

enforces a one-child policy, introduced in 1979. The government boasts that 400 million births have been avoided, but abortions are indispensable and the population is skewed toward 60/40% male ratio in the younger generation. The only ostensibly democratic east-Asian governments are Taiwan, South Korea, and Japan. The first two have oscillated between authoritarian and democratic governments, while Japan has been governed by the Liberal Democratic Party since 1955. Do these facts not refute the hypothesis that high IQ nations tend toward democracy? Do 'Asian values' perhaps better explain the discrepancy? Vanhanen rejects this proposal because it 'cannot explain the extreme differences in the level of democratization within the group of east Asian countries ... clear differences in socioeconomic

systems better explain the differences in the level and quality of democracy' (p. 248). Leaving North Korea aside, there is not a great difference between the governments of Singapore, Taiwan, South Korea, and Japan. And China, which Vanhanen styles 'an extremely deviating country' (p. 248), is not so much an outlier as the main Asian stream because its population exceeds that of all other east Asian nations by about 1 billion people. It exceeds the combined populations of the EU and the United States. From these data I don't detect a trend toward democracy at the highest IQ level, but a split down the middle between authoritarianism and democracy.

The author does not include reproductive rates among his variables, yet they are significant for projecting national futures and for the evolutionary

postulate that, as Darwin said, all organisms do their darndest to reproduce. The result is unsustainable population growth and the struggle for existence in which only the fittest survive. Oddly enough, this principle was no sooner launched than European reproductive rates commenced a long term decline that continues today. Indeed, many European nations, notably Russia, are in dramatic population decline. How can this be reconciled with natural selection, and what are its implications for the continuing advance of democracy?

1 Gregory Cochran and Henry Harpending published a detailed study of recent evolution, in terms of single nucleotide polymorphisms, in their book *The 10,000 Year Explosion: How Civilization Accelerated Human Evolution*. New York: Basic Books, 2008. Website: <http://the10000yearexplosion.com/>

The 10,000 Year Explosion: How Civilization Accelerated Human Evolution

Gregory Cochran and Henry Harpending. (2009). New York: Basic Books, 304 pp, US\$27.00, ISBN: 0465002218.

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The *10,000 Year Explosion*, by physicist Gregory Cochran and population geneticist Henry Harpending, should be required reading for students of genetics, evolution, archaeology, anthropology and palaeontology. It is stuffed with suggestions about recent human evolution; many of which are testable, some of which may even be right. But it is not the proportion of right versus wrong hypotheses that makes it a *must* read; it's because the book is an implicit primer on how to think expansively, speculatively and imaginatively about the big questions in our cultural history.

I first fell under Greg Cochran's spell when he gave a talk at the University of New Mexico a few years ago. He was arresting. How could dressing be such a mystery? Shirt buttons were all hooked into the wrong button-hole, the sagging '50 cent' trousers, huge spectacles last cleaned in the Miocene, hair de

Graaf generator. It was exactly like watching a physicist lecture at CERN: the excited gestures, the scribbled scrappy slides with formulae, instead of the usual nancy-pants greater-crested powerpoints with their horrid, vacuous bullet-points on pelagic backgrounds. It was thrilling; the mile-a-minute talk (which over-ran) was electric; the ideas hummed with originality and credibility. I'm sure many left the room, as I did, thinking 'every department should have one of those' — if only there are enough to go around.

Two key features make these scientists (Greg and Henry) special. First, they are not afraid to be wrong. Second, they are most impolite; in rebutting 'received wisdom' they make our clinging to it seem silly. In this respect they are almost Swiftian. Where we like to avow that there are no genetically based population differences, they present strong evidence for such differences: not just in looks, but

in behavioral differences. Moreover the sky doesn't seem to have fallen. What a relief, we can acknowledge what must be true — human groups vary in noticeable ways for genetic reasons and that's just fine. Perhaps our morality is sturdier than we surmise; very few readers, perhaps none, will become cannibals, bigots or sadists by reading this book. So what are its big ideas?

The central narrative is that evolution has not stopped; in fact it has likely sped up. The reason is forehead-slappingly simple: mutations hit larger mating populations more often than smaller ones (random arrows hit larger targets more often than small targets). Even if most mutations are neutral or harmful, some are beneficial. These arose more often in the big, settled communities generated by farming, than the smaller, more nomadic or hunter-gatherer communities. A mutation that promotes lactose tolerance into adulthood confers a huge benefit

to farmers, but not to hunter-gatherers, so even if such a mutation did arise among them, it would not spread. The same is true for mutations affecting personality and intelligence: the advantage of any particular change depends a lot on the ecology including the social dimension. A puzzle remains, why did farming get going in the first place?

During the previous interglacial, the Eemian ~131,000 years ago, farming never developed. Yet in the Holocene, which began around 12,000 years ago, it was invented every second Tuesday (at least seven times independently). Why? The wild and curly proposal from our intrepid authors is that *Homo sapiens* mated occasionally with Neanderthals. Some of those matings produced offspring with a fitness advantage derived from Neanderthal alleles. How silly is that? Not so much it turns out. We humans do have sex with other species; cross-species fertile hybrids do exist and there is some sketchy skeletal evidence supporting the thesis. Perhaps benefits from the Neanderthal 'introgression' triggered farming. Perhaps it didn't; at least Neanderthal introgression is an empirically testable idea. We think of evolution as taking place on very long time-scales. Could mental or physical changes really have emerged since farming? The authors say that although new complex adaptations may not have had time to evolve since the advent of farming ~12,000 years ago, there has been plenty of time for genetically shallow, but phenotypically deep, changes. One only has to look at dogs.

In just ~15,000 years of selection we've turned wolves into Chihuahuas. It's not all bad — we have created Border collies too. The morphological changes are startling, but the behavioral ones even more so. Try asking a wolf to watch the pram. Although 70% of dog genetic variance is within breed, and 30% between breed, who wants to argue that the average difference within Great Danes is larger than the average difference between a Great Dane and a Chihuahua. The problem is that until we know how allelic variants relate to phenotypes we have no

basis for making assertions about within and between group differences. Group differences don't frighten Cochran and Harpending. Nor does mating across species.

When it got going, agriculture triggered many changes. One of them was a dramatic increase in population size. Size brought its own hazards. Whereas warfare had been a major, if not leading, cause of death in adults, infectious disease became the Grim Reapers' new best friend. Immuno-competence, in the form of HLA diversity, hurried along behind infectious disease, huffing and puffing to keep up. But in the New World, where the population density was lower, HLA did not evolve much diversity. No wonder the death rate from smallpox in the New World was up to 90% while the European invaders' death rate was only 30%. Cochran and Harpending's genetic history continues beyond disease, by discussing the causes and implications of normal variation of human mental traits within and between populations.

Farmers store wealth; wealth is always unequally distributed where there is phenotypic variation in the ability to acquire it, and social mobility. Variance in reproductive success increased in settled societies. But the pathways to that reproductive success vary between populations: different traits are desirable in different places. It follows that there is selection on diverse personalities and cognitive abilities among various populations. For example, in East Asia the 7R allele of the DRD4 gene (an allele associated with ADHD) is almost absent, but importantly, alleles derived from the 7R allele are common. That suggests that the 7R allele did not play well in East Asia although it may have been quite a benefit in other populations. Intelligence has also been under differential selection around the globe.

In the last two decades, Jewish people numbered around 3% of the US population, yet they won almost 30% of the Nobel prizes. It's not skulduggery on the Swedish selection committee, it's because they are brighter. This book suggests an expla-

nation: the occupational possibilities for the Ashkenazim in Christian Europe were limited to those which required abstract reasoning. Those who were good at jobs of high complexity, especially financial work including money-lending, became wealthy and supported large families who survived. Those who couldn't do these intelligence-saturated jobs left no heirs. Persecution, then further occupational restriction, led to even more intense selection on high intelligence. Selection was rapid, it acted so fast that genomic trouble brewed along with intelligence. Several diseases occur at a much higher rate among Jewish people of Ashkenazim descent, these include Gaucher's and Niemann-Pick disease. Perhaps in the race to enhance intelligence, evolution did not have time to purge the harmful, pleiotropic side-effects. Again the idea can be tested — is there any relationship, in Jewish people, between intelligence and genes associated with these diseases? Are these disease side-effects of higher intelligence?

I've sketched cartoons of their ideas, but the authors have fleshed out their hypotheses and set out their evidential stalls very neatly. The journal papers on which the chapters are based are well referenced in a useful set of chapter notes. The book is funny, learned and engaging. It neglects sexual selection (why oh why?) but it's not hopeless since other books ably introduce Darwin's other brilliant idea.

The 10,000 Year Explosion is replete with facts and ideas; we need more books like it. Cracking stories are bumper to bumper; the historical and cultural reach of the authors is impressive. It's a cultural genetics pot-boiler with a serious academic punch. If it sparks no real intellectual curiosity in your students, worry about it. If nobody on the faculty is interested, you're probably in a department where there were, sadly, not enough Gregs to go around.

Disclaimer (potential bias hazard warning): reviewer commented on three chapters of the book prior to its publication.