

planning and the faith of some of the mission's geologists that the bumpy surface of the region is overlain by a thick layer of dust—padding for the lander's Sept. 3 touchdown at about 3:45 p.m., PDT.

The "safe" area chosen for the landing site is a tight fit indeed, largely because uncertainties about the descent path require allowing for touchdown anywhere within an ellipse about 100 kilometers wide and 260 kilometers long. As a result, the chosen region is virtually surrounded by more hazardous terrain, including Mie's ejecta blanket to the northeast, fault-ridden "polygonal ground" or "elephant hide" to the southwest, and a thinner dust blanket (with a corresponding rise in the number of small craters) to the south and west.

The site itself, says Harold Masursky of the U.S. Geological Survey, seems to be covered with as much as 10 to 25 meters of dust, sculpted into dunes by the Martian winds. The thickness is a critical item, since, besides the dunes, the blanket clearly preserves the outlines of pedestal craters, knobs, blocks ejected from Mie and other features of a generally unfriendly terrain underneath. Lander 2 could thus have a surprise in store, but

some of the geologists are banking on comparisons with terrestrial dune fields with similar spacing and contour-softening as evidence for an adequate cushion.

At least there is likely to be more water, although still not necessarily in liquid form. Data from the orbiters has indicated that the amount of water in the atmosphere increases by about 10 times between the equator and the 22° latitude of the lander 1 site, and by another factor of three between 22° and lander 2's tentative destination in the high 40s. Along the edge of the now-minimal north polar cap, in fact, says Crofton B. Farmer of the Jet Propulsion Laboratory, the airborne water-vapor content is nearly 100 times that over the equator. In the lower latitudes, he says, most of the water vapor is concentrated in the bottom 1 to 2 kilometers of the atmosphere, but for the frigid near-polar air to hold as much water as it does, it must be saturated—100 percent humidity—virtually from bottom to top. Temperatures that encourage such voluminous release of water, Farmer adds, suggest that any frozen carbon dioxide from the cap must be long gone, meaning that the cap at its minimum extent must consist almost entirely of water ice. □

injection of antibodies prevents conception during several hamster estrous cycles, but also that the antibodies concentrate in the ovary and not in other organs. This suggests that the antibodies are selective in their action and would not disturb other physiological functions. Whether the antibody injections might somehow compromise future pregnancies or the health of future offspring is not yet known, but the researchers think it is unlikely since the antibody levels in the female hamsters fall off in a linear fashion and do not harm female reproductive organs.

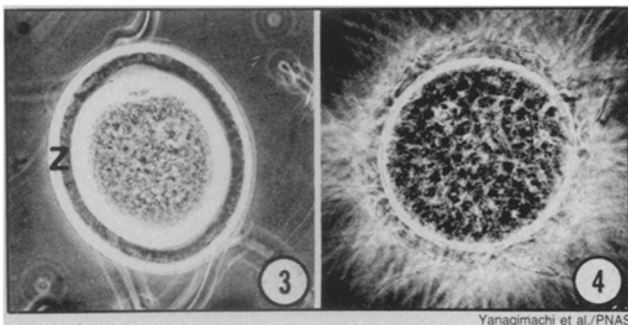
The next step toward applying the concept in women depends on isolating an antigen on the human female egg that can be injected into rabbits to raise protective antibodies. These antibodies in turn would be injected into women. Winkelhake says this feat should not be difficult because scientists now have the technology to do it. Scientists would then have to see how long one injection of antibodies would protect a woman from conception. Since one injection protects a female hamster over four estrous periods (7 days each for a total of 28 days), it is likely that one injection would protect a woman for a comparable period or perhaps longer. In any event, one injection would offer much longer protection than birth control pills that have to be taken daily. And one injection would probably also offer fewer side effects than the pills do since the injection appears to interfere only with sperm penetration of eggs, not with female hormones.

When might such a form of birth control become commercially available to women? Winkelhake estimates it will be five years or even less, depending on how earnestly scientists set about accomplishing these goals and how much support is provided by interested funding agencies such as the World Health Organization.

Actually, some female subjects have already been successfully immunized against pregnancy for up to a year. They received antibodies raised against the human hormone that is necessary for the establishment of pregnancy—human chorionic gonadotropin (SN: 2/21/76, p. 117). Although this approach has proved its effectiveness in some human subjects, and immunization against an egg antigen has yet to do so, Winkelhake believes that the latter approach may eventually prove superior. The reason is that HCG may have some crucial physiological functions other than just establishing pregnancy. If so, knocking HCG out of commission for a year would jeopardize such functions.

Only time will tell whether one form of immunization against conception is more effective and safer than the other. In fact, still a third form of immunization against pregnancy may emerge from this field of research. Once an antigen from the human female egg has been isolated, it might be used alone to vaccinate women against conception. □

## Immunizing against pregnancy: Advances



*Sperm can't penetrate egg coated with antibodies (l.) whereas they can penetrate the uncoated egg (r.).*

Visualize a woman receiving an injection of antibodies, the antibodies keeping sperm from penetrating the eggs she releases during the subsequent year, and the antibodies not interfering with her ovulation, menstruation or other bodily functions. Sound like the ideal female contraceptive? Quite possibly, and researchers are moving ever closer to it.

The most promising and recent evidence that this concept is feasible, that it provides temporary contraception without side effects in live animals, is reported in the July PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES by Ryuzo Yanagimachi of the University of Hawaii School of Medicine, Jeff Winkelhake of the Medical College of Wisconsin and Garth L. Nicolson of the Salk Institute for Biological Studies. Temporary immunization against pregnancy could become clinically available in another five years or even less, these researchers estimate, provided scientists and science funders

make an immediate, concerted effort.

This approach to contraception got its first major boost in 1972. C. Alex Shivers of the University of Tennessee showed that if an antigen of hamster eggs was injected into rabbits, the rabbits made antibodies to the antigen. If the antibodies were then placed in a test tube with a hamster egg and hamster sperm, they coated the egg and kept the sperm from penetrating and fertilizing it (SN: 2/10/73, p. 94).

Last year Yanagimachi showed that the same effect could be achieved in live animals. If antibodies to the hamster egg antigen in rabbits were injected into female hamsters, the antibodies prevented conception during several estrous cycles, showing that the method was both effective and temporary. Scientists had previously worried that antibodies might trigger permanent infertility.

Now Yanagimachi, Winkelhake and Nicolson have shown not only that one