Are **Women** Necessary?

By NATALIE ANGIER

Abundant evidence suggests that females are the first sex, the ancestral sex, the sex from which males are derived.

Boys owe their lives to their mothers in more ways than one. Yet recent experiments with stem cells hint that women, not men, may eventually prove obsolete.

Granted, a post-feminine future sounds far-fetched. In many species, including our own, the fundamental body plan is female, with maleness being a bit of window-dressing tacked on at the last minute.

Some groups of insects, fish and lizards consist entirely of females, which give birth only to daughters. By contrast, no self-sustaining, boys-only population has ever arisen in nature, the efforts of certain Southern golf tournaments notwithstanding.

Indeed, males are famous for their cheap, abbreviated gametes, and their poignant need for the warmth and wealth of the comparatively massive female sex cell to realize their dreams of immortality. You'd think they would be humble, grateful, even obsequious. But it seems that somewhere along the way those slippery flagella figured out a possible pathway to go it alone.

Here are the unnerving results that threaten the matriarchy: last spring, after years of effort, researchers from the University of Pennsylvania and elsewhere announced that they could grow working egg cells in the laboratory if they started with embryo tissue taken from either a female or a male mouse.

These hothouse eggs and their accompanying follicular matrix were so persuasive they even secreted and responded to estrogen, the archetypically "female" hormone.

In September, Japanese researchers said they could create robust little sperm cells in the lab, too — but only if they began with the embryonic stem cells of a male animal. It turns out that the program for making eggs is stored on the chromosomes that males and females share. To manufacture sperm, however, you need that truncated, genetically penurious Y chromosome that only a male can claim.

In theory, then, male starter cells could be used to make eggs and sperm, and those eggs and sperm could be mixed together to yield a new generation. This would not be parthenogenesis as seen in whiptail lizards or Nature's other little sororities, with the parent capable only of spawning more of its own sex and hence being limited in its power to genomically outfox parasites.

This would be like old-fashioned, shake-'em-up, male-female sexual reproduction, a meeting of eggs and sperm. You could mix and match your fabricated eggs and sperm to generate boys and girls alike.

Except why bother with girls, if you don't need mothers to lay those little egg cells in the first place? You could have robust diversity in the human gene pool without the need for pesky separate restrooms.

True, women at the moment remain useful for their possession of another baby-friendly device, the uterus. But how long will this anatomical detail be an impediment to complete female obsolescence?

Already, researchers can keep baby goats alive in an artificial uterus, a big fishbowl of bubbling fluid, for weeks at a stretch. A full-term, full-service exoamniotic cocoon cannot be far behind.

Given such recent and imminent developments, Rebecca West, journalist, novelist and companion of H. G. "Doomsday" Wells, was eerily prescient in her observation that motherhood is "like being one's own Trojan horse."

Yet as women contemplate their pending irrelevance, they can take heart in a more immediate lesson to be gleaned from the latest experimental results. If inside every man's genome is a little mother yearning to be free, well, then, no more excuses when

VOICES

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The big question facing science and scientists in the next 25 years involves the "internationalization," as opposed to the "globalization," of science. We need to include the developing world in all the breakthroughs that are happening in science and technology, which means sharing knowledge and making it relevant worldwide. Breakthroughs have been coming quickly, such as gene chips, proteomics, sensors that allow scientists to ask questions on a scale and time frame never before imaginable. However, these breakthroughs are creating scientific "haves" and "have-nots." Very little of the new technologies are affordable to scientists and doctors in the third world.

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Genetic prediction and prevention of diseases are likely to become so reliable in the next 25 years that the young people will wonder what life was like at the turn of the century when people sat around and waited for diseases like cancer and Alzheimer's to strike. They will be living in an era when the risks for these diseases will be predicted by genetic testing early in life and where preventive medical strategies will be specifically dictated by an individual's genetic makeup.This medical revolution will require psychological counseling for patients and the development of strict legal safeguards for genetic privacy.