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Parenthood Federation

The History of Contraceptives



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The History of Contraceptives

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International Planned Parenthood Federation
18/20 Lower Regent Street London SW1

The History of Contraceptives

Prepared for the Medical Committee by
Beryl Suitters, Librarian I.P.P.F.

Introduction

Man's desire to control his fertility and not to leave child-bearing to chance has been almost universal throughout the ages in widely differing cultures and societies. Some of these attempts have been amazingly rational considering the lack of knowledge concerning human reproductive physiology other attempts were magical, and based on superstitions and taboos.

This exhibition is an attempt to trace the history of the development of contraceptives and to note some of the many contributions to knowledge which have led to the present high levels of medical practice and scientific research in the fields of human reproduction and fertility control. In this way it is designed to add a fifth theme to the four which are the basis of the main conference programme—by providing a sense of history and perspective.

The arrangement of material in either strict chronological or subject matter order has proved a difficult task and it was therefore decided to adopt a compromise solution and divide the exhibition into three sections—one showing the early history, the next the influence of the propagandists, and, lastly, the development of methods in use today.

The first section is sub-divided into the different cultures from which the references have been taken, the second section is concerned with those people who over the years have spread knowledge of birth control and whose courage and persistence have been largely responsible for the spectacular developments which have recently changed the climate of opinion and improved contraceptive techniques. The last section traces the development of the main methods in use today.

In an exhibition of this size it has not been possible to include all those who have made valuable contributions to the movement in many different fields. The I.P.P.F. apologises for these omissions.

The original research was begun by Miss Mary Pascoe and members of the I.P.P.F. Information Team helped with the preparations. Further research and the collection of the many references and illustrations was carried out by the I.P.P.F. Librarian, Miss Beryl Suitters, who has also written the catalogue. The text was translated into Spanish by Miss Esther Corona.

Dr. Guillermo Adriasola, Director of the School of Public Health of the University of Chile, kindly accepted the Invitation of the I.P.P.F. to open the exhibition to the public on April 7th, 1967.

ROTHA PEERS,

Secretary to the Medical Committee.

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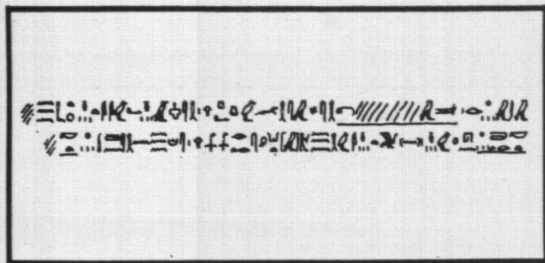
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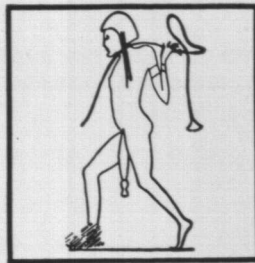
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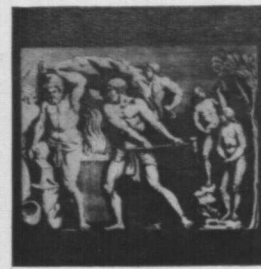
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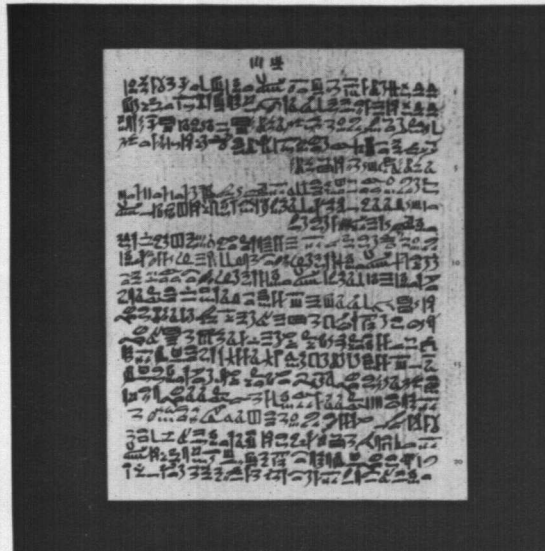
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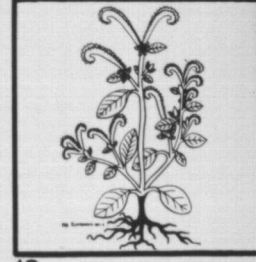
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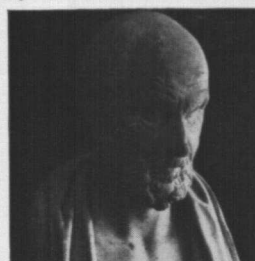
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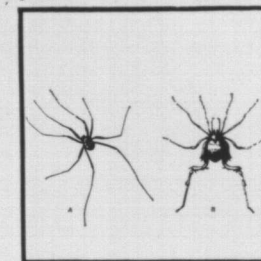
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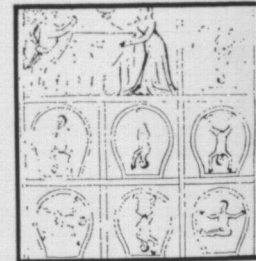
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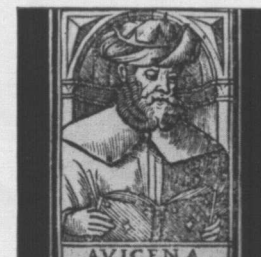
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Egyptians 1850 B.C.

The first known medical text was found at Kahun in El Faiyun, Egypt in 1899. This papyrus is known as the "Petri" or "Kahun" and dates from the reign of Amenhat III, about 1850 B.C. After its discovery, it was reconstructed and edited by the scholar, F. L. Griffiths. The third page had to be assembled from 46 pieces. The Editor thought that the prescriptions for contraception were pure quackery, but on later consideration they were shown to have a logical base.

The prescriptions included one for the use of crocodile dung, mixed with a paste like vehicle, and was probably a pessary for insertion into the vagina. Another consists of irrigating (or plugging) the vagina with honey and natron (native sodium carbonate). The use of a sticky substance, such as honey is frequently mentioned in early history.

1550 B.C.

The second important text of the early Egyptian period was found at Luxor in 1873, and is known as the "Ebers" papyrus. This contains a collection of medical prescriptions, and is some 20 metres in length. The condition of the papyrus is good, and it may be seen at the Karl Marx University, Leipzig. The "Ebers" papyrus gives the first reference to a medicated lint tampon. The prescription reads:

Beginning of the recipes made for women in order to cause that a woman should cease to conceive for one year, two years, or three years:

Tips (?) of acacia.

D'r.t.

Triturate with a measure of honey, moisten lint therewith and place in her vulva.

The tips of the shrub acacia contain gum arabic, which when fermented and dissolved in water, liberate lactic acid; a substance frequently used in early twentieth century spermicides. Gum arabic was also used as a vehicle or medium. Other papyri are known to have recorded information on fertility and its control. The best known of these is probably the "Berlin" papyrus, which suggests the use of fumigation with "Mimi" before coitus, and a potion to be taken afterwards. Fumigation however seems more likely to be used for fertility testing rather than for contraception for it is known that fumigation with peppermint was used to ascertain whether the tubes were blocked. The test to discover whether a woman is fertile consists of mixing water melon with the milk of a woman who has borne a male child. This mixture is to be pounded, and administered to the woman under examination. If she vomited, she would not conceive but if she had eructations, she would shortly become pregnant.

The Ramasseum Papyrus IV advises crocodile dung to be placed on moistened fibres at the opening of the uterus.

Apart from these methods, the early Egyptians had a knowledge of surgery, and are thought to have practised ovariectomy. A bas relief at the Necropolis of Sakkara shows some kind of operation being carried out on the male genitals—probably circumcision.

In 1911, the "Deutsche Gesellschaft fur Urologie" printed a picture headed "Egyptian non-contraceptive sheath of the XIX Century (1350–1200 B.C.). Such sheaths are used by many tribes as protection against infection, injury and insect bites.

Similar recipes to these were passed on, and re-appear in later cultures, and in 1927 these recipes were still in use by the Fellahim of Upper Egypt. Miss W. S. Blackman in her book "The Fellahim of Upper Egypt" mentions the practice of swallowing castor oil seeds, rituals involving the burial of date stones covered with blood from the last confinement. The fox is also associated with fertility as amulets of fox skin were hung in certain patterns to affect fertility. This use of fox skins is not confined to Egypt; in other countries they are thought to increase plant production and foxes are buried at the bottom of vineyards, or hung about the fields after crops have been planted. The Egyptian verb "msy—to give birth" is written . . *. which suggests three fox skins tied together.

The Bible and Talmudic Sources

These ancient works were based on an earlier oral tradition and were written at various times by many authors.

The Biblical reference most frequently quoted is a passage from Genesis 38, which reads:



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AD 1550
• JUGOSLAVIJA – POLENSAK
BEFORE GOING TO THE MARRIAGE CEREMONY THE BRIDE PUT AN UNLOCKED PADLOCK INTO THE BODICE OF HER DRESS. SHE DECIDED UPON THE NUMBER OF HER CHILDLESS YEARS BY MAKING THE SAME NUMBER OF STEPS OUTSIDE HER HOUSE WITH THE PADLOCK UNLOCKED, THEN SHE LOCKED IT.



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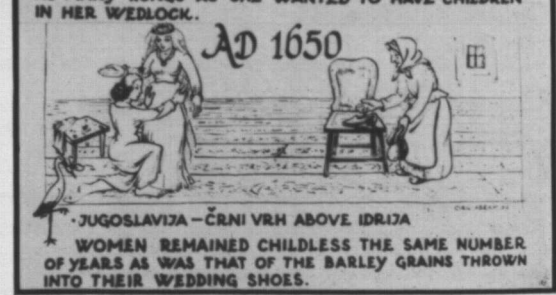
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AD 1600
• JUGOSLAVIJA – PAVLOVCI AT ORMOŽ
WHEN THE BRIDE-GROOM CAME TO TAKE THE BRIDE TO THE MARRIAGE CEREMONY, SHE CLIMBED UP A LADDER AS MANY RUNGS AS SHE WANTED TO HAVE CHILDREN IN HER WEDLOCK.

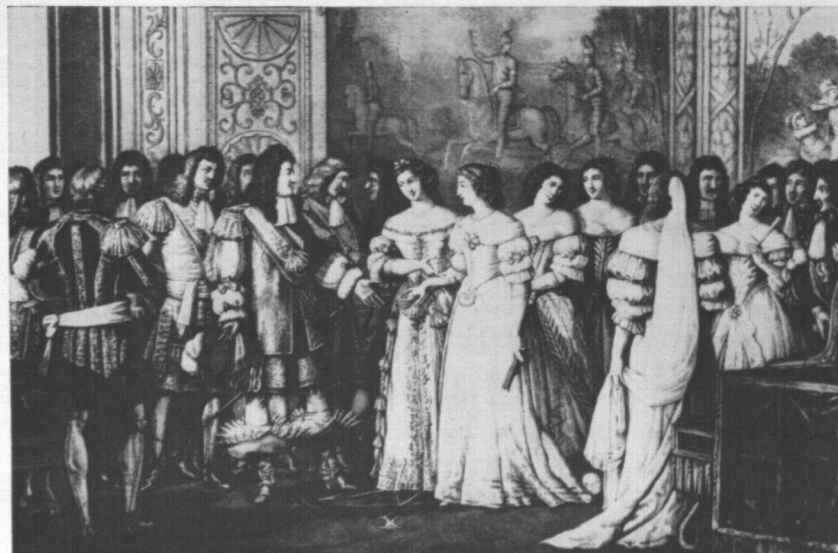


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AD 1650
• JUGOSLAVIJA – ČRNI VRH ABOVE IDRIJA
WOMEN REMAINED CHILDLESS THE SAME NUMBER OF YEARS AS WAS THAT OF THE BARLEY GRAINS THROWN INTO THEIR WEDDING SHOES.

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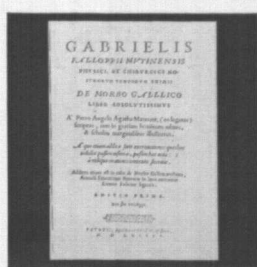
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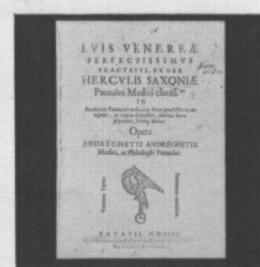
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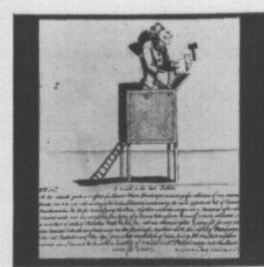
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"And Er, Judah's first born, was wicked in the sight of the Lord: and the Lord slew him. And Judah said unto Onan 'Go in unto thy brother's wife and perform the duty of a husband's brother'. And Onan knew that the seed would not be his; and it came to pass whenever he went unto his brother's wife, that he used to spill it on the ground, lest he gave seed to his brother. And the thing which he did was evil in the sight of the Lord: and he slew him also".

This has been a continual source of controversy. The "sin" of Onan is used as an argument against contraception. In fact, this argument and interpretation of the story was not applied for many years. The sin was usually considered to be that Onan had not accepted the Levirate marriage; which was a form of marriage fairly commonplace in primitive tribes, the main advantages of which were that widows and orphans were provided for, and remained within the family. Later some Rabbis laid stress on the act of coitus interruptus, saying that it was a mortal sin, whilst others continued to teach that Onan's sin was against Levirate marriage, and they recommended coitus interruptus, especially where it was medically indicated.

Other references to fertility in the Bible are less well-known. For example, the story of Leah and Rachel, the wives of Jacob. Genesis 30. v. 14–15.

"And Reuben went in the days of the wheat harvest, and found mandrakes in the field, and brought them unto his mother, Leah. Then Rachel said to Leah, 'Give me, I pray thee, of thy son's mandrakes'. And she said unto her, 'Is it a small matter that thou hast taken away my husband? and wouldest thou take away my son's mandrakes also?' And Rachel said 'Therefore he shall lie with thee tonight for thy son's mandrakes'".

The mandrake had many medical uses. Here it was used to promote fertility, when Leah wanted a child. It has been suggested that the mandrake was some kind of tranquillizer, which was known to help such cases. In his description Dioscorides says that the root "seems to be a maker of love medicines" and says that it can be used as an abortifacient.

It is said to bear a resemblance to Mexican yams, the chief plant used for the synthesis of steroid hormones.

The story of Leah and Rachel admittedly does not strictly belong to the history of contraception—but it indicates that the Jews had a knowledge of the use of herbs for treatment of fertility problems. Later, it was fairly common for women to take a "cup of roots" to render them sterile.

This is illustrated by the story of Rabbi Hiyya and his wife Judith. They lived about A.D. 200. After a difficult childbirth, Judith disguised herself and went to her husband with the question "Does the commandment of propagation include the women?" The Rabbi replied that it did not. And so she took the root medicine and became sterile. The Rabbi later said "I wish you had allowed me one more birth".

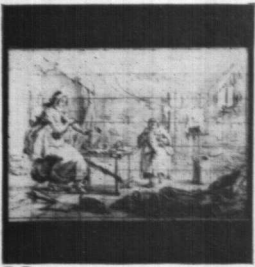
At the time of the great flood, a man used to take two wives, one to bear children, and the other for sexual intercourse only. The latter took the cup of roots.

Rabbi Yohanan, a skilled physician, who died in A.D. 279, left the following prescription for this medicine.

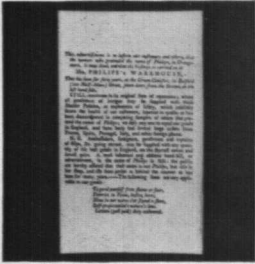
Alexandrian gum of the Spina Aegyptia, liquid alum, and garden crocus, each in weight of a denar are mixed together. Three cups of wine with this medicine are good for gonorrhea and do not sterilize. Two cups of beer with this medicine cure jaundice and sterilize.

The sponge was a method especially recommended by some Rabbis. The controversy over coitus interruptus lasted for some years, and the Tosephta, which appeared about A.D. 230 (though again it was based on an earlier tradition) quoted this controversy in order to show that the sponge method was more acceptable. Coitus interruptus had to be carried out by the man, and since it was his duty to propagate the race, it could be said that it constituted a violation of the commandment of propagation. No such commandment affected the woman, who could therefore accept the use of the sponge. Perhaps the use of the sponge among the Jews was learned during their captivity in Egypt.

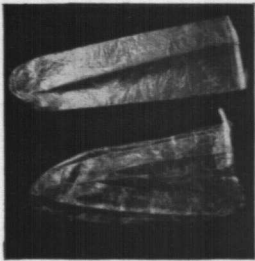
The first known Greek reference to contraception is found in Aristotle's "Historia Animalium"—a highly regarded scientific work from the fourth century B.C. to the seventeenth century A.D., Aristotle observed that:



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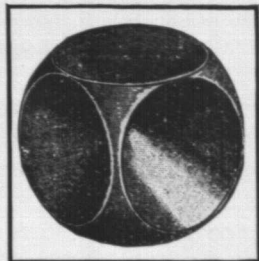
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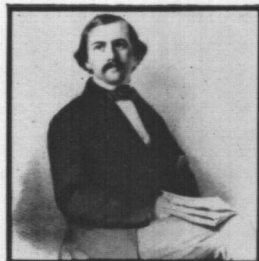
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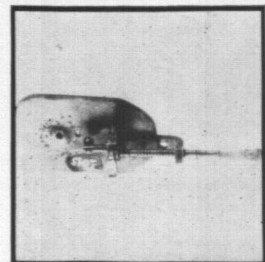
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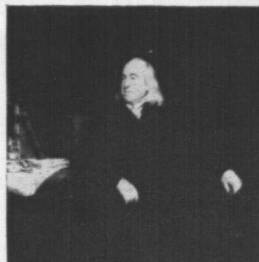
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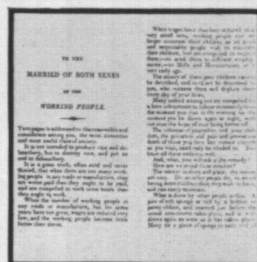
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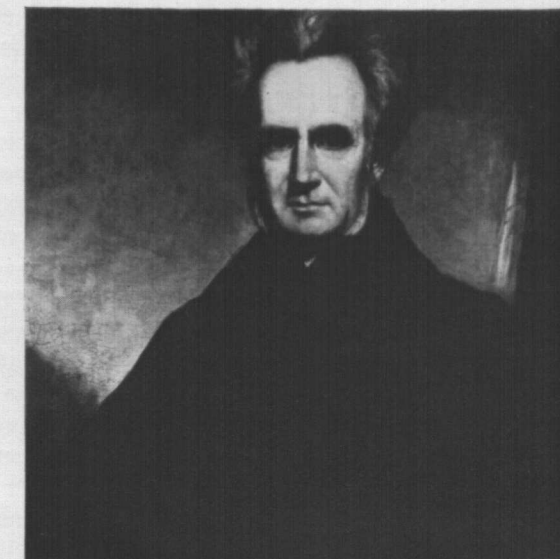
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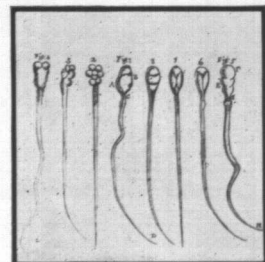
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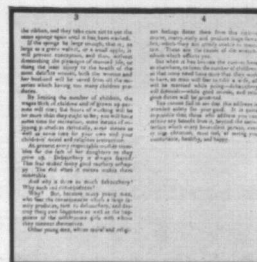
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"some prevent conception by anointing that part of the womb where the seeds fall with oil of cedar, or with ointment of lead, or with frankincense commingled with olive oil".

He believed that the smoothness of the mixture prevented conception, but it is now recognised that oil reduces the motility of spermatozoa.

The School of Hippocrates

The school of Hippocrates recorded a number of methods, one was a potion in which a substance called "misy" was dissolved in water, and when drunk by the women, was to prevent conception for a year. Various attempts have been made to identify misy, and most of the later suggestions are that it was some sort of plant or root, but other Greek writers suggest that it was a metal. Metals and stones have been thought to affect fertility, and Dioscorides (First century A.D.) devoted the fifth book of his herbal to vines, wines and metallic stones. He says the following of misy:

"Misy Copperas.

Misy, but ye Cyprian is to be chosen, looking like gold, hard and in the breaking of a golden colour, and glistering like a starr. It hath ye same faculty and burning Chalcitis, hath, without ye making of Psoricum from it, differing both in ye excesse and ye defect. But that of Egypt in respect of others, is ye best, being ye most effectual".

The "Chalcitis" mentioned is listed as "good for ye Erysipelata, and the Herpetas, and fluxes of blood which come from ye womb". The Hippocratic writers, in common with others of the time also thought that some fusion of the male and female elements were necessary for reproduction to take place, and made recommendations along the line that the semen "should be removed from the vagina" or that "the semen should be shaken out by bodily movements" sometimes this advice is ambiguous enough to be taken as coitus interruptus.

Pliny the Elder A.D. 23-79

Pliny the Elder recorded some thoughts on fertility control in his "Natural History". Most of the methods he records seem to be magical:

"From a spider called Phalangium, described as having a hairy body and an enormous head, are to be extracted two small worms. These, attached to a piece of deer's skin, before sunrise, to a woman's body, will prevent conception." He spends a great deal of time discussing anaphrodisiacs but phalangium is the "Only anti-conceptive I feel myself at liberty to mention, in favour of some women whose fecundity, quite teeming with children, stands in need of some respite".

Dioscorides First Century A.D.

The Greek Herbal of Pandarios Dioscorides of Anzarbos in Cicilia, already referred to on this page was regarded almost as an oracle until the sixteenth century and appeared in most European languages in manuscript form. With the introduction of movable type, many printed editions became available. It was not however until 1655 that the first English translation was made by Jon Godyer. The influence of Dioscorides throughout Europe and the Islamic world was vast. Apart from the substances already mentioned, Dioscorides had some knowledge of at least four different contraceptive methods.

1. Substances which cause sterility.

Chaste Tree—The fruit of which "being dranck . . . brings down ye milk and expels ye menstua, being dranck to ye quantity of a drachma in wine, it destroys generation".

Willow—The leaves of willow, beaten small and taken in water also causes "inconception".

Rennet—The rennet of a hare was also a useful substance, for placed in the vulva with butter, it causes conception, but "being dranck it doth destroy the embyra, and after ye menstruall purging it hinders conception".

2. Medicated pessaries

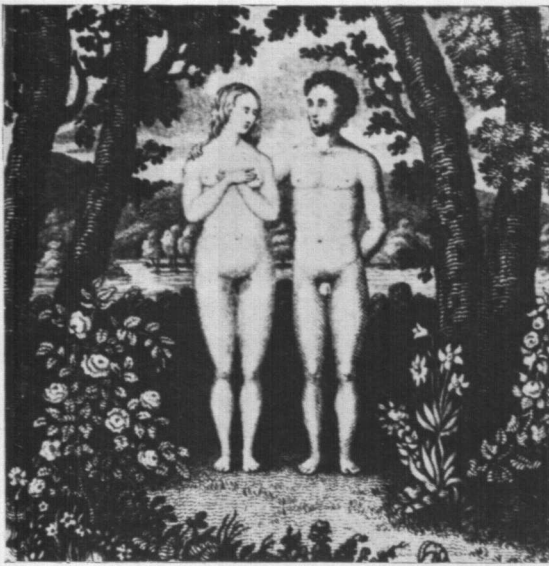
These could be made of various herbs; of pepper; or of "sword-shaped sickle-wort"; or of "Allom of Melos". These "co-operated in inconception, being laid before conjunction to ye mouth of ye matrix".

3. Anointing the genitals with sticky substances.

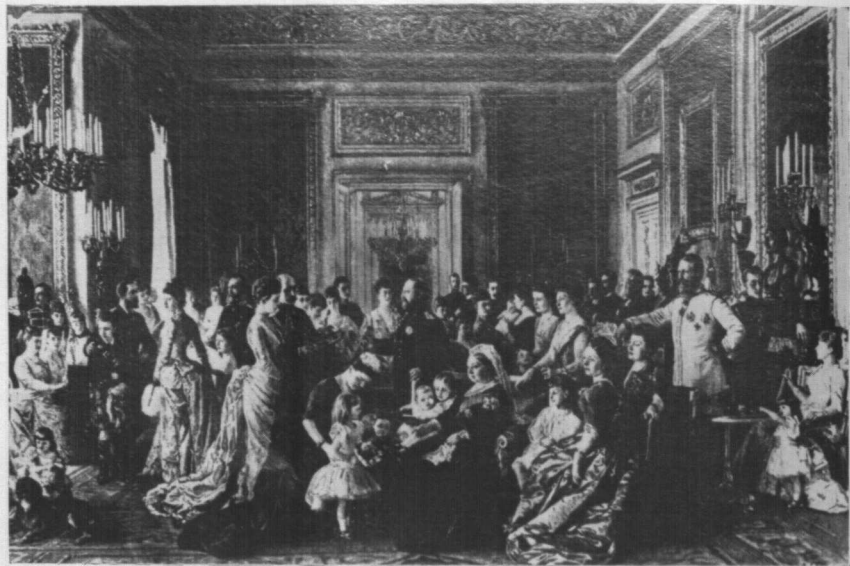
Cedar gum—This should be anointed about the genitals before conjunction.

Alum—This was used in various forms, in the same manner.

4. Amulets and prescriptions—The amulets he recommended were made of



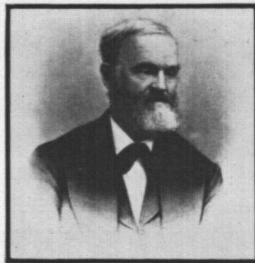
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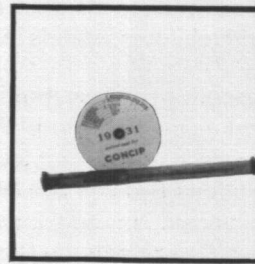
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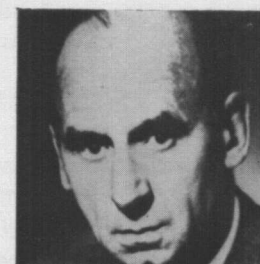
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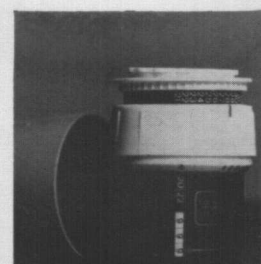
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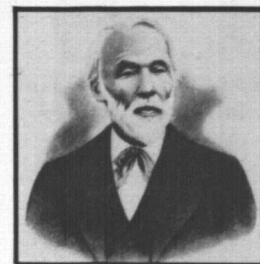
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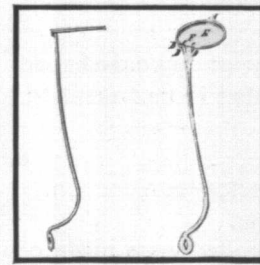
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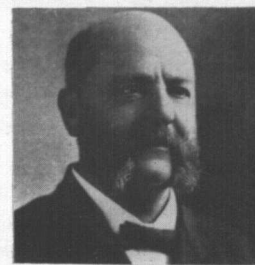
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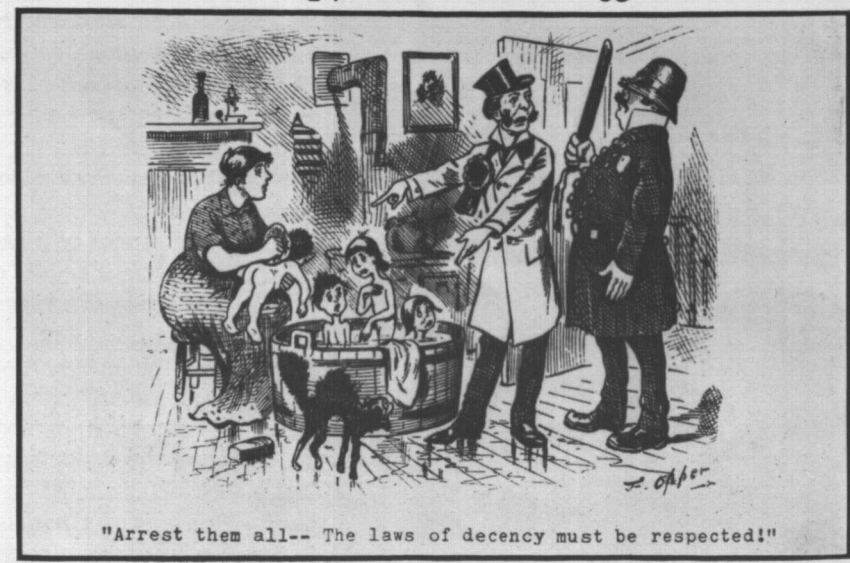
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"Arrest them all-- The laws of decency must be respected!"

substances which could also be used as medicines. Two plants which could be hung about as amulets were :

Asparagus—Of which a “decoction of it drank makes one barren and not fit for generation”.

Heliotropium Europaeum—Which had the same properties, but beaten small and smeared in “Move ye menstus and expel ye Embrya”.

Soranos of Ephesus A.D. 98–138

Soranos, the greatest gynaecologist of antiquity, practised medicine in Rome, during the reigns of Trajan and Hadrian. The original text of his book was lost for many centuries, but was published in German in 1838. His account of contraceptive technique is the most brilliant and original prior to the nineteenth century.

“XIX. Whether one ought to make use of Abortives and Contraceptives and how?

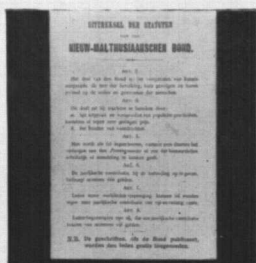
A contraceptive differs from an abortive, for the first does not let conception take place, while the latter destroys what has been conceived. Let us, therefore, call the one ‘abortive’ (pthorion) and the other ‘contraceptive’ (atokion). And an ‘expulsive’ (ekbolion) some people say is synonymous with an abortive; others, however, say that there is a difference because an expulsive does not mean drugs but shaking and leaping For this reason they say that Hippocrates, although prohibiting abortives, yet in his book ‘On the Nature of the Child’ employs leaping with the heels to the buttocks for the sake of expulsion. But a controversy has arisen. For one party banishes abortives, citing the testimony of Hippocrates who says: ‘I will give to no one an abortive’; moreover, because it is the specific task of medicine to guard and preserve what has been engendered by nature. The other party prescribes abortives, but with discrimination, that is, they do not prescribe them when a person wishes to destroy the embryo because of adultery or out of consideration of youthful beauty; but only to prevent subsequent danger in parturition if the uterus is small and not capable of accommodating the complete development, or if the uterus at its orifice has knobbly swellings and fissures, or if some similar difficulty is involved. And they say the same about contraceptives as well, and we too agree with them. And since it is safer to prevent conception from taking place than to destroy the fetus, we shall now first discourse upon such prevention.

61. For if it is much more advantageous not to conceive than to destroy the embryo, one must consequently beware of having sexual intercourse at those periods which we said were suitable for conception. And during the sexual act, at the critical moment of coitus when the man is about to discharge the seed, the women must hold her breath and draw herself away a little, so that the seed may not be hurled too deep into the cavity of the uterus. And getting up immediately and squatting down, she should induce sneezing and carefully wipe the vagina all round; she might even drink something cold. It also aids in preventing conception to smear the orifice of the uterus all over before with old olive oil or honey or cedar resin or juice of the balsam tree, alone or together with white lead; or with a moist cerate containing myrtle oil and white lead; or before the act with moist alum or with galbanum together with wine; or to put a lock of fine wool into the orifice of the uterus; or, before sexual relations to use vaginal suppositories which have the power to contract and condense. For such of these things as are styptic, clogging and cooling cause the orifice of the uterus to shut before the time of coitus and do not let the seed pass into its fundus. (Such, however, as are hot) and irritating not only do not allow the seed of the man to remain in the cavity of the uterus, but draw forth as well another fluid from it”.

He follows here with a vast collection of plant recipes, and many others, such as honey and oils which have been previously recorded by earlier writers, and instructions on abortion. Soranos thus distinguished between contraceptives and abortifacients and mentioned the indications and contraindications for their use. Although he included ineffective potions, his main reliance was upon rational methods—an elaborate array of occlusive pessaries of various types; vaginal plugs of wool, and of gummy substances; astringent solutions to contract the os, and make impregnation less likely; and native acidic fruits. He considered that



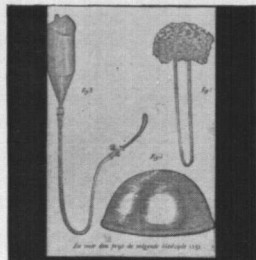
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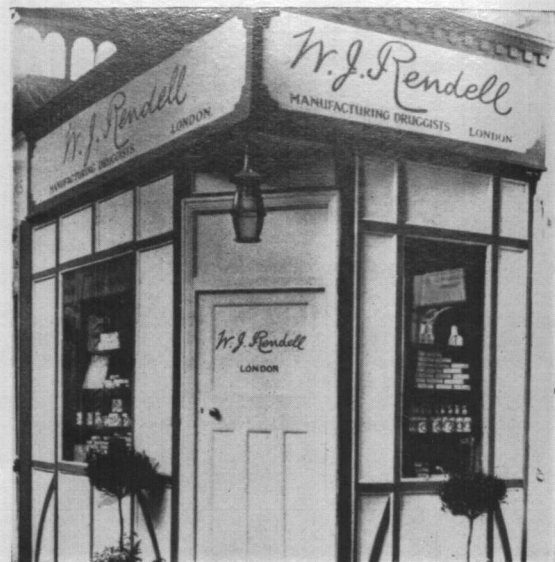
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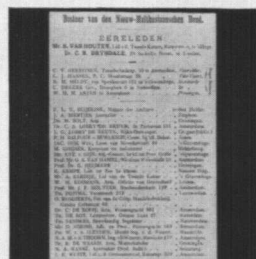
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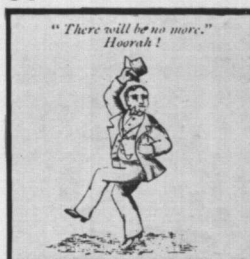
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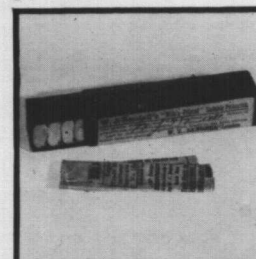
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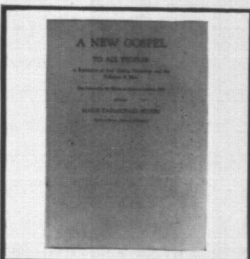
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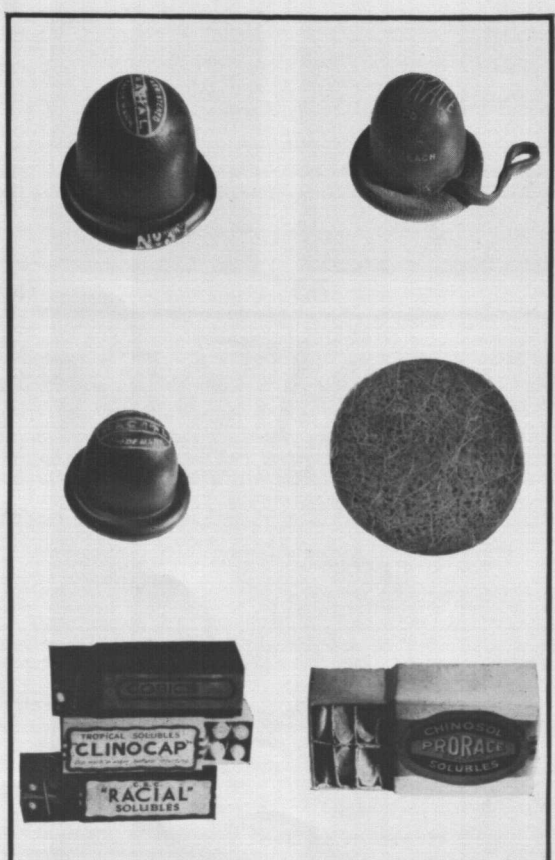
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potions were dangerous, and warned against their use, and he discouraged the use of amulets, in which he had no faith.

It is also interesting to note that he mentioned "that people should abstain from coitus at the times we have indicated as especially dangerous, that is the time directly before and after menstruation". This could be the beginning of the safe period superstitions.

So impressed with the work of Soranos was the Late Professor Norman E. Himes (1899–1949) that he dedicated his great book on the "Medical History of Contraception" to Soranos of Ephesus.

Antoninus Liberalis Second Century A.D.

The "Metamorphoses" of Antoninus Liberalis contains the story of Minos and Pasiphae. Minos was King of Crete, and his semen was said to contain serpents and scorpions, and all the women with whom he cohabited were injured. He married Pasiphae, a daughter of the King of the Sun, who was immune to this infection, yet the union was sterile.

A remedy was finally found. The bladder of a goat was slipped into the vagina of a woman, and into this bladder Minos cast his serpent-bearing semen. Then he went to find Pasiphae and co-habited with her. Eight children were subsequently born to them in this manner.

There has been some discussion as to whether this story illustrates the use of the female sheath, or whether Liberalis had the facts wrong, and King Minos was using a male contraceptive. It is certainly possible that the Romans had a knowledge of the use of animal membranes as condoms, though there is little evidence to prove it.

The cave paintings at Combarelles, in the Dordogne area of France are said to show the early use of the condom. These ancient paintings include drawings of men and women, and sexual organs. One picture is said to show a man and woman engaged in the act of coitus, and the man's penis appears to be covered.

Aetios of Amida Sixth Century A.D.

Aetios of Amida was physician at the Byzantine court during the reign of Justinian I (527–565). He wrote a medical encyclopaedia—"On Medicine, in sixteen books or discourses" which has two chapters on contraceptive technique. For the greater part, this account is very similar to that of Soranos, although he does differ in some suggestions, and includes the use of amulets, in which Soranos had no faith. Near the end of this account, he mentions the use of vinegar and brine, for washing the genitals prior to coitus. Both of these substances are highly spermicidal, and so far as is known, vinegar is not mentioned again in the literature until Charles Knowlton recommended it as a douche in 1832.

India

The great Vedic erotic lyrics originated in very early times, the "Kama Sutra" of Vatsyayana Mallanga appeared in the fourth century. This is a treatise on love, and was followed by a body of imitative writings. Through these works, a knowledge of erotics and a crude knowledge of contraception was spread. These writings appeared from the fourth century to the sixteenth century approximately, and the ideas about contraception vary very little in substance from those from other cultures, already mentioned. They include herbal medicines to be taken by women; the belief that passiveness during coitus would prevent conception; various amulets, and vaginal fumigation with neem wood; vaginal medications of rock salt and oil; and tampons of ground ajowan seed; and honey and oil used to anoint the genitals.

Coitus obstructus was also recommended. Sometimes this was to be practised by magical means, but also "by firmly pressing the finger on the forepart of the testicle, and turning his mind to other things, and holding his breath whilst doing so, a too rapid ejaculation will be prevented".

China

The earliest mention of contraception in a Chinese text was from Sun Ssu Mo, who died in A.D. 695.

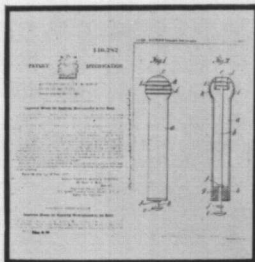
"Take some oil and quicksilver and fry a whole day without stopping. Take one pill as large as a jujube seed on an empty stomach and it will forever prevent one from becoming pregnant—furthermore it will not injure the person". That this recipe would not injure the person is important, since most other Chinese writings consider contraception to be more dangerous and violent than



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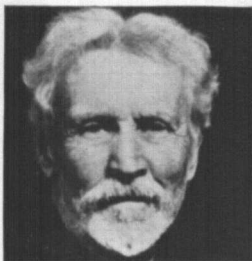
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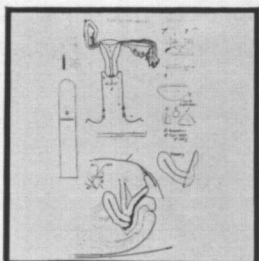
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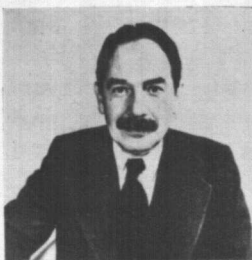
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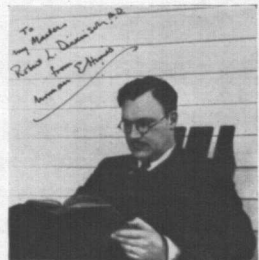
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childbirth. However, it seems very difficult to differentiate between contraception and abortion in these recipes.

Further methods are mentioned by F. A. Wilde, the German gynaecologist, who said that Chinese women desiring freedom from pregnancy burned three moxa balls on the navel. A certain class of priestesses were also permitted to take a solution of white lead.

Islam

The Islamic religion was not in any way opposed to contraception and furthermore it did not regard the foetus as human until it had reached a distinctly human form, therefore abortion was not forbidden either. The influence of Greek culture on Islam is well known, and some work of distinction was produced.

Rhazes, d. A.D. 923–4

Among the earliest of the Islamic writers is Al-Razi, known as Rhazes who lived at Ray, near Tehran, and also in Baghdad. His book, "The Quintessence of Experience" contains a chapter which gives a selection of contraceptive methods. Coitus interruptus heads the list, a method mentioned in the earliest traditions of the Prophet, and probably the most frequently mentioned in Islamic medical writings. His second method is "to prevent ejaculation—a method used by some" and the third suggestion is to apply some drug, which blocks the uterine aperture, or which expels the semen and prevents conception. These are to be used before coitus and consist of:

"Pills or pessaries made of cabbage, colocynth pulp, bryony, iron scoria, tamarisk dew, pitch, ox gall, the inner skin of a pomegranate, animal's ear wax, the ? of a mulberry bush, elephant dung, scammony and whitewash, either used alone or in combination".

He further suggests various exercises useful in expelling the semen, and drugs which may be applied for this purpose, including sugar candy and sal ammoniac. In case of failure, he ends with a selection of methods for procuring an abortion.

Avicenna A.D. 980–1027

The most venerated of the Islamic writers was Ibn Sina or Avicenna. He was born near Bukhara and died in West Africa at Hamadhan. He has been called the most famous scientist of Islam, and his work the climax of medieval philosophy. His great work, the "Canon" is said to have been supreme for six centuries. It contains some twenty contraceptive recipes, one of which is "to avoid the time of coition which favours conception"—though he does not indicate when he believes this to be.

He also mentions coitus interruptus, suppositories—although the contents of the latter differ a little from Al-Razi's list; and jumping seven or nine times. The numbers seven and nine were both considered to have magical properties, and jumping forward was believed to cause the sperm to remain, whilst jumping backwards was believed to cause its expulsion. Fumigation and the use of oil for anointing the genitals are also mentioned.

The pessaries were to be inserted after menstruation, and possibly the women went about with them in situ for days at a time. Coitus was, and is, forbidden by both Jewish and Islamic religions during menstruation. This instruction to insert the pessary after menstruation is followed by those physicians who advise women to insert modern diaphragms and caps each night as a regular part of the toilet. The woman is then more likely to become psychologically adjusted to the procedure, and to be continuously protected.

Other Islamic writers make interesting points, but in general, their recommendations differ little from those of Rhazes and Avicenna. A Persian physician of the tenth century—Ali ibn Abbas is however, of interest in that he was particularly sensitive to the possibility of the misuse of contraceptive knowledge by promiscuous persons, or by midwives, always the advisers of oriental women. He felt that the physician should exercise prudence in imparting such information.

Ibn al-Jami A.D. 1171–1193

"The Book of Right Conduct regarding the supervision of the Soul and Body" by Ibn al-Jami, a Jewish-Egyptian physician, at one time physician-in-ordinary to Saladin (1171–1193) mentions a number of rational and effective techniques, such as medicated tampons and pessaries, and anointing the penis with oil, or onion juice. He then goes on to say that eating beans on an empty stomach causes female sterility. Were this true, many populations would have died out years ago.



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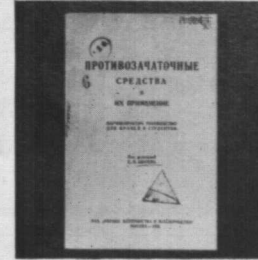
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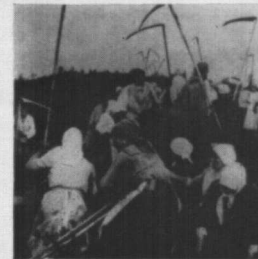
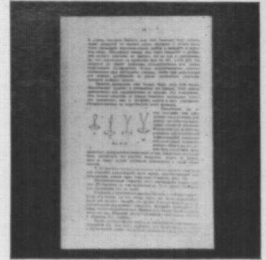
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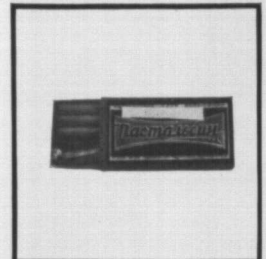
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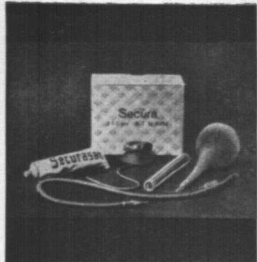
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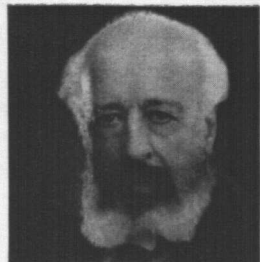
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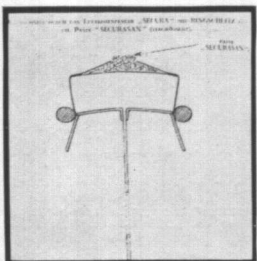
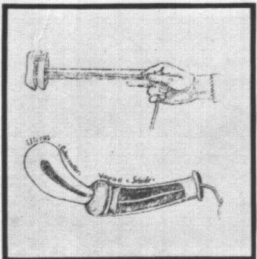
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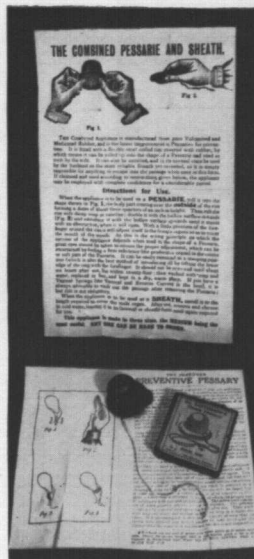
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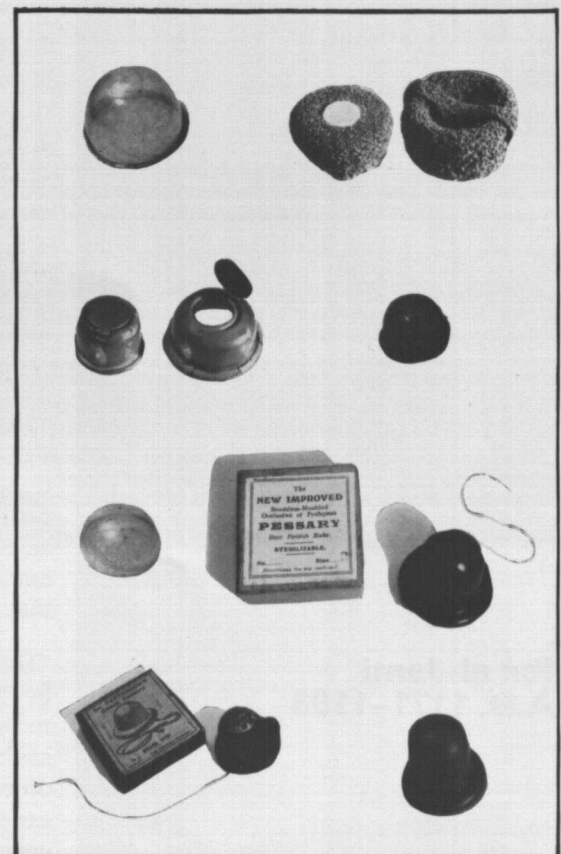
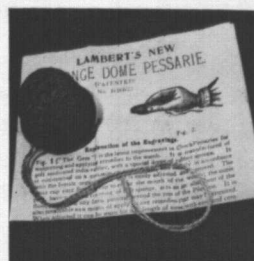
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Islamic medicine is then seen to decline, eventually leading to the use of magic formulae, numbers, amulets, and less and less rational methods, apart from when they followed some other authority such as Dioscorides who was the subject of intense study in Moslem Spain.

Medieval Europe

Many writers have said that little or no information on contraception was available in Europe during the Middle Ages. This is hardly likely to be true, since the writings of the Greeks, Romans and Arabs were all available if nothing else. The "Canon" of Avicenna was translated into Latin at Toledo in the twelfth century and at least 15 incunabular editions survive—proof that it must have been a highly popular book. European physicians learned their art from Avicenna, and so possessed the contraceptive knowledge of the classical world. In the Prologue to the "Canterbury Tales" Chaucer lists sources in which his physician was well versed. These were Aesculapius, Hippocrates, Avicenna, Averroes, Bernard Gordon, John of Gaddesden and Gilbertine—about half of these were notable for their chapters on contraception.

Chaucer c. 1400

The writings of the middle ages are sometimes difficult to follow, and where references occur they are usually ambiguous, and could refer to abortion, unnatural intercourse or contraception. Nevertheless, Chaucer, whose "Canterbury Tales" was the most important literary work of the era, dealt with the whole subject very bluntly.

"Eek whan man destourbeth concepcioun of a child, and maketh a womman outhur bareyne by drynkyge venenouse herbes thurgh which she may nat conceyve, or sleeth a child by drynkes wilfully, or elles putteth certeine material thynges in hire secree places to slee the child, or elles dooth unkyndely synne, by which man or womman shedeth hire nature in manere or in place ther as a child may nat be conceived, or elles if a woman have conceyved, and hurt hirself and sleeth the child, yet it is homycide".

Which roughly translated is:

"When one prevents conception of a child, and makes a woman sterile, either by drinking poisonous herbs after which she may not conceive, or when one drinks an abortifacient, or uses instruments to bring about an abortion and kill the child, or when unnatural intercourse is practised, either coitus interruptus or anal coitus, or if a pregnant woman in any way hurts herself and kills the child, it is still homicide".

Albert the Great 1206-1280

Albert the Great was a Dominican philosopher, teacher, and theologian whose writings on contraception allude to magical methods which include spitting three times into the mouth of a frog, and eating bees, and for this reason he has been passed lightly. But he did have further understanding, much of which was derived from Avicenna. Albert described conception in Aristotelian terms, and then considered the causes of sterility which form the most interesting part of his writings, since they give an account of the accomplishment of contraception—for he sets out a theory from which specific contraceptives may be derived. The way in which this information is given is by listing the causes of sterility, which include physical defects, the wrong position for intercourse, directed urination afterwards, anaphrodisiacs, and recipes previously mentioned as contraceptives. It is acceptable that he could have regarded such things as the wrong position, or the failure to achieve "simultaneous emission" as unintentional causes of sterility—but he would hardly have thought that directed urination and the uses of herbs were employed for any reason other than contraceptive. Others reading this theory could deduce from it the way to use specific contraceptives.

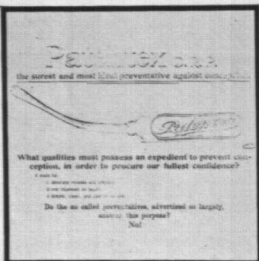
Arnold of Villanova 1238-1311

Arnold of Villanova, a Catalan physician did not distinguish anaphrodisiacs from the contraceptive uses of herbs, and produced a list—all of which: "Cut off the libido, prevent impregnation, diminish milk and menses".

He revived the ancient idea that animals which are sterile, such as the mule, are in some way connected with human fertility. These recipes are magical, and include fumigating the vulva with the smoke resulting from holding a mule's hoof over burning prunes. These magical methods, however, come from a Breviary possibly by an earlier writer, but attributed to Arnold. Also included are Avicenna's



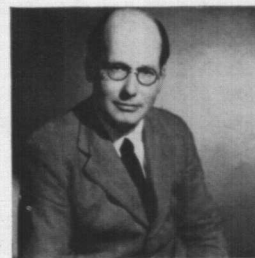
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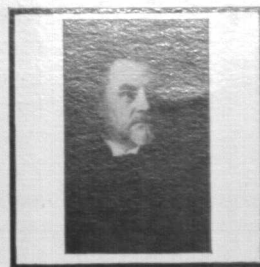
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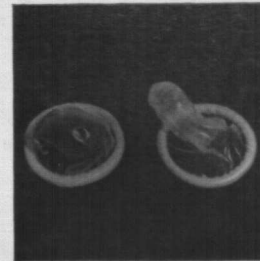
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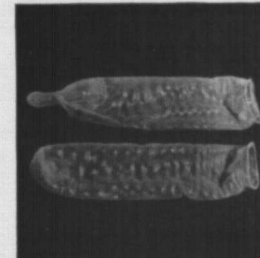
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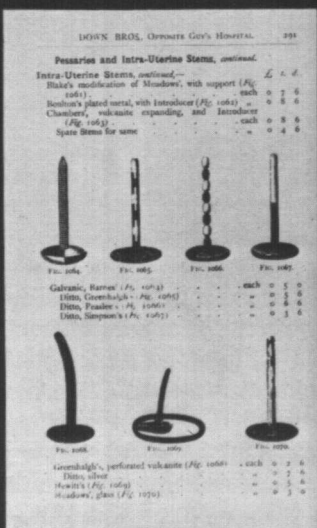
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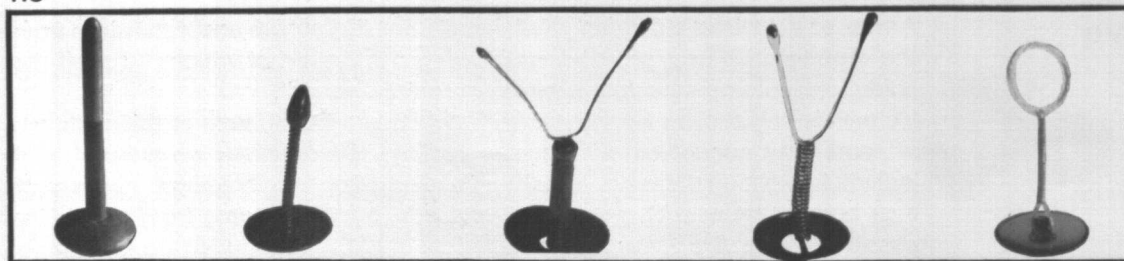
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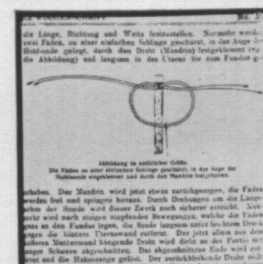
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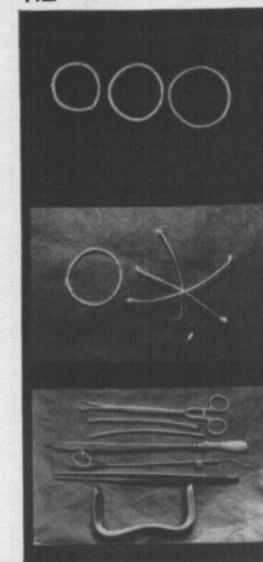
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pessary of elephant dung, and potions of "iron dross" which go back to Soranos and Dioscorides.

Most of the information given by other writers at the time is little different in content from the examples already quoted, though a further insight into the practices in use may be gained from Frater Rudolphus' "*Liber de Officio Cherubyn*", in this the writer, feeling that the superstitious customs circulating jeopardize the people, urges the priests to root out such superstitions. This manuscript dates from the fourteenth century.

"Those who desire to prevent birth and conception do a great many fantastic things. When they sit or lie down they sometimes put a number of fingers under them, thinking they will be free from conception as many years as they put fingers under them. A substance which they call their 'flower' they place in an elder tree, saying 'You will bear for me and I will bloom for you' ".

The writer seems to know that this sort of sympathetic magic was not going to achieve the desired aim, and added :

"And yet the tree blooms, and the woman bears children with pain. Some of this 'flower' they throw away, in order not to conceive. Some of it they likewise give in water to a dog, a pig, or a fish in order that they (the women) may not conceive".

The priests cannot have had much success in rooting out these superstitions for they persisted until relatively modern times.

The practice of coitus interruptus continued and was mentioned in the Abbe de Brantôme's description of sixteenth century court life "*La Vie des Dames Galantes*". He also stated that "Proper means against pregnancy was known to the apothecaries, and that they helped to shield unmarried girls".

Fallopian 1564

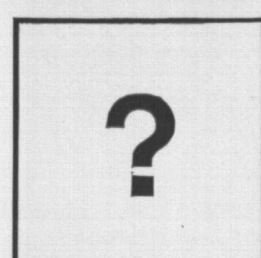
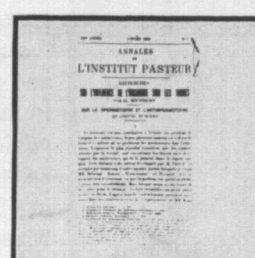
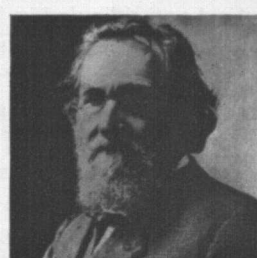
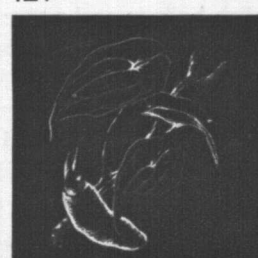
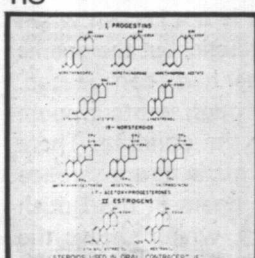
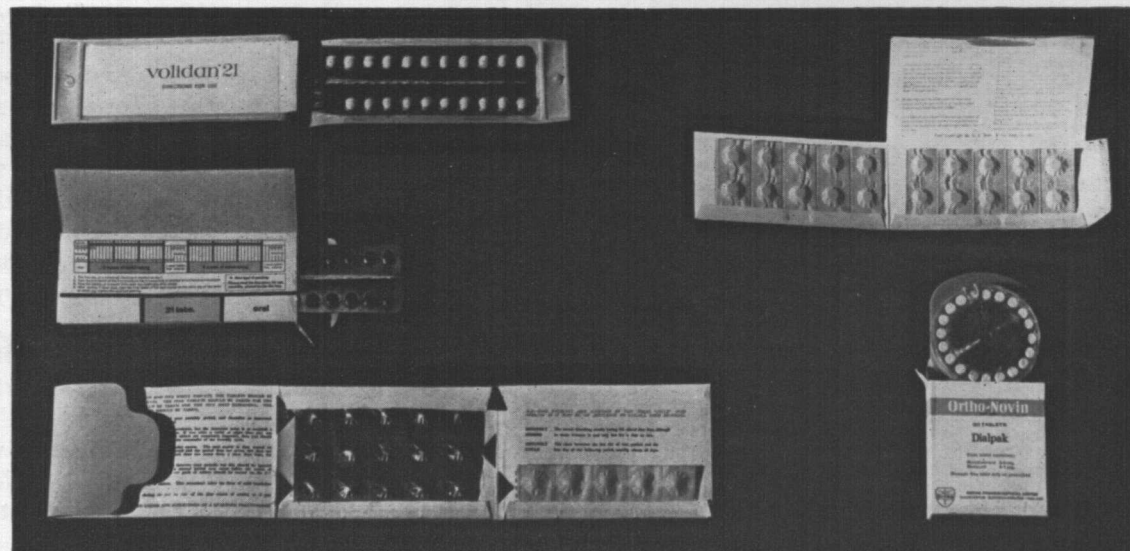
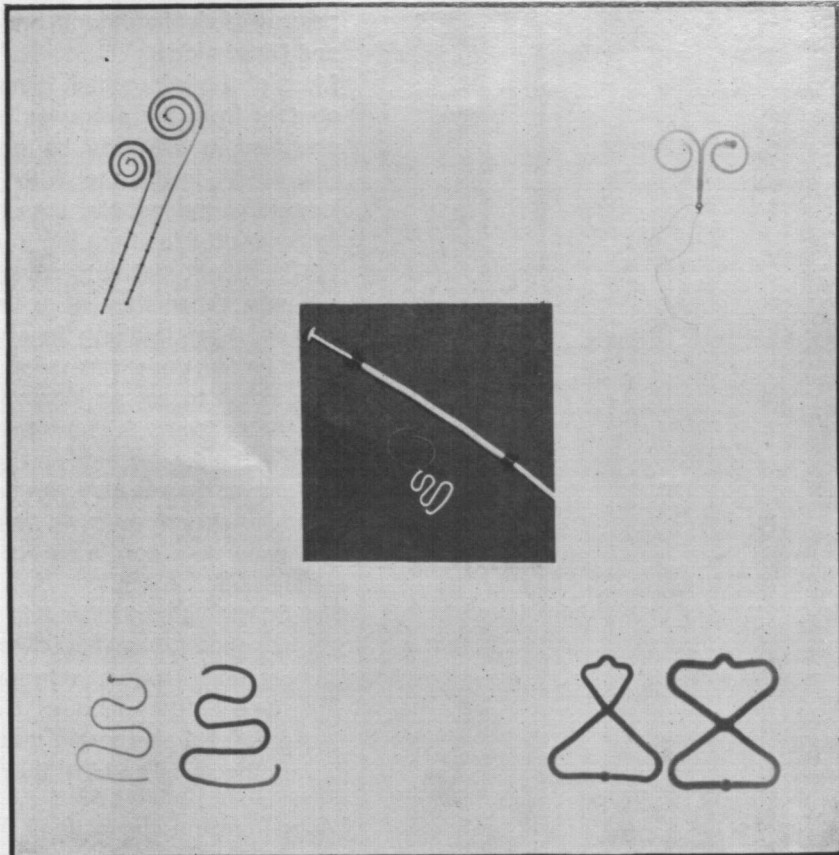
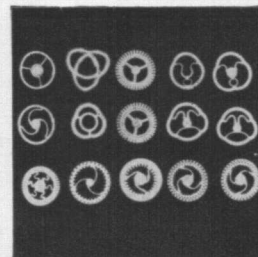
Apart from the suggestions that the condom may have been used in Ancient Rome, the first known published description of the condom is found in the work of the great Italian anatomist, Gabriele Fallopian. The sheath made of linen, was cut to the shape of the glans. Fallopian claims to have invented it to guard against syphilis. He says that he tried this method on eleven hundred men, and that none of them became infected. The reference may be found in "*De Morbo Gallico Liber Absolutismus*", chapter 89, "*De Praeservatione a carie Gallica*", published two years after the death of the author. Hercules Saxonia described a prophylactic sheath in his work "*Luis venereae Perfectissimus Tractatus*". He attributed the invention to Fallopian, and said that the sheath should be soaked in a solution, several times, and allowed to dry in the shade.

The origin of the contraceptive sheath is unknown, unless one accepts Fallopian's claim to have invented it. It has been suggested that some medieval slaughter-house worker had the idea that the thin membranes of an animal would protect him from infection. This kind of theory fits the trial and error way of acquiring knowledge and was how early methods were discovered.

The origin of the name "Condom" is also unknown, though stories and theories abound. The first known mention of the word was in "A Scots answer to a British Vision" a poem probably written by John Hamilton, Lord Belhaven, in 1706. One of the favourite theories is that it was called after its inventor Condom or Conton, or something similar, who was at the court of Charles II. In some versions of the story he was a doctor, in others a Colonel, and Charles II having a large number of illegitimate children was so delighted with this invention, that he conferred a Knighthood on the inventor. Such notoriety came to him, that he was forced to change his name. This is a nice story, but generally considered to hold little truth.

Certainly both the name and the device became well known very rapidly, and were praised and ridiculed in English ballads and poems. It is not known when the condom was used as a contraceptive rather than a prophylactic, but the poems and quasi-erotic literature of the 1700s suggest that the former had been realised. In the 1720s, White Kennet, son of the Bishop of Peterborough wrote a poem rejoicing on the liberation of young women achieved by the condom. There seem to have been various versions of this poem but the last made its appearance in 1744, under the title "The Machine". The copy of this poem in the British Museum is particularly interesting as it has a frontispiece, which shows the manufacture and sale of condoms.

Hercules Saxonia 1597



Condom shops had appeared at this time and in a play, attributed to William Burnaby, it is suggested that there may have been one as early as 1701. By 1766 there were several which were producing handbills and advertisements. A caricature of 1773 shows an auction in progress and among the articles for disposal are "a quantity of articles in Mrs. Phillip's way, not the least the worse for wear". The eighteenth century purveyors of condoms included at least two ladies by the name of Phillips.

Apart from linen condoms, there were those made of "an extraordinary fine thin substance, and contrived to be all in one piece, and without a seam, only about the bottom it is generally bound round with a scarlet ribbon for ornament".

This quotation is from "A New Description of Merryland", which dates from 1740, and the substance was often the dried gut of a sheep.

A description of the manufacturing process appears in "Gray's Supplement to the Pharmacopoeia" of 1828, and the method of manufacture cannot have varied from the 1700s.

The gut was soaked in water for several hours, turned inside out, macerated again in weak alkaline ley (changed every 12 hours), scraped carefully to abstract the mucous membrane, leaving the peritoneal and muscular coats, exposed to the vapour of burning brimstone, and washed in soap and water. They were then blown up, dried, cut to seven or eight inch lengths, and bordered at the open end with a riband.

The sheath was known to many writers and novelists. Boswell was conversant with its use and describes himself as "in complete armour" and "safely sheathed". Madame de Sévigné (1626–1696) mentioned sheaths of gold-beaters skin, in a letter to her daughter. She described them as "armor against enjoyment, and a spider web against danger".

Casanova 1725–1798

Casanova seems to have been more satisfied than Madame de Sévigné. He used them not only to prevent infection, but to prevent impregnating his women. He seems moreover, to have tested them, by inflating them with air. He referred to them by various names: "Redingote Anglaise" (English Riding Coat), "Un vetement Anglais qui met l'ame en repos" (The English vestment that puts one's mind at rest), "Calottes d'assurances" (Assurance caps) and also "preservatives that the English have invented to put the fair sex under shelter from all fear".

His only complaint was "I do not care to shut myself up in a piece of dead skin to prove that I am perfectly alive". Casanova's knowledge of contraception was wider than just the sheath. He also described what sounds like a block pessary. This was a gold ball, and was used intra-vaginally. Casanova reports that he bought three such balls from a Geneva goldsmith, and that they served him well for 15 years. The balls were to be soaked in an alkaline solution before use, as this was believed to give them antipathetic power. As gold is one of the most inert of metals it could hardly have had any chemical effect, but it could have acted in a mechanical way though it would be liable to slip out because of its weight.

Block pessaries were used in America, and were described by Dr. Annette Konikow in 1931 as a "curiosity".

Casanova reported the use of lemon to detect infection in women. The lemon juice would cause any sore or raw surface to smart. He also knew that half a lemon with the juice extracted made a passable cap.

The Jewish practice of taking "a cup of roots" had certainly not died out. An Italian Rabbi, Isaak Lampronti (1679–1776) reported that when medically indicated the Jewish physicians administer the "Trifera" or other medicines to Jewish women, to sterilize them, and to prevent them from conceiving.

Early factors affecting the development of Spermicides. 1677

The development of spermicides really began with the work of Anthony van Leeuwenhoek, who discovered what he called "Animalcula" in semen. Before this important discovery previous methods were very much a hit and miss affair, but work now became more systematic.

In 1678 Leeuwenhoek observed that the dilution of dog semen with rain water deprived the canine animalculi of motion.

1776

Spallanzani discovered that if sperm were retained by a filter, the filtrate was incapable of fertilising an ova. He is said to have practised artificial insemination,

and made a further important discovery. When the pH of a solution of semen was lowered by the addition of vinegar sperms were inactivated.

There were other workers, but the outstandingly important contributions date from the 1850s.

1850

Quatrefages described in great detail the toxicity of salts of heavy metals such as copper, mercury and lead to spermatozoa.

1853

Newport observed the "narcotizing" influence of chloroform vapours on the amphibian spermatozoa and stated "that the spermatozoa does not impregnate when entirely deprived of its power of motion by narcotization and disenabled to penetrate into the envelope of the egg".

1856

Kolliker did many experiments in this field and some are written in his paper "Physiologische Studien über die Samenflüssigkeit" which includes numerous findings on the dilution effect and on the toxic action of various inorganic ions as well as certain organic substances. He noted that cyanide is not always an inhibitor of sperm motility. This somewhat unexpected behaviour of cyanide arises from the fact that cyanide can, if used in appropriate concentrations, inhibit cellular respiration without affecting glycolysis, and it is therefore not surprising that the elimination of only one of these two metabolic processes does not entirely involve a complete sperm standstill.

He also discovered that sodium hydroxide activates immobile dog sperm, which was the first systematic study of the effect of pure chemicals on sperm. He was hampered by a lack of knowledge of osmotic pressure, but nevertheless it was a systematic attempt to discover factors affecting the motility of sperm.

The Influence of the Early English Propagandists

Although concerned here with the scientific and medical aspects of the development of contraception, the way in which others, the propagandists, often lay enthusiasts, influenced the development cannot be ignored.

A recent example appears in Gregory Pincus's book "The Control of Fertility" where he describes a visit from Margaret Sanger in 1951 when she expressed the hope that laboratory research might lead to the development of a simple and effective method of contraception.

Though medical discussion on contraception is very ancient, it was not until the late 1700s and early 1800s that a new discussion on the economic and social justification for contraception evolved. This brought in its wake the first "Campaign to educate and inform the masses".

At this time it was beginning to be appreciated that if family limitation were practised for a long period, the social and economic advantages would be enormous.

Jeremy Bentham 1797

Jeremy Bentham advocated the use of the sponge method to reduce the poor rates as early as 1797. He wrote:

"Rates are encroaching this, You . . . are, I think, for limiting them . . . but how? —Not by a prohibitory act . . . not by a dead letter, but by a living body: a body which, to stay the plague would . . . throw itself into the gap; yet not . . . be swallowed up in it. When I speak of limitation, do not suppose that limitation would content me. My Reverend friend, hurried away by the torrent of his own eloquence . . . let drop something about a sponge. I too have my sponge; but that a slow one, and not quite so rough a one. Mine goes, I promise you, into the fire, the instant you can shew me that a single particle of necessity is deprived by it of relief".

Himes who discovered this passage suggests this interpretation: by "dead letter" he thought Bentham meant the condom. He considered Bentham was saying that although the use of the sponge (a body which could throw itself into the gap) would be a slow remedy for wide-spread pauperism, it would not be such a strain on human nature as abstinence (a prohibitory act). In the last sentence Bentham is willing to discard his remedy as soon as any one can prove to him that there are other and better ways or reducing poverty.

Bentham's "Reverend friend" who told him about the sponge was the Reverend Joseph Townsend (1739–1816), who was a Methodist rector, geologist,

utilitarian, author, and a literary collaborator of Bentham's. He travelled widely in France, where presumably he acquired his knowledge of the sponge as a contraceptive.

Bentham, although remaining in the background, was concerned with the birth control movement and assisted Richard Carlile.

Thomas Malthus 1798

The movement also received a stimulus, the nature of which is often misunderstood, from the Reverend Thomas Robert Malthus. His theory was that population tends to multiply faster than the means of subsistence, and that the only means of adjusting population to the amount of food available are vice and misery. This pessimistic theory had been put forth several times previously. It is ironical that Birth Control should have been called "Malthusianism", for Malthus was too devout an upholder of traditional morality to offer anyone a way of enjoying sexual pleasure without incurring penalties!

The use of the term "Birth Control" is quite misleading in connection with Malthus, for in his essay he was attempting to refute other doctrines, and show that poverty was inevitable, and that it was absurd to provide relief for the poor, who could never obtain higher living standards. He was hated by the working people, for they understood his purpose was to exalt the rich and debase the poor, and they knew that his arguments were used by landowners as an excuse for clearing the estates of peasants.

For these reasons he was an easy target for Francis Place. Malthus repudiated artificial checks of any kind, advising only moral restraint. By this he is said to mean restraint from marriage, not within it. Place criticised this doctrine, and put forth his arguments in favour of the "preventive check". Malthus, himself father of only three children, made no reply to this, but continued to advocate his old remedy. To Himes, this was "his supreme failure as a social philosopher".

Francis Place and Richard Carlile

Place can be regarded as the first person to start a campaign to educate and inform the masses. He called the attention of influential people to the need for contraceptive instruction, and conducted a "grassroots" campaign, distributing handbills. There were three different editions and they came to be called "The Diabolical Handbills".

The first version of the handbills suggested the sponge and coitus interruptus, and the second and third editions only the sponge. An unpublished draft, in Place's handwriting, for a new version of the handbill contained the further information that lint, fine wool, cotton, flax or "whatever may be at hand" could be used as alternatives to the sponge. This campaign was given further impetus by the activities of Richard Carlile. For some time, Carlile himself was not convinced that contraception was at all wise, but once convinced he printed an article in the "Republican" entitled "What is Love?" in which he quoted the third version of the "Diabolical Handbill" in full, and observed that there was nothing improper in its content, and indeed, that the sponsors of the handbill were all elderly men, fathers themselves, and of good moral character. The article was re-edited and appeared as "Every Woman's Book" although in the book the handbill was omitted and in its place, various instances were cited such as the "Prudent English Duchess" (unnamed) who "never goes out to dinner without being prepared with the sponge".

This version recommended the sponge, condom and coitus interruptus.

The Campaign was not without opposition, and there are conflicting reports of its success. The Handbills and "Every Woman's Book" enjoyed a wide circulation, from London to the North of England, but they were mainly addressed to the working class, and it is quite certain that they did not reach the top social classes. In 1841, Queen Victoria wrote to her favourite uncle:

"I think dearest Uncle, you cannot really wish me to be the 'Mamma d'une nombreuse famille' for I think you will see with me the great inconvenience a large family would be to us all, 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 very often".

Poor Queen Victoria! She had to suffer the "hardship and inconvenience" nine times in seventeen years.

Eccentric ideas

During the 1800s many people advocated remedies for the relief of poverty, which we would now consider highly eccentric. Among these was infanticide, which was mentioned by William Godwin in 1801, in a reply to Malthus. He reasoned that this was far more humane than sentencing the child to a life of poverty and vice. The idea was seriously put forward in 1838 by "Marcus" (his identity is unknown). He proposed that babies after the third child born to a family should be killed, and further, that of all third children, three out of four, chosen by lot should also be killed. The children were to be gassed during their first sleep, and buried in ornamental gardens, which were to be places of joy and so lovely that women would spend their pregnancy and confinement happy at the thought of enlarging and embellishing the "Infants' Paradise".

Another strange idea was put forward by C. A. Weinhold, a German Malthusian, who thought that male infibulation should be carried out on certain classes of men. This operation which was known to the Romans, was done by drawing the foreskin forward, clear of the glans, boring two holes through it, top and bottom, and inserting a ring, the ends of which were soldered together and sealed. Weinhold worked out a gruesome system of punishments for any who dared break the ring. The categories to submit to this operation were drawn up, and consisted of most of the working class, and all batchelors 14–30 years old having insufficient income to support a family. Those who had insufficient means for a family at thirty were to go on wearing the ring until they could afford one.

Thomas Ewell, M.D., of the United States Navy, held that coition could only be fruitful if oxygen were present. In coition, it seemed to him, oxygen was protruded into the uterus by the penis—an organ which he saw as admirably shaped for the purpose. He thought that negroes were particularly fertile due to their habit of copulating in the open air, and thought that conception was less likely to take place in the morning in bed, as the air inside the bed became foul during the night, and held less oxygen. He therefore announced that embracing only in vessels filled with carbonic acid or azotic gas (nitrogen) would prevent conception. The community founded by John Humphrey Noyes, known as the Oneida Community, after the place in New York where it moved seven years after its foundation had a system of communal possessions and complex marriage, and every man belonging to the community was the husband of every woman. With the purpose of biologically improving the "stock" Noyes, or a committee, arranged matings among the members, a system which they called "stirpi-culture". In the early days of this system (1869–1879), piety seems to have been the main basis for selection, later, health and intelligence were emphasised but they were never the main or exclusive basis. The Community practised an interesting form of contraception, male continence, which consists of normal coitus without male ejaculation. Detumescence takes place within the vagina. This method was later taken up by various others, and was known under many names—Karezza, Magnetation control, Zugassent's discovery, or coitus reservatus. After various upheavals, the community was abandoned. Noyes stood for controlled fertility, the sexual rights of women, and scientific human reproduction—ideas unheard of, in his time. Odd though it all may have been, Oneida had a low rate of infant and general mortality. Nervous diseases were also far below the national average.

It is not generally known that coitus reservatus is acceptable to the Roman Catholic Church.

Japan 1827

A Japanese erotic book appeared, giving the following description :

"Kawagata ; it is also called Kyotai. Such a Kyotai is made of thin leather, and foreigners call it Ryurusakku. This is an object which prevents the male semen from entering the vagina, thus preventing conception".

Apart from this, there are reports of "kabutogata" a condom made from tortoise-shell, or horn. One may well share the difficulty of writers in imagining such instruments being used at all widely.

The rubber condom is thought to have been introduced in Japan in the 1870's. Other methods employed in Japan were "Mogusa"—or burning balls, which seem to be the same as the "Moxa" used by the Chinese. They also used herbal

potions, of doubtful value. Bamboo tissue paper tampons called "Misugami" were used, a practice attributed to prostitutes. The evidence here is conflicting, since some say that "Misugami" were used for contraceptive purposes, and others say that they were used after coitus, to prevent the clothing from being soiled by semen.

F. A. Wilde 1838

A gynaecological treatise of some importance by F. A. Wilde was published in 1838, in which he discussed indications for contraception at some length. He then turned to methods, and reported some magical and ineffective potions he had heard of, including the Chinese "Moxa". He discussed the condom, sponge, withdrawal, and the cap.

The condom, he stated, tears too easily, and is therefore unsatisfactory. Rubber condoms would hardly have been available as yet, and he may have had experience of some poor grade products.

Withdrawal was unsatisfactory, and the sponge was insufficiently reliable. He therefore recommended that persons in need of contraceptive protection should wear a rubber pessary, which has no opening, and completely covers the os; fits snugly; and is taken off only during menstruation. In order that such a cap should fit every individual case, it should be made from a wax impression of the parts.

This method would be less troublesome than any other, and would be comfortable and effective. In support of this, he cites the use of the cap in rural areas, quoting a report that some of the farming families had only two or three children, and the reason was finally traced back to a midwife, who possessed the secret of placing a foreign body in front of the os, which occluded the entrance. Many have thought that Wilde devised some kind of diaphragm, but it was a cervical cap.

The Rhythm Method

Apart from male continence, the Roman Catholic Church accepts the use of the sterile period as a method of contraception. The idea that there is a sterile period comes from antiquity, it was mentioned by the Greeks, the Manichees—it was mentioned by St. Augustine, and was generally accepted by physicians. It was always thought that the time most likely for conception to take place was the days preceding the following menstruation, now known to be quite incorrect.

During the mid-nineteenth century many workers investigated spontaneous ovulation in animals, and as a result of their findings adopted the theory that in humans, as in many animals the ovulation coincides with menstruation, (menstruation therefore being mistakenly identified as identical to the "heat" period in animals).

In 1845, Felix Archimedes Pouchet won the prize for experimental physiology of the French Academy of Sciences with a report "*Théorie positive de l'ovulation spontanée et de la fécondation des mammifères et de l'espece humaine, basés sur l'observation de toute la série animale*" in which he stated, on the basis of his observations of animals, that conception in all mammals occurred only during menstruation, and one to twelve days after menstruation.

This in theory is clearly incorrect, but was adopted by couples in France, and advertisements appeared in America offering the secrets of the new method based on the discoveries of French doctors.

Some doctors and research workers, however, had other ideas, and considered that perhaps human ovulation was somewhat different from the process observed in lower animals. The London Medical Gazette of 1849 included a paper by Henry Oldham, Obstetric physician and lecturer of midwifery at Guy's Hospital. The subject of this lecture was "Induction of abortion in a case of contracted vagina from cicatrization"—and in the midst of describing his case Dr. Oldham says:

"You see, too, in the history of this impregnation another fact, that its DATE IS FIXED. Now I have taken some pains to be quite sure on this point: and I am well informed that the last day of her last menstrual period was the 16th January—that sexual intercourse occurred on the 28th of January—that it had not taken place for several weeks before, and she has not been repeated since, and consequently she was impregnated twelve days after menstruation. This has an important experimental reference to the modern theory of generation, which makes the menstrual period correspond with oestruation in the

lower animals, and limits the period of conception to a day or two before, and about eight days after the flux. During this time it is affirmed that an ovum has been spontaneously cast off from the ovary, and during the slow movement through the sexual passages, that it may be impregnated; but should it not be impregnated then the female cannot conceive until a day or two before the next menstrual or oestral time. The physical impossibility of pregnancy during this interval is not blinked by the supporters of this theory. You see if this were true that it would have a most practical bearing. It constantly happens that cases come before us where either from disease of the uterus or pelvis, or sexual organs, or exhaustion from frequent abortions or protracted labours—that it would be most desirable to suspend for a time or altogether prevent pregnancy. And this might be done were this really a physiological law, and without imposing much greater restraint on sexual indulgence than does the old Rabbinical law. But the truth is, that this theory has been prematurely shaped into a law, and it will not, I am sure, bear a practical test. I know of cases, which I have carefully inquired into, where impregnation occurred at the respective times of ten days, twelve days and twenty-one days after the monthly periods; and while, on the one hand, I am ready to admit a greater disposition to impregnation shortly after a menstrual period, yet I know no facts to disprove the opinion that the human female is susceptible of impregnation at any time between her monthly periods. Look at an ovary, when you know that a fecundated ovum has been cast out from a Graafian follicle, and no matter when you examine it—whether a few days, or a few months after its dehiscence—there is no sure sign of its escape in the presence of a corpus luteum. Nothing can be more distinct or characteristic than this. And when ova have been detached at the oestrus of the lower animals, without sexual congress, corpora lutea have been seen in no respect differing from the ordinary corpora lutea. But at the so-called oestrus of the human female—at her menstrual time—I am quite convinced that no bodies, such as I know to be corpora lutea are met with. And I infer that no ovum or ova have escaped”.

Which suggests that as far back as 1849, some physicians were aware that the theories were incorrect. We can only wonder what Dr. Oldham's students made of the information.

A French worker, Dr. Avard, of La Rochelle put forward his own theory of ovulation, which differs substantially from any of his predecessors or contemporaries. He states as follows:

“The reproductive cycle is divided into three periods: menorrhagic, genesic and hypnotic. Fertilization cannot occur during the menorrhagic period for physical and physiological reasons. The woman cannot be fertilized except during a few days between menstrual periods, i.e. the genesic period. This begins after the excretory function of menstruation finishes, and generally six to nine days after menstruation. However long the menorrhagic period lasts the genesic period always ends on the fourteenth day after the onset of menstruation.

The hypnotic period then begins, and lasts until the next menstruation, however late that may be. Menstruation is the only way of ending a congestion which in many cases of amenorrhea, dissipates without flow. There is a physiological amenorrhea, that of nursing mothers, and pathological amenorrhea”.

Dr. Avard was not entirely correct either, but it was a step in the right direction. More work was carried out, on discovering when ovulation takes place within the reproductive cycle, and in the 1920s the modern theory of the sterile period was put forward. The work was done by Kyusaku Ogino in Japan, and Hermann Knaus in Austria. The method, known as “Ogino-Knaus” is based on the knowledge that ovulation occurs sixteen to twelve days before the anticipated first day of the next menstrual period.

The influence of Early American Propagandists

The activities of Richard Carlile and Francis Place had indirectly affected the developments elsewhere, and a birth control movement had been initiated in America. This was lead by Robert Dale Owen and Charles Knowlton. Robert Dale Owen was born in Glasgow, in 1801 and went to America at the age of 24. His favourite author was Jeremy Bentham, whom he met, although it is not

Robert Dale Owen and Charles Knowlton

known whether or not they discussed contraception. He did have a copy of "Every Woman's Book"—which he was urged to publish in America, but he refused for several reasons. Some two years later, an attack was launched on him, because he was known to approve of the book, and thus he was baited into writing three articles and a booklet "Moral Physiology" which is largely concerned with social and eugenic arguments for family planning, and early editions recommend coitus interruptus, the condom, and a qualified recommendation of the sponge. The frontispiece, after a painting by Vigneron, shows a poor woman abandoning her baby at the door of a hospital lamenting "Alas! that it should ever have been born".

The other "Father of American Birth Control", Charles Knowlton, M.D., a physician and freethinker from Massachusetts, was the first person to be imprisoned for advocating birth control. In 1832 "Fruits of Philosophy" appeared. This work laid emphasis on douching and chemical methods.

The English and American writers influenced each other and birth control information percolated through, quietly, with some upheavals and prosecutions ensuing when writers were too frank, or their books inexpensive enough to be generally available. Quackery flourished, and tracts appeared mentioning strange remedies.

Eccentric ideas

An example of such quackery, is the work of A. M. Mauriceau, who described himself as a "Professor of the Disease of Women". He produced the "Married Woman's Private Medical Companion"—which quoted much of Robert Dale Owen's book, without crediting Owen at all. Owen was quite prepared to allow others to use his work, but he did like to see in what context, and it seems doubtful that he would have approved of Mauriceau. Mauriceau complained that Owen was unaware of the "Desomauux" method—"A French Secret" for which Mauriceau had the "exclusive distribution agency" at a fee of ten dollars. Desomauux was French, and it seems likely that Mauriceau emigrated to America from France. Since there was this link with France, it would have been possible for Mauriceau to be selling the secret of the sterile period, as put forward by Pouchet *et al.*, but from the descriptions in advertisements, the method sounds as if it involved some kind of chemical, probably as a douche, or suppository. Powders for douching were available in America. The action of the Desomauux secret is described as "to neutralize the fecundating properties in semen . . . " Mauriceau's treatment of these subjects brand him as a quack, and he sold other remedies, including abortifacients (Portuguese Female pills) and Morland's Elixir which was an "infallible cure for sterility—if the case is curable".

First Patent, 28th August, 1846

The first known patent for a contraceptive device was taken out by J. B. Beers, M.D., the patent is American, No. 4729, and is headed "Device for the prevention of conception". Unfortunately at that time it was not the practice to publish a full written specification, sometimes there was only a diagram, and sometimes only a very brief description of the subject matter. In this case, there is a diagram, and a very brief description which read:

"What I claim as my invention is the particular combination of a curved loop attached to a handle by a spring joint, as described, and for the purpose above specified".

How the device was intended to operate is in no way clear.

J. Soule, writing in about 1856, mentioned the following drugs as destroying spermatozoa: Opium, prussic acid, iodine, strychnine, and alcohol. He does not, however, specify how these drugs should be used for this purpose—which could have had some most unfortunate results! He also discussed douches, condoms, the expulsion of semen, and the prevention of ovulation. Sadly, he does not seem to have specified how the latter was to be achieved either.

Anthony Comstock 1844–1915

In the history of contraception Comstock is notable for his bitter persecution of any who tried to spread contraceptive information. He believed that those who advocated contraception, for whatever reason, were literally doing the devil's work, and for 42 years he prevented the free dissemination of information to the American Public. He opposed physicians and radicals who expressed their right to circulate this knowledge. There had always been links between the

birth control and free thought movements, and as he expressed it, in a telling phrase, atheism and obscenity "occupy the same bed". His society--"The New York Society for the Suppression of Vice" from its foundation in 1873 until the end of 1882 was responsible for 700 arrests; 333 sentences of imprisonment, totalling 155 years and 13 days; 65,256 dollars in fines; the seizure of 27,856lbs. of "obscene" books; and 64,836 "articles for immoral use, of rubber etc.". The Comstock Law of 1873 prohibited the distribution of contraceptive information by post, and as special inspector for the Post Office Department Comstock travelled 190,098 miles outside New York city--nearly 60 miles a day for nine years.

Edward Bliss Foote 1829-1906

Edward Bliss Foote, (1829-1906) was the author of several pamphlets on contraception, including one called "Words in Pearl" (pearl referred to the name of the typeface in which it was set). This pamphlet discussed indications for, and methods of contraception. No copy is available now, so we do not know the content; Foote supplied a copy of "Words in Pearl" and was indicted and held in bail for 5,000 dollars. He was tried and found guilty in 1876, and was fined 3,000 dollars, the costs amounting to 5,000 dollars.

Foote's son, Edward Bond Foote, also a strong believer in birth control, claimed that his father invented a rubber cervical cap. There is no evidence to prove this either way. Certainly it is not mentioned in any of Foote's works which are still in existence, but he could have done so in "Words in Pearl" or some other document destroyed. Foote Jr. says "the best mechanical means yet described, though commonly described as a 'French' article, was really invented and elaborated in the office of . . . Dr. E. B. Foote, Sr.", Himes is of the opinion that the 'French' pessary and not the 'French letter' is referred to. It is hardly likely that Foote would have claimed that his father invented the condom.

The Formation of Malthusian Leagues

The original Malthusian League formed in England by George Drysdale was not a success. But after the trial of Bradlaugh and Besant in 1877, a change of public opinion came about, and a "New Malthusian League" sprang up. The example and influence soon spread to other countries, and leagues were formed in France (1865); Netherlands (1881); Bohemia (1901); Spain (1904); Brazil (1905); Belgium (1906); Cuba (1907); Switzerland (1908); Sweden (1911); Italy (1913). The French movement did not become active until 1898, but the Nienw Malthusiaanschen Bond (N.M.B.) of the Netherlands was second in importance to the British League.

Aletta Jacobs and the Dutch Movement

One of the founders was Victor Carel Gerritse, who was later the husband of Aletta Jacobs. She joined the organisation in 1882, and has the distinction of being the first person to open a clinic dispensing birth control advice. Gerritse was a liberal radical, and Aletta Jacobs saw birth control as a powerful weapon in the struggle for female emancipation. Dr. Johannes Rutgers, also a leader of the N.M.B. was advising the use of soap plugs for contraceptive purposes in 1880. Aletta Jacobs searched for something more reliable. Her clinic opened in 1882 to give advice on infant welfare to working class women and it became very popular. Soon after the opening of the clinic, Dr. Jacobs became acquainted with the use of the Mensinga Diaphragm, and decided to add this to her clinic services.

At first, it was hardly a clinic as known today. But by 1886 the N.M.B. pamphlets were mentioning Dr. Jacobs' clinic as a place where birth control advice could be obtained. In 1890 the premises at Tichelstraat where Dr. Jacobs worked were opened, followed by three more clinics in 1892. At this time a booklet describing all of the then known means of contraception was distributed, and the methods were tested for medical reliability. The service boomed and Dr. Jacobs worked overtime and still had to turn women away. This work increased, but at the end of the century the period of liberalism which had made all this possible ended. The right-wing clerical parties seized power, and they were anti-family planning. Dr. Rutgers' attempts to broaden the movement failed because he trained simple working class women to fit diaphragms, which caused serious repercussions and a split between the medical world and the general workers in the family planning movement which was only bridged again in the 1930's.

Marie Stopes (1880-1958) and the English Movement

One of the most serious consequences was that Aletta Jacobs left the movement, disappointed and disillusioned. She continued to work for the causes she believed in through political and cultural organisations, but in her memoirs she never mentioned the clinic at Tichelstraat.

The Mensinga pessary was used so widely by Aletta Jacobs and N.M.B. that it came to be popularly known as the "Dutch cap". In fact, the inventor Dr. Mensinga was a German, who came from Flensburg, and was later Professor of Anatomy at Breslau. Mensinga used several pseudonyms—Karl Hasse, or C. Hasse, and he described his invention in many papers which not only discussed indications, but gave voluminous detailed case histories. These appeared in the early 1880s.

With a few exceptions such as Marie Stopes, most of the leading pioneers of the birth control movement were free thinkers. Most of their writings were issued by secularist publishers, which explains why W. J. Rendell styled himself a member of the National Secular Society when he started advertising in the 1880s. Rendell was a chemist, who set up his shop in Clerkenwell, London, in 1880. This was a poor area, and Rendell saw children born in appalling conditions, and brought up in squalor and poverty. This led him to consider that some form of family limitation would be desirable. He began to experiment, and produced some pessaries—the first samples were distributed free among his poor customers. The results exceeded his wildest expectations. The demand for the pessaries grew so rapidly that producing them was a full time job. Mrs. Annie Besant recommended the pessaries, and Dr. Albutt mentioned them in his "Wife's Handbook". Albutt was cautious, and emphasised that the pessaries were still on trial, but he thought that they would do all that their inventor claimed. And so, one of Britain's oldest manufacturers was founded.

Dr. Albutt, incidentally, also recommended Dr. Mensinga's diaphragm which was the first time it was mentioned in an English tract. For publishing this work, Albutt became the second martyr of the N.S.S.—the first, Edward Truelove was imprisoned for being in possession of 219 copies of "Moral Physiology" by Robert Dale Owen, and 1,212 copies of another pamphlet called "Individual, family and national poverty". Albutt's book cost only sixpence, and was therefore available to almost everyone. He was struck off the Register, but continued to practice. The Leeds Daily News summed it up very well—"If he had published the "Wife's Handbook" at 10s., he might now have been practicing with the full approval of the Medical Council".

Many accounts have been written of the life of this amazing and complex woman, who broke down so many of the barriers against birth control. She was well educated and well read, with a B.Sc., from London with Honours in botany and geology and a Doctor of Philosophy of the University of Munich. She made a tragic marriage in 1911—instinctively feeling that something was wrong with the relationship, she researched in the British Museum and discovered that she was still a virgin. The marriage was annulled in 1916. This unhappy experience led to the publication of "Married Love" which was a book on sex and marriage for ordinary people. She realised that others were as ignorant as she had been when she married, and hoped that perhaps the book would save others from the same sort of unhappiness. Financial assistance from the publication came from A. V. Roe, one of the founders of the aircraft firm, whom she later married. "Married Love" was such a success that she followed it with "Wise Parenthood" in which she recommended the cervical cap, preferably combined with a quinine pessary, or sponge with soap, or a tampon smeared with grease, and rejected the condom, coitus interruptus, douching and the safe period. The book had a mixed reception.

Marie Stopes was convinced that she had divine enlightenment and on the eve of the 1920 Lambeth Conference of Bishops, she had a message from God, which came to her as she walked in the garden of her house. She rushed indoors and dictated the message, which was privately distributed to the Bishops. Later it was published under the title "A new gospel to all peoples". In an obituary Dr. C. P. Blacker has pointed out the unity of theme between this message and the report of the same conference 38 years later. This may in some measure substantiate her claim to have had prophetic powers.

In 1921, she and A. V. Roe opened the "First clinic in the British Empire". It was at her own clinics that she dispensed devices under the trade name "Racial". She experimented and adapted various methods. From her own experience she thought that quinine was not a suitable ingredient in a suppository, as the quinine absorbed through the vaginal walls caused sleeplessness. She considered other chemicals, and suggested them to manufacturers, but the resulting products did not entirely satisfy her either. So she developed a "Racial" suppository without the disadvantages she saw in others.

She also suggested that sponges should be made larger—which resulted in sponges being produced of the same diameter as before, but several inches thicker! However, the problem seems to have been righted, and sponges of a larger diameter were produced.

There were "Racial" sponges and caps. She had used the name "Prorace" at first, but "Racial" was adopted to secure legal protection and to safeguard the public, Marie Stopes, and the Society for Constructive Birth Control (C.B.C.) The cap which she perfected was high domed, and of rubber. Her dislike of many methods stems from two beliefs which she held, the first of which is that she believed that in moments of passion "coital interlocking" occurred. She maintained that the glans became interlocked in the cervix, which lead her to believe that some methods could not be effective since this locking was strong enough to rip or dislodge a contraceptive device.

The second belief was that no device should be tolerated which did not allow "the entry, mingling and mutual exchange of secretions between the man's uncovered organ and the woman's".

However, she did see that methods such as the condom, which transgressed this ideal, had their uses. She saw them as imperative in the first weeks of marriage, in cases of premature ejaculation, and in suspected venereal disease. During the last years of her life she experimented with an oral contraceptive, which was tried out in India. The pill was called "Caulophylan" and was a homeopathic drug. The files of records concerned with this work seem to have been lost.

In 1920 a device was patented, known as Dr. Baxter's patent—this was described by Marie Stopes as a patent for "KPO" or "SOS" Jelly. The patent is not in fact for a jelly but for an introducer. In any case she heartily disliked the apparatus. "It has all the psychological disadvantages of a douche and its metal construction is such that it is certainly beyond the ordinary rather stupid person's power to cleanse it satisfactorily".

There were great changes in the climate of opinion in Britain in the 1920s and by 1922, Dr. C. V. Drysdale was able to say that organised opposition to birth control was dead—with the exception of that from the Roman Catholic Church, which presented such displays of bigotry and intolerance that it was more help than hindrance.

A powerful shock hit the defenders of anti-birth control ideas, when Lord Dawson of Penn, Physician-in-ordinary to the King addressed the lay Church Congress at Birmingham in 1921. Lord Dawson's courageous speech caused an uproar, and he was immediately attacked by the Roman Catholics, some Anglican Bishops and a Conservative newspaper, the headlines of which pronounced "Lord Dawson must go".

Margaret Sanger (1883-1966) and the American Movement

Although family limitation was accepted in many countries, a long struggle took place in the United States where Margaret Sanger (1883–1966) was the pioneer. As a nurse her work frequently took her to the poorer parts of New York, where women lived in appalling conditions, suffering from constant ill health. Abortion was rife, and many women died as a result of botched abortions, leaving large families uncared for.

Many asked her how the rich limited their families, and apart from knowing about the condom and coitus interruptus, she knew no other means of preventing pregnancy. She tried to find further information in the large American medical libraries, but discovering very little, she visited Europe to gather practical information. On her return to America she began publishing "The Woman Rebel" a periodical with the double purpose of testing the Comstock law, and also rallying support to militant feminism and contraception. The paper was "as red

and flaming as possible". Much of her work at this period was based on that of Emma Goldman, a notorious anarchist—though in her claims on the rights of women, Margaret Sanger went much further than did Emma Goldman.

"The Woman Rebel" was soon banned from the mails, and she had some difficulty in getting "Family Limitation" printed, though this was finally done in secret by Bill Shatoff, a Russian-born anarchist.

Having been indicted for nine alleged violations of federal statutes and given insufficient time to prepare her case, she left for Europe, where she met many well-known birth-controllers including Marie Stopes and Havelock Ellis. Emma Goldman meanwhile felt that the time had come to take action, and openly discussed contraception in her lectures, she was subsequently arrested several times, was fined, and also went to prison. Margaret's first husband, William Sanger, was also arrested, having given a copy of "Family Limitation" to one of Comstock's decoys. He was sent to prison for 30 days. At the Sanger trial, Comstock caught a chill, and died a few days later.

Margaret Sanger had meanwhile visited Holland, and had been taught a technique for adjusting pessaries and caps by Johannes Rutgers. Aletta Jacobs snubbed her, saying that it was not for laymen to interfere in the work.

She returned to the U.S. shortly after Comstock's death, to discover that a "National Birth Control League" had been organised by women liberals, one of whom was Mary Ware Dennett, a fairly prominent woman in public life, who had written a book on the Comstock laws. There are several accounts of what happened when the two women met, but it would seem that there may have been a clash of personalities. Consequently they did not work together, although in later life Margaret Sanger said that she regretted this.

The hearing was constantly being put off, and the authorities finally decided not to press the nine federal indictments. She then spent three months lecturing, not always without opposition, which came mostly from Roman Catholics. She was arrested again, this time in the company of six others, but they were all released without punishment. At about the same time, Van Kleek Allison, a rich New Yorker, was arrested for distributing leaflets at a factory gate. He was sentenced to three years, but released after two months. His case led to much publicity and the beginning of an organisation in Massachusetts.

In 1916, the first birth control clinic in America was opened by Margaret Sanger, in Brownsville. But, after nine days, the vice squad arrived and arrested Margaret Sanger, her sister, Ethel Byrne, and Fania Mindell, a woman helper. Ethel was imprisoned, and promptly went on a hunger strike, to be forcibly fed after 103 hours. Only when nearly dead was she pardoned. Margaret was released on bail, re-opened the clinic, and was arrested again and, after a trial in which some of the patients gave pathetic evidence of their circumstances and poverty, she was sentenced to thirty days. "Birth Control Review" first appeared in 1917, whilst she was still in jail. The circulation increased rapidly, but it was still an uphill struggle. In November 1921 the "American Birth Control League" was launched. She organised many Conferences, one of which was the "World Population Conference" in Geneva, 1927. She withdrew from the "American Birth Control League" in 1928 because it was "too conservative".

She founded a "National Committee for Federal Legislation for Birth Control", and the "Clinical Research Bureau" founded in 1923 was attracting medical men. One important supporter was Robert Latou Dickinson (1861–1950) obstetrician, gynaecologist, and pioneer in the collection of detailed records of sexual behaviour. Although untrained, he was a magnificent artist, and his models and drawings of human sexual anatomy are still used in textbooks and teaching aids. He was one of the founders of the "National Committee for Maternal Health", which linked birth control with marriage problems.

Another important development was the "Journal of Contraception" edited by Abraham Stone assisted by an able board of specialists. This was first issued in November 1935, and was sold at the low price of one dollar a year. Its aim was to keep the physician informed on latest developments in contraception, which were coming thick and fast, and this it did most excellently.

As a result of her work in the international field, two organisations were formed, the International Union for the Scientific Study of Population and, in 1948, the International Planned Parenthood Federation.

Elise Ottesen-Jensen and the Swedish Movement

In Sweden there was also a struggle against the laws which forbade the sale of contraceptives—which were finally abolished due to the efforts of those who believed that family planning was a human right, and that sex education should be freely given to all. Among the leaders of the Swedish movement was Elise Ottesen-Jensen who in 1933 founded the Swedish National Union for Sexual Information. The anti-birth control laws were repealed in 1937, but the problem of abortion remained, and Elise Ottesen-Jensen's first clinic had the legend "Contraception is better than abortion" above the door.

Mrs. Ottesen-Jensen had been a member of the World League for Sexual Reform, at whose progressive conferences she told of the struggle against hypocrisy and convention, and the acceptance of family limitation among the poor. She first met Margaret Sanger in 1930, at the Seventh International Birth Control Conference in Zurich.

The work continued in Sweden. Homes for unmarried mothers were set up, since unmarried mothers were often treated most harshly, and dismissed from their employment, just when they needed help most. She continued lecturing and educating the people, and at the outbreak of war, she visited the soldiers, and lectured to them on the dangers of venereal disease and how it could be avoided, and on family planning.

At the end of the war, she decided to invite people from countries which had suffered, and which had previously had family planning movements, to attend the Swedish movement's Conference in Stockholm in 1946. She hoped to encourage their work, and revitalise the movements after the fearful war. Delegates came from England, the Dutch contingent included Dr. Van Emde Boas, and Abraham Stone and Lena Levine came from America. Margaret Sanger also attended. These people believed in the importance of an international movement, and so it was planned that another conference should take place at Cheltenham in 1948. This conference was sponsored by the Swedish, Dutch, British and American movements, and was attended by delegates from many countries. An International Committee was set up, which was the beginning of the International Planned Parenthood Federation. Margaret Sanger was the first President, and in 1959, Elise Ottensen-Jensen became the second.

Sex education became compulsory in Sweden in 1956, and a Guide was produced by the Swedish government to assist teachers in the preparation of the lessons. Mrs. Ottesen-Jensen continues to teach, in the schools, and in public meetings. Her contribution to the movement has been great, and the I.P.P.F. recorded its gratitude in a resolution passed unanimously by the Governing Body in 1965, as she approached her eightieth birthday.

The U.S.S.R.

During the 1920s and 1930s experiments flourished in the U.S.S.R. probably as a result of the changes which had taken place in society, the new status of women, and new ideas about marriage and the family.

They already had a knowledge of methods used elsewhere, and had been experimenting with immunization since 1899. Several books on contraceptive techniques appeared, one of which was edited by Dr. E. J. Kvater—"Contraceptive methods and their techniques" which was published by the Department of Health, Moscow, in 1926.

Dr. Kvater's book was much concerned with the safety of contraception, and contained contributions on the mechanical and chemical methods, and their combined use. The condom, of which both rubber and membrane types were available were considered inadequate, even with lubricating spermicides. They also had "American" condoms—which could have been "tips" for they were described as slipping off too easily, and they reduced sensitivity. They were however, very inexpensive and easily obtainable and, with care, they could be satisfactory for many.

The caps and pessaries were the same as those used in other countries, Kafka caps, Mensinga diaphragms, and there were natural and synthetic sponges. The sponges were used with lactic acid, vinegar and quinine oil. Female sheaths, a method which never achieved much popularity anywhere, were available.

Apart from these and the immunological methods, doctors were studying the effect of X-rays. These were known to bring about sterility, a factor inadvertently discovered by those who worked with them. The report in "Contraceptive

methods and their techniques" was made by C. N. Borman, who worked with 67 women aged from 20–35 years. In each case sterility was maintained for a period of five years. A dose of 50–60% erythema guarantees a sterile state from 4–5 months, after which the session must be repeated. The rays are directed on to each ovary separately, in two sessions a week apart. Each session lasts from 5–15 minutes.

Such a development would provoke discussion on whether this treatment was harmful to the woman, or would affect any future pregnancies she might have, or the possible genetic damage to children born of these pregnancies.

Dr. Kvater's book reports on cases in which X-ray had been used for 18 years without mishap, and there were quotations from reports of other workers experimenting on animals. They had found no harm even after following through several generations. It was also thought that this exposure prevented the possibility of cancer.

By 1927 the situation changed, for Dr. H. J. Muller had shown that X-rays produce frequent mutations in fruit flies. It was shown that gene and chromosome irregularities resulted in lethal and semi-lethal effects, and that although the mutations need not manifest themselves in the individual or the immediate offspring, they could occur in later generations according to the Mendelian principle. Another extreme method was reported in this volume—swabbing the uterine walls with iodine. This was done to irritate the uterine walls and thus make implantation impossible. A thin piece of cotton soaked in 10% iodine solution was inserted into the uterus. After a few moments it was removed. This procedure was carried out either before menstruation was due, or a few days after its delay. The same principle was used in the form of injections. Although the method was said to be used extensively in the U.S.S.R. and Germany, it seems to have been mercifully short lived, for it caused extreme pain, nausea, fainting and vomiting. It also started up old inflammatory conditions. Dr. Selitsky, Chief of the gynaecological department of the Moscow State Hospital did a study of these methods and pointed out cases of the destruction of uterine mucosa. There were also cases of severe haemorrhages, high fevers, at least three deaths, and a number of other tragedies. There was, furthermore, much evidence that the treatment led to ectopic gestation.

A Central Commission for the Study of Contraceptives was formed which undertook investigations on biological, clinical, statistical, and all other aspects and questions bearing on the subject.

In 1934 they reported that a metal cap "Kavki" and a rubber one, "Mispa" were very popular. They were used with paste. The Commission thought that spermicides had a great future but that there was room for improvement in manufacturing techniques.

Condoms were still popular, as was a ball which was coated with chemical substances. The substances dissolved in the vagina and the ball occluded the entrance to the uterus. Apart from this, they were pleased with the results of "Biolactine" which was investigated by Dr. Y. C. Dubintschnik. Metchnikoff's assistant, Cohendi, had isolated the bacillus from yogurt (*Bacillus bulgaricus*) at the beginning of the twentieth century. The bacillus thrives in milk and has a great acid producing faculty. After much work it was used as a contraceptive, apparently fairly successfully, and had the added advantage of having a curative effect on various conditions, such as leucorrhoea.

The work in the U.S.S.R. was still progressing and clinics had been established in all large cities. Research on the spermatoxins was still in progress. In 1934, the Commission called on the International Group for the Investigation of Contraception to call an International Conference to discuss technical and scientific questions relating to contraception and to hold an exhibition of all contraceptives so far known.

Inventions get lost and forgotten. When Dr. Aletta Jacobs had been seeking a method to use in her clinic, she had found no reference to the cervical cap. Wilde's paper was forgotten. If Foote had invented a cap, she found no reference to it at that time. In 1908, however, the cap was re-invented by K. Kafka, a gynaecologist of Vienna. This cap was firm, and made of metal or celluloid. Although his name is hardly known in the West, he is remembered in the

The Development of Caps and Diaphragms

Socialist countries, where cervical caps are still referred to as "Kafka caps". At the third Congress of the World League for Sexual Reform an amazing new device was described—"Das Luftkissenpessar-Secura" which was an "air-cushion pessary". Its German inventor Dr. Leonhardt spent a great deal of time experimenting with his idea, and the version shown in 1929 was the most sophisticated design produced.

The experimental work was carried out on sows, but only five experiments could be made on living animals "for private reasons"—but he invited veterinary surgeons to make more of these experiments. He continued to work on sows' vaginae obtained immediately after slaughter.

Having solved the problem of mechanical occlusion, he added a thick ring, similar to those on other occlusive pessaries, and a sleeve, which was directed outwards. This sleeve and the base of the pessary form a sort of shell shape, and catch the sperm. This shape also prevented the pessary from being dislodged during defaecation. The entire apparatus was to be used with a chemical contraceptive which also had antiseptic and lubricative qualities, and was composed of quinine sulphate, boric acid, glycerine, tragacanth and starch.

When in position the sperm were presented with a barrier some 3–4 cm. thick.

Apart from general lubrication with the ointment, the top of the pessary formed a pocket, and when inflated further quantities of jelly were forced out of an aperture at the top, to cover the cervix. A special applicator was provided and the pessary was to be inflated when in position. For those who objected to the protruding tube, he advised that this could be shortened and the pessary inflated in the outer part of the vagina, and then pushed into position. After inflation the tube should be ligatured, like a blood vessel.

Viewed from the present day, this device seems rather laborious, certainly ingenious, and unpleasant. Marie Stopes was beside herself at the very idea! "The mechanism revolts all my feminine instincts, and I cannot imagine the mentality of any woman who uses it". She added archly that "Specimens of the apparatus may be seen at the C.B.C. Museum—we know of no case of its use".

By the late 1920s there were a wide range of caps and diaphragms in mass production. Rubber, metal, cellulose and other firm substances, were used for cervical caps, and other types were made from spongy materials and intended for use with a chemical. Special tablets were made, which were to be held against the cervix inside the cap. In principle the idea sounds practical for the spermicide would be kept in contact with the cervix and surrounding areas, and the cap would be permeated with spermicidal material.

Clinical experience seems to show that these caps had a tendency to give way right at the centre, just where protection is most necessary.

Those who could not afford or obtain caps were often advised to use small rubber balls. These could be used as a block pessary, like the three gold balls used by Casanova, or the hollow balls could be cut and used as a diaphragm. Dr. Anton Nystroem the Swedish fighter for the rights of women advised the poor to try this method.

Thermosterilization

It was suggested that the decrease in the birth-rate amongst the more wealthy members of the population, which was noted in the latter part of the nineteenth century, could have been caused in part by the installation of hot water systems and the subsequent vogue for hot baths. The hot soapy water could enter the vagina, and might exert its action on subsequent coitus. However, it was pointed out that the male organs would be more likely to be affected by this treatment, considering their anatomical site, and the knowledge that the male organs do respond to temperature. It was therefore put forward that thermosterilization could have taken place. This would not appear to have much practical application, nevertheless, some experimentation began to find ways of applying heat to the testicles—which would seem to be a painful method, even if it could be effective. At Cornell Agricultural College experiments were carried out with asbestos coverings to the scrotum of rams, and Professor Carl R. Moore of the University of Chicago was discovering that if the testicles were elevated into the body, body heat caused them to degenerate. When replaced in the scrotum, they returned to normal.

Later Development of Spermicides

During the early part of this century the first commercial spermicides appeared, and a great deal of work was done on discovering agents which would make effective spermicides, the mode of action of these agents, their efficiency, harmlessness to the user, and tests for those available to the public were devised. To record all of the workers who added to this knowledge would make a long list, and it is hoped that to mention but a few, whilst acknowledging that there were many others, is acceptable.

During 1905–1906, Professor Gustav Günther made a comprehensive investigation of spermicides. For half a century, since Kolliker, nothing had been done to add to this knowledge. Günther obviously greatly admired Kolliker, and carried out his investigation because he had “more suitable material”—and by this time the difference between chemical action and action by osmosis had been realised. The “more suitable material” was fresh ejaculate from the breeding animals of the Veterinary High School, Vienna, where the work was carried out. Kolliker had used “pure seminal fluid”, i.e., the contents of the spermatic duct and of the epididymis of recently killed animals. Günther wanted to add to Kolliker’s findings. He tested 101 substances, alkalis, acids, inorganic salts, organic antiseptics, organic reducing agents, and alkaloids, and a number of miscellaneous substances, such as urea, dextrin, and blood sera. The experiments were carried out by adding a drop of semen to 9 drops of 0.9% sodium chloride solution in which one of the substances under investigation had been dissolved usually at $\frac{1}{10}$ or $\frac{1}{100}$ %. After quickly mixing the fluids he prepared a slide, and examined the sperm under low magnification. The criterion of spermicidal power was how fast the sperm died. He noted the number of minutes elapsing before all signs of movement ceased, and seems to have made only one experiment at each concentration. The work was done at room temperature. He confirmed several points; that sperm rendered less active by acids can be re-activated by alkalis, but that the reverse does not hold true. That alkalis can re-activate sperm immobilized by substances which are not acid. He discovered the high spermicidal power of hydroquinone, and thus discovered that organic reducers are highly spermicidal. Alkaloids have a low spermicidal power.

He tried to compare his animal results with tests using human sperm. Although the sperm he used was derived from healthy young men, most of it was useless, whether because too long a period elapsed between ejaculation and testing, or whether from individual peculiarities, he was unable to say.

Günther’s work was followed with interest by a German pharmacist and chemist, Friedrich Merz, who in 1906 developed the first known commercially produced spermicidal jelly, which he called “Patentex”. This product was very favourably received, and was followed by many other jellies. Patentex has been adapted with the years, and is still in production—the only break was during the Hitler regime, when the fascist dictators closed the plant and forbade the sale of contraceptives. Other spermicides were developed by manufacturers and Family Planning Associations. Marie Stopes and her contemporaries were interested in finding better products, and were always ready with advice to manufacturers, and frequently produced their own formulae. Dr. Hannah Stone discovered the following to be 96% safe, and perfectly harmless :

Lactic Acid	1
Boric Acid	10
Ung. Glycerini ad.	100

which echoes the first known recipe in the Kahun Papyrus.

Clinics were being set up by various bodies, and by individuals, and there was no lack of support for these activities. The British Labour Movement was already well-informed on family limitation, and was available to campaign and publicise causes. There were by this time a number of organisations in the field, eventually leading to the formation of the National Birth Control Association, now the Family Planning Association.

Of these organisations, the “Birth Control Investigation Committee” (B.C.I.C) was particularly important. Its objects were to investigate the sociological and medical principles of contraception, the possible physical and mental effects of the practice on mental health, and the merits and demerits of all methods.

The Committee was joined by Dr. C. P. Blacker, who was to become vice-chairman of the I.P.P.F. from 1953–59, and Administrative Secretary from 1959 to the

end of 1960. At first, the organisation sifted and assessed facts in a study of clinic experiences, but some members of the Committee began to feel that it was imperative that the scope should be broadened and that they should actually undertake research into ways of improving methods of contraception. There was much heart searching and argument when this revolutionary idea was put forward. The main barrier to such a course of action was the cost, but the money was fortuitously provided by C. F. Chance, (the husband of Janet Chance, one of the founders of the Abortion Law Reform Association) who proposed that further expansion of the Committee to undertake research should be financed by money which he would donate. Dr. Blacker supported the idea that research should be done, as he saw the acute need for knowledge of this kind. He was then Secretary of the B.C.I.C., and he approached John Baker and suggested that he should make the study.

The work commenced in 1928, and the first years were spent working on the general discovery of principles underlying the killing of sperm by chemical agents. Then the work turned to applying these principles to create a really powerful yet harmless contraceptive for practical use. The book published in 1935 "The Chemical Control of Conception" gives a detailed account of the work, and a gel was produced—designated as "P.383". This was also produced as a paste, and was marketed by British Drug Houses Ltd., under the name "Volpar"—a contraction of "Voluntary Parenthood".

The course of the work was by no means smooth, and one of John Baker's most vivid memories of the many years of work on chemical contraception was this:

"I worked at the subject for some time in the Department of Zoology at Oxford, but the Head of the Department did not approve, and told me that the research must stop. I well remember that day on which my technician and I loaded all our equipment on to a hand-cart and pushed it round to the Department of Pathology, where a room had been allotted to us through the kindness of Professor Howard Florey (now Lord Florey, O.M., F.R.S.). The fact that the work was eventually successful was due to our acceptance in his laboratory by Professor Florey".

Such an adverse struggle deserved success—which it finally achieved:

"I remember very distinctly the day when I visited the premises of the British Drug Houses in London and saw "Volpar" gels being mechanically produced in bulk by a special machine. The chemical composition of the gels had been worked out in detail by my technicians (Mr. Ranson and Mr. Tynan) and myself. The balancing of the ingredients was a very tricky job. There was an extraordinary sense of fruition in seeing our long research culminating in the mass production of the object that we had at last perfected (so far as we could)".

Baker had ten standards which a spermicide or suppository should realise:

1. It should be inexpensive.
2. It should be solid. and therefore require no appliance for insertion into the vagina.
3. It should be small.
4. It should be unaffected by the ordinary range of climate.
5. It should neither leave any trace on the skin when handled, nor stain fabrics.
6. It should contain no volatile nor odorous substance.
7. It should be non-irritant to the vagina, cervix and penis.
8. It should be without pharmacological effect if absorbed into the blood-stream.
9. It should contain a substance reducing surface tension to ensure the smallest crevices of the folds of the vagina being reached.
10. It should kill sperms at S/8 or lower concentration in the alkaline and acid tests for suppositories, and the spermicide should diffuse rapidly out of the vehicle into semen.

Dickinson and Bryant had worked out such a list of requirements, but theirs also included the stipulation that it must not be easily displaceable.

With the advent of mass production of spermicides it became essential to have some methods of testing contraceptive products for total spermicidal power, and for local harmlessness. Several tests for total spermicidal power were developed and used—the Sander-Cramer method and the Alkaline test of total spermicidal power are examples.

Different countries had set up laboratories for the testing of products but results produced were in no way comparable. Spermicidal testing was in total confusion.

In 1955 the Medical Committee of the International Planned Parenthood Federation appointed a Testing sub-committee to establish an acceptable test which could be used by workers internationally, and would make the results of the tests comparable.

The test so devised was originally known as the "Compromise" test, but is now called the I.P.P.F. agreed test.

Some of the work done by Baker was financed by the Committee on Maternal Health (New York) through the B.C.I.C., this Committee had outlined a project on the investigation of spermicides in 1921. Although the project had been launched in 1923 insufficient money hampered the work, and virtually nothing happened until 1929, when the Bureau of Social Hygiene made a grant. Professor Crew of the Animal Breeding Department of Edinburgh University had already promised full co-operation on the project, and he had asked Dr. Cecil I. B. Voge, who already had experience of research in fertility, to take over the project. The ultimate objective of the study, as first presented was to find an effective, easily available chemical in a form which would keep in good condition over a period of time, in any climate. The chemical should be so simple that anyone could use it, and if possible it should contain prophylactic qualities.

The study gradually broadened its aims, and eventually took in other kinds of contraceptives, and surveyed practically everything available. This encompassed some 180 different products. Some of the products investigated were not listed, these included "quack" remedies, but everything else from Gräfenberg's ring to lactic acid products were included in the assessment. Voge did much work on foam jellies—which were widely manufactured after his demonstrations. Other workers continued in this research all over the world. Gellhorn at the University of Oregon studied the effect of variation in hydrogen ion concentration, tonicity and ionic composition of media. Schlenk demonstrated that certain spermicidal substances when added to semen produce a sudden short lived outburst of activity, something akin to a terminal convulsion which preceded the ultimate loss of mobility.

Development of Rubber Condoms

The vulcanization of rubber, first carried out by Goodyear and Hancock in 1843–44 made a great difference in the use of the condom. This change in technique made it possible to mass produce a more reliable and less expensive product. Skin condoms dropped from popularity, but have now returned to the market as luxury items. Advocates of their use say that they conduct heat better than does rubber, thus interfering less with sensitivity.

Different processes have been used in condom manufacture, the oldest technique is called the "cement process" in which glass forms mounted on racks are dipped into crepe rubber which has been milled and liquefied in a solvent such as benzol or gasoline. The rubber is then vulcanized at high temperatures. There were variations on this technique, one being the "cold chloride cure" and the old and shortlived method utilizing sulphur chloride gas for the "curing". None of these techniques were simple, and there were many difficulties in the mastication of the rubber, and the preparation of the solution, and the fire risk was tremendous.

Skin condoms were made much safer and easier to produce during the first world war. The cementing of delicate peritoneal coverings was developed as part of the war effort. This process was required to hermetically seal and repair air balloon covers. The technique was later turned to the manufacture of condoms, which meant that any peritoneal covering could now be used, and not just the caecum. These condoms were so cheap that retailers refused to sell them at the scant profit.

A second technical revolution took place in the early 1930s with the substitution of liquid latex for crepe rubber. Automation also played a part in speeding up production technique. Latex is the sap of the rubber tree, which is suspended in water, concentrated by evaporation and stabilized by ammonia.

Different manufacturers have their own techniques and improvements in present day production. Glass forms pass through a trough of liquid latex, in some processes the forms are dipped vertically, and in others they rotate through the

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liquid at an angle of 45°. This rotation distributes the latex evenly and prevents the formation of a drop at the end of the condom.

The forms are then generally dried in hot air, dipped a second time and dried again. Vulcanization then takes place, either in hot air or water after which the condoms are cooled and removed from the forms. The condoms are packaged, usually by machine, ready for distribution.

The better manufacturers take a keen interest in quality control and subject each batch of condoms to stringent tests. The Evaluation Sub-committee of the I.P.P.F., through its rubber group has spent considerable time and thought on deciding the best tests and sampling methods for rubber appliances.

At the end of the nineteenth century there were a large number of these devices available.

The origin is obscured by the fury of their condemnation. Almost all medical writers of the time, and for years after, heartily condemned them (not without reason) and listed the evils of such methods, citing particularly unhappy instances of their use. However, they never mentioned how long they had been in use, or from whence they came.

This is unusual, for in the early part of this century, writers seem to have liked to give a short account of the "History" of the method they were describing, even if the "History" was, in many cases, not very near the truth.

The origin of these pessaries seems to be that from about 1863, devices called "elevators" were used, to hold up a retroverted uterus.

They consisted of a stem of zinc-copper or lead fixed to a wide disc, or swung above a circle.

By about 1868, the stem was used to straighten a crooked womb, to take the cramp out of the inner os, and to "open up the way to sperm". This device continued in use, but in about 1878, the stem was split and run the length of the intra-uterine canal, to discourage implantation. Although they were now used for contraceptive purposes, they had some uses in the treatment of various conditions and, in the hands of experts, they could have had some value in selected cases. But for the most part, more harm than good was done.

The forms these pessaries took were numerous. Surgical catalogues advertised dozens of models. Most of them were to be inserted by physicians, but one version was advertised to women directly. The circulars said that the device could easily be inserted by the woman herself, and had a set of instructions to assist her in the fitting, which showed a highly falsified diagram of the female organs, with the cervix nearly at the vaginal entrance, and the uterine canal in about the same axis as the vagina.

Of these pessaries, the metal ones were the most dangerous. The "Pust" pessary (invented by Dr. Pust) was of silkworm gut, and although not entirely successful in any way, it was less lethal.

The intra-uterine devices may have developed from these ideas, but they were quite different. The stem pessaries had a button, lodged against the vaginal wall, with the stem protruding into the uterus through the cervix. The intra-uterine devices were completely within the body of the uterus.

The first known intra-uterine device appeared in 1909. There are many stories of their use earlier, but the claims seem to have little satisfactory proof. It is said that the Ancient Greeks used them; that the Arabs used to insert stones into the uteri of female camels, when going on long journeys; various tribes also are thought to have had some knowledge of such a method.

In 1909, Dr. R. Richter of Waldenburg published a paper in the "Deutsche Medizinische Wochenschrift" about a contraceptive device consisting of a loop of catgut, which was to be inserted into the body of the uterus. He seems to have had experience of this method, and discusses indications for contraception, how his device is inserted, the management of cases, what complications can happen, and what should be done. His technique sounds very little different from that given in any modern manual. There is a small drawing showing the loop, ready for insertion, in a sound. The article was brought to the attention of Marie Stopes by a Dr. Ashkenasay, who also used the method. He showed her two other devices—one of which was Austrian, of silver and called "Uterop". The other was a similar device of German origin and was called "Venor". She described them as

"Freak instruments" and the extensions of the catgut loops and rings. No trace of either seems to exist today.

Gräfenberg's name is closely associated with intra-uterine contraception. In his first experiments, in about 1909 he used stars of silkworm gut. Later he adapted this into a circle of gut, held into shape with silver wire. The gut was too soft and pliable alone. At one time he tried using the circle with the end of the wire protruding through the cervix, so that it would be easier to check that the device was in place, but he abandoned the idea as he thought that the wire would assist ascending infection. His third form was a silver ring, still known as the Gräfenberg ring. In 1930 he reported on 1,400–1,500 patients, using 400 stars, 1,100 silkworm rings, and 600 silver rings. The silkworm showed failures of 3.1% and the silver 1.6%.

Gräfenberg was keenly aware of the possible dangers and contraindications to the intra-uterine devices, and stressed the need for thorough examination of the patient. To avoid insertion after conception had taken place, he stressed the importance of inserting the ring just after menstruation. He pointed out that gynaecological experience was necessary, and that aseptic precautions should be observed.

Hans Lehfeldt, who, like Gräfenberg, was from Berlin, and some of his colleagues reported on the treatment of over 500 cases observed over a three year period. They had used Pust stems and stars. There were 24 unwanted pregnancies known, but he thought that there were probably other failures.

Of the 24 pregnancies, all but five ended in abortions, either criminal or medically indicated. In one case the silkworm gut was seen to have embedded in the mucosa.

Leunbach of Copenhagen recommended silver rings in 1928. He had used them in 114 cases. However he withdrew his endorsement of the method in 1930. In England, Norman Haire inserted 270 rings, with a 13% extrusion rate.

The method fell into disrepute. It was loudly condemned, especially in Germany and the United States, for several reasons. Partly there were theoretical grounds, and partly because intra-uterine devices were confused with intracervical stems, and in addition there were a series of unfavourable case reports involving the Gräfenberg ring itself. The method was scarcely used although several doctors did continue to fit rings, particularly with "problem patients" who continually failed with other methods. Gräfenberg moved to the United States in 1940, where he still used the ring, but rarely and with great reluctance.

Among the other doctors who still used the method were Margaret Jackson and Mary Halton. The latter had adapted the method, and a report appeared in 1948 "Contraception with an intra-uterine silk coil" by Mary Halton, Robert Latou Dickinson and Christopher Tietze. A single strand of the coarsest silkworm gut, about 30 cm long was used. This was rolled in a tight coil, sterilized by immersion in alcohol and inserted inside half a gelatine capsule. The gelatine melted and allowed the silk coil to fit itself to the uterine cavity.

In 1959 two new contributions appeared, almost simultaneously. Dr. Oppenheimer in Israel was invited to report on the use of the ring for the "American Journal of Obstetrics and Gynaecology". Between 1930 and 1957 he had equipped 329 women with 866 rings. The early rings were of silver, but later he turned to silkworm gut. The aggregate exposure of 793 woman-years with 20 pregnancies corresponded with a failure rate of 2.5 per 100 years of exposure. Further, and most important, he considered the method absolutely harmless.

The "Yokohama Medical Bulletin" published Atsumi Ishihama's observations on the use of intra-uterine rings in Japan at about the same time. Japanese physicians had been interested in this method of contraception since 1934, when Tenrei Ota described a modification of the Gräfenberg ring. Ishihama's paper reported on his personal observation of 973 cases, and 18,594 less-intensively studied cases in 149 hospitals. The findings were favourable, and much the same as Oppenheimer's.

Since 1959, a large number of variations of the rings and stars have appeared. Dr. Lazar Margulies became interested in the subject after hearing Dr. John Rock lecture, and his interest was sufficient for him to undertake research on the subject. He conceived the idea of using polyethylene instead of metal or gut. He was encouraged by Dr. A. F. Guttmacher, then Chief of the Department of

Obstetrics and Gynaecology at Mount Sinai Hospital, New York.

Dr. Margulies developed several different shapes, finally the spiral which bears his name.

Dr. Jack Lippes also became interested in the method, and designed the "Lippes Loop" one of the most popular shapes.

The advantages of using polyethylene are great, since this material can be pulled out straight to fit into a tube, and when released it moves back into its original shape. This "memory" facilitates easier insertion, and modern IUD's are threaded into a thin tube, which can be inserted through the cervix, and the device pushed forward into position with a plunger.

The variations in design seem practically endless. There are now versions which incorporate small magnets, to aid in discovering whether the device is in situ. Other designs have strings or beads, which protrude through the cervical os so that the patient may be taught how to feel these, and thus check that the device is in place.

The mode of action of intra-uterine devices has still not been established.

Hormonal Control of Fertility

Over the ages a constant search has gone on to find an effective oral contraceptive. Women in many cultures have taken root and plant extracts, and metallic concoctions, and nearly every tribe has a plant to which contraceptive powers are attributed.

During the 1880s scientists were beginning to suspect that the ovaries secreted a substance which inhibited ovulation, but it was not until 1934 that Corner and Beard isolated and established the structure of one of the ovarian hormones, progesterone.

Prior to this time, many popular writers had been very taken with the idea of pills, injections and hormones, but in most cases it is obvious that they had little idea of what was involved or of the complexity of the endocrine system. Still, they cheerfully thought that such wonder-methods were just around the corner. There were experiments—many were part of the rather over-enthusiastic phase which followed Metchnikoff's reports on the spermatoxins. It was not that they failed to recognise the difference in the action of oral gestogens, and immunological methods, but that there was a general fever to find something which could be simply injected or swallowed.

Professor Haberlandt of the University of Innsbruck injected rabbits with ovarian and placental products ("Ovariolopton" and "Plazentaophon") which were prepared by E. Merck of Darmstadt. The result of this was that at first the animals refused copulation, then followed a period of temporary sterility, but when the animals did reproduce again, the resulting offspring were very weak and few in number. This deterioration of the offspring seemed rather like the dangers produced by the use of X-rays and the idea was therefore dropped.

Professor Haberlandt then turned to experimenting with the implantation of ovaries of pregnant animals in normal females, and this produced temporary sterility. On the basis of these experiments he produced a tablet called "Infecundin". Further information on this product has not been traced.

After progesterone had been isolated, it soon became known that the hormone had the power to inhibit ovulation. A. W. Makepeace and his colleagues demonstrated this in 1937, working with rabbits. It was soon observed that testosterone and oestrogen shared this important property.

However it was some time before this knowledge was put to any practical use in contraception. In the early 1950s two different groups of workers were looking for answers to seemingly opposite problems in fertility. Dr. Gregory Pincus and his colleagues were looking for a practical way to inhibit ovulation and Dr. John Rock and his colleagues were trying to help women who were apparently infertile. Dr. Pincus and his group began by confirming the findings of Dr. Makepeace. There were drawbacks, for although progesterone did inhibit ovulation, large doses were necessary orally, and if given by injection, the treatment was painful, and needed to be repeated frequently.

Dr. Rock and his colleagues were using progesterone in their work on infertility. Eighty women who had been unable to conceive were given massive doses of the hormone for three months, during which time, the women showed many symptoms compatible with pregnancy. They did not menstruate, the breasts

and uterus became enlarged. The treatment was discontinued and the menstrual cycles became normal, and thirteen women were pregnant within four months. Drs. Rock and Pincus then began to share experiences, and another group of 27 women were studied. This time the progesterone was administered in 20 day cycles, which produced intervening menstruation. Four of these women subsequently became pregnant. There were still drawbacks. Progesterone was expensive, it had to be administered in doses so large that it was quite impracticable for general use. The results were, moreover, not always regular or lasting, and the injections were too painful.

By this time there was considerable research in progestin synthesis and chemists were developing the compounds which Drs. Rock and Pincus needed. What was required was a harmless compound, which would be effective in small, inexpensive doses. Dr. Pincus asked the major hormone producing companies to send him samples of all progesterone-like steroids that their chemists had ever synthesised. Dr. Byron Riegel and a group of chemists had already been working on this problem at Searle's Laboratories in Chicago. They were seeking compounds which would have the physiologically desirable qualities of progesterone without the undesirable ones. A compound was wanted which would be far more effective than progesterone, if taken orally, that would be safe taken over a long period, and would have minimal side-effects during medication.

One of the researchers, Dr. Frank Colton was working on the synthesis of the 19-nor steroids. These differ from the natural steroids such as progesterone in that they lack a side chain of one carbon and three hydrogen atoms at the number-19 position. There has been previous work on these compounds, which was followed up by Dr. Colton who began working out a whole series of 19-nor steroids. As each compound was synthesised it was sent to Searle's Biological and Research Division to be tested on animals for oral progestational activity, and to establish whether it was safe to use, and what side-effects it produced.

Two compounds were finally found for which the pharmacists had high hopes and these were norethynodrel and norethandrolone. These were among the samples submitted to Dr. Pincus.

Throughout 1953 Dr. Pincus tested almost 200 compounds for ovulation inhibiting activity, using a small army of rats and rabbits. Fifteen compounds proved to have some effect as ovulation inhibitors and three of the 19-nor steroids were found highly effective. Norethynodrel was found to be at least ten times as active as progesterone.

A new group of 50 infertile women were recruited for a series of tests. The new compound achieved virtually a 100% inhibition of ovulation, and at the end of the treatment all of the women resumed normal ovulation and menstruation, moreover seven became pregnant after the cessation of therapy.

On the basis of these studies, the time was ripe to carry out a trial on a large number of women and the study began in Puerto Rico in 1956—with a product called Enavid.

Since then there have been many new compounds available and the method has been generally well accepted. Two types of oral therapy are now available—the Combined and Sequential methods. Since the first trials in 1956, the "Pill" has been modified and changed. Different dosages and combinations of hormone are available, and the side-effects diminished. Further changes will take place in oral contraceptives. The development of a "Morning after" pill is progressing but problems still exist over timing the medication. Others are experimenting with the implantation of hormones under the skin. Small doses of hormone pass into the bloodstream continuously.

The effect of hormones on the cervical mucus is a further area for study. During the reproductive cycle, changes in the consistency of the mucus are seen. During the non-fertile part of the cycle, the mucus is thick and impenetrable to sperm. Could it be maintained in this condition, protection would be afforded by an impenetrable cap of mucus.

So far the "Male pill" has not been successful, since although hormones have been administered which stop the production of sperm, the accompanying side-effects have been too strong.

More recently it has become possible for women to have long term injections.

Immunological Control of Fertility

The compound employed, MPA (medroxyprogesterone acetate known as Depo Provera) is manufactured by the Upjohn Company. It has been used for some ten years to supplement endogenous sources of progesterone in pregnant women, most of whom were threatening to abort.

MPA has been employed by several investigators, either alone in large doses, or in conjunction with oral or injectable estrogens, the purpose of the latter being to establish a more regular bleeding pattern.

Doses are administered every 90 days, which could well make the method particularly useful in areas where medical facilities are inadequate, since one nurse could administer the treatment to many women, returning in 90 days.

Attempts to control fertility by immunological methods date from 1899, when Metchnikoff published his paper on the spermatoxins. The history of immunological studies is long and involved and the best account is found in Albert Tyler's Oliver Bird Lecture "Approaches to the control of fertility based on immunological phenomena" (Journal of Reproduction and Fertility, 1961, 2, 473-506) which gives a table covering more than 225 sets of experiments in which female animals have been injected with sperm or seminal materials for the purpose of active immunization. Tests for antifertility action were reported in some 55 of these, most of these tests were positive. This includes four reports of experiments with women, in which it was claimed that sterility followed the injection of human sperm or sperm extracts, and, in some cases, of these materials from lower animals.

The tests with women comprise very small numbers and lack adequate controls. The tests with lower animals which have been conducted most carefully have generally given negative results. In the experiments done by Eastman, Guttmacher, Stewart and Henle it was shown that anti-sperm antibodies could be present in the blood serum of the immunized female without any significant effect on fertility. One of those who worked on the active immunization of women was J. M. Baskin, who took out a patent for his method (U.S. Patent No. 2,103,240). He was a member of the Editorial Advisory Board of the "Journal of Contraception" which in December 1935 printed an article on his work, which is followed by "Notes on the use of Spermatoxins in Russia" and describes how at the "Prophylactic (Birth Control) Clinic of the Regional Institute for the Protection of Motherhood" in Moscow, experimental work had been going on for some years, and further describes how the spermatoxin was prepared, and the clinical procedure. These notes are signed A.S.—presumably Abraham Stone. Immunoreproduction is among the most important avenues opening in the future of fertility control. Work is proceeding on the effect of passive immunization of female animals; the immunization of males against sperm (the induction of aspermatogenesis) and the immunization of females with placental materials which would cause abortion, and in one investigation the serum of habitual aborters was found to contain antibodies against the placental proteins. An understanding of such factors would lead to new hope for many childless women. Work is also being done on the possibility that infertility may be linked with human blood groups, and investigation suggests that there is a statistically significant antifertility effect of ABO incompatibility.

A greater knowledge of such principles could be a turning point in fertility control and in the diagnosis and maintenance of pregnancy. Selective fertilization could one day be possible—if this is desirable, for many consider that in the future it will be possible to destroy all but certain desired genetic types in an inseminate.

Many other possibilities for fertility control remain to be explored. Carl Hartman's inventory of unanswered questions on physiological mechanisms concerned with conception lists over 150 questions under eight main headings. These questions evolved from discussions at the Conference held at West Point on Physiological Mechanisms concerned with conception.

The main areas to be explored are:

- Spermatogenesis
- Physiology of the Male Accessory Organs
- Composition and physiology of semen
- Sperm migration in the Female Genital tract
- Oogenesis and Ovulation

Fertilization and transport of the Ovum

Mechanisms of implantation

Immunological phenomena

Studies in all, or any of these topics could lead to new, practical and simple methods.

For the near future the ability to predict the time of ovulation more accurately would be invaluable to those who for religious reasons use the safe period. If drugs could be used to control the actual time of ovulation, surely much worry and despair could be avoided.

Changes in the last decade have been far more wide-reaching and fundamental than in any other time in the history of contraceptives. Such changes must and will continue until simple, practical methods are available to everyone.

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