

New hope for infertile couples

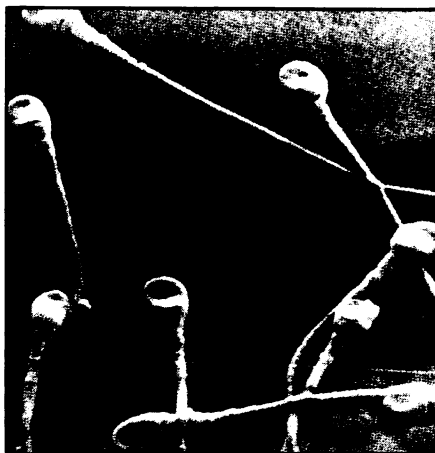
The process of human reproduction could be the most natural, basic and primeval drive in the species, but one-fifth of all couples who try to reproduce are not successful at it. Artificial insemination has helped some of these couples but its success has been limited; artificially depositing enough viable sperm in the uterus is difficult. A few of the side effects common in the past that have kept artificial insemination from being the panacea for unsuccessful but willing potential parents, are cramping and nausea in the woman because semen is rich in prostaglandins and because far more semen is deposited in the uterus artificially than through intercourse. Uterine infections due to bacteria in the artificially deposited semen have also been a problem.

Now artificial insemination for infertile couples promises to be more effective and safer than before and also totally painless, thanks to a technique devised two years ago in the test tube—culling the strongest, most viable sperm from semen—and using these sperm only for insemination.

The principal investigator, then of the A.G. Schering Co. in Berlin, and now of Gametrics Ltd. in Sausalito, Calif., is Ronald J. Ericsson. He is training physicians and medical technologists throughout the United States and in other countries in how to perform the technique for artificial insemination. The technique has already been used for artificial insemination in a handful of cases and has led to pregnancy. Ericsson will also market the technique to any interested physicians 18 months from now. He estimates that the technique should be able to induce conception in about one-fourth of all infertile couples.

Aside from helping couples with fertility problems, the technique will undoubtedly have several other profound effects on society. For one, it separates out only sperm that are the strongest swimmers, and these sperm happen to be those carrying the Y chromosome. That means that any babies conceived with the technique will be male. As a result, couples who have no fertility problem but who simply want a boy may also request the technique. (Ericsson is not trying to discriminate against girl babies, he simply has not yet figured out how to cull sperm carrying the X chromosome.) And then, because the technique selects only the strongest, most genetically fit Y sperm in semen, it will give nature a boost in choosing the most fit sperm to conceive. In other words, it should help reduce genetic defects, an effect that will please many people, but disturb others because of its eugenic connotations.

In the technique that Ericsson and his colleagues devised two years ago, sperm



Fast-moving Y sperm: Selectively sorted.

are spun out of a semen sample and placed in a special solution. This solution is dense and resists sperm swimming in it. Y sperm, those that confer the male sex on the eggs they fertilize, are able to swim through the solution faster than X sperm, those sperm that confer the female sex. As a result, the sperm collected at the bottom of the solution are mostly Y sperm. What's more, of the Y sperm in semen, those collected are the most vigorous and hence, the healthiest. Samples of the isolated sperm have been shown to be free of up to 90 percent of morphological abnormalities. Then the solution, rich in Y sperm, is reprocessed until some 90 percent of the sperm obtained are of the Y variety (SN: 1/12/74, p. 21). Six other groups of investigators in the United States, Europe and Mexico have since confirmed the technique.

Sperm collected by this method, Ericsson explained to SCIENCE NEWS, are then ready to be squeezed with a syringe into a plastic tube with a tiny diameter up into a woman's uterus. The procedure, he says, "doesn't hurt at all."

Ericsson foresees the technique benefiting couples with certain types of fertility problems, but not all. For instance, it should benefit couples when a male does not produce enough sperm in his semen or enough mobile sperm in his semen, because ample numbers of vigorous sperm can be culled from his semen for artificial insemination purposes. About half the difficulties couples have in conceiving stem from problems involving the sperm. The technique should be of benefit when the cervical mucus is hostile to sperm and when the sperm are not vigorous or numerous enough to penetrate this barrier, since enough vigorous sperm can be concentrated and injected past this barrier. The technique should also benefit couples where the male has a urinary tract infection that causes cells to collect in semen and crowd sperm, since the sperm can be isolated from this flotsam and therefore no longer be inhibited in their actions. If a woman does not ovulate, or if a man does not produce sperm or only dead sperm, however, the technique cannot help conception.

The extremely vigorous sperm isolated by the technique also survive the stress of freezing about twice as well as do regular sperm, Ericsson and colleagues will be reporting in the November FERTILITY AND STERILITY. Livestock insemination with the technique is being carried out at Louisiana State University and Cornell University. □

Gallup polls the world: How people feel

Galloping feedback, as it has been called, will soon be with us. The pollsters already let us know what we think on an almost day-to-day basis, and attempts are even being made to get instant feedback during (not after) the presidential debates. Considering the technology available and the value of a well-conducted poll, it is not surprising that poll-taking is becoming increasingly sophisticated and popular. Considering the growing realization that third-, and fourth- and fifth-world nations also have a stake in international affairs, it is not surprising that attempts are now being made to conduct worldwide polls.

Pollster George Gallup, with funding from the Charles F. Kettering Foundation, has recently completed one of the first large-scale attempts at international pulse taking. One-hour interviews with 10,000 persons at all economic levels in almost 70 nations fill an 18-volume report. Among the findings:

- Nearly half the people in the world are engaged in a serious struggle for survival, but as bad as things may be, people in poorer countries tend to believe that

things will improve for them in the future.

- The high cost of living, unemployment and shortages of vital goods, including food, are the top concerns of people, at all levels, in all nations.

- Warm climates do not necessarily produce happier people, but South Americans and Africans are more optimistic about the future than people in more advanced nations.

- The less-well-developed nations are increasingly interested in rapid economic growth through industrialization. Those in industrialized countries tend to favor less industrialization and growth.

- Attitudes toward women are changing in developing countries.

- Family life still provides the greatest satisfaction.

- Rural residents still want to move to the cities.

- Large majorities (up to 93 percent in Africa) still believe in God or a universal spirit.

Gallup's findings are not overly dramatic, but they will provide a valuable baseline for future studies. This first sur-

vey was also less than instant. It took two and one-half years. Gallup estimates, however, that future surveys can be done in 12 to 16 weeks. □

Environment report: A long way to go

The quality of human surroundings is continuing to improve, according to the seventh annual report of the Council on Environmental Quality (CEQ), but the United States has a long way to go before its air, water and natural resources are adequately protected. Some highlights:

- Of 247 Air Quality Control Regions, several failed to meet statutory standards for one or more pollutants. CEQ concludes, however, that "the nation is making significant progress in improving its air quality," and that most of the regions will succeed in meeting the standards by the early 1980s.

- Water quality "has not improved as rapidly as we had hoped." Administrative delays have in turn held up the issuance of guidelines and permits to industry. Also, a follow-up study showed that polluters were not adhering to the conditions of their effluent permits.

- Ocean dumping decreased 23 percent from 1974 to 1975, reducing pollution in coastal waters.

- Hazardous substances are still not being dealt with adequately. There is a lack of "coordinated and comprehensive legal tools" to handle the problem, and in some cases, a "flagrant neglect of good occupational and environmental practices."

- Since the Occupational Safety and Health Act was passed in 1970, only three sets of complete (Section 6b) health standards for industrial exposure to hazardous substances have been issued. The council recommends at least labeling the materials so that workers can take their own precautions.

- Solid waste recovery is proceeding slowly, with 25 communities having facilities in operation, under construction or out for bid. Direct recycling is down sharply.

- During the next decade, the total cost of environmental cleanup will be roughly \$258.8 billion. By the end of the decade the gross national product is projected to be only 2.2 percent lower than it would have been without environmental legislation. Effect on employment is favorable: A net number of 400,000 people are employed now who would not be if environmental laws didn't exist.

- Though total energy consumption dropped by more than 2 percent for the second straight year, petroleum imports rose to about 40 percent of total consumption. More energy conservation would not necessarily lower the gross national product. □

Foxbat: Demythologizing a superplane

Whenever it has wanted money in the last few years, the Pentagon has told Congress about a spectacular new sophistication of Soviet military technology. Just three years ago, for example, the Mig-25 "Foxbat" was heralded as a sort of superplane that could serve as fighter, interceptor or reconnaissance aircraft. Then Air Force Secretary Robert C. Seamans Jr. called it the "best interceptor in production in the world," and praised its "highly capable avionic and missile system." However, when a young Russian Air Force officer defected recently by flying his Foxbat to Japan, Western experts soon found that the plane did not live up to its reputation.

One account of what they found is summarized by Rep. Robert Carr (D-Mich.), a pilot and member of the House Armed Service Committee, in the Oct. 3 Washington Post. He concludes that as a fighter, the Foxbat is "barely equal to our 15-year-old McDonnell F-4 Phantom." As a reconnaissance craft, "It is very good, but we have had better for a decade." As an interceptor, "It is obsolete and inadequate."

Flying as a fighter the Foxbat has a top speed of about Mach 2.8, somewhat faster than American fighters. But Carr says any speed above Mach 2.5 is wasted in a dogfight because of decreased maneuverability. Either of the two newer U.S. Air Force fighters, he says, can "out-climb, out-accelerate, out-turn, out-see, out-hide and out-shoot the Foxbat by margins so wide that our expected kill-ratio advantage is almost incalculable." □

Equipped as a reconnaissance aircraft, the Foxbat can reach a speed of Mach 3.2 and an altitude of 80,000 feet—but can sustain these extremes only for about 10 minutes. For more than 10 years the United States has had a craft that can do better than that: The SR-71 can fly at a faster top speed and a higher peak altitude, and can sustain these for 3,000 miles.

The problem with the Foxbat as an interceptor has not so much to do with its own characteristics as those of modern warfare. It was apparently designed to attack high-flying bombers, while according to Carr, all U.S. strategic bomber missions now call for low-level attack, at altitudes below 500 feet. Neither the Foxbat nor any other Soviet craft, he says, has the sophisticated "look-down" radar needed to track such bombers.

Perhaps the most illuminating discovery from the new examination is that even the successes of the Foxbat were achieved through considerable cutting of corners. The highly touted avionics, for example, turned out to be vacuum-tube systems that Carr says "would have been considered obsolete 10 years ago and unimpressive 15 years ago." And the structure of the plane is of steel, not titanium, as previously thought. Since steel is much heavier, Soviet designers had to achieve lightness by sacrificing several vital items, such as an ejection seat.

Altogether, Carr concludes, the new revelations call into question both the overall Soviet military sophistication and the credibility of the U.S. Defense Department. □

Clean air bill dies; industry in limbo

A bill to amend the 1970 Clean Air Act was smothered to death in hot air last week as Congress rushed toward adjournment and the campaign trail. The bill was successfully filibustered by opponents of its ambient air quality standards, but failure to pass it left automakers with what they call an impossible deadline for meeting emission control standards.

Originally, the Clean Air Act set standards for exhaust gases containing unburned hydrocarbons, carbon monoxide and oxides of nitrogen, which were to be met in 1975. When problems arose in the development of catalysts to remove these noxious components of exhaust (SN: 3/15/75, p. 168), Environmental Protection Agency Administrator Russell E. Train granted automakers a three-year extension and recommended that Congress enact legislation providing extension of some standards until 1980.

The present bill would have given the auto industry only a one-year extension, but failure to pass it automatically makes them liable to meet the standards in 1978 cars. These cars have already had to begin their

lengthy certification procedure, and all four major manufacturers say there is no chance that they can meet the statutory requirements on time.

The bill was defeated because of what opponents said would be its effect in keeping industries from entering areas now relatively undeveloped. A good case in point would be coal-bearing regions of the West, where amendments preventing any degradation of the pristine air would effectively stop construction of power generation facilities near the coal. Not surprisingly, the successful filibuster was led by the two senators from Utah, Jake Garn (R) and Frank Moss (D).

When the '95th Congress convenes on Jan. 4, 1977, one of the first items on its agenda will have to be another attempt to amend the Clean Air Act. The result is likely to be a long-delayed compromise. In the meantime, the legislators will have a chance to explain to the voters why there has been another delay in legislating an extension to a previous delay of an original grace period. □