One difference, seen in studies of isolates from Malawi and Ethiopia, is in the cell surface receptors that HIV docks onto. HIV initially attaches to both a CD4 receptor and a coreceptor called CCR5 to establish an infection. Typically, as a person's immune system wears down, HIV begins favoring another coreceptor, CXCR4, over CCR5. But subtype C rarely makes the switch. This means that at any given time, a person infected with subtype C will likely have more copies of the virus that dock with CCR5—the variant most capable of establishing an initial infection.

Essex also believes that subtype C may transmit more efficiently through heterosexual sex. In the January *Journal of Infectious Diseases*, Essex and co-authors describe a chemical messenger secreted by immune cells that boosts HIV replication, particularly that of subtype C. Because venereal diseases increase secretion of this messenger, the researchers write that "it is tempting to speculate" that these conditions may explain the explosive spread of subtype C.

Other researchers see these speculations as just that. Saladin Osmanov, who tracks subtypes for the Joint United Nations Programme on HIV/AIDS, suspects that subtype C's current front-runner slot may simply be part of the ebb and flow of the epidemic. "Viruses tend to shift and disappear and come back," says Osmanov. "I don't like simple explanations." Virologist Martine Peeters of the Institute of Research for Development in Montpellier, France, agrees. "There are almost no subtype C data," says Peeters, who has worked extensively in Gabon, Cameroon, and Senegal. "It's too early to conclude anything about any subtypes."

HIV and AIDS do have different characteristics in Africa, but most researchers, ultimately, never lose sight of the main similarity: HIV, everywhere it goes, destroys immune systems, cuts lives short, and devastates communities. In Masaka, Uganda, says Whitworth, the risk of death increases by 11 times in people who test positive for HIV. Yet Whitworth says he also appreciates the Thabo Mbekis of the world: "It makes us think about assumptions and be quite sharp in our arguments." **–JON COHEN**

NEWS

Balancing the Collaboration Equation

An inside look at three veteran marriages between African AIDS researchers and foreign colleagues illustrates the benefits—and stresses—of partnership

When researchers from the University of Manitoba in Winnipeg, Canada, began seeing an unusual number of cases of genital ulcers in the late 1970s, they turned to colleagues at the University of Nairobi for help. Friendships grew, and in 1980, the Canadians sent a senior infectious disease fellow to Nairobi for a year to study genital ulcer disease, which is relatively common in Kenya. That visit sowed the seeds for the longest running and one of the most productive AIDS research collaborations in Africa.

The project quickly expanded to include a study of sexually transmitted diseases (STDs) among prostitutes in a teeming Nairobi slum called Pumwani. When STD guru King Holmes of the University of Washington, Seattle, joined the project in 1984, a junior fellow working with him, Joan Kreiss, suggested they look into the prevalence of HIV among the prostitutes. Holmes and Manitoba's Frank Plummer, who now presides informally over the collaboration, tried to talk Kreiss out of the idea. They had seen no AIDS cases in Nairobi and thought the work would lead nowhere. Fortunately, Kreiss persisted. "We found that two-thirds of the women in Pumwani were infected with HIV, which was a complete shock to everyone," recalls Plummer. "That turned things around completely."

High-profile AIDS papers began to pour out of the collaboration. They described the extent of the epidemic in Kenya and linked high risk of HIV transmission to genital ulcer disease, contact with prostitutes, and lack of male circumcision. The collaborators discovered—much to the amazement of AIDS researchers around the world—that about 5% of the prostitutes did not become infected with HIV despite repeated exposure, suggesting that their immune systems might hold important clues for AIDS vaccine developers. "Our collaborations have really yielded results that have benefited the world at large," says the University of Nairobi's Elizabeth Ngugi, who started the outreach work with the Pumwani prostitutes.

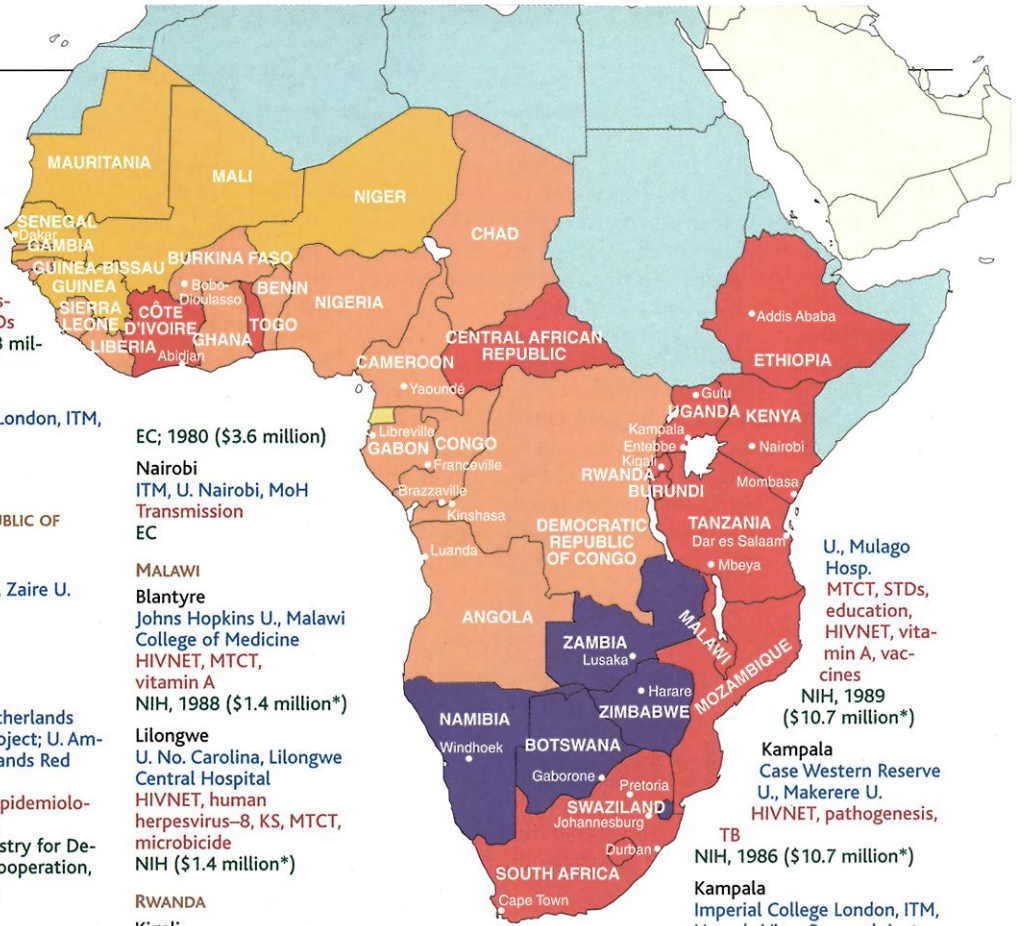
Together we stand. Abidjan's Projet RETRO-CI collaboration, funded by the U.S. CDC, pooled data from studies at this prenatal clinic with those from another similar clinic run by French researchers across town.

Given that string of achievements, you might think the Kenya project is a smooth-functioning model of cooperation. But everybody involved will tell you that it has not been easy. Kenyan researchers constantly find themselves balancing their expectations and needs with those of their collaborators, who not only provide the bulk of the funding but also have better access to organizers of conferences, editors at journals, and the international media. "There are equity issues that make it difficult, and it's a constant tension," says Plummer. "The collaboration is like a marriage," adds Job Bwayo, chair of the University of Nairobi's medical microbiology department and head of the AIDS research effort. "You have to give and take."

Stresses and strains are not unique to the Nairobi partnership. In a dozen projects *Science* visited across sub-Saharan Africa, tensions are part and parcel of collaborative efforts. Most revolve around equity: access to financial resources and facilities, participation, transfer of technology, self-reliance, training opportunities, and credit. Foreign scientists also on occasion have had to confront their African colleagues about using lab resources to conduct personal business.

Yet, in spite of the difficulties, international collaborations are essential for conducting research in sub-Saharan Africa, where few countries can afford scientific research on AIDS—or anything else, for that matter. Indeed, they account for most of the research on the conti-

Major International AIDS Research Collaborations



BENIN

ITM; NAP
Transmission

BOTSWANA

Gaborone
Harvard U.; McGill U.; MoH
Antiretroviral resistance
Bristol-Myers Squibb, 2000 ($1.2 million)

Gaborone and various villages
Harvard U.; MoH
MTCT, vaccine design, viral subtypes, VTN†
NIH, 1997 ($500,000)

BURKINA FASO

Bobo-Dioulasso
Centre Muraz: Organization for Coordination and Cooperation Against Endemic Diseases, ANRS
MTCT, sex workers, genetic diversity, disease progression
ANRS, 1995 ($200,000)

CAMEROON

Yaoundé
IRD, ITM, Cameroon CDC, U. Yaoundé
Subtypes, treatment, transmission, variability
EC

Yaoundé
ITM, University Hospital
Transmission
EC, ANRS

Yaoundé
New York U., U. Yaoundé
Immunology, subtypes
NIH ($327,000)

Countrywide
Hôpital Bichat, Pasteur Institute, Aaron Diamond AIDS Res. Center
SIVs and new HIVs
NIH, ANRS ($668,000*)

CÔTE D'IVOIRE

Abidjan
Projet RETRO-CI: U.S. CDC, MoH
Epidemiology, MTCT, opportunistic infections, STDs, sex workers
CDC, 1988 ($4 million)

Abidjan
ANRS, French Cooperation, INSERM (French biomedical research agency), Treichville University, NAP
Epidemiology, MTCT, opportunistic infections, STDs
ANRS, 1994 ($1.3 million)

Abidjan
Imperial College London, ITM, NAP
Microbicides
EC, 1988

DEMOCRATIC REPUBLIC OF CONGO

Kinshasa
Johns Hopkins U., Zaire U.
Immunology
NIH

ETHIOPIA

Addis Ababa
ENARP: Ethio-Netherlands AIDS Research Project; U. Amsterdam, Netherlands Red Cross
Natural history, epidemiology, viral subtypes
Netherlands Ministry for Development and Cooperation, 1994 ($2 million)

GABON

Franceville
Int'l. Center for Medical Research, Hôpital Bichat, Pasteur Institute, Aaron Diamond AIDS Res. Center
Primate SIVs and HIVs
NIH, ANRS ($668,000*)

GAMBIA

Fajara
U.K. MRC, Oxford, University College London
HIV-2, KS, sex workers
U.K. MRC ($900,000)

KENYA

Nairobi and Mombasa
U. Nairobi, U. Manitoba, U. Washington, U. Ghent, Oxford U., and others
STDs, MTCT, sex workers, vaccines, immunology, epidemiology, HEPS, microbicides
Canada MRC, NIH, U.K. MRC, IAVI, U.S. Agency for Int'l. Dev., Can. Int'l. Dev. Agency, EC; 1980 ($3.6 million)

Nairobi
ITM, U. Nairobi, MoH
Transmission
EC

MALAWI

Blantyre
Johns Hopkins U., Malawi College of Medicine
HIVNET, MTCT, vitamin A
NIH, 1988 ($1.4 million*)

Lilongwe
U. No. Carolina, Lilongwe Central Hospital
HIVNET, human herpesvirus–8, KS, MTCT, microbicide
NIH ($1.4 million*)

RWANDA

Kigali
U. Alabama, Nat'l. Ref. Lab
Long-term survivors
Luxembourg, Belgian agencies; 1997 ($660,000)

Kigali
Johns Hopkins
Vitamin A
NIH ($668,000)

SENEGAL

Dakar
IRD, U. Dakar, Hôpital Bichat
Subtypes
ANRS, 1994 ($530,000)

Dakar
Harvard U., U. Cheikh Anta Diop
HIV-2
NIH ($700,000)

Dakar
U. Washington, U. Dakar
Epidemiology, cervical cancer
NIH ($453,000)

SOUTH AFRICA

Hlabisa
MRC
Vaccines, STDs
IAVI, 1993

Mtubatuba
MRC, U. Natal, U. Durban
Migrants
Wellcome Trust, 1995

Durban
MRC, HIVNET
Sex workers, epidemiology
NIH, 1990

Durban
MRC, Columbia U.
VTN†
NIH, 2000

Cape Town
U. Cape Town, U. Stellenbosch U., Mulago Hosp.
MTCT, STDs, education, HIVNET, vitamin A, vaccines
NIH, 1989 ($10.7 million*)

Kampala
Case Western Reserve U., Makerere U.
HIVNET, pathogenesis, TB
NIH, 1986 ($10.7 million*)

Kampala
Imperial College London, ITM, Uganda Virus Research Inst.
EC, 1998

Entebbe
U.K. MRC, Uganda Virus Research Inst.
Natural history, immunology, subtypes, epidemiology, STDs
U.K. MRC ($2.7 million)

Gulu
U. Milan, Lacor Hosp.
Natural history, immunology, vaccines

Rakai
Makerere U., Columbia U., Uganda Virus Research Inst., Johns Hopkins U., U.S. NIAID
NIH ($613,000)

ZAMBIA

Lusaka
U. Alabama, Zambia UAB HIV Research Project, U. Teaching Hosp.
Discordant couples, TB, transmission, nat. history, acute infection
NIH, 1994 ($1.6 million)

Lusaka
ITM, Tropical Disease Res. Center
Transmission
EC

Lusaka
London School of Hygiene and Tropical Med., MoH, U. Teaching Hosp.
TB

ZIMBABWE

Harare
U.C. San Francisco, U. Zimbabwe, Stanford
HIVNET, STDs, microbicides, MTCT, immunology
NIH ($437,000)

Virology, epidemiology, vaccines, TB
MRC, IAVI

Soweto
Chris Hani Baragwanath Hosp.
MTCT, microbicides, prevention, pediatrics, HIVNET
NIH

Various sites
Population Council
Microbicides
NIH ($602,000)

Various sites
Columbia U., U. Natal
Immunity, pediatrics
NIH ($387,000)

TANZANIA

Dar es Salaam, Kagera
Swedish Inst. for Infect. Dis. Control, U. Umeå, Muhimbili U.
Epidemiology, immunology, nat. history, behavior, MTCT, TB, vaccines
SAREC, 1986 ($660,000)

Mbeya
U. Munich, MoH, Muhimbili U., and others
Superinfection
EC, Henry Jackson Found., DFG (German Research Agency), Swiss Air; 2000 ($330,000)

Dar es Salaam
Harvard U., Muhumbili U.
MTCT, subtypes, vitamins
NIH ($773,000)

UGANDA

Kampala
Makerere U., Johns Hopkins

Key:
Blue: Participating institutions
Red: Research focus
Green: Funding agencies, start date (annual budget)
Map colors indicate prevalence rates (p. 2151)

ANRS: Nat'l. Agency for AIDS Research (France); CDC: Center for Disease Control (for given country); EC: European Commission; HEPS: Highly exposed, persistently seronegative people; HIVNET: NIH's HIV Network for Prevention Trials; IAVI: Int'l. AIDS Vaccine Initiative; IRD: Inst. of Research for Development (France); ITM: Inst. of Tropical Medicine, Antwerp; KS: Kaposi's sarcoma; MoH: Ministry of Health (for given country); MRC: Medical Research Council (for given country); MTCT: mother-to-child transmission; NAP: Nat'l. AIDS Program (for given country); NIH: Nat'l. Institutes of Health (U.S.); SAREC: Swedish Int'l Development Cooperation Agency; STDs: sexually transmitted diseases; VTN: NIH's Vaccine Trials Network

* Shared funding † Preliminary

For updates see www.sciencemag.org/feature/data/africacollaborations.shl. Please send changes and additions to science_news@aaas.org

nent (see facing page). Three of the longest running projects—the Nairobi collaboration, a Swedish-Tanzanian project, and a collaboration in Côte d'Ivoire funded by the U.S. Centers for Disease Control and Prevention (CDC)—provide different models of how contrasting research worlds can work productively together.

Staying power

The fact that the Kenya collaboration continues to flourish and produce groundbreaking results after 2 decades suggests that the partners in this marriage are doing something right. Chemistry is an important factor—as it is in most partnerships—and many of the participants credit Plummer with creating the right ambiance. "Frank is a quiet person who doesn't care about quarreling," says Bwayo. "He's been central to this working."

Plummer, a gentle but determined bear of a man with a salt-and-pepper beard, first came to Kenya in 1981 as the second fellow sent out from Manitoba. His 11-month stay led to a dozen papers coauthored with Kenyans, Canadians, and a young Belgian: Peter Piot, who now heads UNAIDS, the Joint United Nations Programme on HIV/AIDS. "I loved the place," says Plummer. "I couldn't wait to get back." He returned in 1984 and has made it home ever since.

The partnership continued to expand, bringing in universities from Seattle, Ghent, Toronto, Oxford, and Rotterdam. One key to its success is that the international partners—who together spend $3.6 million a year on research and another $1.2 million on intervention and training programs—have brought critical resources to the effort. A clinic to this day provides free care and treatment to Pumwani prostitutes. The University of Washington, with funding from the National Institutes of Health's Fogarty International Center, has paid for 48 Kenyans to come to Seattle for advanced training, and a few more have studied at Oxford, Winnipeg, and Antwerp. Kreiss started new studies across the country in Mombasa. The collaboration also built and equipped a lab on the Nairobi campus that has state-of-the-art machinery for doing HIV virology and immunology. "We wouldn't be doing any research without our collaboration," says Bwayo.

The outside collaborators' willingness to listen to the complaints and concerns of their Kenyan partners helps explain the collaboration's survival, too. On 31 January 1998, they got an earful. On that Saturday, 22 researchers from Kenya, the United States, Canada, Belgium, and the Netherlands held a retreat to discuss the collaboration's strengths and weaknesses. A report of that meeting offers a rare peek into the frustrations faced by African scientists—and their wealthier collaborators—all over the continent.

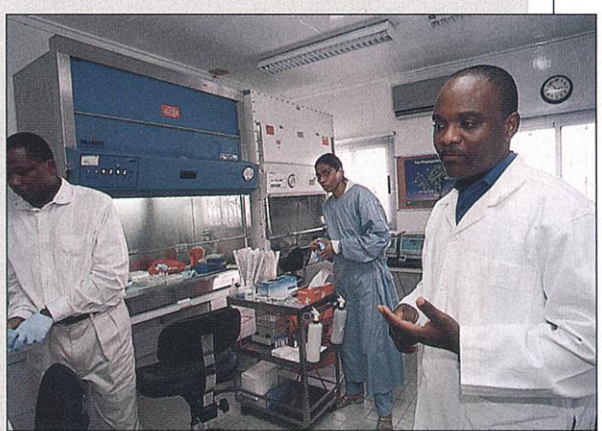
Collaborators, the Kenyans said, should try harder to incorporate Kenyans when they draft research proposals, manuscripts, and conference presentations. University of Nairobi staff who currently do not work with the project should have more opportunities to participate. Collaborators should more freely share their late-model vehicles and computers. Rather than shipping samples out of the country because of a lack of equipment, more technology transfer should occur. The Kenyans also asked their collaborators to share information more freely about their budgets and encourage, rather than criticize, use of the lab for university and even private business.

This soul-searching led to a revised "Statement of Principles" and a list of "expected benefits and mutual obligations." It didn't resolve all the problems, and collaborators challenged many of the criticisms,

Building a World-Class Lab From Scratch

PROFILE

ABIDJAN, CÔTE D'IVOIRE—Shortly after Cameroon first started broadcasting television programs in 1984, John Nkengasong, then a student at the University of Yaoundé, remembers watching a show that featured veterinary scientists working in a laboratory. "I didn't even know what research was," recalls Nkengasong, the son of a Cameroonian subsistence farmer. Now Nkengasong, a virologist at Projet RETRO-CI here, runs one of the best equipped HIV labs in sub-Saharan Africa and has published dozens of papers helping to clarify properties of specific strains of the virus.



Trained brain. Cameroonian virologist John Nkengasong says "there's nothing we can't do" at his well-equipped Projet RETRO-CI lab in Abidjan.

Projet RETRO-CI, a U.S.–Ivoirian collaboration funded by the U.S. Centers for Disease Control and Prevention (CDC), hired Nkengasong in 1996 to build a virology lab from scratch. As Nkengasong leads a tour of his lab, it's clear that scientists working in wealthy countries might well envy *him*. Dangerous viruses like HIV must be handled in sealed and aerated biosafety rooms. Nkengasong has two such P-3 rooms, one for HIV-1 and, to avoid contamination problems, another for the less common HIV-2. He has late-model polymerase chain reaction machines to amplify small amounts of DNA, a procedure routinely done in developed countries to determine how much virus people have in their blood—their "viral load." A new DNA sequencing machine sits on one table and a sleek new Apple iMac computer on another. "There's nothing we can't do here," says Nkengasong.

After graduating from Yaoundé in 1987, Nkengasong won a scholarship to study in Belgium with Peter Piot at the Institute of Tropical Medicine in Antwerp. "He's the first African I put in charge of a lab in Belgium," remembers Piot, who now heads UNAIDS and has trained several African AIDS researchers. "I really had a lot of confidence in him and am proud of his accomplishments."

Nkengasong says he badly wanted to return to Africa after completing his Ph.D. in virology at the University of Brussels. "There are many people in the States who are better than I am," he says. "I can contribute to the development of Africa here." But he could not find an attractive job in Cameroon. "The structures in Africa are not always there to receive the brains that are trained," he says. When the chance to head the virology lab at RETRO-CI came up, Nkengasong jumped at it.

A key part of Nkengasong's current work involves measuring viral loads, which can provide information essential for treatment and for critical research topics such as how much HIV a woman has in her breast milk or in cervicovaginal secretions. Nkengasong and his co-workers also have analyzed the subtypes of HIV-1 and HIV-2 circulating in Abidjan, which may lead to better screening tests for these viruses and, separately, help vaccine developers (see p. 2165).

Nkengasong worries about the project's reliance on "soft money" from the CDC. "I'm always wondering about the day CDC won't do this," he says. "Can the Ivoirians sustain this?" Ultimately, he believes, the lab could survive on grant money. "In 2 or 3 more years," he predicts, "I'll be as competitive as any lab in the world." **–J.C.**

Restarting Rwanda's Research Engine

KIGALI, RWANDA—When Etienne Karita left here in 1993 to study at the University of Brussels in Belgium, the AIDS research community in Rwanda was booming. Karita worked with a French-Belgian collaboration conducting large studies of mother-to-child transmission of HIV; a project run by researchers from Johns Hopkins University in Baltimore, Maryland, was carrying out similar studies; scientists from the University of California, San Francisco (UCSF), were investigating the course of the disease in infected people and the factors that aid heterosexual transmission of the virus; and the World Health Organization had selected Rwanda as one of four developing countries best prepared to stage efficacy trials of AIDS vaccines. "There were very good collaborations with Rwandan doctors," remembers Karita. "It was a spirit of teamwork that was beautiful."

PROFILE

But in April 1994, ethnic tensions between Rwanda's Hutus and Tutsis erupted into one of the greatest atrocities of the late 20th century, a genocidal rampage that killed an estimated 800,000 people during 100 days of terror. When Karita returned home in July, he learned that both his parents and eight of his 10 siblings had been killed. His wife, who had remained in Kigali with their daughter, was shot in the leg but survived by hiding above a ceiling panel. "People were massacred without any defense," says Karita, his rage about the world's inaction accentuated by his quiet tone.

Expatriate AIDS researchers fled the country shortly before the killings started, untold numbers of Rwandan AIDS researchers disappeared or died, and looters wantonly destroyed labs. One of Africa's most vibrant scientific communities suddenly vanished.

Karita took his wife and daughter back with him to Brussels, where in November 1995 he completed a master's program in molecular biology with Peter Piot, now the head of UNAIDS. "He's a brilliant guy," says Piot. "He could definitely have stayed in Belgium and had a quiet academic career."

Kigali can-do. Etienne Karita is restoring science to his war-torn country.

But Karita opted to go home. "The idea I had in mind was, 'What can I do to help Rwanda rebuild the country?' I considered AIDS a priority." Karita, who was a relatively junior researcher before the genocide, was named head of the country's National AIDS Control Program.

With help from the Luxembourg government, Karita finished construction of a lab that was begun before the genocide, and in July 1997 he became head of the Belgian-funded National Reference Laboratory for Retroviral Infections. Today, this handsome brick lab does most of the HIV testing in Rwanda, and Karita, in collaboration with Dirk van Hove, a Belgian tropical disease specialist who also returned, has begun to restart the country's research engines. "Through it all, he's continued to try and improve his skills and stay abreast of current events in research," says Susan Allen, an AIDS researcher at the University of Alabama, Birmingham, who headed the abandoned UCSF project in Kigali.

Karita now collaborates with Allen, studying the immunity of people identified by her project who have survived 14 years with the virus, the "long-term nonprogressors." The United Nations Children's Fund and the Pediatric AIDS Foundation also have awarded him grants to start testing and treating infected mothers to prevent them from passing HIV to their babies.

But the research engine is still missing critical parts. Few Rwandan doctors have time to do research, says Karita. International donors fear investing in the country, too. Still, Allen is preparing a new grant proposal for the National Institutes of Health. And at each AIDS meeting Karita attends, he finds a few more potential collaborators. Says Karita: "As we're moving ahead, more and more people are starting to get interested." **–J.C.**

emphasizing that they had their own frustrations. Yet the collaboration, which has published nearly 300 papers, continues to expand. Recently, the group has started research projects in new communities, launched a project to develop Kenya's first AIDS vaccine, and drawn up plans to construct a new wing at the university.

Long-term survivors

In neighboring Tanzania, a different kind of collaboration between Swedish and Tanzanian researchers, the TANSWED HIV Program, has been flourishing for 14 years. It has resulted in nearly 250 published papers and abstracts. Like most long-standing African AIDS research projects, this one has moved from describing the epidemic to testing interventions to slow HIV's spread, including preparing cohorts for vaccine studies.

"It's a true partnership," says Fred Mhalu, an infectious-disease specialist at Muhimbili University in Dar Es Salaam. "Both sides are benefiting." Gunnel Biberfeld of the Swedish Institute for Infectious Disease Control, who is well known for her AIDS vaccine studies in monkeys, agrees. "It's not one-way," Biberfeld says. "We learn a lot."

In contrast to the relatively freewheeling Nairobi collaboration, TANSWED is tightly structured. The Swedish International Development Cooperation Agency provides most of the funding—$8 million since 1986. It has strict rules designed to encourage technology transfer and discourage empire-building. It prohibits either side from hiring full-time investigators, for example, and doesn't fund new labs for the project. "We don't believe in establishing things separately, but to reinforce what's there," says Biberfeld. "Then it becomes permanent." The project has also provided support for many young Tanzanian researchers to participate in a "sandwich" program that combines brief training in Sweden with studies in Tanzania—a model that aims to reduce the risk of students staying abroad.

These policies draw mixed reviews from the participants. Biberfeld says the prohibition on Swedish researchers working full-time in Tanzania slows down research and discourages Swedish investigators from participating. But Mhalu likes the policy. It encourages more Tanzanians to do the fieldwork, he says, and it helps eke out scarce resources. Full-time Swedish investigators, he notes, would eat up a big chunk of the budget. "I've seen several other projects that had to shut down because of how much they spend on [foreign scientists]," says Mhalu.

On the other hand, neither side likes the ban

on hiring full-time Tanzanians. "Our project has 30 scientists who have to teach, do clerical work, and don't have full-time research assistants," says Mhalu, whose salary and lab space is paid for by the Tanzanian government.

Biberfeld stresses that, at the end of the day, "this is a Tanzanian project." Not only do the Tanzanians have nearly twice as many principal investigators as the Swedes, Tanzanians routinely present the data at international conferences and receive top billing in publications.

A tale of one city

Across the continent in Côte d'Ivoire, a French-speaking country on Africa's west coast, two large, often overlapping AIDS research projects coexist in the bustling city of Abidjan. The U.S. CDC funds the larger one, Projet RETRO-CI, while France's National Agency for Research on AIDS supports the other.

Projet RETRO-CI, in collaboration with the Ivoirian Ministry of Health, set up shop in 1988, studying basic epidemiology of both HIV-1 and the less understood HIV-2, which is largely confined to western Africa. The CDC researchers and their Ivoirian collaborators were soon publishing their findings in high-profile journals, including *Science*. "It was lucky initially that we asked simple questions," says CDC's Kevin DeCock, Projet RETRO-CI's first director.

Like the Nairobi collaboration, RETRO-CI has brought critical resources to the project, including establishing a topflight lab (see profile on p. 2157), a clinic that provides free health care to sex workers, and a training program for African researchers. RETRO-CI, unlike TANSWED, has 135 full-time staff, but CDC limits the number of U.S. scientists (there are now only two), and African scientists are encouraged to publish papers and present at meetings. Yet the initial reception in Côte d'Ivoire was mixed. "When we started, people said, 'What are you doing, research is not very important,' " recalls Ehounou Ekpini, the project's deputy director.

Project RETRO-CI staff had a mixed reaction themselves in 1994 when French AIDS researchers, fleeing the Rwandan genocide, established another program in Abidjan. But after some initial wariness, the two groups began working together. In 1998, they pooled data on mother-to-child transmission of HIV during the postnatal period, and last year, they published back-to-back complementary papers in *The Lancet* demonstrating that cotrimoxazole, a relatively cheap sulfa drug, can decrease disease and prolong the lives of HIV-infected people. CDC's Stefan Wiktor, who stepped down as Projet RETRO-CI's director in August, has come to see the relationship as mutually beneficial. "It looks funny for people to do similar studies in the same city, but it's worked out well," Wiktor says. "And among Ivoirians, they don't view it as a problem."

Issa Malick Coulibaly, who until last year headed the country's National AIDS/STD/TB program, says the intense research interest in Côte d'Ivoire has transferred much technology to his country. "We need to have a good capacity for research," says Coulibaly. "We don't need to take blood of people living here and send it to France and the CDC."

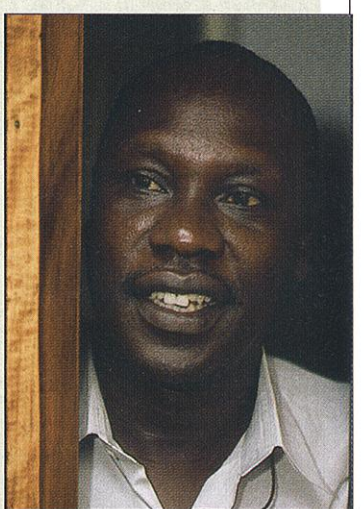
As much as African countries want to build their research infrastructures, ultimately, the collaborations in Kenya, Tanzania, Côte d'Ivoire, and elsewhere won't be judged by how much they strengthen research, but by how much the research findings help prevent HIV and AIDS in these countries. And on that score, everyone is still struggling. "One of the frustrations I felt at the end of my stay here was lack of translation of research findings to public health programs," says Wiktor. "Research isn't enough." —JON COHEN

The Risks—and Rewards—of War Zone Research

PROFILE

KAMPALA, UGANDA—At 2:00 a.m. on Good Friday in 1989, about 30 young rebels from the Lord's Resistance Army breached the gate of Lacor Hospital in Gulu, where Matthew Lukwiya worked as a clinician, and demanded drugs. A gatekeeper roused Lukwiya from bed, and he told the rebels that the Ugandan army was keeping the drugs in town. They threatened to take some of the elderly Italian sisters from the Comboni Missionaries, a religious group that runs the hospital. "I said, 'If you want to take the sisters, take me,' " recalls Lukwiya. Shoving people with their guns, the rebels did just that, grabbing five nurses, too.

"They said, 'Until you pay a ransom, we won't give them back,' " says Lukwiya. "They were very rough, and we thought they were going to kill us." After keeping the hostages in the bush for a week, the rebels released this kind-faced young doctor and the nurses unharmed. But their harrowing experience explains why few Ugandan doctors, to this day, work in Gulu. "People don't want to risk [going there]," explains Lukwiya.



Fear factor. Matthew Lukwiya works in rebel territory upcountry that colleagues avoid.

Gulu, about 4 hours north of Kampala by car, is in an "upcountry" region torn by armed conflict. Residents are fearful of rebel soldiers, who have raped girls and seized boys to serve as fighters. Thousands of townspeople flood each day onto the guarded hospital grounds at dusk for a safe night's sleep. So upcountry clinical researchers like Lukwiya, a native of the Gulu district, play a critical role—and win high praise from their colleagues. "Matthew Lukwiya is the best doctor I have met in Africa," says Giuliano Rizzardini of the University Hospital in Milan, an AIDS clinician who lived in Gulu himself for several years during the mid-1980s and still travels there regularly.

Lukwiya works in Gulu primarily because he wants to provide care for his own people. He also takes the risk because he believes research can help thwart HIV in a region that still has shockingly high infection rates—in contrast to other parts of Uganda that have successfully curbed HIV's spread. In 1999, for example, 35% of the outpatients at Lacor Hospital tested positive for HIV. "It's very important to work in Gulu because when AIDS research started, researchers all centered on Kampala," says Lukwiya, who in 1996 established a long-term research collaboration at Lacor studying immunologic responses to HIV with the University of Milan's Mario Clerici. (Lukwiya himself moved to the capital city last year but intends to return to Gulu soon.) "This cooperation with the Italians up north has done quite a lot for the people and the hospital," says Lukwiya. "There's a transfer of technology and a transfer of scientific culture."

With the Italian researchers, Lukwiya has published cutting-edge papers that may help explain why Africans are particularly vulnerable to HIV, and he says he has been able to offer his patients better care. "Our hospital is the only one in the country that has systematic computerized records," says Lukwiya. "We've been able to improve the training of our staff. And we've been able to link ourselves with good research centers in Italy." Lacor has also attracted international attention, including a 1997 visit by U.S. Secretary of State Madeleine Albright, who pledged to establish a $2 million endowment for the hospital (a promise as yet unfulfilled).

Lukwiya hopes that if the developed world better understands the devastation that HIV and AIDS cause in places like Gulu, it will work harder to provide treatments. "People are dying," he says. "They're dying here day and night." —J.C.