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Recipe for Destruction

By RAY KURZWEIL and BILL JOY OCT. 17, 2005

AFTER a decade of painstaking research, federal and university scientists have reconstructed the 1918 influenza virus that killed 50 million people worldwide. Like the flu viruses now raising alarm bells in Asia, the 1918 virus was a bird flu that jumped directly to humans, the scientists reported. To shed light on how the virus evolved, the United States Department of Health and Human Services published the full genome of the 1918 influenza virus on the Internet in the GenBank database.

This is extremely foolish. The genome is essentially the design of a weapon of mass destruction. No responsible scientist would advocate publishing precise designs for an atomic bomb, and in two ways revealing the sequence for the flu virus is even more dangerous.

First, it would be easier to create and release this highly destructive virus from the genetic data than it would be to build and detonate an atomic bomb given only its design, as you don't need rare raw materials like plutonium or enriched uranium. Synthesizing the virus from scratch would be difficult, but far from impossible. An easier approach would be to modify a conventional flu virus with the eight unique and now published genes of the 1918 killer virus.

Second, release of the virus would be far worse than an atomic bomb. Analyses have shown that the detonation of an atomic bomb in an American city could kill as many as one million people. Release of a highly communicable and deadly biological virus could kill tens of millions, with some estimates in the hundreds of millions.

A Science staff writer, Jocelyn Kaiser, said, "Both the authors and Science's

editors acknowledge concerns that terrorists could, in theory, use the information to reconstruct the 1918 flu virus." And yet the journal required that the full genome sequence be made available on the GenBank database as a condition for publishing the paper.

Proponents of publishing this data point out that valuable insights have been gained from the virus's recreation. These insights could help scientists across the world detect and defend against future pandemics, including avian flu.

There are other approaches, however, to sharing the scientifically useful information. Specific insights -- for example, that a key mutation noted in one gene may in part explain the virus's unusual virulence -- could be published without disclosing the complete genetic recipe. The precise genome could potentially be shared with scientists with suitable security assurances.

We urgently need international agreements by scientific organizations to limit such publications and an international dialogue on the best approach to preventing recipes for weapons of mass destruction from falling into the wrong hands. Part of that discussion should concern the appropriate role of governments, scientists and their scientific societies, and industry.

We also need a new Manhattan Project to develop specific defenses against new biological viral threats, natural or human made. There are promising new technologies, like RNA interference, that could be harnessed. We need to put more stones on the defensive side of the scale.

We realize that calling for this genome to be "un-published" is a bit like trying to gather the horses back into the barn. Perhaps we will be lucky this time, and we will indeed succeed in developing defenses for these killer flu viruses before they are needed. We should, however, treat the genetic sequences of pathological biological viruses with no less care than designs for nuclear weapons.

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