

"SCIENCE SAFARI -- SPECIAL FROM SOUTH AFRICA"
SHOW 702

Teaser
Episode Open
City of Gold
Ways of the Wild
Mr. Cele's Garden
Fighting Malaria
The First People

TEASER

ALAN ALDA There's a lot more going on at the water hole than you might think. On this edition of Scientific American Frontiers, we're in South Africa.

ALAN ALDA (Narration) We'll search for the king of Venda's long-lost ancestors...

MR. CELE ... for protecting the skin from the heat of the sun.

ALAN ALDA (Narration) And ask if Mr. Cele's medicine's are going to last. We'll join the fight against malaria, scourge of Africa ... And return to humanity's very beginnings.

ALAN ALDA I'm Alan Alda. Join me now as we explore science in South Africa.

[back to top](#)

EPISODE OPEN

ALAN ALDA (Narration) As our visit began, South Africans were celebrating a new constitution, and their miraculous transition from segregation and racism to democracy.

WOMAN [SINGING] ...We'll help to make it work alright...

ALAN ALDA (Narration) The crowds outside Parliament sang, while inside President Mandela spoke.

MANDELA South Africa today undergoes her rebirth, cleansed of a horrible past, matured from a tentative beginning, and reaching out to the future with confidence.

ALAN ALDA (Narration) There is a confidence about South Africa today with its large bustling downtown and its commitment to a multi-racial future. A new professional class is emerging from the black majority. And like everywhere, young people are obviously "reaching out to the future". But the country still faces enormous difficulties. In search of prosperity, millions of people have left the countryside only to end up in urban slums where there's appalling hardship -- poverty, disease, crime. It will be years before South Africa can shake off what Mandela calls its "horrible past". But that process will surely include the rediscovery of its magnificent distant past. And that's where our first story takes us.

back to top

CITY OF GOLD

ALAN ALDA (Narration) We're in the far north of South Africa, in the land of the Venda people. The Venda have a long tradition of singing and dancing. But this is much more than a terrific performance -- it's history. This particular song, complaining of hard times under colonial masters, was composed a hundred years ago. In the new South Africa, studying African history is suddenly respectable, which is how I found myself on the way to visit the King of Venda with an enthusiastic archaeologist, Sydney Miller.

ALAN ALDA Syd, is this the Palace?

SYDNEY MILLER That's right, Alan.

ALAN ALDA Why are these white stones here at the entrance?

SYDNEY MILLER These white stones are the monoliths that show us places where the normal commoner people are not really supposed to go unless they are escorted. This is Samuel... and Alan. We are going to go up to the chief's private reception area now.

ALAN ALDA I see.

SYDNEY MILLER And he escorts us all the way up there.

ALAN ALDA (Narration) It's deliberately been made tiring and confusing for the visitor to work his way up through the compound. Everything is designed to promote respect. There are strict standards of conduct.

KING'S PRAISE SINGER [Chanting]

ALAN ALDA (Narration) King Kennedy arrives accompanied by his brothers and a praise-singer, whose job is to recount and explain the history of the King's names. We show the respect that is traditionally practiced here. Although the King is a member of parliament in Cape Town, when he's here in Venda, he tries to keep the traditional customs going.

ALAN ALDA Is that only when you are greeting a stranger, or is it when you go from breakfast to your car?

KING KENNEDY Yeah, to my car, to anywhere, wherever I go they do that.

ALAN ALDA I see. Do you sometimes wish you could move a little faster or have you made it part of your life?

KING KENNEDY Ah, you know, sometimes they... I feel a little bit shy.

ALAN ALDA (Narration) History for the Venda is passed on by tradition. But tradition is never static. It's not just the King who now works far away. And it's unlikely that the kings who went before him would have joined in the dancing. The risk is that tradition and history might be lost. But the king believes this new openness is essential.

KING KENNEDY I think it's better to be with the people. Especially nowadays because we are living in a democratic society. You know -- with your own people.

ALAN ALDA Yeah, so there's still some of the old and some of the new. Tell me about that gun. What are we bringing that for?

SYDNEY MILLER Well, we're in the middle of the park and the elephants are starting to use the footpath. This one that we made up to the site. We need it for a bit of protection.

ALAN ALDA Oh. Could you stop an elephant with that?

SYDNEY MILLER Well it's a 458 and it does the job if it needs to.

ALAN ALDA Why don't you go ahead? And keep your eyes open.

ALAN ALDA (Narration) Fifty miles from King Kennedy's compound, inside the Kruger Park, Sydney Miller has been working at a site which is revealing Venda history in rich detail. Dating back to the thirteenth century, it's called Thulamela -- a royal citadel just like King Kennedy's, perched on a commanding hilltop. For three laborious years, Syd and two helpers rebuilt the collapsed walls, stone-by-stone. Arriving visitors pass under these baobab trees. Then, the same kind of stone markers that King Kennedy has point the way. Up the hill we enter the first ceremonial space, where the dancing would have been staged.

ALAN ALDA Now what happened in here?

SYDNEY MILLER This is now where... one of the real problems that we have got on the site. This is a female enclosure where a wife would have lived. And when I tried to excavate this area, looking for a structure, I found a floor that had collapsed in the middle. And when I had excavated through that I actually found a skeleton down there, of a male which is a very tall person. Over two meters tall.

ALAN ALDA (Narration) Syd had some unsolved problems, but some exciting finds too. Across the royal reception area was the king's private enclosure, once containing a thatched house. We weren't permitted to film in this part of King Kennedy's compound.

ALAN ALDA Is this a pot here?

SYDNEY MILLER That's right. It's a pot that we have found in this very early phase. You can see the floor here is much harder than the floors we see at the top. So this pot is actually sitting on the floor in position.

ALAN ALDA Ah, I see.

SYDNEY MILLER But what's also very interesting here is this little cowrie shell. It's a seashell that has been used for trade money in the olden days, so we might even be sitting here with a pot that had some other valuable objects in it.

ALAN ALDA Oh, I see. This was like a little jewelry chest maybe.

ALAN ALDA (Narration) Also in the king's enclosure, iron bells of a type known in west Africa, two thousand miles away, but never before seen in southern Africa. And Syd's found glass beads from as far afield as India. So Thulamela had wide outside contacts. They were also great metal workers. These beautifully made harpoons are for hunting hippo... There were tough iron hoes for field work... A copper ingot caught at the moment of smelting... And gold, including droplets fresh from the crucible. It has always been known that this part of Africa had trade contacts with the Arabs and Portuguese, but it's thanks to Syd's

archaeology that the breadth and sophistication of what went on here is being revealed.

SYDNEY MILLER Archaeology is like taking the soil and opening up the history book. Africa has always been seen as the neglected country. Everybody thinks about the Egyptians as high culture, but for the whole world to know that these people were just as important as the Egyptians, I think that is what it is about.

ALAN ALDA (Narration) But Thulamela is not just about history -- it's about the present as well. In an approach probably unique in the world, excavation is overseen by a committee, not only of scientists but also of local people from outside the park, whose ancestors created Thulamela. And they'll stay involved in the future too. I met the Venda school teacher, Israel Nemaheni, who will be interpreting the discoveries for visitors.

ALAN ALDA What does this mean to you?

ISRAEL NEMAHENI To me it means... in fact it's my history. It means I've got somewhere, I am coming from somewhere. And that is part of my history.

ALAN ALDA (Narration) The skeleton in the women's enclosure presented the committee with a challenge. To proceed would risk disturbing an ancestor's grave. So they compromised -- excavation could go ahead so long as the remains were given a respectful reburial. And what a find they made. It wasn't a man as Syd had thought, but a tall woman decorated with gold jewelry -- probably the sixteenth century queen of Thulamela. Soon after, the team found the king buried in his enclosure, also wearing lots of gold. The discoveries hit the headlines -- the first royal couple ever excavated in southern Africa. There was rejoicing among the Venda people, by one family in particular who had always thought their ancestors were buried here.

VENDA MAN We've come here with some beer, this is African beer, to pour down so that we can talk to our ancestors.

ALAN ALDA (Narration) To stay in touch with ancestors is of the deepest significance, because they provide the link to God. So from the family level to the national, Thulamela turned out to have gifts for everybody. Israel Nemaheni summed it up.

ISRAEL NEMAHENI I won't say how I will feel as a Venda, but as a South African I am very happy to see that people are remembering their ancestors. But not as a Venda but as a South African, because I regard the whole Thulamela as belonging to all people of South Africa.

back to top

WAYS OF THE WILD

ALAN ALDA (Narration) Classic Africa. An abundance of wild animals, free to roam wherever nature and instinct lead. If only it were true. But the fact is we filmed every one of these scenes inside game parks. In South Africa, all large animals are enclosed by fences. Even in the great Kruger Park, over twice the size of Yellowstone, there is always a fence no more than twenty miles away. Soon animals will be fenced in all over Africa. The demands of people -- for houses, farms, factories and roads -- are irresistible. Confining animals to parks means one thing above all... We humans can no longer afford to leave things alone. The rhinos in Umfolozi game park are overcrowded. Some of them are going to have to go. But biologists here have devised a way to remove them. They pick animals only from the outer edges of the park. To the ones left in the core area, it feels like a natural migration has taken place. But capturing rhinos alive is a dangerous business. The vet has to keep the drugged animal out of the thickest cover, and avoid being charged. With the animal down, the first step is a cautious check on the pulse. The rest of the team's not far behind. It's an elaborate operation, but necessary if you can only take animals from particular areas. While the vet waits, he applies routine antibiotic treatment. Intensive management like this has paid off. In the 1930s, there were only fifty white rhino in the world, all in this park. Now this fine mature female, who is probably also pregnant, is one of two thousand in the park and five thousand more in parks and zoos around the world. She and her calf will join the thousands of other white rhinos this park has been able to breed and send elsewhere. That is, if they can ever move her. At the annual game auction in this province of KwaZulu-Natal, you can pick from a dozen species -- ten thousand dollars for a rhino, fifteen hundred for a giraffe, with the money going to the park. Mkuze is another of the Natal parks. I'm here with Pete Goodman, a biologist and the country's leading advocate of a new way to manage parks. It's too simple to manage species-by-species, he says -- that's like a farm. Instead, you've got to keep nature itself going. We're on our way to a natural water hole. Around midday it's a magnet for all kinds of animals. At the end of the pathway there will be a hide built out over the hole.

ALAN ALDA I don't understand it. If there are...

PETE GOODMAN We'll have to keep quiet.

ALAN ALDA O.K. If there are animals that naturally drink at wells...

PETE GOODMAN We really have to be quiet.

ALAN ALDA O.K. I'm sorry.

ALAN ALDA (Narration) Fortunately I hadn't spooked too many animals, so we were presented with a remarkable sight. It wasn't so much the individual animals that struck me, like these male impala challenging each other, although they were pretty good. It was more the variety... A male nyala cleaning off his horns... This is one of his females. A cautious female kudu. All the animals were clearly thirsty, but equally clearly they weren't being satisfied. A troop of baboons was just as frustrated, as were about a dozen warthog. Although the waterhole was nearly dry, a herd of wildebeest came charging in.

ALAN ALDA They come in and take over, don't they?

ALAN ALDA (Narration) There's more going on at waterholes than meets the eye. For example, wildebeest can use their size to range far and wide for grazing and water. Smaller animals stick closer to the hole, and that affects the whole landscape.

PETE GOODMAN Wildebeest, because they can move much further, are less confined by the distribution of water. They can afford to move much larger distances to drink and much larger distances back to where they graze.

ALAN ALDA So are you saying therefore they are not both competing for the same vegetation?

PETE GOODMAN That's correct.

ALAN ALDA Now these guys have lost interest and they are going now, you think?

PETE GOODMAN Sure. I think so. I don't think they're going to stick around for very long.

ALAN ALDA (Narration) Of course, there were still plenty of animals stuck here.

ALAN ALDA It's very interesting. They came and they took a look, but the baboons are sitting around and I saw one baboon digging in the mud and then putting her face down into it to try to get the last lick of moisture. They just won't give up.

PETE GOODMAN No.

ALAN ALDA (Narration) Pete believes this is a big point. If the water hole dries up, it should be left dry. Some animals may not make it, but the system, as a whole, benefits.

PETE GOODMAN In winter life is tough in Africa, and it's in stress periods like this that natural selection and survival of the fittest take place.

ALAN ALDA (Narration) We're back in Umfolozi park, and Leon Steyn is getting ready for an action-packed night.

LEON STEYN You can appreciate at night you can't see very clearly and you end up tripping over wires. So you have to be pretty careful.

ALAN ALDA (Narration) An nyala carcass will be the bait to draw in lions. Predators are essential in natural systems, to control prey numbers and maintain the stress that Pete Goodman wants.

LEON STEYN You'll notice I'm actually tying it around the bone. If I don't do that the hyena will just take the hind quarter or whatever, or the middle section, and just run away with it.

ALAN ALDA (Narration) As night falls, Leon prepares to broadcast over the countryside a recording of lions squabbling over a kill. Any lions out there will want to snatch a free meal. Within half an hour, the rangers hear grunting outside. They know this female. She's already wearing one of their radio collars. She comes in to join another old friend. The rangers call him Snarly, because he's so aggressive. Lions were reintroduced into the park in 1965, with just six animals. So it's important to keep track of how they are doing.

LEON STEYN We don't know how many lions are in this park. We don't know how many lions are in poor or in good condition. We don't know what the sex ratio is. We need to know that. So that we can manage the total population.

ALAN ALDA (Narration) Tonight they decide to check out Snarly. The health of the lions in the park is a big concern. With so few animals originally, weakness and in-breeding could have developed. A single flashlight is used for aiming the dart gun, so the lions stay calm and settled.

LEON STEYN All right, the animal is darted. We're going to wait for approximately between 10 to 12 minutes. We'll check again. He's still feeding, which is good.

ALAN ALDA (Narration) Sure enough, ten minutes later Snarly is out cold, so the dart delivered the correct dose. And with Snarly, the dominant male, out of the

way, several more animals are now on the bait. That's good news for the rangers, because they didn't know a pride had established itself in this part of the park. Now comes the tricky part. The rangers have to drive off the rest of the pride.

LEON STEYN That one's going to hassle us. She keeps coming in.

ALAN ALDA (Narration) Because the animals have just started feeding, they're persistent and very dangerous. With the lions crouching just beyond the headlights, the rangers quickly drag Snarly away from the bait. When he gets a good look, Howard is very concerned at Snarly's condition.

LEON STEYN He's actually been fighting. It actually looks quite bad. And he's torn up right at the back. Now initially when I first saw this animal, he was in excellent condition. He's losing condition as well.

ALAN ALDA (Narration) It's normal for males to fight -- that's how they work out who's boss. But it's the poor recovery that worries Howard -- maybe there is an inbreeding problem in the park. There's just time for a quick general checkup before Snarly has to be dragged back to the bait. Snarly will come round soon, drive off the other lions, probably, and then go hunting in a few days' time. All providing the competition and pressure that Pete Goodman advocates.

ALAN ALDA Should I stick this in?

RANGER Yes. And then you just walk up the line.

ALAN ALDA (Narration) We are back with Pete Goodman, and I'm wrapping up my visit by carefully setting his park on fire. Actually this is exactly what Pete wants to happen here. In the dry winter landscape, you can see what the term "spreading like wildfire" really means.

ALAN ALDA I can't believe how fast that's going. Why do you have to go out and light it by hand? Why, why can't nature start the fires by itself?

PETE GOODMAN Nature does start fires. Infrequently we have lightning fires, but Man has been a part of the African ecosystem. I don't think we must forget that Man evolved in Africa, and with that his use of fire.

ALAN ALDA (Narration) The leading edge of the fire skips rapidly across the land with the wind, but the back end, facing into the wind, moves slowly. Here the grass burns more thoroughly. On trees there's a different effect.

ALAN ALDA I noticed that this little, little bush over there...

PETE GOODMAN Acacia tree, right.

ALAN ALDA It's not very high and it's still green on top. So that's not killed, is it?

PETE GOODMAN Those leaves are scorched and will eventually die and drop off, eventually in a week or so's time. But then most of these savannah trees are resprouters. They will resprout even if they receive quite an intense fire going through them. They will resprout and carry on growing.

ALAN ALDA (Narration) As long as there's a fire here every year or two, fuel can't accumulate. The fire never gets very intense so it brings a sort of patchiness to the land. Small trees are scorched and they'll resprout. Large trees come through unscathed. Some grass is burned, some remains. It's these kinds of varied conditions that maintain the diversity of plants and animals. When our ancestors were doing this two million years ago, their interest was to draw game into the freshly sprouting grass. But if we like the diversity of the burning, we have to take over their role. By nightfall my fire had spread over a couple of square miles, then was put out by an overnight rain shower. It was a perfect example of the surprising things it now takes in Africa to keep the wild, wild.

back to top

MR. CELE'S GARDEN

ALAN ALDA (Narration) This is Umlazi, near Durban. It's one of the townships set up under apartheid to house non-whites only. Now a big challenge is to develop basic services in places like this. Here in Umlazi I visited a man who is playing his part, in his own inimitable way.

ALAN ALDA Mr. Cele. Alan Alda. How are you?

MR. CELE Pleased to meet you.

ALAN ALDA A pleasure to meet you. This is an amazing place. I am surprised to see so many different kind of things.

ALAN ALDA (Narration) Mr. Cele is a traditional healer, as were his father and grandfather before him. Most of his remedies are herbal -- he can help you when you have a cold, or satisfy more spiritual needs.

MR. CELE This is for our ancestors

ALAN ALDA What is that?

MR. CELE Our ancestors. It's incense grass.

ALAN ALDA Incense.

MR. CELE Yes. That one, when we talk with the people who are the late. We burn this one and pray to them. To help us. They must get power from God -- not to say that they are God, but to get power from God.

ALAN ALDA (Narration) Some things in the shop Mr. Cele keeps only for other healers.

ALAN ALDA What is this? Do you eat this?

MR. CELE In English, I don't know how to call it...

ALAN ALDA I've never seen anything like this.

MR. CELE But it's poisonous...

ALAN ALDA It's poisonous? Thanks but I'm sorry I picked it up. I had to put my hand on it and now I'll never...

MR. CELE When you eat it.

ALAN ALDA Oh yeah?

MR. CELE Not...

ALAN ALDA Not the skin. You are sure about that?

MR. CELE Sure.

ALAN ALDA Otherwise you may have to give me another plant to get rid of that.

MR. CELE To get rid of it, yes.

ALAN ALDA Well what does this do? And why would you sell a poison plant?

MR. CELE Well, it's for those who know how to control it.

ALAN ALDA What does it do for you?

MR. CELE It's for enema.

ALAN ALDA If you take just the right amount. An enema? Oh great. That's wonderful.

MR. CELE To clean out the lower part of the body.

ALAN ALDA Right, right. So you just take a little bit? You would tell them how much to take. What would you do, make a tea out of it? What?

MR. CELE Myself, I don't know how to use this one.

ALAN ALDA O.K.

MR. CELE I sell it to those who know...

ALAN ALDA Who do know how to use it.

MR. CELE This is like a calamine. This is for protecting the skin from the heat of the sun. We crush this one, just part to the baby, the baby will sleep peaceful.

ALAN ALDA Really.

MR. CELE These are good for sharp pains.

ALAN ALDA Sharp pains. Anywhere in the body.

MR. CELE Ah, say there are some sharp pains here, specially.

ALAN ALDA (Narration) Behind the shop, Mr. Cele's assistants chop, cut and grind an enormous variety of ingredients, freshly collected from the wild. The new government is depending on people like Mr. Cele to provide the bulk of South Africa's basic health care. Here's a typical problem. An irritable baby brought in by her grandmother, with the anxious young mother in the background.

MR. CELE (translated in subtitles) His chest is fine -- there's nothing. The problem comes from the tummy. Is that right, Ma?

GRANDMOTHER (translated in subtitles) Yes, that's possible. MR. CELE (translated in subtitles) Is that what brought you here?

GRANDMOTHER (translated in subtitles) Yes, that's it.

ALAN ALDA What did you find when you examined the baby? MR. CELE Well, too much of windy. That causes the child to be uncomforted. And he has got a sore on the back. When he is sleeping it's just -- can't sleep.

ALAN ALDA What's this?

MR. CELE That one is for the child when he is coughing.

ALAN ALDA And this?

MR. CELE This one, it's like a milk of magnesia, to keep the stomach cool.

ALAN ALDA And the package?

MR. CELE And the packet, for the cloudy weather and hot weather when the child can't sleep.

ALAN ALDA (Narration) This is one of Durban's medicinal plant markets. Across the country there's a vast network of gatherers and traders handling tons of material every day. Healers used to do their own collecting. Now it's an industry serving over thirty million people, and the scale is worrying South African botanists. Two years ago, a team from the University of Natal set out to identify every plant in the market, and get an idea of which were coming under the heaviest demand. They've managed to convince the traders they're not from the police. Often plants in the market come out of protected areas. Here's one plant they don't see often.

HERBERT SIBIYA (translated in subtitles) Maybe a plant used in dreaming?

ALAN ALDA (Narration) They get the identity clear then ask, "How much do you sell?"

HERBERT SIBIYA (translated in subtitles) How does this go? Fast or slow?

TRADER (translated in subtitles) It's not fast.

HERBERT SIBIYA Doesn't sell quick.

ALAN ALDA (Narration) Then, what are its effects?

HERBERT SIBIYA (translated in subtitles) Is it safe by mouth? TRADER (translated in subtitles) They say so.

HERBERT SIBIYA Yeah, it's non-toxic.

DEHN VON AHLEFELDT Is it all wild collected?

ALAN ALDA (Narration) And where does it come from?

HERBERT SIBIYA (translated in subtitles) Did you grow any of this?

TRADER (translated in subtitles) No, nothing.

HERBERT SIBIYA All wild collected. She is not a traditional healer but she is a seller. According to the information she got from the traditional healer, this is used as emetic stuff. They chop it and then they mix it with other stuff, they cook it. Then they drink and then they vomit.

ALAN ALDA (Narration) Although they've identified over three hundred species so far, it's often not straightforward.

HERBERT SIBIYA I think we have this.

ALAN ALDA (Narration) Bark from the same tree can look different, depending on the tree's age or how it's been treated.

HERBERT SIBIYA (translated in subtitles) Hey, Mandi. These look different.

TRADER (translated in subtitles) It's the same. They haven't taken off the rough part.

ALAN ALDA (Narration) This piece has been partially scraped, explain the traders. So far the team -- with Mr. Cele's help, by the way -- has identified half a dozen species that are close to extinction. And that's where Mr. Cele comes back in. This is Mr. Cele's garden. He grows his own medicinal plants here -- not something healers have traditionally done.

ALAN ALDA Mr. Cele, how many plants do you think you grow here? MR. CELE Oh, I cannot tell at the moment. But I have got a lot. A couple of thousands of plants.

ALAN ALDA Really?

MR. CELE Yes.

ALAN ALDA (Narration) I'm here with Richard Symmonds, who runs a plant nursery for the city. The young tree is a pepper bark, highly endangered because

it's so much in demand as a cough remedy. Richard raised the seedlings, now Mr. Cele is growing six trees.

MR. CELE Taste comes after.

ALAN ALDA Taste comes after. Anything else comes after? Are you sure this isn't the other one, the laxative?

RICHARD SYMMONDS No, not at all. But then you'll realize why it is useful for the chest by the taste that you..

ALAN ALDA Are there any side effects? I should have asked you before.

RICHARD SYMMONDS No, none at all. It will just clear up the sinuses in your head.

ALAN ALDA Really hot flavor -- I am really getting the hot flavor now. Yeah, it takes a few seconds.

ALAN ALDA (Narration) Mr. Cele is growing one other endangered tree species and several endangered plants. He'll take a little pressure off the few remaining wild specimens. Richard Symmonds' nursery is now trying to spread the word. They invite in groups of healers and offer them young plants to take home to cultivate. Although wild plants are traditionally preferred, it's beginning to work, because the healers know better than anybody what's getting scarce.

HEALER We can't find these at all where we live. That's why we want to plant them -- so we'll always have them.

ALAN ALDA (Narration) Many botanists believe wild stocks won't be truly secure until farmers begin to grow medicinal plants. But that's the next step.

back to top

FIGHTING MALARIA

ALAN ALDA (Narration) The summer rain... And the sun. They bring malaria. Malaria is the scourge of Africa, where it kills maybe two million children and many adults, every year. This woman has the classic symptoms -- high fever, severe headache, exhaustion. She could be dead in two days. In the northeast of the country, South Africa wages a war against malaria that's probably the continent's most effective. Anybody who drops by this clinic gets a blood test, which will be looked at in the lab while they wait. With heavy rains, 1996 was an epidemic year throughout southern Africa. But here they kept cases down to

twenty thousand, with twenty deaths. Neighboring Zimbabwe had two million cases, with two thousand deaths. Here's that very sick patient's blood slide, with the telltale rings of the malaria parasite visible within the cells. She gets treatment on the spot, and she'll rapidly recover. In the undeveloped northeast populations are isolated in the bush, so the malaria program uses multiple ways to reach people. Word went out a few days ago that there would be a mass screening here, with the usual heavy response. Over the years they've managed to ward off racial politics, and avoid any hint of big brother. There's no other way says Sipho Ngxongo, health director for the region.

SIPHO NGXONGO If we don't get cooperation you might as well forget it, you won't be able to control malaria. But if you build the trust and confidence among the people, you work with them, you talk about problems with them, then you can see this type of progress.

ALAN ALDA (Narration) Several hundred health workers on bicycles are the program's front line. They're always recruited locally, because their job is to locate and visit every single homestead in the area. They make about twenty calls a day. They take blood smears and hand out prophylactic malaria pills. If the smears are positive, there'll be follow-up visits until the patient is cured. Here's a follow-up to one positive, a child who attended the mass screening. Every case gets this kind of investigation.

HEALTH WORKER (translated in subtitles) Good day to you.

ALAN ALDA (Narration) The first thing the health worker wants to know is, has the child been across to Mozambique -- where malaria is uncontrolled. The mother says he hasn't.

MOTHER (translated in subtitles) No, we don't go over there.

ALAN ALDA (Narration) The child is treated, and then the team sets about finding the source. Since mosquitoes bite at night, the boy's sleeping hut is the obvious place to look. There should be insects here, themselves infected with the malaria parasite. A quick-acting insecticide will get to them. A few minutes later, the sheet will reveal nothing. And that calls into question the backbone of the malaria-control program -- attacking the mosquito.

DAVID LE SUEUR This is a mosquito called *Anopheles arabiensis*. You could almost call it like our mosquito factory. This is where we actually raise and keep the mosquitoes going, which we then use in various experimentation.

ALAN ALDA (Narration) In David LeSueur's lab in Durban millions of mosquitoes have been raised, but none carries malaria. For that, a mosquito has to first bite

an infected person. Then it transmits the parasite by biting someone else. So if you kill the mosquito, you break the chain.

DAVID LE SUEUR The whole of southern Africa currently relies on going around to every house and spraying insecticide onto the walls of...

ALAN ALDA Every house. You must go to every hut in South Africa and every house and spray the walls?

DAVID LE SUEUR Throughout the country there are, the structures that are sprayed run into the millions.

ALAN ALDA (Narration) In areas close to the border, each house is sprayed once a year. Until recently DDT was used, but now they're switching to a more environmentally-friendly alternative. The new chemical was tested on a range of typical house building materials. Back at the lab, a standard dose of insecticide is applied. Then mosquitoes from the breeding colony are selected.

ALAN ALDA Are you counting? How many do you have there? Let's see eight, nine... oh, make that seven.

BARRY BREDEKAMP We can...

ALAN ALDA Don't breathe in when you laugh.

BARRY BREDEKAMP We can see, I can see ten here.

ALAN ALDA Ten. O.K.

BARRY BREDEKAMP So we'll now introduce them here.

ALAN ALDA You just, you blow them in, huh?

BARRY BREDEKAMP Yes.

ALAN ALDA (Narration) The mosquitoes take up their normal resting position on the wall, where they come in contact with the insecticide. If the chemical works, they'll succumb and drop off. The alarming thing is, some mosquitoes have figured out how to beat the system. Here's what happens. At night, mosquitoes home in on the CO₂ we breathe out. They fly inside and typically head direct for their victim. They bite, injecting an anti-coagulant to help them suck in blood. The malaria parasite is carried by the anti-coagulant. Here's the big change. Many mosquitoes now just fly right out again, without settling on the walls. So they never come in contact with the insecticide. Of course, the mosquitoes haven't

actually figured anything out. It's just that long-term spraying has killed off the majority -- that always settled on the walls -- leaving the few that don't to survive and multiply. Going after mosquito breeding sites, like cattle hoof prints, is one of the new approaches that must be developed before the disease has a chance to build up again. Many breeding sites just come and go so this approach isn't easy. And spraying so much land is an environmental hazard. Nets over beds is another possibility, although people here aren't accustomed to them. Meanwhile the program has found itself with an unexpected bonus. Recently the health workers have been mapping the coordinates of every house they visit, using accurate satellite GPS systems. The information comes back to the lab.

DAVID LE SUEUR This is the high risk area next to the Mozambique border, and the major corridor that people move through is through here, between the Nduma game reserve and the Tembe elephant park. And if we just look at this in a bit more detail, the actual dot in the middle is actually the location of a family -- a family's house -- which was obtained with one of these global positioning systems. So the guys going round on their bicycles actually positioned that house.

ALAN ALDA (Narration) This detailed portrait of a remote area was just what the new government needed to bring in new services.

ALAN ALDA So you were collecting this information to find out about the concentration of malaria in an area...

DAVID LE SUEUR Right.

ALAN ALDA And the power companies were able to come to you and say, We want to know where the people are concentrated so we can bring power to those areas where there are more people.

DAVID LE SUEUR We can also plot every school, so for the education authorities we could tell them where all the small rural schools were. And that was the first phase of power supply. They wanted all the schools to be supplied. We could tell them. We mapped all the clinics. We mapped all the traditional leaders, the chiefs and indunas. So that in fact although it was driven by malaria control, it has turned out to be this broad based information platform which is useful to all aspects of development.

ALAN ALDA (Narration) For the future, this extraordinary program may actually lead to better foreign relations for South Africa. Siphon Ngxongo is now looking north -- and to the day when he'll be out of a job.

SIPHO NGXONGO We need to work with our neighbors if we are going to be controlling malaria, and eventually eradicating it, because we are not living in an island. There are other countries which are around us. We need to work with them.

back to top

THE FIRST PEOPLE

ALAN ALDA (Narration) A sand dune at Saldanha Bay on South Africa's west coast is the first stop on our final journey -- into the distant past. Once this was a hyena den. Now it's a three hundred thousand-year-old pile of fossilized bones. Like this wildebeest's leg, they are leftovers from countless hyena meals. But about one bone in a thousand is special. This is from a human foot. This is from a forearm. They are some of the rarest fossils in the world. On a chilly winter morning, four expert fossil hunters are at work. Because they're approaching a layer rich in bone fragments, they're concentrating hard.

LEE BERGER Are you hitting bone yet?

CEDRIC BOGGENPOEL Yes, I've got some bone.

ALAN ALDA (Narration) Last season the team uncovered a few fragments from the type of archaic human that lived just before modern people -- like us -- came along. Archaic humans are very rare so restraint, says Lee Berger, is essential -- but still hard.

LEE BERGER These fossils are precious and if you destroy them going in, they're gone. I'd love to take a shovel and do this, but you can't. You can't afford to.

ALAN ALDA (Narration) Patience is rewarded. For the last critical stages, Lee Berger is joined by

CEDRIC BOGGENPOEL.

LEE BERGER It's on a very hard little pillar of rock.

CEDRIC BOGGENPOEL This front part here, it looks as if it has got some sutures there.

LEE BERGER A suture, really?

CEDRIC BOGGENPOEL That means that it is definitely skull. A skull fragment.

ALAN ALDA (Narration) The fragment is at least half an inch thick, twice a modern skull. It's definitely from a rare archaic human, three hundred thousand years old.

LEE BERGER Hopefully, eventually out of a lot of little pieces we'll be able to put him back together. That's a fantastic find, huh?

ALAN ALDA (Narration) Put back together, it'll probably look something like this -- flatter and heftier than a modern skull. And it'll be a big contribution to human history, because the only other archaic skull we have wasn't properly excavated. It was found in a quarry in the thirties. On this cast of that skull, you can see the squiggly sutures that made the new fragment so recognizable.

LEE BERGER They are those squiggles right here. It's like a jigsaw puzzle.

ALAN ALDA (Narration) Now the team has to find the rest of the pieces. And it'll be worth the effort...

LEE BERGER This will be the first time we have ever seen a hominid of this age coming out of the ground, excavated by scientists, rather than just showing up on someone's shelf.

ALAN ALDA (Narration) My next stop -- the University of Stellenbosch, not far from Cape Town. An archaeologist here made one of the key discoveries in human evolution -- the oldest known modern human, which came along about a hundred thousand years ago, right after the archaic type. Hilary Deacon showed me the few precious fragments found at the famous Klasies River site. This jawbone is the most important piece. It has a prominent chin, as we all do today, compared to the receding archaic chin on the left. This find is from the upper arm. It's lightly built, just like the modern arm bone below it. So the people at Klasies River were built like us. But did they think the same way?

HILARY DEACON If I can show you one of these things from Klasies River. This is a, well, have a look at it and tell me what you think of that. It's obviously red...

ALAN ALDA Yes, yes, it's red.

HILARY DEACON It's soft.

ALAN ALDA The red comes off.

HILARY DEACON The red comes off. It's like a crayon, it's a red crayon. It's ochre.

ALAN ALDA This looks like it's in a form that might not be found in nature, too, right?

HILARY DEACON Yes, that's actually ground like that. And we have got a number of them in the same pencil form. I call those ochre pencils.

ALAN ALDA (Narration) On the track of red ochre, we've come to the Drakensberg Mountains with David Lewis-Williams. He's spent a lifetime studying southern African rock art. The oldest known art is less than half the age of the people found at Klasies River, along with their ochre pencils. But if the pencils were used by those first modern people to draw or decorate, then the art of their direct descendants might give us a glimpse of what they were thinking. And most rock art, by the way, was colored with red ochre.

DAVID LEWIS-WILLIAMS Here we are.

ALAN ALDA (Narration) It looks like a hunting scene, but in the 1870s a German immigrant in Cape Town, Wilhelm Bleek, asked the native people of the region, the Bushmen, what the paintings showed. Ceremonies, they said, religious rituals. But Bleek's writings were ignored until, a hundred years later, Lewis-Williams began to take them seriously.

ALAN ALDA Looking at this for the first time, I can see how someone would say this is a picture of people hunting an animal. It just seems a picture of that.

DAVID LEWIS-WILLIAMS Yes.

ALAN ALDA But it's more than that, isn't it?

DAVID LEWIS-WILLIAMS It's a lot more than that. People used to think that this was a bull or an ox that had been stolen by these people. But of course the tail is wrong. It's a little short tail instead of a long tail for an ox. And the shape of the body is different. Take this figure. It has no legs, but it has a hand raised to its nose. The word "nose" was actually used as a metaphor for curing power, or the power to go into trance, into the spirit world. On this side of the painting...

ALAN ALDA That looks like a turkey to me.

DAVID LEWIS-WILLIAMS Well if we look a little bit more closely we'll see that it's not a turkey. It's a kneeling figure and its arms are in this backward position, which go right out at the back like that. And that puzzled us for a long time because you get this very awkward arm position painted all over South Africa. And I was in the Kalahari talking to some San Bushman medicine men, and one

of them said, without my asking him, "There is something else I can tell you." And he stood up and bent forward and put his arms into that posture, and straight away I knew he was going to explain what had puzzled us for decades.

ALAN ALDA He gave you the background to that picture. So what was it?

DAVID LEWIS-WILLIAMS And he said some medicine men adopt this posture when they're asking God, that is n/awa, to put more supernatural power, n/um, potency into their bodies. And then when n/awa puts the power into them, it goes into the backbone, into the spine. And they believe that between the shoulders there is a sort of hole which they call the n//au spot. And if you look at this animal, it's...

ALAN ALDA It's got this line coming out of that same...

DAVID LEWIS-WILLIAMS Exactly the same spot, you see. There's a little line, it's a line of little crosses, and those represent bees and bees had supernatural power in them.

ALAN ALDA (Narration) Forty years ago, this rare film of a Bushman ceremony was shot in the Kalahari. With the clapping, the singing, the stamping, the medicine men enter a trance, crossing into the spirit world. Occasionally a spear is thrown wildly into the bush, as the painting shows. Eventually the medicine men collapse, overcome with the power of God. There's a collapsed dancer in the painting, with lines from his head representing travel to the spirit world. So, it's not a hunt, and the animal in the painting is purely mythical, representing rain as it's controlled by the medicine men.

DAVID LEWIS-WILLIAMS We met an old descendant of a painter, and she explained that in the old days people used to dance in the shelter here in front of the painting.

ALAN ALDA Here, on this little ledge?

DAVID LEWIS-WILLIAMS Yes, they danced more or less standing in one spot.

ALAN ALDA I feel nervous just standing here. And they would dance and go into a trance?

DAVID LEWIS-WILLIAMS That's right. And as they danced they would turn to face the painting and then the power would come out into them and that would carry them away into the spirit world.

ALAN ALDA (Narration) South Africa's rock shelters are full of paintings, almost all with a ritual meaning of some kind. But the people who painted them are now gone. Their cousins in the Kalahari never had a painting tradition, so we've lost the connection to the hand that first held the ochre and the brain that first thought about what to draw, a hundred thousand years ago. Until the end, the rock artists painted. But now the subject was their own destruction.

DAVID LEWIS-WILLIAMS They were the first victims of the colonial holocaust. The colonial people wanted them out of the country and they didn't want to save anything of the Bushman culture. And Bushmen were thought of as primitive and backward and stupid and incapable of making something that had religious content. The farmers of those days mounted commandos to hunt down the Bushmen, and they shot them out like vermin.

ALAN ALDA (Narration) The African continent gave birth to humans. Now as South Africa puts its recent past behind it, its scientists are free to offer us their perspectives on those great events of the ancient past.

ALAN ALDA How would you describe what the finds at the Klasies River teach us about ourselves, about who we are?

HILARY DEACON These kinds of people were the ancestors of all the people in the world, so no matter where people spread later in time, they are all related and they're all remarkably closely related. And I think that kind of unified concept of humankind is very important.

[back to top](#)