

HUMAN RIGHTS

Statistical Analysis Provides Key Links in Milosevic Trial

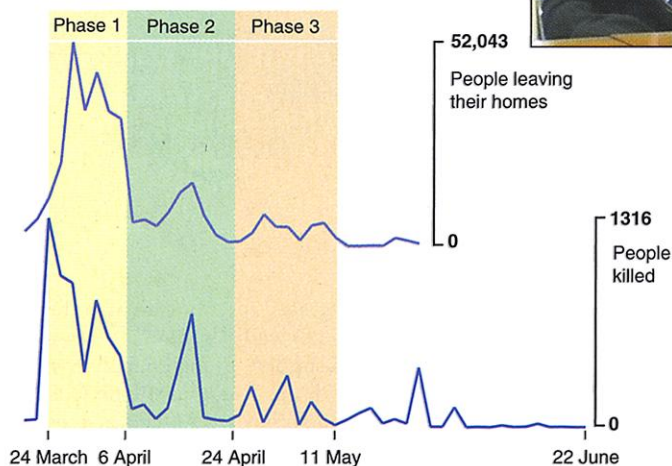
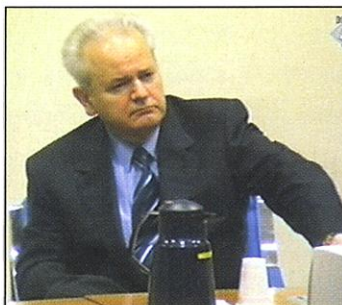
THE HAGUE, NETHERLANDS—Science took center stage last week in one of the most widely watched war-crimes trials since Nazi leaders were brought to justice after World War II. In testimony spanning 2 days, the International Criminal Tribunal for the Former Yugoslavia (ICTY) heard from the sole scientific expert that the prosecution is expected to call against Slobodan Milosevic, Yugoslavia's president and commander of its armed forces during the conflagrations in the Balkans in the 1990s. Patrick Ball, a statistician with the American Association for the Advancement of Science (AAAS, publisher of *Science*), testified that evidence his team has gathered is consistent with the hypothesis that Yugoslav forces conducted a systematic campaign of killings and expulsions of ethnic Albanians from Kosovo in the spring of 1999.

Ball's testimony offered an overview of the Kosovo tragedy while also lowering the level of emotions in court. Until last week, the prosecutors had relied heavily on Kosovar Albanian witnesses, who sometimes broke down on the stand as they described atrocities by Serb forces. In contrast, Ball's testimony, based on statistical analyses, hardly made for courtroom drama. But in a case hampered by the apparent lack of a paper trail linking the Kosovo atrocities to orders given by Milosevic, "the beauty of [Ball's] study is that it actually gets to the truth" of what happened, says David Tolbert, executive director of the American Bar Association's Central and East European Law Initiative (ABA/CEELI).

Moreover, the use of statistical tools to discern patterns in human rights abuses in-

volving many victims could find wide application in other hot spots, from Bosnia to East Timor, says Tolbert, who served as senior legal adviser and chief of staff at ICTY in the mid-1990s: "In that sense, it's groundbreaking testimony."

The first phase of Milosevic's trial for alleged war crimes in the former Yugoslavia deals with events in Kosovo. Between 1 January and 20 June 1999, according to a detailed indictment, Yugoslav and Serb forces



Grim correspondence. Slobodan Milosevic did not challenge a central finding of Patrick Ball's report, that killings in Kosovo peaked in sync with emigration flows in the spring of 1999.

"executed a campaign of terror and violence directed at Kosovo Albanian civilians." During the ethnic cleansing operation, the indictment states, some 800,000 civilians were driven from Kosovo; many were killed on their way to neighboring countries. Milosevic is charged with four counts of crimes against humanity in Kosovo on the basis of his "superior criminal responsibility" for the deportation, murder, and persecution of Kosovar Albanian civilians.

Ball, deputy director of AAAS's science and human rights program, has had plenty

of experience with those sorts of abuses. For more than a decade he has conducted statistical analyses for truth commissions, tribunals, and United Nations missions in countries from Guatemala to Sri Lanka. His work caught the attention of the non-profit group Human Rights Watch, which invited Ball to Albania in March 1999 to launch an investigation.

At the time, refugees were flooding into Albania through one point in particular, the village of Morina. That spring, Albanian border guards registered, by name and town of origin, 272,000 individuals who crossed into

Morina, while international observers, using handheld counters, tallied 404,000. Refugees interviewed by a range of organizations—from ABA/CEELI to the Organization for Security and Cooperation in Europe—told horrific stories of looting, massacres, and other abuses at the hands

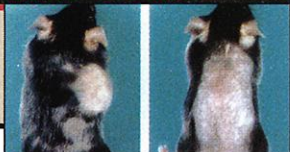
of the Serb military.

Milosevic and Serb leaders have blamed the mass exodus on two causes: the activities of the ethnic Albanian Kosovo Liberation Army (KLA) and civilian suffering caused by NATO bombing of Serb troops in Kosovo. But the tribunal prosecutors say Milosevic caused the tragedy by sending into Kosovo troops who attacked both the KLA and civilians.

On 13 March, prosecutors led Ball through key sections of Exhibit Number 67, a technical report by AAAS and ABA/CEELI that examined these hypothesized causes. Relying mainly on the border records, Ball and his group estimated when the refugee flows began and where they had originated. Ball's team—which included researchers from ABA/CEELI, the University of Chicago, and Carnegie Mellon University—identified three distinct peaks of migration: in late March, mid-April, and early May (see figure).

Ball's team also investigated killings, finding that the murders peaked in sync with the emigration flows. Validating the information was difficult, he says, requiring a complex statistical approach known as "capture-tag-recapture" used widely to adjust census counts. The team drew data from four sources, including interviews conducted by human rights volunteers and ICTY-ordered exhumations throughout Kosovo.

CREDITS: (TOP TO BOTTOM) AP PHOTO/ICTY POOL; AAAS



New doubts about endostatin

Battling an invader



The Model T of astronomy



Starting with tens of thousands of reports, the group identified 4400 "unique individuals" who had been killed, leading them to estimate that the death toll among Kosovar Albanians was 10,356. "That piece of work was very impressive," says Ronald Lee, a demographer at the University of California, Berkeley, who found the report "quite persuasive and done with a great deal of care."

"We made every attempt to be as conservative as possible" in estimating the number of victims, Ball, 36, told the court, "to present a statistical case as favorable as possible to the hypotheses that we ultimately rejected."

His team discovered that the timing of the deaths and refugee movements lined up—even when broken down by region—indicating that they had been triggered by "a common cause." The researchers found that KLA activity, as reported in the Serb press, rarely occurred in Kosovo municipalities at times that could be linked to killings and refugee movements. Nor did these events correlate with NATO air strikes, which occurred after the peak in killings—or did not occur at all—in 20 of 29 municipalities. "If something is to cause something else, then the cause must precede the effect," Ball noted dryly.

Yugoslav army activity, on the other hand, ebbed and flowed roughly in sync with refugee movements and killings. Particularly damning was what happened after a 2-day cease-fire that Yugoslav authorities called on the evening of 6 April 1999 to honor Orthodox Easter. "We found a consistent and drastic decline both in refugee movement and people killed," Ball stated. The findings, he said, contradict Milosevic's claims that NATO bombing or the KLA triggered the disaster in Kosovo, and they are "consistent with the hypothesis that Yugoslav forces were the cause."

Milosevic, who has refused to recognize the tribunal's legitimacy and is representing himself in the trial, often seemed distracted during the 2 hours that the prosecutors took to question Ball. But he sprang to life in the cross-examination. Early on, he suggested that the report's conclusions were contrived to satisfy U.S. foreign policy, as the U.S. government had funded the report. Ball rejected this, noting that previous investigations he had undertaken into human rights abuses in El Salvador and Guatemala had been critical of U.S. foreign policy.

Warned by presiding Judge Richard May to focus on the evidence, Milosevic, after a brief, ironic smile, chastised Ball for ignor-

ing the plight of Serb refugees and suggested that the data from the Albanian border guards had been fabricated. "You have been deceived," Milosevic said. He also asserted that the three hypotheses of Ball's focus oversimplified the events in Kosovo.

"I'm not a politician," replied Ball, looking directly at Milosevic, unlike many previous witnesses. While acknowledging that his group's statistical approach "does not exclude the possibility that there may be other causes," Ball reiterated that the three claims tested were those put forward by one side or the other to explain what happened in Kosovo.

The trial, which is expected to last until early 2004, will undoubtedly detail many more atrocities in Kosovo—and in Bosnia-Herzegovina and Croatia, where Milosevic faces a further 61 counts of war crimes. The prosecution is hoping that Exhibit 67 will at least provide a thread that ties together the events in Kosovo.

—RICHARD STONE

With reporting by Eliot Marshall.

ARCHAEOLOGY

Dam Threatens Iraqi Ancient Sites

LONDON—Construction has begun on a Tigris River dam that will flood dozens of important archaeological sites in northern Iraq, including the ancient royal capital of Assyria. A senior Iraqi antiquities official attending a scientific meeting here last week pleaded for international help in salvage excavations, but researchers say there may be too little time and too much politics to save more than a fraction of the Assyrian heartland before the floodwaters finish rising in 2007.

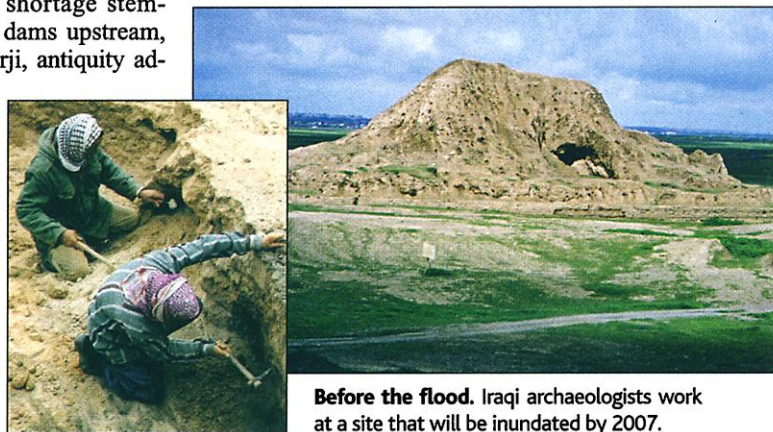
The Makhool Dam, located between Baghdad and Mosul, is expected to alleviate a severe water shortage stemming from Turkish dams upstream, says Muayad Damerji, antiquity adviser to the Ministry of Culture. Those dams have flooded key archaeological sites in Turkey—and more are planned, including one that would submerge the ancient city of Hasankeyf. But the impact of the Makhool Dam

will have much more far-reaching consequences: Damerji has identified 65 important sites in the region that must be salvaged in the next 5 years.

Preeminent among those sites is Ashur, which served as the religious and cultural capital of the Assyrian Empire for half a millennium. Set on a 40-meter-high bluff overlooking the Tigris, Ashur rose to prominence as a trading center during the Old Assyrian period in the middle third millennium B.C., says Arnulf Hausleiter, an archaeologist at Berlin's Free University who is digging at the 65-hectare site.

Ashur later served as the spiritual center of the Assyrian Empire, which by the ninth century B.C. had stretched from the borders of Nubia in Africa to the Persian Gulf. The Assyrians apparently bestowed the city's name on their primary god, and generations of rulers were laid to rest near a ziggurat (temple tower) that still stands on the promontory. After the city was sacked in 612 B.C., Ashur and its empire never recovered. "Ashur is Assyria," says John Russell, an archaeologist at the Massachusetts Institute of Art in Boston. "If that site is lost, we lose the whole matrix" of Assyrian culture. Adds Georgina Herrmann, a University College London archaeologist: "It's an absolute disaster."

Plans for a coffer dam surrounding the site to protect Ashur were abandoned after its projected cost was higher than that of the Makhool Dam itself, says Donny George, research director of the Iraqi State Board of Antiquities, who with a half-dozen Iraqi archaeologists was in London for a conference on Assyria hosted by the British Museum and the British School of Archaeology in Iraq. Even a coffer dam would offer limited protection, George says, because a rising



Before the flood. Iraqi archaeologists work at a site that will be inundated by 2007.