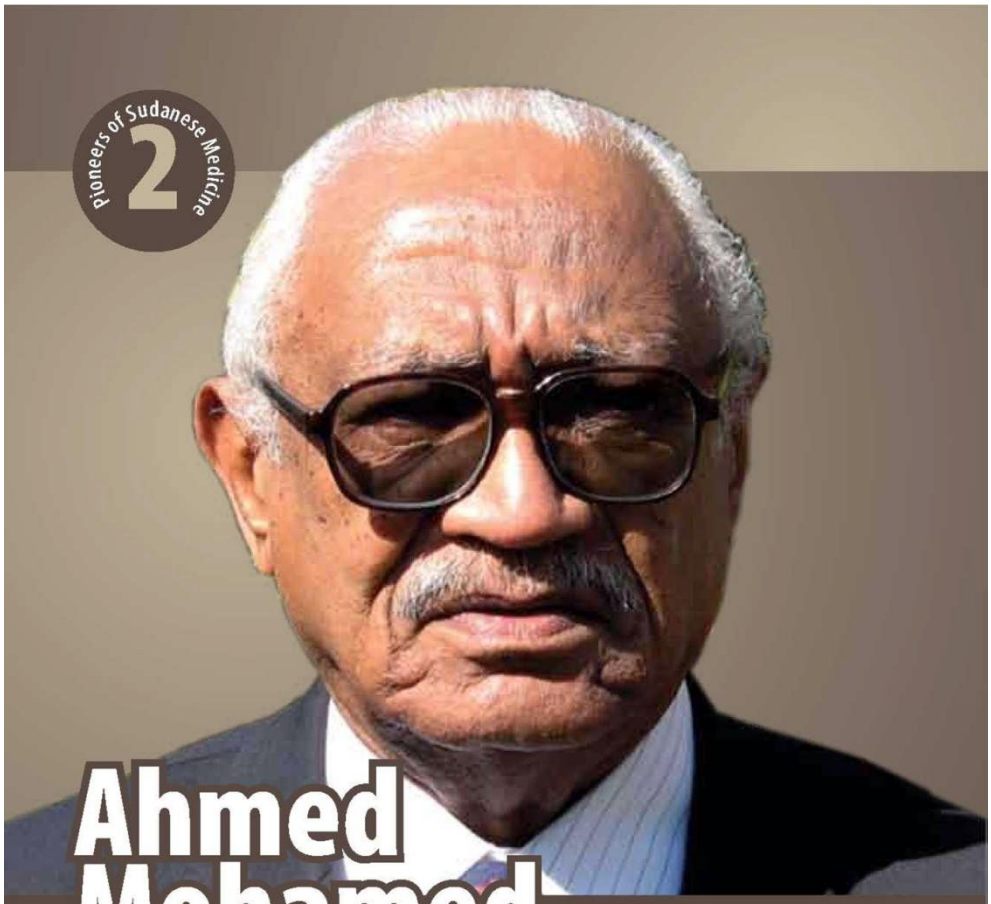


# Ahmed Mohamed El Hassan His life and work

Milestones in tropical disease pathology, cancer research, & medical education

**By Dr Ahmad Al Safi**

Sudan Medical Heritage Foundation Publications

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# Ahmed Mohamed El-Hassan

## His life and work

Milestones in tropical disease pathology, cancer research & medical education

By
Dr Ahmad Al Safi

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# Contents

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I am particularly grateful to Prof. Ahmed Mohamed El-Hassan who went carefully and patiently over the several drafts of this work, and who was kind enough to direct my attention to sources of information that I would have easily missed, and to Prof. Suad Mohamed Sulaiman for checking the language of this monograph. The corrections and suggestions she made, greatly improved the English of this monograph. All deserve my sincere thanks.

The data found in this book have been produced and processed from sources believed to be reliable, and researched extensively. Like most living persons' biographies, the information of this one is obtained straight from 'the horse's mouth,' so to speak. I made full use of Prof. El-Hassan's résumé, verbal and written contributions, and those of his colleagues, students, and coworkers.

Although this author strives for accuracy in his publications, any such work may contain inaccuracies or typographical errors. Changes, corrections, and improvements need to be made and will be incorporated in new editions of this work.

The Photo Gallery annexed to this book is selected from a rich collection of photographs carefully kept by Prof. El-Hassan. Photograph 9 and 10 are kindly sent to me by Mrs. Entisar AM El Agali of the Women Initiative Group, and photograph 11 is provided by Prof. Ahmed Hassan Fahal.

Abbreviations and Acronyms

| | |
|---|---|
| BNHP | Blue Nile Health Project |
| CMP | Centre for Medical Parasitology, Copenhagen |
| CSB | Central Sanitary Board |
| DANDI | Drugs Against Neglected Diseases Initiative |
| DANIDA | Danish International Development Assistance |
| EMRO | East Mediterranean Regional Office, WHO |
| ENRECA | Enhancement of Research Capacity in Developing Countries |
| FMOH | Federal Ministry of Health, Sudan |
| FOM | Faculty of Medicine, University of Khartoum |
| GM | Graphic Museum in Khartoum |
| GMC | Gordon Memorial College |
| IAEA | International Atomic Energy Agency |
| ICRI | Industrial Consultancy and Research Institute |
| IED | Institute of Endemic Diseases |
| IMLT | Institute of Medical Laboratory Technology |
| KSA | Kingdom of Saudi Arabia |
| MOH | Ministry of Health |
| MRC | Medical Research Council |
| NCR | National Council for Research |
| NHL | National Health Laboratories |
| SAD | Sudan Archives, University of Durham Library |
| SMRL | Stack Medical Research Laboratory |
| SMS | Sudan Medical Service |
| SNAS | Sudanese National Academy of Sciences |
| SNMH | Sudan National Museum of Health |
| SNRO | Sudan National Records Office |
| SSTMH | Sudanese Society of Tropical Medicine & Hygiene |
| SUH | Soba University Hospital |
| TDI | Tropical Disease Institute |
| TDR | Research and Training in Tropical Diseases |
| TMRI | Tropical Medicine Research Institute |
| WCL | Wellcome Chemical Laboratories |
| WTRLK | Wellcome Tropical Research Laboratories in Khartoum |

# Preface

The idea for compiling this series of monographs originated after I finished collecting the scattered works of the late Prof. Tigani El-Mahi (1911-1970). In two volumes, I edited and published his articles, which he wrote in Arabic in 1981[1]and those, which he wrote in English in 1984.[2] The warm reception those two volumes had encouraged me to continue similar work on more pioneers albeit in a different way.

Work started during my fruitful expatriate period in Saudi Arabia (1989-2004), and took fresh momentum after I came back to Sudan, when I realized that this type of work could have more far-reaching value than mere documentation. I realized that allusion to several pioneers of the medical profession is anecdotal and reflected misinformation and superficial impressions at best. Given this dismal situation, health care providers, researchers and students are faced with a dearth of reliable sources on the bookshelves. Resource books are alarmingly few and historical writings notably deficient. Sources rest mainly in grey literature, which by definition is not readily available.

For sure, we are not doing enough in the field of documentation. Although we say that health care providers, researchers, and students should be informed about the history of this profession, sources of information are few. History is not written or taught systematically in all health institutions. The few medical schools that started courses in this field still lack authentic sources to help them in their job.

Personal contributions and outstanding achievements of the pioneers of Sudanese medicine were not documented or highlighted. An approach that is more positive should be taken to correct this deficiency. There are lessons to be learnt by posterity from the legacy of their predecessors, how they lived, behaved, and worked. In a fresh look at the lives of the pioneers, there will be an opportunity, I presume, for re-enacting the merits of these great men and women, and emulating their successful stories and bringing those stories back to life in one way or another.

Medical history should be documented. This should be a priority, not only because it is something worthy of our immediate attention; but also because it is the one part of our medical culture, which has been totally neglected.

Now, after so much work by several generations, so much experience and big sacrifices, it is high time for this profession to substantiate what it has gained thus far and put it on record, for surely one good document is worth a billion spoken words.

I took this matter seriously by launching a major documentation project entitled "*Sudan Health Trilogy*" for which I solicited the help of teams of co-workers, co-authors, fieldworkers, and editors.

In addition to performing its chief function, that of recording faithfully the lives and work of the main actors in the medical scene, the *Trilogy* also hopes to provide authentic information. Often we find ourselves uncertain as to whether or not a particular act or technique has been widely accepted or related to a certain person. How can we be sure? This *Trilogy* should help us here. By consulting the appropriate part of this work, we can obtain the information we need on the milestones of different disciplines of Sudanese health care delivery. The danger in thinking that history starts with us, that nothing has been said or done before about the issue in question, or lay hands on what is not ours are obvious caveats. This is the *raison d'être* for launching the project of this *Trilogy*.

There has always been coexisting generations working together, and there has always been a generation gap in the medical profession, and for that matter, in every other profession. The younger generations have grumbled about the way their elders behaved, and the way they treated them, and have repeatedly deviated from the set norms, sometimes in obstinate and intentional rebellion. Traditions, culture, and moral definitions change, and generations interact. Wise interaction and even frictions narrow the generation gap and reproduce yet another generation hopefully wiser and more mature.

In Sudanese medicine, the elders wanted the young generations to excel. The young generations deserve this and are worthy of access to

the highest echelons of the profession if they are well educated and coached in the skills of their trade.

The patrons who were brought up in classical biomedicine and lived the agonies of the birth of the current medical system in the country would not tolerate deviations from the set norms easily. At one time, there were few notable figureheads in each discipline in Sudan. That was understandable and natural, because those were the formative years, the age new medical disciplines emerged, newer sub-specialties born, and foundation of Sudanese medical practice laid down. With the proliferation of sub-specialties, tens of new comers from all over the world joined the service carrying with them new skills, knowledge, and vision. The patrons had to accommodate and surrender some of their monopoly, sometimes reluctantly. Conflicts and professional jealousies reigned for a time. However, life went on and so did the profession.

The wide generation gap that has been enforced over the last two decades was unfortunate and should be bridged. The apprenticeship tradition, the hallmark of medical practice, teaching and training, has suffered badly and the professional unit is breaking up due to a multitude of social, economic, and political factors. Hundreds of resourceful medical scholars were forced into exile or unnecessarily alienated, and as 'nature abhors vacuum', the young filled the void, with inevitable loss of proper professional control and proper management.

If the younger generations are to be the natural heirs of the profession, they have to educate themselves better, they have to explore and analyze the medical past thoroughly before setting new norms and standards. They must speak the language of modern medicine and embrace all its goodness.

We cannot bring the past back and we should not, but we ought to learn from the incidents in its trail. In this instance, the epigrammatic phrase of Sir Winston Churchill '*the longer you can look backward, the further you can see forward*' may be appropriate. The young generations should explore the past and learn from it before they take their decisions. They should be tolerant and reverential towards the old generations. This will assure that some wisdom is shared, and

harmonious living replaces discord and grumbling. I thought this series of works would help to bridge this gap, salvage lost wisdom, and obviate eminent dangers.

Health services in Sudan faced enormous challenges aggravated by poverty, food scarcity, poor infrastructure, significant geographic and socio-economic disparities in access to and utilization of health services over the last hundred years. No effort was spared by the different generations to cover basic health needs, control infectious and non-communicable diseases, manage the sick, and deliver acceptable health services. There was constant and persistent endeavour to strengthen basic health services not only to address the main causes of morbidity and mortality; but also to maintain a healthy productive workforce. The story of this profession with its difficulties, achievements and failures needs to be recollected and consolidated.

Our past is long gone; but our history continues, it cannot be ignored; it is alive, it is continuous, it is active, and needs to be recorded and preserved. This current work is one chapter in the Sudan medical story. It is a reminder of the excellent work that has been done so far to build the health system of the country.

Conservation and development of the medical system and heritage needs to be written down in social history as well as stories of achievements. We need to build a sound health care system, maintain modern medical schools, research laboratories, libraries, and museums. These institutions, which were once intact and functioning, are endangered, mal-functioning or lost.

We need to record the history of this profession more thoroughly before it is too late. We might wake up soon to find out that we have no recollection of our past. Details of this degenerative process have been listed in an earlier monograph.[3]

This series of monographs, however, is written specifically to raise the awareness of readers in the academic community in the health profession about the milestones and important stations in Sudanese health care development, and help them to be better health care providers. They would be, I am sure, if they were better educated about the contribution of their predecessors.

History of medicine is the history of men and women's lives. It is but the biographies of great men and women. No great man or woman lives in vain. There is probably no history, only biographies. This series of monographs is a humble attempt towards documenting the lives and work of some notable Sudanese scientists. It aims to provide concise documentation of the lives and work of the men and women who have shaped the health care services in Sudan. It focuses on individual contributions and through them sheds light on the milestones of health care services in Sudan.

The individuals featured in this series, fulfilled the criteria I set to identify a pioneer. The pioneers in the context of this work are Sudanese men and women, who have established new institutions, founded new disciplines, researched the field, or made new discoveries and techniques, those who laid down new traditions and models of admirable behaviour. They taught, trained, and mentored, and more importantly, provided guidance and encouragement to several generations of young and aspiring physicians and scientists.

They are without exception, meticulous clinicians, arduous teachers, imaginative trainers, and hard-working researchers. They maintained unimpeachable professional integrity, upheld strict medical ethics, and consolidated sound medical traditions in a rich service career. They all worked with purpose, with principles, with culture building, and strengthening people. In every situation, they looked for better management, efficiency, perfecting techniques, practices, and processes.

Their contribution as scientists or physicians to science and life has been exemplary. They searched for continuous improvement in their lives and in the institutions in which they worked. They have been constantly involved in the pursuit of fact and truth about everything in life. That is why they were also notable social workers, sportsmen, poets, musicians, political and social leaders, writers, and competent administrators.

Studying the lives of these individuals clearly shows that the path to success and distinction requires hard work, confident persistent toil, and professional zeal. Nothing happens arbitrarily through luck, or due to quick fixes.

This volume profiles the life and work of Prof. Ahmed Mohamed El-Hassan, the pathologist, researcher, teacher and mentor. Among these pioneers, Prof. El-Hassan has been typical. He did his job as expected in terms of quality. His performance has been solid, fully proficient in all aspects of job content and expectations. That is why he won the admiration and respect of his peers, colleagues and associates. However admirable his qualities as a man, it is his contributions as scientist that have been the chief concern in this monograph.[4]

When I started researching for this work, I discovered the magnitude of my ignorance about the basic landmarks of this profession, and in the process, that of many others. This work is an attempt towards understanding what happened, our role in it and what should be done. I hope this series proves to be useful and fulfils its goals.

# Ahmed Mohamed El-Hassan

## His life and work

## Early years

Prof. Ahmed Mohamed El-Hassan was born in Berber on 10 April 1930. Like many Sudanese children at the time, he was admitted to the *khalwa* (Quranic School) before the elementary school, which happened to be the only one in Berber and its surroundings. He then joined Berber Intermediate School, which was one of three schools (Wadi Halfa, Atbara and Berber) in the whole of the Northern Province. He had to compete fiercely to join Omdurman secondary school, the former Gordon Memorial College.[5] Sometime in the early 1940s, that name was transferred to the High Schools, which with Kitchener School of Medicine formed the foundation of the present Khartoum University. Prof. El-Hassan entry to Omdurman Secondary School was in January 1945. At the end of that year, that school was closed and replaced by the two schools at Wadi Saiadna and Hantoub, which started teaching in January 1946. It is noteworthy that until 1949 the school year, at all stages of education, started in January.

Prof. El-Hassan described the excellent system of education at the secondary schools level at that time and possibly until the mid sixties, saying, "we were given first class education by well qualified teachers. The school library was full of excellent books and magazines. During my school days, I read the classics of Taha Hussain, El Manfalouti, Zaki Mubarak, El Mazini, El Asfahani, Dickens, HG Wells, Sir Walter Scott, Alfred Tennyson, Shakespeare, to mention a few."

Prof. El-Hassan and many contemporaries were educated in the system that was founded in Bakht Er-Ruda.[6] His teachers were graduates of that institute. In the Bakht Er-Ruda system, pupils were encouraged to read and were exposed to a wealth of reading material. The country was poor, but the schools were exemplary, and the educational system immaculate.

Children at an early age were exposed to a variety of cultural experiences. They were instructed and acquainted with several sports. They had the best gymnastic apparatus. Possibly many intermediate and every secondary school had a vaulting horse with its auxiliary springboard and landing mat, hurdles and high jump apparatus, javelin and iron balls. By the time a child is approaching university or high insti-

tute, he or she would have been acquainted with and properly trained in basketball, football, volleyball, and table tennis, the most popular sports of the time.

Children were exposed to all types of art media. They were taught pottery, moulding earth, and tried using crayon, oil colours, watercolours, and etching. They were introduced to theatrical arts and theatre techniques and played classics like Macbeth, Hamlet and the Sudanese love story, Tajouj.

Students in all stages of education were encouraged to work in groups. They were intuitively helped to organize and run a variety of social activities early in life. They were coached on parliamentary procedure and on how to organize societies and local clubs, and how to debate matters in a cordial atmosphere. They were encouraged to participate and interact with others in poetry recitals, and debates competitions. With their limited educational means, they managed to carry out meaningful scientific experiments.

In addition, the system encouraged early access to the cultural life in Egypt, which was the only accessible and resourceful country in the 1940s. Through its two most noted and widely read magazines: *El Thaqafa* and *El Risala* in which Sudanese writer Abdulla Ashri El Siddig used to have a science section, they were introduced to the notable scholars of the time.

That is probably why Prof. El-Hassan developed at an early age of twelve, an interest in psychology. He joined a distant learning course in Cairo run by Dr Mohamed Fayik El Gawahry of Sakakeeny Pasha Street. He was passionate about psychology and read widely on the subject ever since. He was particularly fond of Jung, and read most of his works. He thinks Jung is one of the greatest thinkers of the twentieth century. That is why he read Harry Potter in the context of Jungian psychology,[7] and developed interest in the paranormal.

Prof. Mahmoud Ahmed Mahmoud, a notable researcher in Agriculture was Prof. El-Hassan's schoolmate in Omdurman Secondary School. He gave a vivid picture of the young chap then.[8] He said, 'young Ahmed had been carefree and happy. Two books have been his companions: The *Galgalotiya*[9] and *Mujarabat Al Diarabi*.'[10]

Prof. El-Hassan sees his life dedicated to teaching, research and serving the poor of the rural areas. He thinks highly of 'the people of Sudan' who supported him financially throughout his education, and, of course, his family and co-workers, as the ones whom he thinks should share the credit for whatever he achieved in life and science.

## Education and academic achievements

## Career

After acquiring the Diploma of Kitchener School of Medicine (DKSM) in 1955 with distinction and winning Kitchener Memorial Prize,[11] Prof. El-Hassan joined the Ministry of Health (Sudan) as house officer (1955-1957) and medical officer (1957-58). In April 1958, he joined the Faculty of Medicine, University of Khartoum as research assistant in the Department of Pathology; a post he held up to 1960.

In 1960, he was awarded the Diploma of Clinical Pathology (DCP) from the University of London, and in 1964, PhD, University of Edinburgh. The Royal College of Pathology (RCPath) was founded in 1964. Prof El-Hassan was a founding member/fellow, and was the first Sudanese to be granted the degree of Fellow of the Royal College of Pathologists in London (FRC Path). In 1976, Prof. El-Hassan was also awarded the Fellowship of the Royal Society of Physicians of London.

In 1960-1961, he worked as honourary registrar in the Pathology Department, Royal Postgraduate Medical School, London, and took the DCP Course in London during the period 1961-62. In 1962-1963, he was promoted to lecturer in Pathology, Faculty of Medicine, University of Khartoum.

From 1963 to 1965, he was a PhD student in the Pathology Department, University of Edinburgh, where he was awarded the degree in 1964. On his return home, he was promoted to senior lecturer in 1965 and first Sudanese Head Department of Pathology, University of Khartoum replacing Prof. James B Lynch (the founder of the Department of Pathology, University of Khartoum). In fact, when Prof. El-

Hassan took over the department, Prof. Lynch had already left the country.

## First Sudanese Professor of Pathology

In 1966, Prof. El-Hassan was appointed the first Professor of pathology,[12] and Chairman of the Department of Pathology in the Faculty of Medicine, University of Khartoum. During his term of office, the department was engaged in teaching undergraduate and postgraduate students, rendering pathology services and research. The department served the three towns and major cities in Sudan. Several Sudanese teaching assistants were trained in England, and several are now full professors in pathology.

Prof. El-Hassan was elected Dean, Faculty of Medicine, University of Khartoum, in September 1969. His term of office lasted up to August 1971. During this time, the number of students intake rose from 60 to 120. During his tenure, he was also elected Deputy Vice Chancellor, University of Khartoum.

## Character

The researchers who worked with Prof. El-Hassan see him as a dedicated and motivated scientist; his students are fascinated by him as a superb teacher; his friends and close associates say that he is a remarkable human being, and an amazing blend of a scientist and an artist.

Like many true scientists, Prof. El-Hassan has been extremely helpful to others. His ability and willingness to share what he has with others is unparalleled. He provided his expertise and wisdom to less experienced individuals in order to help them advance their careers, enhance their education, build their capabilities, or simply assist them reach a diagnosis or perform the job at hand efficiently.

He was an enthusiastic pathologist dedicated to his work, to his patients, and his students. The microscope was his best and intimate friend and companion. He often joked that such relationship inflicted him with ‘tunnel vision!’ He lived an uninterrupted life of scientific excitement. Every pathology specimen was a novel experience worth of talking about with students and clinicians. Often he would be the

first to phone a surgeon delivering a pathology report and sometimes he would be in the operating theatre in hospital attending biopsy taking or attending a post-mortem. The number of post-mortems he performed, one of his colleagues commented, is hard to count.

His charitable character led him to work with and help the needy irrespective of locality or ethnic origin. He treated and helped kala-azar patients in Geraif suburb of Khartoum who happened to be predominantly Southerners. His work in Eastern Sudan culminated in the establishment of *Prof. Ahmed Mohamed El-Hassan Centre for Tropical Medicine* in Gedaref in honour of his notable contribution in the region.

His dedication to his work dictated the type and number of friends he had in life. Most of his friends were work associates, co-workers and students. The common theme that attracted them is fascination by science and its potential.

The late Prof. Neil, ex-Prof. of Paediatrics, Faculty of Medicine, University of Khartoum, was quoted to have said after a lecture delivered by the late Prof. Tigani El Mahi in the sixties of last century that he wondered how Tigani could acquire such huge amount of knowledge in one lifetime. Prof. Fahal echoed similar sentiment regarding Prof. El-Hassan. He said, "The extent of knowledge that Prof. El-Hassan gained over the years is astonishing and is extremely difficult for a human being to gain without complete dedication and self sacrifice."[13]

## Initiatives

In addition to the departments of pathology, which Prof. El-Hassan established at home and abroad, he also initiated, founded, or walked through success several autonomous academic bodies in Sudan, KSA and the region at large. He has to his credit so far (of course with the help of several other colleagues and co-workers) the foundation of the Ministry of Higher Education and Scientific Research, Tropical Medicine Research Institute, Institute of Endemic Diseases, Institute of Medical Laboratory Technology (later the Faculty of Medical Laboratory Technology), Sudan Cancer Registry, the Bilharzia Society, the Sudanese Society of Tropical Medicine and Hygiene, and the Sudanese National Academy of Sciences, and throughout his career as a

pathologist, he was as well keen to upgrade and upkeep the Museum of Pathology at the Faculty of Medicine, University of Khartoum.

### Ministry of Higher Education and Scientific Research

In 1971, Prof. El-Hassan was called upon to found the Ministry of Higher Education and Scientific Research. During that period he laid the foundation of the ministry, and with the help of many academicians, he was able to maintain the independence that Sudanese universities enjoyed over the years. He was able to introduce some reforms in technical education and reinstated the Islamic University, which had been downgraded to a college. The independence of the National Council for Research (NCR) was assured and its institutions were evaluated. Several changes in the managerial and academic work force of the NCR and other high institutes of learning were made.

### Tropical Medicine Research Institute

During the period 1972-77, Prof. El-Hassan was Chairperson of the Medical Research Council (MRC), National Council for Research, Sudan. During this period, he and others helped in establishing the Tropical Medicine Research Institute (TMRI) at the NCR with its two parts: the Hospital for Tropical Diseases in Omdurman and Laboratory in Khartoum. Several researches were recruited and sent for training in tropical medicine, pathology, epidemiology and parasitology in Britain.

Prof. Suad Mohamed Sulaiman came to work under Prof. El-Hassan early 1971 when she was a young Assistant Scientific Officer at the Bilharzia Laboratory in the NHL, Khartoum. Prof. El-Hassan was then a constant visitor to the laboratories and participated in most of the activities of the Bilharzia Unit headed by Prof. Mutamad Ahmed Amin. When he became the Chairperson of the TMRI, he was a leading researcher and guide for many young scientists of her generation. During that time, she said, the Khartoum Bilharzia Research Project was very active under the leadership of Dr Mutamad Ahmed Amin & Dr Alan Fenwick. Several scientific achievements took place during those years in the Blue Nile Health Project and Sudan Project (MSU/NIH).[14]

### Institute of Medical Laboratory Technology

In 1966, in collaboration with the Sudanese Ministry of Health, the Institute of Medical Laboratory Technology (IMLT) was established. Graduates from this institute are now operating the diagnostic and research laboratories in Sudan and many Arab countries. Many students have obtained MSc and PhD degrees in technology from reputable local and foreign universities. At least two graduates are now full professors.

### Institute of Endemic Diseases

In 1993, along with other colleagues, Prof. El-Hassan founded the Institute of Endemic Diseases (IED), University of Khartoum, and held the post of the founding Director up to 2000. The objectives of the Institute are to undertake research on endemic diseases, to train medical and paramedical staff, and to offer specialized services in endemic diseases. The main research areas of the IED included leishmaniasis, malaria, tuberculosis, leprosy, cancer, mycetoma, and genetic diversity in relation to disease. Molecular biology and immunology departments were established for the first time in the country. The many students, who obtained their MSc and PhD degrees from the IED, are currently establishing other research institutions and colleges, and helping in others.

The Institute of Endemic Diseases is listed by the Third World Academy of Sciences as a centre of excellence. Further recognition of the Institute followed when one of Professor El-Hassan's co-workers, Dr Hiba Salah El Deen Mohamed was awarded the 2007 Pfizer/Royal Society prize for her work on genetics of leishmaniasis. Professor El-Hassan nominated her for the prize in his capacity as President of the Sudanese National Academy of Sciences.

### Bilharzia Society

The *Bilharzia Society* was founded in 1965 by medical staff, veterinarians and scientists. Research was planned through this society to tackle medical problems in humans and cattle. The founding members were Professor Ibrahim El Desogi Mustafa, Professor of Veterinary Pathology, Faculty of Veterinary Medicine, University of Khartoum,

Dr Gaafar Karrar, Under-Secretary, Ministry of Animal Resources, Tawfeeg Fawi, Pathologist, Ministry of Animal Resources, Professor Mansour Faris, Professor of Veterinary Pathology, University of Khartoum, and Professor Mutamad Ahmed Amin from Medical Laboratories. Prof. El-Hassan was coordinator.

### Sudan Society of Tropical Medicine and Hygiene

One vivid and exciting achievement, Prof. Suad Mohamed Sulaiman recollects, was sharing with Prof. El-Hassan the establishment of the Sudanese Society of Tropical Medicine & Hygiene (SSTMH) in 1994.[15] Prof. El-Hassan was the first president of SSTMH. The society contributed significantly to the promotion of tropical medicine in Sudan and the region, and conducted numerous seminars, guest lectures, and workshops. It was through his consistent encouragement and contributions that members met and several issues of SSTMH Newsletter were published. A large number of members both Sudanese and non-Sudanese, in Sudan and abroad, enrolled in its membership. Unfortunately, like many initiatives, the society lacked institutional support, and eventually lost momentum and the newsletter discontinued after releasing five excellent issues. Prof. El-Hassan still insists on reviving and activating this important organ.

### Sudan Cancer Registry

With the help of the late Dr Dennis Burkitt (of the Burkitt's Lymphoma), the late Prof. El-Sayyid Daoud Hassan, Senior Pathologist and Director of Laboratories, MOH and Prof. El-Hassan established the Sudan Cancer Registry (CR) in 1966 in the NHL for registration of laboratory confirmed cancers. Though it was understood that hundred percent complete data was very difficult if not impossible to obtain in a country like Sudan, yet the registry was devised as an objective measure of obtaining reliable data. The CR provided information that elucidates the incidence rate of the different types of cancer in the country, site and trend. It would also throw light on how the demographic variables of age and sex are related with incidence. The results have useful guidelines towards active control measures and epidemiologic study and research. Dr Burkitt helped to fund the project. A health visitor and a secretary were appointed for a start.

The registry proved its worth in the 1981 Ministry of Health Annual Statistical Report. Total cases of reported cancer of skin, female breast, cervix and uterus were analyzed for the period 1969-1978. Similar data covering the period 1973-1979 was also obtained for the analysis of all cancer sites. The annual numbers of new cases during the period 1969-1980 were obtained for these diseases. Results were obtained using scientific methods and tools.[16] Several researchers made use of this registry and published papers on the epidemiology of cancer. Notable among these was Prof. Mohamed Osman Abdel Malik. The CR was maintained for at least twenty years before it vanished! Yes. It is nowhere to be found.

Fortunately, this registry is now being revived. In 2008, the FMOH appointed a committee to be chaired by Prof. El-Hassan and asked to re-establish the registry on a state-of-the-art methodology.

### The Pathology Museum

The pathology museum, which was established with the start of the Department of Pathology in the Faculty of Medicine, University of Khartoum, grew steadily in time, and all specimens were professionally kept and displayed. In 1964, recognizing the importance of preserving these specimens, Prof. El-Hassan upgraded this museum and did his best in maintaining it. He trained the Museum personnel and established a workshop dedicated to this work.

The museum was envisaged as a repository and historical record for the interesting and rare specimens that he and other pathologists in Sudan received every day. The museum provided teaching material for undergraduate and postgraduate students, and students of health sciences. Currently, this museum is showing signs of decay, and instead of maturing, its growth is arrested and it is in need of immediate rehabilitation.

Considering what happened to this museum and to the Sudan Graphic Museum and the Wellcome Tropical Research Laboratories Museums, it was thought appropriate and timely to propose the establishment of the *Sudan National Museum of Health* (SNMH) in Khartoum State as a non-profit governmental or non-governmental facility governed by a Board of Trustees and permanent professional staff.[17] This was

thought to be an excellent innovative project, which would provide a facility currently unavailable in the country. Through the activities of this museum, public understanding pertaining to the history of health care is achieved through exhibits, public programmes, and outreach education, which stimulate curiosity and interest in health.

The SNMH's mission is to provide a repository of Sudanese medical and health artifacts including surgical instruments, pathology specimens, commemorative objects, public health items, historical archives, and history of health care in Sudan. The material culture, expressed by the collection, reflects the legacy of health care in the country, and as such, it will help in research in and understanding of health care diversity.

### SUH Clinical Health Research Centre

In a paper solicited by Director, SUH in 2005, Prof. El-Hassan put forward an elaborate document on the need for a Clinical Health Research Centre at SUH. The memorandum was based on sound situation analysis of research conditions in the country at the time.

Prof. El-Hassan noted that research has not been given high priority in most developing countries including Sudan. He said that since the mid-seventies of the twentieth century, research output in the university started to decline. The total number of publications in 1970-79, 80-89, 90-99 was 745, 1000, and 701 respectively. One third of those publications were in medicine, and only 9% were in humanities, science, engineering, and social sciences. This low output was despite the fact that the staff in these disciplines formed 35% of University staff. In 1983, the University Senate made several recommendations to correct this deficiency, which were simply not implemented. This resulted partly in the unfortunate low international rating of the University of Khartoum, which was based *inter alia* on research output. The university was put among the lowest in Africa.

The research carried out in the medical field is largely funded by international agencies mainly WHO and Wellcome. Because of the political situation in the country, funds from other international organizations have greatly diminished. Most of this research is carried out in the basic sciences departments. Clinicians have little chance to do re-

search largely because of lack of proper forums. Apart from the IED and the Mycetoma Research Centre, which both have limited funds and space, and thus give limited opportunities for clinicians to do research, no other clinical research institution exists.

Considering these reasons, Prof. El-Hassan thought that there is genuine and urgent need to establish a centre for research that gives the opportunity for clinicians to engage in research, and champion its cause and enhance clinical studies in the University and at national level. The goal of this centre is to promote health for development in the University and strengthen the University's voice in setting and implementing the national research agenda.[18]

The research centre in Soba has been built. A state of the art mycetoma research centre with laboratory facilities and patient management amenities has already started functioning and will be officially inaugurated soon. A research project on the immunology and genetics of mycetoma has already been planned. It is hoped that other research activities such as the breast cancer research unit and other research programmes will be started and or strengthened.

### North-South Collaboration

Prof. El-Hassan has long been an avowed advocate of North-South collaboration in research advancement. The success story of the projects that he was involved in in the last two decades, which he described[19] and we mentioned elsewhere in this monograph, involved several institutions in Denmark and the United Kingdom. They undoubtedly testify to the wise and practical approaches developed. However, it has been evident that for any such project to succeed, it has to be based on mutual interest, benefit and respect between North and South collaborators, and it has to have long-term commitment.

The collaboration between IED and the University of Copenhagen was sponsored by the Danish Overseas Developmental Agency. It included capacity building and training of Sudanese and Danish students in tropical medicine research. Because of this collaboration, the IED laboratories were strengthened, a laboratory was built in the Department of Biochemistry at the Faculty of Medicine, University of Khartoum and a field research station was established in Gedaref State.

Several scientists were trained: Dr (now professor) Muntaser El-Tayeb Ibrahim in Molecular Biology, Dr Ibrahim Mohamed El-Hassan, Dr Insaf Khalil and Dr Hayder Giha in Malariology, and Dr Ahmed Ismail, Dr Ameera Gaafer and Dr Soha Gasim in the Immunology of leishmaniasis. Some of those scientists opted to immigrate; but those who remained at the IED have strengthened the institution further. They have been promoted academically, succeeded in attracting funds for their research from other sources and have trained many other Sudanese scientists. The ingredients of success of this project are that it was conceived and executed by both partners and dealt with problems of importance in Sudan. Workers also collaborated with the University of Amsterdam on a project on leishmaniasis sponsored by the EU. Dr Omran Osman of the Faculty of Science, University of Khartoum and Dr EE Zijlstra of MSF Holland obtained their PhD degrees in this project. Dr Omran has now established his own research at the Faculty of Science and obtained a research grant from TDR, WHO Geneva to continue his research on leishmaniasis. Dr Zijlstra is now Professor of Medicine at Malawi University.

Another important collaboration was between IED and the Department of Pathology, University of Cambridge. Dr Muntaser E Ibrahim, first with Dr D Barker and later with Prof. J Blackwell initiated this programme. The research addressed the genetics of leishmaniasis. Dr Hiba Salah El Deen of the IED and Dr Manal Fadl of El-Nilain University obtained their PhD degrees through this project. Prof. El-Hassan was supervisor for the latter and co-supervisor for the former. Dr Hiba has been awarded the Pfizer/Royal Society Prize for her work on the genetics of visceral leishmaniasis and post kala-azar dermal leishmaniasis in 2008. Ms Rihab and Mr Mohamed Salih obtained their MSc from research carried out within this project.

### EMR Health Research Forum

Prof. El-Hassan was also of the opinion that research has not been given a high priority in most developing countries including countries of the East Mediterranean Region of the WHO. There was evidence of a major disequilibrium in the resources made available for research between developed and developing countries. This has resulted in the

'ten-ninety' gap, where only 10% of research funds are spent on research in developing countries where 90% of disease burden occur. He also noted that investment in health research contributes positively to overall development in any country. There is therefore a need for establishing an organization that will enhance research efforts at national and regional levels and strengthen EMR voice in setting and implementing the global research agenda.[20]

The EMR Office sponsored a study on the status of health research in Sudan. The objective was to assess the quality and quantity of research in the country, identify and evaluate the centres undertaking research, find out if major health problems were being addressed and assess the impact of research and its utilization by end-users. The project was carried out by a team of researchers and included visits to research centres, universities and interaction with researchers and policy makers throughout the country. A final report was submitted to the MOH and WHO. WHO is now supporting research in the priority areas identified through small grants system to which young scientists compete annually. The document is available in the MOH for those who want to know the priority areas of research in Sudan.

### Department of Pathology, Ahfad University

In 1993, Prof. El-Hassan worked closely with the Ahfad School of Medicine, Ahfad University for Women in Omdurman, Sudan. His tenure in Ahfad University spanned the period 1993-2000, during which time he established the pathology-teaching programme at the School of Medicine, and a multidisciplinary laboratory.

### African Malaria Network Trust

Prof. El-Hassan was one of the founder members of the African Malaria Network Trust up to 2002, when Dr Ibrahim Mohamed El-Hassan of the IED took over.

### Medical Photography & Illustration Unit

When he was Dean, Faculty of Medicine, University of Khartoum, Prof. El-Hassan initiated the establishment of the Medical Photography and Illustration Unit in the faculty. To run this unit, he recruited the able photographer Sayyid Ahmed Osman, who was a man with

many talents, and an all-rounder technician. In addition to being a competent photographer, Sayyid Ahmed was also a skilful tennis player, and an elegant well-dressed gentleman and dancer. He was a member of the Khartoum Ice Skating Club and champion of ice-skating in the 1930s. The Photography and Illustration Unit, which was founded, helped in all FOM activities before it disintegrated of late. Three technicians were sent to Britain where they trained as medical photographers.

### Sudanese National Academy of Sciences

In 2005, Prof. El-Hassan with the help of outstanding Sudanese scientists from within and outside the country established the Sudanese National Academy of Sciences (SNAS) as a non-profit, non-governmental organization, and was elected as its first founding president. SNAS has been founded with the premise that development in its widest sense cannot be achieved without making use of the latest achievements of science and technology. Improving on the current situation in Sudan can only be achieved through strengthening and promoting the local research institutions and educational systems, and by establishment of organizations and platforms dedicated to the promotion of science and technology. One instrument that proved useful in achieving this in many parts of the world is a National Academy forum.

SNAS is envisioned as the highest academic institution in the country with the following objectives:

1. Promote research and uphold the cause of science in its basic and applied forms.
2. Offer advice and consultation to institutions, the public and the private sectors in matters relating to science and technology, research, and education.
3. Help in the dissemination of science and research results through publishing and assisting in publishing periodicals, books, and through organization of scientific meetings.
4. Raise community awareness about the importance of science and technology in sustainable social, economic and environmental development.

5. Collaborate with similar regional and global organizations.
6. Raise funds and accept endowments for fulfilling its objectives.
7. Help in capacity building of scientific institutions in the country.
8. Award grants, scholarships, prizes and medals in the field of research.

Prof. El-Hassan is maintaining the momentum of this organization and is keeping it going against numerous difficulties and constraints. Indeed, in this particular venture you see his frustration evident because for no good or understandable reasons, he is blocked from reaching his obviously noble goals. He is blocked not due to lack of ability or confidence; the block is external. It involves blocked roads, lack of resources to achieve goals. This frustration verges into anger. It is not that things are wrong; but that things are not being as perfect as he wanted them to be; it is not that the world has let him and his co-workers down; on the contrary, the world has given them so much that they would have hoped to give everybody what everybody deserves of goodness. Prof. El-Hassan and his colleagues are frustrated and worried, because though they are in the forefront of the leadership of all major research and educational institutions in the country, they find themselves incapable of doing good. They think they have good reasons to be worried, frustrated, and even angry.

This is what Prof. El-Hassan had to say concerning lack of support for SNAS:

> "We contacted relevant ministries and the private sector and showed them our intended activities, the constitution and membership of SNAS and asked them for moral and financial support. All turned a deaf ear and a blind eye to our request. Some mistakenly thought that we were competing with them, which was not the case and we explained to them that we wanted to collaborate with all institutions concerned with research and development in order to realise a common goal. It seems to me that there are hidden agenda that we do not know, or perhaps we think we know; but do not understand. We participate in many conferences about research and development and science and technology abroad and speak in the name of Sudan. Other par-

ticipants in these meetings, all of whom have the support of their governments, were surprised at the treatment we were getting at home. I am saying all this just for the record. We do not live in an ideal world and there are certain things in life that one can do nothing about. One has to stick to one's principles and sometimes has to do what is possible under certain adverse circumstances.

Despite this national neglect, SNAS has been accepted as a member of the Network of the African Science Academies (NASAC) and has participated in all annual conferences of the Third World Academy of Sciences of which it is a member. In a meeting held recently by NASAC, SNAS has been asked to help in establishing academies in the North African countries where there are no national academies. SNAS will host a workshop for this exercise. Just imagine when participants from these countries arrive and realize that we are not getting a fair deal from our own people!"

### Nile College

Prof. El-Hassan is a founding member of the Nile College in Omdurman, Sudan, and is currently the first Chairman of its Board of Directors. The College has at present three bachelor programmes: Medicine and Surgery, Medical Laboratory Sciences, and Nursing Sciences and a Diploma in Medical Information Systems. The College started functioning in 2008.

## Expatriate years

Prof. El-Hassan expatriate career in the Kingdom of Saudi Arabia (KSA) lasted nine years from 1977 to 1987 with one year or so break when he came back to Sudan in 1979 to take the posts of Professor and Chairperson of pathology in the Faculty of Medicine, University of Khartoum, Chairperson, MRC, and Director, TMRI in Khartoum until 1980.

During 1977-87, he established the Department of Pathology in the College of Medicine and Medical Sciences, King Faisal University, Dammam, KSA, and was its first Chairperson and Professor of Pa-

thology. During the same period, he established the Directorate of Research, Publications, and Translation in the Faculty of Medicine and Medical Sciences, King Faisal University, Dammam, KSA, and worked as its founding Director.

When he left KSA, he left behind a full-fledged department in King Faisal University, with thirteen members of staff including three Saudis qualified in pathology. A postgraduate degree in clinical pathology and another in histopathology were established. A modern laboratory was established at King Fahad Hospital of the University in Al Khobar, KSA. During his tenure, the College of Medicine won ten million Saudi Riyals grant money on competition basis with other universities in the Kingdom. That grant was dedicated to research on cutaneous leishmaniasis in the Eastern State of KSA. The parasite and animal reservoir were identified and the epidemiology, clinical features, and management of the disease were determined. Several papers were published in international and local journals.

## Medical & research ethics

It is interesting that Prof. El-Hassan often refers to the Hippocratic Oath that he and every other medical doctor across the globe vowed to obey. It is interesting to refer to that Oath because all Sudanese doctors take it on graduation, and researchers, on the other hand, should be versed in the ethics of research. Prof. El-Hassan must have witnessed real lapses away from these codes. Indeed, instances of involvement of physicians in torture, in helping in amputation of limbs under pretence of faith, in forging post-mortem results in connivance with the political system, or merely carrying out procedures that are clearly forbidden were many and were alarming.

The Hippocratic Oath is the *rite de passage* of medical graduates to the practice of medicine. Though it had been considered satisfactory for twenty-four centuries, there have been five major international codes drawn up in the last twenty-four years.[21] These are:

- The Declaration of Geneva (1947) is the latest European modern restatement. Several parts of the Oath have been removed or re-shaped over the years in various countries, as

the social, religious, and political importance of medicine has changed. In Sudan, an Islamic version has been adopted.

- The Nuremberg Code (1950) on clinical investigation.
- The Declaration of Helsinki (1964) on human experimentation.
- The Declaration of Sydney (1968) on determination of death.
- The Declaration of Oslo (1970) on therapeutic abortion.

Ethical principles should not only be taught, but should be assimilated from the attitudes of colleagues and teachers. Prof. El-Hassan was one such colleague and teacher who often reiterates the importance of adherence to the ethics of research on human subjects that derives strength and impetus from a firm belief in the tenets of Islam. His working paper 'Ethical Issues in research involving communities: Ethical principles in action' is a roadmap for researchers and research institutions.[22]

It is only after the Second World War that the ethical issues of research on human subjects were addressed. Protecting the rights and dignity of participants in research is a fundamental principle of scientific research.

Recent decades abound in scandals concerning social sciences and medical research. The scandals involved working with children, the illiterate, sick and incapacitated, and those who were not legally able to provide consent, without taking due care and without obtaining informed consent of participants or their legal guardians. In the USA, the 'Study of Untreated Syphilis in the Negro Male' was a clinical study, conducted between 1932 and 1972 in Tuskegee, Alabama, in which 399 infected plus 201 control group without syphilis of poor- and mostly illiterate-African American sharecroppers were denied treatment for Syphilis. That study became notorious because it was conducted without due care to its subjects, and led to major changes in how patients are protected in clinical studies. Individuals enrolled in the Tuskegee Syphilis Study did not give informed consent and were not informed of their diagnosis; instead, they were told they had "bad blood" and could receive free medical treatment, rides to the clinic, meals and burial insurance in case of death in return for participat-

ing.[23] The after shocks of this study led directly to the establishment of the 'National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research' and the 'National Research Act'. This act requires the establishment of Institutional Review Boards (IRBs) at institutions receiving federal grants in USA, and special consideration must be given to ethnic minorities and vulnerable groups in the design of clinical studies. These and many more examples instigated a series of reforms worldwide.

Prof. El-Hassan and colleagues, working in and with predominantly illiterate and poor societies in rural areas, designed exacting protocols and implemented them faithfully in the absence of oversight committees that reviewed the study proposals and vetted ethical issues.

In recent years, Ethical Review Committees were established in several research centres in Sudan. This included the IED where all projects are evaluated ethically according to international guidelines. Prof. El-Hassan and colleagues held training courses on ethics of research involving human subjects. Notable among these workshops was the one held for countries involved in the Malaria Vaccine trials, which was held in Khartoum in 2003 with the 'African Malaria Network AMANET'. Other workshops were held at the IED for researchers from different institutions.

## Researcher and mentor

Prof. El-Hassan has been and still is a compassionate scholar dedicated to his work, with high moral integrity and honesty. He believes that a man should give more than take to continue to develop himself professionally, and should work with others giving each the credit he or she deserves. Indeed, his role as mentor of young and aspiring researchers has been paramount. This role was not coincidental; but engineered and sought after. In the opening paragraph of a paper entitled 'Experiences in health research in a developing country: from the field to the molecule,'[24] he made this statement:

> "Let me start by saying that no one can do anything worthwhile single handed. I had the good fortune to have worked closely over the past 40 years with people inside and outside my own country who had vision and shared with me the same passion for

making a better change in people's lives through science and technology."

Prof. El-Hassan has shaped the lives of a sizable number of gifted people by providing them with guidance and encouragement to pursue careers in pathology and various fields of health and science-related research. Many of his students and co-workers have achieved academic distinction as practicing physicians or research workers. Many achieved eminence in their fields on their own right.

He was also keen to lay down sound infrastructure and build the human resource component. In all his research projects, he was careful to add a strong training element at all levels, and ensure development of infrastructure. The result was the creation of a second generation of researchers who are now independent and have competed for and obtained funds from international sources. At present, they are training a third generation of researchers. Most training was carried out locally except when a student had to learn a new technique, which was not available in Sudan. More specific examples of mentoring will be quoted in relevant sections of this monograph.

Prof. El-Hassan obviously knew that his academic and scientific productivity is only as good as the people that he attracted into his research group. Until 1990, he laid firm grounds and made a good name in pathology. Throughout his career, he published few single-author papers. Instead, he started systematic recruitment of young researchers, gave them the resources that they needed to make their projects succeed.

Together with over 230 co-researchers, MSc, PhD, or MD students at the Universities of Khartoum, Amsterdam and Copenhagen, he dedicated research to the understanding of almost all the killer diseases of Sudan. The team studied the pathology, bacteriology, epidemiology, immunology, and treatment of tropical diseases, and obtained useful results. His seminal publications–over 230-refereed papers are listed below with a subject bibliography. Popular publications in the daily press, official reports, talks and presentations that covered pathology, traditional medicine, music, psychology, medical education and research are also listed.

Influencing others and mentoring comes in many forms and guises. Prof. Ahmed Hassan Fahal[25] still recalls a lecture delivered by Prof. El-Hassan when he was a 4th year medical student. 'During one of his visits to Sudan while he was in his expatriate years, Prof. El-Hassan gave us a lecture on visceral leishmaniasis, and even though a long time has passed since then, I can still remember that lecture vividly. It was a panorama; the scientific material was remarkable, the slides were colourful and portrayed striking field scenes. That presentation had a great influence on the way many of us prepared presentations and lectures'.

Prof. El-Hassan has always been interested in veterinary pathology, and as a result established high-quality working relations with veterinarians namely in the Department of Veterinary Medicine, University of Khartoum. One outcome of this joint venture was the discovery of the natural infection of goats by one of the agents of mycetoma. This finding lead Prof. Samia Ahmed Gumaa to use the goat as an experimental animal for mycetoma.

Several PhD degrees have been attained under Prof. El-Hassan supervision and help. Dr Mohamed Hassan Tag El Deen, now a pathologist in Muscat, Oman obtained his PhD on human and bovine tuberculosis. He showed that extrapulmonary tuberculosis was due to *Mycobacterium tuberculosis* and not bovine tuberculosis in the great majority of human infection in Sudan. Dr Ramadan Omer Ramadan now professor of veterinary surgery in King Faisal University, KSA, worked with Prof. El-Hassan for his MSc on melanoma in the goat, and they worked together on veterinary pathology for years on tumours of donkeys, sheep and camels.

## Educationist

Prof. Ahmed Hassan Fahal recalls that the Educational Development Centre for Health Professionals, Faculty of Medicine, University of Khartoum organized a good number of national training workshops on research methodology and scientific writing. Prof. El-Hassan masterminded those events. He worked tirelessly and dynamically to ensure the success of those workshops and in so doing gave valuable time

and unsurpassed experience and knowledge, whilst encouraging many colleagues to undertake research and publish their work.

Over the years, Prof. Fahal managed, with Prof. El-Hassan's help, to organize several clinical pathological conferences for medical students, doctors in training and senior colleagues. Those conferences were well received. It is also worth mentioning that Prof. El-Hassan was always the driving force behind those activities.

In addition, Prof. El-Hassan contributed enormously and impressively to the different Sudanese academic associations and societies, such as Sudan Association of Surgeons, Sudanese Society of Gastroenterology and Sudanese Association of Dermatologists to mention but a few. He delivered high calibre scientific material and offered constructive discussions during their meetings.

## Voluntary work & community service

Prof. El-Hassan believes in the importance of voluntary work. He was founding member or an active friend of several NGOs, and gave material and moral support to many organizations irrespective of size or importance. The organizations he joined, of course not to mention the scientific forums, were as varied as the Women Initiative Group, the Tuberculosis Society, the Philosophical Society, The Water Youth, the Tuti Groups, and Al-Qalam Educational Foundation.

### Women Initiative Group

The Women Initiative Group (WIG) has been established in Khartoum in 1997 by a group of Sudanese women scientists, researchers, and educators as a voluntary non-profit organization concerned with women issues. The goal of WIG is to strengthen and support efforts of women's NGOs concerned with Sudanese women in the face of the different challenges to their basic rights and threats to their legal achievements. The main objectives of WIG are to raise awareness of women about their rights, provide them with knowledge and skills to reach these objectives, and empower them to participate effectively in different developmental issues, particularly in combating harmful traditions and practices in the Sudanese society.

In Sudan, the incidence of breast cancer is relatively high. In 2007, the incidence of breast cancer has been reported to be between 29 and 30% of all cancers in the female, and that of cervical cancer around 18%. Both are among the ten commonest cancers affecting Sudanese females. WIG committed itself to campaign against these two threats by raising women awareness and providing them with the resources and practices needed to detect these two cancers and seek treatment early.

WIG's policy is to produce and distribute literature and audio visual aids, and convene frequent discussion groups in universities, schools, and local communities to raise awareness and remove the stigma and taboos associated with these diseases. A particularly important part of the programme is detection of breast cancer by self-examination. So far, WIG has established five clinics in Khartoum, and ran two mobile clinics, one in Khartoum Province and the second in River Nile Province.

The group conducted several awareness campaigns, seminars on women education, and programmes aiming at combating harmful traditional practices affecting the health and wellbeing of children and women. Its programme of early detection of breast and cervical cancer among women is now running in its seventh year, and expanding nationwide.

Before the inception of this programme, Dr Suad Ibrahim Eissa, Chairperson of WIG, recollects, 'women were asking WIG for financial support to face the ever-rising cost of treatment of breast cancer, which was high among women. WIG had no means of covering those needs, and to solve this problem, contacted several medical doctors for advice. Prof. El-Hassan was among the first to respond, and was the first to suggest a preventive approach to these potentially fatal diseases. He was the one who suggested the title of this programme 'Early Detection of Breast Diseases.' Prof. El-Hassan had been an active member of WIG Advisory Committee, which he hosted at the Institute of Endemic Diseases. Prof. El-Hassan continued his support for this programme through his participation in regular annual training programmes for fieldworkers, through his writings in the daily press,

not to mention his non-relenting moral support for all WIG's activities.

### TB Domiciliary Services

In the occasion of celebrating the International Tuberculosis Day, Prof. El-Hassan wrote a short article in Arabic in *Al Sudani Newspaper* commemorating the life and work of the late chest physician, Dr Mamoun Hussain Sherif. In this article, Prof. El-Hassan described his memorable experience and encounter with Dr Sherif.

Prof. El-Hassan spent six months of his internship in 1956 in the Chest Hospital, which was located in the current Federal Ministry of Health buildings. He worked with Dr Sherif, who was a notable campaigner against TB at the time, and the first to launch the TB Domiciliary Services pilot programme in Khartoum in 1950.

In this service, TB patients were treated as outpatient or hospitalized for only a minimum period depending on the extent of their disease before being discharged and treated at home. A scheme of domiciliary treatment was started for these patients, and they were then followed up at home by a team of trained doctors, laboratory technicians, and female tuberculosis health visitors. Notable among these was Miss Jessie, a Sudanese of Turkish/Libyan origin. Part of the team would arrive first and take the patient for a chest X-ray and sputum test. When the doctor and his team pay a patient a visit, the results of the tests would be ready. The team would assess the patient's response to treatment, screen the patient's household for infection, and start early treatment for those who show positive results.

### Sudan Association for the Prevention of Tuberculosis

In 1950, Dr Sherif, and the wife of the late Dr Labib Abdalla (the pioneer Sudanese Paediatrician), among others, founded the Sudan Association for the Prevention of Tuberculosis to support the domiciliary programme. The main objective of the association was to take care of TB patients and their poor families. The association, the Sudanese Red Crescent, and the Red Cross established a TB rehabilitation centre for cured patients. The Association conducted social surveys for patients, supported them financially until they were cured, and thence enrolled

them in the appropriate vocational training programme (sewing, handcrafts, etc).

## Main fields of research

Throughout the second half of the twentieth century, leishmaniasis, schistosomiasis, mycetoma, tuberculosis, and malaria, have been top of the list of infectious diseases that have plagued Sudanese people. These pervasive diseases have been central to Prof. El-Hassan attention. Together with his co-workers, he directed his research to the understanding of these and other diseases studying their pathology, epidemiology, immunology, genetics and treatment.

The goal behind all of El-Hassan research projects was to raise awareness of the communities to their rights, to tackle the health problems in a cost-effective manner, and build capacities at all levels of the health care system. In addition to applied research, he thought basic research was needed to understand the pathogenesis of disease, which is essential for prevention and treatment.

His rich research repertoire included:

- Epidemiological, clinical and therapeutic studies on leishmaniasis in Sudan.
- Evaluation of molecular biological and serological methods in the diagnosis of leishmaniasis under field conditions.
- Immuno-pathology of leishmaniasis.
- Vaccine against leishmaniasis.
- Infectious agents and cancer: nasopharyngeal cancer, Burkitt's lymphoma, oesophageal cancer, gastric cancer, Hodgkin's lymphoma, and cervical cancer. Currently in each of these topics there is a student working for his/her higher degree under supervision of Prof. El-Hassan.
- Epidemiology and immuno-pathology of mycetoma in Sudan.
- Epidemiology of leprosy in the southern part of Gedaref State, Sudan.
- Epidemiology of malaria in two villages on the Rahad River, and Gedaref State in Sudan.
- Tuberculosis, bilharzia, and renal diseases

An important issue that has always been of concern to Prof. El-Hassan was research priorities in health in a developing country. He was convinced that priority should be given to applied health research that aims to solve the health problems in the country. He stressed, however, that basic research should not be neglected. He found out that the most relevant basic research is the type that stems from applied research and addresses questions raised by findings encountered by the research worker while conducting applied research.

This type of research satisfies the personal ambitions of brilliant young men and women who feel that they are not only solving local health problems but also contributing to knowledge internationally. If scientists in developing countries were denied the opportunity to participate in basic research, they would seek this in the more developed countries. This is one of the main reasons for brain drain among scientists of the developing nations. One way that solves this problem is to involve these young researchers in meaningful research that tries to answer questions derived from applied research. Scientists in these countries should not only be users and adapters of technology developed in the more advanced counties, but should engage in the creation of technologies that benefit their own communities and those of others in the world. In other words, they must be able to contribute to the world heritage in science and technology on their own right.

To illustrate this point, he gave leishmaniasis as an example. While working on this disease, the following questions arose:

- Why two ethnic groups, the Masaleet and Hawsa differ in their susceptibility to visceral leishmaniasis (VL)?
- Why within the same ethnic groups only some develop disease?
- Why 60% of those treated for VL develop PKDL (post kala-azar dermal leishmaniasis) and the remainder does not.
- Why does PKDL persist in some patients and self-cures in others.

To answer these questions, Prof. El-Hassan and his co-workers used field observations and data, formed hypotheses, and tested them. They studied the immune responses in VL and PKDL. Some of the research findings were:

- VL patients respond by a Th2 response. They showed that variation in NRAMP gene and IL-4 and IL9 underlie susceptibility to VL.
- Mutations in the IFN-GR1 gene are associated with PKDL.
- The rash edges in PKDL mirrors the clothing habits, affecting mainly exposed sun-susceptible areas.
- The immune responses in the skin of PKDL patient are compatible with the effects of UVB light.
- The individuals previously infected with L. major and did not develop VL (caused by L. donovani).

These last observation and studies resulted in the development of the first vaccine in the world against kala-azar (Autoclaved *L. major*+alum+BCG), which is now used as immunotherapy against PKDL. The chronic form of this disease was previously difficult and expensive to treat.[26]

This led to a project on the genetics of susceptibility and resistance to leishmania infection. One of his students, Dr Hiba Salah El Deen Mohamed and colleagues from the IED and Cambridge found the responsible genes that explained differences in susceptibility/resistance of ethnic groups and individuals to leishmaniasis.

**Schistosomiasis**

Bilharzia is a major health problem in many parts of Sudan. In the *Gezira Scheme*, the main cotton agricultural project in Sudan, 80% of the population is infected. Serious research to understand and control the disease started in the early 1960s with the formation of the *Bilharzia Society.*

A pilot multi-disciplinary project was launched in the mid seventies of the twentieth century involving researchers, laboratory technicians and fieldworkers. The objective of this project was to control the disease through moluscicides, which were then thought to be a promising tool for controlling schistosomiasis. Many medical and paramedical staff and scientists were trained. These groups later made the nucleus of the *Blue Nile Health Project* (BNHP).

Research on *S. mansoni* infection in the *Gezira Scheme* lead to the formation of the BNHP, which succeeded in reducing the infection in the population from 80% to 6% through a variety of preventive measures. In addition to reduction of morbidity and mortality, that project had an economic impact by increasing workers productivity and reducing absenteeism from work. The Director of the project was Prof. Ahmed Ayoub El-Gaddal who is now professor of community medicine at Sennar University.

The *Blue Nile Health Project* was a joint venture between Sudan Government and WHO. It was started in 1979 and became operational in 1980. Apart from Sudan and WHO support, funds were made available from the USA government, Japan, Holland and United Kingdom. Other diseases included in the project were malaria and diarrhoeal diseases. A member of this group, Dr Allan Fenwick, headed a similar project to control schistosomiasis in Egypt and achieved great success.

The research on *S. bovis* in cattle by the veterinary group led to the discovery of the first effective vaccine against the disease. The work was a joint venture between the faculty of Veterinary Science, University of Khartoum and the London School of Tropical Medicine.

Later on, in the area of basic research, Sudanese scientists in collaboration with French researchers succeeded in elucidating the genetics of susceptibility of humans to Symmer's fibrosis (liver fibrosis), a major cause of death in those infected with *S. mansoni*.

**Leishmaniasis**

Prof. El-Hassan and Dr Zijlstra produced in 2001 a supplement to the *Transaction of the Royal Society of Tropical Medicine and Hygiene*, entitled *Leishmaniasis in Sudan*. The supplement was based on their experiences on visceral, cutaneous, and mucosal leishmaniasis in different regions of Sudan.[27]

The supplement was intended mainly for clinicians and other health workers involved in the diagnosis and management of patients with the various forms of leishmaniasis encountered in Sudan. The emphasis of the work, thus, has been on clinical description, methods of diagnosis and therapy. While keeping as much as possible to this theme,

they have included new developments particularly in immunology and molecular biology and their application to the diagnosis of this complex disease and to a better understanding of its pathogenesis. Since any particular form of leishmaniasis gives rise to a wide spectrum of clinical and pathological manifestations, each section of this supplement included coloured photographs that reflected the wide range encountered in clinical practice. The supplement contained detailed historical account of all the work carried out in the field of leishmaniasis in Sudan since 1904. The authors of the supplement dedicated it to the late Dr Mohamed Hamad Satti, Professor Robert Kirk and Dr DJ Lewis, who pioneered leishmaniasis research in Sudan.

Leishmaniasis in all forms is endemic in several parts of Sudan and is a major health problem. Prof. El-Hassan and Dr Zijlsta reported that a severe epidemic of visceral leishmaniasis started during the mid 1980s in southern Sudan and claimed thousands of lives. Two epidemics of cutaneous leishmaniasis affected northern Sudan along the River Nile, where the disease is now endemic.

The *Institute of Endemic Diseases* in collaboration with University of Copenhagen embarked on a joint project on malaria and leishmaniasis in 1989. The project continued for nine years. It included training and capacity building which helped in the development and training of the researchers at the IED. The epidemiology and clinical spectrum of the two diseases were worked out, and new diagnostic tools based on molecular biology and immunology were introduced. In addition to applied research, several basic research projects derived from field observations were identified and executed. This culminated in the development of the first vaccine against kala-azar in the world, which is now used as immuno-therapy against a form of leishmaniasis (post kala-azar dermal leishmaniasis) that was previously difficult to treat.

A similar successful project was carried out on leishmaniasis in collaboration with the University of Cambridge (United Kingdom) and sponsored by Wellcome Trust. Through this project, which is still running, a Sudanese PhD student worked out the genetics of susceptibility to kala-azar and its major complication, post-kala-azar dermal leishmaniasis (PKDL). Other students trained through this project were mentioned above.

Not all collaboration with the north was so successful. Prof. El-Hassan and colleagues at the IED deviated from the policy of linking training abroad with local capacity building only in two projects with unfortunate results. Two students were sent abroad as full time graduate students with no local capacity component included in the projects. The two students after obtaining their PhD degrees left the country contributing nothing at all to the local research system. The IED had to learn the lesson the hard way.

It was through these projects that Prof. El-Hassan and co-workers were able to help improve the health services of the rural communities in Gedaref State. For example, the villagers in Bazoura, south of Hawata, built a health centre and asked the team of researchers from the *Institute of Endemic Diseases* to run it. The IED trained two medical assistants, a laboratory assistant, and a midwife to work in this centre. When the facility was well established, it was taken over by the Gedaref State Ministry of Health. The IED team then established another modern health centre in Kassab near Gedaref, as a research facility that also provided health care to the local community. Currently, the IED is in the process of establishing a similar centre in Doka village in Gedaref Province.

**Mycetoma**

Mycetoma is a chronic disabling disease caused by fungi and higher bacteria. It is mainly a disease of farmers in rural areas. Prof. El Sheikh Mahgoub and Prof. Samia Ahmed Gumaa established in 1968 a mycetoma ward and clinic in Khartoum North Civil Hospital for therapeutic and diagnostic research, and launched a mycetoma project with the help of the Overseas Development Administration of the United Kingdom, World Health Organization, Ministry of Health and University of Khartoum. The work continued by second-generation scientists until this day. Through this project, many generations of scientists were trained. In all these activities, Prof. El-Hassan saw patients in the ward and offered valuable research advice.

In 1991, the Mycetoma Research Centre was established at Soba University Hospital, University of Khartoum, under the leadership of Prof. Ahmed Hassan Fahal, a student of Prof. El-Hassan. The main

aim of this centre was to eradicate mycetoma through research, education, prevention and treatment of patients. Prof. El-Hassan was there as a founding member; his sound advices and remarks which were intended to help patients, refine and polish research work, educate medical and para-medical staff and improve and develop the centre were helpful. This centre is currently a leading international base in mycetoma research, and Prof. El-Hassan is still closely involved in its activities.

The Mycetoma Research Centre consists of a clinic complex housed in the same building, linking clinical services with research. It contains a library and archives containing historical documents on mycetoma including the papers and correspondence of the late Mr Ibrahim Mohamed El-Moghraby,[28] one of the pioneers of mycetoma clinical practice and research in Sudan.

The main achievements of this Centre in this field are in the epidemiology, immunology, therapy, and experimental infection of laboratory animals. A project on the genetic basis for susceptibility to the disease is being launched, and a full-fledged programme is underway.

This success story is due to the effort of two scientists, Prof Ahmed Hassan Fahal, Professor of Surgery who is also the Chairperson of the Mycetoma Research Group at IED and Director of the Centre, and Mr Suleiman Hussein, Director of SUH. The Centre collaborates closely with IED in the field of mycetoma.

Despite his busy schedule, Prof. El-Hassan was also actively involved in the field study of mycetoma at Western Sennar region, Central Sudan, which is a mycetoma endemic area with high morbidity rate. Prof. El-Hassan managed to spend a good length of time in the field where he observed and talked to the mycetoma patients and interviewed community leaders and elders, conducted health education sessions, and encouraged the local health authority to help those affected by the disease. He also gave presentations on the subject to the staff and students of Sennar University.

## Recognition

In recognition of his academic excellence and distinctive professional achievements, Prof. El-Hassan was honoured in several ways through several awards,[29] several honourary posts,[30]memberships in renowned bodies,[31]and visiting professorships.[32]The *Prof. El-Hassan Centre for Tropical Diseases* in Doka in Gedaref State, which was established by the project of Drugs against Neglected Diseases Initiative (DANDI) stands as a token of gratitude and appreciation for the useful work that Prof. El-Hassan carried out there (see signpost in the annexed Photo Gallery). DANDI has already established Kassab Research Centre for testing new drugs and combination of old drugs in the treatment of kala-azar. Indeed, the career of Prof. El-Hassan has been crowned academically and his excellence acknowledged when the University of Khartoum bestowed on him the status of Professor Emeritus of Pathology in 1991.

## Family

Prof. El-Hassan got married in 1959 to Amal Galal Mohamed from Atbara near his hometown, Berber. Prof. El-Hassan has four daughters, all are university graduates. Only his youngest daughter Dr Lamyaa followed on his footsteps; she is now an assistant professor of pathology at Ahfad University for women in Omdurman.

## Hobbies and pastimes

Prof. El-Hassan has been a particularly keen photographer and more so a lover of music. Interest in photography was expected or at least not surprising. He was expected to document his work visually not to mention capturing the interesting moments in his rich life. The Museum of Pathology he maintained in the Faculty of Medicine, University of Khartoum was based on slides, sections, specimens and photographs among other artefacts. However, his love of music and serious pursuit of research in its history, and his studies in the lives and work of the famous musicians should be explained differently.

As expected, Prof. El-Hassan serious interests were not without interesting applications. He researched the lives of several figures in Arabian history. He studied their lives carefully and drew interesting con-

clusions on the way they died, and published them in Arabic in the Sudanese daily press.

For example, he thought, not without good reasons that Ashaab (أشعب) suffered from Ehlers-Danlos syndrome. Prof. El-Hassan wrote, "This syndrome is an inherited condition characterised by hyperextensibility of the skin and hypermobility of the joints. Ashaab was a multitalented individual. He was a scholar in *Hadeeth*, a comedian/actor, singer and jester. He had interesting relationship with Sukaina Bint El-Hussein and many comic stories involving Ashaab were told at Sukaina's residence. This is what Abu Al-Farag Al-Asfahany tells us:

> "Ashaab came to know that another comedian called El-Ghadry started entertaining people and that he became popular in the city of Madeena. Ashaab once found this man entertaining a group from Ghoraish tribe. He went up to him and defied him to perform in front of the spectators the acts he was about to do. Ashaab then started his performance. He distorted his face so that it became wider bearing no resemblance to his original face. He then extended his face until it reached his chest. He then stripped himself of his clothes and bent his back making a camel-like hump measuring the span of the hand. He then discarded his trousers and stretched the skin of his scrotum until it touched the ground.'[33]

We see from this description that Ashaab had two attributes of Ehlers-Danlos syndrome: hyperelastic skin and hypermobile joints. It is known that the hypermobility in Ehlers-Danlos syndrome may affect the spine, particularly the cervical. This seems to be the case with Ashaab.

The early Arab musician, Ibrahim El Mousili (إبراهيم الموصلي), Prof. El-Hassan wrote, could have died of colonic cancer. This, he deduced from a description of his illness in *Kitab Al-Aghany* by Abu Al-Farag Al-Asfahany). El Mousili was described as suffering from colitis, *Daa Al-gholung* (داء الغولونج) by Abu Al-Farag. Late in his illness, he was not able to pass stools or flatus, and lost a lot of weight. All this is compatible with cancer of the colon. In this condition, the cancer blocks the large intestine. It causes loss of weight known to doctors as

cachexia of cancer. We were told that after his son, Ishag, witnessed how his father suffered from this illness, used to pray to God not to be taken through his father's disease. Ironically, Ishag died of the opposite: severe diarrhoea, probably cholera.[34]

Equally, Prof. El-Hassan has also been studying the lives and diseases, melodies and maladies as it were, of early classical Western composers and musicians namely Mozart and Beethoven. He wrote an interesting article describing the diseases that afflicted Mozart and the possible causes of his death.[35]

Mozart had most likely died of chronic renal failure. He had several attacks of tonsillitis during his childhood. It is well known that this bacterial infection may have lead to inflammation of the kidney (glomerulonephritis). During his last illness from which he died, he had symptoms and signs of chronic renal failure. These included swelling of his body (oedema), and symptoms of uraemia.

Beethoven, he believes, died from alcoholic cirrhosis of the liver. This was documented at the autopsy of the composer performed by two prominent pathologists.

Prof. El-Hassan also did some studies on the history of oriental music in Egypt. He was particularly interested in the period between the times of the French invasion to the first half of the twentieth century.

These topics were delivered and discussed in lectures at different forums including the IED, Shendi University, Faculty of Science of the University of Khartoum and a meeting organised by SNAS. All lectures were accompanied by selections and analysis from the composers' music. Some of these lectures are now available on CDs.

## Notable predecessors & contemporaries

Prof. El-Hassan worked with several notable pathologists and shared their wisdom and experience. The list includes Prof. Mansour Ali Haseeb, Dr Mohamed Hamad Satti, Prof. Robert Kirk, and Prof. El-Sayyid Daoud Hassan, and of course, several colleagues and seniors abroad. The younger colleagues and contemporaries of Prof. El-Hassan include Prof. Ahmed Ali El-Tayib,[36] Prof. Awad Omer,[37] and Prof. El-Sadig Abdel-Wahab.[38] The list of his elders and early Suda-

nese pathologists, however, will not be complete without mentioning two: the late Dr Mahmoud Abdel Rahman Ziada, and Dr Mirghani Yousuf Ali. Dr Ziada graduated from KSM in 1945, and took clinical haematology as specialty, and Dr Mirghani Yousuf Ali opted to emigrate and settle in Australia.

Dr Mirghani Yousuf Ali graduated from KSM in 1952, and was interested in pathology since his schooldays. After graduation, he soon left to Britain where he obtained several diplomas in clinical pathology and forensic medicine. After specialization, he returned to Sudan in 1962 and stayed only for one year before he left the country for good. He landed first in Singapore, and there he joined Prof. Robert Kirk for some time. Then he left to Australia where he settled, made a name in pathology, and became an authority in diabetes. While in Singapore, Dr Ali did an MD by research on the anatomy of the nasopharynx, the material of which was included in Gray's Anatomy. Dr Ali was known to be highly organized and meticulous scientist. During his short period as pathologist in Sudan, he upgraded and modernized histopathology services.[39]

The Sudanese pathologists contributed significantly to the Sudanese medical literature. They published a large number of high-quality papers, books and chapters in textbooks and monographs. This literature will appear soon in a separate work.[40]

### Prof. Mansour Ali Haseeb

Prof. Haseeb (1910-1973) was born in El Gitaina in 1910 though originally his family migrated to this town from El Dammar, the strong hold of the Galieen. He graduated from KSM obtaining the DKSM with first prize in medicine in 1934.[41]He immediately joined SMS. In 1946, he was sent to Britain where he specialized in microbiology. On return to Sudan, he succeeded Prof. Robert Kirk as Director of SMRL. He held this post from 1952 up to 1963. During his tenure in SMRL, he established the Laboratory Technicians School.

Like all WTRLK and SMRL staff, he also worked as part time lecturer in microbiology, community medicine, physiology, and forensic medicine in the school of medicine.

In 1960, Prof. Haseeb established the Microbiology and Parasitology Department under the supervision of Professor James Dunbar. In 1963, he replaced Professor Dunbar as the first Sudanese Head, Department of Microbiology and Parasitology, Faculty of Medicine, University of Khartoum. In the same year, he was appointed first Sudanese Dean of the Faculty of Medicine, University of Khartoum, a post he held up to 1969. During this period, he organized a programme for postgraduate training of junior lecturers in all specialties.

In 1973, he was appointed president of the Sudan Medical Council and in the same year elected as assistant for health affairs for the secretary general of the League of Arab Countries.

Prof. Haseeb's notable contributions are in the field of vaccine production. In recognition of his services and published work (over 60 publications), he was elected Fellow of the Royal College of Pathologists in 1965 and Fellow of the Royal College of Physicians in 1968.

## Dr Mohamed Hamad Satti

Dr Mohamed Hamad Satti (1913-2005), graduated from Kitchener School of Medicine in 1935 and acquired the MPH from John Hopkins, USA in 1959. Dr Satti had been undoubtedly the patron of all Sudanese health care researchers. He dedicated his life to field and laboratory work trying to understand the major diseases of the Sudan. He investigated the epidemiology, causative agents, vectors, reservoirs, diagnosis, and treatment of these killer diseases. He left behind a legacy of scientific excellence and valuable results on leishmaniasis, trypanosomiasis, Weil syndrome, bilharzia, yellow fever, small pox, cutaneous larva migrans, bancroftian filariasis, Kakoom paralysis, etc., and more than 60 published papers and solicited reports.[42]

## Prof. Robert Kirk

Robert Kirk (1905-1962)[43] joined Sudan Medical Service in 1933, eventually becoming Director of the Wellcome and Stack Laboratories in Khartoum. In 1952, he was appointed the first Sudanese Professor of Pathology in the University College of Khartoum, and later (October 1954-March 1955) Dean of the Medical School.[44] He was suc-

ceeded in this post by Dr Mansour Ali Haseeb, the first Sudanese doctor to join SRL, in the post of assistant director of research.

Robert Kirk joined the University College from the Stack Laboratories with a worldwide reputation as a research worker who had made outstanding contributions to the understanding of kala-azar, yellow fever and many other tropical diseases.

Prof. Kirk's interests were wide and varied. Dermatology was not taught systematically in the Kitchener School of Medicine then. In fact, in the middle of the 1930's, it was decided that a course of lectures would be inappropriate, as there would not be enough clinical material in Khartoum to illustrate the subject. A reassessment of this position made in 1952, showed that there was no dearth of material and that even a brief introduction to the subject would greatly assist the students when they qualify.

For many years before he joined the Faculty, Prof. Kirk was interested in the parasitological and pathological aspects of dermatology. Together with Prof. HV Morgan, he introduced dermatology teaching and set up the first skin clinic in the country in Khartoum Civil Hospital in 1952. Prof. El-Hassan used to attend those clinics as a house physician and later he used to discuss the pathology of the cases of the week showing the microscopic slides. This was the basis for Prof. El-Hassan interest in dermatology. This discipline, he believes, demands clinical experience and pathology by both practicing dermatologist and pathologist. Working with both Prof. Kirk and Prof. Morgan, Dr Abdel Moneim Wasfi developed interest in dermatology and helped establish the discipline in the Ministry of Health.

Both deserve to be called the forefathers of Dermatology in Sudan. Indeed, a special issue of *Al Hakeem Medical Students Journal* containing a collection of Prof. Morgan's articles on skin was dedicated to Prof. Kirk.[45] The Editors of *Al Hakeem* rightfully commented that they commemorate the stimulus, which Robert Kirk gave to a branch of medicine, allied to, but different from the field in which he was pre-eminent, hoping that future developments of dermatology in Sudan will pay tribute to his genius.[46]

Because of his contributions to tropical medicine, Prof. Kirk was awarded the Chalmers Medal of Tropical Medicine and Hygiene in 1943.[47]

In 1955, Prof. Kirk took his last journey to Malaya, and thence to Hong Kong, where he died in 1962. In addition to the many papers, he authored and already documented[48] a wide range of other papers and manuscripts relating to medical practice in Sudan were found among his effects after his death. They were presented to the Royal Commonwealth Society in the United Kingdom by Prof. JB Gibson, Dean of the Faculty of Medicine, Hong Kong through Dr KE Robinson in February 1977.[49]

## Prof. El-Sayyid Daoud Hassan

Prof. El-Sayyid Daoud Hassan (1930-2000), (MB BS, PhD, Pathology, University of London, MRC Path, UK), graduated from the Faculty of Medicine, University of Khartoum in 1956. His career in the Ministry of Health progressed until he was Senior Pathologist and Director of Laboratories. In the 1960s, there were only two pathologists in the country: Prof. El-Hassan and Dr El-Sayyid Daoud Hassan. The relation between the two pathologists was perfect. They split the pathology workload into two. Prof. El-Hassan carried out investigations of the capital city, while Dr El-Sayyid took care of the provinces. This arrangement ushered the idea of the Cancer Registry, which they established in 1966. Due to this collaboration and the Ministry of Health support that Dr El-Sayyid made available, the Institute of Laboratory Assistants was founded. In addition, with the help and collaboration of Prof. Awad Omer and other pathologists from the Faculty of Medicine, University of Khartoum, Dr El-Sayyid was enabled to develop the ministry's laboratory services and research. Dr El-Sayyid held the chairs of professor of pathology at Sanaa University in the Republic of Yemen, and Juba University, and the post of visiting professor in the Faculty of Medicine, University of Khartoum. He was the author of the first textbook in forensic medicine in Arabic in Sudan entitled (الطب العدلي). The book was published in Khartoum in 1995.

## Grey literature

Prof. El-Hassan produced several documents that reside in the area of grey literature.[50] These documents like any other 'grey literature' are characteristically not always easily available. Identification and acquisition of this type of documents pose difficulties for librarians and other information professionals. It lacks strict bibliographic control, meaning that basic information such as author, publication date or publishing body if any may not be easily discerned. In addition, non-professional layouts and formats and low print runs of this literature make the organized collection of such publications challenging compared to more traditional published media.[51]

In 2002, Prof. El-Hassan chaired a committee organized by the Directorate of Research, FMOH with support from EMRO on setting health priorities for Sudan. Through several subcommittees using several methods and using secondary data, interviews with health workers, and policy-makers in health and related fields, Prof. El-Hassan's team covered all states in Northern Sudan. Prof. Mohamed Ali Awad El-Karim, Dr Samia Habbany and Prof. El-Hassan wrote the document entitled (Priority Setting on Health Research in Sudan, 2000). The document and report were submitted to FMOH and EMRO. This document is available in Arabic in Research Directorate, FMOH.

In 2002-2003, Prof. El-Hassan was asked by the Research Directorate, FMOH in collaboration with EMRO to chair a committee to carry out situation analysis of health research in Sudan. The research team produced and issued a comprehensive document on the subject.[52]

Prof. El-Hassan also reflected on the major challenges that face science in Sub-Saharan Africa and had shrewd insights and suggestions. Those reflections were presented at a conference on Africa convened by the International University of Africa in Khartoum in 2005. He noted that Africa continues to show a poor performance in the major measures of development. Twenty-five of the 30 poorest countries in the world are in Africa and 32 per cent of the poor of the world are in Sub-Saharan Africa. This region has been plagued with droughts, famines, civil strives and wars. The yield of agriculture is low and has not kept pace with the population growth. Of all infectious diseases,

nearly 80 per cent are in Sub-Saharan Africa. About 75 per cent of HIV/AIDS cases worldwide are in this region. The UNDP's latest Human Development Report uses a new index to capture how well a country is creating and diffusing technology and building human skills base. Of the 24 countries categorized as low human development countries, 16 are in Sub-Saharan Africa.

While migration of professionals from Africa poses a major problem adversely affecting development in the continent, alleviation of poverty, resolving conflicts, investment in science and technology, North-South collaboration are some key measures for achieving sustainable development in the continent. Thus, a suitable instrument to address the challenges facing Africa, he said, is commitment to the Millennium Development Goals.[53]

The issue of North-South collaboration in health research has been pivotal in Prof. El-Hassan research approaches. He noted with concern the wide discrepancy between health care and health research in developing and developed countries. In an effort to narrow the gap that existed, he initiated several activities to forge collaboration between developed countries and Sudan.

He wrote on the issue recounting the success story of the joint programmes that he initiated in Sudan between the University of Khartoum, and Copenhagen, Denmark and identified some problems. The departments of the FOM that were involved in the programme included Biochemistry and Pathology. The project addressed two main health problems in Sudan: malaria and leishmaniasis with the objectives of gaining deeper understanding of the epidemiology and host parasite interaction in these two diseases. The goal was to develop effective preventive and curative measures, strengthen research capabilities in both countries and train Sudanese and Danish students in the fields of leishmaniasis and malaria. Several projects were launched with active participation of both Sudanese and Danish scientists. This collaboration was briefly described above.

The programme, which started operation in 1989 and the first project became active in 1990 was established between the Faculty of Medicine, and IED at the University of Khartoum, and the Centre for Med-

ical Parasitology at the University of Copenhagen, and supported financially by Danish International Development Assistance (DANIDA) through the bilateral programme for Enhancement of Research Capacity in Developing Countries (ENRECA).

This programme was envisaged to continue for 10-15 years. However, it ran from 1990 to 1999, and until DANIDA funding was terminated by the Danish Government because of human rights issues in Sudan. The University of Khartoum provided the infrastructure and payroll of the Sudanese scientists. DANIDA support amounted to about $ 2.6 million during the 9 years, and covered expenses in both Sudan and Denmark.

Through this programme, eight Sudanese and six Danish students obtained their PhD degrees in immunology and molecular biology. The Sudanese students who returned to Sudan continued research through the WHO TDR programme,[54] Wellcome Trust and other sources. They have in turn trained others to the level of Masters and PhD levels.

Sixty-seven papers on leishmaniasis and malaria were published in reputable international journals. A research laboratory was established within the Department of Biochemistry at Faculty of Medicine, University of Khartoum. A field station in a village in a malaria endemic area was established. Data on the village covered ten years and has one of the most meticulously kept database and biological samples in the world. IED benefited from this collaboration through capacity building and training and was able to compete for and acquire funds from various international donors.[55]

Collaboration between Sudan and Denmark is an example of the worthwhile collaboration between North and South. It was realized that collaboration between institutions in the North and South is essential if the wide gap in development is to be narrowed.

The Commission on Health Research for Development reported on the status of health research in developing countries in 1990. The main findings of the commission was that despite the fact that 80% of the world population live in developing countries and shoulder 95% of

global disease burden, only 5% of global investment in research was committed to health problems in developing countries.[56]

Prof. El-Hassan was of the opinion that the collaborative programme between Sudan and Denmark succeeded for several good reasons. The programme has a capacity-building component, and the problems to be researched were regarded as major health priorities in Sudan and were acceptable to the scientists in both countries. It was realized that the eventual control of the targeted diseases require better insight in the host-parasite interaction. This required the development and application of novel research methodologies and techniques. Scientists from both countries were equally involved in laying down the strategic plan for research and the elaboration of the research project. Capacity building included training of scientists from both countries and establishment of facilities in Sudan and Denmark for the implementation of the research project.

Danish and Sudanese students selected their research from the priority areas identified in the research plans of the programme. They did their research partly in Sudan and partly in Denmark. Workshops and seminars were held in both countries. The results of the project were discussed, progress reported, and proceedings were published in *Sudan Medical Journal*. The long-term funding commitment was necessary to build and sustain effective research capacity. In this case, the programme embarked on longitudinal population based studies, which also attracted funds from other international sources and expanded the collaboration to include Southern partners (in Tanzania and Ghana) and participation in the establishment of the African Malaria Vaccine Testing Network, and additional Northern Partners in Britain.

Some collaborative projects, however, did not achieve their set goals or failed to materialize, some students who were sent abroad for training did not come back home. Some European partners sabotaged data collected on the joint projects without approval of the Sudanese partner, and the Sudanese Government did not provide enough of the local component other than salaries of national scientists and overheads.

Nonetheless, Prof. E-Hassan and colleagues, and of course other scientists in other fields have proved that collaboration between devel-

oped and developing nations is possible and could succeed and this programme in particular has paid off.

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## Publications by Subject

## List of scientific journals

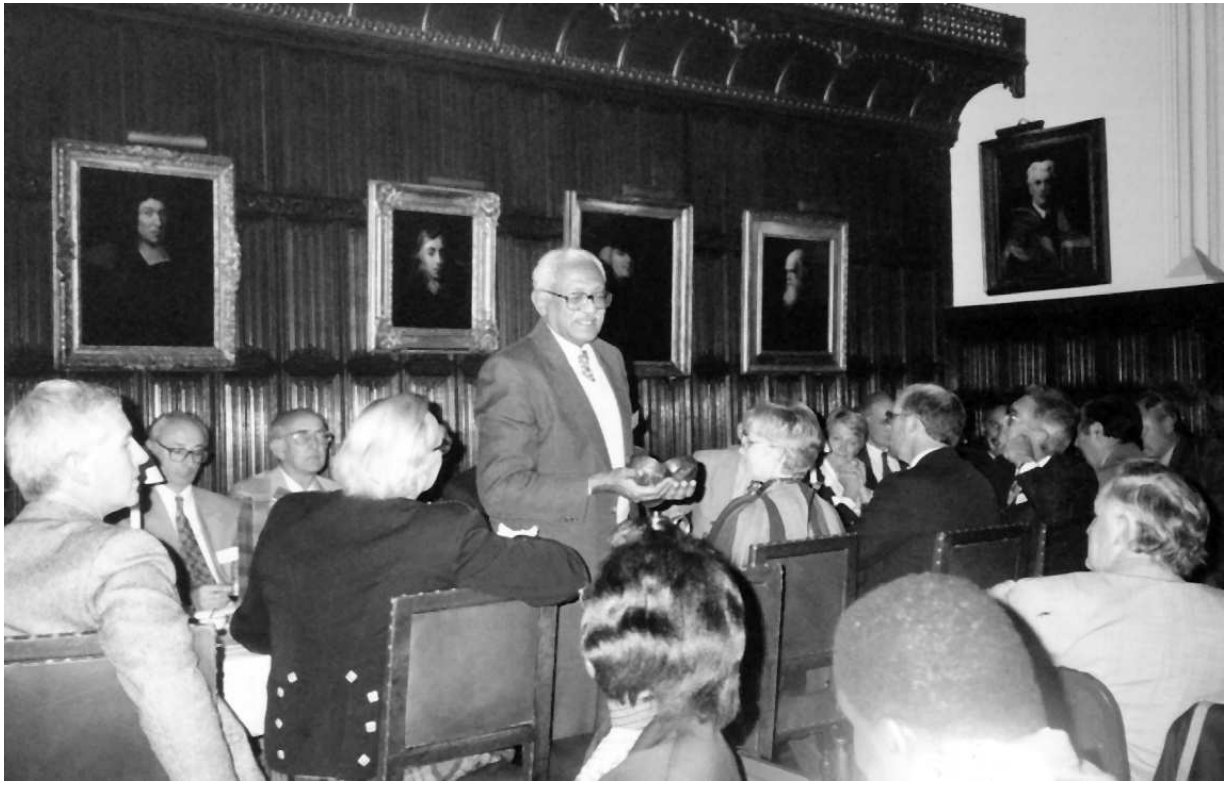
(that published for El-Hassan)
Act. Morph. Acad. Sci., Hung.
Acta. Dermato-Venereologica
Acta. Path. Microbiol. Immunol. Scand.
Acta. Trop.
Afr. J. Med. Sci.
Ain Shams Med. J.
Al-Hakeem
Alpa. Adna. Microbiology Journal
Am. J. Trop. Med.
Am. J. Trop. Med. & Hyg.
Ann. Med. Parasitol.
Ann. Saud. Med.
Ann. Trop. Med. & Parasitol.
Antimicrobial Agents and Chemother. J. Clin. Microbiol.
Arch. Inst. Pasteur. Tunis.
Aust. Vet. J.
B. Trans. Roy. Soc. Trop. Med. Hyg.
Br. J. Exp. Path.
Br. J. Haematol.
Breast Cancer Research and Treatment
Brit. J. Cancer
Brit. J. Dermatol.
Brit. J. of Cancer
Brit. J. Surg.
Brit. Med. J.
Bull. Soc. Path. Ex.
Bull. Soc. Patholg. Exot. Filiales
Clin. Diag. Lab. Immunol.
Clin. Exp. Immunol.
Clin. Immunol.
Community Genet.
Comp. Biochem. Physiol.
Cornell Vet.
Cs. Patal.
Diagn. Lab. Immunol.
East Afr. Med. J.
East Mediterr. Health J.
Eur. J. Hum Genet.
Fet. Pediatr. Pathol.
Genes Immun
Genetica
Immunology
Immunology Letters
Int. J. Dermatol.
Inter. J. Tuberc. Lung Dis.
J. Am. Acad. Dermatol.
J. Clin. Invest.
J. Clin. Microbiol.
J. Clin. Path
J. Comp. Pathol.
J. Gent. Virol.
J. Med. Vet. Mycol.
J. Obst. Gynae.
J. of Immunol.
J. Path. Bact.
J. Pathol.
J. Trop. Med. & Hyg.
J. Trop. Paed.
J. Trop. Paediatr. Environ. Health
Lab. Medica Int.
Lancet
Lepr. Rev
Man
Med. Hypotheses
Nat. Clin. Pract Gastroentrol. Hepatol.
NZ J. Vet.
Oral Surg., Oral Med. & Oral Path.
Parasitol. Res.
Pediatr. Path. Molec. Med.
Postgraduate Doctor
Rev. Elev. Med. Vet. Pays. Trop.
Sabourodia
Saudi Med. J.
Scand. J. Immunol.
Sud. Med. J.
Sudan J. Dermatol.
Thorax
Trans. Roy. Soc. Trop. Med. & Hyg.
Trop. Geogr. Med.
Trop. Med. Int. Health
Tubercle

Vaccine
West Afr. J Pharmacol. Drug Res.
Zbl. Vet. A.

# Photo Gallery

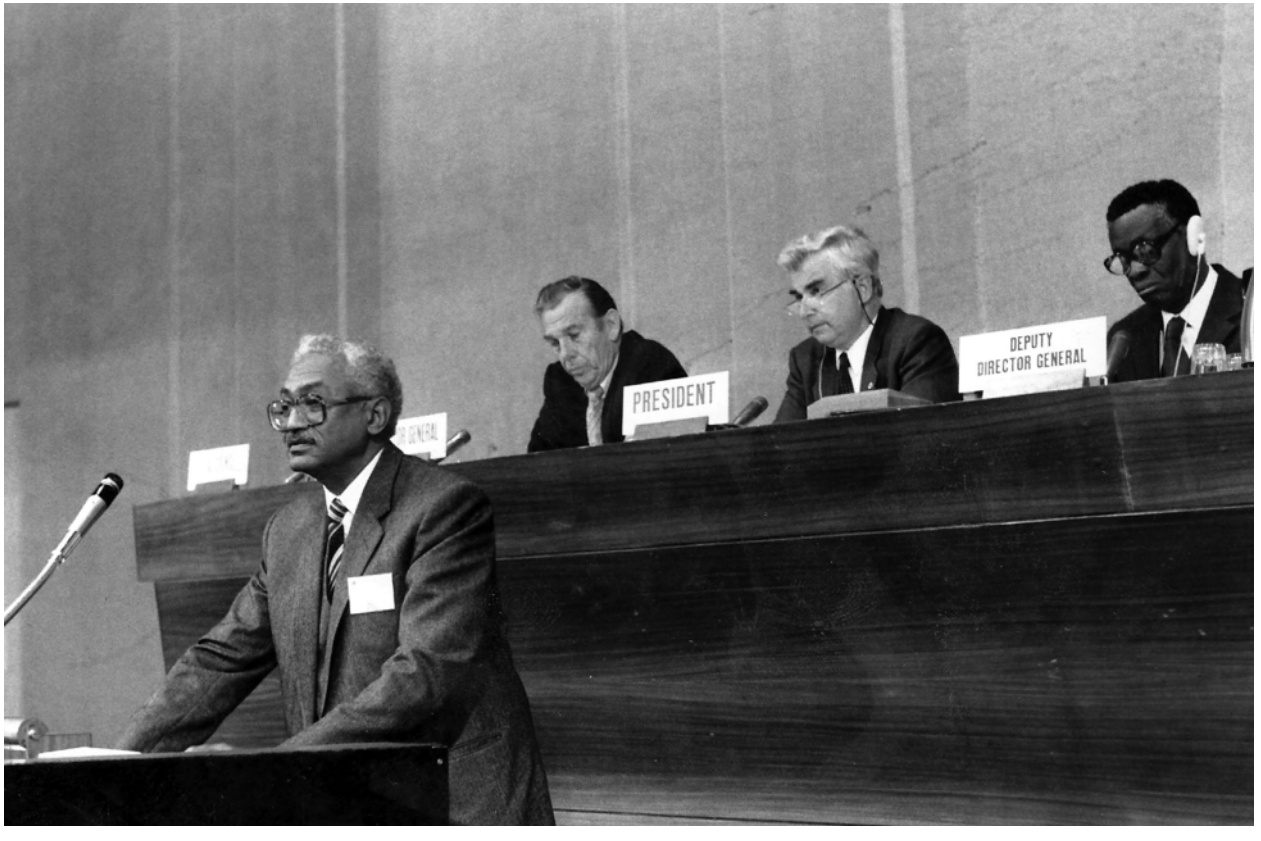
**1. The first basic sciences lecturers in Faculty of Medicine, University of Khartoum: left standing: El-Hassan, Girgis, left sitting: Haseeb, Morgan, & Satti**

2**. El-Hassan & family**

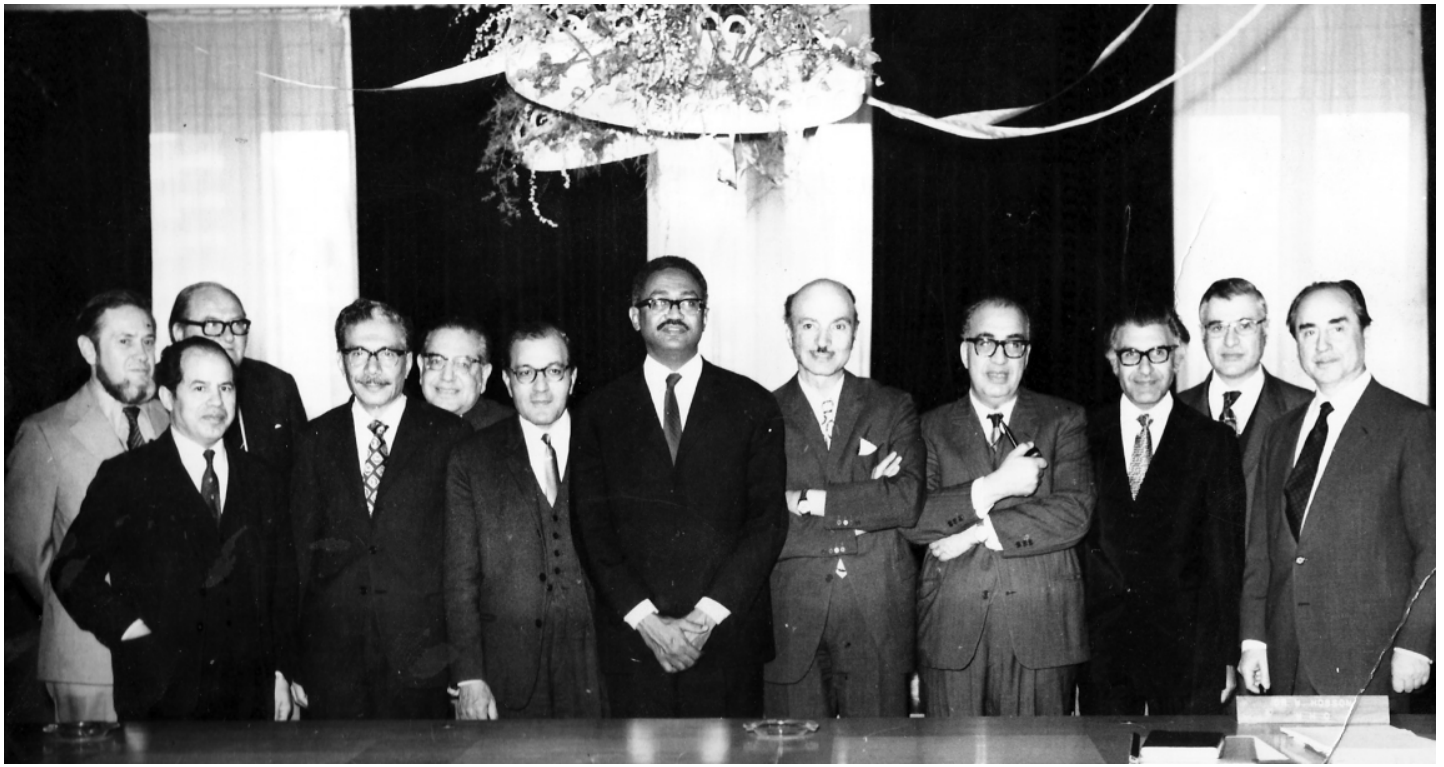


**3. Receiving the Donald Mackay Prize**

**4. Receiving the Donald Mackay Prize**




**5. Receiving the WHO Shousha Prize**



**6. Among WHO, EMRO notables**

**7. From left: Daoud Mustafa, AM El-Hassan, Mohamed El-Nassri (receiving Emeritus Professorship, University of Khartoum in 1991)**


8**. El-Hassan Centre sign post in Gedaref**

**9: El-Sheikh Abdel Rahman & El-Hassan supporting WIG programmes**

**10. WIG group: from left: Suad Ibrahim Eissa, Rashida, El-Hassan, El-Sheikh Abdel Rahman & Fatima Mahgoub**

**11. El-Hassan at work**

## Biographer's Profile

Professor Ahmad Al Safi

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Professor Ahmad Al Safi is an anesthesiologist, researcher, editor, and administrator. He is currently Professor of Anesthesiology, Khartoum College of Medical Sciences, & Executive Director, Sudan Medical Heritage Foundation. He is member of several standing committees in Sudan Medical Council.

Prof. Safi graduated in 1971 from the Faculty of Medicine, University of Khartoum, Sudan, worked and trained in the prestigious Royal Infirmary, Edinburgh, United Kingdom (1973-77). He achieved academic distinction by attaining the DA (RCP RCS) in 1976, Fellowship of the Faculty of Anaesthetists of the Royal College of Surgeons

(FFARCS) of England in 1977, and Fellowship of the Royal College of Anaesthesia (FRCA), England. In 1982, he had orthodox training in traditional Chinese medicine and acupuncture as applied to Anaesthesia, analgesia and therapy in Nanjing (China).

He had strong foundation and experience in almost all subspecialties of Anaesthesia and intensive care. In thirty-six years of medical career, in addition to hands-on clinical practice, he managed departments of Anaesthesia, research institutions and hospitals. He had been consultant Anesthesiologist and Intensivist for the last twenty-seven (27) years in different hospitals around the world including the 1200-bed Khartoum Teaching Hospital in Sudan. He was one of the founding anesthesiologists of open-heart surgery with the late Mr. Ibrahim Mustafa and neurosurgery with Mr. Hussain Sulaiman Abu Salih in Shaab Hospital, Khartoum in 1980 and beyond.

In the period 1978-88, he carried out important studies for Sudan Medical Council, Sudan Medical Association, and Ministry of Health. In 1982, the Sudan Medical Council asked him to study (Postgraduate Medical Qualifications: Recognition and Equivalence). The study became the preamble for the *Specialist Register Ordinance* of 1985. In 1984, the Sudan Medical Association and Ministry of Health asked him to study (Teaching Hospitals Organization and Management in Sudan). The study became the preamble for the *Teaching Hospitals Organization and Management Ordinance* and the *High Council for Teaching Hospitals Ordinance* in 1985.

In the years 1989-2004, he occupied key posts in the medical services in ARAMCO Khafji Joint Operations (KJO) in Saudi Arabia. During this period, he contributed significantly to the promotion of health care management in the northeastern region of Saudi Arabia. In 1999, he was appointed Chairperson for the KJO Healthcare Quality Improvement Programme.

Prof. Safi was a student and disciple of the late Prof. Tigani El Mahi (1911-1970). Due to this memorable relation, Prof. Safi developed a love for the study of sociology, anthropology and history of Sudanese health culture. He dedicated the last thirty-five years in studies in these fields. To perpetuate Tigani’s legacy, Prof. Safi spent ten years

(1970-1980) collecting Tigani El Mahi's scattered works, which he edited with the late Prof. Taha Baasher (1922-2008) and published in two volumes, the English essays in a volume entitled *Tigani El Mahi Selected Essays* in 1981, and the Arabic essays in a book entitled (التجاني الماحي، مقالات مختارة) in 1984.

Prof. Safi wrote extensively on health issues in both Arabic and English. His voluminous book *Traditional Sudanese Medicine* (2006) is a wide-ranging 740-page account of traditional Sudanese medicine targeting health care providers, students of medicine, pharmacy, veterinary, agriculture, medical sociology, medical anthropology, and folklore. The book contains a 2500-reference bibliography of traditional medicine and history of medicine, and a 600-item Sudanese *materia medica*.

In 1981, he founded the Traditional Medicine Research Institute in Medical Research Council (National Council for Research). This institute was designated a World Health Organization Collaborating Centre in Traditional Medicine in 1984. He was founding director for this institute for ten years, and was a member of the WHO Expert Advisory Panel for traditional medicine in the Eastern Mediterranean Region (1982 for over ten years).

In 2005, he founded the Sudan Medical Heritage Foundation as a non-profit, non-governmental organization, and the Health Heritage Studies Centre as a charitable company. Both organizations are dedicated to health systems research, development, & conservation of Sudanese health care heritage and resources.

Prof. Safi has an extensive record of accomplishments in working with and in groups for four decades. He founded or co-founded several organizations-governmental and non-governmental-and held executive offices in many, and memberships in many more.

His Arabic book (المرشد إلى قواعد وإجراءات الهيئات التداولية) *A Manual on Rules and Procedure of Deliberative Assemblies* (first edition 1999: 630 pages, second edition 2006: 580 pages) puts him in the forefront of Sudanese and Arab writers who have drawn attention to the field of parliamentary procedure. Critics have noted that this book is probably

the only one of its kind in Arabic, and that it provided an invaluable toolbox for modern organizations in a country undergoing democratic transformation.

Prof. Safi was Editor of *Al Hakeem Medical Journal* (1968-1970), Editor-in-Chief, *Sudan Medical Journal* (1984-1988), Editor, *Sudan Studies Bulletin* (1984-1988), and Advisory Editor and referee, *Social Science and Medicine*, Aberdeen (1984-1994). He is currently running a service called *Sudan Editors* (SE) aiming at improving Sudanese academic writing tools. The SE service is run by a team of professionals, ex-editors, postgraduate supervisors, and authors specialized in producing and editing corporate communications and academic and postgraduate manuscripts.

He is currently launching a major documentation project called the *Sudan Health Trilogy* including:

- *A Biographical Dictionary of Health Care Professionals in Sudan* documenting the lives and work of the men and women who have served in health care institutions or contributed to health and medicine in service and research in Sudan in the period 1903-1978. This work will be a 'Who's Who' of Sudanese health care professionals, Britons, and other expatriate staff.
- *Pioneers of Sudanese Medicine series* documenting the lives and work of the men and women who have shaped health care services in Sudan. This series will profile the individuals whose work has contributed significantly to the establishment and development of the medical profession.
- A *Bibliography of Biomedical Literature in Sudan* (1900-2000) a compilation of medical literature on Sudan by Sudanese scholars and expatriate staff produced during the 20th century.

His current fields of concern and study include health delivery systems with emphasis on anaesthetic safety and medical emergency preparedness, health culture, traditional medicine, history of medicine, and capacity building of civic society institutions.

## References & notes

[1] Ahmad Al-Safi; Taha Baasher, Editors. *Tigani Al-Mahi: Selected Essays*. First ed. (with an introduction by Taha Baasher). Khartoum: Khartoum University Press; 1981; University of Khartoum, Silver Jubilee-1956-1981. 187 pages.

[2] Ahmad Al-Safi; Taha Baasher, Editors. *Tigani Al-Mahi: Selected Essays*. [Arabic] First ed. (with an introduction by Dr Ahmad Al Safi). Khartoum: Khartoum University Press; 1984; University of Khartoum, 180 pages.

[3] Ahmad Al Safi. *Abdel Hamid Ibrahim Suleiman, his life and work*. Sudan Currency Printing Press, Khartoum, 2008. 96 pages.

[4] This monograph is based on Ahmed Mohamed El-Hassan resume, list of publications, grey documents, written statements, and personal communications with him and his associates.

[5] During the Second World War in 1940, it was decided to deploy Gordon Memorial College buildings for other purposes. The High School was transferred to Omdurman. Professor Ahmed Mohamed El-Hassan, Professor Mahmoud Ahmed Mahmoud (a notable agriculturist researcher), and Professor Hamid Ibrahim Hamid (a pioneer civil engineer and Khartoum University lecturer) were among the 1945 batch.

[6] Bakht Er-Ruda Institute of Education was founded in 1934 as a training college for primary-school teachers. Mr. VL Griffiths, the first principal of the college, selected this countryside, not far from the small market town of Ed-Dueim. The college started with a modest collection of huts and houses made from clay plastered over with mud and dung. The idea was to live just one stage ahead of the ordinary Sudan village and no more. In that isolated place, staff and students generated a sense of community and purpose, which has become a legend in the Sudan. Griffiths was principal from 1934 to 1950. Abdel Rahman Ali Taha was vice-principal from 1935 to1948 and later Minister of Education. The experiment of this institute has been documented in two important books written by Griffiths: *An Experiment in Education: An Account of the Attempts to improve the Lower Stages of Boys' Education in the Moslem Anglo-Egyptian Sudan, 1930-1950*, Longmans, 1953, and *Teacher-Centred: Quality in Sudan Primary Education 1930 to 1970*, Longman, 1975.

[7] Lecture given in close audience in the Institute of Endemic Disease, Khartoum in the period 2005-2007.

[8] Mahmoud Ahmed Mahmoud. Communication in a meeting reviewing a draft of this book in August 2007.

[9] This book is most probably *Al-Rahma fi Al-Tib wa Al-Hikma* [Arabic] by Galal Al-Din Al-Siyouti (Al-Khudra Al-Shafi'i), Abu Al-Fadl Abd Al-Rahman Ibn Al-Kamal Abi Bakr. Cairo: Abbas Abd Al-Salam Ibn Shaqroun; Undated; Many editions. Some authors claim this book is wrongly related to Al-Siyouti. They claim it is by Al-Subairi Al-Maqqarri.

[10] Al-Dairabi, Abu Al-Abbas Ahmad Ibn Ummar. *Mujarrabt Al-Dairabi Al-Kabir* (*Al-musamma bi fath Al-malik Al-majid, Al-muallaf li nafa' Al-'abid, wa qam' kuli jabbarin 'anid*) [Arabic]. Many undated editions published in Egypt.

[11] Prof. El-Hassan won on graduation Kitchener Memorial Prize and distinctions and prizes in Medicine and Surgery.

[12] The few professors who attained their chairs in medicine through the readership system include Mansour Ali Haseeb, Daoud Mustafa and Ahmed Mohamed El-Hassan.

[13] Ahmed Hassan Fahal. Written communication (2007).

[14] Professor Suad Mohamed Sulaiman is a notable Parasitologist with BSc Biology (Zoology & Chemistry) Faculty of Science, University of Khartoum, Sudan, 1970; MSc Medical Parasitology, London School of Hygiene & Tropical Medicine, University of London, England, 1974; PhD Parasitology, Department of Zoology, Faculty of Science, University of Khartoum, Sudan, 1980. She was Ex-Research Professor, National Health Laboratories, Khartoum, Ex-Research Professor & Director, Tropical Medicine Research Institute, National Centre for Research, Khartoum. She is currently Academic Secretary, Nile College, Omdurman, and Research Director, Sudan Medical Heritage Foundation.

[15] The founding members of SSTMH were Professor Ahmed Mohamed El-Hassan, Professor Sami Ahmed Khalid, Professor Suad Mohamed Sulaiman, Mr. Ahmed Hassan Fahal, and Dr Diaa El Din El Naeim, among others.

[16] Sudan Ministry of Health Annual Statistical Report, 1981.

[17] Proposal was made by Prof. Ahmad Al Safi and forwarded to Under-Secretary, Federal Ministry of Health on 31 August 2008. (Text available at the SMHF Archives). The same proposal had been offered to different governmental and non-governmental agencies since 1982. The

idea has been captured by some institutions, and miniature museums started at local levels.

[18] El-Hassan, AM. Rationale for establishing a clinical research centre at Soba University Hospital (2005). (Text in SMHF Archives, Khartoum).

[19] El-Hassan, AM. North-South collaboration in health research: an appraisal of the collaboration between Sudan and Denmark (unpublished paper).

[20] El-Hassan, AM. Establishing a Health Research Forum for EMRO, WHO. Paper presented to a meeting in EMRO in Cairo.

[21] Bliss, Brian P. and Johnson, Alan G. Aims and Motives of Clinical Medicine. Pitman Medical, 1975: page 3.

[22] El-Hassan, AM. Ethical Issues in research involving communities: Ethical principles in action. Unpublished paper (Text in SMHF Archives, Khartoum).

[23] Wikipedia, the free Encyclopedia: Tuskegee Study of Untreated Syphilis in the Negro Male.

[24] Paper presented at a meeting of the Third World Academy of Sciences, Rio de Janeiro, Brazil in 2005. Unpublished paper (Text in SMHF Archives, Khartoum).

[25] Several researchers were influenced by Professor El-Hassan until they were full-fledged professors or notable researchers. Ahmed Hassan Fahal was one. Prof. El-Hassan supervised Fahal's MD degree in Surgery, which was on the clinico-pathological aspects of mycetoma. Professor El-Hassan's input to this research project was invaluable and crucial. Both used to spend whole weekends at the Electron Microscopy Unit, Faculty of Science, University of Khartoum, to study the ultrastructure of the different mycetoma-causing organisms and their host tissue reactions. The work was very demanding, but this research project contributed significantly to the world literature on the understanding of the pathogenesis of mycetoma.

[26] Work highlighted in a presentation to TWAS in Brazil and in the Omdurman Islamic University, in a talk entitled 'The dilemma of researchers in developing countries: reconciling basic and applied research'.

[27] El-Hassan, AM and Zijlstra, EE. Leishmaniasis in the Sudan. Trans. Roy. Soc. Trop. Med. Hyg. (Supplement 1). Editor: Baker, JR. 2001; (95).

[28] Dr (Mr) Ibrahim Mohamed El-Moghraby (1913-1993) graduated at the age of 21 from Kitchener School of Medicine in 1935 with distinction and won the Waterfield prize in Surgery and the school prize in medi-

cine. In 1952, he became the first Sudanese and the firs graduate of Kitchener School of Medicine to obtain the English Fellowship in surgery. He was a pioneer of modern Orthopaedic surgery, and and authority in the surgery of massive Pyloro-Duodenal Fibrosis (Syn. Shaigi Syndrome), Bilharziasis and Portal Hypertension in Sudan. He also conducted notable research in Mycetoma. (Excerpts from a short profile by El-Moghrabi family for establishing El-Moghrabi Prize in Surgery in Faculty of Medicine, University of Khartoum).

[29] The WHO awarded Prof. El-Hassan the Shousha prize and medal in 1986. It is noteworthy that the Sudanese who won this prize include Mansour Ali Haseeb (1973), Mohamed Hamad Satti (1985), and El-Sheikh Mahgoub Gaafar (1989). The Government of Sudan awarded him the Gold Medal for Research and Science in 1977, El Neelain Order (First Class) in 1979, Order of Merit (First Class) in 1995, El Zubair Prize for Innovation in 2000. He was also awarded the Donald Mackay Medal by the Royal Society of Tropical Medicine and Hygiene (London) in 1996.

[30] Professor El-Hassan was elected president of the Sudanese Philosophical Society during the early 1970s. During his tenure, he held a conference on water and proceedings were published in a book. He was also elected President of the Sudanese Cancer Society in 2005. In 2006, the Ahfad University for Women awarded him the Honourary Degree of Doctor of Science (DSc). He was awarded the degree of Fellow of the Royal College of Physicians, London in 1974.

[31] Professor El-Hassan held membership in several scientific bodies and societies including: the Scientific Technical Advisory Committee (STAC) TDR (1979-1982) and (1983-1986), the Advisory Committee on Health Research EMRO/WHO; Sudan Society for Pathology; International Academy for Pathology (Middle East); the New York Academy for Sciences; the Sudanese Society of Tropical Medicine and Hygiene.

[32] Professor El-Hassan served as visiting professor in several reputable universities including the Royal Postgraduate Medical School, University, London, Medical Parasitology Department, Faculty of Medicine, University of Copenhagen (2000), and Faculty of Medical Sciences, October 6 University, Cairo, Egypt (2002, 2003).

[33] Abu El-Farag Al-Asfahany. Ashaab in *El-Aghany*, Vol 19 pp135-163, Abdel Kareem Ibrahim Al-Izbawy (Ed) Gamal Printers and Publishers, Beirut Lebanon. (Undated).

[34] Ibrahim Al-Mousili. *El-Aghany*, Volume 5 pp154-267, Abdel Kareem Ibrahim Al-Izbawy (Ed) Gamal Printers and Publishers, Bairut Lebanon. (Undated).

[35] In memory of 250 years for the birth of Mozart in 27 January 1756. Paper published in the Sudanese daily press. Article text is found in Sudan Medical Archives in SMHF.

[36] Prof. Ahmed Ali El-Tayib (MB BS, DCP, MRC Path) graduated from the Faculty of Medicine, University of Khartoum in 1958. Prof. El-Tayib worked mainly in the Sudan Armed Medical Corps before he settled in private practice.

[37] Prof. Awad omer Ahmed (MB BS, MRC Path, PhD), graduated from the Faculty of Medicine, University of Khartoum in 1960. He was the first Sudanese clincial haematologist and together with Dr Mahmoud Ziada pioneered the field of clinical hematology in Sudan.

[38] Prof. El-Sadig Abdel-Wahab (MB BS, MRC Path) graduated from the Faculty of Medicine, University of Khartoum in 1960. He was the first Sudanese chemical pathologist, and the first Sudanese to acquire the degree of MRC Path.

[39] Excerpts from a concise profile kept in his FOM file.

[40] Ahmad Al Safi. *A Bibliography of Sudan Biomedical Literature, 1900-2000* (Under preparation).

[41] The 1934 graduates were seven: Mansour Ali Haseeb, Abdel Hameed Bayoumi, Habib Abdalla, Labib Abdalla, Ibrahim Sulaiman, and Sulaiman Basioni.

[42] Excerpts from Ahmad Al Safi. *Mohamed Hamad Satti, his life and work* (in press, 2008).

[43] McFadzean, AJS, Teoh, TB, Bell, GH. Robert Kirk (26 January 1905 - 16 December 1962). The Journal of Pathology and Bacteriology, 88, 2 (1964): pp 614-621.

[44] The first Dean of the Khartoum Medical School was Dr. JS Aldridge (November 1944-November 1946), and was the last to occupy the office of Registrar (before it was upgraded to Dean post) of the Khartoum Medical School (November 1938-November 1944). The first Sudanese Dean was Professor Mansour Ali Haseeb (September 1963-September 1969) (See details in MA Haseeb. *A Monograph on Biomedical Research in the Sudan*. Khartoum University Press: 1973.

[45] Skin Problems of the Sudan. *Al Hakeem Medical Journal* Symposium, No. 18, January 1965.

[46] Op. Cit. (Editorial)

[47] Bayoumi, A. *The History of Sudan Health Services*. Kenya Literature Bureau, 1979: pp 130-133.

[48] Haseeb, MA. A Monograph of Biomedical Research in the Sudan. Khartoum University Press: 1973.

[49] Sudan Medical Papers of Robert Kirk, GPR/0115/RCMS 122, Cambridge University Library: Royal Commonwealth Society Library.

[50] This type of literature is defined as "information produced on all levels of government, academia, business and industry in electronic and print formats not controlled by commercial publishing, where publishing is not the primary activity of the producing body." (Luxembourg, 1997 - Expanded in New York, 2004).

[51] Sudan Medical Heritage Foundation is establishing an archive of published and unpublished medical documents (original texts or copies) produced by individuals or institutions under the name of Sudan Medical Archives. These documents will be indexed, described and made available to researchers in hard copy and online. Deposition of these documents is invited.

[52] Research Directorate, Federal Ministry of Health, Republic of the Sudan in collaboration with WHO. Situation analysis of Health Research in the Sudan. 2002-2003. 64 pages.

[53] El-Hassan, AM. Conference on Africa. Convened by the International University of Africa in Khartoum. 2005. Unpublished paper (Abstract in SMHF Sudan Medical Archives).

[54] The Special Programme for Research and Training in Tropical Diseases (TDR) is an independent global programme of scientific collaboration. Established in 1975 and co-sponsored by the United Nations Children's Fund (UNICEF), the United Nations Development Programme (UNDP), the World Bank and the World Health Organization (WHO), aims to help coordinate, support and influence global efforts to combat a portfolio of major diseases of the poor and disadvantaged.

[55] El-Hassan, AM. North-South collaboration in health research: an appraisal of the collaboration between Sudan and Denmark. Unpublished paper (Text in SMHF Archives, Khartoum).

[56] Commission on Health Research for Development. Health Research: Essential Link to Equity in Development. Oxford University Press. 1990. Quoted in El-Hassan. Op. Cit.