The Hirsch Institute of Tropical Medicine
Asella, Ethiopia

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The Hirsch Institute of Tropical Medicine in 2018

The Hirsch Institute of Tropical Medicine Asella, Ethiopia

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List of Abbreviations

ASTU	Adama Science and Technology University
ATH	Asella Teaching Hospital
BSEP	Bile salt export pump
CLD	Chronic liver diseases
DAAD	German Academic Exchange Service
DILI	Drug-induced liver injury
ESTHER	Ensemble pour une Solidarité Thérapeutique Hospitalière En Réseau
HHU	Heinrich Heine University
HITM	Hirsch Institute of Tropical Medicine
PCR	Polymerase chain reaction

Preface

Professor Dr. med. Dieter Häussinger
Director of the Department of Gastroenterology, Hepatology, and Infectious Diseases
Director and Founder of the HITM

In October 2013, the Hirsch Institute of Tropical Medicine (HITM) was officially inaugurated as a branch of the Department of Gastroenterology, Hepatology, and Infectious Diseases at Heinrich Heine University Düsseldorf in cooperation with Adama University in Ethiopia, whose medical faculty was transferred together with other faculties in Asella to the newly-founded Arsi University.

This was preceded in September 2009 by talks about the founding of the institute on the compound of Adama University with the then President of the University of Adama Professor Dr. Eichele and the former Ethiopian Minister of Education D. Mekonnen. On July 21st 2010, the contract between Heinrich Heine University and the University of Adama was formally signed in Schloss Mickeln in Düsseldorf. With the aid of a generous donation made by Wolfgang Hirsch, building work commenced shortly afterwards. The institute was ceremoniously opened in October 2013. Since then it has served as a place of scientific and medical knowledge transfer, postgraduate medical training for German physicians, and of conducting scientific projects relating to tropical medicine and infectious diseases. The costs for building, equipping, and running the institute are largely covered by third-party funding, donations, and grants made by foundations. I am convinced that the founding and running of the institute has contributed significantly to the internationalization of Heinrich Heine University Düsseldorf.

This little book relates the past activities of the institute, its history, and perspectives. Moreover, it permits a look behind the scenes during the construction of the institute in Africa and describes the living conditions and impressions of our staff on site. By now, the first third-party funded research projects have been finished and the first Ethiopian partners are working on their PhDs on a scholarship in Düsseldorf.

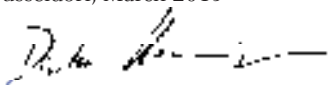
I would like to thank my staff, particularly Dr. Torsten Feldt, the consultant in charge, and the physicians who each worked for a year at the HITM: Dr. Matthias Bosselmann, Mathias Breuer, Dr. André Fuchs, Dr. Tamara Nordmann, Dr. Hans Martin Orth, and Dr. Andreas Schönfeld for their part in the construction of

the institute and the research on site and for the report compiled by them about our institute that by now has a staff of more than 20.

My special thanks go to Sandra Lessmann for the translation of the German version into English.

Finally, I would like to thank all our supporters, sponsors, and the foundations that have made the construction and the running of the Institute of Tropical Medicine in Asella possible.

Düsseldorf, March 2019



Dieter Häussinger

The Origins of the Institute

Under the directorship of Professor Dr. Dieter Häussinger, the unit of infectious diseases, which forms part of the Department of Gastroenterology, Hepatology, and Infectious Diseases, was expanded with the addition of a tropical medicine outpatient clinic. With its fundamental research, clinical research projects, and an increasing number of patients the field of infectious diseases now forms another mainstay within the department besides gastroenterology and clinical and experimental hepatology. The department was also certified as a Center of Infectious Diseases several years ago.

This development is reflected architecturally in the opening of the Center for Liver and Infectious Diseases in 2011. This ultramodern building houses, among others, the only treatment unit in North Rhine-Westphalia for highly infectious patients e. g. those infected with Ebola.

A further ambitious and logical step was the establishment of a branch of the Department of Gastroenterology, Hepatology, and Infectious Diseases in a tropical country with the possibility of research into infectious diseases and tropical medicine in an area with a high prevalence of such diseases. Further aims were to set up an international partnership, a continuous bilateral transfer of knowledge and to support an African university in the areas of medical research, teaching, and the treatment of patients. In addition, it was to be made possible for internists to do their complete training in tropical medicine at the Department of Gastroenterology at the University of Düsseldorf under the directorship of Professor Dr. Häussinger.

Reception with traditional dancing during Professor Häussinger's first visit to Asella Teaching Hospital in 2009

The University in Adama in Ethiopia offered a suitable location and a possible longer-term partnership between the two universities. After many years of political and military conflicts and various repressive regimes as well as periods of famine caused by droughts, Ethiopia is now enjoying a phase of political stability and continuous economic recovery. Even so, Ethiopia is still one of the poorest and least developed countries in the world. With approximately 500,000 inhabitants, Adama is one of the largest cities of the country. The capital Addis Ababa, the only major city in Ethiopia, lies 90 km to the northwest.

In 2006, a teaching school became "Adama Science and Technology University" (ASTU). The aim of the Ethiopian government was to establish a German-style model university. A German university president (Professor Dr. H. Eichele) was appointed and most faculties were governed by renowned, experienced deans from Germany. In 2011/12, the model of the German-Ethiopian dual leadership ended as planned. In 2013, there were up to 20,000 students enrolled in the rapidly growing university.

The medical faculty of the university was founded in 2009. It was to be based in the small town of Asella, which nevertheless is the regional center of the Arsi zone. The city is situated 70 km south of Adama and is mainly characterized by agriculture. The Faculty of Agriculture was already located here.

The main hospital at Asella serves an area inhabited by 3.5 million people. Patients from three (nine are planned) district hospitals and a variety of health centers are referred there. The following specialties are offered: internal medicine, gynecology, pediatrics, and general surgery. Furthermore, a major HIV/AIDS clinic, an eye clinic, a dental clinic, and a project for the care of rectovaginal fistulas common in Ethiopia as well as radiology, laboratory, and microbiology departments are integrated into the hospital.

Affiliated to the hospital, a school for nursing, midwives, and laboratory assistants has also been in existence for many years.

The emergent medical faculty was established under the deanship of Professor Dr. Dietrich Birnbaum (former Medical Director and Executive Director of the Kerckhoff Hospital in Bad Nauheim) and he presided over it for several years. Thus, this fledgling medical faculty seemed most suitable as a partner for the Düsseldorf project and contact was duly made and developed further. In September 2009, a "letter of intent" was signed by Professor Dr. Häussinger, Professor Dr. Eichele, and the then Ethiopian Minister of Education Ato Mekonnen.

Signing of the letter of intent for future cooperation during a visit of Professor Häussinger to Ethiopia in September 2009. M. Biontino (German Deputy Ambassador), Professor Dr. D. Häussinger, His Excellency D. Mekonnen (then Ethiopian Minister of Education), and Professor Dr. H. Eichele (then President of the University of Adama) (l.t.r.)

The cooperation agreement between the Medical Faculty of Heinrich Heine University Düsseldorf, the University Hospital of Düsseldorf, and the ASTU was signed on June 21st 2010. After the institute was planned, built, and equipped, it was inaugurated on October 16th 2013 by Professor Häussinger, Professor Lee (President of the ASTU), Professor Schnitzler (Prorector of Heinrich Heine University), and Dr. Legesse (Dean of the Medical Faculty of the ASTU). Since the inauguration, the Department of Gastroenterology, Hepatology, and Infectious Diseases at the University Hospital of Düsseldorf has almost continuously been represented in Ethiopia by two German physi-

Signing of the agreement between representatives of Adama University (Ethiopia), of Heinrich Heine University (Düsseldorf) and the University Hospital of Düsseldorf at Schloss Mickeln in Düsseldorf on July 21st 2010: front row, l.t.r.: Professor Dr. Dr. H. M. Piper (Rector of the HHU Düsseldorf), W. Hirsch (after whom the institute is named, benefactor, founder, and managing partner of the Hirsch Group), Professor Dr. H. Eichele (President of Adama University), Professor Dr. D. Häussinger (Director of the Department of Gastroenterology, Hepatology, and Infectious Diseases). Back row l.t.r.: Dr. M. Wokittel (Administrative Director of the University Hospital Düsseldorf), Professor Dr. J. Windolf (Dean of the Medical Faculty, HHU), Professor Dr. D. E. Birnbaum (Dean of the Medical Faculty, Adama University), Ms. C. Herrmann (Ministry of Innovation, Science, and Research), Professor Dr. Werner Stüber (Dean, School of Humanities and Natural Sciences, Adama University)

cians as coordinators of the HITM. The institute is mainly financed by funds raised by the founder and director, Professor Häussinger, and furthermore, his continuous commitment guarantees stable financial and material support from German partners, foundations, and donors.

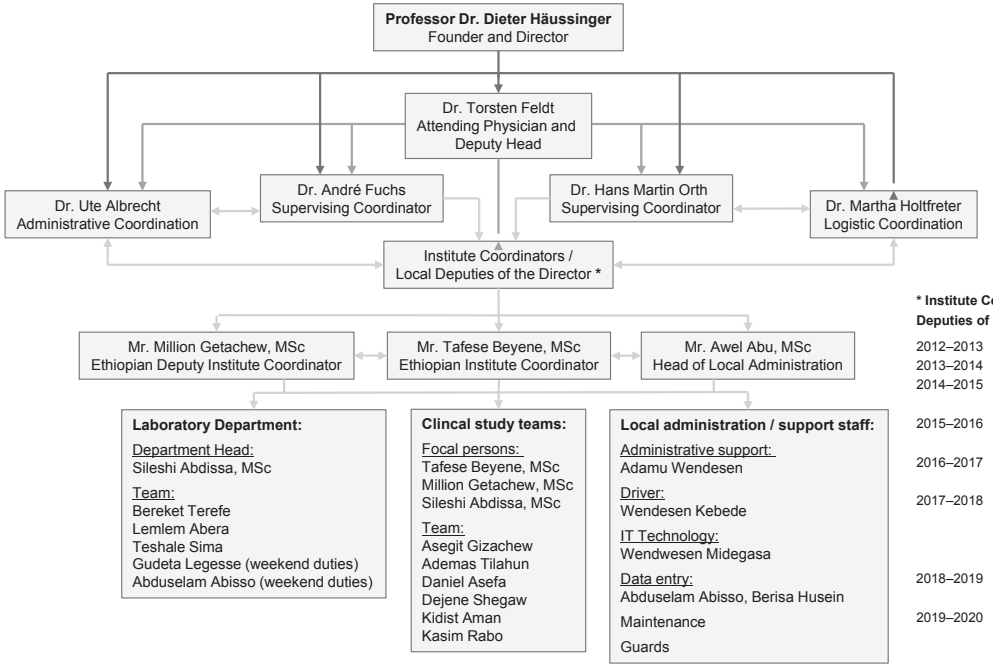
Official presentation of the check by Professor Häussinger to Professor Lee, President of Adama Science and Technology University, during the inauguration in October 2013

The inauguration on October 16th 2013

The delegations at the inauguration of the institute: (l.t.r.) Professor Gerald Heusing (DAAD), Professor Dietrich Birnbaum (Dean of the Medical Faculty of the ASTU), Dr. Torsten Feldt (Consultant and Assistant Director, HITM), Professor Alfons Schnitzler (Prorector, HHU), Dr. Lemi Guta (Vice President of Research, ASTU), Professor Jang Gyu Lee (President of the ASTU), Dr. Habtamu Kabur (Vice President of Administration, ASTU), Professor Dieter Häussinger (Director, HITM), Mr. Thomas Terstegen (Permanent Representative at the German Embassy in Addis Ababa), Professor Herbert Eichele (former President of the ASTU), Dr. Tolla Beriso (First Secretary for Education and Science of Oromia State), Professor Herbert Becker (DAAD), and Dr. Irmela Müller-Stöver (Tropical Medicine, University Hospital of Düsseldorf)

HIRSCH INSTITUTE OF TROPICAL MEDICINE
Organisational diagram (October 2018)

Department of Gastroenterology, Hepatology and Infectious Diseases



*** Institute Coordinators / Local Deputies of the Director:**

2012–2013	M. Breuer
2013–2014	Dr. H. M. Orth
2014–2015	Dr. F. Pfäfflin
	Dr. A. Fuchs
2015–2016	Dr. A. Schönfeld
	Dr. L. Cirri
2016–2017	Dr. T. Nordmann
	Dr. M. Bosselmann
2017–2018	Dr. A. Fuchs
	Dr. S. Heyszl
	Dr. A. Schönfeld
	Dr. H. M. Orth
2018–2019	Dr. J. Früh
	Dr. L. Stötter
2019–2020	Dr. U. Ehehalt

Organizational diagram of the Hirsch Institute of Tropical Medicine

Coffee Ceremony

Coffee is not only one of the most important export goods of Ethiopia; coffee drinking is also deeply rooted in Ethiopian culture. On special occasions a coffee ceremony is performed, which, with all the steps included, may take over an hour. The guests to be entertained are seated on small stools in a semicircle around the woman that gracefully performs the coffee ceremony. The floor of the area where the ceremony takes place is decorated with fresh grass. A fire is lit. The performer of the ceremony uses a piece of ember to light some incense, which spreads a fragrant smell inside the room. Traditionally, chickpeas or wheat are roasted and later offered as snacks with the coffee.

Then the hostess cleans and roasts the green coffee beans in a pan on the fire. The powerful aroma of the coffee promises imminent pleasure. While the roasted beans are crushed into coarse grounds in a wooden mortar, the water is heated in a clay coffeepot. The freshly roasted and ground coffee is added to the boiling water. After a few minutes, the coffee is ready and served in small bowl-shaped cups. The first cup is dedicated to "Mother Earth" and not drunk. The experienced hostess manages to fill the cups in a single stream. Plenty of sugar is added to the traditionally prepared, very strong coffee, before it is drunk. Guests at the elaborate ceremony indulge in lively conversation. The coffee ceremony is performed, when the German employees of the institute in Asella are invited to visit the families of their Ethiopian colleagues or, in an especially lavish way, when the assignment of a German employee in Asella has ended. The impressive ceremony serves a double purpose, enjoying the coffee and communicating socially: in Ethiopia, everybody is allowed to speak openly on any topic.

Traditional coffee ceremony

After the ceremony presents are made

Asella, Life at the Edge of the Great Rift Valley

Impressive Ethiopian flora: poinsettias (*Euphorbia pulcherrima*) grow to the size of stately trees

The Town of Asella

The Great Rift Valley runs over 6,000 km from the north of Syria to Mozambique. The width of the valley varies from 30 km to 100 km. Over the last 35 million years the continental drift has formed deep ravines like the Red Sea and high mountain ranges like the Ethiopian Highlands. Along the Rift Valley, there are many active volcanoes. Among them is the famous Erta Ale in Ethiopia, one of the six volcanoes worldwide with a permanently active lava lake. The Ethiopian Highlands are divided by the Rift Valley into a north-western and south-eastern part. Some locations on the slopes of the Great Rift Valley offer a breath-taking far-reaching view over the escarpment. One of these locations is Asella. The town lies at an elevation of 2,400 m above sea level at the base of the Mount Chilalo, which is 4,036 m high and towers over Lake Ziway, one of the great freshwater lakes of the Rift Valley.

The multi-ethnic state of Ethiopia is subdivided into nine regional states, six of which are

Ethiopia. Asella is located south-east from Addis Ababa. (Source: OCHA/ReliefWeb). Nazret is the capital of the Oromia region. In the Oromo language it is called Adama

View over the Rift Valley near Asella

characterized by their own ethnicity and language. Asella lies in the Oromia region, the land of the Oromo people. The local language is Oromifaa or Afaan Oromo.

The Oromia region is divided into zones. Asella is the capital of the Arsi zone. Located on an old trade route on the eastern edge of

The "thinking Muslim", a conspicuous rock formation on the slopes of Mount Chilalo overlooking Asella

View over Asella toward Mount Chilalo, the "Hausberg" (local mountain) of the town

the Rift Valley, Asella was made into a provincial capital by the Italians during their occupation (1935–1941). No building survives from this time in Asella, but in the 1960s and '70s several building projects like the roofing of the market and the construction of the present hospital were realized with Italian support.

Asella has a population of over 110,000. The inhabitants are very religious. A majority of 67 % are Ethiopian Orthodox Christians, while 23 % are Muslims and 9 % are Protestants, who are the most relevant religious minority in the town. In Ethiopia, there are frequent conflicts between ethnic groups. But the different denominations usually treat each other in a respectful and tolerant manner. Although Asella has a provincial or even rural air, you can see fashionably dressed ladies as well as Muslim women wearing headscarves or burkas. Sometimes you hear the call of the muezzin over the nightly street noise, as you would in Arab countries. Over recent years, the presence of the university has been slowly changing the vibe of the city – students and teachers alike frequent a growing number of restaurants, cof-

Traditional vegetarian Lenten fare: Beyenet

Orthodox church near Asella

Stele from prehistoric times in a field of stelae, which are typical for Oromia. Their historic origin is unclear

The Orthodox New Year's festival often falls on September 11th. On that day children go from door to door to ask for money and sweets

fee houses, and bars. By German standards only a supermarket is still missing. Groceries are largely bought on the city's busy daily market.

The chanting from the loudspeakers of the Orthodox churches, which call worshippers to prayer and service, sounds even louder and is heard over a longer period –– on feast days even during the night hours.

The state also respects the different religions. Christian and Muslim holidays are both found in the Ethiopian calendar and the part of the population that is not duty-bound to take part in festivities nevertheless enjoys the day off.

Market in Asella

Transport and Getting Around

From Adama it takes about an hour by car to Asella. The road climbs up almost 1,000 m. In the lowlands of the very wide Great Rift Valley one passes huge sugar cane plantations, which are watered artificially with water from rivers in the Rift Valley. During the dry season, big herds of dromedaries are pastured here, which are later sold via Djibouti to the Arabian Peninsula. The traveler crosses the Awash River with its lush groves of mango trees. In higher altitudes, the green of the cultural landscape gives way to a semi-arid desert. The region is characterized by umbrella thorn acacias, cactuses, and scattered mud-walled huts. Only during the rainy season, which lasts just a few months, does everything start to bloom and the landscape is dominated by lush green colors.

Since the new toll motorway was opened the journey time from Addis Ababa to Adama has been shortened by several hours

The traveler drives through small towns and villages. The majority of the fields are cultivated by peasants, who live with their families in mud huts or simple houses among the fields. Children on donkeys loaded with yellow plastic canisters, which they use to bring water home from public wells, ride along the side of the roads. As part of the Chinese development cooperation, another lane was added to the road from Adama to Asella and beyond. Compared to the national average it has relatively few potholes. Fully-laden donkey carts and heavy-laden trucks lumbering up the hill seem to be rooted to the roadway und often force faster travelers to overtake them. The commonly used Isuzu trucks transport high-stacked goods, entire herds of cattle or even densely-packed people on their open beds. Being more powerful than most of the vehicles on the road, they never seem to feel obliged to slow down for the benefit of others. As a motorcar driver, you are often overtaken by one of the numerous overcrowded minibuses. These are used by small entrepreneurs who provide passenger traffic between Ethiopian cities. They try to maximize their profit by overloading their vehicles, economizing on safety features, driving very fast, and quite frequently performing risky driving maneuvers.

The employees of the institute do not have to rely on the precarious public transport. They are driven around safely at a moderate speed in the cars belonging to the institute: a 2000 Nissan Patrol and a brand-new 2017 Toyota Land Cruiser.

From Adama the road south passes along the eastern edge of the Rift Valley, traverses Asella and goes past Mount Chilalo and Mount Kaka into the Bale Mountains in the east and down again into the Rift Valley in the west to the cities of Hawassa and Shashemene, the stronghold of Rastafarians in Ethiopia.

Living in Asella

In the cooperation agreement, Adama University promised to provide accommodation for the colleagues sent to Asella from Düsseldorf. This takes the form of two neighboring houses situated in Ardu, which are owned by the university. Ardu, a suburb of Asella, is located on a hillside on the slopes between the Rift Valley and Mount Chilalo, about four kilometers from the hospital and the institute. One has to drive three kilometers on the main road up the hill and then turn right past a wood of eucalyptus and a local recreational area, which has seen better days and includes an idyllic lake and a model organic farm.

One of the houses in Ardu

The inside of the house

View over the house into the Rift Valley – a pleasure especially at sunset

The recently refurbished side road leads to the Arsi University administration building and some of its faculties, including the large Faculty of Agricultural Science. After crossing the simple housing development with its wooden and mud huts, one has to turn right again to reach a residential fenced-in area with two roads, on which the staff of a Swedish foreign aid project built comparatively spacious detached houses in the Scandinavian style in the 1960s. Nowadays, teachers and administrators of Arsi University reside in the former Swedish houses, which are called "Ardu Villas" by the locals. A clubhouse and a sports ground with tennis, squash, and basketball courts testify to the comfortable times of a European community. Tennis and squash have not been played here for a long time now, but the asphalt basketball court was repaired by a German neighbor, who worked for the GIZ (Society of International Cooperation and Development Organization of the Federal Government), and an American Peace Corps Volunteer. It is used every day by the children and youths of the neighborhood. The clubhouse looks a little dismal and run-down and has stood empty for some time. But now, there is

fresh “Dabo”, a kind of white bread, and simple Ethiopian dishes served throughout the day for students and employees of the university.

Young neighbors. Despite our everyday presence, we “Faranji” (white people) still attract a lot of attention

The red-brick bungalow on a beautiful plot with a lawn and a garden area is luxurious by Ethiopian standards. The kitchen, living room, and two bedrooms are well shaped. The fireplace in the living room is decorative at any rate, although it is rarely used either out of fear that it may not draw properly or in consideration of the catastrophic effects of deforestation in Ethiopia if trees are cut down for firewood. Sometimes, on cold nights during the rainy season 2,400 m above sea level, a warming fire offers welcome comfort.

First, there was only one house available for visitors from Heinrich Heine University. When the physicians from Düsseldorf who would be staying in Ethiopia for a longer period of time started to come over in August 2013, it became necessary to create more accommodation. Fortunately, the adjoining house of identical construction was vacant. It had previously been occupied by Professor Birnbaum, former dean of the Medical Faculty of the ASTU. After standing empty for so long the sparsely furnished bungalow looked a little run-down, but was quickly made habitable again.

In the meantime, the physicians from Düsseldorf in the first house prepared themselves for a longer stay. A small library for the long evenings during the rainy season has been added to by every visitor. In the garden, local vegetables are grown in a “monkey-safe” area underneath a mesh cage. A barbecue grill for communal summer evenings was built with bricks left by the Swedes and a metal sheet reamed from an old agricultural machine. Shelves and garden furniture were partly self-built or made by local carpenters from bamboo. TV sets from Germany and a satellite dish that was set up ensure that the staff do not lose sight of what is happening at home. Every new colleague from Germany contributes something to improve the comfort of living.

In the equally beautiful flower garden a swing and a small fire pit were quickly installed for the children of the first occupants of the houses from Düsseldorf. A passage through the high garden hedge links both properties so that there can be a friendly exchange among colleagues after work.

Two night guards are employed for security reasons. Gesagne, or rather “Ato Gesagne” (“Ato” = Amharic: venerable sir) is about 60 years old and served as a soldier in the wars with Eritrea. He is a kind-hearted, obliging man and always watchful. If you want to enjoy a beautifully clear view of the bright Milky Way at the back of the house before bedtime, you have to be careful when stepping around a corner: you may then come face to face with Ato Gesagne – highly alert, with a pink bob-

Cross-cultural fellowship: former housekeeper Isgaharia with Clara, Dr. Orth's daughter

ble hat on the head and a machete in his hand, alarmed by the slightest noise. His son Tesfa, a rather silent and reluctant companion, is employed as a night guard for the second house. He is usually enjoying the silence and tranquility of Asella's short evenings and early mornings.

During the day, two housekeepers, Kidist and Etafrhau, keep watch over the houses. They do the laundry, the dishes, and the cleaning. As they and the guests do not speak the same language, communication primarily works via sign language and it is accepted that the tidying up is done as they think fit. This includes, for example, the decorative arranging of pots and pans in the living room cupboards or laundering clothes neatly packed away in the shelves.

In 2013, a part of the back garden of one of the houses became the home of five chickens. In addition to the luxury of a wooden shed with a chicken-run the animals got the freedom of roaming around freely in the back area of the garden during the daytime.

Despite the idyllic location of the houses and the memories former residents have of evenings spent admiring the sunset over the Rift Valley and the sea of blossoms in the gardens, the neighborhood has its disadvantages: due to frequent power outages, some evenings the occupants have to manage with candles. For the throughout the year rarer, but during the end of the dry season common water cuts, there is a water tank to supply the toilet and shower. There is also only limited internet access through a rather unreliable 3G network.

Genet in the garden of one of the houses

At a Different Time ...

The Ethiopian calendar is a variant of the Coptic calendar. It has twelve months of 30 days and a thirteenth month of five days, except in leap years when it has six. Ethiopian Airlines advertises its flights with the slogan "13 months of sunshine".

The Ethiopian calendar is over seven years behind our Gregorian calendar. January 1st 2015 in Düsseldorf was equivalent to April 23rd 2007 in Asella. Therefore, when communicating internationally or arranging an appointment one has to make clear whether the international or the Ethiopian calendar is being used. Even the time of day is calculated differently. Due to the closeness of the Equator day and night almost always comprise 12 hours, starting at six o'clock our time. Therefore, it is reasonable to count the hours from sunrise and sunset. Two o'clock in "local time" would thus be eight o'clock in "international time", a difference that has to be made clear during communication in order to avoid misunderstandings.

Despite all efforts to agree on a date the different interpretations of time often still result in the situation that in the end you are the only one to turn up for an appointment made for two o'clock "local time". The Ethiopian partner arrives cheerfully ... at a different time.

Traditionally dressed Orthodox monk in Addis Ababa

The Fifth Season: Harvest

The Institute of Tropical Medicine lies in the fertile Arsi zone, Ethiopia's breadbasket. Apart from wheat, mostly teff, the main ingredient of the sourdough-risen flatbread called "injera", which is a national dish in Ethiopia, and barley for the production of the local beer called "t'ela", as well as millet, maize, beans, oats, and several varieties of lentils are cultivated on the slopes of Mount Chilalo. The traditions of land cultivation go back a long time. Many of the varieties of wheat which are cultivated in Europe and the USA have their origins in Ethiopia. Only a small share of grain cultivation, which is rarely mechanized, is done on huge state farms. Far more common are small farmers, who cultivate their fields of ca. 2.5 acres with the help of farm animals. After sowing, the different cereal crops germinate during the rainy season (June/July). After the rains a dry period follows, which lasts for several months. During this time, the corn matures. Harvest is only possible with the aid of a considerable number of hands. The ears are reaped with sickles and gathered. On special threshing floors oxen work as living flails – the animals are repeatedly herded in small groups over the scattered ears until the grains have separated from the straw and chaff. The subsequent steps are mainly women's work: sifting out the grains and stacking up the straw into big sheaves as fodder for the dry season. The corn is then packed in sacks and piled on donkey or horse carts and trucks and taken to the peasant huts and the traders' storehouses. Harvest time is of such importance to the rural population that even the number of patients with certain illnesses in hospitals and smaller health care centers declines during these important weeks. People do not have the time to look after their health. In this way, the land and its inhabitants have adapted to the recurring rhythm of dry and rainy season, sowing and harvesting.

Grain harvest in the uplands near Asella

Drought

After the last of the rain showers which gathered from the Indian Ocean have dispersed, the long dry season begins. The corn, which was still green at the start of the dry season, is harvested during the winter months, when it is yellow and dry. The land, which was full of life, changes. Streams and rivers become stony ditches. Entire lakes crowded with brightly colored waterfowl start to silt up and over the following weeks and months turn into barren deserts. Nomadic Afar and Somali drive their herds of camels from the dry plains in the east to the higher mountain region of Oromia in search of water and food. Emaciated cattle, which were sturdy and splendid-looking during the rainy season, are feebly chewing on straw which has been left on the fields. The ubiquitous spotted hyenas stray more and more often into villages and smaller towns looking for food. At the height of the dry season dust devils move over the lowlands of the Great Rift Valley and hot winds drive their dry load of sand through every crack and gap into houses and cars. Almost everything is coated in a layer of reddish dust. Bushfires race through the heathland high up in the mountains, which are up to 4,000 m high. Due to the drought, the municipal water supply repeatedly fails at this time with the result that the hospital in Asella sometimes has to limit the number of operations it is able to perform, as there is not enough water to prepare the instruments. A voluminous water tank is currently being constructed on the hospital grounds to solve this problem.

In spring, tropical rain clouds from the Congo Basin are finally driven to Ethiopia by the westerly winds. Rain comes in from the south. From big cumulus clouds, torrential rains pour down on the parched earth. Heavy thunderstorms move along the Rift Valley. In just a few days nature comes back to life. The peasants flock to the fields in order to plow the now saturated soil. Cattle, horses, donkeys, sheep, and goats gorge themselves on the lush leaves. The drought is over.

During the dry season humans and animals seek shelter from the burning heat

Among Germans

Asella is not exactly a metropolis. The international community in the city is negligible. Two to three Koreans work in a project of KOICA, the South Korean development aid agency, outside the city. A few Indians and Cubans teach at one of the vocational colleges. Some American members of the Peace Corps, if the political situation allows, give aid in rural Ethiopia. A Frenchman devotes himself to the conservation of the Ethiopian wolf, a native to the highlands around Asella, and Chinese construction companies are building roads as well as the new stadium for the athletes of the sports academy.

And finally, there are a few Germans living in Asella. Until the first half of 2015, there was an employee of the GIZ from Dortmund, an avowed fan of Borussia Dortmund, staying there. The social worker and trained agricultural machinery mechanic worked for various development aid agencies in Ethiopia for seven years. Most recently, he was responsible for organizing an agricultural training center of the GIZ on the grounds of a nearby state farm, which aims to promote the mechanization of agriculture. Professor Dietrich Birnbaum, emeritus professor of cardiac surgery, and Professor Frank Riedel, emeritus professor of pediatrics, also supported the hospital in Asella and the medical faculty with great commitment and with their expert knowledge by teaching and treating patients for several months a year. This exchange was supported by the German Academic Exchange Service (DAAD). Professor Dr. Eberhardt Becker, emeritus professor of algebra and former President of the Dortmund University of Technology, also paid a visit. Finally, the physicians of the HITM, who live in Asella with their families or partners, have to be mentioned. Thus, a kind of camaraderie has quickly developed. People know and help each other. They not only exchange news from all over the world but also regional specialties. Spicy bacon, muesli, and of course chocolate are especially popular. In November 2014, probably the first St. Martin's parade in Asella was held together with the children of a German colleague and at Easter small presents and Easter eggs were hidden. Thus, it is possible to live in a foreign land, in the middle of Ethiopia, and still be somehow – among Germans.

Members of the German “community” at an unofficial street naming ceremony in Asella

Fleas

The IUCN (International Union for the Conservation of Nature and Natural Resources) has not yet put it on the Red List, even though it is becoming increasingly rarer across the world. In Ethiopia, however, *Pulex irritans*, the human flea, is still very common. The incomplete water supply infrastructure and the fact that humans live side-by-side with their animals provide it with ideal living conditions.

The local people are used to the fleas and react – if at all – only with a slight itching to the bites. The "Faranjis", the white foreigners like us, however, regard the fleas as a pest. When the itching starts, the flea has long since gone. The whole extent of the reaction only becomes visible after a few hours: several reddened wheals are increasingly starting to itch. Common creams for insect bites help to a degree. The problem can be managed with bug repellents.

The fleas are only about 2 mm in size. They move soundlessly and are able to jump up to 50 cm high. They are real acrobats. Accordingly, it is near on impossible to catch one. By certain anatomical criteria the human flea clearly differs taxonomically from the rat flea, the main carrier of the plague. Fortunately, *Pulex irritans* is only able to pass on diseases to a very small extent.

Ethiopian human flea

Building and Furnishing the HITM

Location

The grounds of Asella Teaching Hospital and the affiliated medical faculty are situated at the entrance to the city. In the center of the area there is the hospital with its mostly single-story buildings, which accommodate various wards, outpatient clinics, and laboratories, a pharmacy, laundry, kitchen, archives, and offices. It is a very active and constantly growing training center for medical professions. In the near future, a new building for the ever-growing Pediatric and Gynecological Departments is to be opened. Construction work has already started. Apart from physicians, nurses, laboratory personnel, and health officers are trained here. The latter have to complete a three-year training program, which partly overlaps with the study of medicine. Health officers provide basic medical services in Ethiopia, which suffers from a lack of physicians. They rank between nurse and doctor.

A large modern library, seminar rooms, and a lecture theater are at the students' disposal. A simple canteen and a couple of barrack-like dormitories provide food and lodgings. Especially in this area the number of students has outgrown the infrastructure. The medical students regularly complain about the poor hygienic conditions in the dormitories and the shortage and limited variety of food in the canteen. Governmental interventions are on the way to address this problem. The Hirsch Institute is also situated on the premises close to the hospital and the laboratories.

The Building

The building project was partly financed with a donation made by the entrepreneur Wolfgang Hirsch from Düsseldorf. Planning was done by Professor Häussinger and his staff in close cooperation with the architect Uta Groß, who was employed by the University of Adama and played a part in expanding the university.

The planning envisaged a building with offices, laboratories, and examination rooms as well as a seminar room. The laboratory wing and the seminar room have separate entrances. There is enough space for a waiting area for the patients on the roofed terrace. There are outside toilets and, for hygienic reasons, the exam rooms can be entered from the outside.

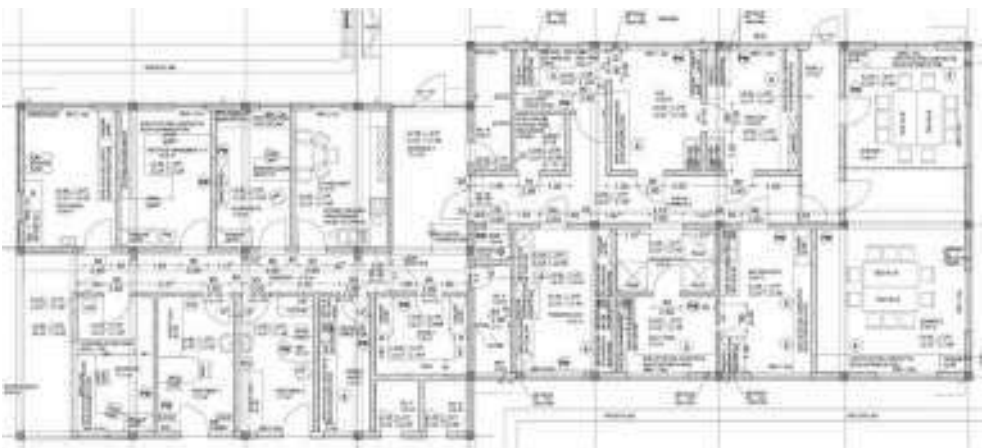
An outlying building housing a generator was constructed to provide a self-contained power supply and a water tank, which can hold up to 2,000 liters, was installed on top of a tower so that the institute is independent from the not always reliable municipal water supply – at least for a certain time.

As the university was rapidly growing, it needed an experienced department of infrastructure, which promoted the building of the institute by a local well-known construction company.

The one-story building of solid construction complies with the modern earthquake construction guidelines.

A lot of timber was used for the scaffolding. Instead of using wheelbarrows, the workers carry the material by hand. It is striking that in this way of construction all power lines and water pipes are integrated into the concrete floor. The ultimate result was a structure that surpassed the local building standards.

Layout of the hospital in Asella including the Institute of Tropical Medicine (red, as of 2009)



Floor plan of the institute

The shell of the institute (2011)

Financed by the German Academic Exchange Service (DAAD), a member of the Department of Gastroenterology, Hepatology, and Infectious Diseases (Dr. Simone Kann) was able to work at the hospital for a year and thus to observe and support the final construction phase. This included planning the interior furnishings and coordinating the laying of special hard-wearing sealed flooring in the laboratories.

Interior Furnishings

As agreed in the cooperation treaty, the Ethiopian partner was responsible for furnishing the seminar rooms and the offices, while the German side bore the costs of fitting out the laboratories to the highest quality standards.

The lab furniture is being delivered (2013)

The furnishings were produced by a state-run joinery company in Asella, which normally manufactures furniture for schools and administrative buildings. The 30 wooden chairs the University of Adama had planned for the seminar room were complemented with 30 modern upholstered chairs paid for out of the budget of the institute. High quality standards were required of the laboratory equipment, which needed to be stable, well-fitted and easy to clean. Dust and draft would make the envisaged molecular genetic analyses impossible. There was no producer of laboratory equipment of a satisfying standard to be found in the whole of East Africa.

With the help of a letter of recommendation the equipment was ordered from a company in Dubai. A German-Ethiopian importer monitored the production and organized the shipment and import of the container with the laboratory furniture. Due to the high administrative barriers on imports into Ethiopia the container was delayed in reaching its destination. It took the people from the production company in Dubai, who were flown in for the purpose, just under a week to assemble the lab furniture. The seminar room was equipped with a lockable shelf for a small library, a whiteboard, a screen, and a projector.

The fitting of the institute with research and diagnostic equipment meant that burglary protection became necessary. The window panes were thin and could be broken without much effort. The fence separating the premises from the street was only ten meters from the buildings and could be climbed easily. The security

staff consisted of two guards armed with bamboo sticks stationed at each of the two main gates. In order to reduce the danger of burglary from the institute a local metal-worker fitted bars to the windows to make them more secure using a rather bizarre-looking welding device.

During 2012/2013, the area surrounding the institute also began to take shape. The forecourt had already been cobbled. After the new lecture hall building was completed close by the cobbling was extended to it by the institute. Rubble and brushwood were removed from the green area around the building and shrubs and flowers were planted.

When it was time to lay the lawn, there was a surprise in store for the staff of the institute: in lieu of grass seed two big bags of freshly harvested seedlings were delivered, which had to be planted on the same day.

As in the beginning there were construction defects, subsequent work became necessary. During heavy rain, there was water ingress through the windows and doors, which subsequently had to be sealed and repainted. Sticking doors had to be planed, loose door handles had to be fixed, and further smaller and larger repairs and maintenance work had to be done.

In addition, the demands on layout and function of the rooms had changed since the planning of the building. A switch room had since been turned into an office, a laboratory was fitted with a double door system and thus converted into a cleanroom, a toilet became a generator room and a generator room a workshop. More rededication of different rooms was necessary with the installation of microbiological culture facilities in the spring of 2018. Rooms for an autoclave, a biosafety cabinet, incubators, media preparation, and washing capacities had to be introduced.

In Ethiopia, you have to be able to improvise with the tools – like with this welder

A considerable amount of the work was done by the German employees themselves. Only occasionally did they receive help from a member of the GIZ who lived nearby. Other work was done by local craftsmen, some of whom were trained by international organizations. They did a very good job.

The final result is a multifunctional institute, which accommodates teaching, research, administration, clinical medical examination and treatment of patients under one roof. Financial support for the building work and the furnishing of the institute was ensured by the tireless commitment of the institute's founding director, Professor Häussinger, and provided by the *Gesellschaft der Freunde und Förderer der Heinrich-Heine-Universität e. V.*, the *Leber-Liga zur Förderung und Unterstützung chronisch Lebererkrankter e. V.*, and the Rotary Club Düsseldorf South.

Power Supply

In Asella, power failures, which can last for hours or even days, are frequent. Without power for the projector, laboratory equipment, and computers work in the institute is not possible. Voltage fluctuations and unplanned power outages may affect the sensitive laboratory equipment. Even more important is the upkeep of the electricity supply for the refrigerators. If the cold chain is interrupted, the work of months may be ruined.

The first backup power supply was provided by a small 3 kW diesel generator set, which was operated by the institute's employees. During out of duty hours this was done by the security officer. In case of a power outage there was a smaller gasoline generator set available to keep the refrigerators operable. A more efficient generator that guarantees an uninterrupted power supply of the entire institute was installed in the middle of 2016 with the kind support of the Rotary Club Düsseldorf South.

Equipment

Already during construction, a modern duplex ultrasound unit (GE Vivid e®) with three probes financed by the Ministry of Health,

The two backup generators used in case of power outage…

…have now been replaced by a larger model

Emancipation, Nursing, and Age of the state of North Rhine-Westphalia was transported to Asella. It is well suited for bedside examinations as it is only slightly bigger than a laptop. The German colleagues are regularly asked by Ethiopian doctors and students for advice in making a diagnosis using their machine. Several Ethiopian internists and a pediatrician were trained with this unit in making ultrasound examinations of the abdomen. Senior staff members of the hospital also frequently use the machine for diagnostics and teaching. By now a second larger ultrasound unit has been donated from Germany and installed in the sonography room of the institute.

Procuring laboratory equipment and regularly supplying the Hirsch Institute with consumable materials is a major logistic challenge. The

Ethiopian market for medical material is very limited and there are often bureaucratic obstacles to overcome.

The first laboratory equipment, a photometer and a coagulometer, used to examine different blood-clotting proteins, were acquired through one of the importers of medical products in Ethiopia. The supplies in stock as well as difficulties when importing goods sometimes limit the provision of the institute. In order to be able to do a complete laboratory test a hematology analyzer, used to analyze a full blood count, was later acquired from a different vendor.

Good relations with the University of Adama (and later with Arsi University) and in turn their relation with the Ethiopian authorities and administration were often helpful and necessary when importing equipment.

Some of the acquired and used equipment was financed by donations from various industrial companies. Two centrifuges and a PCR cycler (Mastercycler®) were donated by Eppendorf, two Elecsys® 2010 blood analyzers by Roche, and a real-time multiplex PCR cycler by Qiagen. After the institute received research funding from the Else Kröner Fresenius Foundation it was possible to furnish the laboratory

The institute's hematology analyzer

Everything is paid for in cash: the money for the analyzer. The banknote of the highest value is worth about €3

with a GeneXpert®, which is used for diagnosing tuberculosis. A further expansion of laboratory capacity with the acquisition of a special centrifuge, an ultra-low freezer (-80°C), and a workbench for safely and cleanly processing biological samples was made possible by a donation from the Rotary Club Germany. Study-related financing from the German Ministry of Education and Sciences allowed for the purchasing of an automated blood culture machine (BacT/ALERT® 3D 120) in 2018.

For study purposes a FibroScan® machine, financed by the Heinz Ansmann Foundation for AIDS Research, was introduced. It uses an elastography technique which measures the stiffness of the liver through the skin. This makes it possible to diagnose liver diseases like liver fibrosis or cirrhosis early and with a non-invasive method. At the present time, it is the only unit in Ethiopia, maybe even in the whole of East Africa.

All equipment installed and used at the HITM was donated or financed by funding personally raised by Professor Dr. Dieter Häussinger. Running costs for operating the institute like staff wages, laboratory supplies, expenses for building maintenance, or operating expenses

for the cars are also largely covered by funds raised by the institute's director.

The parasitologist of the institute M. Getachew with the new PCR cycler

FibroScan® in use on the ward

Personnel

After the structural work was finished Matthias Breuer was sent from the Department of Gastroenterology, Hepatology, and Infectious Diseases in Düsseldorf to Asella to act as a coordinator of the institute. Unlike his predecessor sent via the DAAD (German Academic Exchange Service) he primarily had no commission to work in the hospital so that he could concentrate on setting up the institute. Being an internist he took part in consultations and ward rounds and was asked for advice especially during diagnostic ultrasound examinations.

The assumption that it would not be possible for the University of Düsseldorf to employ Ethiopian personnel or rather that this would entail almost insurmountable bureaucratic obstacles soon proved to be right. Therefore, it was incorporated into the cooperation agreement that the Ethiopian partner was to provide workers for the institute's different tasks. Within the framework of the cooperative partnership staff for the Hirsch Institute were formally hired through the Ethiopian partner university. The recruitment was, however, organized by the institute's coordinators on site.

Initially, an administrator, an administrative assistant, two laboratory technicians, two security guards, and three cleaners were hired for the daily operation of the institute. When the studies started, two nurses were also employed.

Hiring personnel in Ethiopia requires local, regional, or national job advertisements depending on the post. Anyone who registers with complete application documents before the fixed deadline is admitted to the selection procedure. A panel decides who is recruited following a complicated procedure applying criteria that are as objective as possible. This strict system restricts the coordinator's freedom of choice. However, the procedure is prescribed by Ethiopian law in order to prevent nepotism and corruption.

The personnel include a driver who is supplied by the Ethiopian side according to the cooperation agreement. Ato Shiferaw, the first driver of the institute, had to be replaced after a few

The HITM team in 2018

years, because he went into retirement. The new driver, Mr. Wendwesen, is a very careful and conscientious driver. He is available at all times and tends "his cars" affectionately. He also makes simple repairs single-handedly.

With an increase in clinical studies done at the institute more staff were needed. Two microbiologists and a parasitologist as well as three health officers, a midwife, and an additional laboratory assistant were employed.

Teaching the laboratory team the PCR method

Since August 2014 the Heinz Ansmann Foundation for AIDS Research has financed the post of coordinator and clinical study investigator for a second German physician in Asella. Since the summer of 2014 it has been possible to win several physicians from various locations in Germany for this position. At the same time two physicians were sent to Asella in order to help the team cope with the growing responsibility for the staff, the organizational challenges and the increasing numbers of clinical studies at the HITM, but also the safety of the employees. Currently, the institute has 26 staff in total, some of them working full-time, some part-time. In the summer of 2018, apart from the two German coordinators, three scientists (one parasitologist and two microbiologists), an administrator, an administrative assistant, three study nurses, three laboratory assistants, four health officers, two data clerks, a driver, two night guards, and four cleaners were work-

The study team of the HITM in March 2015

ing for the HITM. Several hospital doctors are involved in various studies on a fee basis or out of professional interest.

Communication between Continents

Consulting the director of the institute in Düsseldorf about further planning frequently poses challenges to the team in Asella due to the physical distance and the unreliable telephone and internet connections. Monthly "Asella reports" keep the Director of the HITM, Professor Dr. Häussinger, informed about all current activities and events in Ethiopia, e. g. the progress in the medical and scientific areas, logistics (personnel matters, buildings, vehicles etc.), and the financial situation. Material expenses for the day-to-day running and upkeep of the institute amount to about € 100,000 per year including the wages for the staff in Asella. These running costs are covered by third-party funding and diverse donations acquired by Professor Dieter Häussinger.

Vehicles

Since building work began the institute has had its own 4x4 vehicle (Toyota Land Cruiser, 1996 model, turbodiesel). The car was bought by a colleague from a non-governmental organization on behalf of the director of the institute. Fortunately, NGOs like the GIZ and the DAAD do not have to pay any duty on imported vehicles. The normal tariff would come to double the price of the car. As future coordinators will no longer have this customs privilege, the import duty would have subsequently been payable in full when the vehicle ownership transferred to the succeeding coordinator of the institute. Here, too, the cooperation with the Ethiopian partner university was essential. The car was donated to Adama University with an agreement that it would be exclusively used by the Hirsch Institute. This process may sound easy, but it still took six months and many letters and visits to the authorities in Addis Ababa in order to get the car registered in the name of the University of Adama. Until then, the coordinator of the institute usually had no choice but to use Ethiopian public transport. When a second German physician began to work in Asella and logistic requirements became more challenging because of an increasing number of clinical studies, a second car was needed.

The driver Shiferaw doing maintenance work on the car

The new cars

The former vehicle was only big enough to carry two people over longer distances. Large loads did not fit into the small trunk and had to be fixed to the roof rack. In addition, more and more repairs on the 20-year-old car became necessary. For these reasons a larger four-door vehicle was chosen. In December 2014, a Nissan Patrol in mint condition (2000 model, 3.01 turbodiesel) was bought from a German employee of the GIZ who was leaving the country. This car was also donated to the Ethiopian university with a respective permission for use contract.

As the first car of the institute grew older and the frequent necessity for repairs hindered reliable service, the acquisition of a new car was necessary. Financed by funds raised by and donations granted to the institute's director, Professor Häussinger, and with the administrative and to some extent financial support from Arsi University for import and licensing with the Ethiopian Roads Authority, a brand-new Land Cruiser TDI 2.0 was bought in the fall of 2017 and has been giving reliable service to the institute since early 2018. With this new car serving the institute, the first Toyota was handed over to Arsi University and the medical faculty for local transport service and field work.

Fresh Eggs Every Day

A supermarket as known in Germany does not exist in Asella. The bigger grocery stores consist of a room of approximately 10 m^2 in size with a counter and shelves filled with different kinds of food. The eggs that are sold there are much smaller than the ones back home and are kept in wire baskets next to the counter. These eggs are laid by the chickens kept in a yard behind the store and it is not uncommon that you get the opportunity to study the various stages of the embryonic development of the birds when opening the eggs. For this reason, the staff of the institute decided to keep their own chickens in order to ensure a steady supply of fresh eggs.

They make fancy two-story chicken coops in Asella – with a lockable entrance, a tin roof, and flaps through which the eggs roll out to be collected. The coop was delivered by donkey cart and found a place at the far end of the garden of one of the residential houses. With great zeal Gesagne, one of our security guards, helped putting up a suitable chicken run made from wire mesh. When choosing laying hens at the local market we also had to rely on Gesagne's advice – Germans have long since lost the art of identifying healthy laying hens.

After the new co-residents had completely grazed their run down to the roots in one week and started to pick on each other (establishing a pecking order), something had to be done. The entire plot was fenced in with chicken wire. Since then the hens have been able to roam free in the garden all day. And there have been fresh eggs every day.

One of the hens in the garden

Spotted Hyenas

Hyenas are supposed to be scavengers with the exception of the spotted hyenas found in Ethiopia, which are primarily hunters. The staff of the institute reside in Ardu, a suburb of Asella, adjoining cultivated fields and wild nature. Almost every night you hear the typical *uuuuuiiiip!* calls ring through the otherwise silent night. Only a few hundred meters down the slope the carnivores have their dens.

During the past years, careless wanderers that spent the night unsheltered in the open have supposedly become victims to hyenas. Even students from the university campus in nearby Adama claim to have been attacked. It is difficult to assess the value of the Ethiopian folk wisdom which says that an adult human does not have to fear an attack from hyenas as long as they do not turn up in groups of six or more individuals. In the Ethiopian city of Harar hyenas are venerated as saviors of the city according to a legend and they are fed daily with trimmings and offal left over from butchering.

So far, our staff have only spotted lone animals, during the night in front of the headlights of the car, as a curious companion on the slopes of Mount Chilalo when hiking or on rare evenings around the living quarters. The animals are certainly formidable, especially when they gallop past your car with their oversized forelegs and heads.

Young spotted hyena

Road Traffic in Ethiopia

In Ethiopia, they drive on the right. In everyday practice, however, driving on the right is regarded only as a recommendation. Rumor has it that there is an obligation to drive on the right on divided highways, but this is unenforceable in practice as on these roads, which are mostly in towns, the right lane is commonly used by stopping minibuses and pedestrians, who like to walk four abreast in order to communicate more easily with each other. Trucks crawling up a hill are overtaken on the right, whenever there is space.

Following the economic upturn more and more roads are being paved and thus make faster driving possible. The children, in particular, have to get used to the changes and dangers a speedier traffic flow entails. Hence by now road safety education has become part of the curriculum. As a driver, you always have to watch out for children or adults crossing the road. Animals present a major traffic hazard. Stray dogs rank among the more vigilant road users. Many Ethiopians keep livestock like sheep, goats, and cattle without owning adequate grazing grounds. The animals often graze at the side of the road and spontaneously cross in order to get to the grass on the other side. Even entire cattle herds are commonly driven along the main roads to fresh pastures.

A technical control board as known in European countries that closely monitors the safety of motor vehicles on the road does not exist in Ethiopia. It is up to the owner to ensure that his vehicle is safe and in good working order.

For safety reasons, the employees of many international aid organizations are not allowed to drive after sunset, which in Ethiopia is at about 6 pm all year round. Vehicles with badly adjusted headlights may dazzle the eyes, vehicles in front may lack functioning taillights, slow horse carts are usually without lights and difficult to see in the dark. However, with a bit of practice and alertness even Central Europeans are able to drive safely over shorter distances.

Oncoming traffic in rural areas

Traffic on the Meskel Square in Addis Ababa – everyone drives his car wherever there is space

Building Activity

When your plane lands in Addis Ababa, you see a country on the move. New roads, rail lines and buildings are being built everywhere. The scaffolding and the cladding even on very high buildings are especially eye-catching. These are usually made of eucalyptus wood, which is secured and supported with ropes. Often the building materials are transported up to the higher floors by hand. Remarkably, this heavy bodily work is often done by women. Wheelbarrows are rarely seen. Heavy loads are carried by two workers on a simple pack frame. With these simple methods, the Ethiopian economic recovery and the expansion of the infrastructure is initiated in order to meet the needs of the rapidly growing population and the economy. In essence, there are two arguments in favor of the swift expansion: speed and cost efficiency!

For many years now efforts have been made to implement sound training in skilled trades. Before the fall of the Berlin wall support came from East Germany, later from international organizations e. g. the GIZ or the initiative "Menschen für Menschen".

When you know a country a little, you will always be able to find skilled tradesmen with the help of recommendations. When the HITM was built and furnished, tradesmen who repaired earlier construction defects were hired. The physicians working for the HITM also lent a hand whenever help was needed. Today, among others, the laboratory wing boasts rainproof windows, flooring that can easily be cleaned and disinfected and a stable electricity supply.

Many things are still done by hand in Ethiopia, e. g. sawing eucalyptus logs into boards

The shell of the Hirsch Institute surrounded by traditional scaffolding in 2011

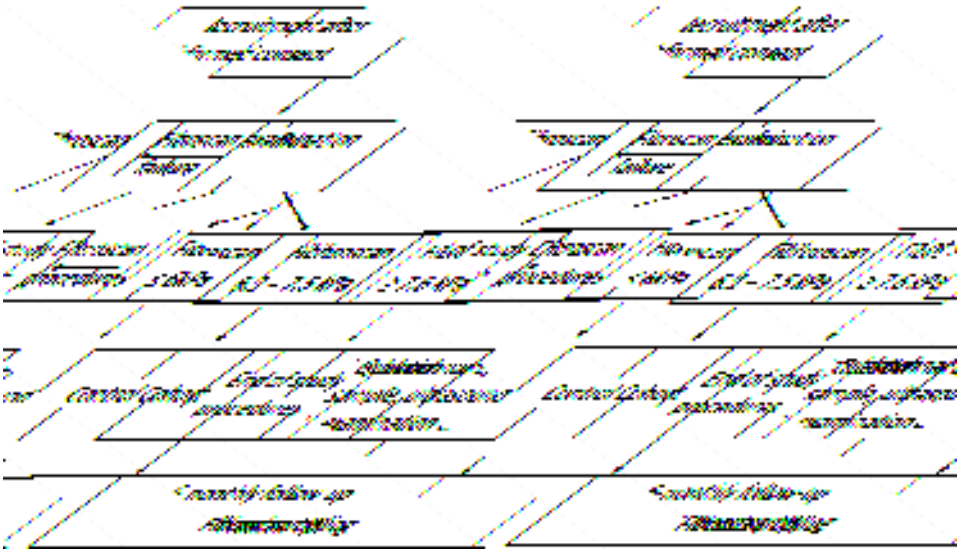
Research Projects

Etiology of Chronic Liver Disease in Asella Teaching Hospital of the Arsi Region, Ethiopia (CLD Study)

The high incidence rate of patients with chronic liver disease is known from previous epidemiological surveys done in Ethiopia. The German physicians working at Asella Teaching Hospital (ATH) also noticed a high rate of patients presenting with clinical signs of liver cirrhosis. A therapy focused on the underlying disease (e. g. chronic viral hepatitis) is in practice not possible within the Ethiopian health system. The treatment of subsequent complications like decompensation of liver cirrhosis with hepatic encephalopathy, ascites, hepatorenal syndrome and variceal hemorrhage or even hepatocellular carcinoma is limited (at best paracentesis or a diuretic therapy may be used) or not possible at all. In most cases, the etiology of the underlying liver disease remains unknown. The *Chronic Liver Diseases* (CLD) Study tries to identify typical causes of liver disease in the Arsi region in order to facilitate suitable therapies. In order to be able to perform transient elastography examinations the institute was equipped with a Fibroscan® machine, which is probably the only one found in Ethiopia. All in all, 149 patients showing signs of chronic liver disease in the elastography (Fibroscan® result $\geq$ 7.6 kPa), 86 of them with evidence of liver cirrhosis (Fibroscan® result $\geq$ 13 kPa), and 167 controls without evidence of liver disease (Fibroscan® result $\leq$ 6 kPa) were examined to identify possible causes of chronic liver disease. Serological tests performed on site showed, as expected, a high rate of HBsAg-positive results and thus of patients infected with the hepatitis B virus. Positive hepatitis C test results were surprisingly rare. Serological markers of HIV infections were found in 15.3 % of inpatients and thus more often than in the average population. There was no difference between patients with or without liver disease. The high rate of patients with a pathological Fibroscan® result (44 %) who showed signs of right ventricular heart failure in the ultrasound examination compared to the controls was conspicuous. Only 5 % of the control group showed signs of right heart failure. It is known that right heart failure may be a cause of liver cirrhosis as well as induce false-positive elastography results. Old age, infection with the hepatitis B virus, and illiteracy were associated with liver disease. First results of the study were presented at the Congress for Infectious Diseases and Tropical Medicine (KIT) in Würzburg, Germany, in 2016 (see reference 17). Blood and serum samples were sent to Germany for further examination and evaluation in the laboratories of the University Hospital of Düsseldorf.

ESTHER Study of the Prevalence of Infectious Diseases with Impact on Morbidity and Mortality of Mothers and Newborns

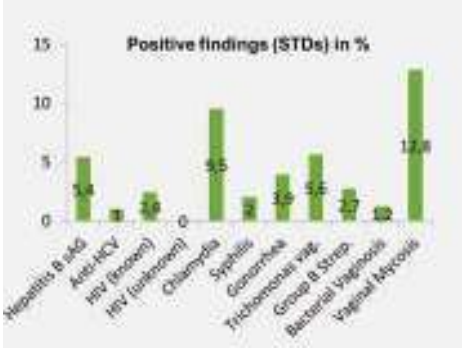
In June 2014, after comprehensive preparation, a new clinical study was begun at the ATH in cooperation with the European ESTHER (*Ensemble pour une solidarité thérapeutique hospitalière en réseau*) Alliance. At the end of June 2015, the recruitment phase of almost 600 women into the study of the preva-



Flowchart of the CLD study

lence of infectious diseases in mothers and newborns was completed. The last follow-up examinations were performed in August 2015. The aim of the study was to identify dangerous diseases for mothers and newborns at the ATH and to initiate a specific therapy for the improvement of the health of mother and child as well as to prevent mother-to-child transmission. During the study the employees of the Institute of Tropical Medicine closely cooperated with the Departments of Gynecology and Pediatrics as well as the HIV clinic of the hospital if necessary. Mothers and newborns were examined by staff from the Institute of Tropical Medicine and various microbiological samples were collected. These were tested for different pathogens like *Chlamydia trachomatis* (serovars D-K), *Treponema pallidum, Neisseria gonorrhoeae*, HIV, HBV, HCV, or group B *Streptococcus*.

If a positive result was found during the prenatal examination of the mother, a specific therapy was initiated before birth by the colleagues of the Gynecology Department and the child was re-examined in the Department of Pediatrics.



Prevalence of sexually transmitted diseases in the 592 pregnant participants of the ESTHER study in Asella, Ethiopia

During these examinations, numerous cases that required treatment were identified. The women concerned, their partners and their children were treated accordingly. It was noteworthy that a high incidence of *Chlamydia* infections was found. If necessary, further specific tests can be done in Germany. Based on the results of this study, several follow-up studies could be devised. At the German-Austrian AIDS Congress (DÖAK) in Düsseldorf in 2015 and the Congress on Infectious Diseases and Tropical Medicine (KIT) in Würzburg in 2016 poster presentations of the first results of the study were given (see references 15, 16, 18, 19, 22), and final results were published (see reference 2).

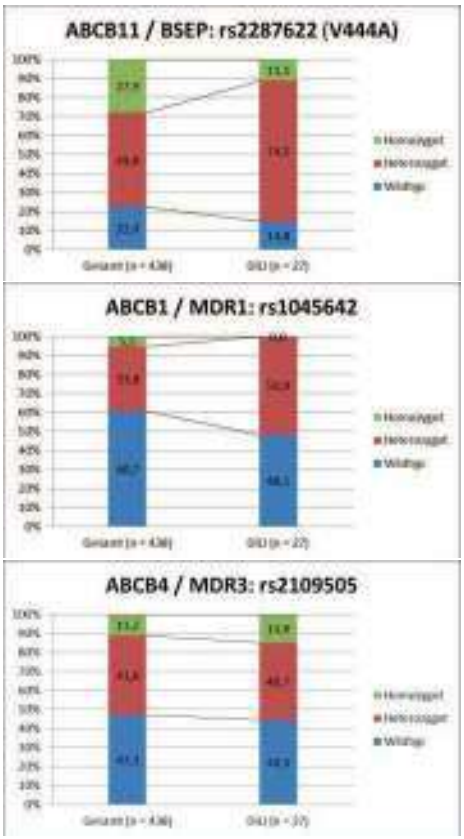
ESTHER Study on Prevalence, Risk Factors, Outcome, and Microbiological Spectrum of Hospital-Acquired Infections at Asella Teaching Hospital (HAI Study)

The ESTHER Project "Prevention and clinical management of hospital-acquired infections at Asella Teaching Hospital, Central Ethiopia" was launched in 2017 as an Ethio-German partnership program to increase patient safety at the ATH with the objective of curbing the morbidity and mortality of hospital-acquired infections. The project is funded until April 2019. Besides an intense training program (e. g. hospital hygiene and hand disinfection), an upgrade of the microbiology laboratory and a surveillance study to determine the prevalence, risk factors, and outcome of hospital-acquired infections in the various departments of the ATH are part of the activities. During the first study phase, which lasted until August 2018, over 600 inpatients of the ATH were screened for the presence of hospital-acquired infections throughout their inpatient stay. First data show astonishing rates of colonization with multi-resistant bacteria in the investigated patients. Results from this study will enable physicians at the ATH to prescribe more targeted antibiotic treatments for their patients and therefore help to reduce the burden of infections with multi-resistant bacteria.

Predictors of the Development of Drug-Induced Liver Injury under Tuberculosis Therapy (DILI Study)

In cooperation with the ATH and six cooperating health centers in the proximity of the hospital the recruitment phase for the Drug-Induced Liver Injury (DILI) study was realized after a positive vote by the medical ethics committee and logistic preparations. The study examines the prevalence of various functionally relevant mutations of the *bile salt export pump* (BSEP) and other bile salt transporters in drug-induced liver injury under tuberculosis therapy. It is known that influencing factors like old age, female sex, malnutrition, existing chronic liver disease, or hepatotoxic comedication (e. g. antiretroviral therapy for HIV infection) increase the risk for patients of developing drug-induced liver injury. The pathogenesis is not yet fully understood. However, various mutations of the genes encoding the transport proteins BSEP, MDR1, and MDR3, e. g. the polymorphism V444A, were described as functionally relevant and common variants of hepatobiliary transport proteins. Therapeutic options e. g. the use of ursodeoxycholic acid to increase choleresis are available. This study

examined the mutations in the populace of the Oromia region of Ethiopia. During the study a PCR protocol was established in our institute's laboratory. This will offer a broad range of diagnostic and scientific possibilities in the future. A first presentation of the study results was given at the Congress on Infectious Diseases and Tropical Medicine (KIT) in Cologne in 2018 (see reference 24). Further statistical analysis is currently ongoing.



Examples of genetic polymorphism analyses in patients of the DILI study

Active Case Finding of Patients with Tuberculosis in the Community in and around Asella (CONTRA TB Study)

The Award of the Else Kröner Fresenius Foundation helped finance a tuberculosis research project in the region around Asella. Family members of newly diagnosed tuberculosis patients, who are at high risk of acquiring tuberculosis themselves, were identified by means of screening with standardized questionnaires. Early detection can reduce the severity of the disease and the rate of mortality and transmission of tuberculosis. Previous data showed that members of a household of patients with pulmonary tuberculosis are especially at risk of catching the disease and passing it on before they are diagnosed and treated. The aim of the study was to show a way of reducing the rate of transmission and thus the incidence of tuberculosis in the region in the future.

Ms. Biomdo, master's student and holder of the Else Kröner Fresenius Foundation scholarship, and the health officer Kasim Rabo before examining a TB patient participating in the DILI study

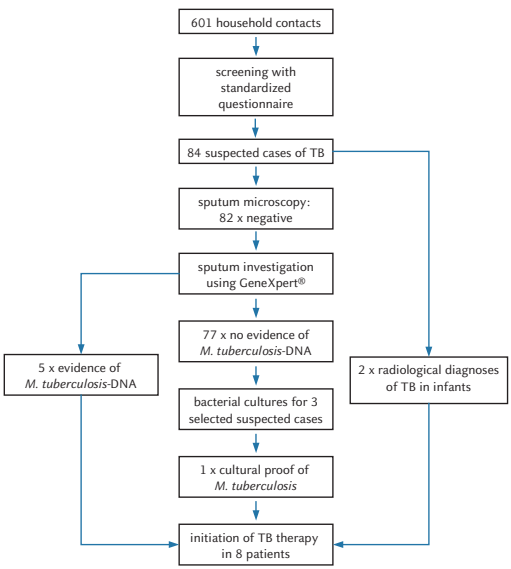
Examination of an infant during a house call as part of the CONTRA TB study

In order to be able to detect tuberculosis with high sensitivity, the laboratory at the Hirsch Institute was equipped with a GeneXpert® device. In selected cases, tuberculosis culture tests were done in cooperation with the Oromia Regional Laboratory in Adama.

In 17 of 144 (12 %) microscopically negative primary cases the infection that had previously been diagnosed only by physical examination was confirmed by molecular diagnostics. Four cases (3 %) of resistant tuberculosis were of even more importance as they were not detected during the conventional diagnostic investigation. The patients in question were immediately referred to a specialized treatment center for tuberculosis for additional tests and therapy. If these patients are treated with a standard tuberculosis therapy, there is a high risk of treatment failure with progression of the disease and a continuous danger that they will transmit resistant tuberculosis bacteria to people they have contact with.

In total, the study comprised the households of 144 patients with newly diagnosed pulmonary tuberculosis. 601 household contacts were investigated and in 84 of these individuals with anamnestic or clinical signs of possible tuberculosis additional investigations were performed. Thus, eight new cases of tuberculosis (1.3 % of household contacts) were detected (five adults, three children). An early diagnosis and initiation of treatment helped prevent complications of the disease and possible transmission within the community.

Although the rate of infection attributed to household contacts in this study was less than in previous investigations in low- and middle-income countries, an effective screening is essential in order to control tuberculosis epidemics in Ethiopia. In cooperation with the person from the National Ethiopian Tuberculosis Program who is in charge locally the possibilities of implementing the recommendations of the World Health Organization (WHO) were discussed and the study data were pre-



Results of the tuberculosis diagnostic investigation of the 601 household contacts made during the CONTRA TB study

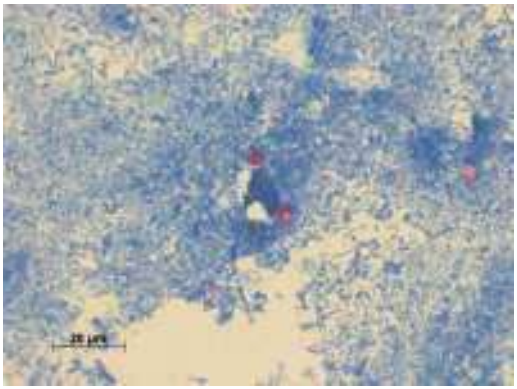
sented and discussed with stakeholders during the Ethiopian annual conferences on TB in Dire Dawa in 2016, Addis Ababa in 2017, and at international conferences (see references 11, 13, 20, 25, 27). In addition, the Hirsch Institute pledged further support even after the study has finished.

Prevalence of Intestinal Parasitic Infections in Symptomatic HIV Patients

Stool samples from symptomatic HIV patients were examined for intestinal parasites (*Cryptoporidium*, *Cyclospora*, and *Isospora*) and the results were correlated with the anamnestic data and the current immune status. The stool concentration and staining techniques required for this are standard practice in Germany, but as yet little used in Ethiopia. The aim is to determine the prevalence of intestinal infections with various parasites in susceptible HIV patients. The recruiting phase for this study started at the end of July 2015.

163 patients have participated in the trial, 85 (52 %) with and 78 (48 %) without diarrhea. In 30 (18 %) of the samples at least one parasite was detected, most often C*ryptosporidium* followed by *Giardia lamblia*. A correlation between diarrhea, the consumption of raw food and an impaired immune system (CD4 count) was found.

This shows the importance of an improvement of hygiene, regular screening, and a systematic treatment of intestinal parasites especially in HIV-positive patients. First results of the study were presented at the Conference of the German Society of Tropical Medicine and International Health (Jahrestagung DTG) 2017 in Bonn and the Congress on Infectious Diseases and Tropical Medicine (KIT) 2018 in Cologne (see references 6, 9, 14).



Microscopic image of *Cryptosporidia* in the stool of an HIV patient (parasite dyed red)

In a second phase of the study a new technique for parasite enrichment in the stool with utilization of the ParasiTrap® was launched by the end of 2017 and recruitment is ongoing. With this modern technique, the sensitivity of detection of parasites in stool samples from affected patients will be increased. The aim is to identify risk factors for certain infections in study participants from the Arsi Zone in Ethiopia.

Identification of Bacterial Pathogens in the Arsi Zone (IDA Study)

Acute infectious diseases and sepsis are among the leading causes of mortality in sub-Saharan Africa. Detailed information on the epidemiology of certain communicable diseases and the pathogens involved is largely lacking from East Africa in general and from the Arsi Zone in Ethiopia in particular. For example, in 2014, an employee of the Friedrich Löffler Institute

Employee of the institute performing a diagnostic microbiological examination

took several soil samples in the Rift Valley in which *Burkholderia pseudomallei*, the bacterium that causes melioidosis, was detected. A similar activity is known from melioidosis hotspots in northern Thailand. The geographic distribution of melioidosis on the African continent is as yet largely unknown. The lack of local data concerning causative pathogens in acute febrile illness and pertinent resistance patterns may result in unreliable empirical treatment and, as a consequence, an unfavorable outcome, a longer duration of hospitalization, an increase in multidrug resistant bacteria, and higher healthcare service costs. The need to fill this gap prompted the Hirsch Institute to develop the IDA study, another ambitious research project.

In this study, the causative bacterial pathogens and their antibiotic resistance patterns in patients with acute febrile infections are systematically investigated.

An efficient microbiology laboratory with bacterial culture facilities has recently been set up in Asella. It goes without saying that it is

BacT/ALERT 3D 120 for blood culture diagnostics at the institute's microbiology laboratory

Hands-on microbiology training at the Hirsch Institute

not only being used for scientific projects, but also for the care of the patients at the hospital. Within this study, an outbreak of louse-borne relapsing fever, caused by *Borrelia recurrentis* and transmitted by lice, was detected among urban dwellers in Asella and the surrounding area.

A total of 63 louse-borne relapsing fever cases were reported with an overall case fatality rate of 13 % among treated patients. The management of the outbreak, including epidemiological assessment, individual prevention and control measures, public health investigations and interventions, and treatment recommendations, were published (see refer-

ence 1). In cases where it is not possible to identify the pathogen on site, samples are sent to Germany for further analysis. Tafese Beyene, one of the institute's microbiologists, is currently executing his PhD thesis in this research field at the laboratories of Heinrich Heine University in Düsseldorf. First results of the study were presented, among others, at the Congress on Infectious Diseases and Tropical Medicine (KIT) 2018 in Cologne (see references 4, 7, 15–18). Information on bacterial pathogens and antimicrobial resistance was available for 684 patients who were admitted to the ATH with an acute febrile illness between April 2016 and June 2018. Of 83 cultured organisms, 38 (46 %) were gram-negative, 43 (52 %) gram-positive, and 2 (2 %) were candida species. Of 43 gram-positive bacteria, 25 (58 %) were *Staphylococcus aureus* and 18 (40 %) coagulase-negative staphylococci, respectively. Of 38 gram-negative bacteria, 16 (42 %) were E. coli, 15 (39 %) were *Klebsiella pneumoniae*, and 4 (11 %) were *Pseudomonas aeruginosa*. For the confirmation of local identification and antibiotic susceptibility test results, MALDI-ToF, VITEK2, and PCR techniques were performed in Düsseldorf.

We found an alarmingly high rate of extended spectrum β-lactamase (ESBL)-producing bacteria among the gram-negative isolates (81 %) and carbapenem resistance in 7.4 %. Of 27 gram-negative bacteria available for resistance-gene analysis, 22 were confirmed to contain ESBL genes as follows: TEM 17 (77 %), CTX-M-1 group 15 (68 %), SHV 6 (27 %), and CTX-M-9 group 2 (9 %). Among ESBL isolates, 11 (50 %) contained both CTX-M-1 and TEM genes. We could also detect two carbapenem resistance genes, namely $bla_{\text{NDM-1}}$ in a *Klebsiella pneumoniae* isolate and $bla_{\text{NDM-1}}$ plus $bla_{\text{OXA-51}}$ in an *Acinetobacter baumannii* isolate. These preliminary findings underline the importance of antimicrobial resistance for health care services in the study region and most likely in many regions in sub-Saharan Africa. Further studies are currently implemented in order to assess risk factors for infections with resistant bacteria and associated clinical consequences.

Immune Modulation through *Helicobacter pylori*

There is growing evidence that the bacterial colonization of the gastrointestinal tract has a profound effect on human health. Gastrointestinal bacteria were identified as important influencing factors on the immune response. Recently, it was reported that chronic infection with *Helicobacter pylori* is associated with a decreased immune activation and improved immune and virological parameters in patients infected with HIV. Such interactions are elementary for the understanding of immune modulation and immune pathology and may become important when treating patients with common disorders like allergies and cardiovascular and autoimmune diseases.

At present, an interventional study is ongoing with the objective to systematically analyze how the immune modulation is affected by chronic *Helicobacter pylori* infection and its clinical relevance.

A DAAD scholarship enables Ethiopian scientists to take part in a newly-founded international PhD program at Heinrich Heine University Düsseldorf as part of the study.

Likewise, motivated master's students are also able to contribute to the study. Furthermore,

Holder of the PhD scholarship Million Getachew

laboratory staff and selected scientists were trained in special techniques of cell isolation and processing. For this purpose, additional equipment was procured and installed at the HITM, like an ultra-low temperature freezer and a refrigerated centrifuge. First results of the study were presented at the Congress on Infectious Diseases and Tropical Medicine (KIT) 2018 in Cologne (see reference 5).

Risk Factors, Spectrum of Pathogens, and Effect on Patients with Sepsis at Asella Teaching Hospital

Sepsis is an under-recognized clinical diagnosis in Africa, although the mortality due to infectious diseases is particularly high in this region. Commonly applied scoring systems and treatment algorithms are poorly evaluated for resource-limited settings. Within this study, the prognostic value of the sequential organ failure assessment (SOFA) and the qSOFA (= quickSOFA) scores are investigated. Furthermore, blood cultures are taken from patients with sepsis and pathogens characterized, including resistance patterns. Recent data show that antimicrobial resistance, in particular in gram-negative bacteria, is common and emerging in Africa and developing countries elsewhere. Within the study, risk factors for an unfavorable clinical course are analyzed with the objective to develop simple recommendations for the management of patients with sepsis. The study is funded by the German Federal Ministry of Education and Research (BMBF). Data from the evaluation of 202 patients with clinical signs of sepsis (SOFA score $\geq$ 2) during a first phase of the study showed that sepsis recognition at the ATH is challenging and early recognition and treatment therefore often missed. Isolated bacteria from patients with sepsis are highly resistant to commonly used empirical antibiotic treatments. Data from the first phase of this study were presented during the Congress on Infectious Diseases and Tropical Medicine (KIT) in Cologne in 2018 (see reference 4). During a second study phase, the investigation will focus on evaluation of screening and recognition tools in the sub-Saharan African setting and antimicrobial resistance patterns. A state-of-the-art automated microbiological detection system for blood cultures (BacT/ALERT® 3D 120) has recently been installed at the microbiological laboratory of the Hirsch Institute for rapid, sensitive, and reliable detection of blood stream infections.

HRP2-deficient *Falciparum* malaria

Diagnosis of life-threatening *Falciparum* malaria infections in rural areas is largely depending on rapid diagnostic tests (RDT),

because other tests like microscopy or molecular analysis are not commonly available. Commonly used and sensitive malaria RDTs exploit a specific antigen from *P. falciparum*, the histidine-rich protein-2 (HRP2). Studies performed in different parts of the world showed HRP2-deficient *P. falciparum* strains which cause malaria infections that are not detected by the commonly used RDTs. This factor is threatening WHO efforts to control malaria worldwide. Studies performed in neighboring Eritrea and Kenya showed high HRP2 deficiency rates in the studied populations. To date, no data are available from Ethiopia.

Starting during the summer of 2018, blood samples from microscopy-positive *Falciparum* malaria patients living in two highly endemic areas for malaria in the Rift Valley (Ziway Dugda and Abomsaa) are being investigated by RDT and subsequent molecular analyses for HRP2 (and HRP3) genes are being done. To perform the needed investigations, PCR techniques are being established and training on the methodology is given at the Hirsch Institute for cooperating scientists and technicians.

Cooperation Projects with Other Institutes and Universities

The HITM endeavors to promote scientific exchange on a national as well as an international level. For this purpose, the employees of the institute support the activities of other research facilities by helping them organize studies and acquire sample materials. The coordinators of the institute are in contact with several national and international medical research establishments.

These include the Friedrich Löffler Institute in Greifswald, the Armauer Hansen Research Institute in Addis Ababa, the Ethiopian Health and Nutrition Research Institute, the Ethiopian Biodiversity Institute, the Oromia Regional Laboratory in Adama, Black Lion Hospital in Addis Ababa, Adama Hospital, Bekoji Regional Hospital, Adama Science and Technology University, and Jimma University.

Within the ESTHER project "Prevention and clinical management of hospital-acquired infections at Asella Teaching Hospital, Central Ethiopia", joint workshops, training and research activities are conducted with other partners of the ESTHER network (e. g. German institutions from Hamburg, Munich, Frankfurt, and Berlin and their African partners from Rwanda, Tanzania, Ethiopia, Kenya, Ivory Coast, and Ghana). Within this network, further training of physicians and academic employees of the ATH is frequently possible. For example, in May 2018 one physician, one microbiologist, and one pharmacist from the ATH participated in the workshop on antimicrobial stewardship held by ESTHER partners at Kenyatta Hospital in Nairobi, Kenya.

Recognition from the Ethiopian Ministry of Science and Technology

At the Ethiopian Ministry of Science and Technology (MoST) and the affiliated National Ethics Review Board (NERB) it was noticed that many applications for approval of clinical studies in Ethiopia were submitted from a previously unknown study site – the Hirsch

Visit from a delegation from the Ethiopian Ministry of Science and Technology (with Professor Tilahun, head and spokesperson of the National Ethical Review Board, in the center with hat)

Institute of Tropical Medicine. Also, the sophisticated quality of the submitted proposals was noted. For this reason, a delegation headed by Professor Tilahun, the spokesperson of the NERB, decided to satisfy their curiosity and visit the institute on site. In April 2018, the delegation from the MoST was welcomed at the new research institution in the Ethiopian scientific landscape. They were impressed by the organizational structure and the institute's high-quality laboratory capacities and greatly appreciated the opportunity for Ethiopian physicians and scientists to actively engage in and benefit from research, education, practical training, and the international partnership.

Other Activities

Commitment of the Hirsch Institute in Cooperation with the ESTHER Initiative to Improve Hospital Hygiene at the ATH

When the HITM began its work in Asella only a few measures were taken to prevent the transmission of pathogens and the development of nosocomial infections (infections acquired in a hospital). Infectious patients who posed a health risk to other people were not isolated as is usual in Germany, but kept in beds next to other non-infectious patients. Due to structural shortcomings, dereliction, and the lack of equipment simple measures of hygiene like hand disinfection before and after patient contact or facilities for washing hands were not available. There were no soap dispensers at all. The sanitary facilities, especially in the Pediatric Department, were in a poor condition and could not be used. The hospital sewage treatment plant did not work due to a defect of the control system.

All sewage from the hospital got unfiltered into the groundwater. The hospital's "Infection Control Team" had ceased working.

Employees of the institute instructing hospital staff in Asella to produce their own hand disinfectants

The toilets just before the renovation was finished

Instructions about how to clean your hands are placed visibly around the hospital

Hand sanitizer dispensers are installed throughout the hospital

Repairing the Hospital Sewage Treatment Plant

This situation clearly demanded measures to improve hospital hygiene. In cooperation with the ESTHER Alliance the HITM continuously endeavors to improve the hygienic standards at the hospital, e. g. it was possible to put the hospital sewage treatment plant back into operation after installing a timer paid for by ESTHER.

Direct Engagement in the Hospital's Hygiene Activities

The sanitary facilities in the children's hospital were fixed and sinks were repaired in the entire hospital. On the premises of the Institute of Tropical Medicine hospital staff were instructed in the simple, but essential measures of hygiene according to WHO standards. Following the training sessions soap and disinfectant dispensers were installed and filled and personal hand sanitizers were distributed to all staff on the wards that have contact with patients.

The training is repeated regularly in order to instruct new staff at the hospital in current standards of hygiene. The project is supported

Defective sewage treatment plant in September 2013

The sewage treatment plant was put back into operation after a new timer was installed

by the hospital administration and the responsibility for continuous training efforts are increasingly being handed over to the Ethiopian partners to achieve a lasting effect. The first phase of the project was scientifically monitored. In this way, it was possible to demonstrate for Ethiopia and beyond to what extent the adopted measures of hygiene may achieve positive results. The results of this project were published (see reference 3). During a second phase, which was started in early 2018, once again supported by the German ESTHER hospital partnership initiative, hygiene measures have been intensified. Training and exercises are conducted with all employees of the hospital. With support from the Hirsch Institute a hospital hygiene nurse was employed and a committee for hospital hygiene commenced activities at Asella Teaching Hospital. A possible lack in hospital hygiene and risk factors for nosocomial infections are to be identified within the ongoing clinical investigation on hospital-acquired infections throughout the whole hospital and will be addressed during a planned intervention.

Supporting Medical Student Community Projects

During their medical training in Asella the Ethiopian students initiate so-called "community projects" in their fifth year of training. These aim to identify possible dangers or problems threatening the health of the population of the Arsi zone and to help rectify them.

Newly-built toilets on the marketplace of a small town near Asella

In the summer of 2015, the Hirsch Institute and the ESTHER Initiative financially supported two of these projects. In two of the communities surrounding Asella (Iteya and Bekoji) there was no organized waste disposal and a lack of public toilets, which was identified as a potential health risk for the residents. Up till then any kind of rubbish simply ended up on the street. There was no waste removal. The residents of the two communities relieved themselves in the villages' alleyways and in corners. Both together served as a breeding ground and as vectors of various different diseases in the region. The medical students built public conveniences and refuse pits with the financial support of the HITM. In addition, they started an initiative to dispose of the distributed rubbish and trained the population in proper waste disposal. We hope to be able to support similar projects in the future.

Building a New Incinerator for Infectious Hospital Waste

The old hospital refuse dump

The newly-built incinerator in June 2016

On the initiative of the Institute of Tropical Medicine the German organization "Technik ohne Grenzen" (Engineers Without Borders) built a new incinerator for potentially infectious hospital waste on the grounds of the hospital in Asella in February and March 2016. This medical waste constitutes a danger to the surrounding residential areas and has to be safely disposed of. In developing countries, the waste is commonly incinerated at high temperatures. The hospital in Asella used a furnace, which was built in the late 1960s. Diesel is injected into it in order to reach high enough combustion temperatures. Unfortunately, the injection equipment is prone to failure, thus the incinerator had been out of order in recent years. Therefore, the hospital waste was carbonized at low temperatures on a smoldering garbage dump behind the hospital supply buildings. During rain the unprotected waste with its infectious material is flushed into the groundwater. The non-governmental organization "Technik ohne Grenzen" was engaged to improve the situation. At the beginning of 2016, two of their employees traveled to Ethiopia in order to build with the support of the hospital a modern dual-chamber incinerator using local materials. Combustible non-infectious waste is used as fuel to ensure high enough combustion temperatures to destroy infectious waste. The staff of the hospital and the HITM were trained in operating the incinerator in order to guarantee a hygienic waste disposal from hospital and institute.

Education and Training at the Institute of Tropical Medicine

Besides conducting clinical studies and realizing the project to improve the hygienic standards at the ATH the employees of the Institute of Tropical Medicine also educate and train Ethiopian and German academics and

Advanced training course as part of a workshop in the seminar room of the institute: speech by the director of the institute

students. Regular medical education for the Ethiopian partners and workshops about key subjects are offered. The German physicians working in the institute pass on their skills (e. g. abdominal ultrasound and echocardiography) they have acquired in Germany to the Ethiopian colleagues for the purpose of capacity building. During ward rounds patients' cases are discussed.

During their time in Asella the German physicians broaden their knowledge in tropical medicine. Three of them (Matthias Breuer, Dr. Hans Martin Orth, and Dr. Andreas Schönfeld) acquired a certificate in the specialty of "Tropical Medicine" after finishing their year abroad. In addition, two German doctors (Dr. Nicole Schmidt and Dr. Tamara Nordmann) did research work in Asella which they needed for the qualification "Master of International Health".

A basic component of the cooperation is the support of dedicated and motivated Ethiopian scientists. During the Immunology Study (s. a.) a place was organized for our long-serving employee Million Getachew, "Master of Science in Parasitology", in a PhD program in Germany. In addition, he was awarded a PhD scholarship from the DAAD for the study. Two more sci-

Employee of the institute, Kidist Aman, after receiving her master's degree in "Nursing Science"

entists from Asella could be enrolled into the international PhD program of Heinrich Heine University (Tafese Beyene and Sileshi Abdissa) and are funded through stipends (Carl Duisberg/Bayer Foundation and DAAD).

Workshops

Parasitology workshop at the HITM

In January 2014, the first workshop on the subject of "Hospital Hygiene and Infection Control" took place in the rooms of the institute with the support of the ESTHER Al-

The participants of the second ESTHER workshop of the HITM in February 2015

Participants of the ESTHER workshop on "Hospital-Acquired Infections and Antimicrobial Resistance" at the Hirsch Institute of Tropical Medicine in October 2018

liance. This informative workshop, which was organized by the HITM with the combined contribution of Ethiopian and German speakers, was received favorably by physicians and academics of the Asella School of Health Science. The workshop prompted the reactivation of the almost forgotten "Infection Control Team" of the ATH. It is to be hoped that the workshop has had an effect on the hygiene and infection prophylaxis in hospitals. Subjects of the workshop included infectious diseases that affect the health of mother and child

and their prevention. Further workshops on the subjects of "Infection Control, Tuberculosis, and Mother and Child Health" and "Scientific Methods, Research and Publication in Low-Income Settings, and Clinical Research in Obstetrics" took place in February and April 2015.

During the study on diagnosing tuberculosis in relatives of affected patients (CONTRA TB study), which was initiated in 2015, a workshop on hygiene and preventing the transmission of TB was held.

Within the ESTHER project "Prevention and clinical management of hospital-acquired infections at Asella Teaching Hospital, Central Ethiopia" (2017-2019), an ESTHER workshop on hospital hygiene, antimicrobial resistance, and challenges in the treatment of nosocomial infections in the Ethiopian setting was held in September 2017. Another ESTHER workshop on "Hospital-Acquired Infections and Antimicrobial Resistance" was scheduled for October 2018. For the first time this workshop attracted a larger number of international guests, host speakers, and scientists from different cities in Ethiopia, partners from other African countries like Ghana, Ivory Coast, and Kenya, and from different universities in Germany. This workshop was a great opportunity for all participants to share knowledge and experience from different perspectives, partnerships, and research sites in African countries and helped to build up a network among researchers from sub-Saharan Africa.

Advanced training course on hygiene in the seminar room of the Hirsch Institute during the ESTHER project

Advanced Training Courses

Weekly advanced training courses in current subjects of infectious diseases, tropical medicine, parasitology, clinical pharmacology, microbiology, and hospital-acquired infections take place at the Institute of Tropical Medicine. Speakers are usually members of the local academic staff of the ATH. The microbiologist Tafese Beyene, who works for the HITM, gave a lecture, for example, about current developments during the Ebola epidemic in West Africa. Another interesting lecture discussed the pros and cons of various vaccinations against pneumococcal disease. Many more interesting lectures on various topics have been held over the years. The course is open to the employees of the institute as well as all medical students, health officers, physicians, and other academic staff from Asella Teaching Hospital or the College of Health Sciences and it has increasingly been well-attended. The program is supported by the Vice Dean of Research, who welcomes our scholarly exchange initiative with the medical faculty. Furthermore, there are internal training courses covering currently relevant subjects during the weekly meetings in the laboratory of the institute. These offer an opportunity for deeper and explanatory discussions.

Voluntary German Classes

Receiving a DAAD scholarship as a PhD candidate brings with it certain benefits and duties. One of the clearly beneficial aspects is a mandatory German language course before joining the scientific program at the German partner university. Two of the institute's PhD candidates are being supported by the DAAD and therefore successfully joined ambitious full-time German classes for several months at different schools in Berlin and Marburg, both in Germany. Communication on day-to-day business between the two PhD candidates and the German doctors working at the institute in Ethiopia is increasingly being handled in German. Million, the first PhD candidate of the institute attending the German course in Berlin in 2016, suggested the idea of teaching the German language among fellow Ethiopians at Arsi University. With the support of the Hirsch Institute he started the first-ever German language course at Arsi University as an extracurricular activity for medical students and young doctors from the College of Health Sciences. Many were eager to attend; therefore a demanding admission exam after two trial lessons was needed to help select a promising class. After several months of weekly lessons and a final exam the first graduates were awarded a certificate and celebrated their degree together with their Ethiopian and German teachers. Many students of Arsi University are motivated to attend future classes.


German language course (A1 level) from April to July 2018

Deutschsprachkurs (A1-Niveau) von April bis Juli 2018

Certificate for the German class attendees


The first German class with their teachers at the Hirsch Institute of Tropical Medicine

Practical Training

The German physicians working at the HITM take part in ward rounds, consultations about special medical questions, and training the Ethiopian academic staff. They also participate in the practical training of medical stu-


The institute's coordinator Matthias Breuer is training an Ethiopian physician to do an ultrasound scan of the abdomen

For the first time since the hospital in Asella opened, a pericardial effusion is punctured after it has been located using an echocardiogram

dents and physicians at the hospital of Asella. Interested colleagues get the opportunity to qualify in performing abdominal ultrasound scans and transthoracic echocardiograms. Especially abdominal ultrasound examinations are becoming more common in Asella, thus extending the range of diagnostic and interventional procedures.

Ethiopian medical students have the opportunity to attend examinations at the Institute of Tropical Medicine and thus get an insight into ultrasound technology and how to interpret the findings. The possibility of an ultrasound training course has already been discussed with the dean of the medical faculty. Planning will soon commence.

Scholarly Exchange between Research Assistants of the Institute of Tropical Medicine and Heinrich Heine University as Part of an ESTHER Twinning Program

Dr. Tesfa Gebremeskel and Tafese Beyene were the first two Ethiopian employees of the Hirsch Institute of Tropical Medicine who visited the University Hospital of Düsseldorf in September 2014. Dr. Tesfa is a pediatrician and cooperation partner of the institute as part of the ESTHER study. In Düsseldorf, he was able to become acquainted with the work of his colleagues at the Pediatric Department. Owing to his enthusiasm for pediatric cardiology, he was particularly interested in the diagnostic possibilities echocardiography offers. The Pediatric Department of the ATH has as yet neither a physician trained in echocardiography nor a cardiac ultrasound machine. The Hirsch Institute has an ultrasound unit including the necessary equipment available, which in future may be used for selected cases. Tafese Beyene is a microbiologist. His work as a research assistant at the institute includes the duties of a coordinator for the ESTHER study of the health of mother and child. He is interested in doing further training in virology and plans to contribute with his own scientific work to the expansion of the cooperation between the hospital in Asella and the University Hospital of Düsseldorf. In Düsseldorf, he visited various laboratories of the Department of Gastroenterology as well as the Institutes of Microbiology and Virology. In February 2015, the

Ethiopian visiting researchers in Düsseldorf, l.t.r.: Dr. T. Feldt, Dr. T. Gebremeskel, Professor Dr. D. Häussinger, T. Beyene

Tafese Beyene, a research assistant at the HITM, at a poster presentation at the German-Austrian Aids Congress in 2015

parasitologist Million Getachew, who works at the institute, and the gynecologist Dr. Wasihun Alemayehu of the cooperating women's hospital stayed at the University Hospital of Düsseldorf for three weeks.

In Düsseldorf, Mr. Getachew worked with the head of the diagnostic parasitology laboratory attached to the Unit of Tropical Medicine, Dr. Martha Holtfreter. This gave him the opportunity to share experiences and plan joint research projects. He also learned how to use new techniques in diagnostic parasitology and molecular biology in order to prepare for the setting up of a PCR laboratory in Asella.

At the Department of Gynecology and Obstetrics of the University Hospital of Düsseldorf, Dr. Alemayehu received an insight into the care of newborns and hospital hygiene in Germany. With Professor Monika Hampl from the Gynecology Department he worked on diagnosing vaginal dysplasia caused by human papillomavirus infection. Both of them plan a clinical study in order to improve the care of patients in Asella. Needless to say, the exchange included an accompanying program that offered the visitors the opportunity to experience the German way of life and culture. As a highlight the guests took part in the street carnival in Düsseldorf and Cologne.

Ethiopian visitors at the street carnival in the Rhineland

Recently, three colleagues from Ethiopia had the opportunity to do an internship at the University Hospital of Düsseldorf for three weeks in August and September 2018. Dr. Nuwama, internist and Dean of the College of Health Sciences, Dr. Abebe, pediatrician and Head of the Pediatric Department of Asella Teaching Hospital, and Mr. Awel, MSc in Public Health and administrator of the Hirsch Institute, attended different areas of clinical service, diagnostics, and research at the German university hospital. This exchange not only served the purpose of knowledge transfer and capacity building, but also intensified the partnership between the German and the Ethiopian university.

The Ethiopian visitors were not only impressed by the work of German physicians and scientists, but also by the cleanliness of the streets, journeys on trains and the underground system as well as automatic sliding

Visit of the Ethiopian delegation in 2018

doors, and the German supermarkets. Nevertheless, after the end of the exchange programs the participants were keen to get back home to Ethiopia. All of them appreciated a training program in Düsseldorf within a specified time period, but after finishing their advanced training they wanted to continue their work, e. g. as part of a PhD program, in Ethiopia. Further exchange programs are planned for the near future.

Internships for German Medical Students

German medical students have already repeatedly taken advantage of the cooperation between the institute and the hospital in Asella in order to get support in organizing their medical clerkships (compulsory internship during the clinical semesters) in the various departments of the hospital in Asella. During the winter term of 2014/15 two medical students of the HHU traveled for the first time to Ethiopia and spent four months of their practical year at the Department of Internal

Tired but content: the first two German students who spent part of their practical year in Ethiopia return home with heavy luggage

Medicine in the hospital in Asella. The employees of the Institute of Tropical Medicine were able to assist their young colleagues in completing part of their training under local conditions by helping them with organizing contacts, finding accommodation in Asella, and transport from and to the airport. In turn, the involvement of the Institute of Tropical Medicine in student training in Düsseldorf promotes interest in the work on site, in tropical medicine, and not least in the exchange with local physicians and students. Further medical students followed and enquiries about medical clerkships, non-academic medical internships, and practical years are frequently being received. In 2017, the first medical student from Düsseldorf was given the opportunity to do the research work for his medical dissertation in Asella.

Winning the Medical-Humanitarian Award of the Else Kröner Fresenius Foundation

In September 2014, Professor Häussinger and his colleagues at the HITM received

the Medical-Humanitarian Award of the Else Kröner Fresenius Foundation for their work on the prevention and treatment of infectious diseases in the Arsi region of Ethiopia. Every two years this award for development cooperation in medicine goes to exemplary medical humanitarian projects which focus on improving health care in developing countries. It is presented exclusively to projects which are characterized by an outstanding commitment to the sick and needy and a special sustainability in the sense of capacity building.

The cash prize of € 50,000 was used for improving the diagnosis and therapy of tuberculosis in the region. Ethiopia is one of the countries with the highest incidence rate of TB globally, but it lacks adequate diagnostic and treatment options.

X-ray image of a 7-month-old child with severe pulmonary tuberculosis

The Hirsch Institute supports the introduction of reliable diagnostic tests and is committed to training the necessary medical personnel. The funding was also used to screen close relatives of TB patients for tuberculosis and in case someone is found to be infected they get treatment as soon as possible. Part of the funding was used for the purchase of a GeneXpert® machine for the laboratory of the institute.

House call as part of the tuberculosis study

These Monkeys!

Ethiopia is famous for its endemic geladas (aka bleeding-heart monkeys) in the Simien Mountains of the northern highlands. In the Arsi zone, the region where the HITM is located, there are colonies of Anubis baboons in rural areas and near the towns.
In Ardu, where our colleagues live, the slightly shy and graceful black-and-white colobus monkeys can be seen regularly. They usually sit in groups of two or three on the branches of the high trees, enjoying the sun burning on their long, patterned fur.

Black-and-white colobus monkey on top of an African umbrella thorn acacia

Much more common, however, is a species of guenons. They usually roam around the houses in bands of 5-25 family members. In Ethiopia, it is customary to shout or throw stones at them to scare them away; otherwise they would lose their fear of humans. If windows and doors are not properly closed, some of the pluckier guenons climb inside the houses, looking for food. Bananas, avocados, eggs, or apples are especially sought-after.

One Sunday morning, the breakfast table was already laid on the terrace when a loud clattering noise boded ill. A monkey helped himself to the fragrant freshly-cut bread. In return he left an old potato in the bread basket.

A group of grivets (*Chlorocebus aethiops*) on the garden fence of one of the houses – on lookout for treats

Baboons on a site near Adama

Gelada (bleeding-heart monkey) with young

Geladas in the sunset

The Founding of Arsi University

The logo of Arsi University

At the end of 2014, within the framework of a program for the establishment of new institutions of higher education all over the country, the Ethiopian government instigated the formation of the newly-founded Arsi University

Signing the agreement in April 2015, l.t.r.: Professor Dr. Dieter Häussinger (Director of the HITM), Dr. Tolla Beriso (former President of Arsi University), Dr. Hirpho Teno (former Vice President of Arsi University)

The gymnasium of Arsi University under construction

in Asella out of the faculties of the University of Adama (medicine, law, agricultural science, humanities, economics, and the physical education college).

As the new university of the Arsi zone based in Asella it took over the governance of the medical faculty and thus the local responsibility for the partnership with Heinrich Heine University. The former president of the newly-founded Arsi University, Dr. Tolla Beriso, confirmed from the beginning his interest in continuing and extending the partnership. This was laid down in a cooperation agreement signed during a visit of Professor Dr. Häussinger and a German delegation in Asella in April 2015. In Arsi University Heinrich Heine University has gained an Ethiopian partner who is interested in furthering international education and academic training. The construction of much-needed new buildings at the hospital in Asella is also planned for the near future. After some years, Dr. Tolla Beriso was promoted to the Oromia state educational administration and Dr. Duguma took over as

Tour of the hospital grounds during the meeting of the German and Ethiopian delegations (April 2015)

Meeting with Dr. Duguma, the new president of Arsi University

president of Arsi University. With him as president, the Ethiopian partner's interest in international cooperation, e. g. with the Hirsch Institute, has been intensified and the partnership is being continued with great motivation.

Arsi, a Land of Athletes

The list of Olympic medalists from Ethiopia is impressive. The Ethiopian athletes have so far won 53 medals, all at the Summer Olympics. Especially the internationally famous marathon runners are remarkable, e. g. Haile Gebrselassie, who was born in Asella in 1973. All in all, he set 26 world records and he was Olympic champion twice (1996 in Atlanta and 2000 in Sydney, gold medal, 10,000 meters). He won the Berlin Marathon four times and the Dubai Marathon, one of the world's richest road races, three times.

In April 2016, the Tirunesh Dibaba Athletics Training Center, which was named after a top Ethiopian athlete, was ceremoniously opened in Asella. On 45 hectares, the training center boasts not only a 400-m cinder track, but also a football field, tennis courts, common rooms for athletes and trainers, a library, a health clinic, and an administration building.

Kenenisa Bekele is one of the world's greatest long-distance runners. He also hails from the land of the Oromia. He is not only a three-time Olympic champion, but holds the world records in the 5,000 meters and 10,000 meters (in September 2016). The region has also produced top female athletes: Derartu Tulu won an Olympic gold medal in the women's 10,000 meters race twice, in Barcelona in 1992 and in Sydney in 2000. Ms. Tulu owns and manages the first-class Deratu Tulu Hotel in Asella, which was named after her and has been praised and recommended in various internet portals. The staff of the institute have very often enjoyed dining at the splendid hotel restaurant.

The cinder track of the Tirunesh Dibaba Athletics Training Center, which belongs to the Physical Education College of Arsi University in Asella

The main campus of the Tirunesh Dibaba Training Center

November 2016: young athletes training

These Ethiopian runners train in simple conditions in the surroundings of the Physical Education College and thus in close proximity to our houses. Hence, the coordinators of the institute meet with international top athletes every morning on the way to work.

Professional marathon training in simple conditions: not all training exercises can be done at the new Athletics Training Center

Group training sessions

Young runners from Arsi

Perspectives

Reducing Administrative Barriers

The Founding of Arsi University has facilitated administrative procedures, which may present the Hirsch Institute of Tropical Medicine with new development opportunities. The increasing involvement in everyday clinical practice, medical education, and the collaboration with physicians of the expanding hospital in Asella offer further possibilities for doing clinical studies. In addition, research will be stimulated by the introduction of new testing procedures e. g. flow cytometry and other PCR procedures at the HITM.

Since the institute was officially opened in 2013 there has been a regular exchange with the German Embassy in Addis Ababa. The last visit of the former German Ambassador to the HITM was in 2015. He was very impressed with our work.

Exchange Programs and International Cooperation

The expansion of cooperation projects with national and international partners offers great opportunities for the institute. In addition to more workshops with international lecturers an expansion of the academic exchange program with Düsseldorf and the PhD program in cooperation with Heinrich Heine University, which has been launched in 2016 and already hosts three participants from Ethiopia, is planned.

August 2015: His Excellency the Ambassador of the Federal Republic of Germany, Joachim Schmidt (on the left) is visiting the HITM. On the right: the coordinator of the institute Dr. André Fuchs

Expansion of Medical Care at the Hospital in Asella

One of the focal points of the Institute of Tropical Medicine in addition to expanding its scientific work is the improvement of medical care at the hospital in Asella. After extending Arsi University in order to invigorate the Arsi zone the Ethiopian government decided to rebuild the hospital in Asella. The institute is committed not only to improving hospital hygiene, but also to extending the currently limited diagnostic and therapeutic methods. The construction of an endoscopy unit would be a conceivable project. In the Ethiopian city of Gondar an endoscopy unit was set up in the local university hospital in cooperation with the Medical Faculty of the University of Leipzig. The colleagues in charge have already been contacted in order to check the feasibility of such a project. In future, German experts are going to provide advanced medical education at the HITM.

The Institute of Tropical Medicine regularly recommends physicians from the Medical Faculty of Arsi University for further training in Germany. In the summer of 2015, Dr. Dejenne, a pediatrician from the ATH, attended a four-week-training program in cardiac ultrasound in Hamburg.

A Christmas Party at the Institute

At the end of 2013, when the first German-Ethiopian team was formed at the Hirsch Institute, a Christmas party was celebrated together for the first time. Celebrating Christmas is not only a wonderful tradition, is also serves as a welcome team building event. The proposal made by the new staff was accepted and the planning of the event consigned to the young team.

On the evening of the party, everyone met in the garden of the "Universal", a restaurant in Asella, which incorporates an old movie theater, where sometimes Ethiopian movies or English Premier League matches are shown. The employees brought along an artificial Christmas tree with blue LED lights. Before dinner, the obligatory personalized cake from the "Asella Café" was eaten as well as biscuits and Christmas *stollen* from Germany. During the feast *injera*, the traditional sourdough-risen flatbread made from teff flour, was served accompanied by spicy pieces of meat. When it got dark, a big open fire was lit in a special way – with lots of diesel fuel. As soon as the flames flared up towards the night sky, everybody began to dance around the fire to Ethiopian music. It was a successful and enjoyable party. The staff from Germany will remember this day particularly well, as it was Christmas Eve at home.

The Christmas party of the Hirsch Institute in 2013

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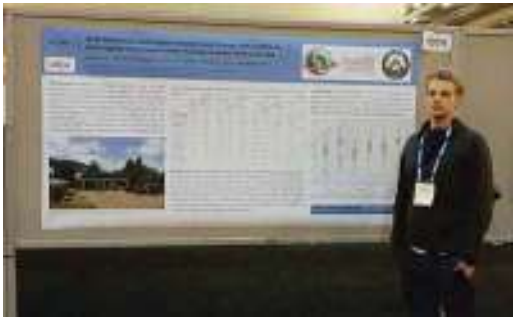

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Further Information

Further information about the Institute can be found on the homepage of the HITM:

https://www.uniklinik-duesseldorf.de/en/department-of-gastroenterology-hepatology-and-infectious-diseases/hirsch-institute-of-tropical-medicine

The Oldest Ethiopians

On November 24th 1974, the Beatles song "Lucy in the Sky with Diamonds" became an earworm, when the audio cassette was played repeatedly at the archaeological field base camp at Harar.

While cataloguing the finds of the day, the team noticed that many of the bones belonged to the same skeleton. Soon the significance of the archaeological find became clear and the female skeleton estimated to be 3.2 million years old was named Lucy, at first jestingly, but so far the name has stuck. The Ethiopians call her "Dinknesh", which in Amharic means "you are marvelous".

Lucy belongs to a new species called *Australopithecus afarensis*, which as far as we know is an ancestor of modern humans. Her discovery is still regarded as one of the most important finds in the story of human evolution.

Three hominids in the National Museum of Ethiopia in Addis Ababa: Dieter, Lucy, and Alfons

Furthermore, the oldest known fossils representing the evolutionary line of hominini are exhibited at the National Museum of Ethiopia. These are skull fragments of *Ardipithecus ramidus*, probably a direct ancestor of the genus *Australopithecus* and the genus *Homo*, who lived in Ethiopia 4.4 million years ago.

Professor Berhane Asfaw, Director of the National Museum of Ethiopia, explains the archaeological finds in Ethiopia to the guests from Germany with the aid of exhibited skull fragments of *Ardipithecus ramidus*