The Seoul of Clones

Solving a biotech mystery: Why South Korea leads the world in stem-cell research.

By David Plotz

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The genius behind South Korea’s cloning industry

Yesterday Hwang and his colleagues announced that they are opening a stem-cell library in Seoul. The library, the first of its kind, will create 100 or so cell lines a year to supply the world’s scientists.

But it only begins to explain a peculiar anomaly of global science: how South Korea, a nation of only 48 million people and no history of biotech accomplishment, has emerged as the world capital of stem-cell and cloning research.

There is no clear reason why this future should be happening in Seoul. South Korea has only a few dozen stem-cell researchers, compared with more than 600 in the United States. The Korean government spends only $10 million or so a year on stem-cell and cloning research, less than one-twentieth of what the U.S. government disburses. Fellow Asian Tiger Singapore has spent $500 million to build Biopolis, a huge bioscience campus. By contrast,
Hwang's lab at Seoul National University, responsible for most of the Korean advances, gets by on only a couple million dollars a year.

And yet there they are in Seoul, cheerfully cloning for the brave new world.

Why?

**For starters, the country is not preoccupied with moral questions about the beginning of life.** Unlike its Asian neighbors, Korea has a huge and powerful Christian community, with strong ties to the evangelical American churches that have boilled up stem-cell research in the United States. Evangelical Protestants make up a quarter of the South Korean population, and Catholics are another 6 percent. Yet this has not translated into a moral movement against stem-cell research. Korean Protestantism is relatively new, only a century old. Prof. James Grayson, an expert in Korean religion at Sheffield University, says that Korean Christians—who have spent that century under occupation, at war, and then rebuilding a destroyed and colonized nation—have been busy with more practical moral questions of human rights, justice, and economic development. Whether life begins at conception, at implantation, at quickening, at birth—these abstract theological questions are distant from the daily demands of Christianity in Korea. (Non-Christian Koreans are not interested in these issues either.) The result is an entirely different approach to life issues. For example, despite a nearly absolute ban on abortion, Korea has one of the highest abortion rates in the developed world because the government looks away and no one protests. Similarly, the moral wrangling that has crippled American stem-cell research is absent. This liberates Korean scientists from exhausting debate and frees their research from condemnation. As Jose Cibelli, a Michigan State professor who collaborates with Hwang, puts it: "It really helps that every time [Korean scientists] give a talk, they don't have to have an argument about whether an embryo is a person."

In the nature-versus-nurture debate, Americans tend to come out for nurture. Our strong democratic ethos insists that anyone is capable of anything and that genes are secondary. This is much less true in Korea. Blood and genes are fundamental to Korean identity. Korea is the most ethnically homogeneous big country in the world. Practically everyone can trace their bloodlines, and a traditional clan system regulates marriage. **Koreans think about themselves in explicitly genetic terms,** and this makes them more sympathetic to genetic research than Americans, who tend to get queasy about such tampering. Similarly, Koreans are extremely open to medical self-improvement: Korean cosmetic-surgery rates are among the highest—by some accounts the highest—in the world.

Korean fascination with bloodlines nurtures local stem-cell research in another way. Korean couples face enormous pressure to have their own genetic children, which has fueled one of the most vigorous assisted-reproduction industries in the world. According to Shin Young Moon, obstetrics professor at Seoul National and director of the Stem Cell Research Center, Korea has 95 IVF centers, and 4,000 IVF births occur every year. Korea's success rates for traditional IVF are as good as ours, says Shin, and its success rates for more specialized forms of assisted reproduction are even better. **The IVF clinics have trained a generation of technicians with incredible lab skills.** This outstanding technical ability—perhaps enhanced by steel chopsticks—explains why Korean stem-cell researchers can perform micromanipulations (such as gently squeezing DNA out of a single egg) that scientists in other countries struggle to master.

Korean scientists aren't just more technically skilled, they are also more diligent. **Korean scientists work much harder than Americans.** At Hwang's lab, everyone works every day of the week and holidays. This is not hyperbole. Hwang never takes a vacation, and neither do his underlings. In some branches of science—such as pure math or theoretical physics—this mania for work wouldn't matter much, but in stem-cell research, it's incredibly valuable. This research is repetitive, tedious, and factorylike. It rewards the persistent. Hwang's lab cloned and transferred more than 1,000 embryos into 123 dogs to make a single cloned puppy. "That tells you how single-minded they are. If it was me, I would have given up at the 10th transfer," says Hwang collaborator Cibelli. **The work culture is not merely relentless, it is also collectivist.** In American and European labs, Cibelli says, researchers jockey to test their own hypotheses, run their own experiments, and publish their own papers. At Hwang's lab, scientists take their orders from the top, work ferociously to carry
them out, and let the glory fall to the boss. This is likely the product of Korea's Confucian tradition. Confucianism teaches that workplaces should be run as benevolent hierarchies, with younger and junior people obediently taking guidance from seniors. Stem-cell research depends much more on technical proficiency than blue-sky brainstorming. It fits well with a collectivist approach that focuses the entire scientific team on a single goal.

**Korea reveres scientists more than we do.** Science is trendy in Korea. It attracts the nation's best students. There's no nerd derision. Hwang Woo-suk is a celebrity in a way we can't imagine an American scientist could be. The national law-enforcement agency assigns officers to protect him. Korean Airlines flies him around the world for free. The minister of science and technology ranks at the top of the South Korean Cabinet—as high as the secretary of state or treasury in the United States. While most foreign scientists who study in the United States end up staying there, nearly 90 percent of Korean scientists end up returning home, despite much lower salaries.

The reverence for science helps cloning research, in particular, because cloning requires **a huge supply of fresh human eggs.** For one recent paper, Hwang and his colleagues used nearly 200 eggs collected from Korean women. To gather such a supply of eggs in the United States would be practically impossible, legally dubious, and financially ruinous. But Hwang has a waiting list of Korean women who have volunteered to donate eggs for free, to help his cause.

Korea had a rotten 20th century—occupied by Japan, split by war, driven into a miserable poverty. (At war's end, Korea was one of the world's poorest countries.) Koreans felt acutely the shame of being booted from the ranks of important nations, of being supplanted by China and Japan. It is hard to overstate just how driven Koreans are to make Korea a great nation. **This nationalism has helped Korea nudge aside whatever moral objections to cloning have popped up.** Though Korea has banned cloning for reproductive purposes, it has enthusiastically supported the research cloning that so troubles American conservatives. The ethical concerns in Seoul are minor, weighed against Korea's chance to become the world leader in the next great biotech industry.

Still, the most important reason why Korea leads the cloning race has nothing to do with the nation. The majority of Korea's stem-cell and cloning advances have been made by a single man, the profoundly brilliant, enthusiastic, and energetic Hwang. Korea's government, religion, culture, reverence for science, nationalism, and skinny chopsticks may make it possible for the nation to be a world leader in this research. But it is an individual genius who is turning his nation's potential into actual stem cells.

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