



Conference report

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**WESTERN AFRICA NETWORK OF NATURAL PRODUCTS
RESEARCH SCIENTISTS (WANNPRES), FIRST SCIENTIFIC
MEETING AUGUST 15 -20, 2004. ACCRA, GHANA : A REPORT**

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Introduction

The first scientific meeting of the Western Africa Network of Natural Products Research Scientists (WANNPRES) was held in Accra, Ghana. Most of the participants arrived on August 15th 2004. The Conference Venue of the Noguchi Memorial Institute for Medical Research (NMIMR) of the University of Ghana's College of Health Sciences served as the venue for the five-day meeting which had the theme; *Harmonizing Scientific and Indigenous Knowledge Systems for the Management of Malaria and HIV/AIDS*. Scientists, Researchers and Practitioners from Benin, Burkina Faso, Cameroon, Congo, Ghana, Mali, Nigeria, South Africa, Switzerland and Togo attended the meeting. Simultaneous translation (English and French) was made possible through the good offices of the Minister of Regional Cooperation and NEPAD of the Government of Ghana. The registered participants were about eighty and the number of people at each session was high throughout the meeting period.

Some of the participants were noted academics and they included Professor Iva Abubakar, a Senator and Chairman of the Senate Committee on Science and Technology in Nigeria, who had held a number of top academic as well as political posts in Nigeria. The activities of the meeting was preceded by an Opening Ceremony on Monday August 16th, chaired by Professor D.A. Bekoe, one time Vice Chancellor of the University of Ghana, formerly President of the International Council for Science and a member of Ghana's Council of State, a body which advises the President of the Republic. The Keynote Address was delivered by Professor C.O. Wambebe from the WHO Africa Regional Office. Others who spoke during the Opening Ceremony included the Professor D. Ofori-Adjei, Director of NMIMR who welcomed the participants and Professor Carel IJsselmuiden from the Geneva-based Council on Health Research for Development (COHRED) who spoke on ethical issues in health research. The history and background to the meeting was provided in an address by the Executive Secretary of WANNPRES, Professor Marian Ewurama Addy

Activities of the meeting included:

- Symposia;
- Special lectures;
- Parallel oral presentations; and,
- Round-table discussions.

This report covers all the activities of the meeting, and the various outcomes.

I. SYMPOSIA

There were three symposia focusing on A) Malaria, B) HIV/AIDS and C) Research Ethics.

A. MALARIA

HERBAL ANTIMALARIALS: STANDARDS AND EFFICACY STUDIES

Date: August 16, 2004

Chair: Prof. C. O. Adewunmi, a member of WANNPRES Council, a renowned natural products research scientist and Director, DRPU, Faculty of Pharmacy, OAU, Ile-Ife, Nigeria.

Topics:

- i. The pros and cons of isolating antimalarial compounds from plants - Prof. B. T. Ngadjui
- ii. Efficacy models for screening antimalarials - Dr. J. P. Adjimani
- iii. Quality assurance in the absence of identified active components - Prof. Marian E. Addy

The pros and cons of isolating antimalarials compounds from plants

Prof. B. T. Ngadjui gave a general introduction on the advantages of isolating compounds from natural resources. He outlined the various steps involved in the isolation process as follows:

- Collection of plant material;
- Drying;
- Grinding;
- Extraction;
- Separation; and,
- Purification.

He also talked on identification and characterization processes in general and gave examples of the methods used such as HRMS, UV, IR, NMR and X-Ray diffraction. The speaker then gave a list of the advantages of the isolation processes as the ability to:

- Develop concentrated products;
- Determine mechanism of action;
- Carry out pharmacokinetic studies;
- Carry out structural modifications of active molecules to enhance activity;

- Synthesize compounds; and,
- Conserve medicinal plants.

The following were listed as disadvantages:

- Loss of original activity;
- Loss of synergistic effects;
- Possible increase in toxicity; and,
- Increased cost of drugs due to increased investment.

Concluding, he stated that isolation was central to the global war against malaria.

Efficacy models for screening antimalarials

Dr. J. P. Adjimani gave a brief introduction on malaria indicating its threat to health and the economy. According to him, there are 300 - 500 million new cases of malaria worldwide every year, resulting in between 1 and 3 million deaths, with majority occurring in children under five years in sub-Saharan Africa. Resistance of the malaria parasite to chloroquine was given as one of the causes of the present situation.

Chloroquine and Fansidar were named as some of the drugs for treatment but the lecturer said that choice was based on affordability, efficacy and low toxicity. Dr. Adjimani saw the screening of more natural products for antimalarial activity as the way forward for unearthing alternatives to chloroquine and other current antimalarials. He then mentioned drug discovery efforts and outlined how understanding the biochemistry of the parasite could be used in the drug discovery effort.

Both *in vivo* and *in vitro* studies were considered important in identifying drug resistant and sensitive strains of the parasite during the drug discovery process. As part of the *in vitro* studies, it was indicated that culturing of the parasite was very essential, and that simple techniques had been developed for this.

Using the haem polymerization inhibition activity (HPIA) method to assay for the action of known antimalarial drug action, Dr. Adjimani indicated that chloroquine gave the highest inhibition rate, followed by artesunate, whilst proguanil showed no activity. For medicinal plants known to have antimalarial activity, *Euphorbia hirta* gave the highest inhibition rate. He however added that the other medicinal plants may have different mechanisms of action. According to the speaker, the HPIA method is fast and relatively cheap. A cell-free *in vitro* method for assaying antimalarial activity based on inhibition of haem polymerization was discussed as a fast screening method. The setback however was that it did not detect non-quinoline drugs.

The lecturer concluded by stating that conventional drug discovery was a high risk venture, and a concerted effort has to be employed if the battle against malaria is to succeed.

Quality Assurance (QA) in the absence of identified active components

The last speaker on the first symposium was Prof. Marian. Addy. She started by indicating that in the case of herbal preparations, the specific active components were generally not known, and this resulted in there being no clearly defined QA processes. Use of marker compounds that were unrelated to the activity of the herbal preparation did not solve the problem. She cited other difficulties giving the example of research on the plant *Desmodium adscendens* which was shown to have five main components after flash chromatography, four of which were found to be active (caused relaxation of

smooth muscle). In such a situation choice of a standard for QA purposes would not be clear cut.

In the opinion of this lecturer QA should be a documented process that would ensure consistency, uniformity and reproducibility of experimental results. Thus QA of herbal preparations must analyze and document the following:

- Source of material - location, season, day and time of collection etc.;
- Harvesting, drying and storage conditions; and
- Preparations - tablet, ointment, decoction etc.

Purchase of raw material from the open market should thus be discouraged.

In the laboratory, instead of analysis for active components or marker compounds which might have no bearing on the efficacy of the plant material, the lecturer stressed that products should be analyzed for their peculiarities using analytical or separation techniques such as planar or thin-layer chromatography (TLC), which would identify all components, or many of the components that are present, in order to produce fingerprints of samples. Such fingerprints could serve as standards in the QA process.

Discussions

In the discussions that followed the first symposium, the need for proper documentation of research procedures was further emphasized. The fact that scientists should foster a greater collaboration with traditional medical practitioners (TMPs) so as to win their support and confidence was also emphasized. It was realized that through such collaboration, researchers would obtain authentic samples, speed up the research process, and herbalists' formulae and processes could be documented for QA purposes.

B. HIV/AIDS

EVALUATING HERBAL PREPARATIONS FOR HIV/AIDS TREATMENT

Date: August 17, 2004

Chair: Dr. Mokowa Adu-Gyamfi. A Community Medicine Specialist and the Deputy Programme Manager of the Ghana National HIV/AIDS Control Programme of the Ghana Health Service. Co-author of various guidelines on HIV/AIDS interventions.

Topics:

- i. In Search for a Cure for HIV/AIDS: A Focus on Nature's Pharmacy - Dr. A. A. Sittie
- ii. Laboratory Evaluation of Herbal Medications for the Management of HIV/AIDS - Dr. J. Brandful
- iii. African Herbal Anti-retrovirals: PROMETRA Research Findings - Togbega Dabra VI
- iv. Treating Patients Living with HIV/AIDS: The Ashanti-Mampong Experience - Mr. J. Amoa
- v. Generic Model Protocol for Clinical Evaluation of Traditional Medicines - Dr. C. O. Wambebe

In Search for a Cure for HIV/AIDS: A Focus on Nature's Pharmacy

In his introduction, Dr. Sittie stated that plants were possible sources of immunomodulatory, antiviral and other antimicrobial agents. Examples of studies done on AIDS patients using plant extracts for the elimination of virus from host, restoration

and improvement of immune status and treatment of opportunistic infections were cited.

The work done on the discovery of PROVIR (for respiratory virus) and some examples of plants from Cameroon with antiviral agents were presented. The following were listed as examples of plants with antimicrobial properties: garlic, kola, *Xylopi*a and *Cryptolepis sanguinolenta*. The African potato, garlic, carrot and guava were listed as examples of plants which stimulate the immune system. All these could be used in the management of HIV/AIDS.

Examples of successful outcomes in the use of natural products for the management of HIV/AIDS and opportunistic infections in some countries were presented and they included:

- Uganda, where an NGO called THETA, promoted collaboration between herbalists and biomedical practitioners, resulting in the discovery of a cure for *Herpes zoster*;
- Senegal, where PROMETRA, an NGO used *METRAFAIDS*, a herbal preparation, to treat 62 AIDS cases, resulting in a decrease in viral load and opportunistic infections, with no side effects;
- St. Dominic's hospital in Ghana, where 30 AIDS patients showed improvement in the quality of life after being treated with herbal preparations.

Thus in 1999, a study was conducted in Ghana that involved collaboration between traditional medical practitioners, some research institutions and hospitals. Four traditional healers were each assigned 24 HIV/AIDS patients for treatment. Clinical chemistry, haematology, CD4⁺ and CD8 counts as well as viral loads of each patient were recorded during the course of the study. In the course of time, patients showed a reduction in the frequency of opportunistic infections whilst there was considerable improvement in body weight as well as physical and psychological well-being. The study was however inconclusive due to budgetary constraints which did not allow measurements of CD4⁺ counts.

This presentation indicated that:

- experts were available in the country to carry out major research investigations in herbal preparations and
- nature holds the greatest promise in our quest to find an antidote to the HIV/AIDS scourge.

Laboratory Evaluation of Herbal Medications for the Management of HIV/AIDS

Dr. J. Brandful started his presentation by pointing out that HIV infections destroyed the immune system by killing CD4-positive T-cells. Viral levels then increased resulting in the onset of the symptoms of AIDS such as diarrhoea, weight loss, persistent fever and vaginal discharge. He further stated that under host immune pressure, viral replication resulted in the emergence of strains that were resistant to medication. His presentation was therefore to outline some laboratory techniques that could be used to assess the ability of herbal-based medications to treat or manage HIV/AIDS cases.

Key indicators that can be used as proof of the ability of a medication to manage HIV infections include:

- Improvement of the immune status (CD4⁺ count) of the patient;
- Elimination of the virus;

- Attenuation of the virus;
- Elimination of symptoms;
- Reduction of opportunistic infections; and,
- Minimal side effects

On immune status, he indicated the measurement of CD₄ levels, which should increase over a baseline level established at the beginning of treatment. Flow cytometry was a method that could be used in the determination of CD₄ levels. On viral load, he indicated the measurement of RNA copies in plasma/serum or measurement of levels of the enzyme reverse transcriptase (RT) of the virus as some available techniques. The speaker however pointed out that resistance on the part of the virus could lead to a reduction in the efficacy of medications. Thus resistance must be monitored through sequence analysis of some key genes and comparison with documented mutations associated with drug resistance.

On safety considerations, he suggested the use of laboratory animals for acute and chronic studies as well as LD₅₀ estimation for liver and kidney functions.

Dr. Brandful concluded by emphasizing that an effective management of HIV infections should result in an increase in CD₄⁺ count with a simultaneous decrease in viral load and opportunistic infections. Thus in evaluating herbal drugs, these two parameters must be carefully monitored.

African Herbal Anti-Retroviral (METRAFAIDS): PROMETRA Research Findings

Speaking on this topic, Togbega Dabra VI mentioned PROMETRA as an NGO that comprises herbalists, scientists and researchers working together to solve health problems. In his introductory remarks, the speaker referred to effective herbal products commonly used by traditional medical practitioners for the treatment of viral infections including HIV. Among these were *Aloe vera* and *Garcinia kola* (bitter kola), which were considered anti-viral, *Aframomum melegueta*, *Cassia alata* and *Sutherlandia frutescens*, which were effective against opportunistic infections and a third category which were immune boosters or bio-stimulants. Examples given for this third category were “Jubi Formula”, a proprietary drug containing a number of medicinal plants including *Parquetina nigrescin* and METRAFAIDS, a 5-plant combination blend with both anti-viral and immuno-stimulating properties and the subject of the presentation.

The effects of METRAFAIDS against HIV/AIDS were studied in 3 cohorts of 62 HIV positive (determined by ELISA) patients between 1999 and 2002. CD₄⁺ counts and viral load were determined in admission prior to treatment and on monthly basis during the course of the treatment. Physical examination and symptoms provided the basis for determining opportunistic infections and patients were monitored for fungal and bacterial infections, fever etc. Patients were treated for a period of 4 to 6 months.

The data indicated that as a result of the treatment, 54% of the patients had their viral loads reduced by 66%, 74% of patients increased their CD₄ counts by greater than 70% during therapy (CD₄⁺ counts of the patients varied at the beginning of the treatment, not all of them were low), opportunistic infections, dermatosis, weight and clinical symptoms improved in greater than 85% of the patients and there were no documented adverse effects of the preparation.

The regain in weight, in some cases up to 20kg, the significant decrease in viral load, significant increase in CD₄⁺ counts and the reversal of cases which under other

circumstances would have been terminal are all indications that METRAFAIDS is an effective herbal combination therapy for managing HIV/AIDS cases.

Concluding, Togbega pointed out that METRAFAID had been trademarked and patented in Cameroon and that its benefits included low cost, less side effects and low toxicity. He also recommended further clinical trials in other sister African countries. He did not forget to mention that the research project was funded by the Ford Foundation.

Treating Patients Living with HIV/AIDS: The Ashanti-Mampong Experience

According to Mr. Amoa, a programme of treating and monitoring 70 people living with AIDS (PLWA) was started in the year 2000 with the aim of reducing their mortality and morbidity rates. The specific objectives were to characterize PLWAs, identify the types of secondary infections and to come up with a protocol. Patients were made to sign or thumb-print consent forms. Currently the number of patients was put at 250 from four different parts of the country.

The methodology used was direct observation of patients, review of secondary data and discussions with the patients.

PLWAs were categorized using the WHO categorization of HIV/AIDS into:

- Category A - asymptomatic stage;
- Category B - symptomatic but ambulatory;
- Category C - symptomatic but bedridden < 50% daytime; and,
- Category D - symptomatic and bedridden > 50% daytime

The programme had its own characterization which was also based on symptoms (asymptomatic and symptomatic) as well as level of appetite, response to food containing oils and tolerance of solid foods with the symptomatic patients. This characterization compared with that of WHO with the worst patients (category D) being those who had episodes of fever when they took in solid food which was also oily.

Secondary infections listed included oral thrush, diarrhoea, tuberculosis, pneumonia and herpes. Treatment included adequate nutrition (of what could be tolerated), clean water, avoiding oily foods, and adding *abendro* leaves (a mixture of leaves of several endogenous plants) to the diet at all times. The following treatments were for the management of secondary infections:

Oral thrush - Bark extract of red wood.

Diarrhoea - An enema using a mixture consisting of 2 capsules of tetracycline and 2 tablets of Flagyl in a cup of water.

Herpes zoster - Extract of kola nut.

Tuberculosis - Cocoa root and coconut tree bark.

STDs - *Nyamedua* tree bark

In administering these treatments, it was observed that the transition of PLWAs from category D to A was within a shorter period of time compared to those not under treatment.

This presentation concluded with a statement to the effect that PLWAs must be provided with adequate nutrition and should be given drugs that will improve their immune status. It was recommended that all herbal preparations that had the potential of managing HIV/AIDS should be brought under one umbrella and the more efficacious ones scientifically studied so that their potential could be harnessed.

Generic Model Protocol for Clinical Evaluation of Traditional Medicines

In a brief presentation, Dr. C. Wambebe of WHO/AFRO gave an overview of what the WHO had developed as a protocol for clinical evaluation of traditional medicines. In a summary, he listed some of the issues in the protocol as:

- Name and description of the product;
- Anecdotal and ethnomedical evidence regarding safety and efficacy;
- Non-clinical data;
- Clinical trials;
- Known and potential risks;
- Mode of administration - dosage regimes, treatment period etc.;
- Statement of compliance on the part of test participants;
- Description of operational study; and,
- General and specific objectives and purpose of the study evaluation.

A copy of the protocol was made available to the officials for later distribution to the participants.

Discussion

In the discussion following the presentations, it was noted that as antiretroviral drugs were quite expensive, attention needed to be focused more on natural products as they have been seen to be quite promising in the management of HIV/AIDS. However emphasis should be placed on educating the public on behavioral change so as to minimize re-infections.

C. RESEARCH ETHICS**ETHICS AND CODE OF CONDUCT FOR NATURAL PRODUCTS RESEARCH SCIENTISTS**

Date: August 17, 2004

Chair: Prof. I. P. Guissou, Institut de Recherche en Sciences de la Sante (IRSS/CNRST) Universite de Ouagadougou, Burkina Faso

Topics:

- i. Principles of Ethics in Biomedical Research - Prof. C. IJsselmuiden
- ii. Improving Natural Products Research through the Informed Consent Process
- Prof. S. Gamaniel
- iii. Expectations of the Herbalist in Relation to Collaboration with the Scientist
- Narh Naatey

Principles of Ethics in Biomedical Research

Prof. IJsselmuiden started his presentation by citing the Nuremberg trials and Tuskegee project as some of the extreme cases that should serve as a basis for ethics in research. He then cited the Helsinki Declaration, which served as the protocol on ethics in research.

The speaker referred to ethics with respect to protection for research participants who were at a disadvantage due to:

- lack of knowledge about the research processes;
- disease conditions;
- poverty and ignorance; and,

- power and influence of researchers.
- On the principles of ethics, he stated that there must be:
- Autonomy (respect for persons);
 - Beneficence (doing good to persons);
 - Justice (distributive justice)

He emphasized that research proposals must be submitted to Institutional Review Boards (IRBs) or Ethics Review Committees (ERCs) for clearance, and researchers who violated Code of Ethics must be appropriately sanctioned. He also talked about the need for informed consent which must explicitly seek the permission of the volunteers after the research process has been adequately explained to all potential participants in the study. Another area of emphasis was the need for clinical trials after *in vitro* experimentation and animal studies. Standard care, sharing of research benefits and intellectual property rights were mentioned as other important areas of concern.

Improving Natural Products Research through the Informed Consent Process

Speaking on this topic, Prof. Gamaniel was of the view that the informed consent process was to give understanding to all stake-holders in research, and that ethics was a complimentary component of bench work and for good research results. The Pfizer incident in Nigeria was given as an example.

How the informed consent process ensured a valid study design in the proper scientific evaluation of traditional medicines was an important message in this presentation. The lecturer proposed the need for collaboration between the researcher and the herbalist as well as between the researcher and the research participants. In all these relationships, explanation must be the key in order to ensure the benefit of research and also empower the community to understand research on a long term basis.

The speaker concluded by emphasizing that informed consent, a key instrument in creating understanding for research involving human beings, must be written in legal language and appropriately witnessed. He recommended that memoranda of understanding (MOU) should be part of informed consent and this must be signed before the research begins, and that all research protocols must be approved by Institutional Review Boards.

Expectations of the Herbalist in Relation to Collaboration with the Scientist

Mr. Narh Naatey began his presentation with the following expectations from WANNPRES:

- build trust between scientists and herbalists;
- coordinate research activities within the sub-region;
- produce model agreements and MOU;
- provide for benefit sharing so as to motivate scientists and herbalists;
- provide a platform for transparency;
- foster collaboration with other regional groupings engaged in natural products research;
- secure subsidies for testing fees charged at the Center for Scientific Research into Plant Medicine (CSRPM) in Ghana.

There was a personal reference to frustrations encountered in an effort to develop an antimalarial preparation from herbs. In 1983 he noticed that chloroquine had failed to relieve his children of bouts of malaria so he developed a herbal formulation (NASRA tablets) which worked perfectly. He subsequently commercialized the product, exhibited it at the Ghana International Trade Fair in 1988, and the Ministry of Science and Technology agreed to promote it. However, the Ministry of Health was unable to authorize the use of the product because of lack of scientific data on it.

Through his persistence, a committee was set up, which recommended that the preparation must pass safety and toxicity tests. Thus in 1989, he submitted a sample to the CSRPM for such tests, but the in turn asked for a written report on the properties of the preparation. He thus submitted a sample to the Kwame Nkrumah University of Science and Technology (KNUST) for analysis, but upon return to CSRPM he was told that the report from KNUST was no longer relevant. This lack of commitment and trust on the part of the various relevant institutions had frustrated all his efforts such that to this very day, his product is still not officially licensed for use.

The speaker then concluded by stating that without researchers, herbalists cannot be competitive in the world and gave the example of India where research in science and technology backed by the political will has given that country a competitive urge in natural products use.

Discussions

In the discussions that followed, it was noted that since herbalists were now increasingly getting formal education, it would be worthwhile for them to establish their own R & D programmes as their research proposals could be stolen by scientists, ignored or simply discarded.

II. SPECIAL LECTURES

The two lectures summarized below were decided upon when the abstracts received indicated that there were certain topics that were of such importance that they should stand on their own at plenary sessions.

LECTURE 1

Safety Concerns of Plant Extracts and Medicinal Products

Date: August 18, 2004

Speaker: Prof. C. O. Adewunmi

Chair: Prof. F. N. Gyang

Prof. Adewunmi started his presentation by indicating that plants have a wide range of therapeutic uses as they contain several active components. However issues that were of great concern in the use of herbal preparations included:

- active ingredients which were frequently unknown;
- use of contaminated and adulterated preparations;
- wrong identification of plant species;
- over harvesting of some plant species leading to their extinction;
- lack of empirical data;

- self medication by patients and prescriptions by unqualified "physicians";
- excessive ingestion;
- inconsistent standards due to variable levels of constituents in same species of plants as a result of variable environmental factors.

As a way of mitigating these concerns, Prof. Adewunmi recommended the following:

1. Medicinal plants should be properly classified as recommended by WHO.
2. Plant species should be cultivated under sound environmental conditions.
3. Traditional practitioners should be monitored and their products evaluated periodically.
4. Toxicological data on herbal preparations should be documented and widely disseminated.
5. More clinical trials should be carried out to determine unequivocally, the clinical efficacy as well as adverse effects of herbal medicines, if any.

LECTURE 2

Consideration of Sustainability, Availability, Sovereignty and Equity Issues in Natural Products Research

Date: August 18, 2004

Speaker: Prof. A. Oteng-Yeboah

Chair: Prof. E. Laing

Prof. Oteng-Yeboah's presentation was aimed at drawing attention to issues that could influence the economic take off of a scientific breakthrough from natural products research. These issues were placed in their proper context within Agenda 21 and the three Rio Conventions leading to the Millennium Development Goals for Sustainable Development.

He defined the various terms in the heading and their use in sustainable development, putting emphasis on the information that a sovereign nation ought to have of her natural products, and how all aspects of such information should be brought together to bear on the plant, from which the natural product may be obtained. Products with potential economic gains should be considered along social commitments and the environment.

The lecture also stressed the fact that existing Intellectual Property Rights may not cover indigenous/traditional knowledge. But the *sui generis* system, recognised in lieu of IPR under the WTO/TRIPS agreements, could take care of documented traditional knowledge.

Participants were also informed of an OAU Model Law which encourages *sui generis* and could be used as a template for the protection of knowledge of traditional medical practitioners.

III. PARALLEL ORAL PRESENTATIONS

There were three (3) groups for the oral presentations, running at the same time. The groups were

- A. HIV/AIDS and Antimalarials;
- B. Antimicrobial, Antihelminthic, Antiinflammatory, Antioxidant.
- C. Gland/Organ Functions and Metabolic Disorders.

Date: August 17, 2004

GROUP A

Chair: Prof. I. Addae-Mensah & Prof. B. T. Ngadjui. **Rapporteur:** Y. Ameyaw

A1. Antimalarial Agents from some Cameroonian Plants - B. T. Ngadjui

Compounds isolated from two plants, *Croton zambesicus* and *Hoslunda opposita*, which are used in traditional medicine for the treatment of a number of diseases including malaria, were characterized and screened for anti-plasmodial activity using inhibition of growth of *Plasmodium berghei* in mice. They included abiatane diterpenoids, quinines, triterpenoids and flavonoids. Results indicated that a number of compounds had anti-plasmodial activity. Hoslundal, a flavonoid from *H. opposita*, exhibited strong anti-malarial activity against the multidrug resistant K1 strain of *Plasmodium falciparum*. Hoslundal was however weakly active against the chloroquine sensitive strain NF54 of *P. falciparum*.

In the short discussion that followed, it was suggested that for malaria treatment, preparations that were found to be active against chloroquine resistant strains of *Plasmodium* and those active against chloroquine sensitive strains should be used in combination.

A2. Evaluation of Selected Benin Medicinal Plants for their in vitro Antiplasmodial Activity - T. Adjobimey

Twenty four extracts from twelve medicinal plants (selected for their ethnobotanical uses) were screened for antiplasmodial activity using the method based on measuring the inhibition of parasite maturation from ring stage to schizont stage. According to the results obtained using IC₅₀ values, the highest antiplasmodial activity for the chloroquine-sensitive 3D7 strain of *P. falciparum* was found in the methanolic extract of *Croton lobatus* aerial part. For the chloroquine resistant K-1 strain, the highest antiplasmodial activities were found in the dichloromethane extracts of *Hybanthus enneaspermus* (aerial parts) and *C. lobatus* (root).

A3. Screening of *Teclea verdoorniana* and *Rothmannia longiflora* for Antiplasmodial Activity - W. A. Asomaning

This study was a joint effort between the University of Ghana, the Centre for Scientific Research into Plant Medicine and the University of Copenhagen, the aim of which was to come up with a chemical compound that could be developed as an antimalarial compound. Three (3) acridone alkaloids from the ethanolic extract of *Teclea verdoorniana* were isolated and characterized using spectroscopic methods. *In vitro* antiplasmodial activity was demonstrated in these compounds and in the extracts from *T. verdoorniana* and *Rothmannia longiflora*. Compounds isolated from *R. longiflora* are yet to be characterized. Participants however recommended that further work be carried out on these compounds.

A4. Clinical Efficacy of PHYTO-LARIA® - A Teabag Formulation of *Cryptolepis sanguinolenta* - Marian E. Addy

This study was a clinical evaluation of a teabag formulation of *Cryptolepis sanguinolenta*, a plant used in the West African sub-region to treat a number of diseases including malaria. The study was undertaken mainly because of the difference a new formulation could make to the efficacy of a drug. Thirty-one out of 42 patients

recruited initially completed the study which utilized the WHO extended 7 day in vivo test to measure *P. falciparum* response to this formulation of *C. sanguinolenta*. Evaluated on evidence of fever clearance and disappearance of parasitaemia by Day 7, according to the WHO criteria, PHYTO-LARIA®, the teabag formulation, of *C. sanguinolenta* root was found to be highly efficacious as the study revealed an overall cure rate of 93.5% for acute uncomplicated malaria. Participants suggested that IC₅₀ value of the product should be determined, even though IC₅₀ values may have been determined for other formulations of *C. sanguinolenta*.

A5. Sub-acute Toxicity Studies on the Aqueous Extracts of *Nauclea latifolia* in rats
- K. S. Gamaniel

Preparations from root bark of *N. latifolia* are used in the treatment of malaria, cough, stomach disorders and gonorrhoea. The work was to evaluate the safety of an aqueous extract of the plant. The extract did not significantly affect the liver, kidney, heart and the homeopathic system of rats. However, in spite of these indications of safety, there was reduction in feeding and water consumption as well as body weight at the highest dose tested. It is believed that these adverse effects could be dose related.

A6. Usefulness of Herbal Medications in the Management of Opportunistic Infections in HIV/AIDS - M. Osei-Kwasi

This presentation was on some HIV/AIDS patients in Ghana who had been put on herbal preparations and had survived beyond expectation. The patients were diagnosed using the following symptoms:

- I. Chronic diarrhoea of greater than 1-month duration.
- II. Unintentional weight loss greater than 10% of body weight.
- III. Dermatological problems.
- IV. Prolonged fever (documented more than 1-month duration).
- V. Persistent cough
- VI. Genital ulceration and vaginal discharge.
- VII. Amenorrhoea and oligomenorrhoea.

On the basis of CD4 counts during treatment, the patients could be put into three categories: those with constant low CD4 counts, those whose CD4 counts increased during treatment and those with constant high CD4 counts through out treatment. Many of the patients were in the second category.

The following were listed as problems encountered in the use of herbal preparations for the management of AIDS:

- mistrust;
- quality of herbal product;
- dosage;
- definition of cure/treatment;
- acceptance of herbal products by orthodox medical practitioners;
- support for researchers, herbalists and patients.

There was a recommendation that the Centre for Scientific Research into Plant Medicine located at Mampong-Akwapin in Ghana should be converted into a tertiary educational institution of Herbology for the study of plants and their active principles, not only plants against HIV-AIDS and other sexually transmitted diseases, but also diseases such as malaria and other communicable and non communicable diseases.

A7.HIV/AIDS and Community Organizations. What Ethics? - E. Konde

A semi-structured questionnaire was used to collect data on the HIV/AIDS knowledge levels of some community organizations in Burkina Faso. Analysis of the data indicated that 20% had no knowledge of HIV/AIDS, 20% had little knowledge whilst 60% were well-informed. Attitudes and perceptions of HIV/AIDS were considered important attributes which could influence the ethics and code of conduct of researchers in this area. In the discussion that followed the presentation participants pointed out the need for more education at all levels.

A8.Community Approach in Dano to Malaria, Water Related Diseases and Opportunistic Infections of AIDS: Perception and Management - N. Some

Studies on a community's perception and management of malaria and other diseases related to water or diseases of opportunistic infections related to AIDS were carried out on site at Dano, a Province in Burkina Faso. Water bodies in this Province were described with respect to disease vectors and pathogenic agents. The results indicated that members of this community distinguished between two types of water related diseases; i) malaria and its related syndromes and ii) diseases with no connection with malaria or AIDS, but are water borne, such as dracunculosis or guinea worm infestation. For management of the diseases, self medication and traditional herbal therapy constituted the first mode of treatment, followed by treatment in health institutions.

Reacting to a question, the presenter pointed out the need to create viable databanks of the various approaches to treatment and their effects on disease management.

GROUP B

Chair: Dr. N. Ochekepe and Prof. G. T. Odamtten. **Rapporteur:** P. C. Anatole

B1.The in vivo Activity of some Plant Extracts on Worm Burden in a Murine Model of Schistosomiasis - S. U. Adamu

Mice were challenged with *Cercariae* worms and then treated with methanolic leaf extracts of *Bauhania rufescens*, *Erythrina senegalensis* and *Jahropha curcas* for 5 days. Results showed a significant reduction in worm burdens using *B. rufescens* and *E. senegalensis*. The lethal doses of these two plants were much higher than that of *J. curcas*. These results indicate that the two plants with antischistosomal activity could be used to reduce morbidity due to schistosomiasis which is a major scourge in the tropics.

B2.Phytochemical Analysis and Antimicrobial Activity Study of some *Gladiolus* sp - P. O. Olorunfemi

Cold water soxhlet extracts of *Gladiolus* spp. were screened for antimicrobial activity against a number of Gram positive and Gram negative bacteria as well as some fungi. The extracts were found to be active against *Pseudomonas aeruginosa* and the fungus *Aspergillus niger*. The active ingredient in the extract responsible for the activity has yet been identified.

B3. Medicinal Plants from Cameroon with Amoebicidal Activity: *Codiaeum variegatum*, a Potential Source of New Products against Amoebiasis - P. F. Moundipa

Thirteen out of 56 Cameroonian medicinal plants that were screened exhibited significant antiamebic activity. However *Codiaeum variegatum* was the only plant that had more pronounced activity than Metronidazole. Toxicity studies of the aqueous extract of *C. variegatum* in mice and rats indicated no lethal dose up to 25g/kg body weight. The research thus confirmed the efficacy and safety of *C. variegatum* used in Cameroonian traditional medicines.

B4. Antifungal and Antioxidant Activities of 14 plants used in the Treatment of Sexually Transmitted Infections. - Rokia Sanogo

A team of researchers investigated 14 Malian medicinal plants used in the treatment of sexually transmitted infections (STIs) for their *in vitro* antifungal activity as well as antioxidant activity. Eleven extracts from *Anacardium occidentale*, *Anogeissus leiocarpus*, *Combretum glutinosum*, *Daniellia oliveri*, *Ficus capensis* and *Stylosanthes erecta* weakly inhibited the growth of clinical strains of *Candida albicans*. An extract from the root bark of *Vitex doniana* strongly inhibited the growth of all clinical strains of *C. albicans* used, whilst other plants exhibited antioxidant activity.

B5. No to Desertification! - Hassanata Millogo-Kone

A study comparing the antimicrobial activity of leaves with that of the stem bark of *Parkia biglobosa* was carried out, and results indicated no significant difference in activity between the two. The aim of this study was to provide evidence that will convince traditional healers who currently use the stem bark of the tree to switch to the use of leaves so as to save the tree.

B6. In vitro analysis of "Mist Nibima" Against Common Pathogens of the Urinary Tract - F. C. Mills-Robertson.

"Mist Nibima" is an herbal preparation that is used in the treatment of urinary tract infections. In this study the antimicrobial potential of this preparation was measured using bacteria isolated from hospital samples. The results showed that "Mist Nibima" had antibacterial and antifungal activities against pathogens that inhabit the urinary tract and vagina, including drug resistant types. All strains of *E. coli*, *Staphylococcus* and *Candida albicans* used were inhibited. The continuous use of the product for urinary tract infections was recommended.

GROUP C

Chair: Prof. J.A.O. Ojewole & Prof. A. C. Sackeyfio. Rapporteur: S. Ouedraogo

C1. The Estrogenic Effects of Aqueous Extracts of the Leaves of *Holarrhena floribunda* in Ovariectomized Rats - Bayala Balé

Holarrhena floribunda, a plant used to improve fertility in animals, was investigated with respect to its oestrogenic effects. Whilst the dry leaves of the plant did not exhibit any activity, the wet leaves showed estrogenic activity in rat models, indicating that the fresh plant has potential uses in prostrate pathology and infertility cases. An LD₅₀ of 495mg/kg the plant was found to be probably too toxic to use. Further research was thus recommended.

C2. Assessment of the Effects of Aqueous Extract of *Odontonema strictum* on Blood Pressure in Rats - A. Traore

The effect of the leaf extract of *Odontonema strictum*, a plant used in Burkina Faso for the treatment of hypertension, was studied by measuring arterial blood pressure of rats. The results justified the use of the plant as the extracts were found to have profound effects on the cardiac and vascular adrenergic systems.

C3. Cardiovascular Effects of *Harpagophytum procumbens* Secondary Root Aqueous Root Extract in some Mammalian Experimental Animal Models - J. A. O. Ojewole

Harpagophytum procumbens is considered a wonder plant in Southern Africa as it is used as an anti-inflammatory, antimalarial, anticancer and also for HIV/AIDS cases. Investigations on the cardiovascular effects of the root extract of *H. procumbens* on rats revealed that relatively moderate to high doses produced hypotensive and cardio-depressant effects on arterial blood pressures. Extracts of the plant are already commercialized in Germany.

C4. Studies on the Vascular Effects of extracts of *Odontonema strictum* - S. Ouedraogo

Water, ethyl acetate and methanol extracts of *Odontonema strictum*, a plant used in Burkina Faso for the treatment of hypertension, were investigated for vascular activity in isolated rat tail and pig coronary arteries. The ethyl acetate fraction appeared to contain the active principle and this extract was thus recommended for further investigations.

C5. Cardiovascular Properties of Aqueous Extract from *Mitragyna inermis* - S. Ouedraogo

Mitragyna inermis is a plant indigenous to West Africa and used in the treatment of malaria as well as hypertension. In the study reported, aqueous extract of *M. inermis* was shown to have hypotensive, cardiotropic and vasodilatory properties in rats.

Date: August 18, 2004

GROUP A

Chair: Prof. A. Oteng-Yeboah & Dr. H. Millogo-Kone. **Rapporteur:** S.V. Nwafor

A9. Composition and Anti-plasmodial Activities of Essential Oils from some Cameroonian Medicinal Plants - F. F. Boyom

Five essential oils extracted from five Cameroonian plants, *Antidesma laciniatum*, *Hexalobus crispiflorus*, *Pachypodanthium confine*, *Xylopiya aetiopica* and *X. phloiodora*, were evaluated for antiplasmodial activity against *P. falciparum*. All the oils exhibited activity with IC₅₀ between 2 and 29 mg/ml with the oil from *H. crispiflorus* being the most active, suggesting that the oils offer new possibilities for antimalarial chemotherapy.

A10. Pilot Clinical Trials to Evaluate Efficacy and Safety of "Nibima" and "NASRA" - Two Antimalarial Herbal Preparations Widely Used in Ghana - J. Asiedu-Larbi

Efficacy studies were carried out on *Nibima* and *NASRA*, two antimalarial herbal preparations which are widely used in Ghana. None of the patients on *NASRA* was

cured (negative blood film, afebrile and asymptomatic by Day 7) but 42% of those on *Nibima* were. Eighty-eight percent of patients on *NASRA* showed partial response, (reduction in parasitaemia but no clearance, afebrile and asymptomatic by Day 7). Only one patient (11%) on *NASRA* did not response but 42% in the *Nibima* group gave no response (no change or increase in parasitaemia on day 7). Subsequent dose-range study of *Nibima*, with 37 patients, using 150% of the original dose for 6 instead of 3 days resulted in a cure rate of about 66%, partial response of 27% and 5% did not respond. Toxicological assessment indicated that the treatment was safe.

A11. Diagnosis of Malaria with the Help of Extracts of a Medicinal Plant *Dicliptera venticillata* - W. R. Sawadogo

A compound isolated from the leaf stalks of *D. venticillata* was tested for its ability to diagnose malaria in infants in a hospital. Paper strips impregnated with the pale-rose coloured compound turned violet within seconds when applied to the skin of patients, indicating a positive test for the presence of malaria. Colour remained unchanged when malaria was absent. Results of the test compared favourably (95%) with conventional diagnostic methods, indicating that this quick and simple method can be adopted to facilitate diagnosis and treatment.

A12. Seasonal Variation in *Cryptolepis sanguinolenta* an Antimalarial Plant Used in Ghana - Y. Ameyaw

Total alkaloid content in the stem, roots and leaves of the antimalarial plant *C. sanguinolenta* obtained from three different sites in Ghana were measured in order to determine quantitatively the seasonal variation of the total alkaloid content in these parts of the plant. Seasonal variations were recorded. There is thus the need to bear in mind that secondary plant metabolites vary according to season when these plant species are to be harvested.

There were variations in alkaloid content of the various plant parts. However, a comparison of mean total alkaloid content from the three populations of *C. sanguinolenta* indicated that there were no differences in the values for the root and stem but a difference in the leaf from two out of the three sites. The conclusion drawn from this study was that the quantified alkaloid content of the plant organs were not significantly different and that two phenetic groupings were present out of the three populations.

A13. Antimalarial secondary metabolites from some Cameroonian Medicinal Plants – D. Ngamga

In the search for antimalarial compounds from nature, the following plants used in the central and western part of Cameroon for the treatment of various diseases were investigated: *Pentadiplandra brazzeana* (Pentadiplandraceae), *Xymalos monospora* (Monimiaceae) and *Millettia griffoniana* (Leguminosae). Seven compounds were isolated from the CH₂Cl₂-MeOH (1:1) extract of the roots of *P. brazzeana*, including three thioureas, previously described and three ureas. Five alkaloids (an aporphine and four benzyloquinolines) were isolated from an extract from the stem bark of *X. monospora*, and from the hexane and acetone extract of the seeds of *M. griffoniana*, sixteen isoflavonoids were isolated. Crude extracts as well as pure compounds were tested against two *Plasmodium falciparum* strains, the chloroquine-resistant Indochina W-2 and the chloroquine-sensitive Sierra Leone D-6.

Afr. J. Trad. CAM (2005) **2** (2): 177 - 205

All the compounds had moderately strong antiplasmodial activity, better than the crude extracts, but they were not as effective as chloroquine. Interestingly, the compounds were equally effective against both chloroquine-resistant and chloroquine-sensitive strains of the parasite.

A14. Standardization and Quality Control Studies on "Mist Nibima," a decoction of *Cryptolepis sanguinolenta*. - A. A. Appiah

"Mist Nibima" which is used in the treatment of malaria and urinary and respiratory tract infections in Ghana, is a decoction of *Cryptolepis sanguinolenta*. The aim of this study was to provide specification towards quality control of an aqueous extract of the major constituent in "Mist Nibima", the alkaloid cryptolepine. Absorbances of three solutions, cryptolepine solution, an aqueous solution containing an extract of *C. sanguinolenta* and another containing the alkaloids extracted from the *C. sanguinolenta* solution, have been used to provide an equation from which the Cryptolepine Base Equivalent (CBE) of any batch of *C. sanguinolenta* preparation can be determined.

A15. Mosquito Repellents from Herbs: Case Studies with Essential Oils from Seven Plants - G. K. Tuani

Out of nine plants studied so far, the best repellency action has been exhibited by a mixture of oils from *Cymbopogon nardus* and *Cinnamomum zeylanicum* in 20% aqueous ethanol when mixed in a ratio of 3:1(v/v). This mixture, when applied to the skin, can repel mosquitoes for as long as 4 hours.

GROUP B

Chair: Dr. S. Ouedraogo. **Rapporteur:** A. Traore

B7. Susceptibility of Diarrhoeal Pathogens to "Mist Nibima" - F. C. Mills-Robertson

The antibacterial activity of "Mist Nibima" was investigated and the results presented indicated that the extract exerts inhibitory (bacteriocidal) effect on diarrhoeal pathogens such as non-typhoidal *Salmonella*, *E. coli* and *Shigella* isolated from foods, food vendors and diarrhoeal patients. Participants suggested that acute toxicity studies of the extract should be conducted, as well as statistical analysis on the current results.

B8. Antimicrobial Activity of Essential Oils of the Leaf, Stem and Root Bark of *Xylopiya aethiopica* - T. C. Fleischer

The research was undertaken to determine the composition of the essential oils obtained from different organs of the plant and to assess the antimicrobial activity of the oils. In all 94 compounds were identified. All the essential oils were complex mixtures of compounds and all samples contain remarkable amounts of α -/ β -pinene. Germacrene D was also present in high quantities in all samples with the exception of the root bark essential oil. Essential oil yield from the various morphological parts of *X. aethiopica* was in the order Fresh fruits > Dried fruit > root bark > stem bark > leaves. The microorganisms used were *Ps. aeruginosa*, *E. coli*, *B. subtilis* and *S. aureus*. The sensitivity of the microorganisms to the oils was generally low, *S. aureus* being the most sensitive and *C. albicans* the least sensitive. The results indicated that the essential oils contribute only a small part to the antimicrobial activity of the plant.

B9. Malaria Prevention: Attitude, Knowledge and Practice in a Southwestern Nigerian Community - E. O. Agbani

In this study, a questionnaire was used to ascertain the level of knowledge of the symptoms of malaria, attitudes towards preventive measures as well as treatment seeking behaviors among members of the Ile-Ife community in southwestern Nigeria. The findings suggested that convenience and the severity of the disease affected respondents' choice of treatment in more than 50% of the cases. The recommendation was that malaria public enlightenment efforts be intensified, effective malaria preventive methods be affordable and that support be provided to make malaria treatments at public hospitals free.

B10 Anti-ulcer Property of the Ethanolic Root Extract of *Cissampelos mucronata* A. Rich Fam. Menispermaceae. S. V. Nwafor

The anti-ulcer property of ethanolic extract from the roots of *Cissampelos mucronata* was investigated using models of indomethacin-, histamine- and stress-induced ulcers. The extract of *C. mucronata* protected rats against ulcer induced by the various ulcerogens especially indomethacin. The mechanism of the anti-ulcer activity is postulated to be by cytoprotection and inhibition of calcium ion mobilization into the intracellular compartment. The study justifies the use of the extract in the treatment of peptic ulcer in some parts of Nigeria.

B11 Bioactive Compounds from *Boswellia dalzielii* and *Steganotaenia araliacea*. T. E. Alemika

Phenolic compounds (protocatechuic acid, gallic acid and ethyl gallate) and a new stilbene glycoside were isolated as the antimicrobial/antioxidant principles in *Boswellia dalzielii* and *Steganotaenia araliacea*. Acetyl-ketoboswellic acid (AKBA) from *B. dalzielii* gum resin showed anti-inflammatory activity while a saponin mixture from *S. araliacea* demonstrated strong spasmolytic properties.

B12 Mechanisms of the Antiinflammatory Effect of the Active Principle of Leaves of *Culcasia scandens* P. Beauv (Araceae) C. O. Okoli

Various methods were used to investigate the anti-inflammatory effect of components of *Culcasia scandens*, a plant with ethnomedicinal uses against inflammatory conditions such as tonsillitis and pain relief in toothache. The methods included xylene induced topical edema in the mouse ear, paw edema induced by egg albumin, gastrointestinal irritation, leukocyte migration induced by dextran, all in rats, and heat- and hypotonicity-induced haemolysis of human red blood cells. The results indicate that the anti-inflammatory effect of *C. scandens* extract and fractions and compounds from it may be mediated through prostaglandin inhibition, membrane stabilization or inhibition of leukocyte migration.

B13 Isolation and Characterization of an Antimicrobially Active Hydroxybiflavanoid constituent from *Garcinia kola* Stem Wood (chewing-stick) S. Y. Gbedema

The aim of the study was to screen *G. kola* stem wood extract for antimicrobial activity and to isolate and characterize the bioactive constituent(s). Chromatography

was used to isolate GBK2 which was identified as II-3-4'-I-4'-5-II-5-I-7-II-7-heptahydroxy-3,8-biflavanone. The crude extract exhibited antimicrobial activity against all test organisms including *Pseudomonas aeruginosa*, with more pronounced activity on *Streptococcus*, *E. coli* and *Candida*. However, GKB2 had more pronounced activity on yeast-like fungus and Gram positive bacteria than on the Gram negative bacteria. The use of *G. kola* plant in treating infectious diseases appears to be justified. This is first report of presence of this constituent in the stem wood of *G. kola*.

B14 Ten Plants from Cameroon Screened for Potential Antimicrobial and Antitumour Activity - Pieme

This was a preliminary study in which seventeen organic and hydro-organic extracts prepared from ten plants from nine different families collected around Yaoundé in Cameroon were tested for their biological effects. The *in vitro* evaluation of antibacterial and antifungal activity was carried out using bacteria (*P. aeruginosa*, *E.coli*, *S. faecalis*, *S. choelera*, *P. mirabilis*, *M. morgani*) and two groups of fungi (Filamentous, Yeast.). Antitumor activity was evaluated with the Crown gall tumor induced by *Agrobacterium tumefaciens* using the Potato discs bioassay method.

Twelve of the 17 extracts demonstrated their antibacterial activity against the pathogenic bacteria tested. Extracts of *Solanum aculeastrum* and *Syzygium guineensis* showed the highest antibacterial activity. Most of the extracts were active against *Geotrichum candidum* and *Penicillium* species, indicating antifungal activity. Four of the extracts, ie, *Desmodium adscendens*, *Centella asiatica*, *Leea guineensis* and *Senna alata* exhibited potential antitumor activity. These extracts also showed antibacterial and antifungal activity. They are currently undergoing analyses to identify the active constituents.

GROUP C

Chair: Dr. A. Traore and Dr. T. Adjobimey. Rapporteur: S. Ouedraogo

C6. Evaluation of the Efficacy and Safety of the Anti-diabetic Preparation ADD-199 in Some Laboratory Animals - L. K. N. Okine

ADD-199 is an aqueous extract from 4 different plant species: bark of *Maytenus senegalensis*; root of *Annona senegalensis*; fruit of *Kigelia africana* and bark of *Lannea welwitschii*. It is used by Ghanaian herbalists for the management of diabetes mellitus.

The study was conducted to evaluate the safety and efficacy of ADD-199 using streptozotocin-induced diabetes in C3H/He mice.

ADD-199 stimulated the release of insulin from residual β -cells of pancreas and showed hypoglycaemic activity comparable to Glibenclamide and Metformin. Like the two anti-diabetic drugs, it was able to overcome the effects of a glucose load in an oral glucose tolerance test. The results also indicate that ADD-199 is not nephrotoxic, pneumotoxic or hepatotoxic even at 5 times the daily human dose of 100 mg/kg. It does not appear to have effect on the bone marrow, did not modulate CYP activities, and had no effect on zoxazolamine paralysis and pentobarbital sleeping times. It decreased the body weight of the experimental animals and its hypoglycaemic actions, like Glibenclamide, may be through the stimulation of insulin secretion by β -cells of the pancreas. The results so far suggest that the preparation has hypoglycaemic properties and exhibits no overt organ toxicity.

C7. Effects of Some Autocoid Inhibitors and Antagonists on Malaria Infection in Mice - E. O. Agbani

The aim of this study was to confirm the idea that autocoid antagonist and inhibitors also possess antimalarial properties. The study revealed that the selective inhibition of local hormones implicated in the pathological manifestations of malaria infection by autocoid inhibitors and antagonist is a possible means to reduce the severity of infection and associated tissue damage and to enhance the efficacy of available anti-malarials such as chloroquine when combined with it for malaria therapy.

C8. Design of an HPLC Method for Quantification of the Amount of Reserpine in *Rauwolfia vomitoria* - L. Sorkpor

The study was undertaken to design an HPLC method that would separate and quantify the alkaloid reserpine from *Rauwolfia vomitoria* and to investigate the effect of the geographical location of the plant on the yield of total alkaloids. The plant was collected from two different sources. The results indicated the development of quick and efficient HPLC method for the quantification of reserpine in the total alkaloidal extract from *R. vomitoria*. The results also indicated that the source of the plant material i.e. the geographical location could have a profound effect on the yield of total alkaloids and the amount of a particular alkaloid.

C9. Safety Evaluation of ADD-203, Fermented Seed Extract of *Cassia occidentalis* Used in the Management of Human Diabetes Mellitus in Rats. - L. K. N. Okine

Some herbalists in Ghana use "AD-203" (fermented ground seed extract of *C. occidentalis*) for the management of diabetes mellitus (DM). The safety of ADD-203 has however, not been scientifically proven to warrant its use in humans. The aim of this study was to assess the safety of ADD-203 using acute and sub-chronic toxicity tests in rats. Biochemical, haematological and histological analyses were carried out.

The results showed that the rate of growth of ADD-203 treated animals were significantly slower than that of controls. Size and weight of spleen of animals treated with ADD-203 were significantly higher than controls. There were indications of haemolysis and bilirubin levels also indicated hepatocellular damage. The suggestion of hepato-toxicity was corroborated by the dose-dependent shrinkage of hepatocytes and increase in size of interstitial spaces in these cells. There was no evidence of pneumo- or nephro-toxicity. These findings suggest that AD-203 is quite toxic to rats. Therefore, care should be taken in the administration of the preparation to humans.

C10. Analgesic and Anti-Colitic Evaluation of the Ethanolic Extract of *Securidaca longepeduclata* - K. O. Buabeng.

An ethanolic extract of *Securidaca longepeduclata* (an herb used widely in West African traditional medicine for many ailments including pain relief) was investigated to ascertain its analgesic and anti-colitic properties using acetic acid-induced abdominal writhing in mice [analgesic evaluation] and tri-nitro benzene sulphonic acid (TNB)-induced colitis in rats for the anticolic effect.

The extract dose dependently inhibited acetic acid induced abdominal constriction in mice by 45.0% and 65.0% respectively, while aceclofenac, the reference drug used, inhibited it by 68.75%. The results indicate that *S longepedunculata* possesses

analgesic properties, does not possess any anti-colic activity. In addition, the plant was found to be toxic to rats since it damaged the gastrointestinal mucosa.

C11. Hypoglycaemic Activity of the Alcoholic Fruit Extract of *Tetrapleura tetraptera* in Normoglycaemic Wistar Albino Rats - G. Komlaga.

Virtually all morphological parts of *Tetrapleura tetraptera* are used for the treatment of various disease conditions including convulsion, hypertension, leprosy, malaria, inflammation and rheumatic pains. In some localities of Ghana, the fruit is used for the treatment of diabetes mellitus. While most of the traditional uses have been scientifically investigated, there is no documented evidence on the antidiabetic effect or the hypoglycaemic property of the plant. The study was to validate the antidiabetic property of the fruit. The method used was the time course (10hrs) of the percentage change in blood glucose level after oral administration.

The results indicated a biphasic effect; an initial increase in blood glucose level (most probably because of the presence of sugar in the fruit) followed by a sustained decrease. The extract at a dose of 2000mg/kg, significantly lowered the blood glucose level by 71.4% in the 10th hour, and this was significantly greater than the effect of glibenclamide, which was used as the positive control. This study corroborated the claim by Ghanaian herbalists who use the fruits of *T. tetraptera* for the management of diabetes. The hypoglycaemic properties were found to be comparable to those of glibenclamide.

C12. Influence of *Picralima nitida* Extracts on Cytochrome P450 Content and Activity in Rats - K. A. Ofori

Picralima nitida known as "PICAP CAPSULES" is used in Ghanaian folk medicine for the relief of pain. Such drugs with analgesic and anti-inflammatory activity tend to be abused and therefore could interfere with liver microsomal enzymes altering disposition of drugs and their efficacy and safety profiles. The aim of the study was to investigate the effect of *P. nitida* on hepatic cytochrome P450 content for some information on the effect of *Picralima* extracts on induction of microsomal enzymes. Reference drugs used were phenobarbitone and ketoconazole.

The results showed that the total crude extract of *Picralima nitida* induced hepatic microsomal cytochrome P450 in a manner similar to the induction by phenobarbitone. Based on the findings, *P. nitida* is likely to cause drug-drug interactions.

C13. Hypoglycaemic Activity of *T. tennifolia* - G. A. Koffuor

The hypoglycaemic effect of *T. tennifolia* (a plant used in Ghanaian folk medicine for the management of diabetes mellitus) was investigated using plasma glucose concentration of normoglycaemic rats in an oral glucose tolerance test. Results indicated that an ethanolic extract of *T. tennifolia* caused a significant reduction in plasma glucose levels and the area under the oral glucose tolerance time-course curves. The reductions were similar to those caused by glibenclamide and metformin, which were used as reference standards. The study thus supports the use of the plant in the management of non-insulin dependent diabetes mellitus.

IV. Ethical issues: code of conduct

Another objective of this First Scientific Meeting had to do with ethical issues in the conduct of research into natural products. As part of the activities then, a Code of

Conduct was drafted and presented to the participants for discussions. It is still in a draft form but WANNPRES now has a Code of Conduct that its members can start working with. Below is the 15-point introductory part of the document which has been referred to as the Accra (Ghana) Accord. Other sections were on Relationship with Healers, Handling Laboratory Animals and Relationship with Volunteers. The full document appears in the Proceedings to issue later.

**DRAFT CODE OF CONDUCT FOR MEMBERS OF WESTERN AFRICA
NETWORK OF NATURAL PRODUCT RESEARCH SCIENTISTS**

ACCRA (GHANA) 2004 ACCORD

Introduction

1. The Western Africa Network of Natural products Research Scientist (WANNPRES) has developed the Ghana Accord 2004 as a statement of professional code of conduct to provide guidance to natural product researchers and other participants in natural product research.
2. Progress in health and wellbeing is based on research which ultimately must rest in part on experimentation involving animal and human subjects.
3. Natural product research must conform to generally accepted scientific principles, be based on a thorough knowledge of the scientific literature, other relevant sources of information, and on adequate laboratory and, where appropriate, animal experimentation.
4. The primary purpose of natural product research is to improve prophylactic, diagnostic and therapeutic procedures and the understanding of the aetiology and pathogenesis of disease. Even the best proven prophylactic, diagnostic, and therapeutic methods must continuously be challenged through research for their effectiveness, efficiency, accessibility and quality.
5. A researcher shall safeguard the interest of the healer and his clients as well as the community when carrying out research on products that might have the effect of harming the existing harmony in a given community.
6. In current traditional medical practice and natural product research, most prophylactic, diagnostic and therapeutic procedures involve risks and burdens.
7. Research Investigators should be aware of the ethical, legal and regulatory requirements for natural product research in their own countries as well as applicable international requirements. No national ethical, legal or regulatory requirement should be allowed to reduce or eliminate any of the protections for human subjects set forth in this Declaration.
8. The design and performance of all experimental procedures involving human volunteers or animals should be clearly formulated in an experimental protocol according to the principles of GCP and GLP. This protocol should be submitted for

consideration, comment, guidance, and where appropriate, approval to a specially appointed Institutional review board /ethical review committee, which must be independent of the researcher, the sponsor or any other kind of undue influence. This independent committee should be in conformity with the laws and regulations of the country in which the research experiment is performed. The committee has the right to monitor ongoing trials. The researcher has the obligation to provide monitoring information to the committee, especially any serious adverse events. The researcher should also submit to the committee, for review, information regarding funding, sponsors, institutional affiliations, other potential conflicts of interest and incentives for subjects.

9. Notwithstanding the provisions of these guidelines, all studies should be handled in accordance with existing international ethical guidelines e.g. WHO, Helsinki, UCH.
10. The natural product scientist must take time to explain the study protocol to the healer so that complete understanding of the project is achieved. This will go a long way to reduce apprehension and lack of trust between the two parties.
11. The research protocol should always contain a statement of the ethical considerations involved and should indicate that there is compliance with WANNPRES 2004 Accord, Accra (Ghana).
12. Natural product research should be conducted only by scientifically qualified persons and under the supervision of a competent natural product scientist.
13. Both authors and publishers have ethical obligations. In publication of the results of research, the investigators are obliged to preserve the accuracy of the results. Negative as well as positive results should be published or otherwise publicly available. Sources of funding, institutional affiliations and any possible conflicts of interest should be declared in the publication. Reports of experimentation not in accordance with the principles laid down in this Declaration should not be accepted for publication.
14. Natural product research shall include medicines for animal health and husbandry (veterinary medicines)
15. Research on natural products must support and encourage environmentally sound practice and sustainable use of natural products. This will be in accordance with the international guidelines [e.g. article 8j, 15, 16 of CBD, WHO, etc]

V. Round table discussions and outcomes

Participants were put into groups for the Round Table Discussions which were held on Wednesday, August 18th, after the symposia and parallel oral presentations. Six groups were formed, three of which were to discuss issues relating to anti-malarial herbal preparations and the other three issues relating to herbal preparations for the management of HIV/AIDS. The following objectives of the meeting were provided as background for the discussion groups:

- Present and discuss results of original research on medicinal plants used for the treatment and/or management of diseases of public health importance, especially malaria and HIV/AIDS;
- Identify plant products most effective against malaria and HIV/AIDS;
- Prioritize and harmonize methods for assaying for anti-malarial activity of medicinal plants;
- Harmonize methods for evaluating efficacy of plants used for the management of HIV/AIDS.

Related to the objectives were the tangible outcomes, which the groups were to keep in mind during their discussions. The groups dealing with malaria were to consider the following:

- Methods of assaying for anti-malarial herbal preparations acceptable to all members of the network in the sub-region.
- A list of widely acceptable, evidence-based anti-malarial plant products.
- Of the methods available for assaying for antimalarials, the ones considered most appropriate for adoption;
- Ranking the methods if more than one method was chosen;
- The laboratories in the sub-region that are well placed to use the methods chosen;
- Whether all the laboratories, or one laboratory in each country, should develop capabilities for carrying out at least, one assay; and,
- What laboratories in each country should have in order to be able to carry out at least, one good assay for evaluating antimalarial herbal preparations.

The groups dealing with HIV/AIDS were to consider the following:

- Methods for identifying medicinal plants which could be considered useful in managing HIV/AIDS.
- Tests to be carried out to evaluate plants with anti HIV/AIDS properties;
- Ranking these tests;
- The tests which must be “unavoidably” carried out;
- What a laboratory in each country must have to be able to carry out, at least, one good assay for evaluating herbal preparations used for the management of HIV/AIDS; and,
- Preparing a list of all the plants mentioned which were considered good for the treatment of HIV/AIDS.

Below are the outcomes of the two main groups.

HIV/AIDS GROUP.

1. Before recommending a herbal preparation for use on a wider scale for the management of HIV/AIDS, tests should indicate that the preparation:
 - Causes a decrease in viral load;
 - Shows an increase in CD₄ count from a baseline; and,
 - Exhibits immunostimulatory properties.

2. Tests should be prioritized as follows:
 - Toxicity;
 - Antiviral;
 - Antimicrobial;
 - Immunomodulatory activity;
 - Activity against opportunistic infections; and,
 - Overall improvement in the quality of life, elimination of the symptoms of the syndrome.
3. Laboratories which should be able to determine viral load and CD₄ count should be available in as many regions within a country as possible.
4. No specific herb was identified as being capable of effectively managing HIV/AIDS cases during the meeting. Preparations that were considered or shown to be effective had trade names. The suggestion is that WANNPRES should set up a committee to consult and come up with a list of such herbs.
5. For opportunistic infections *Cassia alata*, *Aloe vera*, *Piper guinensae* etc were mentioned as being quite effective
6. Collaboration between researchers, scientists and herbalists must be effectively fostered, and WANNPRES should play a very active role in this direction.
7. There should be pre-clinical and clinical studies of putative plant preparations using the WHO generic protocol

MALARIA GROUP

1. Considering the accuracy of the methods, their precision and WHO requirements, the following methods were identified as appropriate for *in vitro* studies:
 - Microscopic/morphological methods;
 - Anti-plasmodial methods;
 - Flow Cytometric methods

The following observations were made:

- The microscopic method was preferred because it was relatively cheaper than the other methods and could be carried out in most laboratories. However a skillful microscopist was needed.
- Equipment and radiolabelling were the factors militating against the use of the anti-plasmodial methods based on inhibition of incorporation of radioactive nucleotides.
- Availability of equipment and other resources would be the limiting factor; flow cytometry could be the method of choice if the equipment is available.
- Capability ought to be the basis for decision as to what method to use.
- With the methods involving the culture of the parasite, the availability of the right type of serum could be a limiting factor.

For the *in vivo* methods, the usual methods using rodents were suggested. Another observation made was that the use of the herbal preparations by humans over time could be regarded as having satisfied the *in vivo* method requirement.

2. Within the sub-region, laboratories that are capable of carrying out these tests exist in Benin, Cameroon and Ghana for the *in vitro* studies and in Nigeria, Ghana, Cameroon, Ghana and Nigeria for the *in vivo* studies.

3. One laboratory in each country should develop the capacity to carry out at least one of the required assays listed above.
4. WANNPRES, through government, International Foundation for Science and other development partners, should help in the purchase and delivery of equipment and consumables to these laboratories.
5. Plants to be investigated should be selected based on results presented during the meeting on one hand and on the knowledge of the traditional healers on the other.
6. *Cryptolepis sanguinolenta*, *Azadiracta indica*, *Nauclea latifolia*, *Cassia alata* and *Picralina nitida* were identified as plants which are quite efficacious in the treatment of malaria, based on the evidence provided during the meeting.

VI. Conclusions

The first scientific meeting of WANNPRES was very successful. Participants (see Figure 1) were very enthusiastic about the various activities and participated fully to the very last day when a seminar on Good Laboratory Practice was conducted. That a code of conduct has been drafted indicates yet another area of success. Some of the discussions produced below indicate the direction in which WANNPRES would like to go:

1. The individual efforts at validating the curative properties of natural products in our own environment was highly commendable;
2. We should develop keen interest in the opportunities that exist for developing our own resources;
3. Scientific justice rather than neglect and stigma should be applied to validate claims of ethnomedical practitioners;
4. Discoveries made during the world war 1 were not made using sophisticated methods but by simple observations and practices;
5. Therapeutic agents of natural origin, yet unknown can be the African contribution to global activities in health;
6. Scientific exploration of our environment is the only way to exploit it in a sustainable way and we should do it because one would do it for us in a way that we would want it to be done;
7. Globalization is contributing to the spread and emergence of diseases, but it also affords us the opportunity to share facilities, knowledge and resources using a collaborative approach;
8. Research attention should also be focused on the silent killers and not only on the major diseases of public health interests;
9. African "Nobel" Prizes should be instituted to motivate individuals and groups as well as encourage the youth to be involved in natural products research.

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Figure 1: Some of the participants at the WANNPRESS Meeting, Accra, August 2004.

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