

## Monkey meat and its hazards

*Hopkins researchers in Cameroon try to stop emerging viruses in their tracks*

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### Document Text

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AKAM, Cameroon -- The glow from the cooking fire danced on the walls of the smoky hut, and Luci Mbala knelt on the dirt floor to prepare dinner with the practiced swing of a machete. She was making a favorite meal for her family of 11, deep in the West African forest.

Her husband, Junior, had come home holding a monkey with white- milk- mustache lips, olive-brown fur and, now, a red patch from Junior's shotgun blast. She'll fry up the meat, add some salt, pepper, beef stock and bush mangos, then boil it into a stew.

But first she paused for science.

With her husband holding a piece of filter paper, she dripped onto it four drops of the monkey's blood. It will be sent to Johns Hopkins' Bloomberg School of Public Health in Baltimore as part of a search for viruses that lurk in monkeys or apes and could, conceivably, jump to humans.

Medical research and traditional hunting are converging in west- central Africa, not far from where chimpanzees decades ago planted the seeds of the global AIDS pandemic. The researchers' goal is clear but not guaranteed of success: to spot emerging diseases and keep them from spreading around the world.

Already a Hopkins team has shown that viruses in Cameroon have leaped to humans more often than previously thought. Among people who are in regular contact with primate blood, the researchers found last year, one in six had exposure to a simian strain of HIV, the virus that causes AIDS.

The implications for human health are still being explored, but medical researchers see cause for concern as more guns and new logging roads put people and other primates into closer contact. The Hopkins team warns of the possibility of new types of "emerging HIV infections."

Hunters have been enlisted to help by providing blood spots and details on what they kill. The plan is to create hunter monitoring networks - the kind that experts say might have mobilized a quicker response to HIV and saved some of the 25 million lives claimed to date by AIDS. The researchers are also trying to overcome the villagers' skepticism of authorities and worries that hunting will be curtailed.

There is also something in it for the villagers. The researchers, mindful that bushmeat hunting is a way of life and largely legal, are teaching people how to handle monkey blood safely. There are important new lessons for the men who hunt in the forest, and for the women who, like Luci Mbala, wield sharp

machetes in dimly lit kitchens.

#### A shout in the forest

Goats, sheep and chickens wander in Akam, but the 125 villagers rarely eat them, and do little to nurture the herds and flocks. One reason is that it takes land and feed to support them. Another is that many villagers say they prefer the taste of wild creatures and have always found their fill in the dense forest known simply as the bush.

Monkeys, porcupines, antelope-like duikers - they are the primary sources of food in southern Cameroon. Monkeys, far from being seen as a relative of humans, are just meat. Boys learn at a young age how to navigate the bush, becoming master trappers as teenagers before moving on to hunting with guns.

After a half-day of classes at the village school, and after sweeping up around the communal well, Andre Ngbwa, 17, ventured into the bush to check his traps, joined by two friends.

Andre led the way, moving quickly down a narrow, overgrown path into the forest, the air still and silent except for birdsong. He carried a wicker basket for holding his catch, and a 6-inch knife and a machete, occasionally hacking at a bamboo stalk or a vine.

The deeper the boys went, the denser the forest. Giant fronds of palm trees, like louver blinds, slatted the light, amid every possible shade of green. The forest floor is spongy from decay, except when it is quicksand-like mud or a cluster of tree roots. Despite past logging, many mature trees remain, their trunks vanishing into the leafy canopy like skyscrapers swallowed up by fog.

Andre moved briskly in flimsy-looking sandals, barely breaking a sweat in his red Coca-Cola shirt and blue sweat pants. After two hours, the boys reached their first trap.

The traps are simple but effective, as attested by the village's three-pawed dog. One end of a wire is attached to a branch and pulled taut, like a fishing rod. On the wire's other end is a ring gently fastened to a stick anchored in the ground, ready to grab the foot of a passing animal. While the researchers' interest is focused on primates, the boys and their elders trap whatever can walk or climb.

The first trap was empty. They checked a second. A third, fourth and fifth trap - all empty. Within minutes, 10 of the 50 traps were checked.

Then, a shout filtered through the forest. One of the boys found a live pangolin - an anteater - dangling dazed from one of the snares.

The boys removed it from the snare and put it into a wicker basket. There was soon more good news, in the form of a dead porcupine surrounded by buzzing flies. The boys guessed it was dead two days but, after smelling it, deemed it fine to eat. Another trap held a dead pouched rat.

Later, one of the boys sold the pangolin to a villager and took the rat home for his mother to cook.

That left the porcupine for Marceline Akamesse to turn into supper. A grandmotherly woman of 63 who looks after two of the boys, she lives in a one-room house about 20 feet by 22 feet. She often sits looking out her door, as if expecting to see someone new traversing the grassy strip that is the only road through the village.

Her house has plank walls and a dirt floor, a quarter of it taken up by a dip for a kitchen fire. Without ventilation, smoke curls under and along the metal roof.

She sleeps in a cot-like bed against one wall.

Akamesse dunked the porcupine in boiling water to loosen its quills. She said she never nicks herself while cooking. So she saw no reason to worry about animal blood mingling with her own.

Yes, she heard the Hopkins people lecture about the need to avoid butchering a monkey if she has a hand wound, because primates are more likely than other animals to pass disease to humans. No, she did not put much stock in what she heard.

"I continue cutting up meat, monkey or otherwise, because I am used to it," she said. "I know they have diseases, but I'm used to it. And we've never had any case of disease."

#### Collecting blood

Joseph Diffo practically shouted to be heard over bleating goats and a crowing rooster. He wanted to make sure his stern warning reached the dozen or so villagers gathered in Mbong, just down the road from Akam, on a hot, muggy afternoon.

"We're asking you to take precautions when you are hunting animals, because when you happen to get infected by sick animals, there might be no cure; you might end up dying," said Diffo, a Cameroonian member of the Hopkins team. "You can't tell if it's infected."

When hunting, he said, men should take careful note of any cuts from thorny bushes. Also, he advised them to stop slinging dead animals over their backs or putting them in wicker baskets, because blood can enter through any cuts in their skin.

For butchering, he urged women to check their hands beforehand. If they get a cut while butchering, they should stop, wash their hands with soap, tie a bandage and avoid touching the meat or blood. They should let their husband finish the preparation.

Eating potentially virus-infected meat is not a great risk, he said, as long as meat is boiled "very well."

When the question-and-answer session began, Olivier Minko, 31, thrust a hand in the air. He wore his hunting outfit - tan cap, green Calvin Klein polo shirt and once-khaki pants turned mud-colored with rips in both knees.

"We don't know whether you are preventing us from hunting," Minko said, more accusing than asking. "You say you need blood, and at the same time there are certain animals that are not supposed to be hunted. How do we get this blood?"

Diffo said he was merely citing Cameroon's laws. "We can't work without telling you about these laws," he said. "We need to tell you which animals are totally protected, which you can hunt."

Then he emphasized that he was not an agent of the government: "We are not spying to see what you kill or to go to the authorities. We have come just to do our work, our research. We are only trying to educate you."

Afterward, men turned in their envelopes with blood spots. The researchers do not pay for them because it would encourage more hunting or fraud, such as passing off chicken blood as a wild animal's. Blood samples are collected anonymously, with details only about the animal hunted.

Ebaia Emmanuel turns in six envelopes. He hunted a giant genet (distantly

related to a mongoose), two types of squirrels, a pouched rat, a toucan and a porcupine. Diffo has the hunters check a picture guide of animals to make sure the names are right.

"We are not really sure that they really take into consideration what we tell them," Diffo said later. "Most of them are still doing what they've been doing. But a large number have started to protect themselves."

### Virus hopping

The growing evidence of virus hopping has come largely from research in Cameroon overseen by Hopkins epidemiologist Nathan D. Wolfe, a leading expert in emerging infectious disease.

In 1998, Wolfe published in a medical journal an article describing potential discoveries from studying hunters in richly biodiverse regions. That article led to an invitation by Don Burke, at Walter Reed Army Medical Center and later at Hopkins, to do postdoctoral work in Cameroon, whose dense jungles teem with life forms, including viruses.

Wolfe's first big discovery came in 2004, when he documented the first ongoing transmission from monkeys or apes to humans of a virus, simian foamy virus, or SFV. While that virus is not known to cause health problems in humans, the finding proved that such jumps were not isolated events that had occurred only in long-ago chapters of human-animal interactions, as was previously believed.

Early last year, Wolfe and colleagues reported that primates appear to be continuing to infect humans with a class of viruses - deltaretroviruses - that can cause leukemia and other cancers and could be transmitted human-to-human. That project also discovered two previously unknown deltaretroviruses in people, doubling the number of known human retroviruses in that class.

Wolfe's team also found that people in Cameroon had been exposed to - but not necessarily infected with - simian immunodeficiency virus, or SIV. A few months ago, other researchers reported tracing the source of HIV to chimps in southeastern Cameroon. That study did not determine how the disease was passed to humans, but bushmeat hunting remains a possibility."

Those findings are unsettling. "We don't know whether HIV is done emerging," said Wolfe. "It may be the case that novel forms of HIV continue to enter the population." New logging roads and growing urbanization could raise the odds of its spreading into a wider population. That, Wolfe maintains, offers all the more reason to monitor people and primates in Cameroon.

"If we'd known HIV was originating in these animals back when it was, could we have stopped it?" said Matthew LeBreton, an ecologist who joined the Hopkins program in 2003, echoing a question often raised by Wolfe. "Could we have put up enough barriers at village levels to stop it? If it's proven it's happened once, there is no reason it can't happen again.

"If it was my own kids, I'd probably stop them from handling monkeys because of the risks from scratches and bites," LeBreton said. "I wouldn't want anyone in my family doing butchering of monkeys."

### The chief's blessing

In Akam, most families butcher monkeys, and sometimes the children help out.

The village chief, Pierre Ndjou'ou Etetam, who is 80, hunted during much of his life, killing monkeys, chimps and gorillas with a rifle. His father taught him, and he taught his son.

As chief, Etetam has authority in the village to mediate disputes. On a recent

morning, he lay in a small bedroom of a mud- brick house with dirt floors, furnished in part with five photos of Cameroonian President Paul Biya, a squirrel skin that Etetam said was for sale and two guns (one toy, one real). On the floor was a gym bag emblazoned with the Olympic rings and "Beijing 2008."

His grandparents, of the Essekak people, moved here more than 100 years ago from a river several miles away. Control of this area shifted - to Germany in the 1880s, to France in 1919 after World War I, to an independent Cameroonian state in 1960 - but the village has always moved to its own rhythm.

Cocoa farming in partly thinned-out jungle remains the economic mainstay. Men gather at midday in the shady aba to banter, doze or play songo, a game in which two players move dried seeds from slot to slot on a wooden game board at a dizzying pace. Boys play soccer on the central grassy area that most of the two dozen houses face.

The nearest clinic is 15 miles away, and a pickup laden with goods for sale makes the difficult trip down the dirt road only a couple of times a week from Mvangan, 35 miles away.

So it is notable that the chief has embraced outsiders such as the Hopkins researchers, whom he welcomed to the village several years ago. The researchers could not operate effectively without the blessing of the chief, who says he is interested in their work but does not understand it.

#### Taking precautions

Olivier Minko, the outspoken hunter, understood the message spread by Wolfe, LeBreton and Difo. "As the saying goes, to be ignorant is a very big disease," he said. "Now we take precautions."

He used to carry bloody meat on his back; now he wraps the meat in leaves. He used to help his wife slaughter bushmeat if he had a cut; now he does not. He used to pick up dead monkeys from the forest floor, but now he steers clear - wise, given that usually fatal outbreaks of Ebola have started when people handled primate carcasses.

He still likes to eat monkey and not what opponents of bushmeat hunting call "culturally acceptable alternatives." Minko says that even if goats, cows and chickens were plentiful, "I will still prefer to eat from the forest."

That is why early on a rainy morning, he prepared to head into the forest behind his family's cocoa plants in search of monkey for that evening's supper.

He carried a well-worn, single-barrel shotgun. A black rubber strip joined the barrel and handle. He had five cartridges.

For two hours, he crunched through soggy logs that splintered apart, and stepped into thigh-high sinkholes hidden under leaves. Aside from the patter of raindrops, the only sound was a hornbill's hoot-hoot.

There were no signs of monkeys. Minko did not even point the rifle toward the trees. Dinner would be peanut soup and a vegetable dish made from the peanuts and cassava he and his wife grow.

The rain was a factor; the monkeys were probably huddling to stay dry. But the skies were clearing; the next day, Minko would head back into the bush.

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#### [Illustration]

Photo(s); Caption: 1. Marceline Akamesse, 63, cooks porcupine. She puts little stock in the Hopkins team's advice on handling meat. 2. Junior Mbala shows his family the monkey he shot. Before his wife prepared it for a meal, they took samples of the monkey's blood for Hopkins' virus research project. 3. Luci Mbala (left) uses steel wool and water to scrub the fur off the monkey. She no longer handles meat if she has wounds that could get infected. Young neighbor Gael Medom (right) stands nearby. 4. Ecologist Matthew LeBreton, a coordinator of the JHU research project, steps through a forest in Akem. Recalling the roots of AIDS decades ago, he poses the question: "If we'd known HIV was originating in these animals back when it was, could we have stopped it?" 5. In the Cameroonian village of Mbong, Robert Otyam looks over sheets of information designed to help him identify animals in case he supplies samples of their blood to the Johns Hopkins team. 6. Alain Etom is a government "eco-guard" who monitors hunting in the area. He educates villagers about what they may hunt, but he finds his task difficult because he works alone in a large area.; Credit: PHOTOS BY ANDR F. CHUNG : SUN PHOTOGRAPHER

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#### **Abstract** (Document Summary)

Photo(s); 1. Marceline Akamesse, 63, cooks porcupine. She puts little stock in the Hopkins team's advice on handling meat. 2. Junior [Luci Mbala] shows his family the monkey he shot. Before his wife prepared it for a meal, they took samples of the monkey's blood for Hopkins' virus research project. 3. Luci Mbala uses steel wool and water to scrub the fur off the monkey. She no longer handles meat if she has wounds that could get infected. Young neighbor Gael Medom stands nearby. 4. Ecologist [Matthew LeBreton], a coordinator of the JHU research project, steps through a forest in Akem. Recalling the roots of AIDS decades ago, he poses the question: "If we'd known HIV was originating in these animals back when it was, could we have stopped it?" 5. In the Cameroonian village of Mbong, Robert Otyam looks over sheets of information designed to help him identify animals in case he supplies samples of their blood to the Johns Hopkins team. 6. Alain Etom is a government "eco-guard" who monitors hunting in the area. He educates villagers about what they may hunt, but he finds his task difficult because he works alone in a large area.; Credit: PHOTOS BY ANDR F. CHUNG : SUN PHOTOGRAPHER

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