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Infectious Diseases: A Growing Global Threat

by John Eberlee



**Environmental deterioration contributes
to the spread of infectious diseases**

When it comes to disease transmission, there are truly no borders in the global village. Human activity and environmental change are dramatically increasing the potential for worldwide epidemics of infectious disease -- a fact that makes North/South distinctions less and less meaningful. Despite steady advances in our ability to identify, monitor, and control pathogenic organisms, human populations everywhere are becoming more and more vulnerable to disease. To better protect human health, the world needs a global early warning system, according to panelists at a recent IDRC forum on emerging and resurgent diseases.

"As the Nobel laureate Joshua Lederberg has pointed out, the microbe that felled one child in a distant continent yesterday can reach yours today and seed a global pandemic tomorrow. There is nowhere in the world from which we are remote and no one from whom we are disconnected," said Dr Catherine Hankins, an epidemiologist at McGill University in Montreal.

"Infectious disease remains the leading cause of death and disability worldwide and will continue to do so as a result of changes in society, technology and the environment," she added.

Impact of Disease

In Tanzania, a recent study sponsored by the World Bank found that diseases account for 64% of "discounted life years lost" (a quantitative measure of premature deaths), noted Dr Konrad Mmuni, principal consultant physician with the Muhimbili Medical Centre in Dar es Salaam. The most prominent diseases are AIDS, malaria, tuberculosis, cholera, plague, meningitis, rabies, and dysentery. According to Mmuni, incidence rates of many of these diseases have been increasing dramatically in recent years.

Mmuni blamed Tanzania's woes on inadequate hygiene and overburdened health care facilities. "Locally, there is a stretching of limited resources from trying to treat people with malaria and AIDS." He added that malaria control programs are facing tougher challenges because of a steady increase in both drug-resistant parasites and insecticide-resistant mosquitoes.

Return of Tuberculosis

Although the situation is not as serious in the North, the fight against disease has taken a turn for the worse. In Canada, tuberculosis is emerging once again as a serious threat after decades of decline, noted Dr Joseph Losos, director general of the Canadian Laboratory Centre for Disease Control.

Across Canada, approximately 10% of tuberculosis strains are resistant to antibiotics, and a small percentage of these are resistant to more than antibiotic. "The disturbing news," said Losos, "is that the genetic sequence of some of our strains is starting to look more and more like W-strain, which is resistant to all seven anti-tuberculosis drugs. W-strain is associated with 60-70% mortality rates in the best health care facilities on Earth."

Additional concerns include food-borne pathogens, such as "hamburger disease", a virulent form of *E. coli* that can cause kidney failure in young children; and water-borne pathogens, such as *Cryptosporidium*, that caused massive illness in Milwaukee, Wisconsin a few years ago. Approximately 403,000 people came down with diarrhea after drinking water that met all federal and state standards for water purity, reported Hankins.

Shifting Patterns of Disease

According to Dr Jonathan Mann, a professor at Harvard University and founding director of the World Health Organization's Global Program on AIDS (1987-1990), the emergence of infectious diseases in the South and North is associated with six main factors. These include changes to the physical environment, human demographics, international travel and commerce; technological changes such as mass food production, microbial adaptation, and the dismantling of public health measures. The latter change contributed to the resurgence of tuberculosis in North America.

Among these factors, the movement of people and goods has perhaps had the greatest potential impact on global public health. For instance, 42 million travellers visit the tropics every year, which translates into hundreds of millions of contacts between individuals. Not only do people from the North risk catching exotic diseases, but they carry with them antibiotic-resistant bacterial flora, stressed Losos.

Tiger Mosquito Threat

One example of the impact of international commerce is the introduction of the Asian tiger mosquito into Texas a few years ago. The mosquito entered the United States via Japan in a load of used tires, some of which stored enough water to provide a habitat for the mosquito larvae. "Its range has now extended as far north as Illinois," said Hankins. "It's a hardy mosquito -- one that can withstand North American winters. It's thought to be capable of carrying at least 15 viruses, including those responsible for dengue and yellow fever."

Global climate change is yet another phenomenon that could prove to have untold impacts on patterns of disease transmission. For instance, higher average temperatures globally could extend the range of certain disease-carrying mosquitoes that were previously limited to warmer regions and lower altitudes.

Finger-Pointing

Although diseases are now harder to control, improved surveillance could reduce the risk of local problems

becoming global epidemics. Although the WHO coordinates with other agencies to establish global surveillance and response teams, the challenge is to ensure the participation of all nations. One obstacle, said Mann, is the universal reflex toward blaming or finger-pointing when an epidemic occurs. He noted that the South is often the victim of this kind of blaming and many countries respond by denying that a public health problem exists.

"Country after country around the world fails to report epidemics of cholera to the World Health Organization, even though it's obvious cholera is occurring, because they are concerned about their international image. There is nothing a country fears more than to be embarrassed," said Mann.

Questions of Sovereignty

From the perspective of global health, "we are currently held hostage to national sovereignty," he continued. "Take the example of a plague outbreak. Until or unless the [local] health officials let the World Health Organization come in, or let the Centers for Disease Control in Atlanta come in, you can't go in. And yet the implications of an epidemic for international health could be quite extraordinary."

To resolve this problem, Mann proposed the establishment of global institutional arrangements based on certain universal principles. First, the same rules should apply to both the North and the South, he said. "When an outbreak occurs in a developing country, industrialized country researchers are quite willing and able to go help. But how many times has Canada or the United States brought in foreign researchers at the beginning of a new epidemic to participate in [public health efforts]?"

"Second, we need an honest broker: a neutral, transnational organization capable of conducting surveillance, initiating investigations and coordinating responses in a way that is suitable to all of us," he added. "We need simple and fair rules of engagement that describe how and when to enter and deal with a country. And we need to involve NGOs in the process to ensure the free flow of information and to raise the costs to governments of denying that there is a problem."

John Eberlee is a writer based in Ottawa and the acting editor of IDRC Reports.

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[The Intellectual Arrogance of the North](#) *Large-scale production of the world's first safe and effective malaria vaccine could begin in 1997. But the vaccine might already have been in use if not for the "intellectual racism" of scientists in the North.*

[Combatting Leishmaniasis in India](#) *Creating a better understanding of the causes of leishmaniasis and the most effective responses to it.*

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Bednets for malaria control

by Robert Bourgoing



Fighting malaria: African women dip bednets in a natural insecticide

Gbaguidi XII -- the King of Savalou -- yawns widely. He has slept well and with good reason: he spends his nights under a mosquito net impregnated with insecticide, a practice that could save many lives in his small kingdom in central Benin. At the end of the rainy season, Savalou, 200 km. north of Cotonou, is also the kingdom of the anopheles, the mosquitos that transmit malaria. One of the world's most deadly diseases, malaria claims up to three million lives per year, a million of which are in Africa. Hardest hit are children under five.

LIKE CLEOPATRA

In her day, Cleopatra, Queen of Egypt, also slept under a mosquito net. Today, there is renewed interest in this method of preventing malaria. Despite the encouraging results from tests conducted in Tanzania on the anti-malaria vaccine developed by a Colombian doctor, an effective vaccine against malaria will not be available over the short or medium term. There is no longer any hope of eradicating the mosquito itself and drugs are increasingly ineffective against certain resistant strains. Therefore, the new approach of insecticide impregnation of bednets becomes one of the most promising avenues for limiting the number of deaths caused by malaria. In one of the areas where it was tested in Gambia, it cut the child mortality rate by more than half.

Researchers have been trying for the first time in Africa to find out why some people decide to sleep under mosquito nets and to discover how to convince others to make the same decision. Their test field: Benin, where less than 15% of the population use the nets. Over a 3-year period, researchers from Benin and Canada, funded by IDRC, sold tulle (the fabric used for making mosquito nets) curtains to 1,550 families in the Savalou region. Each week, survey takers visited about 400 families in twenty or more villages to check whether they had used the fabric.

CLEAR BENEFITS

The surveys reveal general agreement among the intended beneficiaries: the new mosquito net provides undeniable benefits. In contrast to the traditional mosquito net, this net is light, transparent and permits air circulation. People are less hesitant about installing it during periods of intense heat. Impregnating the nets with an insecticide that is odour-free and harmless to users increases protection.

However, this apparently simple method is confronting certain barriers. The household head sometimes appropriates it for his own use, although the project has had some success in changing this behaviour by emphasizing the importance for children to be protected, owing to their delicate immune systems.

Local people are often unaware that only one mosquito bite can transmit malaria. The critical time for protection is around 1 a.m., the peak time of biting activity by the anopheles mosquito -- the one that transmits malaria.

DISEASE OF THE SUN

Dr Achille Massougbodji, a parasitologist at the Centre national hospitalier et universitaire du Bénin (Benin's national university hospital), considers animist religious beliefs and lack of knowledge to be the main barriers to the use of mosquito nets. "When you ask people in their own language, you have to take into account that malaria is associated with the sun and excess use of peanuts and red palm oil. However, the linkage between the mosquito and the disease is not always made".

Economics also play a part in net use. The tulle, like the insecticide, has to be imported from Canada. Nigeria manufactures this fabric, but it is expensive and of poor quality. According to Christophe Codjo Gbaguidi, President of the Organisation savaloise pour la solidarité et le développement (OSSD), this increases its costs and makes its use more difficult. "The tulle and the insecticide are funded by Canada. When the funding ends, I do not know if they will still be within peoples's financial reach. We are looking for ways to produce them at lower costs". A tulle net currently costs CFA6000 (US\$17) and, since the insecticide evaporates, it costs CFA600 every 6 months to reimpregnate it, a problem for those coming from outside the region, or for those with limited incomes. Nonetheless, researchers believe that nets are being purchased by women in families where the woman's income is greater than the man's.

MARKETING IN THE BUSHLAND

A Savalou resident spends, on average, US\$35 per year on drugs, medicated strips, insecticide sprays, and medical bills to combat malaria. The researchers are trying to convince people that the mosquito net will become less expensive. The researchers employ a variety of means to sell the mosquito net concept to the rural population: distribution of tee-shirts emblazoned with advertising slogans, a poster campaign to sell mosquito nets at a promotional price, a travelling theatre in the villages using the theme "the whole family under the mosquito net." The sale of mosquito nets more than tripled last year.

IMPROVES WOMEN'S STATUS

At the Centre de promotion sociale de Savalou [Savalou Social Advancement Centre], about thirty seamstresses sew up the polyethylene tulle manufactured by a Montreal company, Rentex. Two others put on long rubber gloves and plunge the new mosquito nets into a large tub of insecticide. "In the African family, it is the woman who takes care of the family's health," says Solange Laleye, who is the group animator. According to her, the project is seen as important and, therefore, enhances the esteem accorded to women. She also believes the initiative has contributed significantly to the emancipation of Savalou women. "In the beginning, their husbands were not too pleased because women spent less time at home. Afterwards, however, they realized that it was also to their advantage. There is less family illness. They have the benefit of the additional income of their wives and the bikes that are made available to them. Now, no husbands are bitterly opposed to the project. They are the ones reminding their wives that it is time to go. Some of them even drive their wives to work!"

ENCOURAGING RESULTS

The complete results from the user survey of the mosquito nets are not yet available. However, it is believed already that there has been an appreciable decline in the cases of malaria accompanied by anaemia in Savalou. These results are encouraging because, in addition to being one of the major causes of mortality, malaria, along with the guinea worm, is the main obstacle to the region becoming productive and developing. Christophe Codjo Gbaguidi believes that the benefits of the mosquito net strongly outweigh its limitations. He wants to extend the experiment to a much larger region and establish centres for impregnating mosquito nets. He is hoping for assistance from the Benin government and UNICEF.

Fagbedji Houchanu, village chief, claims that his life is no longer the same. "Before, I got up at about 3 a.m. and I never slept after that. During July, I was sick for 10 days, even with drugs. This year, I have felt some aches and pains, but I have had no malaria attack. Now, I get up at 5 in the morning. I sleep much better. If it was up to me, the whole village would be equipped with mosquito nets. However, not everyone has the money to obtain one". The piece of tulle has even received royal assent in Savalou. King Gbaguidi XII is converted. "Before, I used to scratch myself and I had to go to the hospital. I had a mosquito net, but it was not as well doused as yours. Now, I sleep very well. I don't feel a thing."

Robert Bourgoing, correspondent for PÉRISCOOP News Agency, reporting from Bénin.

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[Vol. 23, No. 3 \(October 1995\)](#)

VIEWPOINT: THE INTELLECTUAL ARROGANCE OF THE NORTH

by John Eberlee



Credit: Eco Latino, Ottawa

Large-scale production of the world's first vaccine showing both safety and efficacy against malaria could begin as early as 1997. But the vaccine might already have been in use if not for the "intellectual racism" of scientists in the North.

That is the view of the vaccine's developer, Colombia's Dr Manuel Patarroyo, WHO bore 6 years of attacks from the international research community after reporting his work. "When we first published our data in 1987, they said, 'It's impossible that a malaria vaccine is coming from Colombia.' They were reluctant to accept that there was not just a malaria vaccine, but the world's first chemically synthesized vaccine."

Patarroyo, founder and director of the Immunology Institute at the National University of Colombia in Bogota, joked during an Ottawa luncheon sponsored by IDRC and the Canadian Science Writers Association that had he been American "I might have already received the Nobel Prize."

Patarroyo's experience is featured in *Southern Lights: Celebrating the Scientific Achievements of the Developing World*. The Colombian immunologist has a message for the developed world: "There are lots of good scientists in the developing world working hard to solve the problems of mankind." Patarroyo's war on malaria began in the early 1980s when he organized a monkey colony in the Amazon jungle as an

experimental model for malaria. His team isolated different molecules of the malaria parasite, then immunized the monkeys with each one.

"We found four molecules to concentrate on. We then went back to the Amazon and identified the specific pieces of the structures that induced protective immunity. We mixed them up and made a vaccine cocktail," explained Patarroyo.

Critics dismissed the results, published in *Nature*, on grounds that the vaccine had not been tested on humans. When data showed the vaccine to be safe in humans, they criticized the method of transmitting the parasite -- via intravenous injection rather than by a mosquito bite. In fact, injections are more scientifically defensible, since it is impossible to tell whether a mosquito harbours the malaria parasite or in what numbers.

While this issue was debated, Patarroyo launched a major clinical trial involving 25,000 Colombians. Although the results clearly showed the vaccine's efficacy, critics charged that the trial had been improperly designed. Nor were they satisfied by subsequent trials in other countries, which met standard epidemiological criteria.

"The efficacy rate of the vaccine was 40% in Colombia, 55% in Venezuela, 60% in Ecuador, and 35% in Brazil," said Patarroyo. But the critics said that it might not work in Africa where the malaria challenge is greatest. However, a recent trial in Africa places the vaccine's efficacy at 31% for malaria morbidity. The next steps in Africa will be to determine the vaccine's impact on malaria mortality in order to understand its public health effectiveness.

The scientific world has now bestowed over 50 awards on Patarroyo. But Patarroyo has refused offers from drug companies of up to \$68 million for the vaccine rights, choosing instead to donate them to the WHO.

"It is not my project in life to become a millionaire, or to be powerful or famous, but really to solve what I want to solve. That is my life project, my life purpose," he declared.

John Eberlee is an Ottawa writer.

[Southern Lights](#): Celebrating the Scientific Achievements of the Developing World by David Spurgeon
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[Vol. 23, No. 1 \(April 1995\)](#)

Combating Leishmaniasis in India

by John Ramlochand

Creating a better understanding of the causes of leishmaniasis and the most effective responses to it. It is dry and hot on the dusty main street of Hassanpur village in Bihar, Northeastern India. Dr. L.S. Prasad, known throughout the state as "Dr. Lala," is beginning to sweat in the 43°C heat. For an hour he has sat in the centre of the village and examined twelve patients while over a hundred villagers watched.

The patients are mostly children. Dr. Lala is checking for a swollen spleen, a darkening of the skin, and fever. These are signs of visceral leishmaniasis: one of the most debilitating illnesses that regularly affects residents in this region.

Epidemics in 1992 of visceral leishmaniasis (VL) or "Kala-Azar" (Black Fever), as it is commonly known in Hindi, killed more than 100,000 people in India and Sudan. VL infects the body, breaking down the various organ systems such as the spleen, bone marrow, liver, lymph nodes and skin. It invariably causes death if left untreated. Leishmaniasis is, however, not always fatal. There are two other major forms: cutaneous leishmaniasis (CL) and mucocutaneous leishmaniasis (MCL). CL produces skin lesions, both chronic and self-healing. MCL tends to invade the mucous membrane of the upper respiratory tract, destroying the soft mucocutaneous tissue of the nose and mouth, thus resulting in gross mutilation and disfiguration. All three forms of leishmaniasis cause fever, an enlarged abdomen, general weakness, headaches and dizziness, weight loss, sweating and diarrhoea.

The leishmaniasis are a group of insect-transmitted parasitic diseases that are among the most misunderstood and least studied of endemic diseases. Three parasitic species are the primary culprits: *Leishmania donovani*, *L. tropica*, and *L. braziliensis*, which lead to the visceral, cutaneous, and mucocutaneous forms of leishmaniasis respectively. Lately, these parasites are known to have divided into several closely related subspecies and strains, complicating both the study and treatment of the diseases.

The parasites are transmitted mainly by the bites of *Phlebotomus* and *Lutzomyia* sandflies. These insects - about half the size of a mosquito - are in turn infected either from people or, more frequently, from domestic or wild rodents, dogs and other mammals. Person-to-person transmission of the diseases is now known to occur in some areas of India and Bangladesh, but it is usually animals that help spread the diseases.

Leishmaniasis often affects the poorest towns and villages, which are usually distant from schools and hospitals and thus tend to receive only minimal attention. As well, areas hardest hit by visceral leishmaniasis infections commonly overlap with endemic malaria regions, possibly leading to underestimates of the importance of VL. People with cases of CL and MCL often try to hide their scars and disfigurements rather than seek treatment.

This kind of behaviour heightens the invisibility of leishmaniasis as a major public health concern.

Although worldwide cases have surpassed 12 million, it remains largely unknown. The number of new cases officially reported annually is about 300,000 for CL and MCL, and 90,000 for VL. However, the World Health Organization estimates the true annual number of cases at about one million.

In developing nations, leishmaniasis causes not only individual suffering, it also contributes to higher unemployment, lower productivity and added health-care costs. Therefore, leishmaniasis is both a biomedical issue and a serious development one.

Since 1986, IDRC has supported various programs to combat this illness. The Centre has made a concerted effort through workshops, exchanges and community-based research in ten countries to generate information for the prevention and control of leishmaniasis. This initiative has grown into an information sharing network that links researchers and promotes environmentally sustainable solutions based on full community participation.

Thus Dr. Lala does not, figuratively, sit alone. He heads a joint project between IDRC and the Rajendra Memorial Research Institute of Medical Sciences (RMRI) - a division of the Indian Council for Medical Research - that studies leishmaniasis transmission in Bihar and aims to develop sustainable control strategies through community mediated approaches.

As Dr. Lala examines villagers, another member of the research team, Dr. Archana Sinha, head of the Department of Sociology at Patna University, seeks out shy villagers in Hassanpur who may have, or be carrying, the disease. Some she leads back to Dr. Lala. In other cases, she records their medical histories or simply listens to their fears and needs. It is a long process, but Dr. Sinha notes: "This is our first visit to this village. In other places, they see us and come running with their children. It takes time to build up their trust....That's my job here." Dr. Sinha adds, "I must stress that it is important to recognize that these people are not stupid. They may be illiterate, but they are wise to the problems their communities face. The challenge for us is to explain how this disease works and give practical suggestions on how to fight it."

To reach out to these communities a variety of posters, drawings and information in simple language is distributed. Consultation with village elders and local medical staff is standard practice before the team approaches a village. Because the aim is to change people's understanding and attitudes about the disease, the first visit is crucial in creating the right impression. Therefore, it always proceeds with the participation of village leaders.

Creating a better understanding of the causes of leishmaniasis and the most effective responses to the disease is not always an easy task. Dr. Mahabir Das, assistant director of the project, relates that "during the last leishmaniasis epidemic in Bihar in 1992, people in a nearby village held a ceremony to counteract the disease: they sacrificed a goat to the goddess Kali." Clearly, he adds, more work needs to be done in terms of improving people's understanding and behaviour or the material conditions of their existence that might have a direct bearing on their susceptibility to leishmaniasis.

The national and state governments have not always been forthcoming with assistance. Despite recommendations from Dr. Das and others as early as 1987 that extra funding for more staff, medicines, studies and an increase in insecticide spraying was necessary to prevent the predicted epidemic of leishmaniasis, the government's response was sporadic at best. The cost of such a program was simply too burdensome.

The need for a long-term, community-supported solution thus became an urgent one. Dr. Lala, because of his reputation in the state, and his vast experience (over fifty years) in treating and researching leishmaniasis, was considered the natural choice to assemble a team that would organize this new approach. He also seems to have a boundless energy; in spite of his 81 years, it is quite common for him to put in twelve-hour days at his clinic and at the RMRI lab, seven days a week.

"We must work hard," states Dr. Lala. "This disease has a long history in this part of the world and I have

seen too many people suffer. If we can bring all the elements together, and I believe we have made a good start, we can eradicate Kala-Azar."

Indeed, watching the efforts of this team of researchers in villages like Hassanpur, it is possible to believe that with the continuing support this project has engendered, leishmaniasis could one day be eradicated from all villages in Bihar.

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[Vol. 21, No. 2 \(July 1993\)](#)

Cleaning Up on Schistosomiasis

by John Eberlee

Disease-carrying snails and other troublesome molluscs throughout the world may soon meet their match in the form of a natural pesticide derived from the purple berries of an African plant.

In research spanning nearly three decades, scientists in Ethiopia, Canada, the United States, Europe and elsewhere, have demonstrated that *Phytolacca dodecandra* -- the endod, or soapberry, plant -- contains a toxin lethal to freshwater snails that harbour the parasitic worms that cause schistosomiasis. The tiny flatworms penetrate the skin of people who come in contact with water in which the worms live. The disease produces symptoms of fatigue, fever and diarrhea, damages the liver, spleen and bladder and can lead to cancer and death. Schistosomiasis affects an estimated 300 million people in the developing world.

Trials are now under way in Zimbabwe to verify whether endod is indeed capable of controlling schistosomiasis. At the same time, scientists are studying other potential uses for endod, perhaps as a botanical pesticide to control zebra mussels in the Great Lakes.

TRADITIONAL SOAP

In Ethiopia, endod berries have traditionally been ground into powder and used as soap. Their molluscicidal potential was recognized in 1964, by Dr Aklilu Lemma, founder of the Institute of Pathobiology in Addis Ababa. He observed large numbers of dead snails downstream from where a woman was washing her clothes with endod powder. In the following decade, Dr Lemma and his colleague, Dr Legesse Wolde-Johannes, conducted detailed studies on the cultivation of endod and its impact on other aquatic organisms.

But their research came to a halt at a crucial stage. When the Ethiopians sought funding from the international donor community to conduct field trials, they were turned down because of incomplete toxicological data. Nor could they interest any multinational companies in underwriting the required toxicological studies.

"Endod can be grown and processed and applied for free by the people who need it," explains John Lambert, a biology professor at Carleton University. Some commercial molluscicides, by contrast, cost more than C\$30,000 per tonne.

After a meeting with Dr Lemma in 1982, Dr Lambert helped persuade IDRC to support the necessary research on endod. The ensuing research was divided between his lab and others in the United States, the Netherlands, and Ethiopia. IDRC coordinated the process of bringing together experts from various countries. They charted the course for developing endod to the point where it could be used safely in community intervention trials. One step along the way was to develop a replicable extract and extraction procedure for endod using one variety of *Phytolacca dodecandra* and following a standardized method. Then the required toxicology studies were carried out.

The toxicology results agreed with the Ethiopian team's original conclusions -- endod powder degrades rapidly in the environment and has little impact on most plants and animals. Indeed, it poses about the same health risk to humans, says Dr Lambert, as ordinary bath soap. Endod is now the focus of a five year community-based trial in Zimbabwe to determine its impact on schistosomiasis transmission. "We know that endod kills snails. That's easy to measure," says Dr Don de Savigny, principal program specialist in the Health Sciences Division of IDRC. "But what we're really interested in is whether the human disease is controlled. If endod reduces the snail population by 99% and the remaining 1% is enough to keep the disease going, you really haven't changed anything."

While Zimbabwean scientists address this question, a team at the University of Toledo in Ohio is studying whether endod has a role to play in North America. In the 1980s, tiny zebra mussels imported from Europe began clogging intake and drainage systems in the Great Lakes. Lab tests show that at certain concentrations, endod kills zebra mussels and loosens the cement these creatures use to stick to sunken pipes.

Here is proof that the North can learn from the South, comments Dr Lambert. "Third World science is rarely given the credit it's due. But scientists in developing countries have plenty of good ideas. And they're able to make them work under sometimes appalling working conditions."

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A Critical Mass of AIDS Research

by Jim Beatty in Nairobi

Since its emergence in the early 1980s, AIDS has become the African continent's biggest health threat. It is already the number one killer among adults in some sub-Saharan countries.

The World Health Organization estimates that by the year 2000, 40 million people worldwide will be infected with AIDS or HIV, the human immunodeficiency virus that triggers the killer disease. Of those, 25 million will be in Africa. Thus, Africa appears destined to continue to bear a disproportionate share of the AIDS pandemic.

In this environment, IDRC is supporting a collaborative research effort by the University of Nairobi and the University of Manitoba intended to find ways to protect certain vulnerable groups. The team of African, Canadian and European researchers is led by the University of Nairobi's Dr. J.O. Ndinya-Achola and the University of Manitoba's Dr. Frank Plummer. Plummer, a Winnipeg native, has conducted research on AIDS from a base in Nairobi, Kenya for some 10 years. Over that period, the research has included studies focusing on three diverse but important groups affected by AIDS: sex workers (prostitutes), children, and long-distance truck drivers. Plummer's collaborators in the 70-person team have become one of the most prominent AIDS research groups in the world and certainly the best known such research team in Africa.

Some of their most remarkable findings to date have emerged from a study of 1,700 Nairobi sex workers, 95% of whom have AIDS or are infected with HIV. The researchers are trying to determine why the remaining uninfected five percent whose behaviour is apparently no different from that of their cohort have not acquired the disease. "We're very interested in how they resist HIV infection", says Plummer.

"Something makes the AIDS-resistant sex workers special. We're pretty sure they're resistant to HIV in some way", says Plummer. "They could have cellular immunity to HIV. There's something about their white blood cells that kills the disease. Finding the answer could mean a cure, or at least a vaccination, for AIDS. It's the best clue in determining if there is a natural immunity", he says. Dr. Joanne Embree, of the University of Manitoba's Medical Microbiology and Pediatrics Department, says if the prostitutes have an immune defence mechanism, then you're well on your way to finding something to cure it or at least minimize the effect of AIDS. And if researchers determine the women are genetically immune to the virus we can look at gene therapy or something to block the (genetic) receptor.

MOTHER TO CHILD TRANSMISSION

The group is also trying to determine the role of breast milk in HIV transmission between mother and baby. Out of 500 children of HIV-positive mothers, 47% were infected with the virus. Half of those children were infected through breast feeding.

"That's an incredibly important issue," says Plummer. "Breast feeding is almost universal in Africa. And

for impoverished women, without the resources to buy food or provide clean water, there is no alternative to breast feeding to nourish an infant.

"Even if there were a choice, the benefits of breast feeding in developing countries cannot be overlooked. They are vital to the health of the child in the first few years in the prevention of disease, particularly potentially fatal diarrheal diseases."

This study is not yet complete but already the researchers think that a three to six-month period of breast feeding rather than the suggested two years may be a better practice for HIV-positive mothers. The researchers hope that a shorter period of breast feeding will lower the transmission rate of HIV while still giving the babies the necessary immunities to fight other diseases.

Plummer says the research group initially focussed mainly on women and children: little research was directed toward hard-to-reach men. Then, as part of a study led by the Kenyan researcher Dr. J.J. Bwayo, they set up a roadside clinic near a police checkpoint to contact truck drivers, who generally have a high frequency of HIV and other sexually transmitted diseases.

"There is a lot of HIV along the truck routes", says Plummer. "They are a mobile population who play an important role in the geographic spread of HIV." It has even been suggested that long distance truck drivers may, in part, be responsible for introducing HIV to Kenya from neighboring countries.

Of the 800 men in the study, about 30% have HIV, a figure that is growing by about four percent a year. Plummer calls the roadside bars and truck stops that the drivers frequent "little HIV factories". Research has shown a higher prevalence of HIV in towns near major highways than in nearby towns further from the road.

In 1990, the project interviewed 350 long-distance truckers. Despite having adequate knowledge of AIDS and other sexually transmitted diseases, 80% reported having had unprotected sex with prostitutes within the previous year and 25% reported weekly sex with prostitutes. Only 10% had ever used a condom.

The roadside clinic attempts to change attitudes about unprotected sex. While drivers wait for police to check their rigs, they are offered HIV tests as well as condoms, education and counselling. "Most everybody in Kenya and Africa knows about HIV but they don't do what they ought to," says Plummer. "We're trying to understand the impediments to translating knowledge to safer behaviour."

"If AIDS continues at its current pace within 10 to 15 years you'll be able to see effects on population growth", says Plummer. "There'll be negative population growth. Right now, 15% of the general population have HIV in Kenya. When 15% of your workforce have a fatal disease, that's pretty important."

Exacerbating the health crisis are governments too poor or too slow to combat the problems. Annual health-care spending amounts to only about \$6 for every man, woman and child in sub-Saharan Africa, according to the World Development Report. "Governments are not putting enough money or resources into the problem of AIDS", says Plummer. "They can't hope to cope with the problem with the money they have right now."

LOCAL IMPACT

The research by the Kenyan-Canadian team, along with the educational and counselling components, has made a considerable contribution to slowing the transmission of sexually transmitted diseases in Kenya and beyond. "We've helped a lot of people along the way. We've prevented countless HIV infections", says Plummer.

But the research program has had other important results apart from its findings on sexually transmitted diseases. From modest beginnings, when Plummer and one or two Kenyan colleagues worked on small

studies, it has grown into a sophisticated, world-renowned research team. Sixty members of the 70-person team are Kenyan.

"We've built the human resources to begin to deal with this problem, says Plummer. We've built a fantastic research and training facility. We've trained a lot of Canadians and Kenyans. These studies aren't possible anywhere else in the world."

Embree underscores the importance of the Canadian-Kenyan partnership. "With African investigators much more work can get done", she says. "There is much more cooperation and help. It would be a lot slower and not as well done if the Kenyan investigators weren't working alongside. They've been a great asset. And the expertise will stay in Africa no matter what."

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