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Commentary

Evolution's Pregnant Pause: Artificial Wombs

“The womb is a dark and dangerous place, a hazardous environment,” the late Joseph Fletcher, professor of medical ethics at the University of Virginia School of Medicine, wrote 25 years ago. “We would want our potential children to be where they can be watched and protected as much as possible,” Fletcher said.

These words came back to me in recent weeks with talk of the prospect of cloning a human being and of using embryonic stem cells to create specific body parts to cure or alleviate diseases.

But another biological bombshell is waiting in the wings, one that would forever change our concept of human life: the possibility of an artificial womb so that, theoretically, tomorrow's babies could be grown in laboratories.

Yet the prospect of an artificial womb raises troubling questions. One example: We know that the developing fetus responds to the mother's heartbeat, emotions, moods and movements. What kind of child would we produce from a liquid medium inside a plastic box? Do we risk producing beings who are unable to emotionally connect and be fully human?

These and other important practical, moral and ethical questions must be addressed before we let science move ahead willy-nilly. However, there may be no way to stop it.

Several weeks ago, a team of Cornell University scientists announced that it had succeeded in creating an artificial womb lining using a cocktail of drugs and hormones.

The goal of the research, led by Dr. Hung Chiung Liu of the Center for Reproductive Medicine and Infertility, is to help infertile couples by creating an entire womb that could be transplanted into a woman.

Halfway around the world, working in a small research laboratory at Juntendou University in Tokyo, Yosinori Kuwabara and his colleagues are developing the first operational artificial womb—a clear plastic tank the size of a bread basket filled with body-temperature amniotic fluid.

For the past several years, Kuwabara and his team have kept goat fetuses growing for up to 10 days in this womb by connecting the goats' umbilical cords to machines that serve as a placenta, pumping in blood, oxygen and nutrients and disposing waste products.

While the plastic womb is still only in development, Kuwabara predicts that a fully functioning artificial womb capable of gestating a human fetus may be a reality in less

It's possible that one day we could bring a baby to term in a laboratory. Should we?

than six years.

Other scientists say we will probably see the mass use of artificial wombs by the time today's babies become parents.

Artificial wombs will likely first be used in cases where either the mother can no longer carry the child or where the fetus needs to be cared for in an environment where it can be easily monitored.

We already can keep fetuses alive in incubators during the last three months of gestation. And researchers routinely fertilize eggs and keep embryos alive in vitro for three to four days before implanting them in a woman's womb.

Scientists such as Kuwabara are attempting to fill in the

time between the beginning and end of the gestation process—the critical period during which the fetus develops most of its organs.

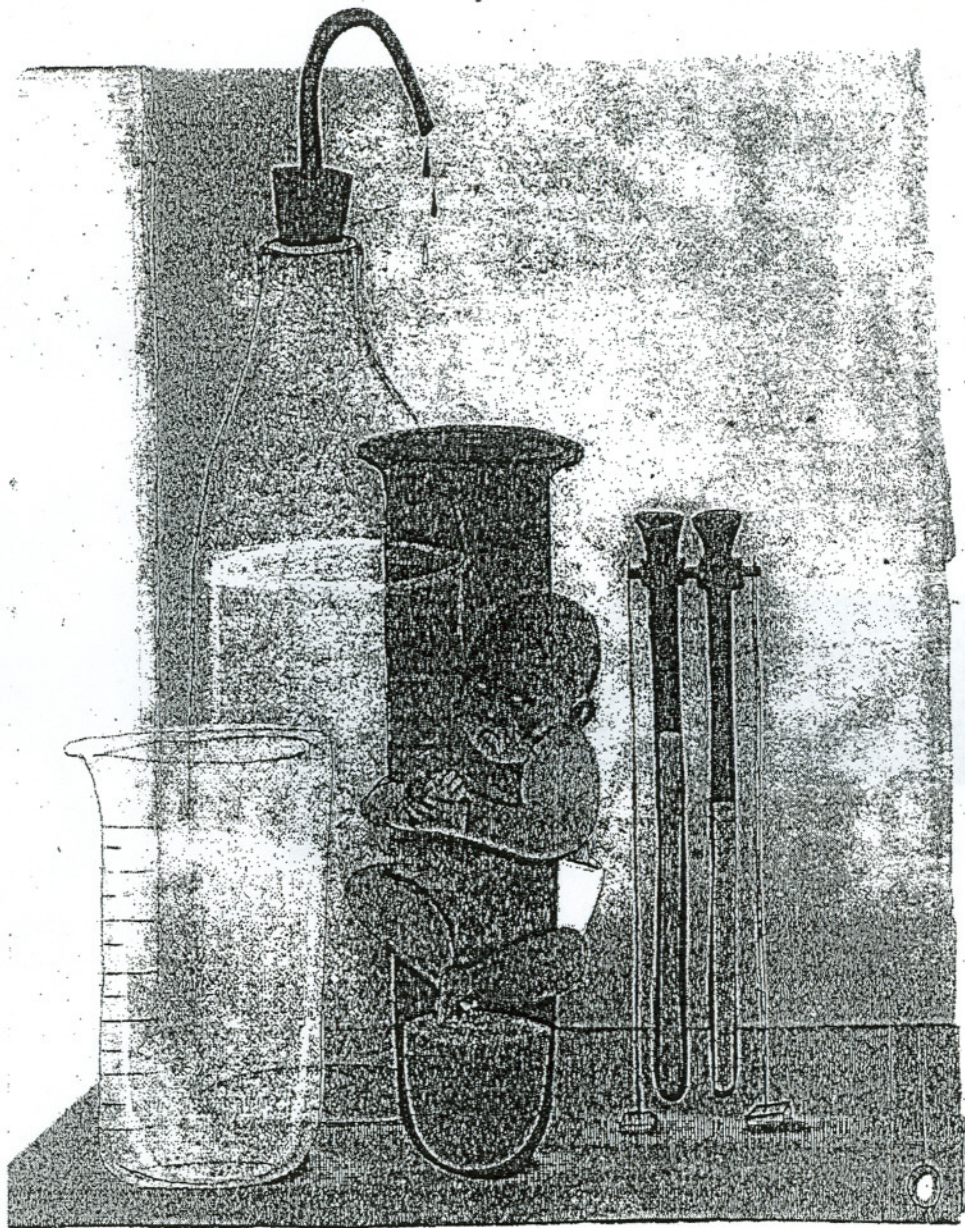
Eventually, being able to grow a fetus in a totally artificial womb would make it easier to make genetic corrections and modifications, thus creating “designer babies.”

The artificial womb could even become the preferred means of producing a child. Young women could have their eggs removed when the eggs are most viable.

Ditto for men's sperm. Parenthood would thus become an option at any time using petri dishes and artificial wombs.

Mothers could thus spare themselves the rigors and inconveniences of pregnancy and bring their babies home when “done.”

Farfetched? Thousands of surrogate mothers' wombs already have been used to gestate someone else's fertilized embryos. The artificial womb seems the next logical step in a process that has increasingly removed reproduction from traditional maternity and made of it a laboratory-conceived,



PAIGE IMATANI, For The Times

The artificial womb completes the process.

Supposing there is an end to human pregnancy, how would that affect the concept of parental responsibility? Would parents feel less attached to their offspring and come to think of a baby more as an object and less of an extension of their being? Would there still be a sense of generational continuity that is so essential for maintaining historical continuity and civilized life?

How would the end of pregnancy affect the way we think about gender and the role of women?

Years ago, the feminist writer Shulamith Firestone wrote enthusiastically about the prospect of an artificial womb: "Pregnancy is the temporary deformation of the body of the individual for the sake of the species. Moreover, childbirth hurts and isn't good for you. At the very least, development of an option should make possible an honest examination of the ancient value of motherhood."

Other feminists view the artificial womb as the final marginalization of women, robbing them of their primary role as progenitor of the species. The artificial womb, they argue, becomes the quintessential expression of male dominance, a mechanical substitute for the female womb honed to engineering standards and quality controls.

Armed with the artificial womb, asexual cloning technology and stem cells to produce all the extra body parts they need, men could free themselves, once and for all, from their dependency on women.

Whether this comes to be or not, the artificial womb represents the completion of an even longer historic process that began nearly 400 years ago at the dawn of the Scientific Age.

It was Francis Bacon, the father of modern science, who referred to Mother Nature as "a common harlot." He urged future generations to "tame," "squeeze," "mold" and "shape" her so that "man could become her master and the undisputed sovereign of the physical world."

No doubt some people will see the artificial womb as the final triumph of modern science. Others, the ultimate human folly.

Some take comfort in the fact that the artificial womb is far off on the horizon. Five years ago, we thought the same thing about human cloning and using stem cells to produce body parts.

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