

**Recent Advances in Medical Research
with a Symposium on
Environmental and Occupational Health**

Proceedings of the
10th Annual Medical Scientific Conference
Nairobi, Kenya 1989

**S. N. Kinoti
J. K. Omuse
W. M. Kofi-Tsekpo**

KENYA MEDICAL RESEARCH INSTITUTE (KEMRI)
KENYA TRYPANOSOMIASIS RESEARCH INSTITUTE (KETRI)

**Recent Advances in Medical Research
with a symposium on
Environmental and Occupational Health**

Proceedings of the
10th Annual Medical Scientific Conference
Nairobi, Kenya 1989

Editors
S.N. Kinoti
J.K. Omuse
W.M. Kofi-Tsekpo

Conference Organization

Organizing Committee

Chairman: S. N. Kinoti

Secretary: J. M. Rintari

Members: T.A. Siongok, P.G. Waiyaki, J.K. Omuse, C. N. Chungu, W.M. Kofi-Tsekpo, J.B. Were, R. Oduwo, W.M. Olaho-Mukani, P. Mukiria, J.N. Kariuki, L.K. Gikaru, S. Gitatha, H. Uganga, B. Otori.

Scientific Committee

Chairman: J. K. Omuse

Secretary: W. M. Kofi-Tsekpo

Members: P.G. Waiyaki, J.B. Were, S.K. Gitatha, M. Mutugi, C.N. Chungu, B. Kitoto, L.K. Gikaru, M. Njenga S.N. Kinoti.

Production and Technical Editor - Lawrence Gikaru

Assistant Production Editor - Bernard Muthaka

Illustrations - Andrew Koske
- Chacha Mwita
- Hezron Mulongo

Wordprocessing - Catherine Ranja
- Wanja Ndabi
- Nancy Njoroge

ISBN 9966-869-12-6

First published 1991

Copyright © KEMRI and KETRI

Originated on an IBM computer and
laser printed at KEMRI

Printed by Kenya Literature Bureau
P. O. Box 30022 Nairobi

Acknowledgements

The conference organizing committee acknowledges with thanks the generous support of the following organizations:-

CIBA GEIGY

Coca-Cola Company

Dawa Pharmaceuticals

Farmitalia Carlo Erba

Kenya Wine Agencies

Mohan Meakin

National Council for Science and Technology

World Health Organization

PREFACE

Following in the footsteps of the previous nine Annual Medical Scientific Conferences, the 10th brought together top scientists to review their work and line up priority areas requiring further research.

For five days in the first week of February 1989, scientists from virtually every corner of the world converged in Nairobi for some serious brainstorming on a great deal of topics of public health importance.

As is gradually becoming clear, these conferences have steadily grown in nature and once again, not all papers received could be accommodated in the programme. However this may not so much be a reflection of the quality of omitted papers, but rather a comment on the programme's duration.

The Minister for Research, Science and Technology Hon. George Ndotto kindly agreed to officially open the conference and on behalf of KEMRI and KETRI, I would like to sincerely thank him, the National Council for Science and Technology and all the various local and international organizations which chipped in financially and materially to make the conference the sounding success it was.

I would like to pay special tribute to the presiding Chairman Professor Mahmoud Musa Mahmoud, first for his illuminating opening remarks and for aptly summarizing the salient points arising from all the issues tackled.

I want also to congratulate the organizing committee for utilizing meagre resources and coming up with the noble exercise which will no doubt prove useful to the participants for a long time to come.

And further the editorial team which had the unenviable task of producing these proceedings with minimum facilities. Their efforts are commendable and as these facilities become fully developed, it will no doubt be possible to produce even better quality work within a shorter time.

For all those who contributed in no mean way to make the 10th AMSC the success it was, I say keep up the spirit in preparation for the forthcoming conferences.

J. K. Omuse

Director, Kenya Trypanosomiasis Research Institute

CONTENTS

Conference Organization ii

Acknowledgements ix

Preface x

J.K. Omuse, Director, KETRI

OPENING SESSION

Opening Speech 1

Hon. G.M. Ndotto

Presiding Chairman's Opening Lecture 4

Prof. M.M. Mahmoud

SESSION 1: MALARIA/FREE COMMUNICATIONS

Effect of *P. falciparum* on the survival of wild, naturally infected afrotropical anopheles (Diptera: Culicidae) 13

G.M.M. Chege and J.C. Beier

Characterisation of Kenyan isolates of *Plasmodium falciparum* by enzyme electrophoresis and antimalarial drug sensitivity 18

A.V.O. Ofula, B. Khan, J.I. Githure and W.M. Watkins

A preliminary investigation of a traditional medicine (KRM 913) as a potential antimalarial and antiparasitic agent 25

W.M. Kofi-Tsekpo et al

The pharmacokinetics of the B. biguanide antimalarial chlorproguanil and its active metabolite chlorcycloguanil 29

E.K. Mberu, W.M. Watkins and C.J. Nevil

A 12-month prospective trial of health promotion and antimalarial prophylaxis in patients with sickle cell disease (Hb SS) in South Western Togo 33

T. Teuscher, P. Baillod and B. Holzer

Outbreak of epidemic malaria in Uasin Gishu District - 1988 38

A.M. Ngindu et al

Isolation of a ribosomal DNA probe *Theileria parva* 42

B. Khan, V. Nene, M. Kibe and K. Lams

Comparison of red blood cell osmotic fragility in children with sickle-cell anaemia (Homozygous AA) 45

B.E. Omondi, S.N. Kinoti, M. Desai and L. Muthami

Estimation of parasitic infection dynamics when detectability is imperfect 51

J.D. Nagelkerke, R.N. Chungu and S.N. Kinoti

SESSION 2: TRYPANOSOMIASIS

- Immunosuppression in *Trypanosoma vivax* infection in mice 55
M.V. Otsyula and R.S. Phillips
- The detection of trypanosome antigens and antibodies in the serum samples 61
W. Olaho-Mukami, J. Ngaira and D. Mbwabi
- Studies on the biology of *Glossina longipennis* in Galana Ranch 65
N.K. Mungai, E.A. Opiyo and T. Okedi
- Serum lipoprotein-lipid/*Trypanosome brucei* interactions 69
V. Vandeweerd and S.J. Black
- Establishment of cultures of *Trypanosoma congolense* from infected cattle 73
A. Ochieng and M.A. Gray
- Difluoromethyl Ornithine (DFMO) for the treatment of human trypanosomiasis in Kenya 77
K.M. Tengekyon *et al*
- Treatment of trypanosomiasis in Maasai cattle with homidium chloride 80
P. Stevenson, E. Mwangi, R.M. Muriithi and D. Gitau
- Trypanosoma brucei* subgroup sensitivity to Suramin and Melarsprol (MeIB) 83
C.K.A. Mango *et al*
- Drug sensitivity of *Trypanosoma congolense* ILRAD 1180 in mice and steers 88
R.D. Kratzer, D. Roettcher and A. Ismail
- Susceptibility of *T. evansi* - like isolates to trypanocides administered intravenously in rats 93
S.K. Gitatha *et al*
- The immune system in *T.(Trypanosoma)brucei* subspecies resistance to diminazene aceturate 96
S.P. Muriuki and S.M. Macharia
- Mechanisms of *Trypanosoma(Nannomona)congolense* resistance to diminazene aceturate in murine infections 100
S.P. Muriuki and S.M. Macharia

SESSION 3: DRUGS/MEDICINAL PLANTS

- Effect of Oxamniquine on antipyrine metabolism in the mouse 105
G.O. Kokwaro
- Detectability and measurability of amoscanate in plasma by TLC and HPLC 108
W.M. Kofi-Tsekpo and C.W. Karekezi
- Selective and specific determination of hydralazine HPLC in the urine of hypertensive patients 113
W.M. Kofi-Tsekpo and J.R. Rashid

v

Dissociation between the analgesic effects of temperature (2-4°C) and tactile stimulation(massage) in physical therapy for the treatment of pain 116
T.I. Kanui

Male attitudes to vasectomy in rural Kenya 119
G.K. Bundi et al

SESSION 4: LEISHMANIASIS

A rapid staining technique for leishmania parasites in splenic aspirate smears 127
C.N. Chunge et al

Experimental transmission of *Leishmania major* to vervet monkeys (*cercopithecus aethiops*) by bites of *Phlebotomus duboscqi*(Diptera: Psychodidae) 129
P.G. Lawyer et al

Acute phase proteins in visceral leishmaniasis 134
K.M. Wasunna et al

The combination of aminosidine plus sodium stibogluconate for improved treatment of visceral leishmaniasis in Kenya 139
C.N. Chunge et al

SESSION 5: SCHISTOSOMIASIS/HYDATIDOSIS

Ultrasound scanning for detecting morbidity due to *Schistosoma haematobium* and its resolution following treatment with different doses of praziquantel 147
C.F. Hatz, C.L. Macphersén and C.C. Mayombana

Daily changes in haematuria in schistosomiasis haematobium patients in Mtsangatamu, Kwale District 153
M.W. Goto

Change of water contact pattern after installation of piped water supply in an endemic area of schistosomiasis haematobium 157
S. Katsuyuki et al

Schistosomiasis control: water contact and defaecation habits of a community in Mwea Irrigation Scheme before and after intervention 160
M.N. Katsivo, L.N. Muthami, M. Karama and P. Kingcri

Schistosoma haematobium control-Mwachinga, Kwale District, Kenya: Effect of praziquantel following initial treatment with metrifonate 166
N. Muhoho et al

Comparison of graded doses of praziquantel on protoscoleces of *Echinococcus granulosus* isolated from hydatid cysts of Kenya sheep, goats and cattle 169
G.M. Lubano, E. Zeyhle and C.N. Macpherson

An evaluation of the diagnostic value of double diffusion (dd)test based on "Antigen 880" and "Arc-5" in human hydatidosis 175
P.G. Gathura

Hydatid diseases (echinococcosis) complicated by bacterial infection of cyst 178
K.M.A. Wasunna et al

Treatment of echinococcosis in dogs using controlled drug release formulation 183
T.M. Wachira et al

SESSION 6: MICROBIOLOGY

Solubilization, partial purification and characterization of clostridium botulin toxin binding component from synaptosomal membranes of rat brain 189
J.O. Ochanda, B. Syuta, H. Kitagwa and S. kubo

Campylobacter pylori-associated chronic gastritis in healthy asymptomatic Kenyan pupil nurses 194
G.W. Lachlan and D. Forman

Mixed infections in childhood diarrhoea: results of a community study in Kiambu District, Kenya 197
R.N. Chunge et al

An outbreak of infections caused by *Staphylococcus aureas* resistant to methicillin: case report 203
P.G. Waiyaki, J.N. Muthotho and C.N. Kungu

The comparison of aminosidine, nimorazole and etofamide alone or in combination in the treatment of amoebiasis 207
B. B. Estambale et al

Wuchereria bancrofti: application of the provocative test 213
C. N. Wamae, N. Muhoho, F. Kiliku and S. Gatika

Some aspects of obstructive jaundice at Kenyatta National Hospital 219
F. A. Okoth et al

SESSION 7: VIROLOGY/STD/HIV

Diminished antibiotic sensitivity and downward trends in isolation rates of penicillinase producing *Neisseria gonorrhoeae* stains in Nairobi 225
J. N. Muthotho et al

Low prevalence of oral mucosal lesions in HIV-1 seropositive African women 228
P. Wanzala, F. Manji, J. Pindborg and F. Plummer

Implications of HIV infection on tuberculosis as observed in Infectious Diseases Hospital of Kenyatta National Hospital between January 1987 and June 1988 232
D. Kibuga, S.N. Gathua and P. Nunn

The current status of AIDS epidemic in Kenya with special emphasis on seroprevalence in selected high risk groups 234
G. S. Gachihi et al

HIV seroprevalence survey among high risk females at Mombasa, Kenya 238
G.G. Mbugua et al

Prevalence of hepatitis B surface antigen (HBsAg), human immunodeficiency virus (HIV) and syphilis in Western Kenya 241

M. A. Omari, J.J. Bwayo and P. Wanzala

HIV Seropositive in children with previous blood transfusion at Kenyatta National Hospital 245

S. E. Waweru, D. W. Kinuthia, J. Meme and G. Kitonyi

SESSION 8: RESPIRATORY DISEASES/FREE COMMUNICATIONS

Tuberculous pleurisy (TBPL) - prospective analysis of 136 proven adult ambulatory Ethiopian patients 251

D. Saifu

Tuberculin survey among primary schoolchildren in Nairobi 257

B. O. Swai et al

Haemorrhagic fever in Kenya a risk? 262

P. L. Petit, B. Johnson and P. Tukei

SESSION 9: NUTRITION/FREE COMMUNICATIONS

The variability of sodium chloride and sucrose levels of simple sugar-salt rehydration solutions prepared by mothers and health educators in Kiambu 269

J. N. Muttunga et al

Food variability and diversity as predictors of the nutrition status of children in a rural community in Kenya 274

S.N. Kinoti et al

Hygienic conditions of hands and utensils used to feed infants 278

H. Mwenesi et al

SESSION 10: ENVIRONMENTAL AND OCCUPATIONAL HEALTH

Lead in Nairobi Urban dust 285

O. Okelo

The pathology of spontaneous aflatoxicosis in the dog 288

G.J. Wandera, J. Kamau and S.M. Njiro

Some factors related to contamination of infant food during its preparation 292

A. Pertet

Smoking and reproductive health: cigarette smoking as a risk factor in ectopic pregnancy 297

A.J. Nyong'o

Pesticide handling at community level: perceptions and awareness of health hazards 301

V.N. Kimani and M.A. Mwanthi

Serological, entomological and clinical observation of plague in Lushoto District, Tanzania from 1980-1988 305

B.S. Kilonzo, T.J. Mbise and R.H. Makundi

Rodent control in Nairobi city using second generation anticoagulant rodenticides(difenacoum and chlorophacinone) 311

A.M. Ngindu et al

Hospital records as an initial approach for surveillance of occupational diseases and injuries 314

B.S. Levy and A. Choudhry

SESSION 11: SYMPOSIUM ON ENVIRONMENTAL AND OCCUPATIONAL HEALTH

Keynote Address 321

J.A. Merchant

Occupational hazards: an overview of the Kenyan situation

W.D. Sakari 325

Presiding Chairman's closing remarks 328

Author index 332

Subject index 334

List of participants 339

Opening Speech

HON. G. M. NDOTTO

Minister for Research, Science and Technology

The Presiding Chairman, Professor M. M. Mahmoud, the Chairmen and members of the Boards of Management of KEMRI and KETRI, distinguished guests, ladies and gentlemen:

It is indeed very gratifying for me to be invited to officiate at the official opening of the 10th Annual Medical Scientific Conference, jointly organised by KEMRI and KETRI.

My pleasure emanates from the fact that it is only a few months back when this country was in a festive mood during celebrations of the 10th Year of the Nyayo Era and the 25th Year of Kenya's attainment of independence. It is thus fitting that your 10th Conference should follow so soon after these important political milestones in Kenya's history.

I consider this 10th Conference a milestone in Kenya's scientific and technological history as well. Way back in 1977, the Kenya Parliament passed the Science and Technology Act (Chapter 232) of the Laws of Kenya and which has since been amended and revised. This Act set up the National Council for Science and Technology (NCST) and Sectoral Advisory Committees. I have no doubt in my mind that the NCST has played its advisory role to the Government commendably and

with foresight to the extent where science and technology is in the process of being fully integrated into the planning and political machinery of this country.

I say this because we now have sectoral science and technology plans in our National Development Plan and we have a full-fledged Ministry of Research, Science and Technology which I have the great honour and privilege to lead and represent in the Cabinet.

Mr. Chairman, I must at this early juncture pay my highest tribute and respects to His Excellency, President Daniel Toroitich arap Moi, who during his tenure of office has been able to place science and technology in its rightful place in national development by his immense concern in the promotion of science and technology and his personal foresight in various areas of national development. The emphasis on Science and Technology in the 8-4-4 education system is envisaged to have far reaching effects on Kenya's scientific and technological development in the future. No country can rightly claim to be politically and economically developed unless it can and does control its own technology. For this foresight, we should all thank His Excellency the President and I

am sure you all join me in doing this.

Mr. Chairman, at the same time that the NCST was being officially launched in 1977, various events were taking place in East Africa. We are all aware that the East African Community broke up in July of that year. This left us with institutions that were parentless and people without employment. The Kenya Government took immediate steps to salvage what it could and by 1979, the Science and Technology Amendment Act (Chapter 250) of the Laws of Kenya was passed. This Act not only strengthened further the role of the NCST but also created five semi-autonomous research institutes, namely the Kenya Medical Research Institute (KEMRI), Kenya Trypanosomiasis Research Institute (KETRI), Kenya Agricultural Research Institute (KARI), Kenya Marine Fisheries Research Institute (KEMFRI) and the Kenya Industrial Research Development Institute (KIRDI).

That Act also empowered the Minister to create or even abolish such institutions. My office has not yet abolished any. Indeed we have recently created a sixth Institute, the Kenya Forestry Research Institute (KEFRI) which was formerly within KARI on the advice of the NCST and other relevant government bodies.

Conferences such as this one have become national scientific events in Kenya which all scientists look forward to attending every year. This particular year, your conference has the theme "Recent Advances in Medical Research with a Symposium on Environmental and Occupational Health". Again, this is a fitting theme in that the subject of environmental conservation is becoming extremely important in all sectors of our economy. It is particularly important to those of you in the health sector because of the fact that a lot of diseases afflicting people in developing countries arise out of improper environmental measures which predispose people to disease. It is also important in that in the ever expanding economy of wage employment which Kenya is experiencing, occupational health problems are going to feature much more in medical care in the future. We should also not forget that we have major diseases, both new and old for which we have not yet found appropriate and affordable forms of treatment.

Mr. Chairman, I am aware that these conferences have continued to be an important avenue for the dissemination of the research findings

that have emanated from research not only in KEMRI and KETRI but also at the Universities and other Institutions of higher learning both in Kenya and even far afield.

It is indeed gratifying to note that this year, the Conference organising committee received 131 abstracts, 98 of which were accepted for oral presentation and 28 for poster sessions.

The rejection of only five abstracts must surely attest to the high standard of presentation of subject material that has been achieved by the scientific community in Kenya and elsewhere. I am pleased to learn that of the abstracts received and accepted, a number are from Ethiopia, Tanzania, Zambia, Nigeria and other countries, including those from Europe. I would like to congratulate the organisers for their relentless efforts in ensuring that this conference gains not only a sub-regional but a truly regional and global outlook.

Both KEMRI and KETRI have come of age now. Both institutes have excellent scientific and technological infrastructures, as well as physical structures which have been put up by Kenya and friendly donors. Both institutes are reasonably well equipped, although this area could be improved. I am aware that both institutes have undertaken vigorous staff recruitment and training exercises where they now have a crop of highly trained and experienced Kenyans on their staff. These are all highly commendable efforts for which I would like to congratulate the Boards of Management of both institutes. However, I would like to state here that Kenya expects from you more than just beautiful buildings, well equipped laboratories and a staff with a chain of qualifications.

This country expects practicable and affordable technologies from you in order to tackle the many pressing problems of development and health care facing our nation.

Mr. Chairman, in saying this, I would like to take cognisance of the fact that both institutes have so far achieved very commendable results in the past. These have included better management of diseases that are of priority in this country and the development of appropriate technology for the study of such diseases.

These and many others are commendable efforts for which I congratulate you. Let us keep up the good work and double our efforts to justify all the sacrifices the nation is making to develop an

infrastructure for scientific and technological research.

Finally, Mr. Presiding Chairman, I would like to thank you for honouring us with your presence here. I am sure all of us will learn a lot in the course of this Conference. I would also like to thank the Conference organizers for the many long

hours they have spent to ensure the success of this Conference. Finally Mr. Chairman, allow me to thank all of you for listening to me so patiently.

I now have the pleasure of declaring this 10th Annual Medical Scientific Conference officially open.

Presiding Chairman's Address

Professor Mahmoud Musa Mahmoud

Vice-Chancellor
University of Juba, Juba, Sudan

Hon. Minister for Research, Science and Technology, Chairman, 10th Annual Medical Scientific Conference, members of the Board of Management of KEMRI and KETRI, Distinguished Scientists, Ladies and Gentlemen.

It is indeed a great honour and privilege to my country, University and myself to be invited to address such a distinguished audience as presiding Chairman. I pray to Allah for assistance in this formidable but pleasant task. I look forward to lively and constructive deliberations during the conference. Your cooperation and attention will guarantee that the business of this conference is smoothly conducted.

The international and Kenyan Scientific Institutes of Research represented by KEMRI, KETRI, ILRAD, ICIPE, and Government departments involved in research have already attained international acclaim. It is with pride that I find myself addressing a scientific family so distinguished and so dedicated to solving the tremendous problems hobbling down the African continent. Any serious enlightened scientist must be able to take into consideration that all scientific

research must aim at achieving the one, noble and absolute goal - the improvement of human life regardless of the nature of the research or its complexity and no matter how divorced it may look from the mainstream of medical sciences. Everybody's contribution is an essential component of the scientific medical jigsaw.

The theme of this 10th Medical Conference "Recent Advances in Medical Research with a Symposium on Environmental and Occupational Health" seems to be very wide. It is still however encompassing. I am expected to address you on a *relevant topic of my choice* and which is *dearest to my heart*. Instead, however, I have chosen to raise a few pertinent questions regarding the degree of strength of the inter-relationships that ought to exist among scientists of the medical sciences. Do these strong relationships in research exist? Do they all adopt a unified and comprehensive team-work approach to studying medical problems? How much secrecy shrouds each research activity? I believe that a unification concept should be upheld and sensitivity in research be minimized among researchers as much as possible.

Our fellow physicians who are entrusted with protection of human life may be the least acquainted with research conducted by their other colleagues such as the veterinarians and other biologists who seem quite unrelated to the field of human medicine. I would like to assure our colleagues, the physicians that, many other scientists regard medical research to be equally their sacred domain and have contributed immensely to it in the past and will continue to do so in the future.

To emphasize the oneness of our goal I wish to enlighten our colleagues in the medical profession of some historical achievements made by non-medicals which were highly basic to medical advances separately or in collaboration with the medics and to say:

- That all of us gathered here are very much concerned about the deterioration of our environment and that something must be done about it.
- That many of us are involved in occupations which are hazardous in their nature; therefore such risks must be reduced.
- That demographic pressures and environmental pollution pose formidable challenges to human health and development and therefore action is urgently required at the policy making, planning and administrative levels to find appropriate solutions.

It is incumbent upon us, politicians or scientists, to look for an appropriate formula to arrest this worsening situation so that we can guarantee for ourselves a bright future. Our strategy must adopt an inter-sectoral and inter-disciplinary approach.

While I shall leave the scientific papers to speak for themselves in this regard, I invite the audience to develop this concept and venture with me in the past to review what some of the veterinary scientists have contributed towards human medicine as recorded in medical history. As a veterinarian who has devoted most of his lifetime to teaching and researching various aspects of veterinary preventive medicine and veterinary public health especially in the area of zoonosis and African trypanosomiasis, I am more aware of such contributions. Frankly speaking, we the veterinarians are genuinely disturbed by the apathy of our colleagues, the physicians and the medical authorities in most

countries towards communicable diseases and their epidemiology and their failure to realize that many other scientists share with them the same concern for human public health. I feel very sad to see that public health continues to be an illegitimate field or an orphan. All of us must seriously think of jointly adopting it and nourishing it to develop as a strong discipline hence the importance of scientific collaboration between all concerned.

I do not however claim that inter-disciplinary collaboration and team-work does not exist in institutes such as ILRAD, KETRI and the like, especially in regard to trypanosomiasis. Any institute dealing with a public health problem must involve scientists of different skills in order to advance and achieve its objectives.

Going back to the exposition on the historical role played by veterinarians in the advancement of medical science, medical history contains the following facts:

The American veterinarian and writer on the history of veterinary medical contribution to human health, Prof. Calvin W. Schwabe of the University of California has published on the subject. His work may have gone unnoticed by many medical specialists of today. It would do little harm if other scientists here who are neither medical nor veterinarians are also made aware of these discoveries and contributions. I am sure other scientific experts are eloquent enough when they wish to present their own research contributions which may have gone unnoticed. Here are some of the contributions.

Environmental Pollution

A British veterinarian in 1873 was able to correlate the asphyxiating influence of London's irritating smog (fog) on cattle in the Smithfield Stock Show to cattle death observed at the time. It took physicians more than 75 years to appreciate the significance of his observation from an environmental human health point of view until the incidences of 1952 when similar pungent and irritating fog (smog) caused death to more than 1000 persons after breathing such fog for just one week.

Nutrition as Environmental Cause of the Disease "Pellagra"

A veterinarian from North Carolina, T. N. Spenser,

discovered that pellagra in dogs has a nutritional causation. This led to the discovery of niacin and B complex group of vitamins which have proven indispensable in the treatment of human pellagra ever since.

Chemical Pollutants as Cause of Epileptic Seizures

Chemical additives to food such as nitrogen trichloride (agene) which is a flour bleach was discovered by practising veterinarians as a cause of epileptic fits and seizures in dogs. This has drawn attention to the possible harmful effects of drug additives when added to human food. The above examples illustrate the need for comparative epidemiological studies and programmes to identify environmental or host determinants for diseases of unknown aetiology in man. This new concept is highly appreciated and supported by the World Health Organization.

Human Clinical Case Management and Treatment

- (a) A Swiss veterinarian in the 16th Century called Jacob Nuffer used to perform caesarian operations in sows with success. When his wife experienced difficulty at delivery he had to operate on her with subsequent success, saving both mother and child. Medical historians consider Dr. Nuffer's caesarian section to be the first ever done on a woman with a result in which both mother and child remained alive.
- (b) A French veterinarian (Henri Augustine Chavean) was able to catheterize hearts of living horses in the 19th Century. This technique is now essential adjunct to heart surgery.
- (c) A further surgical advance was made when Otto Stader, a Pennsylvanian veterinarian, in 1937 pioneered animal orthopaedic surgery using stainless steel devices to mechanically reduce bone fractures through bone pinning techniques which later proved their usefulness in man during World War II.
- (d) Professor F. W. Schofield's observation that moldy sweet clover silage caused a highly fatal hemorrhagic disease in cattle, led other

workers to identify the toxin responsible as "discoumerol" and for prevention of arterial thrombosis and embolism in man.

Management and Control of Human Disease

Disease control and eradication in animal populations such as quarantines, mass screening or testing of populations for sickness, mass treatment, mass immunization, control of arthropod vectors of disease are all based on animal disease preventive procedures which had later on been adopted and applied to human populations.

Other examples are the discovery of the tetanus and diphtheria toxoids by a French veterinarian (Gaston-Ramon) and the discovery of immune-conferring properties of killed bacteria (bacterins) by the veterinarians Salmon and Smith in the United States more than a hundred years ago. It is also significant to add the development of the tuberculin test as a diagnostic reagent for the control of animal and subsequently human tuberculosis. That was a contribution by the Danish veterinarian Bernard Bang. This list of contributions by veterinarians to human medicine and public health is by no means exhaustive. However this fact emphasizes the importance and expanse of the area of collaboration between one group of scientists i.e. the veterinarians with their colleagues the physicians in order to improve the quality of human environment and health.

The concept of collaboration between scientists is best illustrated through the discussions of the panel of experts on environmental management for vector control (PEEM) in September 1987 in Rome. The theme was "Effects of Agricultural Development and Changes in Agricultural Practices on the Transmission of Vector-Borne Diseases".

Several international organizations such as FAO/UNEP, International Irrigation Institute, The World Bank and the International Development Research Centre of Canada took part. Environmental changes and ecological effects created by new changes in agricultural practices, management of water supply and use of pesticides were thoroughly discussed.

The effects and risks of agricultural pesticide use on disease vector species had been acknowledged and a need arose for a strategy of