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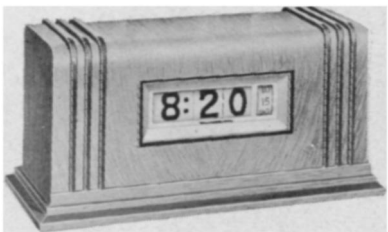
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GENETICS

Sperm Banks Debated

System could breed race of geniuses—
but many doubt its basic premise.

by Barbara J. Culliton

Banks of frozen sperm similar to blood banks might be used to breed a super race of men, solve problems of human barrenness, and breed inherited defects into oblivion—if they work.

Some scientists foresee the establishment of banks of stored sperm, while others believe the idea—aside from any legal or moral difficulties—will never work.

Visionaries suggest that under the plan women would be impregnated by sperm cells taken from deep-freeze storage. Donor men would be chosen for intellectual and physical superiority—perhaps creating a world peopled with Beethovens and Einsteins.

The ultimate goal is to freeze human sperm for long periods of time—even centuries. The late Dr. Herman J. Muller, winner of a Nobel Prize for his discovery that radiation causes inheritable changes in reproductive cells, believed such storage possible. He called for sperm banks for the protection of astronauts, soldiers, scientists and others who might be exposed to radiation damage. Sperm banks, he said, would offer them a kind of insurance.

Dr. J. K. Sherman of the University of Arkansas Medical Center, Little Rock, who has done extensive work on freeze-storing human sperm, says sperm banking offers hope to barren couples and even has a role in contraception.

Some men are unable to fertilize their wives because they do not have enough active sperm cells at any one time. Collection and storage, he says, can solve that problem. For contraceptive purpose, he suggests some men would be willing to be sterilized after having the number of children they want if they knew their sperm might still be used as a "genetic legacy" to others.

Behind this dream of preserving human reproductive cells is the assumption that they can, in fact, be kept almost indefinitely in cold storage.

One skeptic, Dr. Glenn W. Salisbury of the University of Illinois at Urbana, says it is most unlikely this will ever happen. He reports that even under conditions of storage at minus 320 degrees F. sex cells mutate.

The situation, as he sees it, brings questions of birth and aging very close together. The chemical changes in sperm cells, even in extreme cold, mark

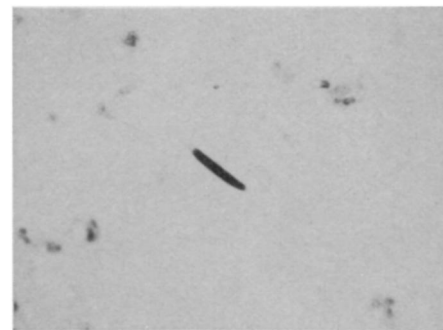
the beginning of aging. Although cold storage significantly slows chemical activity within cells, it does not turn it off completely, he reports. Dr. Salisbury suggests these cells might make a good model for the study of aging as scientists attempt to learn what it is all about.

Aged or stale male or female sex cells, scientists have shown, are less likely to get together to produce healthy offspring than are fresh ones.

Older women, for example, are more likely to bear mongoloid children than young women. This may be because the supply of eggs is somewhat stale.

Women are born with a single supply of eggs, releasing one or two a month at ovulation. Men, however, are continually replenishing their supply of sperm cells.

In studies with cattle, Dr. Salisbury found a decrease in fertility and an increase in embryonic death among cows fertilized with stored, aged sperm. Cattle sperm stored at minus 41 degrees F. shows mutagenic effects within only four or five days, he says. At minus 142 degrees mutations appear in three or four months and at minus 320 degree, sperm cells begin to loose



Glenn W. Salisbury

From frog sperm: a key to aging.

activity within six months to a year.

Dr. Salisbury found that 30 percent of cows fertilized with bull sperm over a year old lost their calves to spontaneous abortion within the first three months of pregnancy.

To follow up clues pointing to aged sperm as a source of trouble, Dr. Salisbury inaugurated experiments with frogs whose sperm and egg cells mate

and develop in the open, not within the female's body. This gave him a chance to closely observe chemical reactions that take place.

Dr. Salisbury discovered that frog embryos fertilized by aged sperm make two proteins fewer than embryos developing from fresh, young sperm.

Dr. Salisbury and his co-worker, R. G. Hart, homogenized the embryos at the gastrula stage when they are multi-celled but have not yet developed limb buds, eyes, a beating heart or other individualized organs. Then they counted the number of proteins in the homogenates.

So far, Dr. Salisbury says, the two proteins missing from the aged embryos have not been identified, but before long he hopes to isolate them and determine their composition.

Mutations in the cells of the aged sperm, Dr. Salisbury theorized, produced defective RNA or ribonucleic acid. RNA directs cells' protein-making operations.

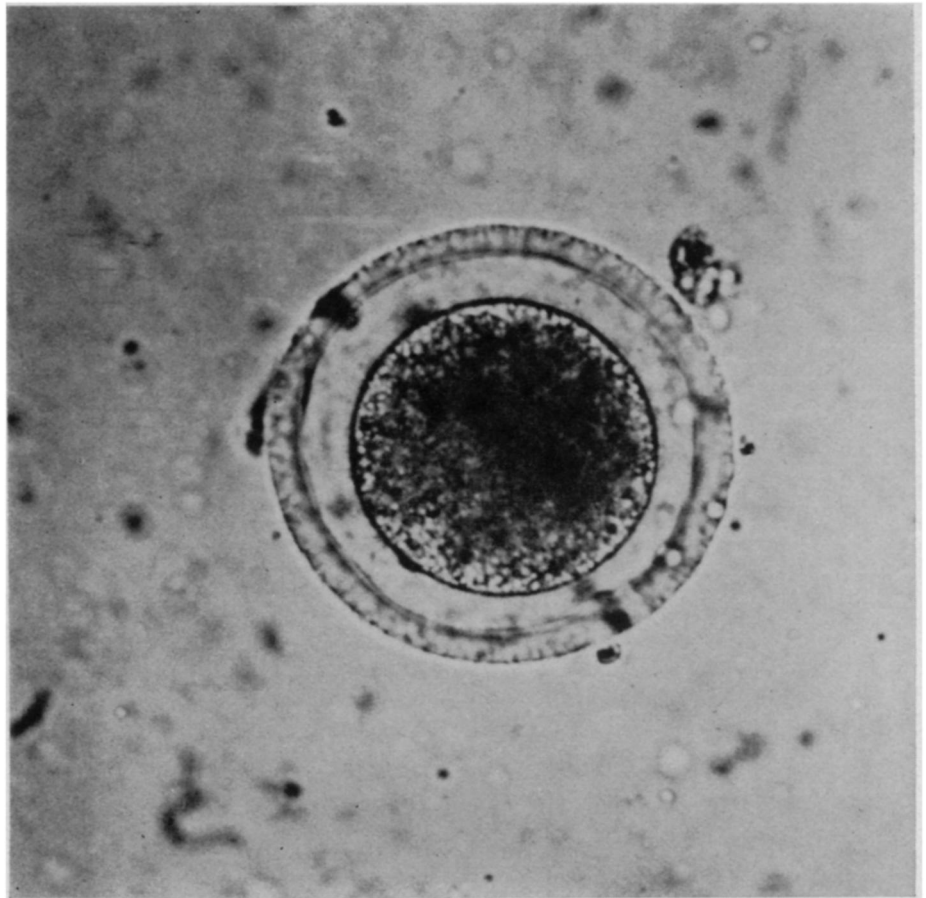
To prove his theory, he isolated RNA from young and old embryos. When normal RNA was injected into embryos fertilized by aged sperms, the embryos carried out all normal stages of development. But when aged RNA was injected into aged embryos, development stopped at the gastrula stage just as it did in aged embryos not given any additional aged RNA.

Although his evidence is preliminary, Dr. Salisbury suspects cattle and human sperm undergo similar aging processes and that a failure to manufacture the normal complement of proteins may account for decreased effectiveness of stored sperm cells.

Attempts to fertilize women with sperm taken from the freezer and thawed have been few indeed, but what little evidence there is seems to support Dr. Salisbury's skepticism.

One woman conceived after artificial insemination with five-year-old sperm, but she is very likely to have a spontaneous abortion, Dr. Sherman says. About 40 infants have been born to women impregnated by frozen sperm, but the storage time in these cases was only about six months.

The only real way to test the possibility of using frozen sperm, according to Dr. Sherman, is to try it extensively in human experiments. Although there is a vague but widespread fear of the possibility of genetic damage, both Drs. Salisbury and Sherman agree it is not probable that deformed children would ever be born to women participating in such studies. If mutations have occurred in the stored sperm cells, they say, the probability is that there will be no fertilization in the first place or that the embryo will be aborted early in pregnancy.



Glenn W. Salisbury

Experiments with cattle show that a cow egg, above, fertilized by aged sperm, below, is less likely to develop than one fertilized by young sperm.

