

INFECTIOUS DISEASES

One Year After Outbreak, SARS Virus Yields Some Secrets

the largest ever known ... and the earliest," he says, estimating the date at around 2300 B.C.E.

That is a contentious claim. Full-fledged ziggurats do not appear until around 2100 B.C.E. But Uruk's white temple in today's southern Iraq is a platform with a temple on top—and it dates to about 3150 B.C.E., over 1000 years earlier, notes archaeologist Margarete van Ess of the German Archaeological Institute in Berlin, who has dug at Uruk.

Furthermore, Majidzadeh's date is based only on a preliminary look at pottery, with no radiocarbon data. And the pottery chronology is unclear. Stone vessels similar to those dug up by Jiroft looters have been found in Ur and other Sumerian cities dating to around 2500 B.C.E., but others in the Persian Gulf were apparently made several hundred years later.

What's not in dispute is the wealth of seals and seal impressions on clay discovered at a second mound that likely served as an administrative center. These seals make up "a fascinating corpus notable for its extraordinary variety," says Pittman. Seals were typically used as signatures by businessmen and scribes, and the dozens of examples found offer a trove of data on trade, religion, and governance. One impression includes a crocodile-like creature, similar to seals made in the Indus River valley. Others display similarities to seals found in Afghanistan and Mesopotamia. The variety, says Pittman, shows extensive contact with a host of other civilizations.

The most intriguing finds are two small fragments that Pittman says are "neither figurative nor geometric" and which could be inscriptions. "They are so fragmentary, they just offer hints," she says. But both she and Majidzadeh hope to find written inscriptions when they return to dig in December. Pittman sees the Jiroft civilization as one of several early states in the region, each "autonomous and indigenous" but in contact with one another.

Majidzadeh, however, has made claims in the Iranian press that Jiroft predates Mesopotamian civilization, and he's expressed confidence that the two fragments are indeed written inscriptions. Although his Berlin talk avoided making these assertions, some scholars worry that such overreaching could damage the credibility of the digs. "There are some rather extravagant allegations," says Harvard University's Carl Lamberg-Karlovsky, who excavated at nearby Tepe Yahya during the 1970s. "What we need is data." Majidzadeh says he plans to wait for next season to find undisturbed material for radiocarbon dating: "So far, we have only excavated what amounts to a pencil dot on a blank piece of paper."

—ANDREW LAWLER

LÜBECK, GERMANY—What a difference a year makes. This time in 2003, severe acute respiratory syndrome (SARS) was spreading like wildfire, and researchers barely knew what they were up against. Today, the disease is gone, and researchers are elucidating some of its most intimate details. At a recent meeting* here, they reported progress—and some setbacks—in everything from molecular biology to epidemiology to drug development.

Only four mini-outbreaks have occurred since SARS was vanquished worldwide.



Counterproductive. Rather than preventing symptoms, a SARS vaccine worsened them in ferrets.

Three of those were the result of labs failing to contain the virus (*Science*, 30 April, p. 659)—a record that many scientists fear may erode public support for research on SARS and other agents. "It's terrible news for all of us," says Luis Enjuanes of the Universidad Autónoma in Madrid.

The one natural outbreak since last summer, which sickened four people in the southern province of Guangdong in December and January, has provided intriguing new clues into the virus's epidemiology. Genomic analysis of the virus isolated from one of the patients showed that it was highly similar to a virus isolated from a masked palm civet, bolstering suspicions that civets transmit the disease to humans. But researchers do not think civets are the elusive natural hosts of the SARS virus because, as another study showed, civets suffer symptoms when experimentally infected. A natural host would normally be symptom-free.

Adding another wrinkle to SARS's confusing epidemiology, Lin Lifeng of the Center for Disease Control and Prevention in Guangzhou

* "International conference on SARS—one year after the (first) outbreak," Lübeck, 8 to 11 May.

showed that the genetic signature of the virus has been detected in the lungs of three out of six rats caught in the building where one of the four recent patients lived. The patient had disposed of a dead rat shortly before getting sick, Lin said, suggesting that the animals may be carriers just like civets. If true, that would pose the specter of a continuous urban source of new infections, says Enjuanes, but much more study is needed. The researchers have not shown that the virus replicates in or is transmitted among rats, for instance.

On the vaccine front, meanwhile, news was sobering. A flurry of vaccine studies began almost immediately after last year's outbreak, and China has embarked on human trials. But experts fear that some vaccines might worsen the disease rather than prevent it, a phenomenon seen in cat coronavirus vaccines (*Science*, 13 February, p. 944). Now a study by Cao Jingxin of the National Microbiology Laboratory in Winnipeg, Canada, and his colleagues adds weight to those worries. The SARS virus, the group found, can cause mild liver inflammation in ferrets; that damage was much more serious if animals were first given a candidate SARS vaccine based on a vaccinia virus. "This is another warning sign," Cao says: "Be very careful before you put anything into large numbers of humans."

In terms of therapeutics, virologist Berend Jan Bosch of Utrecht University, the Netherlands, showed that peptides resembling part of the virus's "spike" protein can inhibit the fusion of the virus and its host cell in vitro. And a team at the University of Leuven, Belgium, reported that a compound that produces nitric oxide inhibits virus replication as well.

But without new outbreaks, researchers say it's hard to see a market for new therapeutics. Even well-established drugs that show promise against SARS may not get their chance. A recent study, for instance, showed that one type of interferon- α could prevent a SARS-like disease in monkeys (*Science*, 27 February, p. 1273). According to in vitro studies presented by Lawrence Stanton of the Genome Institute of Singapore, several other commercially available varieties of interferon- α and - β showed a "nice potent inhibition of the SARS virus" as well. "You'd think the interferon companies would be very interested" in planning a clinical trial, Stanton said. Not so, he discovered recently: "They have adopted a wait-and-see attitude."

—MARTIN ENSERINK