

A Tropical Medicine Expedition – TROPMEDEX Tanzania 2010

Dr Denise Barnfather (Public Health Medicine Specialist)

Why TROPMEDEX?

Compelling reasons abound for healthcare providers working in non-tropical parts of the world to gain continuing medical education in clinical tropical medicine and travellers' health. Increasingly, tourists are choosing tropical and subtropical travel destinations, often without obtaining the appropriate pre-travel advice, vaccinations or malarial chemoprophylaxis. Returning travellers, refugees and migrants continue to enter New Zealand with malaria, Dengue fever and other rarely seen tropical infectious diseases, requiring timely and appropriate management from General Practitioners and Public Health Medicine Specialists. Lack of training and experience with tropical diseases can sometimes result in late diagnosis or misdiagnosis. Additionally, global warming is contributing to an increase in both tropical infectious diseases and existing communicable diseases in temperate climes. Practice-oriented training programs for healthcare professionals, such as the TROPMEDEX courses run in East Africa, are essential for the timely diagnosis, treatment, and public health management of tropical infectious diseases.

About TROPMEDEX

The two-week TROPMEDEX expedition begins in the city of Arusha. Beautifully situated in northern Tanzania on the eastern branch of the Great Rift Valley at an elevation of 1400m, it lies in the paternal shadow of Mount Meru (4566m). The dry, temperate climate of Arusha is excellent for coffee-growing and we stayed at the magnificent Arusha Coffee Lodge in the midst of a thriving coffee plantation.

Course participants included medical colleagues from Australia, USA, Portugal and Germany. The course leader, Dr Kay Schaefer - an enthusiastic and knowledgeable consultant in Tropical Medicine and Travellers' Health from Cologne - has organised and led 35 tropical medicine expeditions (TROPMEDEX) to Kenya, Uganda and Tanzania since 1995 for healthcare professionals. These are undertaken in collaboration with leading medical institutions and hospitals in East Africa. Kay works with local experts to supervise on-site bedside teaching and laboratory exercises in parasitology, and lectures are given in tropical medicine and travellers' health. Together, these comprise 60 hours CME, and include the epidemiology, clinical manifestations, diagnosis, treatment, prevention and control of Africa's leading infectious diseases. As a boon to Kay's and local experts' passionate tutelage, participants gain a fascinating insight into the local healthcare system and explore the epic flora and fauna of East Africa during field excursions.

The TROPMEDEX Tanzania itinerary saw us visiting hospitals, clinics and public health field projects; travelling 700km by land-cruiser through the Great African Rift Valley to destinations in Arusha, Magugu, Karatu in the Ngorongoro Conservation Area, and Lake Eyasi (home of the Hadza tribal hunters), and then flying to the exotic spice island of Zanzibar, where diseases such as elephantitis and schistosomiasis remain prevalent.

Malaria and Mortality

Malaria is the leading cause of mortality and morbidity in Tanzania, especially for children aged under five years and pregnant women, and features as a major contributor to poverty and underdevelopment. Malaria control strategies require an integrated approach including improved case management, vector control using insecticide treated mosquito nets, prevention and control of malaria in pregnancy, and epidemic preparedness, prevention and control. We

were privileged to experience firsthand the management of cases, production of insecticide-impregnated mosquito nets, and village-based malaria prevention interventions.

Malaria tropica (*Plasmodium falciparum*), the most frequently life-threatening of the four types of human malaria, is a medical emergency, with cerebral malaria capable of killing within hours. During the rainy season, *Anopheles* mosquitoes breed rapidly, and a distinct rise in malaria cases can be seen in hospitals, particularly within paediatric wards. We saw cerebral malaria in an 8-month-old boy with convulsions and fever admitted to the St. Elisabeth Hospital in Arusha. Fortunately, he was one of the lucky minority in East Africa, able to receive timely and appropriate medical care. After being stabilised with IV dextrose solution and diazepam, the attending physician requested a thin blood smear, explaining "It is much more important to stabilize the life-threatening condition, before thought is given to diagnosis. In most cases it's *malaria tropica*, but one should at least consider the possibility of meningitis, and perform a lumbar puncture in case the quinine is not effective".

In Tanzania, significant progress in malaria control has been made through the development, production and distribution of Permethrin-impregnated bed nets. We visited a production facility on the outskirts of Arusha where the Olyset net developed by Sumitomo Chemical scientists is being manufactured (*Image One*).



Image One: Olyset factory producing permethrin-impregnated mosquito nets (Arusha, Tanzania)

The Olyset net is made of polythene with Permethrin incorporated into the fibres, creating both a physical and chemical barrier against mosquitoes that lasts for five years, compared to the six months of protection that insecticide-coated nets provide. The World Health Organisation reports that they are being used in malaria control projects worldwide with great success,

On a subsequent tour of one of the villages on the island of Zanzibar, we saw how malaria prevention interventions, including widespread household usage of Olyset nets, removal of mosquito habitat,

and timely healthcare interventions, had led to a thousand-fold reduction in annual malaria cases, from 5,566 to 5 cases between 1999 and 2006.

The Flying Doctors and Fluorosis

Father Pat Patten - an American priest, paramedic and pilot - founded the Flying Medical Service (FMS) near Arusha thirty years ago. Small planes are required for doctors, nurses and healthcare workers to reach remote, otherwise inaccessible, regions in the vast Maasai plains (*Image Two*).



Image Two: The Flying Medical Service tending to Maasai people

FMS is a strictly non-profit, volunteer organization which, in addition to medical care and education services, also provides air transport for medical emergencies. On our visit to FMS headquarters, at the foot of nearby Mount Meru, Father Pat had just returned from flying a young Maasai herdsman, whose chest was punctured by a raging bull, to Agha Khan hospital in Nairobi. Father Pat remarked, “he was lucky, life is cheap in Africa. Last week I evacuated an American tourist who died *en route* from injuries suffered in a car accident. Road accidents are the premiere killer of visitors to Africa - forget about malaria, lions or poisonous snakes.”

Father Pat has also established a trade school for victims of disability facing limited educational and work opportunities in their villages, where they learn sewing and woodwork skills, and produce crafts for sale. Sadly, many of the disabled were victims of skeletal fluorosis, a crippling, endemic condition found in villagers living in and around the Rift Valley. In Tanzania, this condition is largely caused by excess fluoride that was released into shallow and ground waters during volcanic activity that formed the Rift Valley, when conditions of high temperatures and pH were present. In Arusha, levels of fluoride in water supplies lie between 10.5 and 46.0mg-F/L, 10-40 times higher than the maximum level of 1.5mg-F/L recommended by the World Health Organisation. This has led to widespread dental fluorosis (up to 95% affected in some villages) and skeletal fluorosis (in some villages up to one third may be crippled).

Sleeping Sickness and Poverty

Sleeping sickness (*Trypanosomias rhodesiense*) is endemic in Tanzania. Occasionally tourists acquire the disease in the Serengeti or Tarangire national parks. The tsetse fly vector transports trypanosome parasites from game animals, which are immune to the disease, to people and cattle. Parasites infect internal organs and the brain, and cause sleepiness, apathy and finally unconsciousness and death if left untreated.

After a lecture by Dr. Abasi at Magugu Hospital on human African *trypanosomiasis*, we visited the wards. A 30-year-old man with severe meningoencephalitis caused by sleeping sickness, lay on a rusty pallet. At his bedside, Dr. Abasi discussed the advantages and disadvantages of Melarsoprol therapy, a highly toxic organic compound of arsenic that is fatal in 8% of cases.

He concluded by informing us that “with greater frequency, tourists in East African national parks are being bitten by the tsetse fly

– therefore it is increasingly important that travellers returning from tropical regions with fever, who have visited endemic areas, should be investigated for both malaria and sleeping sickness.”

Both diseases are diagnosed using the thin blood film technique, and after ward rounds, we visited the hospital laboratory where we learnt this technique for diagnosing *malaria* (Image Four) and sleeping sickness (Image Five).



Image Three: Tsetse fly collection showing the characteristic scissoring of the wings



Image Four: Thin blood film showing *Plasmodium falciparum*

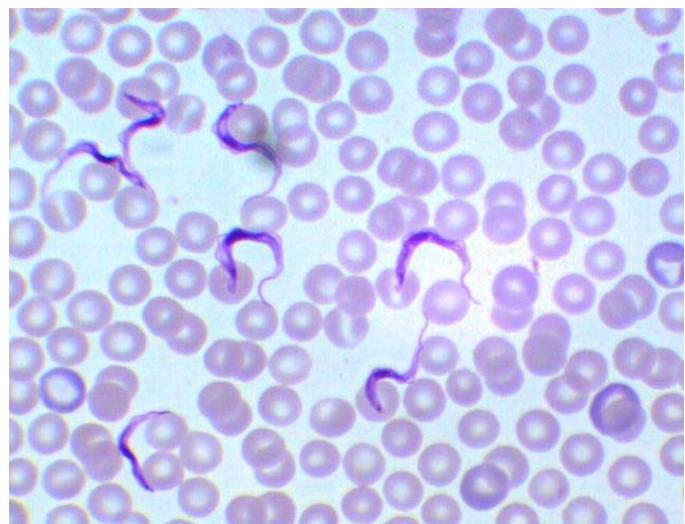


Image Five : Thin blood film showing *Trypanosoma*

The day included a field excursion through the Lake Manyara National Park, home to many game animals, including antelope - the main reservoir of the *Trypanosomiasis rhodesiense* parasite.



Image Six: An antelope herd - the main reservoir of the *Trypanosomiasis rhodesiense* parasite (Tanzania)

On our journey towards the National Park we drove through a vast steppe landscape where sleeping sickness is endemic. Farms thrive poorly where the tsetse fly is found – cattle succumb to the parasite and farmers must till the land by hand. Conservationists believe that this fact alone keeps cattle, and thus people, outside protected areas. In effect, the transition from subsistence agriculture to income-generating mixed farming, has been stopped by the ‘ecological barrier’ presented by the tsetse fly through preventing livestock development.

An experienced public health expert and entomologist from the Ministry of Health in Tanzania explained the control measures taken in surrounding villages. Endemic areas are dotted with fabric traps – their blue colour and the fermented cow urine bait used, together lure the tsetse fly into the insecticide impregnated traps. Once population levels of tsetse have been reduced with such conventional techniques, waves of factory-reared sterilised male tsetse flies are released from the air in some African countries. This is called the “sterile insect technique” and signs heralding the adoption of this strategy read “one plus one equals zero”.

Brucellosis and the Maasai People

Our travels included skirting the rim of the magnificent Ngorongoro Crater on our journey towards the Endulen Mission Hospital. A Tanzanian doctor described the brucellosis cases, also known as undulant fever, which are frequently seen at the hospital. Typically, patients complain of sudden fever and present with enlargement of the spleen and liver. Although they

are treated with doxycycline and streptomycin, the patients, who are primarily Maasai people, usually return with the same symptoms. We were told that the Maasai have found it difficult to make the transition to drinking only pasteurised or heat-treated cow's milk, and therefore they reinfect themselves repeatedly. As in the other hospitals we visited, the Endulen Hospital was also populated by patients with pneumonia, AIDS, tuberculosis, malnutrition, and infants with diarrhoea and dehydration.

Driving across the sweeping Serengeti steppe towards the Olduvai Gorge (The Cradle of Mankind), we saw several groups of staturesque, leanly-muscled Maasai warriors guarding their cattle herds or trekking vast distances across the arid plain in the heat of high noon. Today, the Maasai still live as they have for centuries past, and have shown little interest in changing their traditional, semi-nomadic lifestyle.

The FAME Clinic

The renowned FAME clinic situated in the fertile region of Karatu (*Image Seven*) and co-founded and run by American couple Doctor Frank Artress and Susan Gustafson, includes an outpatients' clinic, medical laboratory and outreach service (*Image Eight*), and opened in April 2008.



Image Seven: FAME Clinic (Karatu, Tanzania)



Image Eight: FAME outreach service (Karatu, Tanzania)

FAME (the Foundation for African Medicine and Education), a non-profit organisation, is currently working on expanding its services to include a multidisciplinary hospital and housing for volunteer health professionals. Financing FAME requires intensive biannual fund-raising trips to the couple's original homeland, the USA. However, they remain committed to providing an ongoing top quality medical service in the region; hoping to alleviate the overwhelming need for medical care that exists in East Africa.

Frank regaled us with the inspiring and humbling FAME story: it began eight years ago when they were jolted into reassessing their lives' direction after Frank nearly died of high altitude pulmonary oedema atop Mount Kilimanjaro. Deeply impressed by the perseverance, generosity, and resourcefulness of their guides and crew, and moved by the patient endurance of the Tanzanian people in the face of an enormous burden of preventable disease and premature death, Frank and Susan decided to return to Tanzania. This time they were there to give something back to a people whose voice is rarely heard; a people who lack our opportunities to live largely disease-free lives and to share their wisdom, strength, and vision with the rest of the world.

Snakes and Bites and All Things Berry Nice

After a rather alarming lecture on venomous African snakes given by Dr Schaefer the previous evening (“alarming” because at the time we were living in the middle of a coffee plantation where snake bites had been identified as the largest occupational health hazard), we visited the Miserani Snake Park gracing the outskirts of Arusha. The owner of the snake park, Berry Bale (BJ), a big game hunter originally from South Africa, who exchanged hunting for conservation – a conversion that is apparently not uncommon amongst hunters in Africa – founded and runs the snake park, an intimate attached pub and lunch bar (where pub food, poor lighting and rugby memorabilia are guaranteed to gladden the heart of any Kiwi), and the nearby six-bed Miserani Snake Bite Clinic which he is in the process of converting into an AIDS orphanage whilst rebuilding the clinic nearby. BJ has also been responsible for significant community projects including the provision of a clean borehole water supply to Eluai and Emerate villages, a Maasai museum with attached handicraft shops, and the building of eight classrooms each housing 40 children.

Wandering through the snake park, we saw the legendary puff adder, actually quite a sluggish snake that usually only presents a threat when approached; the black mamba, by far the quickest and most poisonous snake in Africa with a paralyzing neurotoxic venom that can lead to death by suffocation within minutes; and the Egyptian cobra, made infamous as the asp clasped to the suicidal breast of Cleopatra. During our visit to the nearby snake bite clinic, we were introduced to a puff adder victim - a small boy bitten on the right foot (*Image Nine*), fortunate to have survived as a result of receiving timely antivenom injections and proper wound care.

BJ is supplied with venomous snakes, from which he produces the antivenoms used in his clinic, by the locals - whom he takes the opportunity to educate in the correct management of snake bites.



Image Nine: Young boy with snake bite being seen at the Miserani Snake Bite Clinic (Arusha, Tanzania)

Zanzibar and the Schistosomiasis Story

Our flight from Arusha to Zanzibar heralded a change from the temperate climes we experienced at altitude around the Rift Valley, to the heat and humidity of the low-lying spice island. Our drive from the airport to a hotel north of Stone Town, was an enchanted journey past merchants hawking their wares by candlelight and in whose faces an exotic mix of African, Indian, Arabian and European ancestry was writ. Our bus driver informed us that the Zanzibarian population, which mingled extensively with peoples of other races over the centuries, is united by a common religion, Islam, and language, Kiswahili.

The next morning we visited Dr. Simba, Vice-Director of the Schistosomiasis/Elephantiasis Institute, who coordinates prevention and control projects on Zanzibar. A recent success was the dramatic reduction in both prevalence and intensity of *Wuchereria bancrofti* (lymphatic filariasis) through mass drug administration using a combination of albendazole and ivermectin - five rounds of treatment for the entire population were administered. Factors crucial to the project's success included high-level political commitment, developing appropriate social mobilization strategies, involving communities in drug distribution, and introducing a formal management protocol for individuals with lymphoedema.

Similar success can not yet be claimed for *Schistosomiasis*, and this disease, caused by a trematode worm that damages internal organs, impairs growth and cognitive development, and increases the risk of bladder cancer, is considered the second most socioeconomically devastating parasitic disease after malaria. During the drive to a school in Kinyasini in the northern part of Zanzibar, Dr. Simba explained why this disease has been so difficult to control. “It’s mainly because schoolchildren bathe in ponds and rivers. They get infected, they are treated, and then they get reinfected when they bathe or go swimming in rivers, creeks and ponds. It’s a vicious circle.” An hour later we drove past a group of children in the midday heat – over 32° C, with nigh-on 100% humidity – splashing and washing in a creek (*Image Ten*).



Image Ten: Children washing in a creek harbouring freshwater snails hosting *Schistosoma haematobium* (Zanzibar)

In the afternoon we returned to the Schistosomiasis Institute laboratory in Stone Town to learn the filtration technique for isolating eggs of the pathogen from urine - having obtained positive *Schistosoma haematobium* samples (i.e. haematuric urine) from schoolchildren in Kinyasini (*Image Eleven*).



Image Eleven: TROPMEDEX participants examining urine samples for *Schistosoma haematobium* eggs under the microscope (Zanzibar, Tanzania)

Urine microscopy revealed the *Schistosoma haematobium* egg with its distinctive terminal spine (*Image Twelve*).



Image Twelve: *Schistosoma haematobium* egg in the urine. Image from the Public Health Image Library, CDC, USA

In the process, they were coming into contact with freshwater snails, the intermediate host for *Schistosoma haematobium* – we found hundreds of snails in the surrounding reeds when we ventured down to the creek to investigate - so it was no surprise to learn that high rates of infection with urinary schistosomiasis are found in Zanzibarian children.

Farewell from Tanzania

Bidding farewell to our colleagues was bittersweet. During the two week TROPMEDEX course, we had grown together as both colleagues and friends, learning not only from the course, but also from each other's experience in public health and medicine in various countries. We had learnt about many significant tropical infectious diseases and their prevention and management, in a wide variety of settings, including hospitals, clinics, research centers, communities, schools and within the epic landscapes of the Rift Valley. On numerous excursions we had come to know and appreciate, not only the Tanzanian healthcare system and its public health challenges, but the land, the people and the extraordinary flora and fauna of East Africa.

East African Tropical Medicine Expeditions:

Kenya 23nd January - 4th February 2011
Tanzania 20th February - 5th March 2011

Uganda 29th January - 10th February 2012
Tanzania 26th February - 10th March 2012

Certified: 60 CME hours on Clinical Tropical Medicine and Travellers' Health
Course Convener: Dr Kay Schaefer (MD, PhD, MSc, DTM&H), Tropical Medicine and
Travelers Health Consultant (Cologne, Germany)
Information: www.tropmedex.com