Besides doing something about the mental strain, the woman's college could turn out a far more marriageable product if it put less physical strain on girls. Most boarding-schools know better than to require girls temporarily excused from athletic work to walk long distances to a cold gymnasium and sit for an hour watching the work of the others, and getting thoroughly chilled. Yet strains of this type are to be endured in every college, and they may not seem to harm a girl during her first year or two, but they most certainly do harm her later on, often after she has been graduated. Another thing that wears girls down in college (not boarding-school) is poor or insufficient food. The chalky rubbish fed to them is often mere roughage with very little nourishment. Girls with allowances can supplement the food in the halls with the usual chocolate, cheese, cream, and other concentrated foods that growing people crave; but girls without ready funds must earn the money to supply these necessary things.

However, looking out for physical and mental well-being is about the most that a woman's college can do for a woman beyond teaching her what she goes there to learn. It's no use blaming the college curricula if she doesn't marry and have children, though it would certainly help her to retain her natural femininity if she were to be guided by a college faculty made up in large measure of human, warm-blooded people.

Most of the blame for her failure is inherent in the predicament of her going to college at all, but at least a part of it must be laid to society, and to the large number of men who are still unwilling to marry thinking women, and continue to prefer very young, affectionate, pretty, and opinionless girls, who are bound to make more docile, if less faithful, wives.

The Control of Human Sterility

By JAMES A. TOBEY, Dr. P. H.

Since the days of Dagda, keeper of the inexhaustible caldron of the ancient Celts, mankind has eagerly sought fertility. In his quest he has invoked the aid of Ashtar and Ariadne and the cat-headed Ubastis; he has made sacrifices of rams to Aphrodite and he-goats to Artemis; he has danced in the festivals of Diana and the ceremonies of Demeter and Ceres. Sometimes the goddess has looked upon him with favor, but often she has spurned him, whether he was in Egypt or Crete or Phœnicia or Greece or Rome or anywhere else.

In Talmudic times the wife of Manoah was told: "If you wish to get children, take the skin of a fox, burn it in a fire, take the ashes and mix them with water, and drink of that water three days, three times each day, and you will get a child."

The Talmud also tells us that a cock and a hen were carried as symbols of fertility before the bride and her consort on their wedding-day. In later Hebrew times Moses promised the Israelites numerous progeny as a reward for the journey into the promised land.

Throughout the ages women have sought magical cures for barrenness. At Bethlehem there is a cave called the Milk Grotto, where, according to legend, the Holy Family took refuge. As the Virgin nursed the Child, a drop of her milk fell on the floor, with the consequence that this grotto has since been considered to possess the power to promote fertility among all women who sojourn in it. In certain non-Christian peoples the sun has been worshipped in past centuries as the producer of the greatly desired fertility. The Middle Ages, with their innumerable superstitions and their dependence on legerdemain, likewise were replete with mystical cures for barren marriages. Even to-day, reliance solely upon prayer and superstitious rites has not been wholly abandoned.

The promotion of fertility, or the power to beget living offspring, is just as important and vital a problem in many modern families as the prevention of procreation seems to be in many others. Sterility control is, in fact, even more significant than birth control, for it is

usually more difficult to get what seems to be lacking than to prevent what seems to be abundant.

One out of every six marriages in the United States now fails to result in live issue. Since about a million and a quarter marriages are consummated annually in this country, this means that approximately 200,000 of them are fruitless from the standpoint of progeny. In most instances this unfortunate condition is not due to conscious attempts to limit the population, but to physiological sterility. Sometimes the situation is accepted with humility and resignation, sometimes frantic attempts are made to overcome it, and sometimes the tribulations induced by it culminate in one of the nearly 200,000 divorces which are granted annually in our advanced American civilization.

Sterility is somewhat like smallpox. It is pestiferous when it occurs but usually can be prevented. Like smallpox, a barren marriage is generally regarded as a misfortune, and often as a disgrace, though it is not necessarily either. Sterility is not, of course, contagious, and the analogy would be even stronger if it were compared to pellagra, the dietary deficiency disease which is so prevalent in our Southern States in times of economic stress. Sterility is, in fact, often caused by improper nutrition.

The idea that diet could influence fertility is an ancient one, but only in recent years have the scientific reasons for it been adduced. Charles Darwin asserted in the middle of the last century that the amount of food affects the sterility of the individual, and Herbert Spencer declared that an abundance of nutrition sufficient to leave a large excess after defraying the cost of carrying on parental life, is accompanied by a high rate of genesis. On many occasions famines have been observed by physicians to bring about cessation of menses in women and a reduction in the number of pregnancies.

To-day we know that it is not so much the quantity of food as its quality which influences reproduction, fertility, gestation, and parturition. Over-eating, which leads to obesity or even to overweight, does not facilitate fertility, but has a reverse effect. It is the well-balanced diet which is conducive to human fecundity, and such nutriment is within the reach of all persons if they only know how to select it. An adequate diet is, moreover, not necessarily an expensive one. As long ago as 1813 a leading book on domestic medicine stated that "The inhabitants of every country are prolific in proportion to their poverty, and it would be an easy matter to adduce many instances of women who, by being reduced to living entirely upon milk and vegetable diet, have conceived and brought forth children, though they never had any before."

Here was an observation which modern science has confirmed. Milk and certain vegetables do promote fertility in many persons when these products are abundantly used in the dietary regimen. Other foods which help to exert this beneficial effect are eggs, whole-grain cereals, dairy products generally, and certain fruits. If the daily diet is built around the so-called protective foods, milk, fruits, and the green leafy vegetables such as lettuce, spinach, peas, beans, cabbage, chard, and the like, health and vitality will be fostered, and fertility will be improved and maintained.

Evidence to support this contention is abundant. Not only are the laboratories of the biochemists constantly giving us the proof, but controlled clinical observations on many individuals have revealed the importance of good nutrition in the prevention of sterility. Thus, the beneficial effect of a single food on fertility has been demonstrated in the laboratory of Professor Henry C. Sherman at Columbia University in New York. Here during the course of the last decade this authority on nutrition has successfully raised some twenty-five generations of experimental animals on a diet consisting entirely of a mixture of whole-milk powder and whole-wheat powder. The interesting point, however, is not merely that this diet is adequate for reproduction and the successful raising of offspring, but that when the amount of milk in this ration is doubled, so that it comprises one-third instead of one-sixth, remarkable results with respect to increased fertility have been achieved. The animals on this optimum diet have regularly displayed earlier maturity, a longer duration of the prime of life, and even greater success in the production and rearing of their young. They have also shown increased longevity.

On the clinical side we have the experiences of gynecologists, who have achieved gratifying results in their patients by means of improvement in diet. In a recent issue of *The Journal of the American Medical Association* there were reported the cases of 206 sterile women, who consulted one specialist over a period of two years. Analyses of the diets of these women revealed that the nutrition of many of them deviated in many important respects from an adequate and well-balanced fare. This was nothing unusual, for defective diets are as common among the well-to-do, even among

those sufficiently affluent to consult a specialist, as among the poorer classes.

After treatment, forty of these afflicted women became pregnant, an achievement accomplished in most cases chiefly by improvement in diet. The foods employed consisted in general of eggs, meat, milk, butter, cod-liver oil, green vegetables, and fresh fruit, the quantity yielding somewhat over 2,200 calories per day. In some instances it was not the wife but the husband who needed a corrective diet.

Experimental data on the value of diet in the promotion of fertility has also been corroborated by other scientific observations on the human race. An officer of the British Medical Service in India, Doctor Robert McCarrison, discovered far in the Himalayas an isolated tribe, the members of which are distinguished by a magnificent physique, and a potent fertility, with the virile characteristics of youth retained until late in life. The diet of this remarkable race consists almost entirely of goat's milk, supplemented by certain vegetables. Goat's milk, incidentally, has no magical properties not possessed by cow's milk. In the Panjab section of India, where the pastoral people consume as much as a gallon of milk a day, an amazingly high fertility, with a birth-rate as high as 42 per 1,000, has been reported by British medical officials.

In his monumental "Principles of Biology," Herbert Spencer quotes the traveller Barrow as reporting that the South African Kaffirs were a particularly fertile people. "Rich in cattle," he writes, "leading easy lives, and living almost exclusively on animal food (chiefly milk, with occasional flesh), these people were then reputed to have a very high rate of multiplication." Spencer devotes several whole chapters to a discussion of the coincidence between high nutrition and genesis, though he was, of course, writing long before the advent of the modern science of nutrition.

The first really scientific clew to the relationship between diet and reproduction came in 1911 as a result of nutritional experiments with animals. In 1906 Doctor S. M. Babcock started an investigation at the Wisconsin Experiment Station to determine the effects of feeding to cattle similar rations derived from different plants. Thus, one group of animals received a ration of wheat only, another got corn only, a third was favored with the oat plant, while the fourth group had food of the same chemical composition, but made up of all three of the plants, wheat, oats, and corn. In the conduct of this brilliant test, Doctor Babcock had the assistance of E. B. Hart and G. C. Humphrey, and later of Harry Steenbock and E. V. McCollum, all names to conjure with in the modern science of nutrition.

At the end of a year the effects of these different diets on the young heifer calves were somewhat startling. Those animals who were corn-fed were sleek and well nourished, carrying their young to full term and producing vigorous offspring. The wheat-fed group, on the other hand, were rough and gaunt. Their young were small and prematurely born, usually dead at birth or succumbing soon afterward. The oat-fed group gave better results than the wheat-fed, but much poorer than the corn-fed, as did also the control group which had received the combination of foods.

The explanation for these interesting and significant results was not forthcoming until several years later. At the time of the Wisconsin experiments those elusive elements now called vitamins were more or less unknown. In 1915, however, Professor McCollum and his co-workers noticed that certain diets which promoted growth in laboratory animals failed to stimulate reproduction.

Suspicion was then pointed at a lack of the vitamins, the accessory food factors, two of which had been discovered by that time. Today, after a legion of scientific investigations, we know that it is the presence or absence of certain of the half-dozen or more recognized vitamins which chiefly influences fertility favorably or adversely. The minerals in the diet, particularly calcium or lime salts, also play a certain part, but the vitamins have the principal rôle.

During the past three decades half a dozen of these vitamins have been discovered and the functions of each has been more or less determined. Thus, vitamin A promotes growth, general good health, a favorable resistance to disease, and fertility. Vitamin B, which has lately been shown actually to be twins and probably triplets, also promotes growth. One fraction of it prevents the disease known as beri-beri, while the other, now generally called vitamin G, prevents pellagra. Vitamin C averts scurvy and also helps to build bones, while vitamin D prevents rickets and brings about the proper deposition of the lime salts which construct bones and teeth. The vitamins also play other parts in the performance, or metabolism, of the human machine, but those functions mentioned are, in general, their chief duties.

Among this elusive category of vital sparks, or vitamins, there is one which is actually an anti-sterility vitamin, for its sole function

seems to be to aid in the promotion of fertility, at least in white rats. This vitamin, discovered in 1918 and known as vitamin E, is really not of great practical importance, as it is widely distributed in nature, occurring in muscle meats, in butter, in grains, and in many vegetables. Individuals need not worry about any conspicuous lack of it, for those who seek improved fertility should endeavor instead to secure ample amounts of vitamins A, B, and G in their daily victuals, and these may be obtained from such foods as milk, green vegetables, fruits, whole grains, and eggs.

A passing allusion to this anti-sterility vitamin in an article on diet contributed by the writer to a woman's magazine of wide circulation elicited immediate responses from several women who desperately wanted children. One of them wrote that she had been doctoring for several years with a number of eminent gynecologists, so far without results, and that none of them had so much as mentioned diet to her. She wondered, with anguish in every line of her letter, whether she, and perhaps her physicians, had missed the real remedy all these years.

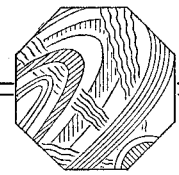
It might have been so. On the other hand, important as is diet, it is not the only factor in sterility. In order to secure successful reproduction, there must be ovulation in the female, migration of the ovum, fertilization by the male, implantation in the uterus, and successful growth there. Defects may occur in one or several of these various steps, either on the part of the male or female, or both. Science does not know positively the specific effect of nutrition on all of these physical operations, but it does know the effect of good or bad diets on many of them. Then, there are also numerous other causes of sterility, mechanical and otherwise. The medical advisers of the lady mentioned may have realized that the right food might have made no difference in her particular case, because of other insurmountable difficulties, though proper nutrition is always worth trying, because of its beneficial effect on general health, if for no other reason.

Early abortion is, in general, due to the same nutritional deficiencies as is sterility. If the embryo is to survive and not to be resorbed, it must be guarded against malnutrition, which means, of course, that the expectant mother must be adequately nourished. Many women who have shown a history of unsuccessful pregnancies have later given birth to full-term infants as a result of scientific attention to their dietary needs during the prenatal period.

Although proper diet favorably promotes reproduction, it does not exert any influence on the sex of the child, so far as is known to-day. As long ago as 1897 a scientist made the interesting claim that the sex of the child could be determined by the nutrition of the embryo, basing his conclusion on the hypothesis that sex depends upon the nutritive superiority of one of the parents. Physiologists have demonstrated, however, that sex is determined at the time of the union of the sperm-cells and is governed by the type of chromosomes in the spermatozoa. There is as yet no possible way to predict the results of such a union.

Whether due to a general diminution in fertility, or to the expansion of the social movement known as birth control, or to other factors, the United States is to-day facing a definite decline in the birth-rate. Concentration in cities tends to reduce birth-rates, for rural peoples are more fertile than urban, and the restriction of immigration, with its former influx of young adults in the prime of life, further tends to lower national fecundity.

Our birth-rate of about 20 births per 1,000 population is only slightly in excess of the death-rate. Many competent statisticians believe that we are approaching a stationary population, with this excess actually lower than it appears and near the vanishing point. Whether such a situation is a good thing is a matter of opinion. But since knowledge of birth control is limiting the number of children in homes where more are not wanted or no provision can be made for them, the promotion of fertility and the prevention of sterility are matters of great national and social significance.



A Partner for Life

By WALTER GILKYSON

A story of human beings behind the stock ticker in time of stress

HENRY ARMAT, standing in front of the fire, listened to his partner with a feeling of envy and a queer, half-uncomfortable desire to protect him from the too great flame of his enthusiasm. Barklie believed: his dark, thin face burned with intensity, and his fingers roamed nervously through the pockets of his dinner jacket. Such enthusiasm was rare in Philadelphia, and even more rare in a Philadelphia banker. It was the quality in Barklie that especially endeared him to Henry Armat. Old, sceptical and dry, as he dimly pictured himself, he treasured Barklie's courage and daring, curbing it only when necessary, and always believing in it as the ultimate though uncertain guide to their success.

"The market can't possibly break now," Barklie was saying. "We're on the crest of a continuous wave, with business rising steadily under us——"

Henry Armat shook his head.

"Man, look at the earnings of the country for the third quarter of the year!"

"That ended three weeks ago. This is October the twenty-second."

"What's the difference!"

"A lot."

"A very slight falling off—seasonal——"

"Getting ready for Hallowe'en, I suppose." Henry Armat moved his big body away from the fire that was scorching his legs. He looked over at Margaret, Barklie's young wife. She was a blond, tranquil woman with blue eyes and smooth, banded hair. At the moment she was waiting for Barklie to come back with some annihilating retort. That was right. She was quite as she should be. There were times when he felt sure that what she and Barklie and the two children had was worth more than the banking business.

"I hope we aren't all of us being fooled," he said, in his long, slow, even voice with its faint up-state twang. He stepped away from the fire, his heavy legs breaking the line of his trousers grotesquely at the knees. In the wide drawing-room, with its Lorraine engravings and cupboards of fragile china and delicate ramping chairs, he looked rough-hewn and square, as if he belonged to the logs and the stones and the andirons he had just left.

"I must get along, Barklie. If you come back from New York in time I may run up to Lancaster to-morrow night."

"If you do, give my love to your mother." Margaret rose, went over to him, and absent-mindedly picked a thread off his sleeve.

"Thanks," he said. For a moment he