HERBAL MEDICINE—DOES IT HAVE A FUTURE IN GHANA?*

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History of Herbal Medicine

The use of indigenous plants for medicinal purposes has existed for centuries. The earliest recorded mention of the medicinal use of plants, is perhaps the one found in the Rig Veda, probably the oldest repository of human knowledge, written between 4500 and 1400 B.C. One can also mention publications like the Ayurveda and the Susruta Samhita, in which the properties of various drugs are given in detail, and both of which were published before 1000 B.C.1

In Africa, Asia and the tropics in general, where Western medicine has only recently been gaining ground, the wide application of local herbs in the treatment of various illnesses, is perhaps the largest single contributor to the health needs of a vast majority of the population. Many plants have been credited with curative attributes, some of which are useful and authentic, others of rather doubtful, spurious or unproven status. Yet, one cannot dispute or dismiss the enormity of the knowledge of the medicinal uses of plants possessed by African and Asian herbal doctors.

The exploration of the plant kingdom for chemical compounds of medicinal value has been going on for several years. Herbalism and folk medicine are recognised in many countries for their contribution to much useful therapy. Herbal Medical Practice in Ghana: In Ghana, there are three main categories of herbal doctors. These are:

(a) Those who are properly trained, usually by very competent herbalists who have had their skills handed over to them through oral traditions, through a long ancestral line. Those in this group are reputable and well qualified. They usually have their own "hospitals" or "Clinics", and are consulted by clients in a manner similar to what normally happens in a conventional Western-type hospital or clinic. This class of herbal medical practitioners usually emphasise the actual efficacy of the herbs, and attribute their cures to the particular herbs administered. Supernatural considerations are a secondary, (although quite important) factor, in their practice.

(b) The set-up of the second class of herbal medical practitioners is similar to those in the first category, but those in this category believe more in the supernatural causes and cures of diseases. Usually the herbal preparations they administer are employed, not as the actual curative agent, but as a means of either driving away evil spirits, destroying the supernatural powers responsible for any particular ailment, or invoking the help of "good spirits" who will then effect the cure required.

(c) The third group includes the itinerant herbalist, who conducts his trade either at street corners or from house to house. His practice is usually an ill-defined hybrid of categories one and two above. He goes from house to house advertising cures for a wide spectrum of ailments—from piles and boils.

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through ability to make a 35 year-old barren woman a prospective mother of triplets, to converting a sexually weak or impotent man into a “super-he-man” overnight.

Then of course there is the large group of amateur practitioners made up mostly of people who have had a bit of skill, or a few remedies, transmitted to them by friends or relatives, and who usually give their services to friends or relatives free of charge, or for a token fee.

The practice of herbal medicine, including self-medication upon the recommendation of a particular drug by a friend, is very widespread in Ghana. It is not uncommon to find people admitted to hospitals or undergoing long term hospital treatment for diseases such as hypertension, jaundice and tuberculosis, also secretly receiving herbal treatment without the knowledge of the doctor. In fact, the only serious threat, in terms of attracting clientele, that I see at the moment to herbal medical practice in Ghana, is therapy through prayer and an ointment with Florida water, that is, faith healing as practised by the multi-farious spiritual churches that have sprung up in recent times all over the country.

Effectiveness of Herbal Medicine: The efficacy of herbal medicine is so well known that we need not elaborate on it here. Most Ghanaians are likely to have heard of, or undergone, treatment for an ailment that has defied “conventional” medical practitioners. For example, there is a well known skin disease, Herpes zoster (known in Fante as “Ananse”). This is quite a serious disease, and can be fatal if not promptly treated. I am informed that its treatment in hospitals has met with more failures than successes. But I know of herbalists who have made a name in curing this disease. Their treatment involves burning the affected area with pounded steamed plantain or banana stem, smearing the affected area with the juice from the plantain stem, and finally smearing the area with a paste of pulverised seeds of Aframomum melegueta K. Schum. (known in English as alligator pepper, and in Twi and Fante as Fam wisa or wisa;) and other herbal preparations, the composition of which they would never divulge to anyone but the initiated, and this at a handsome fee. Total cures are known to have been effected from within five days to two weeks.

One common childhood disease is mumps. The disease can be very painful, and the conventional hospital treatment takes a fairly long time. But in the Fante areas of Ghana, of which I am more familiar, mumps are treated by smearing the cheeks with an aqueous paste from the seeds of Piper guineense (Osoro wisa or sasima) or Aframomum melegueta. A paste of red, white and black clay is then prepared and the cheeks spotted into a multicoloured pattern of red, white and black spots. The poor victim is then sent to the market place where he is hooted and jeered at by crowds chanting a well known verse in Fante. The mumps disappear within two or three days. Whether it is the herbs applied, or the hooting and jeering which effects the cure, nobody seems to be sure.

In eastern Mediterranean countries and in Arabia, local physicians prescribe a decoction of the dried seeds of a local plant, Anmm Visnaga as a diuretic and as an antispasmodic in renal colic. Investigations by G. V. Andrep and his colleagues in Cairo have shown that the active constituent in the plant was Khellin (I), which they found to be an effective vasodilator with a selective action on coronary arteries. Subsequent clinical trials demonstrated the value of this compound in the treatment of Angina Pectoris.²

Even in the currently popular field of chemotherapy of tuberculosis,
indigenous plants are attracting a great deal of interest. Japanese workers have isolated from *Stephania cepharantha*, and from *Stephania sasakii*, the alkaloid cepharanthine which is being used for the treatment and the prophylaxis of tuberculosis in Japan. Chinese workers have reported a prominent tuberculostatic activity in extracts of the roots of *Coptis coinensia*. The activity has been attributed to the alkaloid, berberine sulphate (II), found in the plant.

The fruit of *Ammi Majus* is used by the Egyptians in treating leucoderma, by oral administration of an extract of the plant, and subsequent exposure to sunlight of white patches on the skin. A crystalline active principle, xanthotoxin (III), also known as Ammoidin, has been isolated from this plant.* One could go on ad infinitum on these success stories of herbal medical practice. But herein lies the danger.

Conventional Western medicine is known to have its good and bad sides. Its areas of competence and shortcomings appear to be well defined and well documented. The vast number of drugs used are also well known and properly tested. The danger of misuse of drugs is well understood and documented, and certain drugs are not allowed to be administered without proper medical supervision. Previously supposedly harmless drugs have been found later, after more rigorous tests and a longer period of use, to be highly dangerous if misused.

However, in herbal medical practice, one unfortunately gets to know of only the good and glamorous aspects of the practice. This is not surprising, for several reasons. These include the fact that in herbal medicine, the possible side effects of the use of any particular plant extract have not been properly investigated and documented, partly because the average herbalist is not well equipped for such studies, and partly because these effects may be of such a long term nature that they would not be immediately apparent to a practitioner. Moreover, the very nature of the herbalist's practice is such that there is the need for him to maintain all the public confidence in him that he can muster. Therefore even if he recognises certain deleterious effects of his prescriptions, he is not likely to make these public, for fear of losing valuable clients. He needs to shroud his practice in mystery and secrecy.

These, and other factors, such as the success stories of herbal medicine have unfortunately blinded us to the harmful and probably more dangerous side effects which might arise. Very little work has been done on the toxicology and teratology of herbal medicines, but the possible dangers in its practice are gradually becoming apparent. Herbalists are apt to frown upon people who point out these dangers to them. There is a well known school of thought among herbalists, that "nature has its own checks and balances" and that if a particular plant being used to effect a cure of some disease contains poisonous components, nature always makes sure there is another component present which neutralises the effect of the poison. But I am afraid this line of thought has no basis whatsoever in the light of evidence available from the little work done so far. It is true that poisonous plants are usually known as such by local people. But one may not be aware of the hazards of plants which do not show immediately toxic effects, but which act insidiously and can cause chronic disease and eventually death after a long latent period, even with a single dose. Such insidious

* Xanthotoxin was recently isolated from *Afragile Paniculata* Schum & Thonn, by Drs. Adjanglaa and Asomaning, of the Chemistry Department, Legon. Its pharmacological activity has been tested (see Ghana Journal of Science, Vol. 8, 1968 pp. 97-100, and Vol. 10 No. 2, pp. 82–84)
action has only recently been recognised and can only be detected by screening the plant materials in long term experiments on animals including pregnant and lactating females.

Research into Plant Medicine: It was not until the early nineteenth century that organic chemists took up a systematic study of many plant principles, to find out whether they contained any useful active recognizable compounds whose physiological and pharmacological effects would be of some benefit to medical practice.

In India, the systematic investigation of drugs used in traditional and folkloric medicine on modern scientific lines started about fifty years ago. It was recognised that the indiscriminate use of these plants by herbalists, was both dangerous and wasteful since in most cases the actual dosage and even the correct identification of the plant was left to individual herbalists to determine. Even though a herbalist might know all this through centuries of experience, one cannot rule out the danger of misuse or the use of a wrong, probably poisonous, plant with fatal consequences. To illustrate this point, let us consider a few cases. There are several examples of different species of plants with different physiological properties having virtually the same indigenous names. For example, according to Irvine,\(^4\) Conopharyngia cumminsii Stapf and other Conopharyngia species are all called KAKAPEMPE by the Asante and Akyem. This could easily be confused with the completely different but also widely used plant Rauwolfia vomitoria Afz. which is also called KAKAPENPEN by the Asante, Akyem, Fantse and other Akan speaking peoples in Ghana. The two names differ only slightly in spelling. Pronunciation is virtually the same. All these plants have very different physiological properties. Whereas extracts of some Conopharyngia species are drunk for gonorrhoea, others are known to contain high proportions of poisonous substances. On the other hand, Rauwolfia, which also bears a similar local name, is used in Ghana as an enema, and in Nigeria for treating jaundice, and is used in the Ivory Coast to induce genital excitement, even though it is known to induce body weakening when used for certain diseases. The Gas of Ghana, for example also call both Vitex doniana and Xylopia aethiopica SOO, the pronunciation differing only slightly in tone. One can therefore imagine what might result from an improper identification of any of these plants before use.

Normally, one finds that any particular plant species is claimed to effect a wide spectrum of cures. For example, Piper guineense Schum & Thonn., known by the Asante as Osoro Wisa and by the Fantse as Sasema, is used for a wide variety of ailments. The root is used for gonorrhoea, the stem for coughs, and also as a medicine for bronchitis and intestinal disorders. The leaves, when eaten in soup, are thought to assist conception in women. The fruits are used as a stimulant, and the seeds as a carminative and for rheumatism. The seeds are also used for syphilis and the common cold. The pulverised seeds are also used as an insecticide for clothing.

Surely, if this plant can do all that it is claimed to do, then the cures cannot possibly be attributed to only a single active principle. There must be several active compounds, some with a wide spectrum of activity, others with a narrow spectrum. What may be active against any particular disease, may probably produce other side effects or, may be very toxic if not properly regulated in its administration. It is, therefore, only by a thorough investigation that the merits

\(^*\) See Schoental, R. Cancer Res. 28, 2237 (1968).
or demerits of any plant as a source of useful drugs can be proved and a bigger demand created for it.

Some people argue that there is no value in researching into indigenous drugs. They argue that in recent years, a vast amount of potent remedies such as the arsenicals, anti-malarials, the sulphonamides, and antibiotic drugs have revolutionized the treatment of bacterial and viral diseases. They argue that centuries of empirical discoveries by "primitive man" have covered all the main sources of botanical drugs, and that by the end of the nineteenth century, there was no scope for discovering any more new useful drugs from plant sources. Moreover, a large number of the drugs examined from the plant sources so far, even though shown to be of significant activity, are not superior to those already listed in the various Pharmacopoeas, and are perhaps only useful as substitutes for other well known drugs. These assertions are aptly answered in an editorial comment in a well known British journal "The Practitioner" (Dec. 1950). The editor in question stated that

"the wise and experienced clinician never spurns an 'old wife's tale' until he has good evidence for doing so. The lore of the 'countryman' is built upon experience spanning across generations, often of centuries and the data upon which it is based have often been obtained at a price in human lives which no modern research worker would ever dream of considering. It is particularly appropriate at the present moment when pharmaceutical companies of the world are emitting an unceasing flow of new synthetic drugs, that attention should be turned to the possible remedies that may be found among indigenous herbs..."

I am inclined to share the view expressed above, as far as herbal medicine in Ghana is concerned. But there is a clear need for systematic research into plant medicine in this country. This has to be undertaken by those who have the requisite knowledge and experience in this field; scientists, medical doctors, herbal doctors with the requisite reputation and experience, pharmacologists, etc. It is necessary to bring home to people the hard realities of herbal medical practice and what is involved in any meaningful research in this field, and to avoid the sensationalism which has hitherto characterized pronouncements on this subject, and which can only lead to hasty decisions being taken on the subject (even at the Governmental level), decisions which could lead to a lot of money being poured down the drain. But have our efforts in this direction so far been devoid of these pitfalls?

As a chemist involved in this type of research, I have had several approaches from people — scientists, laymen, herbalists, even medical doctors, etc. — with claims of the curative potentials of various plants, for various diseases. I have seen, in newspapers, and heard from very high and respectable circles, claims for cures for a wide variety of serious diseases such as cancer, hypertension, sickle cell anaemia, Parkinson's disease, leukaemia, as well as relatively minor disorders such as diarrhoea, malaria, the common cold, cough, etc. It has been claimed even at governmental level that research into these medicinal sources would revolutionise medical practice in Ghana and the whole world. It has not been uncommon to find laymen waxing eloquent over cures said to have been effected by various plants. Statements such as "School teacher discovers cure for cancer" and "Ghanaian scientist invents a vaccine for malaria" have been common in recent times in our newspapers. Statements of this nature, supported by insufficient evidence, have, sadly, sometimes even appeared in reports from reputable institutes and establishments as well as
journals. Governments have set up whole institutes to conduct research into these claims, which is fair enough, since proper investigations into these claims are extremely useful. But one gets really disturbed when one views the approach being adopted towards this question in this country. It appears to me that until recently, our approach to plant and folk medicine had bordered rather on the jingoistic or emotional side. We have avoided a proper scientific approach to the whole problem. Sometimes I wonder whether when we talk of research into local herbs, we ever pause to consider the enormity of the task, costs involved, and how best we can tackle the problem to avoid waste, duplication of effort, and the rather haphazard and unscientific approach to this type of medical practice, with possible fatal consequences to people.

The aim of this paper is to examine the question of indigenous plant medicine, examine some of the myths surrounding it and try to focus attention on some of the hard realities we have to face if we seriously wish to reap any benefits out of it. We have in recent times heard pronouncements of cures, some by lay people, others by knowledgeable people, for a wide variety of diseases, sometimes after SIX or even THREE MONTHS' research. Such pronouncements could have gone unnoticed or been ignored in scientific circles but for the great premium placed on them by the press as well as policy makers of this country. It has to be brought home, therefore, to both Government and the people of this country, what the hard facts of research into plant medicine and its implications to this country are.

The need to avoid unnecessary sensationalism, and for a proper systematic scientific and clinical examination of the claims attributed to plants, would be recognised by the few examples I shall cite below. Let us take the well known plant, the tobacco, *Nicotiana tabacum* L. This plant has had attributed to it over the centuries many medicinal properties. It is said that smoking of tobacco was initially practised in attempts to cure certain diseases. Larson and Silvette have given an account of the many medical uses of tobacco. It was claimed that it was used for treating diseases of the nervous system, Parkinson's disease, muscular spasms, cardio-vascular diseases, respiratory diseases, hicouh, nasal polyps, dropsy, constipation, hernia, gout, skin diseases, and itching. It has also been used as a vermifuge, and as a prophylactic for contagious diseases such as Plague, cholera and cerebrospinal meningitis, in which smoking is alleged to offer some degree of immunity. However, those conversant with recent advances in research on the constituents of tobacco, would not be unaware of its harmful properties. Many smokers want to give it up for reasons such as poor physical conditions, nervousness and chronic bronchitis, stomatitis, cardiovascular and digestive symptoms, fear of lung cancer, etc. Moreover, tobacco is perhaps the best known source of nicotine (IV), an alkaloid which is, used as an insecticide. Nicotine is rapidly fatal to all animal life. It causes rapid respiratory paralysis, followed by death. The fatal dose for man is 40 milligrams. But a single stick of cigarette contains about 14 milligrams of nicotine, and a 5 gramme stick of cigar contains 70 milligrams. But for the fact that the human body is able to degrade nicotine rapidly into less harmful compounds, and also the burning off of most of the nicotine during smoking, the harmful effects of the indiscriminate use of tobacco, for all the things that used to be attributed to it, would be costly in terms of human lives.

Let us take another example. From ancient times the root of *Rauwolfia serpentina* Benth. ex Kurz. had been used in India and Malaya as an antidote to snake and insect bites, as a febrifuge, as a stimulant for uterine contractions, and as a sedative. The isolation of reserpine from this plant in 1952 was perhaps
the single feat which regenerated interest in research into plant medicine. Reserpine is a widely used drug for the treatment of hypertension, through its action of depleting the stores of noradrenaline, a neurotransmitting substance, and thus causing a lowering of the blood pressure. But the use of reserpine is not without its drawbacks. It causes loss of mental alertness, promotes emotional depression which can be severe enough to result in suicide. It can also produce tremors resembling Parkinson’s disease. It can also cause nasal congestion, and gain of weight with oedema. Its administration, is therefore, strictly under medical supervision. Recently, a group of scientists in one of our Universities isolated reserpine from Rauwolfia vomitoria (Kakapenpen), an event that would normally be taken as a perfectly normal one in the scientific field. But somehow this got to the Ghanaian press, and the news was blazoned in the papers in huge headlines: “GHANAIAN SCIENTISTS DISCOVER CURE FOR HYPERTENSION”. The news was even made the subject of an editorial comment. Such uninformed reporting could be as embarrassingly to the scientists as it could be dangerous to the general public. It could easily result in hypertensive patients resorting to indiscriminate use of concoctions from Rauwolfia vomitoria, with possible fatal consequences. Such a fear is not far fetched. It has actually happened in a sister African country (Nigeria) in the recent past. Recently, there was a symposium at Ife University on “The Effects of the Constituents of Fagara xanthoxyloides on sickle cell anaemia”. Fagara xanthoxyloides is a very common plant in West Africa. The Gas of Ghana call it Haatso, and the Akans Okanto. It is known in English as Candlewood. It is used extensively in Nigeria as “chewing stick”, and can be found on sale at street corners and in the market. The plant has had a long reputation for its analgesic effects on carious teeth. It is used in Ghana in relieving post-delivery pains. It is also used as fish poison, as an enema, for purulent conjunctivitis, for oedema, for fevers, as a laxative, for diarrhoea, small pox, syphilis of the throat, etc.

At the symposium, it was reported by one of the medical doctors that when the isolation of the active ingredient alleged to be effective against sickle cell anaemia was announced, it somehow also got to the press, which sensationalised the whole discovery. Sickle cell patients then receiving treatment from hospitals suddenly stopped attending clinics thus making it difficult for proper clinical follow-up of their condition. It was discovered later that quite a number of them had resorted to self-medication with Fagara extracts. Trade among ‘chewing stick’ sellers suddenly became extremely lucrative. This alarmed the medical authorities a lot, because at the symposium, it became quite clear that a lot of work still remained to be done on this alleged desickling agent, and the information that the press managed to get hold of was rather prematurely let out. It was quite clear to the chemists, biochemists and pharmacologists at the symposium that the compound alleged to have desickling effects was one which was likely to have side effects on the respiratory system. On my return to Ghana, I consulted one medical officer who also practises herbal medicine, and he confirmed to me that he had used the plant in treating whooping cough, and also as a pain killer, and had observed that patients often developed asthmatic symptoms after prolonged treatment with his extracts. The damage that may have been caused to sicklers who may have resorted to indiscriminate use of Fagara extracts can perhaps never be assessed since these patients will probably never visit a clinic as they may consider it a waste of time or may not live long enough to do so.

In a recent paper by Schoental of the Toxicology Unit of the Medical Research Council of Britain, he points out that work on some East African...
herbal medicines has given direct evidence that the wide incidence of certain liver lesions and tumours, hepatitis, lung and kidney diseases in certain specific areas of East Africa could be attributed to the widespread use of certain species of Senecio, Crotalaria and Cynoglossum species as herbal medicines. The occurrence of liver lesions in the form of cirrhosis, kwashiorkor or marasmus in children in East Africa has been traced apparently to the widespread use of fresh juice from crotalaria in treating measles. 8

Apart from the direct evidence, indirect evidence also abounds in the literature regarding the possible harmful effects of herbal medicines. The decrease of the incidence in children of “veno-occlusive” liver disease in Jamaica followed a successful educational campaign against the use of Crotalaria fulva L. in making “bush tea”. This plant contains pyrrolizidine alkaloids which are known to have no significant medicinal value. But most of them have hepatotoxic and carcinogenic action. A single dose may be sufficient to induce tumours. 9

My last example of the possible harmful effects of herbal medicine concerns two patients who reported independently at the Medical department of the Korle Bu Teaching Hospital sometime in November and December last year with acute kidney failure. Upon close questioning by the doctors, it was found that they had both drunk an aqueous extract of leaves of the neem tree (Azadirachta indica) to cure a fever or stomach ache. Further questioning did not reveal any other herbs having been used by them. The case was mentioned to me with a view to finding out whether the toxicology of the neem tree extracts had been properly investigated.10 A literature survey revealed the presence of over 50 different compounds that had been isolated from the neem tree. These ranged from relatively harmless fats and fatty acids, to potentially toxic steroids and phenolic compounds. Any of these could have been responsible for the kidney failure. But there was no evidence in the literature about any systematic toxicological studies on these chemical constituents. If such information were to be available, it would have been of great help to the doctors who handled the patients in question.

All the cases cited above, leave me in no doubt whatsoever, about the need for systematic, well co-ordinated research into plant medicine, if any benefits are to accrue from it.

What is involved in Drug Research?

Having now discussed the dangers inherent in indiscriminate use of herbal drugs, and having seen the need for a systematic approach to research in this field, let us now examine what research in this field implies, the enormity or otherwise of the task, the costs involved, and the time that it normally takes to perfect a single drug and place it on the market. To get a better perspective on this problem, let us consider a few of the commonly known synthetic drugs, and what was involved in their development and final introduction on to the market.

Discovering a new drug and taking it through modern complex screening tests is a very laborious, expensive and highly sophisticated process. Research is only the first, and is not even necessarily the most expensive. This includes

* The Physicians in question have since had seven more cases of acute renal failure reported at their clinic, and have traced five of these cases to indiscriminate use of herbal decoctions.
either synthesizing the substance, or extracting it from a natural source, and testing it for physiological activity. This stage normally takes from three to twenty years. After that, the substance then goes through the next phase which includes tests for toxicity and unwanted side effects, teratology, and carcinogenicity, metabolism studies on animals, and then a large scale process for its manufacture. If the substance is considered suitable, then it goes to the next stage where it is tested, first on human volunteers, and then for properly controlled clinical tests. The results of all these tests are used to determine whether the substance is good as a medicine, and if so, whether it has any advantages or disadvantages over existing ones. Only then can the final stage of market research be undertaken. All this takes from five to eight years. So from the discovery of a new drug to the time it comes on the market as a patented drug could take any period between eight to thirty years. Costs in this kind of sophisticated and laborious process are enormous, and the processes are very time consuming, and any government, body or organization interested in going into this field, commonly known as "therapeutic innovation", or the process of discovering and putting new drugs on the market, needs to be aware of all these problems.

Aspirin (v), a very common and well known drug, has been known for over sixty years as an effective analgesic and anti-rheumatic agent. It was first made by acetyling salicylic acid. The discovery of aspirin began with the isolation of the parent acid, salicylic acid, in 1885, from a natural source. But salicylic acid itself, the natural compound, was found to be highly toxic even though it had the same therapeutic properties as aspirin. It was not until 1909, twenty-four years later, that its acetylation, a reaction that is now part of the sixth form practical chemistry course in West Africa, was achieved. Aspirin itself, even though it is still very widely used, is known to cause gastric bleedings in a few patients. But the important point here is that the mere discovery of the parent salicylic acid from a natural source was not enough to put it into large scale use as a potent and safe drug. A less toxic derivate had to be prepared after intensive tests.

The discovery of the now equally widely used pain killer and temperature reducing (antipyretic) drug, Paracetamol, follows a similar story. It was realised that aniline, the highly toxic parent compound, was a very efficient temperature agent. Acetylation of an aniline derivate, para-aminophenol (VI) gave the less toxic paracetamol (VII). Even aspirin and paracetamol are not completely safe for all patients as they are now believed to cause haemolysis in certain people with a certain enzyme (Glucose-6-phosphate dehydrogenase) deficiency disease.

These may look very simple straightforward discoveries, but to get an effective drug in this category required the preparation of a few hundred similar compounds and the testing all of them before an effective, non-toxic and safe one could be obtained. For example, from the time Ehrlich realised that certain types of organic dyes had effects on certain protozoa which caused diseases such as trypanosomiasis (sleeping sickness) to the time the drug Arsphenamine, or Salvarsan (VIII) and Neo-Salvarsan (its water soluble methyl sulphonate), derived from one of these dyes were first produced and found to be active against syphilis, as many as 606 compounds had to be synthesized, and properly screened. This is obviously a very expensive and time consuming process which only those with the requisite capital can undertake. We also have to recognize that even the present highly sophisticated and meticulous screening processes are not necessarily one hundred per cent efficient. The story of thalidomide is a typical example. At the time thalidomide was first synthesized, it
was put through all the necessary screening tests, and finally put on the market in Germany in 1957. All tests necessary to pass the drug as 'safe' had been performed. But unfortunately for the manufacturers and for the millions of unborn children who were eventually affected by the drug, at the time the drug was first produced, no one knew that any type of foetal damage could ever be caused by giving an analgesic, or for that matter, any drug or chemical to women in the early stages of pregnancy. So no pharmacological laboratory thought of including teratological tests in its screening programmes. One cannot, however, escape from the fact that the conduct of some of the licencees of the drug, especially the German firm, Chemie Gruenenthal, was most despicable. Even though there were reports circulating at the time about thalidomide causing severe polyneuritis, and even though the British firm, The Distillers Company Limited, withdrew it from the market immediately it became known that there appeared to be some connection between Phocomelia, (i.e. the malformation of the arms and legs in which the long bones become stunted) and thalidomide, the German firm continued to market it, and by 1961, were making sales of up to £1 million sterling per annum. This was a clear case where profit motivation was allowed to override human interests.

The story of thalidomide cannot be ignored in any serious attempt at finding new drugs from natural sources. Attempts to avoid any such tragedies will again involve further huge expenditures, which governments or research organisations should be prepared to bear.

At the moment the success rate in discovering new drugs is about 1 in 10,000. It is widely believed in the medical field that there are comparatively few areas of medicine left in which existing drugs cannot be beneficial. Random screening, with a success rate of 1 in 5,000 to 10,000, is very expensive. For example, in 1972, America spent about 615 million dollars on drug research, and Britain spent about 70 million dollars. The American drug firm, Hoffman-La Roche alone is believed to have spent over 93 million dollars. With such heavy odds, against success in therapeutic innovations, and with the costs involved, we cannot seriously contend that Ghana can afford to go seriously into full scale therapeutic innovation, considering her present economic position.

The highly sophisticated equipment required for preliminary investigations are either available on an extremely limited scale, or non-existent. There is no pilot plant in the whole country for drug research and development. Virtually all pharmacological, toxicological and chemical analyses of newly isolated constituents of plants have to be done overseas, usually through the benevolence of some friends of those currently engaged in this field of research in Ghana. What then can we meaningfully contribute? Perhaps a few suggestions here would be useful.

We have to recognise that plant medical research is not an easy, cheap venture in which one can shout “Eureka” every other day, as we are sometimes made to believe even in very high and responsible places. It involves a lot of expense and sacrifice, both in time and human resources. I cannot dispute the fact that plant medicine has a lot of untapped resources to offer to the medical world in the treatment of such supposedly fatal or incurable diseases as leukaemia, hypertension, heart diseases, liver diseases, and also in childbirth and birth control. But I will not seriously contend that Ghana, with her present resources, can at the moment make any meaningful impact in this field if she goes it alone. The need for regional co-operation cannot be over-emphasized. Perhaps, we have to face the hard realities that our efforts cannot go beyond the primary and secondary stages where chemists and pharmacologists isolate
and test physiological effects of various drugs from plant sources. This sort of research is very important as it will contribute to the eventual elimination of most of the waste and risks currently found in traditional medical practice by actually pinpointing the active ingredients possessing the curative properties claimed for any particular plant. But beyond this type of research, I doubt whether we can achieve much in this field without co-operation with other bodies or countries. At the moment several institutions in this country are involved in this type of research. We have the universities, the various organizations under the Council for Scientific and Industrial Research, and the recently established Centre for Research into Plant Medicine at Akwapim Mampong. But it seems to me that there is a lot of duplication and hardly any co-operation among workers in this field. In some cases even, one group of scientists does not appear to know what another group is doing elsewhere. On the continental level, most of us do not even know of the existence of the Drug Research Institute at Ife, Nigeria, sponsored with O.A.U. funds, and what this institute is doing in the field of plant medicine. The blame does not lie solely with individual scientists. The status of the Unit vis-a-vis Ife University and other African Universities does not seem to be clearly spelt out. On the local scene, the expected co-operation between scientists and herbal doctors has met with a lot of difficulty. Many scientists admit having received a lot of valuable information from so-called illiterate herbalists. In many cases, these herbalists appear to be more open-minded. The major difficulty in co-operation lies with the educated herbalists, who, in most cases, lack sound scientific training. They have certain set, dogmatic ideas, and any effort to understand what they are doing, investigate their methods, make suggestions, or co-operate with them, is viewed with a great deal of hostility and suspicion. Among both the scientists and the "literate" herbalists, dissemination of information is very scanty, resulting in a lot of duplication of effort. The good work being done in some places appears to get submerged by sensational discoveries which, sadly enough, are the ones that appear to impress policy makers in deciding where funds should go and what should be the input for such research. We therefore need a central co-ordination and information centre, if possible on a continental or regional basis.

In conclusion, I must state that as far as I am concerned, there is quite a bright future for plant medicine in Ghana. For a very long time to come, herbal medicine will continue to be a very important supplement to Western medical practice in Ghana. Certain diseases which have defied conventional medicine partly because they involve the individual's psychological state will continue to be treated through time-tested herbal remedies; what remains to be done is to improve the practice and adopt a more scientific approach to it without at the same time destroying the psychotherapeutic aspect, which is most important in a community like ours.

Chemists may continue to synthesize many drugs. But we cannot ignore the efficiency of nature in doing the same job. Synthetic processes for which a chemist employs heat and pressure are effected in plants at ordinary temperature and pressure. It took chemists about 50 years to synthesize quinine. But the cinchona plant does it without difficulty every day. The occurrence of a great variety of antibiotics in plants is yet to be fully exploited. Indeed, the world is only at the threshold of plant medical research. Only nature knows what is in store.

But if we are to achieve any measure of meaningful success in this field of indigenous plant medicine, then we have to face the hard realities of the situation, and concentrate our efforts on the little that we can do and do well at
minimum costs. Many great contributions to various fields in the world have started from such humble beginnings. Merely setting up a conglomerate of Research Centres without proper planning and proper appraisal of what this implies, or setting up state-sponsored psychic and traditional healers associations which break up in no time into warring factions highly suspicious of each other's activities and busily engaged in politicking and one-up-manship, when precious human lives are at stake, will not get us anywhere.

\[ \text{CHELLIN} \]

\[ \text{HERBERINE} \]

\[ \text{XANTHOTOXIN (AMMIDIN)} \]

\[ \text{NICOTINE} \]

\[ \text{ASPERIN} \]

\[ \text{p-AMINOPHENOL} \]

\[ \text{ARSIPENAMINE (SAL/ARSAN)} \]
GLOSSARY

Analgesic ... ... Pain killer
Angina pectoris ... ... An oppressive sharp pain in the heart, sometimes radiating into the neck or arms, due to inadequate supply of blood to the cardiac muscle. It is the chief symptom of acute coronary-artery insufficiency due to chronic arteriosclerosis or severe anaemia. It also occurs in syphilitic aortitis.
Antispasmodic ... ... Able to prevent or relieve spasms or convulsion.
Carcinogenicity ... ... Ability to cause cancer.
Carminative ... ... A drug that cures or relieves flatulence.
Diuretic ... ... Producing an increase in the amount of urine.
Febrifuge ... ... Fever reducing.
Haemolysis ... ... Unusual destruction of red blood cells with the release into the blood of cell pigments that should be transformed into bile.
Herpes zoster ... ... An acute, self-limiting disease caused by a neurotrophic virus which involves the posterior nerve root ganglia of the spinal nerves. It is recognised by the appearance of a unilateral eruption of one or several groups of tense vesicles along the lines of distribution of cutaneous nerves. The affected skin is lightly enymatous, and the proximal lymph glands are enlarged. In some cases the vesicles are filled with blood-stained fluid, and occasionally there is marked necrosis of the affected skin.
Leucoderma ... ... Depigmentation of the skin to produce white patches. May be due to chemical contact (eg. monobenzyl ether of hydroquinone), congenitally (as in albinism), or during the later stages of syphilis.
Oedema ... ... Swollen state of tissues, etc., usually with large quantities of serous fluids.
Polyneuritis ... ... Inflammation of many nerves. May result from many causes such as fever, diabetes or excessive consumption of alcohol.
Purulent conjunctivitis ... ... Inflammation of the conjunctiva of the eye, caused by virulent organisms such as gonococci, pneumococci, or streptococci.
Renal colic ... ... A severe spasmodic gripping pain which increases in intensity to a climax, then remits for a short time and returns with the same
Stomatitis ... ... ... Inflammation of the mucous membrane of the mouth.

Teratology ... ... ... The science dealing with the induction of malformations in the foetus.

Vermifuge ... ... ... Expeller of intestinal worms.

intensity as before. It results from stones in the kidney and/or ureter.

REFERENCES

5. See Chopra, Nayar and Chopra (Ref. 1, p. viii)
6. Larson and Silvete
   
   See (i) Jackson, K. E. Chem. Rev. 29, 123 (1941)
   
11. See Robinson, F. A.
    "Therapeutic Innovation — The end or a new beginning". Chemistry in Britain; Vol. 10 No. 4 (April, 1974).
12. Ibid. p. 131.