of marriage was often a justification for intercourse.

Within marriage, there can be little doubt that coitus interruptus and induced abortion were known methods of fertility control throughout the Middle Ages. It is possible to show age-specific fertility differences by social group in the 17th century, which is powerful evidence of voluntary fertility control, although there is no way of apportioning the relative role that coitus interruptus, abortion, and abstinence may have played in achieving this end. Some couples managed to delay the first conception within marriage and few babies were born in the months of July and August, when the heaviest harvest labor took place.[16]

Quaife quotes a case in which an unmarried woman, seduced in a rye field, seems to have been unaware of her lover's precautions, complaining he had "fouled her clothes." One Somerset herbalist publicly named an unmarried woman who had used abortifacient medicines with apparent success, because "the whore should have paid for them." A punitive father recommended his pregnant girlfriend "take bear's foot

and savin boiled, and drink it in milk, and likewise, hay madder chopt, and boiled in beer and drink it to destroy the child in her." Savin recurs in European literature as an abortifacient.

Aristocrats, as well as peasants, needed to control their fertility. In 1671, writing to her daughter who had borne three children by the age of 22, a French aristocrat, Madame de Sevigne, advised,

"I beg you, my love, do not trust the two beds; it is a subject of temptation. Have someone sleep in your room." Later she wrote, "If Mr. de Grignan falls into temptation, don't believe he loves you! Continue this nice custom of sleeping separately, and restore yourself. … I kiss your husband. I like him even better in his apartment than in yours."[18]

The writer described her son-in-law as having "already killed two wives under him," but only suggested abstinence as a means of fertility control. A similar sentiment was expressed almost 200 years later in a letter by young Queen Victoria:

I think, dearest Uncle, you cannot really wish me to be the *'Mamma d'une nombreuse famille',* for I think you will see the great inconveniences a large family would be to us all, and particularly to the country, independent of the hardship and inconvenience to myself. Men never think, at least seldom think, what a hard task it is for us women to go through this *very often.*[19] In fact, Victoria was to bear nine children before the Prince Consort's premature death. Perhaps, like millions of commoners in Britain, she would have benefited if the history of fertility control in the 19th century had been different. In particular, she never understood that by putting all her children to a wet nurse at birth, she was hastening the return of ovulation and increasing her own fertility.[20]

NINETEENTH CENTURY

Historically, what was achieved in family planning in the 19th century is less remarkable than what was not. The 19th century ushered in an era of accelerating social change that continues to this day. The Industrial Revolution; the rise of modern methods of communication; the expansion of Western influence throughout the world; the explosion of scientific knowledge; and the success of public health, preventive, and curative medicine all distinguish the 19th century from the whole of preceding history. Yet Western society found it difficult to adjust to the need to control of family size. For the first time in human experience, adults were obliged to adapt to a world essentially different from the one they had known as children; yet, it is in childhood that many patterns of sexual behavior are formed. As the pace of change accelerated, so the earthy pragmatism of the 18th century turned into 19th century prudishness. But the good intentions of a worthy minority often did little more than build a framework to house the dual standards of the majority.

In 1873 in the United States, a dry goods salesman called Anthony Comstock successfully lobbied the U.S. Congress to pass an Act for the Suppression of Trade In and Circulation of Obscene Literature and Articles for Immoral Use. A pedantic, joyless man and head of the New York Society for the Suppression of Vice, Comstock claimed to have "convicted persons enough to fill a passenger train of sixty-one coaches, sixty containing sixty passengers each, and the sixty first almost full. I have destroyed 160 tons of obscene literature."[21,22] When asked why he classified contraceptives as obscene he replied, "If you open the door to anything, the filth will pour in."

Prostitution, continually fueled from the children of the poor, was endemic in the 19th century. When Acton wrote on the subject in 1869, estimates of the number of prostitutes in London ran as high as 80,000.[23] The confused tradition of Christian sexual ethics proved an inadequate guide to deal with the dilemma facing social leaders. On both sides of the Atlantic, Europeans attempted to use an array of contraceptive techniques but without scientific review and in an increasingly hostile environment.[24] By 1900, a greater divergence than had existed in 1800 developed between the private need for fertility regulation and the public ability to deal with this need. The contemporary world is still partially lost in the

maze of false beliefs that confused their forebears.

It is difficult to recreate attitudes toward sex and contraception existing at the end of the 19th and the beginning of the current century. They were more different from modern perceptions than perhaps any other factor separating us from the past. The 19th century saw the rise, particularly in America, of the male gynecologist who created numerous, often cruel myths about childbirth and women's diseases. Marian Sims, the 19th century American gynecologist who devised the first vaginal speculum and did the first successful repairs of rectovaginal fistulas, once treated a case of vaginismus by visiting "two or three times a week to etherize the poor wife," so the husband could enjoy a year of what he called *ethereal copulation*. Clitoridectomy was devised as treatment of female mental disorders in 1858, and oophorectomy was used for a variety of irrelevant conditions. One Boston doctor held that the female orgasm was a disease and commented, "We must not impute to a woman feelings in regard to loss of her organs which are derived from what we, as men, would think of a similar operation on a man."[25] The Western phobia against masturbation reached its apogee in the 18th and 19th centuries. An anonymous publication appeared in 1700 entitled *Onania: or the Heinous Sin of Self Pollution and All Its Frightful Consequences.* In 1835, the Reverend John Todd, a joyless congregational minister in America with a passion for collecting firearms published the *Student Manual* (sic). It reached its 24th edition by 1854. Male physiology was compared to an economy, "A miser will frequently become wealthy—not because he has a great income but because he saves with the utmost care." But when he tried to be more specific, Todd was faced with an interesting problem-how to warn young men of the dangers of the "secret vice" without suggesting it to the innocent who might never have thought of it. He overcame the problem by phrasing the key passages in Latin (presumably learning Latin destroys innocence). He describes masturbation as follows (in translation):

No light, except that of the ultimate God, can uncover the practice of pouring out by hand (the vicious act of Onan), in spite of its frequency and constancy … I have seen some come to premature death, some in academic halls, some very quickly after leaving college … the memory is much debilitated, the mind greatly deteriorated and foolishly weakened and it bears the deadly seeds of sickness.[25]

Malthus and Darwin

The Essay of the Cambridge-educated clergyman Thomas Malthus (1766 to 1834) was the intellectual hinge between the passive acquiescence in the outcome of human fertility that preceded his writing and the discipline of scientific analysis (and controversy) succeeding it.[26]

Malthus stimulated the analysis of population change and profoundly influenced Charles Darwin (1809 to 1882), who characterized it as "the ever memorable Essay." However, Darwin, with his astonishing perspicacity, understood the factors regulating human fertility more clearly than Malthus, and even more accurately than most of his successors in either the 19th or the 20th century.

> There is no reason to suspect …. as Malthus has remarked. … that the reproductive power is actually less in barbarous than in civilized races [but] it appears that their families are usually small, and large ones rare. This may be partly accounted for, as it is believed, by the women suckling their infants during a long time…. Savages almost always marry; yet there is some prudential restraint, for they do not commonly marry at the earliest possible age.[27]

The Koran (2:233) says, "Mothers shall give suck to their offspring for two whole years if they desire to complete the term."[5] In the past 2 decades, insights into the role of lactation in fertility control have come from historical demography. From the reconstitution of family histories using parish records, Wrigley and others have shown that if there is a stillborn child or early infant death, the following pregnancy interval is reduced.[16] Before the Industrial Revolution, higher fertility rates were seen among women who used wet nurses for their children. A marked change in child-rearing practices, including patterns of breastfeeding, appears to have occurred about 1750.[28] In some countries, the suppression of ovulation occurring during lactation is probably still responsible for averting more births than all aspects of modern family planning. This generalization must have assuredly been true in Europe and North America throughout much, or all,

of the 19th century. The switch from breastfeeding to bottle feeding is probably among the most significant of the biologic changes associated with Western living but only recently documented and understood.[29]

Darwin's comments on the age at marriage were also accurate and, as noted earlier, the tradition of postponing marriage with the implicit aim of restraining fertility within the nuclear family appears to have been most fully developed in Western Europe.[30]

Finally, Darwin comments that, "Malthus has discussed these several [population] checks, but he does not lay stress enough on what is probably the most important of all, namely infanticide, especially of female infants, and the habit of procuring abortion."[27] Darwin lived shortly after an age when infanticide was particularly visible and shortly before abortion was to become a major variable in reproductive outcome. The killing of babies need not be a deliberate act in a poor society. In the 18th century, use of opiates, dosing with gin, and too little food probably took many a child's life. Other parents smothered their infants in bed, and abandonment was a common method of dealing with an unwanted pregnancy. In 1700, Coram, appalled by the plight of babies born in London, petitioned King George II "to prevent the frequent murders of poor, miserable infants at their birth and to suppress the inhuman custom of exposing new infants to perish in the streets." However, the Foundling Hospital, which Coram founded (1741), merely institutionalized infant death. Of the first 14,934 admitted, 10,204 died. Between 1770 and 1789, 31% of the baptisms in Paris were foundlings. The foundling hospital in Florence, Italy, kept unusually accurate records, and it is interesting to note that the majority of admissions were children of legitimate birth. For the period 1775 to 1794, foundlings from one (probably representative) group of villages constituted 4.2% of all legitimate births and 50% of all legitimate births to mothers with six or more children in those villages.[31]

When the poor stayed with their children in workhouses, the outcome was little better. Between 1728 and 1757, there were 468,081 christenings and 273,930 infant deaths in those younger than the age of 2 in London workhouses. Foundling hospitals and workhouses were institutionalized infanticide machines.

Abortion

In 1800, the average married woman in the United States could expect to have 7.04 children; by 1900, the number was 3.56. In Britain, 25% of women marrying in 1860 had eight or more children; by 1925, 40% were to have one or no children. Fertility regulation was so hidden at the time that when demographers began to analyze demographic transition, they often saw it in socioeconomic terms, rather than in behavioral and technologic terms, as if education or income itself could affect fertility directly. Obviously, this is not true, although the exact balance of contraceptive use and induced abortion can never be established in detail. Very low coital frequencies, which may have occurred in some marriages fearful of unintended pregnancies, may also have played a role.[32] Oral and anal intercourse were, as today, taboo subjects, and if they were significant variables in achieved family size must forever remain unmeasurable. Coitus interruptus was certainly widely used and is referred to commonly. Spermicides and condoms were well known in the 19th century. Finally, abortion played an important role. In 1889, Rentoul, in Britain, wrote the following:

"Everyone must notice that, although the number of marriages is on the increase, the number of births to each couple is decreasing, and also that no satisfactory explanation is forthcoming. Instead of the number of cases of abortion undergoing a diminution, an enormous increase is taking place."[33] In France, in 1868, one commentator wrote that abortion had grown "into a veritable industry." One of the few statistical estimate measures of abortion was made at the Manchester Lying-In Hospital by Whitehead in 1845 and 1846. He questioned 2000 women, and more than one third of them (747) reported one or more abortions. The women with abortions had been pregnant more often (mean, 6.4 pregnancies) than the total population (mean, 4.3 pregnancies).[31] In 1873, an American physician pointed out that "abortion has become so frequent that it is rare to find a married woman who passes through the childbearing period who has not had one or more!" One student of abortion patterns estimated that probably 75% to 90% of the abortions performed at that time were for married women.[34] Legal cases sometimes illuminate 19th century abortion practices. In 1896, the Chrimes brothers set up a mail-order business in London for the sale of a simple blood tonic that their advertisements implied was an abortifacient. The brothers

attempted to blackmail the women who wrote in to purchase the remedy, but their plan was exposed and they were arrested, convicted, and jailed for extortion. In the course of 2 years, they had collected a file of more than 10,000 names, and they were only one of many similar businesses peddling various types of medication for the relief of a "delayed period."[35]

In 1868, a representative of the *British Medical Journal* replied to newspaper advertisements for ladies who were "temporarily indisposed." More than half the advertisements offered abortions.[31] In the United States, an English immigrant, Ann Lohman, trading under the more colorful name of Madame Restell, began practicing in New York in the 1830s. She offered both pills and surgery to induce abortions. By the 1840s, she had opened branch agencies in Boston and Philadelphia, and by 1870 she was spending approximately $60,000 each year on advertisements alone. First arrested in 1841, she was convicted of only minor infractions of the law. Her final arrest was because of the activities of the notorious Anthony Comstock, who had launched a personal crusade to ban every form of birth control and prosecute every abortionist.[36]

However, the scale of abortion and, to some extent, the acceptability of 19th century abortion services are revealed in the number of years it took Comstock to bring Madame Restell to trial: He succeeded in 1878. The confrontation between the missionary of purity and the most famous 19th century abortionist ended dramatically when Madame Restell committed suicide immediately before her trial.

The prices quoted for services were high, ranging from 10 to 50 guineas ($15 to $75) in Britain, or 5% or more of the annual income of an average lower middle class family of the time. There was frequent physician involvement in the delivery of services, and fee splitting was common. Services provided in the 19th century parallel those currently found in many parts of the developing world.

One abortion provider claimed to have been in the business for 27 years, beginning in the first years of Queen Victoria's reign. She had patients who came back six or seven times and is quoted as saying, "I'm a jokelar [jocular] person, I am; and cheers 'em up. She needn't mind and mustn't fret, and I'll see her all right. I'm the old original, I am, and have had hundreds."[31]

In the 1870s, Ely van der Warkle wrote particularly vivid accounts of abortion services in his hometown, Syracuse, New York, having ascertained that the most common method used was injection of water into the cavity of the womb. He described "women who have achieved the difficult feat of auto-catheterism of the uterus cavity. Commenting on fees, van der Warkle stated, "The luxury of an abortionist is now within the reach of the serving girl. An old man in the city performs this service for $10 and takes his pay in installments."[37]

Large volumes of patent medicines were available as correctives or to relieve obstructions and treat female irregularities. In America, there were Madame Drunette's Lunar Pills. Dr. Peter's French Renovating Pills were sold as "a blessing to mothers … and although very mild and prompt in other operations, pregnant females should not use them, as they invariably produce a miscarriage." Dr. Monroe's French Periodical Pills were also "sure to produce a miscarriage," as were Dr. Melveau's Portuguese Female Pills.

Van der Warkle made the most systematic observations of emmenagogues of any 19th century writer, testing samples on himself and his dog. He purchased 11 of the leading brands and had them chemically analyzed. Five were relatively harmless but six could prove dangerous in the hands of desperate women. One contained ergot; another, ergot and tansy; a third, savin; and the remaining three, aloes. His description of the effect of savin is particularly vivid:

A violent pain in the abdomen, vomiting and powerful cathartic action, with tenesmus, strangury, heat and burning in the stomach, bowels, rectum and anal region, intoxication, flushed face, severe headache … salivation is often present. Its odor is clearly evident in the urine, which is increased in quantity and passed more frequently … distressing hiccup is very generally present.[34]

At the turn of the century, the British Medical Association published a series of monographs called *Secret Remedies: What they Cost and What they Contain,* and *More Secret Remedies*.[38] Proprietary drugs were purchased, analyzed chemically, and then published along with instructions for use and prices from the

over-the-counter trade. Most were found to be mixtures of iron compounds, aloes, various spices, purgatives, and oil of pennyroyal.

The fact that some emmenagogues were dangerous is well documented by the outbreak of lead poisoning in Britain at the end of the 19th century. Alert women in Sheffield had noted that pregnant women had aborted during an outbreak of poisoning due to the use of lead pipes in the city's water supply. This observation stimulated the illicit use of diachylon, a plaster containing lead, as an abortifacient. The first case was reported in 1898 in Sheffield, when a young married woman admitted taking the substance, but it was not until 1917 that diachylon was placed on the poison list. In the intervening years, an epidemic of poisoning due to the use of the compound as an abortifacient spread in the Midlands of Britain. Just before World War I, one chemist in the country admitted to selling 14 lb of 500 individual doses of diachylon in 1 year.[35]

The history of Beecham's Pills in the United Kingdom involves the spread of a drug perceived to be an abortifacient. An 1897 advertisement in the Queen Victoria Diamond Jubilee Number of the *Christian Herald* is typical: "Worth a guinea a box. Beecham's Pills for all bilious and nervous disorders such as Sick Headache, Constipation, Weak Stomach, Impaired Digestion, Disordered Liver and Female Ailments. The sale is now 6 million boxes per annum." This advertising copy was frequently printed with a picture of a young woman walking along the seashore or saying goodbye to a sailor boyfriend and was captioned, "What are the wild waves saying? Try Beecham's Pills."[31,39]

The family planning pioneer, Dr. Evelyne Fisher, wrote of abortion practices in a Welsh mining community in the 1920s: "Most of the people belonged to various chapels but many had Roman Catholic friends who used to bring them the small, thin candles meant for lighting to the Virgin and then they would push these up through the cervix."

Science and Medicine

When Darwin was born, the existing technologies of birth control were little different to those used by the Romans. By the time of Darwin's death, the cell theory of biology was finally established, the infective role of bacteria had been shown, the evolutionary process was understood, the study of anatomy had reached its final development, aseptic surgical techniques had been developed, and anesthetics had been introduced. A basic understanding has been established of the physiology of every body system. However, the understanding of reproduction lagged behind that of other systems.

The early stages of mammalian development are difficult to study. Although William Harvey deduced the nature of the circulatory system, he failed to understand basic steps in mammalian reproduction. King Charles provided Harvey with red deer as experimental animals and unwittingly gave him a species in which egg implantation is delayed, so (before the use of the microscope) there was no visible link between coital behavior in the autumn and the development of the fawn after the winter season.[40] Mammalian eggs were first recovered from the fallopian tubes by Cruickshank in 1797, and the discovery of the mammalian ovum is usually ascribed to von Baer's work on dogs in 1827.

Von Baer's British contemporary Martin Barry said von Baer "saw no more than a transparent space," and it was only with the introduction of the achromatic microscope that Barry, in 1838, described some of the stages in the development of the rabbit blastocyst.[41] The processes of cellular and nuclear division were unraveled with the help of Hofmeister's work on plants in the 1840s and Reichert's on nematodes a few years later.[42] In 1852, Newport described fertilization in the frog, and in the last quarter of the 19th century reproductive science began to move forward, although extrapolation from animal observations to the human situation continued to be accompanied by mistakes. Nearly all 19th century writers assumed menstruation in women and vaginal bleeding in bitches had a similar relationship to ovulation, identifying the "safe period" at the middle (sic) of the cycle.[43,44]

It was known that fowl testes controlled such adult sex characteristics as the comb and spurs. The work of Heap and Marshall in England and Schroeder and Meyer on the continent set the stage for a clear understanding of the ovarian cycle. In 1909, Loeb showed that decidual changes depended on the corpus luteum. A crude extract of estrogen was prepared in 1913, and in 1923, the Americans Allen and Doisy

obtained a pure isolate. The hormone was characterized chemically in 1929 and synthesized in 1936; the first analogue, diethylstilbestrol, was produced just before World War II. The key steps in progesterone research were each made a few years later, and synthesis was achieved in 1934. The human ovum was seen for the first time in 1930.[45]

First Steps in Scientific Contraception

Despite the many biologic problems in the understanding of human reproduction, it seems reasonable to assert that progress in the control of fertility could have been more rapid than it actually has been. Social factors, rather than an absence of scientific knowledge, proved the greatest barrier.

By the turn of the 19th century, all the major leads in contraceptive development had taken place. Condoms were described as protection against venereal disease by Fallopius as early as 1504, but they may have been a device to wear under the foreskin after intercourse. The British seem to have pioneered making condoms from the caecum of a sheep. Boswell wrote in his *London Journal,* on May 10, 1763, how he "picked up a strong young jolly damsel, led her to Westminster Bridge and there, in armour complete, did I enjoy her upon this noble edifice." In 1749, the British secretary at the Paris embassy, Colonel Joseph Yorke, wrote to the Duke of Cumberland about fertility regulation and King Louis XV of France. "His majesty," it seems, had "an utter aversion to his Mistresses bearing children." One mistress had had a pregnancy scare and Yorke was commissioned "to procure from England, as it is not a manufacture of this country [France], 330 or more, of those preventive machines, made use of by the Gallant tho' prudent young Gentlemen of this age."[46] In 1844, Hancock and Goodyear in America discovered the vulcanization of rubber, and after about 1870, reasonable quality rubber condoms became widely available.[47]

Female barrier methods were well established by the 19th century. In 1838, in Europe, Wilde was fitting a cervical cap with the aid of a speculum, describing it as something, "to let persons, to whom childbearing is impossible, wear a rubber pessary constantly; the pessary having no opening, covering the os uteri completely and closing it tightly, is to be removed only during the menstrual period."[48] In the 1880s, Mensinger advised a diaphragm without spermicide be worn more or less continuously. By 1915, Rutgers was using 16 sizes of diaphragms, recommending use of spermicides and individual fitting by a physician. In 1922, to make contraceptives respectable in the United States, Margaret Sanger employed Bocker, a physician, to fit vaginal diaphragms. In England, Marie Stopes engaged nurses to teach the use of cervical caps. Controversy surrounding contraception, lack of alternative choices, and prevailing clinical standards all discouraged extensive scientific investigation. Choices were more the result of fashion and anecdotal impression than clinical observation. Bocker claimed a 2% failure rate for diaphragms and spermicides and a 100% failure rate for cervical caps, while Stopes insisted on a 0.2% failure for cervical caps and a high failure rate for diaphragms.

All the early family planners claimed unacceptable failure rates (and usually fearful, life-threat-ening side effects) for coitus interruptus. Both Stopes in Britain and Stone in the United States observed that the pre-ejaculatory fluid sometimes contained sperm and speculated that these might cause pregnancy.[49] Modern reproductive physiology would suggest that the few sperm present are unlikely to be associated with fertilization, but even today the suggestion is still copied from text to text.

In the 19th century, attempts were made to block the cervix with metal pessaries. The devices required an intrauterine portion to hold them in place, and sometimes they broke, when it was noted that they still acted as successful contraceptives. In 1909, Richter, in a German medical journal, described a flexible ring made of silk that he placed in the uteri of women seeking contraceptive help.[50] By 1923, Proust claimed to have distributed 23,000 intrauterine devices (IUDs). At about the same time, Grafenberg began making IUDs of silk and later of silver wire.[51] However, interest in his devices was also short-lived, and they were condemned by most gynecologists as sources of infection. Between 1934 and 1959, only one publication concerning IUDs appeared in the English language, but a few brave doctors, such as Hall in America, Jackson in England, and Knock in Indonesia, continued to recommend them to patients. In Japan, Tenrei Ota, who knew of the European work, developed his own device, publishing his first results in 1934. Partially as a result of his views on birth control, Ota spent a number of years in prison.

The biologic possibility of imitating early pregnancy to inhibit ovulation was well understood by the

Austrian physiologist Haberlandt when he published a series of papers, beginning in 1921, on what he called "hormonal sterilization." Ovaries from pregnant does were transplanted into nonpregnant rabbits, rendering them infertile for several months. By 1927, Haberlandt was exploring the possibility of oral contraception, and he collaborated with a pharmaceutical firm in Budapest to produce a preparation called *Infecundin.* Writing about hormonal sterilization in 1931, Haberlandt stated, "It needs no amplification. Of all methods available, hormonal sterilization based on biological principles, if it can be applied unobjectionably in the human, is an ideal method for practical medicine and its future task of birth control."[52]

A number of methods were available for performing abortion in the 19th century. The operation of dilation and curettage was established and, as early as 1863, Simpson, the physician who gave chloroform to Queen Victoria during childbirth, described a procedure for "dry cupping" the uterus. Today it would be called vacuum aspiration. He writes, "I have made frequent use of a tube resembling in length and size a male catheter … and having an exhausting syringe adapted to its lower outer extremity, by which air can be withdrawn after it has been introduced into the cavity of the uterus."[53] Simpson concludes that in some instances, "This instrument is attended with striking results." It is illustrative of the barriers that existed to the scientific development of fertility regulation methods that vacuum aspiration techniques for abortion were invented on two occasions and then lost to medicine—once by Simpson, then by a Russian called Bykov in the 1920s, and finally by Wu and Wu in China in 1958. Vacuum aspiration using a hand-held syringe and a flexible plastic cannula was first described by Karman and Potts in 1972.[54]

The operation of female sterilization had been described in 1881.[55] Sir Astley Cooper experimented with vasectomy in dogs in 1830, Harrison recommended the operation as a cure for enlarged prostate in 1889, and between 1909 and 1929, Popenoe published a series of 6255 vasectomy operations for contraceptive reasons.[56,57]

In short, the scientific basis for all the modern methods of contraception was established by the end of World War I. Social and family life were changing and the demand for family planning was strong. Professional groups were already having small families. The 1911 British Census showed a range of advanced fertility (Table 1). Why did the contraceptive revolution not take place? Why did society not respond to the need of the less privileged so that they too might control their fertility? These questions are best understood by looking at the history of the few persons who first tried to answer them.

Table 1. Fertility by Occupation: 1911 Census (Britain)

	Births per 1000 Men
Group	**Younger Than Age 55**
Clergy	96-101
Doctors	103
Policemen	153
Dock laborers	231
Miners	258
General laborers	438

PIONEERS

Perhaps it is not surprising that Malthus had only been able to suggest "moral restraint" in answer to the conundrum he posed of geometric population growth outrunning an arithmetic increase in resources. He alluded to contraceptives as "violations of the marriage bed and improper arts to conceal the consequences of irregular connections."[26]

It was left to a small band of free thinkers, who had rejected orthodox religion, to disseminate realistic contraceptive information.[58] Francis Place was born in 1771 into what today's social worker would call a "problem family." At the age of 19, he married a girl 2 years younger than himself, and although the couple eventually had 15 children (of whom five died early) and suffered great economic hardship, it was a happy union. When Place was 52, long after the birth of his last child, he launched a campaign of public propaganda for contraception through a series of printed leaflets. They were widely distributed in London and the North of England. Addressed "To the Married of Both Sexes of the Working People and Similarly the Married Sexes in Genteel Life," the author noted the use of both coitus interruptus and vaginal barrier methods:

A piece of soft sponge about the size of a small ball attached to a very narrow ribbon and slightly moistened (when convenient) is introduced previous to sexual intercourse and is afterwards withdrawn, and thus by an easy, simple, cleanly and non-indelicate method, in no way injurious to health, not only may much unhappiness and many miseries be prevented, but benefits of an incalculable amount be conferred on society.[54]

Place writes of having consulted with "accoucheurs of the first respectability," and the *Handbills* probably represent the first systematic attempt in history to accelerate the transfer of a fertility regulation technology, already widely used among the wealthy, to the socially less privileged. However, his contemporaries called these publications the "Diabolical Handbills."[59]

Place set the use of contraceptives within a health and economic context. He believed that women deserved "the utmost sympathy and commiseration" because of the burdens of pregnancy, the dangers of childbirth, and because they often had "more children than the income of the parents enables them to maintain and educate in a desirable manner."

John Stuart Mill (1806 to 1873) was another free thinker who advocated birth control, writing columns in the radical publication *The Black Dwarf*. He was arrested as a youth for handing out birth control leaflets. The ideas of the British movement were taken to America by Robert Dale Owen, who went to the New World at the age of 24 and in 1831 published *Moral Physiology—or a Brief and Plain Treatise on the Population.* The book was adorned with a frontispiece depicting a mother abandoning her child and lamenting, "Alas that it should have been born." It discussed the sponge, condom, and withdrawal. Owen had considerable influence on Charles Knowlton, whose book *The Fruits of Philosophy* was published anonymously in 1832. Knowlton recommended postcoital douching, giving details of various formulations such as "liquid Chloride of Soda, a pint of water, four or five great spoonsful."[60]

The Fruits of Philosophy was reprinted several times on both sides of the Atlantic, and in the 1870s, a Bristol printer was sentenced to 2 years' imprisonment, with hard labor for selling it. Two courageous free thinkers, Charles Bradlaugh and Annie Besant, set up the Free Thought Publishing Company to provoke a test case by republishing the book in a new, cheap edition, informing the police of their action. The case of *Rex v Charles Bradlaugh and Annie Besant* ended in their acquittal after an appeal to the High Court. At the original trial, the jury had found that the book was "likely to deprave public morals" but exonerated the defendants from any corrupt motives in publishing it.[61]

The details of the trial and the book were secondary to the revolution in public attitudes that the publicity surrounding the trial brought about. Birth control, it has been said, was "thrown onto the breakfast tables of the English middle classes." There was an explosion in printed literature about family planning. Sales of *The Fruits of Philosophy*, previously fewer than 1000 a year, rose to more than 100,000 in the 3 months preceding the trial and continued at a high level thereafter. Besant subsequently produced her own book, *The Law of Population,* dedicated to "the poor in our great cities and agricultural districts, dwellers in stifling courts or crowded hovels, in the hope that it may point a path from poverty and may make easier the life of British mothers." In earlier versions, she advocated the use of the sponge, but later editions favored two new methods: the cervical cap and soluble pessaries. The manufacture of spermicides, condoms, and vaginal-occlusive devices grew rapidly.

In 1879, the Malthusian League was founded and its journal, *The Malthusian,* began publication. The

Bradlaugh/Besant trial marked a turning point in social and demographic attitudes, with a concomitant improvement in contraceptive practice in the latter part of the 19th century. Besant subsequently became a religious mystic, moving to India in 1880. One of the main roads in Bombay is still named after her, but unfortunately her family-planning message was not transmitted to this part of the world. Bradlaugh became the first free-thinker member of Parliament and was persistently re-elected by his constituency in Northampton, even though his right to take his seat was for many years resisted because of his refusal to swear a religious oath (Fig. 3).

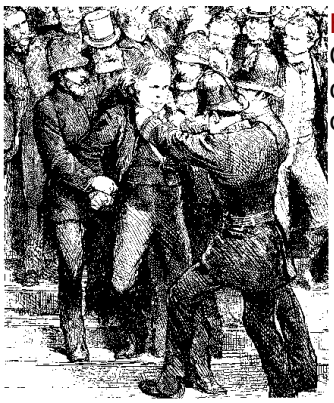

Fig. 3. Charles Bradlaugh (1833-1891) being ejected from the House of Commons in 1880 after his right, as an atheist, to take the oath of office was denied.(From Stopes-Roe HV, Scott I: Marie Stopes and Birth Control. Pioneers of Science and Discovery Series. London, Priory Press Ltd, 1974.)

Even after the Bradlaugh trial, prosecutions continued. In 1878, Edward Truelove, a 67-year-old rationalist publisher, was sent to prison for 4 months for publishing *Owen's Moral Physiology*, while as late as 1892, a Newcastle phrenologist received a sentence of 1 month's hard labor for selling *The Wife's Handbook,* which had first been published in 1886 and contained a four-page comprehensive review of methods of contraception, from "coughing (unreliable) and *coitus interruptus* (hurtful to the nervous system in many persons), to French Letters (a very certain check) and Rendell's soluble quinine pessaries."[62] W. J. Rendell is a British manufacturer that still produces spermicides.

For the most part, the medical profession was implacably opposed to contraception, with the *Lancet* praising the views expressed at an annual meeting of the British Medical Association about "beastly contrivances and filthy expedients for the prevention of conception." One section of the medical profession had attempted a more rational approach to the cases of human sexuality and fertility control. At what may have been the first medical symposium on contraception, in 1888, Blackwood of Philadelphia advocated contraception saying, "The land is full of wretched, broken-down women today whose lives have become mere machines for the reproduction of the race." But opinions and thoughts were polarized at such extremes that it was to take virtually a century to reconcile the disparate groups, and some might question whether the process is over completely even today.

Sanger and Stopes

The lives of Margaret Sanger (1879 to 1965) and Marie Stopes (1880 to 1958)[59,63] provide both contrasting and complementary symbols of the birth control movement in the first half of the 20th century. Sanger was born into a free-thinking family of Irish-Catholic stock. She was to divorce and remarry in a generation when such events still bordered on the scandalous. Stopes grew up in a middle-class Edinburgh home, cloistered from life's vulgarities. As a teenager, she read the whole of Darwin and suffered from an evangelic sense of sin. In 1899, she entered University College, London, and went on to become the first woman botanist to be awarded a doctorate in Munich. Appointed the first woman lecturer at Manchester University, she was also the first to receive a travel grant from the Royal Society. To her, a kiss literally denoted betrothment and she sublimated her emotions in unacceptable plays and unpublishable novels.

Sanger knew the reality of poverty from her work among the poor. She had three children and was practicing as a public health nurse when her own Road to Damascus occurred. In 1912, she had nursed Mrs. Sadie Sachs, a frail young mother of three, back to life after a self-induced abortion. Sanger always remembered with bitterness the words of the attending physician: "Any more such capers, young

woman, and there will be no need to send for me. … You want to have your cake and eat it too," he chuckled. Just before leaving, he added another jocular word. "Tell Jake to sleep on the roof!" Alone, the woman asked for advice, but Margaret procrastinated because she had none to give. When she was called to visit Sadie Sachs again 3 months later, it was to see her die from a second induced abortion.

At the age of 31, Stopes married botanist Reginald Ruggles Gates. A vivid illustration of the straightjacket that late Victorian attitudes imposed on sex is the fact that it took the woman who had been the youngest Doctor of Science in Britain several years to discover that her husband was impotent. Dr. Stopes had to visit the British Museum to discover her marriage was unconsummated. Her doctor and her lawyer were unhelpful. "I should go mad if it were not that I say to myself, "Why have I a scientific brain and all my scientific knowledge, if it is not to find out the things that seem to puzzle everybody?"[64] In her misery and frustration, she wrote *Married Love*. It was a poetic hymn to unachievable Victorian idealism. After numerous rejections, and only because of a subsidy from the man who was to become her second husband, Stopes published *Married Love* in 1918. It electrified Britain. It went through six editions in a year and was considered by contemporaries to be one of the most influential books of the 20th century. Even liberal contemporaries were shocked by what today appear as convoluted allusions to the realities and practicalities of sexual life. Stopes, for example, wrote that a wife had "in her … wonderful tides, scented and enriched by the myriad experiences of the human race from its ancient days of leisure and flower-wreathed lovemaking, urging her to transports and self-expressions."[65] Sanger started a magazine, *The Women Rebel*, to challenge the Comstock Laws and then, in 1914, published a pamphlet called *Family Limitation,* describing condoms, suppositories, and douching. She was indicted but fled to Europe after half a day's trial, arriving in London when Stopes's manuscript for her book *Married Love* was almost complete. She was invited to dinner by the Scottish scientist and, during what must have been one of the oddest but most significant meetings of the 20th century, showed Stopes "the French pessary which [Stopes] stated she saw for the first time." A section on contraceptive methods was hastily added to *Married Love.* However, the book remained primarily a revolutionary statement of a woman's right to sexual pleasure. "It is vital," Stopes wrote, "that the two not only pulse together to the highest climax but also remain thereafter in a long brooding embrace without severance from each other."[64] It was a remarkable vision for a woman who had suffered through an unconsummated marriage. Stopes enthusiastically espoused Sanger's cause and petitioned President Wilson on her behalf when she returned to the United States to resume her trial:

"Have you, Sir, visualized what it means to be a woman whose every fiber, whose every muscle and blood capillary is suddenly poisoned by the secret, ever-growing horror, more penetrating, more long drawn than any nightmare, of an unwanted embryo developing beneath her heart? … What changes of slavery are, have been, or ever could be so intentional a horror as the shackles on every limb, on every thought, on the very soul of an unwillingly pregnant woman?"[64]

Sanger's trial in New York attracted great attention and eventually, afraid of making her a martyr, the government entered a plea of *nolle prosequi*. In October 1916, Sanger opened America's first birth control clinic in Brownsville, New York, and 140 women came on the first day. On the 9th day, the police came.

Margaret and her sister Ethel were indicted once again. But the clinic work continued and the Comstock Laws were circumvented by the Crane Decision of 1917 that permitted a licensed physician to prescribe contraceptives "for the cure and prevention of disease." The verdict was a welcome milestone for Sanger but historically proved a millstone around the neck of family planning services that has still not been entirely eroded away. There were no technical reasons to involve doctors in fitting vaginal diaphragms, and Stopes steadfastly used nurses for this task. Physicians entered family planning because they made a controversial topic both legally and socially acceptable.

The clinic was raided again in 1919, but this time medical involvement was not only a legal defense but also brought political support. However, imported contraceptives continued to be confiscated by the U.S. postal services until the 1937 ruling of the New York Circuit Court of Appeals, in the case known as the *United States v One Package.* The Comstock Laws were interpreted as not intended to prevent the use of materials "which might be intelligently employed by conscientious and competent physicians for the purpose of saving life or promoting the well being of their patients." However, it was not until the

Supreme Court ruling of *Griswold v Connecticut* in 1965, upholding an individual's right to privacy, that all the legal restraints on contraceptive use were finally removed. In January 1972, the Court, in a logical extension of Griswold, struck down all state laws forbidding abortion.

Both Stopes and Sanger traveled widely, including visits to the Orient. Both women were effective public speakers, and both married twice, falling in love with wealthy men who helped their crusades. Both women read H.G. Wells and knew and were deeply influenced by Havelock Ellis.

Stopes was a passionate advocate for the cervical cap but condemned the diaphragm; in her opinion, it covered too much of the vaginal wall and prevented the absorption of a "fortifying influence" found in the semen.[66] She denounced IUDs and, although she lived long enough to see the first work on oral contraceptives, she sincerely hoped the pill would never be used. Her views of sterilization also reflected historical background: "boys should be sterilized in families where there is epilepsy, or any degree of feeble mindedness, not only in the parents but in collaterals, such as uncles or aunts, for feeblemindedness and epilepsy are apt to "miss a generation."[64] Abortion was anathema.

But in a historical context, Stopes is mild compared to her opponents. Stopes and Sanger had to fight against the sort of world Todd epitomized. "We know the toil and work connected with the raising of large families," wrote Gardner, a 19th century supporter of Todd, "but the efforts at the present day, made to avoid propagation, are ten thousand-fold more disastrous to the health and constitution to say nothing of the demoralization of mind and heart." The pain of the privileged was well-described in the letter from an Anglican clergyman to Stopes after he had read *Married Love*: "Once or twice a year, possibly four times, I find heaven in *her* unspeakable sweet joy." He wrote of his wife, *can it be oftener? Can it be fairly regular?* I am afraid too often I bore her and that ends by boring me inexplicably. Single lust is a feasible squibb. I want fireworks!" She made a pragmatic alliance with the medical profession to further her cause and saw the services she had dreamed of setting up in America and many other countries before she died.

EMERGING SERVICES

Perhaps the key intervals in family planning history were the decades from 1880 to 1950 when so much was needed in the way of contraceptive technology and service but so little happened. It is difficult to know whether the uneducated poor having crude abortions or the sexually ignorant rich suffered most.

Overall, the fog of 19th century thinking was slow to dissipate. *Married Love* may have inspired many people, and Sanger's clinic, opened in Brooklyn in October 1916, gave practical help to thousands of women, but the uniqueness of these efforts emphasizes their failure. In a world irrevocably altered by World War I, crushed by an economic depression, and striving for the lowest birth rate in history, the majority of couples struggling to regulate their fertility faced only the bleakest choices.

The disjunction between social and intellectual leadership and the will of the people, as expressed by their practice of fertility limitation, has only partially narrowed with time. It still retards research (no major pharmaceutical companies want to be seen developing abortifacient drugs) and influences the organization of services (under the Helms Amendment, the U.S. Agency for International Development cannot sponsor any activity that might be interpreted as promoting abortion). In 2001, President Bush has reinstituted the global "gag rule" with respect to abortion. Foreign organizations cannot receive U.S. funds if they talk about or counsel women for abortion, even with their own money.

Conflict With the Church

Christendom made sex synonymous with sin. By high medieval times, intercourse was proscribed on Fridays (the day Christ died), on Thursdays (the day He was arrested), on Saturdays (in honor of the Virgin), on Sundays (in memory of the resurrection), and on Mondays (in memory of the departed).

Even Tuesdays and Wednesdays were forbidden during the 40 days of Lent; sex was also forbidden on Pentecost and Christmas and before Communion. Intercourse was only to take place in the female supine position, and the more devout fashioned heavy garments with two small orifices so that a minimum of bodily contact occurred during intercourse.[67]

The escape from this perspective was too slow and painful. In 1920, the Lambeth Conference of Anglican Bishops condemned "any deliberate cultivation of sexual activity as an end in itself." By 1958, this same group proclaimed, "The procreation of children is not the role of Christian marriage; implicit within the bond of husband and wife is the relationship of love with its sacramental expression in physical union." By 1966, the Archbishop of Canterbury was able to give guarded approval of abortion. "Discussion [of abortion] should be about the moral responsibilities of mother and doctor and, I suggest, is not helped by introducing ideas of infanticide, which attribute to the embryo personal fights which it cannot be shown to possess."[31]

In 1930, in the encyclical *Casti canubii* (Of Chaste Marriage), the Vatican began down the same road of theologic accommodation to the need for contraception. In a contrived and convoluted way, the church began to approve the rhythm method of family planning, even though St. Augustine, the chief architect of the condemnation of contraception, had explicitly condemned the method. John Rock, who helped invent the Pill, was a devout Catholic who attended mass every morning. In his widely read book, *The Time Has Come: A Catholic Doctor's Proposal to End the Battle over Birth Control* (1963),[68] Rock argued that oral contraceptives were merely an extension of natural processes and that they were morally acceptable.

The Vatican Council in 1962 was a major milestone in Catholic theology. It redefined the church as God's people, not as a flock obedient to a master, and it underwent the same type of about-face on the purpose of marriage, substituting a theology built on mutual love for one that had seen the primary aim of marital union as being the procreation of children. The majority of Catholics and practically all theologians of stature began to develop an ethical system that embraced so-called artificial contraception. In 1963, Pope Paul IV set up a Pontifical Commission to discuss the matter. Initially, the Commission consisted of 13 men, but it was expanded to 58 members, including five women. As the Commission began to re-examine the Church's teaching on contraception, the Pope appointed 16 Bishops to oversee its work, and in the end even the bishops voted nine to three (there were three abstentions) to accept so-called artificial contraception. Pope Paul was obsessed with the prestige of his office and in the end he rejected the majority findings of his own commission and endorsed a minority report by Cardinal Ottaviani, Fr. John Ford, and others. Ford was concerned that the Vatican could not change on birth control because, in his words, of "the millions we have sent to hell if these norms were not valid."[69]

On July 29, 1968, Pope Paul IV issued the encyclical *Humanae vitae* (Of human life) upholding the ban on birth control. Catholics all over the world were shattered. Theologians were dismissed, priests left the church, and bishops contrived Jesuitical ways of permitting their congregations to "follow their consciences." After *Humane vitae,* the percentage of American Catholics attending mass on a weekly basis dropped from 71% to 50%. By the 1970s, the marital fertility rate for Catholic women in the United States was 2.27, almost identical to the 2.17 for non-Catholics.[70] Family planning became a common practice regardless of religion, and today the percentage of Catholic women having abortions in the United States is slightly higher than the percentage of non-Catholic women.

Research

Freud, who more than any other person broke apart the bonds constricting 19th century thought on sexuality, wrote, "The greatest invention some benefactor can give mankind is a form of contraception which doesn't induce neurosis."[71] The Seventh International Birth Control Conference (Zurich, November 1930) had reviewed a number of possible leads in contraception, and the idea of vaccination seemed particularly exciting. Seventy years later, vaccination is still the subject of research.

In 1952, when Sanger was older than 70 years, she set about raising funds to accelerate contraceptive

research.[72] Page McCormick, of the International Harvester family, had already given approximately $2 million to launch and support the Worcester Foundation outside Boston. The second woman to graduate from the Massachusetts Institute of Technology (in biology, 1906), she belonged to the generation and background of Stopes and Sanger. She made an additional $116,000 available to Gregory Pincus, John Rock and Min Chueh Chang, who were exploring the possibility of hormonal control of conception, which Haberdandt had seen with such vision 30 years earlier. Results of a small-scale clinical trial of what were to become oral contraceptive pills were published in 1957.[73] Trial results showed convincing effectiveness, and in 1959, the Searle Company marketed the first contraceptive Pill. By the time the barriers that Western philosophy and medical attitudes had placed in the path of contraceptive development fell, innumerable anxious women were lined up to enjoy the quantum leap forward that oral contraceptives presented. Within a few years, millions of American women were using the new drugs; by the year 2000, 100 million women around the world were taking them.

The Pill was not only a biologic triumph, but it was also a manufacturing miracle. Oral contraceptives became a possibility only because ovarian hormones became cheap and chemical modifications were made to render them active when taken by mouth. This part of the story occurred in California and Mexico, with the inventions of Russell Marker, who, in the 1930s and 1940s, found it was possible to make ovarian steroids from plant sources. His first effort was to manufacture enough progesterone to fill two jam jars, then an amount worth $160,000 at market prices. By 1959, steroid costs were one hundredth of what they had been a decade previously.

Until 1959, the National Institutes of Health was explicitly forbidden to support research connected with contraception. In the World Health Organization, hostility from the Vatican State prohibited any response to those nations seeking help with family planning programs.[74] Only bold philanthropic institutions, such as the Scaife, Ford, and Rockefeller Foundations, were left to carry the research burden. Even in 1980, the United States spent only 50 cents per capita on contraceptive research and development, and the total worldwide investment in contraceptive and reproductive research plateaued in the 1970s. The National Institute of Child Health and Human Development was forbidden to sponsor research on contraception until 1968, and today legislation excludes research on possible abortifacient drugs. Even in its most active years, no more than 2% of the institute's budget was devoted to reproductive research, and only 0.4% has gone into contraceptive development.

As early as 1961, a study of nearly 10,000 pill users and users of barrier methods of contraception was launched, but the logistics of such large trials were not fully understood; the questions to be asked could only partly be defined; and funding was to prove irregular.[75] The first suspicion that oral contraceptives had serious and possibly fatal side effects became available only when data on several tens of thousands of users had been accumulated. (They would not have been revealed in the original clinical trials, even given current requirements for drug registration.) Extensive retrospective and prospective studies were then initiated. Contemporary commentators are sometimes stridently critical of the way that the Pill was introduced. It was marketed in 1957 and approved by the U.S. Food and Drug Administration in 1960. The original approval had been given on a series of 132 women, and there is no doubt that current U.S. Food and Drug Administration regulations would not have permitted the use of the Pill with evidence then available. Equally, current regulations are now so stringent that oral contraceptives might never have been introduced at all if, as could have happened, introduction had been delayed even longer by hostile attitudes. Conversely, if their development had taken place 10 years earlier, which was technologically and scientifically possible had a reasonable pace of development been sustained in the 1930s, they would have become available without the necessity for a medical prescription, ushering in an entirely different era of contraceptive availability.

Side Effects

In the case of family planning, moral condemnation has often been underscored with threats of physical harm. Stopes, in a series of well-published legal cases ending with an appeal to the House of Lords, clashed with Dr. Halleday Sutherland. Sutherland wrote, "That the majority of gynecologists … have reached the conclusion, from clinical observation, that contraception is a cause of sterility, neurasthenia and of fibroid tumors in women."[76] A speaker at a 1929 physician's conference maintained, "Inflammation of the neck of the womb results not infrequently from the use of preventives. That such

inflammation may in turn lead to cancer is mentioned in nearly all scientific publications dealing with the subject." Sir Robert Armstrong-Jones, when he was a medical authority in Britain, declared, "Birth control often leads to lunacy in women. If you are to have birth control on a large scale, you will have to add to your lunatic asylums for women. I have known from my own practice this is a fact."

The contemporary world may be marginally more objective, but the shadow of the past is easily discernible in the lack of perspective often attendant to reporting the genuine but rare, serious adverse effects associated with some modern methods of family planning.

In addition, the rare serious adverse effects of modern contraceptive use became apparent at a time when society was coming to expect a high degree of safety in therapeutics. Contraceptive experiment and experience, which might have taken place in the 1930s, occurred instead in the 1950s. The interpretation of Pill side effects might well have been different if it had been invented earlier. Death from thrombosis related to Pill use would have been no less tragic in 1940 than 1965 but, set against a higher maternal mortality and in a world that was more astonished by the progress of medicine and less sophisticated in the use of drugs, might have been seen in a more tolerant perspective.

Early work on pills and IUDs took place in Western nations when abortion was illegal. Hence, women and their physicians were anxious to avoid any risk of pregnancy, however remote. Instead of raising incrementally the dose of an oral contraceptive to achieve the required effect as is routine in all other therapies, the initial dose was set at an excessively high level and only a decade later was it discovered that it could be reduced by a large percentage.

Barbara Seaman's *The Doctors' Case Against the Pill* (1969) is typical of the attacks mounted against oral contraceptives.[77] Seaman felt so compelled to find fault with the Pill that she invited Davis, the inventor of the Dalkon Shield, to write the preface. It is interesting that her book does not mention Margaret Sanger or Page McCormick. Contemporary women who enjoy the freedom for which Sanger and her associates fought are often ignorant of the pains and frustrations endured by their predecessors. It took the drive of two women, each older than 70, to complete something that had been described as a theoretical possibility by Haberlandt more than 35 years before. In historical terms, the injustice was not that the Pill was introduced too rapidly but that its development was delayed so long.

Services

Governments have always been interested in the number of their peoples. After the devastation of World War I, the French Ministry of Health established a Conseil Superieur de la Natalire in 1919 and much of Europe and Canada adopted pronatalist policies in the early decades of this century. The first nation to offer family planning was Lenin's Russia in 1920, 1 year after the Revolution. Restrictive abortion laws were rescinded and contraceptives promoted. In the rest of Europe and North America, family planning clinics arose as a specific response to a legal and social situation that made contraception a mystery and denied the poor access to a technology they desperately needed. Clinics were not, however, the most rational way of disseminating contraceptives and in numeric terms nearly always played a minor role in family planning, lagging behind the over-the-counter sale of contraceptives. Two doctors, de Roy and Jacobs (the first woman practitioner in Holland), working for the Dutch Neo-Malthusian League, had opened the first family planning clinic in the world in 1882. It aroused local hostility, not least from the medical profession, but by the early 20th century, Queen Wilhelmina called it a public benefaction.

During the 1930s, some small steps were taken. In Britain, the Society for the Provision of Birth Control Clinics was founded in 1927 and in 1930 became the National Birth Control Association, ultimately growing into the British Family Planning Association. Stopes's Society for Constructive Birth Control and Racial Progress (founded in 1921) remained outside the national movement.[64] In 1930, the Ministry of Health Memorandum[153] empowered municipal authorities to provide contraceptive advice for expressly medical indications. However, until the Family Planning Act of 1967 (which followed the Abortion Reform Act of the same year) added family planning to the National Health Service, the voluntary movement had to carry the burden of services.

The State of Mysore, India, opened a clinic under government auspices in 1930, but it was only one in a country of hundreds of millions of people. The Indian Census Commissioner wrote 1 year later, "It appears to be the general opinion of Indian economists who discuss the population problem that the only practical method of limiting the population is by the introduction of artificial methods of birth control."[78]

At the beginning of her crusade, Sanger had created the National Birth Control League, which in 1921 became the National American Birth Control League and later still the U.S. Planned Parenthood Federation. The federal government first gave money to support family planning in 1964. At her death, Dr. Alan Guttmacher (1899 to 1976) became President of Planned Parenthood, continuing Sanger's effective leadership.

Historical pressures molded family planning clinics in particular ways. They concentrated on female methods of contraception and provided their services in a medical context. With the exception of creative work in Sweden and Japan, the clinic movement turned its back on the commercial marketing of contraceptives, and for many years found it difficult to accommodate anyone but married women.

Most voluntary family planning groups were slow to appreciate the role of surgical services. Even as late as the 1960s, the horizons of the British Family Planning Association were so limited that it was unable to respond to the opportunities provided by the 1967 reform of the abortion law. The government and, above all, women wanted services that the Family Planning Association was well placed to provide and the Association needed the financial surplus they would have provided. Instead, it was left to the new, not-for-profit Pregnancy Advisory Services to fill the gap. Inevitably, the latter had to add contraception to their work. The U.S. Planned Parenthood Association was more responsive and provided abortion and sterilization service as soon as it became possible.

INTERNATIONAL INTEREST AND NATIONAL POLICIES

The Malthusian League was founded in 1879, after the Bradlaugh/Besant trial. In 1881, the League had brought together 40 individuals from various European nations for the First International Family Planning Meeting. Further gatherings occurred in Liege (1905), The Hague (1910), and Dresden (1911). Between the wars, a remarkable series of international meetings were held in London (1922), Geneva (1927), and Zurich (1930). The League of Nations was approached to consider review of population issues, and it was officially represented at Sanger's 1927 Geneva conference. A health committee of the League looked at abortion and birth control in 1932, and in 1938 League of Nations set up "a special committee of experts to study demographic problems and especially the connection with the economic, financial and social situation…."[74] Tragically, the rise of Hitler extinguished these few sparks of national and international awareness of the need for family planning services. Authoritarian regimes always seem to find it particularly difficult to accept the individual need for family planning, and Hitler's Third Reich invaded the bedrooms of its citizens before it moved its troops into Sudetenland and Poland. Within months of coming to power in 1933, the Nazis forbade the display of contraceptives and all birth control clinics were closed.[79] Contraception was labeled the "by-product of the asphalt civilization," and Hitler himself described it as "violation of nature, as degradation of womanhood, motherhood and love." Abortions were termed "acts of sabotage against Germany's racial future," and prosecutions of abortion providers jumped 50% between 1934 and 1938. Attempts were made to register pregnancies, and in 1943, Germany at war across the world still found time to pass legislation introducing the death penalty for abortion providers whom "continually impaired the vitality of the German people by such deeds." The regime that produced the concentration camps also sent a French laundress to the guillotine in February 1942 for performing abortions.[31] Yet despite these ferocious measures, the number of illegal abortions seems to have risen.

When it came to Jews and gypsies, other laws applied. Forcible sterilization, which came to be known as the Hitlerschnitt (Hitler cut), was made legal under the 1933 Act for the Prevention of Hereditary Diseased Offspring, and 375,000 operations had been performed by 1939. No estimates exist for the numbers later in the regime. A revulsion against sterilization still obtains in eastern Europe, where

voluntary sterilization remains rare, even today. The Japanese followed the Nazi example, arresting family planning pioneer Madam Kato in 1937.

As the world came together again after World War II, neutral Sweden, under the leadership of Mrs. Ottesen-Jensen, was host to a brief international conference in 1946. The British followed in 1948, and in Bombay in 1952, Sanger and others took the first steps toward creating the International Planned Parenthood Federation (IPPF).[74] This international work was financed with limited private funds but much was achieved, particularly under Vera Houghton, the first administrator of the London office. (In the 1960s, Houghton became the most effective lobbyist for abortion law reform in England.) During the 1960s, the United States pushed forward the work of the IPPF with donations by Hugh Moore (whose fortune was founded on the manufacture of paper cups) and with a legacy from Alexander Victor (of "His Master's Voice" records). The Swedish government began to support the IPPF in 1965, and the U.S. Agency for International Development (USAID) joined in soon afterward.

The modern era of international family planning was firmly put together by two people. General William Draper (1894 to 1974) built up the IPPF, often against internal opposition, and put together the initiative that became the United Nations Fund for Population Activities (founded in 1969).[80] Dr. Reimert T. Ravenholt, a civil servant of remarkable courage and vision, worked closely with Draper and took an unpopular new USAID project and shaped it into one of the most successful international assistance programs in history. At the same time, it is necessary to remember that international family planning was getting under way 50 to 80 years after the need was first recognized; Guttmacher, Houghton, Draper, and Ravenholt represented a tiny minority of leaders who broke out of the historical straightjacket they inherited. Fortunately, they were supported by a few equally remarkable leaders from developing nations such as Dr. Jae Mo Yang (South Korea), Dr. Fernado Tamayo and Dr. Miguel Trias (Colombia), Dr. Benjamin Viel (Chile), and Dr. Fred Sai (Ghana).

Technology did begin to catch up with need, and services began to expand, but history continued to cast a dark shadow. Often services began with the least-effective methods (literally beginning by offering the rhythm method in India) and least-effective channels (such as family planning clinics). Often, the opportunity for voluntary sterilization services was avoided and the role of abortion dismissed. It took undue time and a great deal of political capital to launch social marketing schemes, the most cost-effective and easy-to-implement distribution systems. The demographic momentum that was building in the 1960s and 1970s would have been defused much earlier if modern methods of contraception could have been circulated by traditional practitioners (such as ayurvedic doctors in India) and if traditional methods (such as abortion) had been replaced by modern techniques.

United Nations Conferences

In 1954, the United Nations held a Population Conference in Rome. It was followed in 1965 by one in Belgrade, but only in the 1974 Bucharest conference did the issue of international family planning gain wide publicity. Further conferences followed in 1984 (Mexico City) and 1994 (Cairo). Each was very different and none were implemented as intended. Public policy on the controversial subject of fertility regulation seems to find it difficult to establish a common sense middle ground.[81-83]

At Bucharest, the developed countries pressed for greater commitment to family planning in developing countries. Led by India and China, the developing world came back with the argument that "development is the best contraceptive." Yet soon after delegates returned home, China was to launch the "one child" policy and for a brief while under Indira Gandhi, India flirted with coercive family planning policies. Two decades after he had coined the slogan "development is the best contraceptive," Karen Singh, Secretary of Health and Family Welfare of India in the 1960s, publicly reversed himself saying, "contraception is the best development."

In 1984, representatives of the Reagan administration from the United States turned their back on international family planning, preaching a free-market solution to all problems of population and environmental change. Meanwhile, practically every country in the developing world had adopted a

national family planning policy and was asking for increased international assistance.

The 1994 International Conference on Population and Development (ICPD) represented yet another twist in the tangled tale of international family planning. The ICPD linked the need for family planning to efforts to improve the status of women and as an element for achieving the goal of comprehensive reproductive healthcare.

Historically, in the years immediately before Cairo, five schools of thought had arisen in population and development.[84] The Vatican held only so-called "natural" family planning was acceptable and maintained an implacable opposition to abortion. The population community continued to balance a concern for individual suffering associated with unwanted fertility with a realization that rapid population growth has serious economic, environmental, and social costs. In contrast, many economists held that free markets can solve all problems and population growth is irrelevant to human progress and happiness. The distribution group within the development community held that in an economically divided world, family planning simply side-stepped a fundamental injustice that can only be solved by massive transfers of wealth. The women's initiatives community accepted family planning and argued strongly for realism over abortion. However, advocates such as Adrienne Germain and Geeta Sen made a concerted effort to frame all previous family planning efforts as in some way intrinsically coercive.[85,86] In the compromises that characterized the ICPD, the Cairo Programme of Action emphasized the continued need to slow population growth if sustainable development is to be achieved, but for most commentators, the conference was seen as a paradigm shift in policy setting. Population concerns became almost taboo and great emphasis was placed on removing quantitative targets as an element in managing large service programs.

The United Nations Conferences represent consensus, but they lack the force of an international treaty. The ICPD set financial goals for developed and developing nations. By the year 2000, the donor countries were providing less than half their anticipated contributions toward implementing Cairo.[87] Like the famous WHO Conference in Alma Ata in 1978, which proclaimed "Health for All by 2000," the ICPD seems unlikely to achieve it ambitious goals.

The Chinese "Crash Program"

In historical and global terms, the single most important event in 20th century family planning was the decisions taken at the Fifth National People's Congress in Beijing, on September 7th, 1979. China was recovering from the disaster of the Great Leap Forward and the chaos of the Cultural Revolution. The total fertility rate (TFR) was around 6.0, the People's Congress determined.

> If population growth is not controlled, there will be a dizzying peak, making it virtually impossible for the economy and all our social institutions to cope. Upon careful study, the State Council deems it necessary to launch a crash program over the coming 20 to 30 years calling on each couple …. to have a single child, so that the rate of population growth may be brought under control as soon as possible. Our aim is to strive to limit the population to a maximum of 1.2 billion by the end of this century.[88]

China, like many countries, failed to recognize the threat built into demographic momentum until it was too late. Mao Tse-Tung had proclaimed that population growth would be solved by "revolution plus production." During the Cultural Revolution (1966 to 1968), family planning was attacked. Rather timid family-planning policies were introduced in 1971, but by 1979, the Chinese population was 980 million, and it was growing at 2.6% per year.

Isolated from the rest of the world, China developed its own contraceptives, including such innovations as a "paper pill," but the most widely used contraceptive was the steel ring, derived form Grafenburg's design. It was a less-than-optimum device, but at a global level, it was the most important contraceptive of the 20th century, greatly outweighing the Pill in its demographic impact. Nobody liked the one-child policy, and undoubtedly hateful things happened as irresponsible local party leaders strived to meet targets imposed in Beijing. The idea of one-child certificates and the image of women being forced to

undergo abortion late in pregnancy continue to dominate the Western image of family planning in China. But no practical alternative to the policies set has ever been suggested for the demographic problems China confronted in 1979. As it is, even with widespread adoption of the one-child policy in the cities and a national TFR that reached 1.8 in 2000, the population of China has grown since 1979 by as many people as there are in the United States.

From 1998 on, the State Family Planning Commission, working with the United Nations Fund for Population Activities, has embarked on a new policy of improving the quality of services and setting aside the quantitative targets. In a pilot project covering 35 million people, the birth rate hardly changed when the targets were removed. China has completed the demographic transition, and it has become a low-fertility society.

The undoubted pain of the 1979 polices have now paid off. In 1979, 33% of the population was classified as living below the poverty line; while using the same standard today, only 3% are at that level. If China had continued to have the TFR of the 1970s, there would have been 800 million more people by 2000.

CONCLUSION

History cannot be unwritten, but knowledge of past events can illuminate contemporary issues. Societal attitudes, most especially those of the Judeo-Christian tradition that molded Western Europe, often inhibited recognition of problems related to human reproduction.

The Western World was blinded by an unfortunate set of religious beliefs that were not germane to the urgent situation of 20th century exponential population growth. Over the past century, the West has stumbled when searching for technical and organizational solutions to fertility control. Scientific insights were not fully exploited, known technologies went unapplied, and modern resources that could have made striking differences were held back. Each defect interacted with the other in a vicious spiral of problems. The Protestant churches were the first to see the scales fall from their eyes, and a similar but later movement is taking place among Catholics. Only future history will judge whether the delays that have taken place, through their piling up of massive demographic problems, will prove a crippling, or even mortal, blow to civilized living.

By and large, all societies find it difficult to adjust to changing needs in the area of contraception and abortion. If Mao had not denied the demographic problems of China in the 1960s, and it had started its family planning a decade earlier, then most likely it would have reached its current low fertility without any coercion, just as South Korean and Thailand were to do. The delays experienced by Western civilization in dealing with the human need for effective contraception and safe abortion were especially unfortunate. It was Christian sailors who first circumnavigated the world, Christian philosophers who founded modern science, and Christian yeomen and burghers who put together modern economic capitalism, and it was also Christendom that exported effective death control dissociated from birth control.

Western medicine and Western political systems found it more difficult to extend altruism to those struggling to control their fertility than to those suffering from infectious diseases. Important clinical developments, such as IUDs and oral contraceptives, progressed more slowly than they might otherwise have done. There is an historical link between outlawing abortion; Todd's masturbation phobia; Sanger's prison sentence; the latent period between the scientific possibility and the actuality of widespread IUD use; the 100 years that separated the possibility of manual vacuum aspiration and its widespread use; or the 40 years that divorce the theory and the practice of oral contraception.

In demographic terms, the population explosion is a numbers equation, birth rate decline lagging behind a fall in death rate. But in terms of historical action, the population explosion is the result of the unequal diffusion of the two technologies of death control and birth control. One element, probably the most important, in this inequality stems from broad societal attitudes toward human reproduction. In the last

analysis, it seems to be attitudes among decision makers and elite members of a society as they relate to the availability of choices, rather than attitudes among the world's contemporary millions, that still slow the repairing of the mistakes.

The profound demographic changes consequent on the end of World War II were slow to be identified, especially in the developing world. Cataclysmic alterations in population structure have already occurred; half the world's population is now below the age of marriage. National family planning programs have taken time to develop, and the response of Western countries in providing aid and technical assistance was delayed, uneven, and, when it occurred, sometimes inappropriate.

In many ways, the scientific and clinical aspects of family planning, and the political policy making and administrative decisions that must go with the creation and development of family planning services in the closing decade of the 20th century, remain caught in a web of events that reaches back to the 19th century and sometimes even earlier. Basic research into reproductive physiology and contraceptive research and development have not caught up with the massive human need for fertility regulation. Key contemporary issues, from the Western debate over abortion to the use of voluntary sterilization in developing countries, are still being acted out with a 19th century vocabulary of social and individual beliefs. African countries, whose abortion laws were drawn in the 19th century to match those of their respective European Colonial powers, still suffer under those outdated laws, even after the European countries have adopted for themselves more liberal policies. In a historical perspective, mankind is only just arriving at a rational starting point from which to reach out and grapple with major problems, private and public. The Catholic church, which in many human affairs now has the beautiful voice of a skylark, still hangs over decisions related to fertility with the claws of an eagle. Society has created more problems for the individual in the area of reproduction than in most other areas of human activity. History seems likely to judge the Western approach to human reproduction with increasing harshness.

REFERENCES

1. Campbell KL, Wood JW: Fertility in traditional societies. In Diggory P, Potts M, Teper S (eds): Natural Human Fertility, pp 39-69. London, Macmillan Press, 1988

2. Potts DM: Limiting human reproductive potential. In Austin CR, Short RV(eds): Reproduction in Mammals V5. Artificial Control of Reproduction, pp 32-66. New York, Cambridge University Press, 1972

3. Hopkins K: Contraception in the Roman Empire. Comparative Studies in Society and History 13: 124, 1965

4. Himes NE: Medical History of Contraception, 1936. Reprint. New York, Gamut Press, 1963

5. Omran AR: A resume of Islam's position on family planning and abortion. In Nazer IR (ed): Induced Abortion: A Hazard to Public Health. Beirut, IPPF, 1972

6. Potts DM: Coitus interruptus. In Corson S, Derman RJ, Tyrer LB (eds):Fertility Control, pp 299-305. Boston, Little, Brown & Co, 1984

7. Kauffman-Doig F: Sexual Behavior in Ancient Peru. Lima, Kampaktos, 1979

8. Riddle JM, Estes W: Oral contraceptives in Ancient and Medieval times. American Scientist 80: 226, 1992

9. Janssens P: De benen stilet uit een Gallo-Romeins vrouwengraf, gevonden te Tongeren. Hades 5: 34,

1966

10. Narkavonnakit T: Abortion in rural Thailand: A survey of practitioners. Stud Faro Plann 10: 223, 1979

11. Gallen M: Abortion choices in the Philippines. J Biological Science 11: 28t, 1979

12. Rochat R: Abortion, the Bible and the Christian Physician. Christian Med Soc J 7: 19, 1976

13. Bray B: Montaillou: The Promised Land of Error. Translated by LeRoy Ladurie. New York, Vintage Books, 1975

14. Noonan JT: Contraception: A History of Its Treatment by the Catholic Theologians and Canonists. Cambridge, Harvard University Press, 1967

15. Ruggiero G: The Boundaries of Eros: Sex Crime and Sexuality in Renaissance Venice. Oxford, Oxford University Press, 1985

16. Wrigley EA: Family limitation in preindustrial England. Economic History Review 30: 82, 1966

17. Quaife GR: Wanton Wenches and Wayward Wives. London, Croom Helm, 1979

18. van de Walle E, Knodel J: Europe's fertility transition: New evidence and lessons for today's developing world. Popul Bull 34: 1, 1980

19. Queen Victoria. Letter to the King of Belgium, January 15, 1841

20. Potts DM, Potts WTA: Queen Victoria's Gene: Haemophilia and the Royal Family. Stroud, Suttons, 1995

21. Broun H, Leech M: Anthony Comstock: Roundsman of the Lord. New York, 1927

22. Comstock A: Frauds Exposed: How People are Deceived and Robbed, and Youth Corrupted. New York, Patterson Smith, 1880

23. Acton W: Prostitution. London, 1869

24. Brodie JF: Contraception and Abortion in 19th-Century America. Ithaca, NY; Cornell University Press, 1994

25. Barker-Benfield GJ: The Horrors of the Half Known Life. New York, Harper& Row, 1976

26. Malthus TR: An Essay on the Principle of Population; or a View of its Past and Present Effects on Human Happiness. London, John Murray, 1803

27. Darwin C: The Descent of Man, London, 1871. Facsimile of 1st ed. Cambridge, Harvard University Press, 1964

28. Ryerson AJ: Medical advice on child rearing, 1550-1990. Harvard Educational Review 31: 302, 1961

29. Fildes V: Breasts, Bottles and Babies: A History of Infant Feeding. Edinburgh, Edinburgh University Press, 1986

30. Hajnal J: European marriage in perspective. In Glass DV, Eversley DEC(eds): Population in History.

London, Edward Arnold, 1965

31. Potts M, Diggory P, Peel T: Abortion. New York, Cambridge University Press, 1977

32. Sanderson WC: Quantitative aspects of marriage, fertility and family limitation in nineteenth century America: Another application of the Coale specifications. Demography 16: 339, 1979

33. Rentoul RR: The Causes and Treatment of Abortion. London, Pentland, 1889

34. Mohr J: Abortion in America. New York, Oxford University Press, 1978

35. McLaren A: Birth Control in Nineteenth Century England. London, Crown Helm, 1978

36. Mohr J: Abortion in America. New York, Oxford University Press, 1978

37. van der Warkle E: The detection of criminal abortion. J Boston Historical Society, Vols 4 & 5, 1870

38. British Medical Association: More Secret Remedies: What they Cost and What they Contain. British Medical Association, London, 1912

39. Davis G: Interception of Pregnancy. Sydney, Australia, Angus and Robertson, 1974

40. Short RV: Where do babies come from? Nature 403: 705, 2000

41. Barry M: Researches in embryology. Philos Trans R Soc Lond Biol 127: 301, 1839

42. Hughes A: A History of Cytology. London, Abelard-Schuman, 1959

43. Pouchet F-A: Theorie Positive de la Fecondation des Mammiferes. Paris, Libralrie Encyclopedique de Roret, 1842

44. Short RV: The discovery of the ovaries. In The Ovary, 2nd ed. London, Academic Press, 1977

45. Allen E, Pratt JP, Newell U, Bland LJ: Human tubal ova: Related early corpora lutea and uterine tubes. Contributions to Embryology Carnegie Institute 22: 45, 1930

46. Black Jeremy: Fit for a King. Cross Current (date unknown)

47. Peel J, Potts M: Textbook of Contraceptive Practice. New York, Cambridge University Press, 1968

48. Stopes M: Early vaginal contraceptives. Clin Med Surg 12: 889, 1931

49. Stone A, Himes NE: Practical Guide to Birth Control Methods. New York, Viking Press, 1938

50. Davis HJ: Intrauterine Devices for Contraception: The IUD. Baltimore, Williams & Wilkins, 1971

51. Stemm K, Giese K.-P: Ernst Grafenberg, das Leben und Werk des Kieler Facharztes. Zum 100. Geburtstag am 26 September 1981. Geburtsh u Frauenheilk 41: 444, 1981

52. Haberlandt L: Uber hormonale Steriliserung des weiblichen tiekorpers. Munch Med Wochenschr 68: 1577, 1921

53. Simpson JY: Clinical Lectures on Diseases of Women. Philadelphia, Blanchard & Lea, 1863

54. Karman H, Potts M: Very early abortion using syringe as a vacuum source. Lancet 1: 1051, 1972

55. Lungren SS: A case of caesarian section twice successfully performed on the same patient. Am J Obstet Gynecol 14: 78, 1881

56. Cooper A: Observations on the Structure and Diseases of the Testes. London, Longmans, 1830

57. Harrison R: Selected Papers on Stone, Prostate and Other Urinary Disorders. London, Churchill, 1899

58. Fryer P: The Birth Controllers. London, Secker and Warburg, 1965

59. Contraceptive Handbill, Form B: To the Married of Both Sexes in Genteel Life. Place Collection 61 pt 11. London, British Museum, 1832

60. Knowlton C: Fruits of Philosophy or Private Companion of Adult People. In Himes NE (ed): New York, Mount Vernon

61. Chandrasekar S: A Dirty, Filthy Book; The Writings of Charles Knowlton and Annie Besant on Reproductive Physiology and Birth Control and an Account of the Bradlaugh-Besant Trial. Berkeley, University of California Press, 1981

62. Allbutt AH: The Wife's Handbook: How a Woman Should Order Herself During Pregnancy With Hints on Other Matters of Importance, Necessary to be Known by Married Women. London, 1886

63. Douglas ET: Margaret Sanger: Pioneer of the Future. Maryland, Gamut Park Press, 1975

64. Hall R: Marie Stopes. London, Andre Deutsch, 1977

65. Stopes MC: Married Love: A New Contribution to the Solution of Sex Difficulties. London, Putman and Co, 1918

66. Stopes MC: Wise Parenthood, 25th ed. London, Putman, 1957

67. Haskins S: Mary Magdalene: Myth and Metaphor. London, Harper Collins, 1994

68. Rock J: The Time Has Come: A Catholic Doctor's Proposal to End the Battle over Birth Control. London, Longmans, 1963

69. Wills G: Papal Sin: The Structure of Deceit. New York, Doubleday, 2000

70. Westoff CF, Jones EF: The secularization of US Catholic birth control practices. Fam Plann Perspect 9: 203, 1977

71. Taylor L: The unfinished sexual revolution. J Biosoc Sci 3: 473, 1971

72. Douglas ET: Margaret Sanger: Pioneer of the Future. Maryland, Gamut Park Press, 1975

73. Asbell B: The Pill: A Biography of the Drug that Changed the World. New York, Random House, 1995

74. Symonds R, Carder M: The United Nations and the Population Question. New York, McGraw Hill, 1973

75. Potts M, Feldblum P, Chi I-C et al: The Puerto Rico oral contraceptive study: An evaluation of the

Methodology and results of a feasibility study. Br J Fam Plan 7:99

76. Peel J, Potts M: Textbook of Contraceptive Practice. New York, Cambridge University Press, 1968

77. Seaman B: A Doctor's Case Against the Pill. London, Michael Joseph, 1970

78. Suitters B: Be Brave and Angry. London, IPPF, 1973

79. Grunberger R: The 12-year Reich: A Social History of Nazi Germany. New York, Holt, Rinehart and Winston, 1971

80. Piotrow PT: World Population Crisis: The United States' Response. New York, Praeger Publishers, 1973

81. Finkle JL, Crane BB: The politics of Burcharest: Population development and the new international order. Pop Devel Rev 2: 367, 1975

82. Finkle JL, Crane BB: Ideology and politics at Mexico City: The United States at the 1984 International Conference on Population. Pop Devel Rev 11: 1, 1985

83. McIntosh CA, Finkle JL: The Cairo Conference on Population and Development. Pop Devel Rev 21: 223, 1995

84. Campbell MM: Schools of Thought: An Analysis of Interest Groups Influential in International Population Policy. Pop Environ 19: 487, 1998

85. Sen G, Germain A, Chen LC: 1994. Population Policies Reconsidered:Health, Empowerment, and Rights. Boston, MA, Harvard University Press

86. Hartmann B: Reproductive Rights and Wrongs: The Global Politics of Population Control and Contraceptive Choice. New York, Harper and Row, 1987

87. Potts M, Walsh J, McAninch J: (1999) 'Paying for reproductive health care: What is needed, and what is available?' Int Fam Plann Perspect 25 (Suppl): S10, 1999

88. Chen P-C: Rural Health and Birth Planning in China. North Carolina, IFRP, 1981