

PHARMACEUTICAL SOCIETY OF GHANA
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THE GHANA PHARMACEUTICAL JOURNAL

Restricted

Incorporating a Report on the 33rd

GHANA PHARMACEUTICAL CONFERENCE AND EXHIBITION

held at the STATE HOUSE, ACCRA, 28-30 August, 1975

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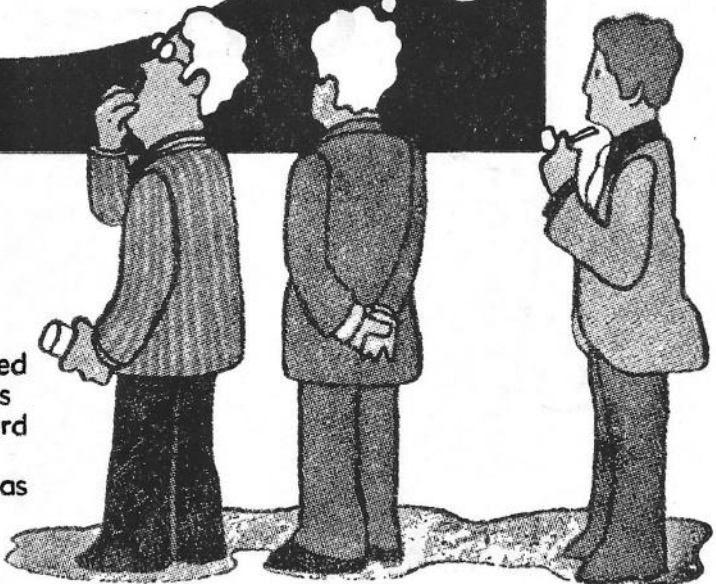
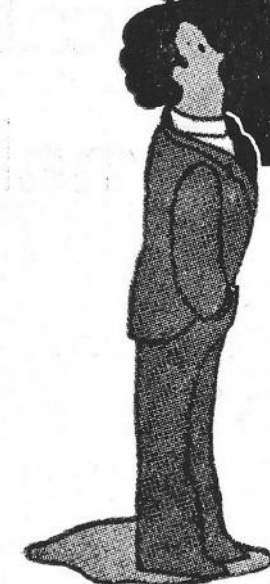


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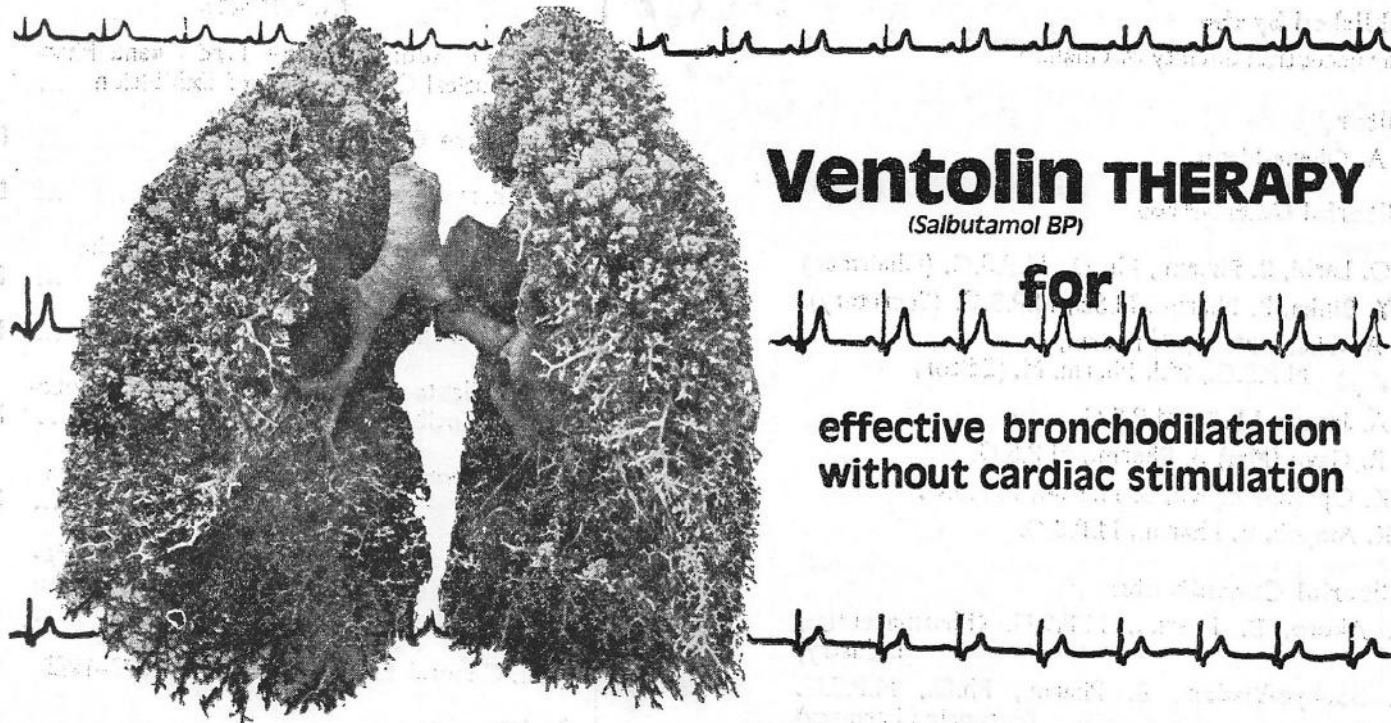
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33RD GHANA PHARMACEUTICAL CONFERENCE & EXHIBITION AT THE STATE HOUSE, ACCRA, AUGUST 28TH-30TH, 1975

Welcome Address By: *K. Sarpong, B. Pharm. (KSI.), Ph. D (Lond), MP SG., President, Pharmaceutical Society of Ghana*

Your excellency the Regional Commissioner, Your Excellencies, Distinguished Guests, Nananom, Fellow Pharmacists, Ladies and Gentlemen,

Once again we have assembled to take stock of our activities over the past two years and to define our objectives and tasks for the next cycle. This year's Conference is a great and a special one. It might have come to your notice that the Pharmaceutical Society of Ghana, one of the oldest professional societies in the country, is forty years old this month. This conference therefore commemorates our 40th birthday.

Two years ago, the Government agreed to discontinue the controversial Pharmacy Technologists Course which had been running for four years. These technologists have since been undergoing an intensive course at the Faculty of Pharmacy, University of Science and Technology, Kumasi. I am happy to say that the last batch of technologists complete the course at the end of next month. Those who have already successfully completed, and qualify for registration have been accepted into the Society and I believe that some of them are here with us. My heartfelt

congratulations to them as well as all others who have recently joined the Society. My advice to them is that they should take active part in all activities of the Society and be devoted to their profession and work efficiently and effectively wherever they may be. To those who have joined the Civil Service, I have this to say,—now that the salary and conditions of service are gradually but steadily improving do not get frustrated and attempt to leave at the first opportunity. Do stay on and give your best to the nation's health programme. Please be prepared to accept transfer to any part of the country, particularly the rural areas, because it is by doing so that you will truly be serving your nation and our less fortunate brethren who do not get adequate health services.

Much has been said about the inadequate number of pharmacists in the country. Over the years, the Faculty of Pharmacy, University of Science and Technology, Kumasi, which is the only institution for training pharmacists in the country has been facing acute space problems. Fortunately the new Faculty building which was started three years ago is near completion. This will make it possible for the Faculty to step up

its students intake considerably and so help to relieve the country of the shortage of pharmacists. You would agree that this shortage has partially contributed to lack of proper control of drugs in the country. We find ourselves in a situation where very dangerous drugs are handled by all sorts of people and so are open to abuse. One major contributing factor to this is the pilfering at the port of entry of the drugs. We will like to appeal to the Government to review the rather cumbersome way for clearing drugs from our ports so that his pilferage can be averted. The longer the drugs stay at the ports, the brighter we make the chances for the drugs to be stolen.

It is gratifying to note that the Faculty of Pharmacy has expanded its curricula to include Pharmacy Management and Administration. Your Excellencies, Distinguished Guests, Ladies and Gentlemen, kindly join the Pharmaceutical Society in expressing our deepest appreciation to the Dean of the Faculty of Pharmacy and his staff for this move. Such a training will no doubt equip the newly qualified pharmacy graduate with the rudiments of management and so give him a good ground-

ing during his pre-registration training.

Ghana is vastly expanding its pharmaceutical industry. You will recall that at the opening of the 32nd Ghana Pharmaceutical Conference and Exhibition at this same venue in 1973, the Head of State and Chairman of the National Redemption Council, Colonel I. K. Acheampong said, and I quote, "I would like to see that most drugs needed in this country are produced locally and at reasonable prices without sacrificing quality. In this regard the Government will be prepared to look into the possibility of giving you protection against the importation of such pharmaceutical products which are produced locally provided they are at reasonable prices, in sufficient quantity and of course of the highest quality" un-quote. This challenge has been keenly taken up and you will see evidence of it yourselves when we go into the exhibition hall from here. You will agree that it is appropriate for this Conference to discuss Pharmaceutical Industry in Ghana at this time of our National Development. I hope that those of you in industry will make good use of the deliberations of this meeting. In view of the rapid growth of the pharmaceutical industry, the Society wishes to ask the Faculty of pharmacy and other authorities concerned with the design of the pharmacy course structure to place some emphasis on Industrial Pharmacy in the course of training of pharmacists. This I believe will go a long way to improve upon the performance of those pharmacists who go into industry.

Let me turn to one interesting aspect of the practice of pharmacy. This is the contribution of the pharmacist to the care of the patient after handing over the drug. It is desirable that the pharmacist must become involved with the other members of the health team directly concerned with the welfare of the patient. He must study any incidence of adverse drug reactions, what specific characteristics of the patient are associated with these reactions; which of these reactions are due to interaction with other drugs and so on. This he can do better at in the living subject, in other words, at the patient's bedside. He must therefore go round with the physician to participate in the proper administration of drugs, interview patients about their drug therapy and main-

tain proper records of patients. This is BIOPHARMACY, CLINICAL OR WARD PHARMACY. I must emphasise that the idea is not to produce a second class physician or a physician's assistant. We want a pharmacist who can speak the physician's language and communicate with him if he is to be a drug consultant. We are again asking the Faculty of Pharmacy and all others concerned to look into the possibility of introducing clinical or biopharmacy.

Please permit me to take you back again to the 32nd Conference in 1973. The Head of State then indicated the Government's intention of setting up a Centre for Research into Plant Medicine. Last month, we all read about a decree establishing this centre. I am happy to say that the Pharmaceutical Society of Ghana is represented on the Council of the Centre. We assure the Government of the Society's unflinching support in this venture. I note that the Centre is working along the lines suggested by the Pharmaceutical Society two years ago and we feel very proud of this. Although I do not have any authority to speak for the Centre or the Faculty of Pharmacy, I know that these two institutions are collaborating in the research and that some of the preliminary results are most encouraging. There is no doubt that the Centre has a very bright future. I sincerely believe that in the very near future some formulation of compounds obtained as a result of these researches or at least standardised extracts of herbs will find their way into our hospitals, clinics and pharmacies. At this point I would earnestly appeal to all medical practitioners in the country to give herbal medicine a serious thought. We believe that there is quite a lot to it.

The Pharmaceutical Society would like to register its gratitude to the Government for its concern over the drug situation. Two years ago Government set up a Committee to look into the causes of drug shortages in the country. It is encouraging to note that while asking other importers to pay 100 per cent cash margin for their letters of credit, pharmaceutical importers pay only 25 per cent. This is a clear indication of the Government's interest in the health of the people of Ghana. We are aware of the health needs of the people of Ghana. We are aware of

the problems that the Government is facing with regards to foreign exchange which is the result of present world-wide inflation and the oil crises. We however think that when it comes to the granting of import licences, the quota for pharmaceuticals, both raw materials and finished products, is a little bit on the lower side. Shall we hope that something will be done about this to ensure the nation does not face a serious drug shortage situation?

Mr Commissioner, I would now like to touch on the laws governing the pharmacy profession in this country. At our annual Conference in Cape Coast last year, we discussed exhaustively a draft of proposals intended to replace the existing Pharmacy and Drugs Act 1961, Act 64 which we consider hopelessly out of date. This act governs the practice of pharmacy; and the regulation of the sale, distribution and manufacture of drugs in this country. The idea of the proposals was to break these two major functions of the Pharmacy Board set up under the old Act so that the control of the practice of the profession of pharmacy would fall directly under the National Council of the Pharmaceutical Society of Ghana. This of course is necessary to bring the provisions of the present laws governing pharmacy in line with the provisions of N.R.C. Decree 143, the Professional Bodies Registration Decree. After the Cape Coast Conference the Council of the Pharmaceutical Society submitted to the Ministry of Health the proposals adopted at the Conference. We were then optimistic that by this time a new Decree would have been promulgated so that as the adage goes, the Pharmaceutical Society could begin life at FORTY. I regret to say that to date, however, for reasons beyond the control of the Society, the new Decree we expected to be promulgated to give effect to the proposals has still not been published. This is disheartening because although our Society was one of the first professional bodies to register under N.R.C. Decree 143, our "Professional Independence" as envisaged by the Decree has been unduly delayed. The Pharmaceutical Society of Ghana therefore appeals to Government to give our proposals urgent attention so that the present pharmacy laws can be brought in line with the objectives and spirit of N.R.C. Decree 143. We trust that

not long after this Conference we will have the good fortune of Government coming out with a Decree to give effect to the changes proposed.

Your Excellencies, Distinguished Guests, Fellow Pharmacists, Ladies and Gentlemen, on behalf of the National Council of the Pharmaceutical Society of Ghana and on my own behalf, I welcome our guest of honour in the person of the Regional Commissioner for Greater Accra, Lt.-Col. K. A. Takyi to the 33rd Conference and Exhibition of the Society which also coincides with our 40th anniversary. We are

grateful, Sir, that in spite of your heavily loaded schedule, you found it convenient to be with us. To all our guests present here this afternoon, I say thank you for honouring our invitation. We welcome particularly our Guest Speaker, Mr C. C. B. Stevens of the Pharmaceutical Society of Great Britain and on our other guests from our Sister Pharmaceutical Organisations in Nigeria, Sierra Leone and Liberia and wish them a very enjoyable stay in Ghana. We hope that they will take this good chance to see and learn a little more about Ghana, her people and her rich culture.

May I also seize this opportunity to express, on behalf of the Pharmaceutical Society of Ghana, our profound indebtedness to those firms and individuals whose support in diverse ways have made this Conference and Exhibition possible.

Finally, to the delegates and members of Pharmaceutical Society of Ghana, it is with the greatest pleasure that I receive you here on behalf of the National Council. We believe that we can deliberate in the climate of peace, love and brotherhood and that we will come out with practical ideas useful to ourselves, our profession, our society and our nation.

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PHARMACEUTICAL SOCIETY OF GHANA
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CONFERENCE OPENING ADDRESS

By Lt.-Col. K. A. Takyi, Regional Commissioner Responsible for Greater Accra At The 33rd Ghana Pharmaceutical Conference and Exhibition at The State House, Accra on Thursday, 28th August, 1975

Mr President, Your Excellencies, Distinguished Guests, Ladies and Gentlemen,

It is a great source of pleasure to me to have been invited to deliver the Anniversary Address of the Pharmaceutical Society of Ghana on the occasion of their 33rd Pharmaceutical Conference and Exhibition today. It is even more gratifying to observe that this Conference also coincides with the 40th Anniversary of the founding of the Society.

I have noted with pleasure the solidarity which your President in his Welcome Address has expressed on behalf of your Society to the Government of the National Redemption Council. The many interesting suggestions made in it have also been noted and will be brought to the notice of the various authorities for consideration and implementation.

Mr President, Your Excellencies, Ladies and Gentlemen, I would, however, like to make some observations on some of the proposals made in the Welcome Address and also some of my own.

The training of professional and technological grades in various countries in the world has brought a lot of conflict within the ranks of many economic and social enterprises. It is therefore a great source of satisfaction to note that the Society has with the support of the proper authorities resolved this controversial problem in their profession. All that we Ghanaians ask for is that the rank and file of the Pharmaceuti-

cal Society should give us service of high quality backed by unimpeachable professional ethics. We appreciate the efforts of both the University of Science and Technology, Kumasi and the Society to train more pharmacists for service in the country. We believe they will succeed and we wish them well.

Mr President, the challenge that your Society has taken up following the appeal made by the Head of State and Chairman of the National Redemption Council when he commissioned the pharmaceutical factory in Koforidua recently is most comforting. We in this country are looking forward to the various economic sectors to be self-reliant and to produce goods locally from our own local materials. As it was rightly said, quality and reasonable prices should not be sacrificial in this venture.

Another suggestion made by the President in his Address that the pharmacist should form part of the medical team is most welcome. This indeed is a modern concept of integrated medical health team-work and it should be encouraged and practised in this country. Appropos to this, I am considering the fact that your Society has made an appeal to your Members in the Civil and Public Services to accept appointments and work in the rural areas of the country.

There is the need to consider seriously the position of the pharmacist in the service of the public

health team. We need the public Health Pharmacist to help in not only dispensing drugs and tablets but also in sharing in the treatment of the patient who does not require hospitalization. I believe that such a Rural Public Health Service will greatly reduce the cost of our health bill, and also improve the health of the worker generally so as to ensure maximum man-hours a day and an increase in his productivity. Our farmers, fishermen and workers especially in the agro-based industries would be the better for it.

Ladies and Gentlemen, as we are all aware the profession of pharmacy deals with drugs or what is sometimes commonly called medicines. Herbal drugs have been in existence as far back as man realised the use of plants to keep him healthy in his life on this earth. However, with discoveries and modern technology, synthetic drugs appear to be the order of the day. But we should realise that the basis of all drugs or medicines is derived from the natural organic substances which are mainly parts of a plant.

It should also be realised that in the practice of native medicine not only in this country but in many of the undeveloped countries of the world, herbs have always been the main constituent of the medicine dispensed to patients. We should therefore not condemn the drugs used by some of our native medical practitioners. What we should really do is to examine critically and

analytically the raw materials which are used in concocting these drugs or medicines.

In this connection, we observe with pleasure the collaboration in the researches being undertaken by the University of Science and Technology and the Herbalist Association under the general administration of the Centre for Scientific Research into Plant Medicine at Akwapim-Mampong. It is unfortunate that apart from non-scheduled drugs which are sold over the counter to the public, large varieties of dangerous drugs which should be sold out by prescription from medical and dental practitioners are sold indiscriminately and also at exorbitant prices by pedlars. This unlawful practice has brought untold misery and even death to many unsuspecting

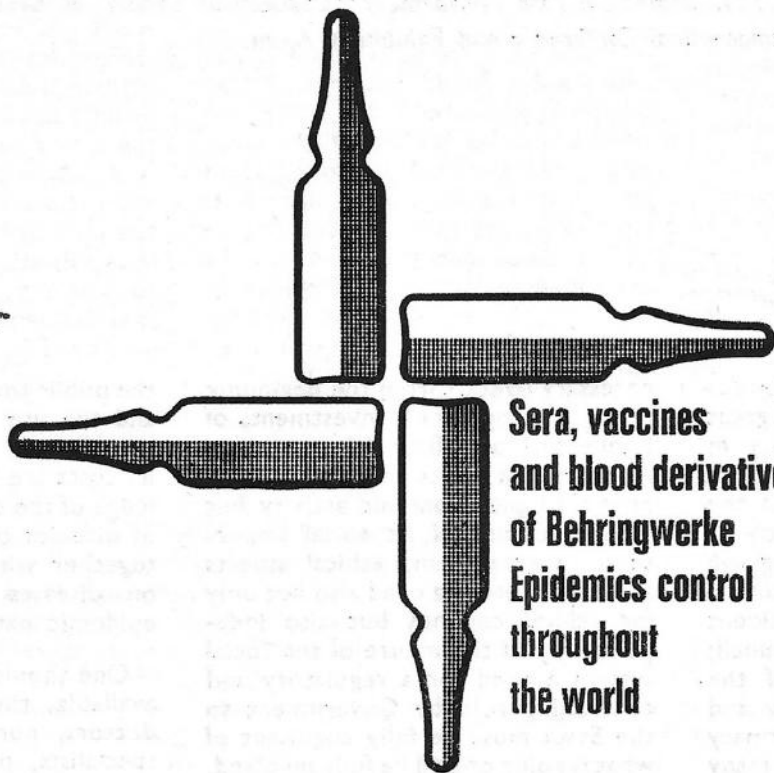
patients. Members of the Society, being responsible citizens, should take up the challenge of assisting the law enforcing agencies in curbing this illegal pharmaceutical practice in this country. It is a great pleasure to me to welcome to the City of Accra the delegates to this Conference, some of whom, we are informed, come from some African countries as well as Great Britain. We hope that arrangements have already been made for these Guests to travel round the country and especially in this Region in view of the time at their disposal to see some of our places of tourist attraction. We wish them a very happy and enjoyable stay and a very safe return home at the close of the Conference.

Mr President, Your Excellencies,

Distinguished Guests, Ladies and Gentlemen, on behalf of the National Redemption Council I say a happy birthday to the Society on attaining its 40th year of existence. I also wish to send their salutations and felicitations as well as my own to the Society on the occasion of its 33rd Conference. I believe that this Conference will have fruitful deliberations and its decisions which should be practical would be applied for the benefit and upliftment of the health of the people in this country.

I now have the pleasure to formally inaugurate the 33rd Ghana Pharmaceutical Conference and Exhibition and also the 40th Anniversary celebrations of the Pharmaceutical Society of Ghana.

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THE PHARMACEUTICAL INDUSTRY

By C. C. B. Stevens, OBE., LLB., FPS. Immediate Past President, Pharmaceutical Society of Great Britain and Guest Speaker to the 33rd Ghana Pharmaceutical Conference and Exhibition, Accra.

Mr Chairman, Ladies and Gentlemen; it is a great honour and a great pleasure to be with you today in Ghana to have the opportunity to address you on the subject of the Pharmaceutical Industry. Firstly as Immediate Past President I bring you greetings from the Pharmaceutical Society of Great Britain, its president and my colleagues on its Council; next from the Association of the British Pharmaceutical Industry and also from the Institute of Pharmacy Management, to which so many pharmacists here in Ghana belong and of which I am a member of Council.

I wish to commence by stressing the value of a viable pharmaceutical industry in any country and especially in one with a developing and bright future. It is of economic significance and also raises the status of any nation in the medical, research and educational sense. It is probably the fastest developing sector of industry in the world and having regard to the advance in medical treatment and the clamour for improved health no country can afford to neglect it.

The pharmaceutical industry which must be inter-related with other medical and para-medical services has as its principal objective the welfare of mankind but it is nevertheless of a complex character. This complexity arises not only from the difficulties, economic, technical and educational, among others, but also its link with the development of an efficient public health service. The presence and level of its pharmaceutical industry may in itself influence fundamentally the health and sanitary conditions of the country in which it is located but when it is

necessary to start from the beginning it requires significant investments of intellectual and financial resources. Pharmaceutical manufacture is not only a simple economic activity but it has because of its social importance, a great many ethical aspects as well. There is a need also not only for ethical confines but also independently of the nature of the social system a need for a regulatory and controlling role by Government so the State must be fully cognisant of what is going on and be fully involved. The Government must ensure that medicaments will exercise their power for the benefit of the patients, and that there is no possibility of marketing ineffective or dangerous drugs for the sake of unethical economic profits, no matter to what individual, organisation or official body such profits may accrue. Recent events with "Stalidon", a certain baby powder and thalidomide emphasise this fact.

I wish now to place before you my views on the necessary assessments to be made before launching a pharmaceutical venture. These necessary steps are reinforced by advice given on this subject by a number of international agencies. I will first deal with the matter in a general sense and afterwards with your approval will relate these steps to what appear to be the conditions, economic and legislative in your country.

It is essential to have data on the general economic and hygienic standards of the country. Demographic data is required such as the population of the country, average life expectancy, population structure and increases, and the general attitude of

the public towards medical treatment and the use of medicaments. Local patterns of medical treatment and its costs are important as is a knowledge of the existence and prevalence of diseases common to the country together with minor ailments; data on diseases of an infectious and epidemic nature must be obtained.

One should study the medical care available, the number of practising doctors, nurses, hospital beds and specialists, pharmacies and pharmacists together with data on technical and scientific staff related to medicine and supporting technicians. Also the size and nature of the local pharmaceutical market in all sections of distribution, together with the traditional supply and distribution systems, price levels and the pricing structure.

In my introduction I mentioned the need for adequate and good legislative control and this means a review of the laws covering importation and distribution of pharmaceuticals, company and industrial law, taxation, customs duties and protection of industrial property. There are physical requirements that must be known such as the local availability of trained manpower, or manpower capable of training suitable for the various technical tasks found in the chemical and pharmaceutical industries. Also some idea of the potential and projected demand for pharmaceuticals, preferably classified in therapeutic categories.

Where livestock makes a significant contribution to the national wealth there should be information available on the likely demand for veterinary medicines, together with

information on animal disease patterns and the classes of animals to be treated. The availability of qualified or trained veterinary manpower should be known.

It has been suggested by the United Nations Industrial Development Organisation that Governments themselves, possibly under the direction of their Health Departments should undertake a detailed investigation of the following data: Human therapeutic requirements, treatment patterns, and treatment costs. It is suggested that such information can be obtained from: (a) Physicians and veterinarians familiar with the local situation, (b) statistical data on drug imports, (c) indicated demand of drug consumption obtained for example, from local health organisations, the records of local hospitals of government and local authority dispensaries and (d) representative samples of medical prescriptions issued by hospitals and general practitioners.

The purpose of this assessment is to evaluate demands for pharmaceutical preparations and drugs essential for sound medical care in the region under study, with estimates of annual consumption, and where possible, standard treatment costs per patient per day.

On the economic side it is important to know the general attitudes in the country towards foreign assistance or investment, and if there are any incentive or protection policies. Data is needed on the industrial feasibility of manufacture of selected pharmaceuticals and this could well be carried out jointly by the State with an international agency such as the World Health Organisation, the Food and Agriculture Organisation or the United Nations Industrial Development Organisation. One would then have the benefit of personnel expert in the subject drawn from the organisations working with specialists in the country concerned.

I have in the summary of my paper prepared and distributed to you said that I would deal with some general economic aspects and as this is so important I shall now proceed to do just this.

One must realise that with a new project particularly located outside the traditional areas of the well-known multi-national pharmaceutical companies that the costs of pharma-

ceuticals produced during the first year of operation might be expected to exceed the costs of comparable costs of foreign products.

A reasonable economic position, however, may well be reached with few troubles with growing experience and sales. The rate of consumption of pharmaceutical products has been shown to rise with and continue to rise with progressive rises in living standards, the levels of health and hygiene and advances in medical care. Furthermore there are ancillary benefits in that requirements of packaging material such as cartons, glass and plastic containers and labels set up demands that can in their own right generate additional profits. It might be necessary to place a small local tax on locally produced pharmaceuticals in order to compensate for the loss of customs revenue received from products previously imported and now substituted for by local manufacture.

The marketing and the choice of distribution channels together with the selection and pricing of products can be rationalised. Where a great part of the demand is met by importation, either by private industry or state corporations there may well be a proliferation of competing products and channels of distribution, with the result that wholesalers and retailers cannot spread their costs over a high value of sales. It has been suggested in some quarters that a national pharmaceutical industry could organise the distribution of locally manufactured products and seek power to rationalise the distribution of products that continue to be imported.

Right at the beginning I mentioned status and economics as twin reasons for setting up a pharmaceutical company but it is essential that these are not confused especially for reasons of misplaced national pride. The establishment of pharmaceutical manufacture should be based upon a well directed assessment of the economics, labour supply and markets involved and should not be undertaken merely for reasons of national prestige and rarely for the sole purpose of conserving foreign exchange. When it is feasible consideration should be given to the consolidation of manufacture on a regional or inter-regional basis to minimize the financial burden on small countries.

Realism must be shown in the

type of goods to be manufactured. It may well not be possible to manufacture specialised drugs or treatments such as certain vaccines or biologicals. A developing country interested in the establishment of national pharmaceutical manufacture may well be advised to encourage experienced foreign pharmaceutical organisations in establishing facilities to initiate production of pharmaceutical products and then should provide adequate incentives and some form of protection.

Having looked at the data required for planning and having given some consideration to the economic factors involved, perhaps I can sum up in this general part of the paper by setting out what may well be considered as the pre-requisites for sound pharmaceutical production.

Sound pharmaceutical production is affected by:

- (a) The permanent availability of specialists who can advise on therapeutic needs and progress, and the existence of a number of public hospitals and pharmacies open to the public together with health centres, clinics and other facilities large enough to provide a permanent minimum level of consumption of the pharmaceutical products made by a newly established factory or factories.
- (b) The local pharmaceutical market—a population that is increasing, observation of changes in the disease spectrum, urbanisation and growing awareness of health needs and desires, increase of national income per capita, activity on the part of official and quasi-official social security and health service organisations, medical facilities and personnel. If possible there should be export possibilities, the opportunity for promotional efforts by local pharmaceutical industry, scope for the discovery of new drugs against previously incurable diseases or of better treatments and newer drugs against diseases currently under treatment. All these influence greatly the local market.
- (c) Of greatest importance is the domestic sector. The establishment of a domestic sector of pharmaceutical industry in a developing country with a relatively small or medium population can effect a saving in foreign

●● not only are the two primary pathogens, *Strep pneumoniae* and *H influenzae*, sensitive, but so are the secondary invaders such as klebsiella which often replace them after antibiotic treatment.●●¹

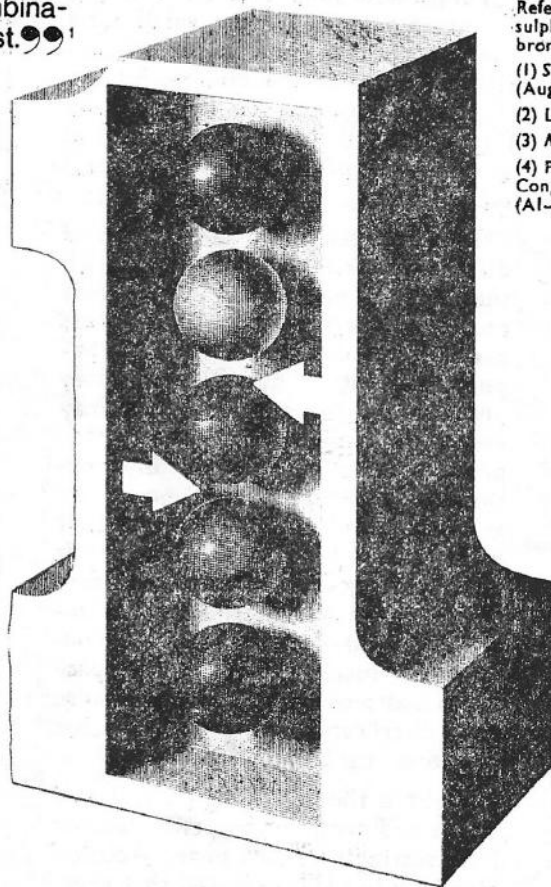
●●... clearly superior to either of the other treatments...●●²

●●... indeed one cannot remember any other drug performing so well...●●³

●●... one is struck by the tremendous success rate, certainly superior to any antibacterial we have tested...●●³

●●It rapidly cleared purulent sputum with improvement in all 50 cases.●●⁴

●●Of the easily administered primary treatments for urinary tract infection, this combination is probably the best.●●¹



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References to the role of the trimethoprim-sulphonamide combination in treating bronchitis and urinary infections.

(1) *S Afr med J.* (1970) 44, Supplement (August) 12.

(2) Leading Article *Brit med J.* (1969) 1, 525

(3) *Med J Austr* (1971), 1, 526

(4) Proceedings of the V International Congress of Chemotherapy, (1967) (A1-5a/3)293.

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exchange, and can facilitate control of production, prices and distribution patterns of pharmaceuticals. The most urgent need in many parts of the world is frequently for effective drugs for control and treatment of parasitic diseases in both man and animals. Development of pharmaceutical manufacture will depend upon its purpose, the money available and therapeutic needs.

Plans can be made upon three premises: 1. with profit as the only aim; 2. actual therapeutic needs with no thought of profit and 3. a combination of both. It has been shown in the United States, Switzerland and Britain that production programmes based only upon therapeutic needs are generally not profitable. What must be sought is a compromise between the economic realities of the market, actual therapeutic needs and what are considered to be public health needs and the local conditions of life. In making these calculations and the final assessment it is necessary to remember that economies of scale of manufacture play an important part in the calculations.

(d) Consumption rate: Since it is known that the rate of increase in consumption of pharmaceutical products of all kinds continues to rise, because of increasingly higher living standards any country planning an industry on a national basis should undertake the planning of the pharmaceutical industry to provide for future development.

Having dealt with the pharmaceutical industry and its launch as a new venture in a general way, applicable throughout much of the world I would now like to relate some of these generalities to the position as I see it in Ghana. As an outsider I do this most respectfully and with some trepidation and would welcome either within this session of the Conference or in informal discussion outside the lecture hall your views, comments and criticism on the points I make. This is exceedingly so when I come to the next part and tentatively make some recommendations. I wish very much to acknowledge the help and information given to me in respect of Ghana by your Vice-President,

Mr Ago Simmonds, your Honorary General Secretary Mr D. Anim-Addo and Mr Michael Kirkness, Export Manager of the Association of British Pharmaceutical Industry.

It has been represented to me that the problems of the pharmaceutical industry in Ghana are the following:

1. Planning
2. Licence to manufacture
3. Patents
4. Engineering, factory construction and installation of machinery and equipment.
5. Manpower, skilled and unskilled
6. Raw materials
7. Marketing.

I shall deal with these in the context of the statements I have already made and also cover some other factors which have been mentioned previously in this paper.

Planning: This is most important and I have emphasised the need to survey the position fully and not only to assess the necessary data before setting up manufacture but also to have a clear idea of your aim. The relevant legislation is, of course, the Manufacturing Industries Act 1971 and one must be conversant with this and with any regulations made under its authority. This Act does of course give the Government an absolute power to regulate any new or increased industry in the overall interests of the national development. Section 1 ensures that nobody may establish a new manufacturing industry or expand an existing one without a government licence. This licence can be issued on such terms and conditions as the minister considers fit. Section 4 sets controls on import licences thus limiting the freedom of the manufacturer to deal exactly as he would wish and also limits immigration quotas which could be importance to a foreign firm wishing to come into Ghana and bring his own specialist staff.

At this stage it is fair to say that Ghana with justice and like many of the developing countries has rightly adopted a policy of self-reliance and self-sufficiency in all aspects of her economy. Drug manufacture is no exception and the pharmaceutical industry which has recently started is still at an early stage of development. It is perhaps a matter for

regret that with the exception of the Pharmaceutical Division of Ghana Industrial Holding Corporation most of the pharmaceutical manufacturing concerns are foreign-owned, it has been pointed out in discussions with companies in the United Kingdom that overseas firms could offer help in respect of technical engineering and managerial skills and have their products made by Ghana Industrial Holding Corporation under licence. All governments in Ghana have since independence always stressed Ghanaianisation and have expressed a willingness to assist Ghanaians to establish local industries. Although there has been considerable success in this in some fields it appears that little or nothing has been accomplished in the pharmaceutical sector. This may be because of the difficulty this specialised industry has in overcoming its many problems.

Reverting to the Manufacturing Industries Act Section 8 gives the Minister power to control quality, quantity and prices of products thus limiting the field of manoeuvre of the manufacturer. Careful note must now be taken of Section 11 which allows the Minister by executive instrument to exempt any person or industry from all or any of the provisions of this Act. This does give a chance for the Government to take into consideration the problems special to the establishment of pharmaceutical manufacture.

Licence to Manufacture: This has been briefly mentioned when discussing the Manufacturing Industries Act as the authority to establish or expand manufacture is given by means of a licence which licence will contain the conditions under which it may be operated. In addition, because of the special nature of medicines, special licences are required in respect of drugs under Part IV of the Pharmacy and Drugs Act 1961 dealing with "Control of Manufacture and Storage of Drugs." Any specialty manufactured must be registered and this is in accordance with the general requirements, internationally recognised that I earlier mentioned. Countries could however, do much to simplify and speed up drug registration. The manufacture must be supervised by a pharmacist or approved person and in certain restricted cases a medical practitioner.

Patents: The subject of patents and in fact industrial property of any kind

is an emotive one and I would not wish to start a spirited discussion on the subject here not only because it may well be out of context but I am not prepared to take sides. I must however make some statements of fact and refer to the Patents Registration (Amendment) Decree 1972. This decree forbids the grant of Patents in respect of any drug, medicine or pharmaceutical preparation, substance or material. Any patent granted for such is cancelled and the Registrar appears to have an absolute discretion in deciding whether a product comes within the definition of the prohibited class or not. The multi-national pharmaceutical industry and particularly that part of it concerned with research makes great use of patents and so considers it a necessary adjunct to their business. It could be that this patent decree in Ghana has the effect of limiting the participation of overseas companies in local manufacture or in the licensing of their know-how and products to Ghanaian companies. The United Nations Industrial Development Organisation in its studies and recommendations does consider that an efficient system of protection of industrial property does assist in the establishment of pharmaceutical industry in developing countries.

Building & Machinery: The pharmaceutical industry requires a very heavy capital investment. I am told that in Ghana the cost of setting up a tableting unit with an installed capacity of 100 million tablets or a rather modest factory for intravenous drips like normal saline or five per cent dextrose would require a capital investment of not less than ₵200,000.00. Obviously the average Ghanaian cannot afford such a heavy initial investment. Banks are chary about lending for such ventures and in a time of high interest rates and dear money, with loans on short term it is doubtful if anyone could afford to borrow the money even if it were available. This may well be a case for sharing the setting up of industry with overseas companies or dealing with international agencies which I shall mention later.

Manpower: I have shown under general requirements that the industry needs manpower, not only the unskilled labourer, but in comparison with most other industries a high proportion of technical and

professional personnel. The pharmacist is one of the most useful trained professional to be engaged in the pharmaceutical industry and in Ghana such a person is provided for by the Pharmacy and Drugs Act 1961 and the Professional Bodies Registration Decree 1973. The University of Ghana and the University of Science and Technology are graduating chemists and pharmacists each year but nevertheless overall the country lacks sufficient trained personnel for the pharmaceutical industry. It would help if some could be trained overseas to acquire the necessary skill and know-how. Managerial staff as well as factory hands need training and it is significant that the Institute of Pharmacy Management has established a branch in Ghana and an increasing number of pharmacists are taking up membership. Training needs money and time and is difficult for any one organisation in the country to provide these and there is scope for Government to do more about this problem. The pharmacy course at the University of Science and Technology covers most of the needs for Ghana in respect of industry, e.g. Dispensing, Formulation, Quality Control Research, Marketing, Management and Consultancy but having regard to the changing role of the pharmacist from that of dispenser to a professional in his own right and the complex nature of the pharmaceutical industry this training is not broad enough.

Raw Materials: The need to assess raw material supplies to ensure that they are adequate to enable the industry to survive let alone flourish has been commented upon in the general requirements. It is said that in Ghana there is a plentiful supply of medicinal herbs and other materials. These have not been commercially assessed nor have they been scientifically approved to be adequate for the pharmaceutical industry. At the moment practically 100 per cent of raw materials are imported along with packaging materials and some labels. Import duty up to 50 per cent is paid on some of these imports and even when produced locally there is excise duty on them ranging from two per cent to 11½ per cent. Additionally again shortage of import licences leads to shortage of raw materials resulting in under-production in the factories. At present some of the local factories

are not working to full capacity because of inadequate import licences or delay in the grant of import licences. If the pharmaceutical industry is to play a meaningful role in the economy of the country then everything must be done to keep the industry's factories in full production.

Marketing: It is acceptable that there is a big market for the products of the pharmaceutical industry in Ghana. This is borne out by the government budget for drugs and medicines in the health service and the private sector.

New and struggling young firms find stiff competition from imported finished products. Economic reasons and the complexity of the industrial pharmaceutical scene means that the manufacturing houses in Ghana are at present engaged on the production of common over-the-counter lines and a few specialities which are assured a ready market. Even here the prices do not compare favourably with the imported counterparts because of the combination of government taxes together with advertising and promotional costs. Unfortunately the true position appears to be that it is now cheaper to import the finished products, which are almost free of import duty, than it is to manufacture these locally. The government is attempting rightly to encourage production by a bonus on export—export naturally helps the balance of payments. It is important to ensure that the goods are manufactured and are there for export.

Law: Earlier I mentioned the need for government legal controls to ensure that quality and proper distribution is covered and Ghana lacks nothing in this respect. I have mentioned various Acts and now let me point out some more useful provisions on drugs and medicines of the Pharmacy and Drugs Act 1961. In addition to registration of the drug it must be classified and categorised. There is ample evidence of clinical trial by reputable hospitals or organisations; that for overseas drugs a certificate of free sale has been issued, a system of analysis or assay has been provided by the manufacturer, that the descriptive literature and labels are acceptable and that samples of the drug are lodged with the Pharmacy Board (Section 54).

Class A & B drugs must be manu-

factured under the supervision of a pharmacist or approved person and there are special restrictions for narcotics. An omission that should be rectified in the Act is that covering export. Storage and wholesale and retail distribution are covered.

I am now going to be possibly reckless and make some recommendations. I make these knowing that I am a guest and an outsider but this is done with the greatest respect and in a spirit of helpfulness. They say that the onlooker sees most of the game and I have had the far-sightedness to consult with my Ghanaian colleagues. I would propose:

1. The government should appreciate the realistic position and abolish excise duties, import duties and sale taxes on locally produced pharmaceuticals to help the indigenous industry.
2. Import licence restrictions on raw materials for the pharmaceutical industry should be waived or at least liberalised to allow an adequate supply of raw materials at all times.
3. As government is a major single buyer it should encourage local industry by government bulk purchases, not only from the state owned pharmaceutical company but also from private local companies.

4. Reorganise the National Standards Board so as to be in a position to check and advise on locally produced pharmaceuticals to bring them up to the best international standards.

5. Overseas companies operating in the country, especially the larger ones, should be encouraged to manufacture locally and expand their existing facilities. They should be allowed adequate return on their investment and encouraged to increase export as well as conserve foreign exchange by local manufacture.

6. In view of the present economic climate the need to conserve foreign exchange the existing restrictions should be looked at to see if they are self-defeating. The position should be studied in depth and the government come out with a long term plan for the benefit of the country and the industry in the health sector.

I want to conclude by saying a few words about outside help and advice that can be of service and is available without cost and is entirely unbiased. I have mentioned a few international agencies in this paper and probably the most important from the point of view of Ghana would be the United

Nations Industrial Development Organisation which not only does surveys and gives technical advice but also has certain funds available. The official role of UNIDO is to provide assistance to developing countries in those sectors of the pharmaceutical industry which lend themselves to industrialisation. This assistance would include, for example, the assessment of the present status of such sectors, detailed evaluation of domestic demand for pharmaceuticals and classes of products, and recommendations concerning the improvement of infrastructures to provide a viable basis for the industrialisation of such sectors.

UNIDO works closely with WHO in the development of pharmaceuticals for human use and with FAO in relation to veterinary pharmaceuticals.

The role of UNIDO in the development of a pharmaceutical industry includes the planning of the enterprise, the initiation of its operation, the development of production, training of the staff needed, organisation of marketing and ensuring that there will be adequate motivation for management.

Mr Chairman, ladies and gentlemen, thank you for listening to me and I hope I have given you some material for thought and discussion.



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¹ *Rheumatol. and Rehabil.*, 13, 125, 1974
² *Scand. J. Rheumatol.*, (in press), 1974

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³ *Br. Med. J.*, iv, 398, 1972 ⁴ *Br. Med. J.* iv, 82, 1973
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THE PHARMACIST'S RESPONSIBILITY TO THE COMMUNITY *

By JOHN OCRAN, Dept. of Pharmaceutics, Faculty of Pharmacy, University of Science & Technology, Kumasi.

At some stage in one's life some unexplained force, or perhaps an event, usually an unpleasant one, compels the individual to sit down and examine himself critically to see where he has gone wrong or why things are not going well and how he can improve his lot. This should also be true of so many things in life, professional associations not excluded and I think pharmacists of this country should take time off the race for recognition to see if they could not improve upon their performance and thereby render better service to the community. Without this self-examination we may not survive as a profession for any length of time.

I have a strong feeling that with the exception of the academic side of pharmacy which has seen tremendous changes within the last ten years much has to be done to raise the image of pharmacy in hospital, manufacturing and general practice.

The hospital pharmacist in this country feels it is degrading to dispense; most of them prefer to sit in the store behind fat ledgers. I am aware that making entries in the ledger is part of his responsibility but this should never be regarded as more important than filling prescriptions in the dispensary. He cannot personally fill all prescriptions but it is essential for every action of the assistants to be under his immediate supervision.

This means the pharmacist should not open the dispensary for the assistants early in the morning and leave them alone to prepare stock mixtures and other products. Handing over the drug to the patient is the responsibility of the pharmacist but in this country the hospital pharmacist thinks this does not befit his status so he should get somebody to do it. Even when he has nothing to keep him occupied he expects an assistant to give the drug to the patient. The assistant, by his training, cannot go about this job with the seriousness and professional tact it deserves and it is no wonder many patients leave the hospital fuming and cursing the dispensary staff. Invariably the patient does not hear what the assistant rattles out but he dares not ask for a repeat because he knows he will be asking for insults or rude remarks. If a pharmacist does not stay in his dispensary so that anytime a doctor calls for some information the doctor only meets assistants what opportunity will the pharmacist have to discuss matters with him and offer his expert advice on drugs?

Pharmaceutical industry is only starting to develop in this country but it appears to have started on the wrong note. Finding ourselves in a country where there is a perennial shortage of several articles, drugs included, those of us in industry may be tempted to produce items of rather low quality. The only thing which can raise and maintain quality

standards is free competition. There cannot obviously be competition where there is a shortage or where the biggest manufacturer has a guaranteed market and is given official patronage. As pharmacist we shall be failing in our duty if we think it is a waste of time and money to adopt good manufacturing practices or employ qualified and experienced personnel since our contacts with influential people in the society or our position as a state-owned company can always get us out of trouble if anything goes wrong. We should not forget that drugs are a special class of goods so there should be no dishonesty or preferential treatment when it comes to deciding on whether to reject or accept a particular batch. I know that for some special reasons people may be forced to buy "seconds" but I wonder if this grade of goods do or should exist in the drug trade. In my opinion drugs should be either good or bad and nothing else. Some of our manufacturing houses are producing drugs of doubtful therapeutic value and it is disgraceful to find pharmacists occupying responsible positions in these establishments or being directly involved in the production. Are we being honest with ourselves by labelling anything which contains traces of iron as Blood Tonic when in fact the only benefit the patient may derive from the preparation is due to the presence of a saline purgative. If ours is a society that has so much confidence in

* This paper was presented at the 33rd Ghana Pharmaceutical Conference & Exhibition, State House, Accra, August 28-30, 1975.

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purgatives is this a justification for capitalising on the ignorance of the people?

Taking a close look at the sort of drugs coming into the country in terms of quality, type and quantity one wonders if pharmacists have any hand in the importation of drugs. We cannot escape blame by arguing that the law allows importation by non-pharmacists; the laid-down procedure ensures that all applications have to go before some pharmacists in the Ministry of Health at some stage before final approval is obtained. Those of us who advise on what drugs have to be purchased for the state hospitals will be helping the tax-payer a lot by not allowing ourselves to be influenced by considerations other than price and quality and also by exercising true professional judgement in drawing up our list of priorities. It is indeed ridiculous to find the country flooded with one brand of disinfectant at a time when it was difficult, if not impossible, to find an ampoule of a widely used general anaesthetic. Somebody must have had his priorities wrong and it is almost certain that official is a pharmacist. If it is a group of bureaucrats who have to be blamed for this situation it is likely the majority of the group will be pharmacists.

Things are certainly no better in general practice pharmacy. Many pharmacists running retail shops are absent from the premises most of the time so they never have the opportunity to advise customers or supervise what their assistants do. The design of some of our shops is such that even when the pharmacist is present he may be found in an obscure office far removed from the dispensary or main shop. In some cases the pharmacist in fact sits in a room on another floor! I wonder how such a pharmacist discharges his professional duties. Many of us in charge of wholesales are content

to do business with anybody who has the money, contrary to the law. Is there any justification in accusing the few inspectors for not doing their work, granting that most of them may not be as efficient as one would expect.

I think we could provide better service to the public if pharmacists were really in control at the lowest level in the distribution chain. In other words, I am suggesting that only pharmacists should own pharmacy shops. In the first place the professional and ethical standards of pharmacy demand the pharmacists' concern for the quantity and quality of stock. A drug which has deteriorated because of improper storage facilities can be detrimental to health. A drug not in stock poses a threat to the person who needs it urgently. Decisions made on the quality and quantity of stock by non-pharmacist owners could be detrimental to public health and welfare. A businessman would like to fill his shop with only those items which move fast and give him a high profit margin however useless or non-essential they may be. Supervision of pharmacists in charge of a shop by pharmacist-owners would be in the best interest of public health and safety since responsibility for improper action could be readily pin-pointed. I am convinced that the dignity of a profession and the morale and proficiency of those authorised to engage therein is enhanced when the practitioner is prohibited from subordinating himself to the direction of unqualified supervisors. If control and management is vested in laymen unacquainted with pharmaceutical service there is the risk of subordinating social accountability to the profit motive. Those who argue that anybody with money should be allowed to open a shop must realise that the term 'Pharmacy' is intended to identify a particular type of establishment within which a profession

concerned with health is practised, and thus is intended to be more than a mere means of making money. The one holding the purse strings will surely dictate the policy. If we refused to work for non-pharmacists we shall eliminate the possibility of having doctor-owned pharmacies with built-in conflict-of-interest problems. Essentially what is at stake is a clash between the desire of some smart person to do business and the right of the public to be protected from improper dispensation of drugs.

As a professional group are we doing enough to protect and inform the public? When our local newspapers came out with those misleading headlines about A.P.C. and Septrin people expected the Society to come out with a statement at the earliest opportunity explaining the situation. This would have been a means of educating the public about drugs. Why should the Pharmacy Board sit down unconcerned while a pharmaceutical manufacturer advertises atropine sulphate ampoules in a magazine for women and mass circulation newspapers?

Is it not strange to find large quantities of drugs with very limited shelf life at some hospitals while other hospitals also run with the tax-payer's money experience a shortage of the same drugs. Are we behaving as the responsible citizens our code of ethics charges us to be by keeping quiet while tablets the "active" ingredients of which may be only as effective as lactose and starch are dumped on the market or while liquid preparations no more effective than solutions of toilet soap are advertised as disinfectants which at the same time can cure cancer? There is certainly a need for improvement in the quality of service pharmacists are providing in this country. The improvement will benefit us as individuals and pharmacy as a profession.

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STUDIES ON THE GENUS COLA

Part I. Intra-Specific Variability in *Cola Nitida* and *Cola Acuminata* Occurring in Ghana

K. Sarpong, M. L. K. Mensah and D. K. Santra, Department of Pharmacognosy, Faculty of Pharmacy, University of Science and Technology, Kumasi.

Summary

At least sixteen species of *Cola* grow in Ghana, classified broadly into the 'false kolas' and the 'true kolas.' Twelve varieties of two edible species of *Cola*, *C. acuminata* and *C. nitida* have been analysed, qualitatively and quantitatively. The results showed that all varieties contained caffeine and theobromine, and no theophylline. The average content of caffeine varied between 0.75 per cent and 2.21 per cent and the theobromine content between 0.07 per cent and 0.43 per cent among the different varieties examined. The consistent variation in the quantitative distribution in these two varieties appear to indicate that they constitute different genotypes. Attempts at large scale production of 'Kola' in Ghana therefore requires a careful scrutiny of the species for high yielding varieties.

Introduction

A number of therapeutic claims have been made for the "kola plant" in Ghanaian folk-lore medicine. The nuts are chewed as a stimulant and conservator of strength. It is said to be useful as a tonic and antiperiodic, in dysentery and exhausting diseases and to prevent vomiting in Fevers.¹ Eka (1971) determined the nutritive value of kola nuts and reported that kola contains 50 per cent of nutritive matter made up of proteins, carbo-

hydrates and lipids. The nut extracts have been incorporated in certain brands of tonic wines, beverages and soft drinks.

Two broad classes of *Cola* are known namely, the 'false kolas' and the 'true kolas'. Dalziel (1955) and Irvine (1961) together mention a total of twenty-one species of *Cola* as occurring in West Africa, fifteen of which are found in Ghana. All these are claimed to have various medicinal uses, the principal action being ascribed to caffeine. The improvement of the quality of the 'true kolas' which are cultivated in this country is necessary both medically and economically. Quantitative determination of purine bases and nutritive matter in kola grown in Ghana would indicate which of the species or varieties are desirable for cultivation as medicinal or cash crops. Further experiments on the conditions of growth would lead to improvement of the quality of the drug by introducing improved conditions of soil and control of insect pests and fungal infestation.

It was therefore, considered desirable that as a first step, a systematic study of the content of total purine bases in each species of kola grown in Ghana be determined. The seeds of eleven hybrids and varieties of two species of *Cola*, viz. *C. acuminata* and *C. nitida* from two endemic areas have thus been examined.

EXPERIMENTAL

Materials and Methods:

- i. Mature fruits or ripe seeds of varieties of *Cola acuminata* and *Cola nitida* were collected from Bunso in January, 1973.

<i>Cola</i> species	Variety
<i>C. acuminata</i>	Kade pink
<i>C. nitida</i>	Kumasi white
"	Bunso white
"	Kade red
"	Labochi white
"	Noyem white
"	Pankese white

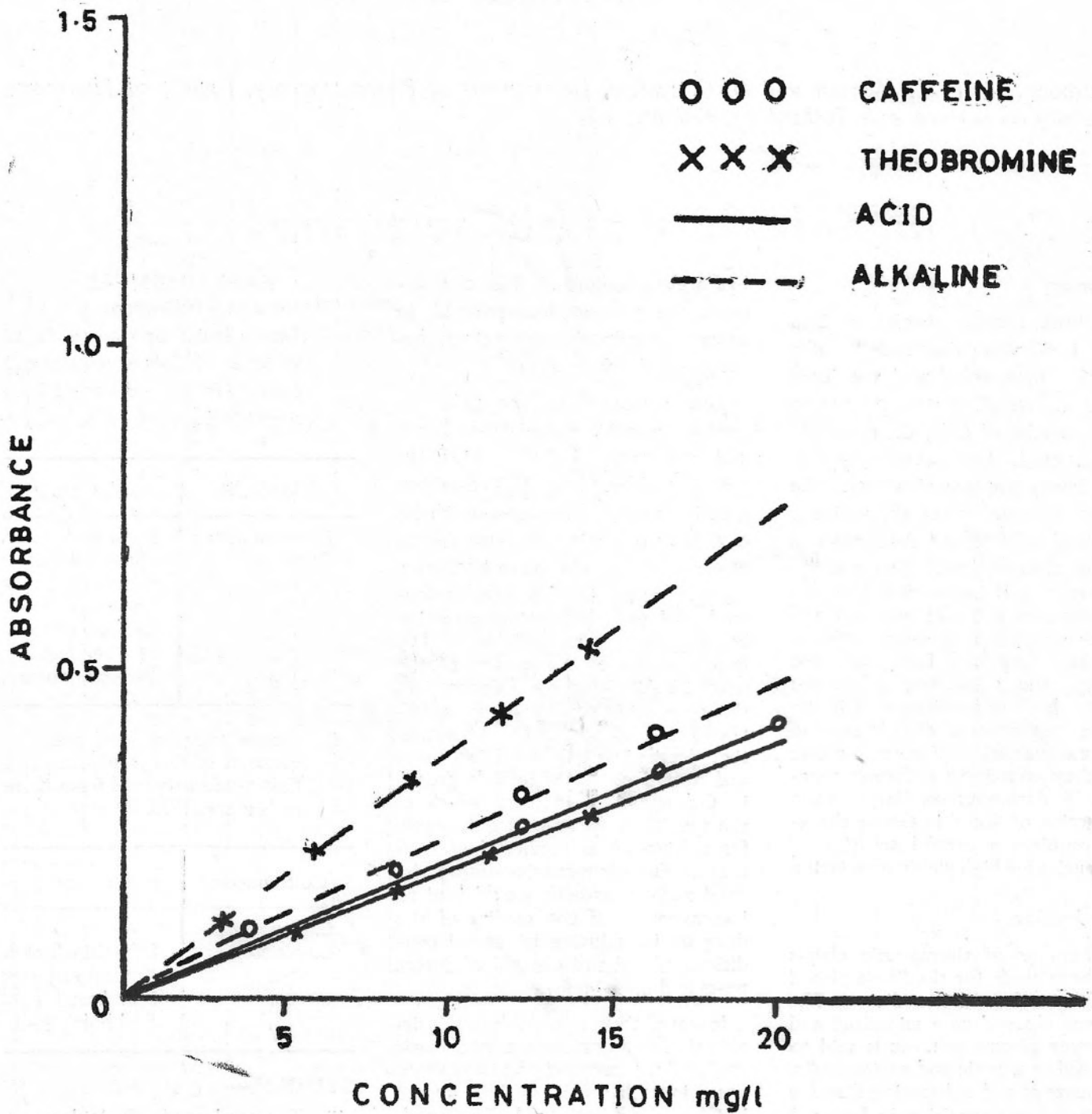
- ii. Mature fruits or ripe seeds of varieties of *Cola acuminata* and *Cola nitida* collected from Kade in January, 1973.

<i>Cola</i> species	Variety
<i>C. acuminata</i>	—
<i>C. nitida</i>	Labochi white
"	Kumasi red
"	Pink kola
"	Red kola

STUDIES—

- iii. The total crude alkaloids were extracted from:
 - (a) the dried powdered samples by cold maceration in chloroform;

FIG.1a. CALIBRATION CURVE FOR CAFFEINE AND THEOBROMINE AT 235 nm.



(b) the sliced fresh kola nuts by cold maceration in 90 per cent ethanol.

- iv. Thin layer chromatography:
Adsorbent—a, Silica gel G (Merck.) b, Silica gel G (Merck.) buffered to pH 6.8 with Sorenson's citrate buffer; layer thickness: 250 μ .

Solvent systems:

- i. Ethyl acetate—Methanol-Acetic acid (9:1:1).
- ii. Chloroform—Ethanol (9:1)
- iii. n-Butanol—Water-Formic Acid (77:13:10).

Detecting reagents:

- i. Alcoholic solution of iodine.
- ii. 96 per cent ethanol—25 per cent HCl solution (1:1)

The adsorbent for column chromatography was acid activated alumina (Spence.), Alumina washed with 0.1N HCl until acid to litmus and activated at 120°C.

- v. Melting point (uncorrected). Determinations were made using Galenkamp Electrothermal Melting Point Apparatus.
- vi. Ultra-violet absorption spectra: The spectra were determined in water, acid and alkaline solution on the Unicam Sp. 800 ultra-violet spectrophotometer.
- vii. Infra-red absorption spectra. The spectra were obtained using Unicam Sp. 200 infra-red spectrophotometer. Samples were prepared in nujol.
- viii. Quantitative determination. Ultra-violet spectrophotometric determination of absorbance of alkaline and acidic solution of samples.

Extraction:

- i. To 5g. each of the dried powdered sample of kola, 5ml. of concentrated ammonia solution were added followed by a little water to moisten. Sufficient chloroform was added to just cover the powder and the flask was stoppered and shaken on a rotary shaker for 1 hour. The chloroformic extracts were filtered and concentrated to a small volume.
- ii. 10g. each of fresh kola nut samples were sliced and steeped in 90 per cent alcohol for 48 hours. The filtrate from each sample was concentrated to a small volume.

The chloroformic and alcoholic extracts from the various samples were examined by thin layer chromatography on silica gel G and buffered silica gel G plates. The chromatograms were run in solvent (i), (ii) and (iii), using caffeine, theobromine and theophylline as reference compounds. The components were identified by their hRf values and colours after spraying separately with alcoholic iodine solution and with alcoholic HCl. All samples showed the presence of two compounds corresponding in colour and hRf values to caffeine and theobromine. The alcoholic extracts showed, in addition, the presence of other compounds, none of which corresponded to theophylline.

Isolation of Caffeine and Theobromine

450g. of dried powdered sample of *Cola acuminata* (Kade species) were moistened with concentrated ammonia and extracted with chloroform in a Soxhlet. The extract was concentrated to dryness to give 10.65g or crude total alkaloids (A). 3g. of (A) were placed on a column of acid activated alumina. The alkaloids were eluted with chloroform and the fractions after monitoring by thin layer chromatography on buffered silica gel G plates in chloroform ethanol (9:1), were bulked to give two main fractions. The solvent was removed and the residue dried to give 2.21g. and 0.04g. of crude caffeine and theobromine respectively. They were recrystallised from chloroform. The identity of the separated components were established by the Murexide test, hRf values, melting point and mixed melting point, ultra-violet and infra-red absorption spectra.

Quantitative Determination

The determination was based on the comparison of absorbance of caffeine and theobromine in acid and alkaline.

The absorbance of solutions of caffeine and theobromine (concentrations 1.0 — 16.4mg/litre) were determined in 0.1N HCl and 0.1N NaOH at 235nm and 272 nm. The absorbance were plotted against concentrations (Fig. 1a and 1b).

20g. each of the dried powdered kola samples were placed in a 150ml. conical flask. 20ml. concentrated ammonia solution were added to

each sample followed by 50ml. of chloroform. The flasks were shaken on a rotary shaker for 1 hour and the chloroform filtered. 45ml., 35ml. and 30ml. portions of chloroform were added to the residue and shaken for one hour each time an addition was made. The extracts were filtered off each time and portions tested for the presence of purine bases. The residues were finally washed with 20ml. of chloroform on a buchner funnel using reduced pressure. The total extracts for each sample were bulked and the solvent removed under reduced pressure. The residues were dried and weighed. The percentage weights of total crude alkaloids were given in Table 1a and 1b.

TABLE 1(a)

PERCENTAGE COMPOSITION OF CAFFEINE AND THEOBROMINE IN KOLA FROM BUNSO

Sample	Total Crude Alkaloid %	Mean % Caffeine	Mean % Theobromine
<i>C. acuminata</i> (Kade pink)	1.20	0.75	0.17
<i>C. nitida</i>			
Bunso white	1.90	1.28	0.24
Kumasi white	2.60	1.61	0.43
Pankese white	2.80	1.98	0.36
Noyem white	2.50	1.71	0.34
Kade red	2.00	1.38	0.22
Labochi white	1.65	0.98	0.21

TABLE 1(b)

PERCENTAGE COMPOSITION OF CAFFEINE AND THEOBROMINE IN KOLA FROM KADE

Sample	Total Crude Alkaloid %	Mean % Caffeine Content	Mean % Theobromine Content
<i>C. acuminata</i> (Kade)	2.50	2.11	0.07
<i>C. nitida</i>			
Labochi white	2.75	2.15	0.12
Kumasi red	2.75	2.08	0.16
Red kola	2.15	1.59	0.22
Pink kola	2.90	2.21	0.28

Accurately weighted portions (0.02 — 0.03g.) of the residues were dissolved in 100ml. of warm water. The solutions were filtered to clarify and two 5ml. aliquots of each filtrate transferred into 100ml. volumetric flasks. 20ml. of distilled water were

FIG.1b. CALIBRATION CURVE FOR CAFFEINE AND THEOBROMINE AT 272 nm.

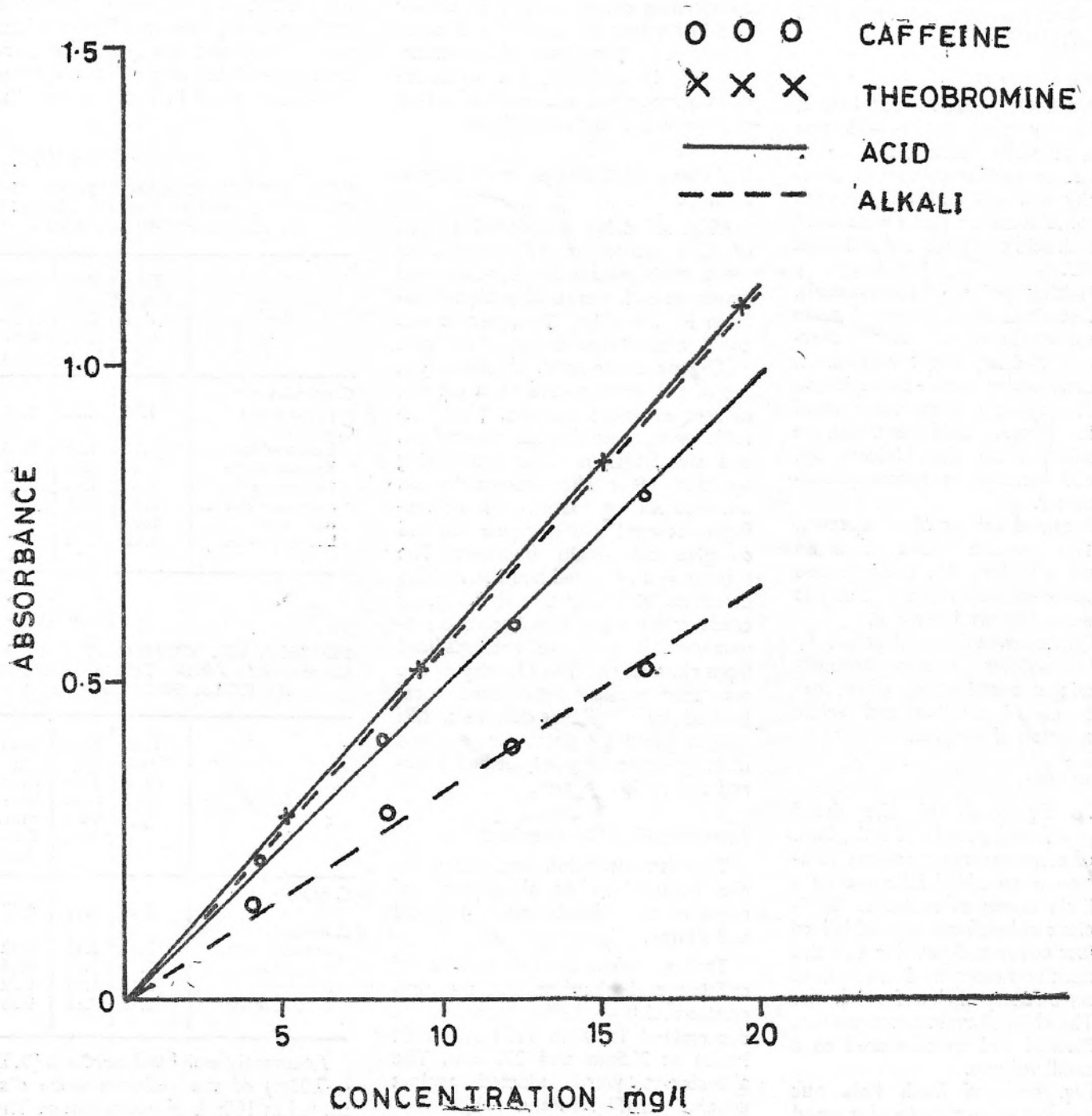


FIG. II ABSORBANCE DIFFERENCES OF ALKALI OVER ACID FOR CAFFEINE AND THEOBROMINE AT 235 nm

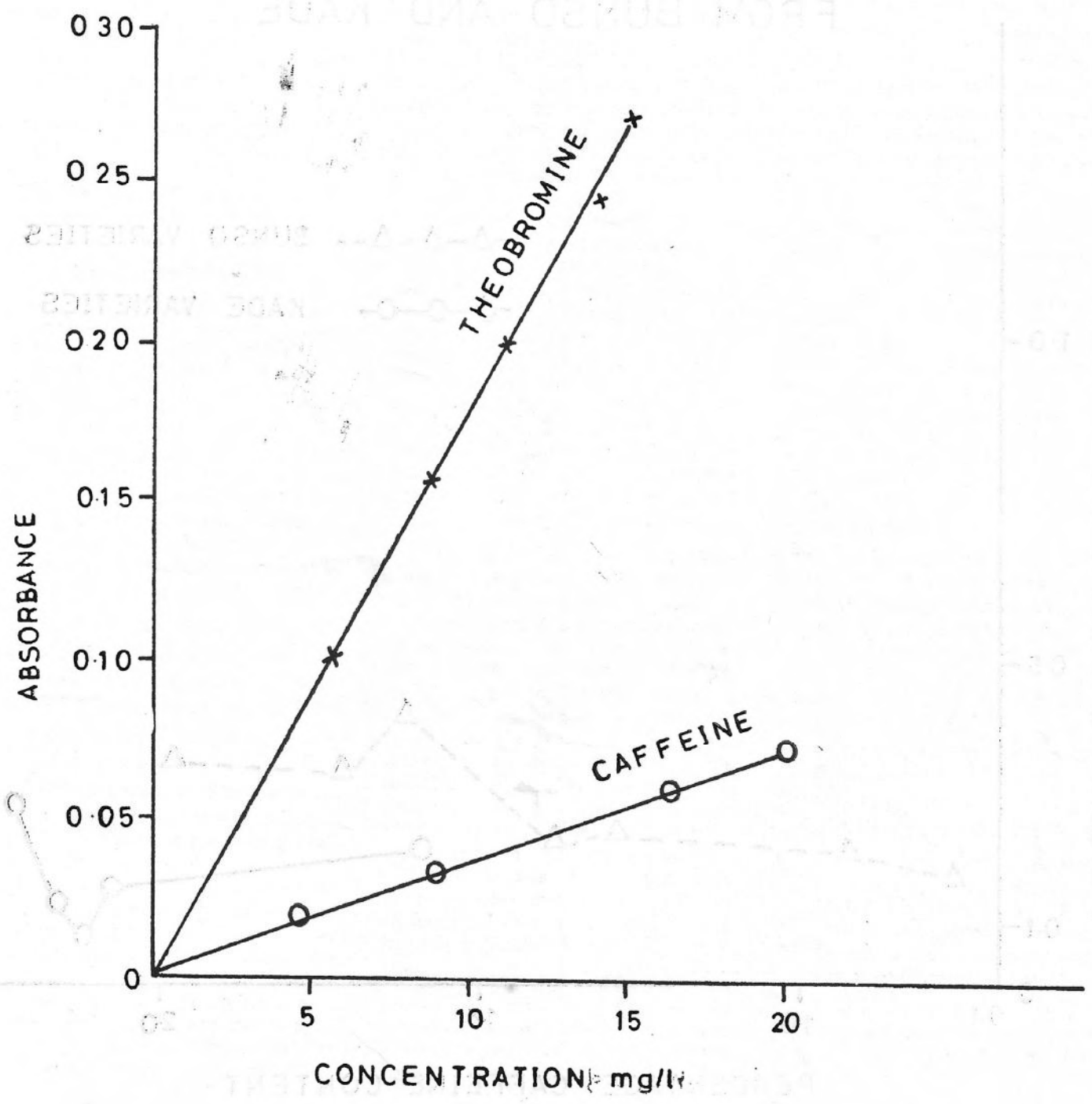
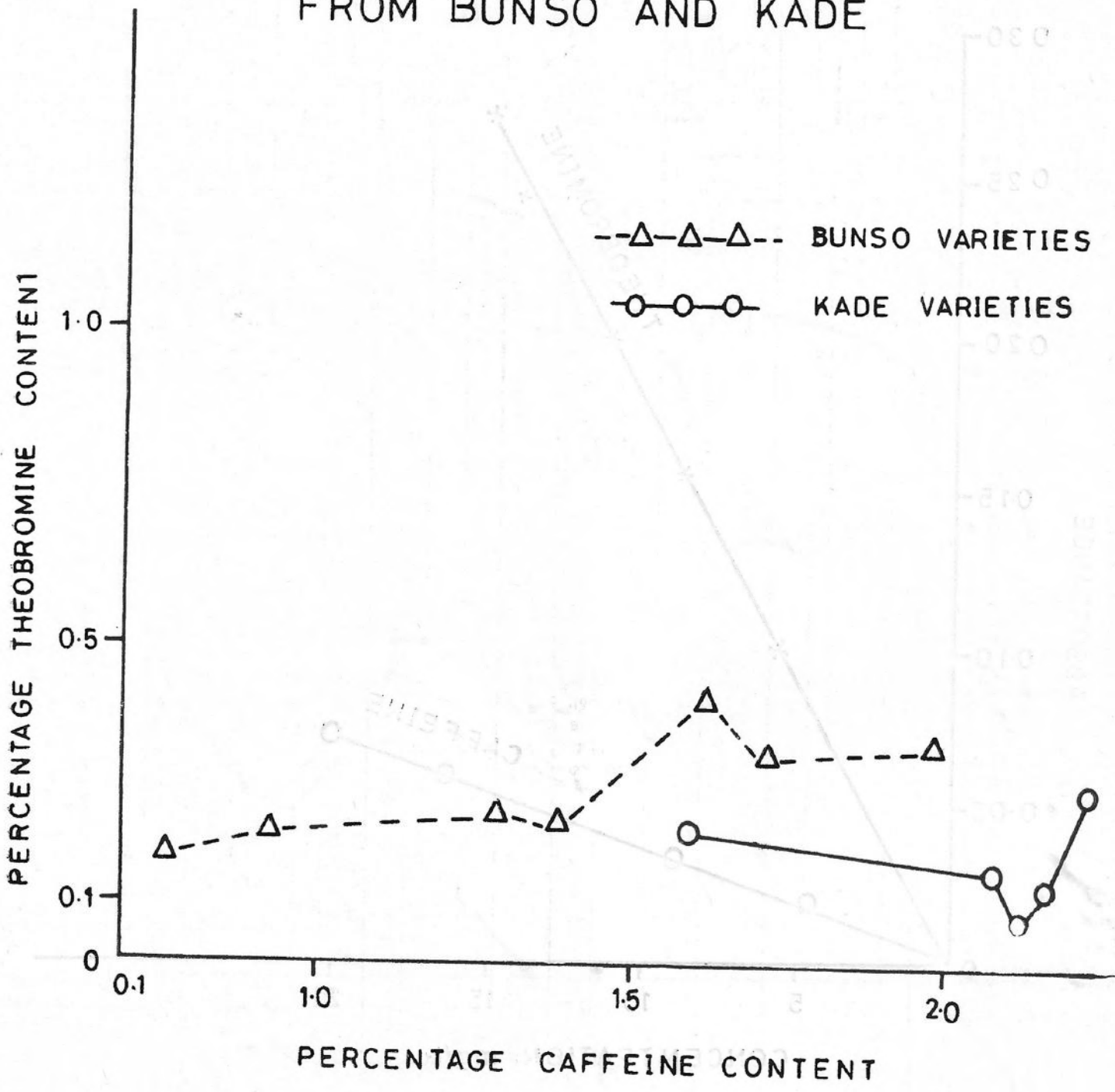


FIG.III CAFFEINE AND THEOBROMINE CONTENT VARIATION IN COLA VARIETIES FROM BUNSO AND KADE



added to each flask. One aliquot of each sample was made up to volume with 0.1N HCl and the other with 0.1N NaOH. The ultra-violet absorption spectra of these solutions were determined.

RESULTS AND DISCUSSION

hRf values (system ii)

Caffeine 58; Theobromine 21.

Melting point

Caffeine 238°C Theobromine 292°C. (sublimes)

Ultra-violet absorption spectrum (H₂O)

Caffeine ϵ_{\max} 272nm. (log E=3.96)
235nm (sh.) log E=3.63
 ϵ_{\min} 245nm. (log E=3.43)

Theobromine ϵ_{\max} 272nm (log E=4.01) 235nm (sh.) log E=3.56

ϵ_{\min} 244nm (log E=3.42)

The isolated caffeine and theobromine were similar in hRf values melting points, ultra-violet and infra-red spectra with authentic samples of caffeine and theobromine. Their melting points were not depressed when admixed with the authentic samples. Their identities were thus confirmed.

Caffeine and theobromine exhibit similar ultra-violet absorption and therefore the quantitative determination of these bases would seem difficult. However, in alkaline solution, theobromine exhibits a considerable increase in absorbance at 235nm over the acidic solution (Fig. II). In a sample containing both caffeine and theobromine, it was possible to determine the theobromine content by measuring the increase in absorbance of its alkaline solution over the corresponding acid solution after determining the total alkaloidal content at 272 nm. The method was simple and accurate and had a clear advantage over other methods like iodometric, colorimetric, argentimetric

and gravimetric which have been found to be unreliable.

The determinations were done on the second day after preparation of the samples. The absorbance of both the acid and alkaline solution were erratic on the first day of preparation and the samples broke down on the third day giving no characteristic absorption peaks.

Previous description of kola was based on the colour of the fresh seeds, for example, *Cola alba* and *Cola rubra*. Chevalier's broad classification into 'false kola' and 'true kolas' has been further used to classify the *Cola* spp. botanically. In addition to the main species mentioned, a number of sub-species are described — for example, Chevalier described four sub-species of *Cola nitida*, the description of which was rather general and based on the colour of the fresh seeds. On similar basis of colour, Trease and Evans (1966) mention species like *Cola astrophora* (red), *Cola alba* (white) and *Cola vera* (red and white)—possibly a hybrid of the latter two species. It seems clear though that *Cola astrophora* mentioned by Trease and Evans is the same as *Cola rubra* of Chevalier. Similarly *Cola vera* and *Cola mixta* may be the same species.

It has been observed that the same tree may bear nuts of different colours, but trees grown from white seeds produce, if self-fertilized, only white ones⁴ so that the production of coloured nuts may be due to cross-fertilization. On this basis it is difficult to assign specific values for caffeine and theobromine contents for nuts from trees which are not self-fertilized, assuming that the genetic make-up of the individual tree would determine the alkaloidal content of its seed. We note this because the fresh samples of fruits and seeds provided were all of different colours although they were treated as coming from specified varieties.

The results of the determination showed that the total crude alkaloid varied between 1.20 per cent and 2.9 per cent. The average caffeine content of the nuts varied between

0.75 per cent and 2.21 per cent and theobromine content between 0.07 per cent and 0.43 per cent (Table I, Fig. III). The varieties from Kade contained greater proportion of caffeine than those from Bunso. The theobromine content of Cola from Bunso were, however, proportionately greater than those for the Kade varieties.

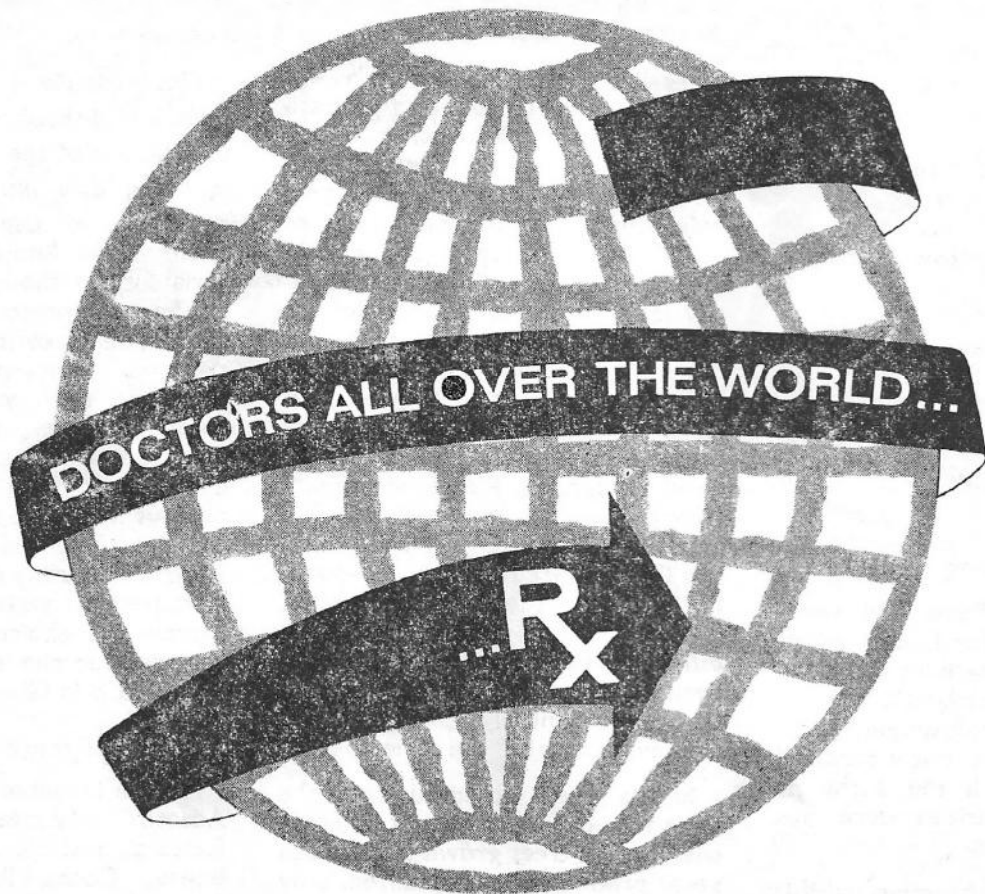
The variation in the content of caffeine and theobromine in different populations of the same species, for example, *Cola nitida*, indicates the occurrence of chemical varieties—a phenomenon known as intraspecific variability. Although these varieties all show the presence of caffeine and theobromine, their quantitative distribution varies consistently and therefore, these varieties appear to constitute different genotypes. This quantitative variation of chemical constituents within a species has obvious implications in the commercial production of vegetable drugs. A careful scrutiny of species showing intraspecific variation may help narrow the choice of high yielding varieties for the economic production of kola in Ghana.

Acknowledgement

We are indebted to Messrs. M. A. Adansi, Chief Research Officer, Crops Research Institute, Kade and Osei-Bonsu, Cocoa Research Institute, Bunso, for supplying plant material.

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HIGHER PLANTS—A POTENTIAL COMMERCIAL SOURCE OF ANTIBIOTICS *

By K. Boakye-Yiadom, Department of Pharmaceutics, University of Science and Technology, Kumasi, Ghana

Mr Chairman, Fellow Pharmacists, Ladies and Gentlemen, it gives me great pleasure to have been invited to read this paper on "Higher Plants as a Potential Commercial Source of Antibiotics" at this 33rd Conference and Exhibition of the Pharmaceutical Society of Ghana. I am grateful to the organisers.

Introduction

An antibiotic, by an older definition, is a chemical substance derived from or produced by living organisms, which is capable in small concentrations of inhibiting the life processes of micro-organisms, (Benedict and Langlyke, 1947). The term, antibiotic, has now become stretched to include semisynthetic substances to which belong those antibiotics whose molecules are not totally biosynthesised by living organisms but are partly synthesised in the laboratory for incorporation into the antibiotic molecule and substances produced by chemical synthesis in the laboratory.

As the original definition states, antibiotics are obtained from living organisms, thus incidence of antibiotics have been found in the

bacteria, the actinomycetes, the moulds, lichens, algae, yeasts, higher fungi, higher plants and animals. It must be noted however, that antibiotic production is more frequent among the lesser plants and is mostly demonstrated in the bacteria, the actinomycetes and the moulds; and it should be said that the outstanding antibiotics in use in medicine today have come from this source. This might most probably have been due to the great work stimulated in the search for antibiotics from this source by the fact that, Penicillin after its discovery from the mould *Penicillium*, showed great potential as a therapeutic substance and was demonstrated to be able to eliminate diseases in a few days in cases where these diseases had been highly fatal or recovery was a matter of months.

Antibiotic Production

The production of antibiotics from micro-organisms has the advantage that microbes have very short generation times, and a single microbial cell is capable after a short time of multiplying into great numbers. Since yield in production is relative to the growth of the microbes, large amounts of an antibiotic may be obtained within a short period of time. However production of antibiotics from this source entails a wide range of problems. This stems

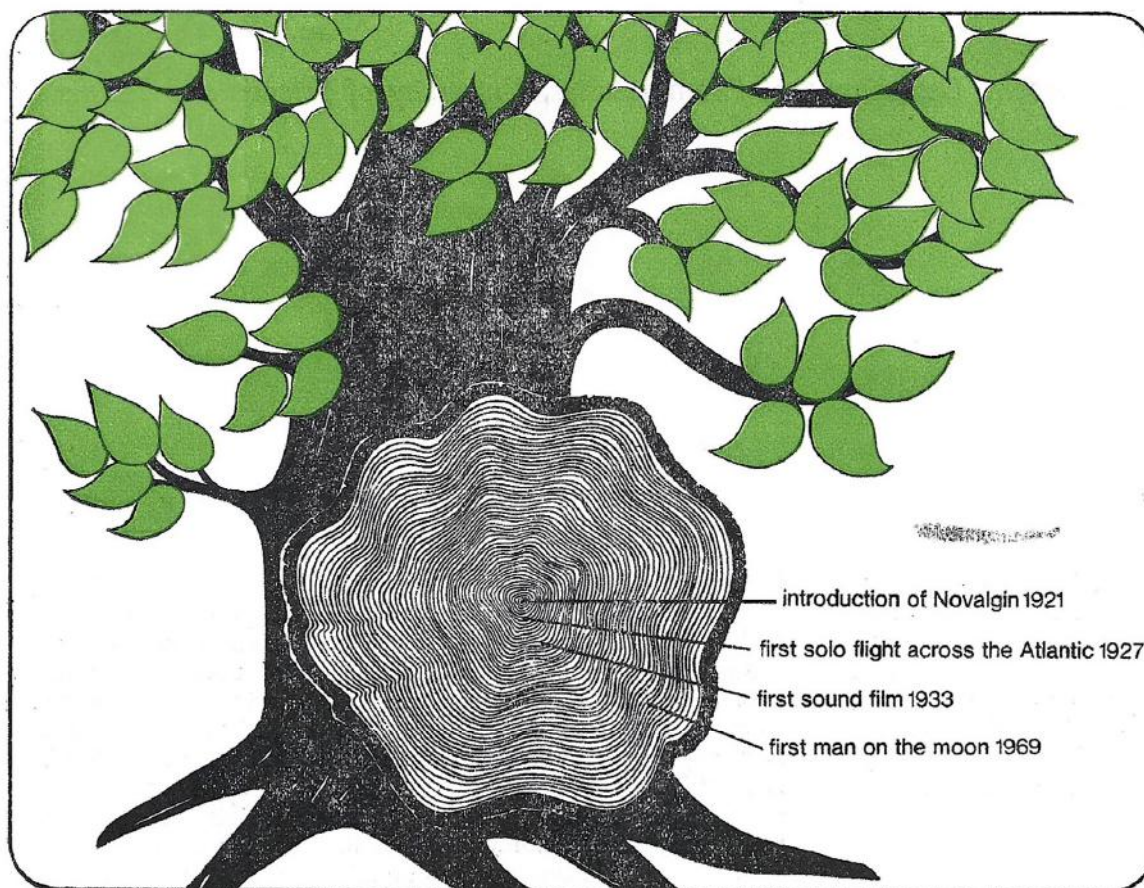
from the basic fact that micro-organisms are very susceptible to their environment, the production of these metabolites therefore require great care and expense if the desired product and a good yield of it is to be obtained. It is reasonable to believe that other clinically useful antibiotics might be obtained from other sources at probably far less cost. A potentially useful source deserving of exploration is the higher plants.

Higher Plants and Antibiotic Activity

Several studies have indicated that several higher plants contain substances which are able to inhibit the growth of micro-organisms. Reports on these studies include those on the biological and phytochemical evaluation of plants (Farnsworth, et al. 1966); the antibacterial properties of some Hawaiian plants (Bushnell et al. 1950); the antimicrobial activity of some Nigerian plants (Malcolm and Sofowora, 1969); the evaluation of the anti-microbial activity of pure plant products and plant extracts (Mitscher et al. 1972); the antimicrobial activity of aquatic plants from Minnesota (Su, Abul-Hajj and Staba 1973) and the demonstration of antimicrobial activity in Chilean plants by Bhakuni et al. (1974). A survey of individual reports on the incidence of antimicrobial activity in

* This paper was presented at the 33rd Ghana Pharmaceutical Conference & Exhibition, State House, Accra. August 28-30, 1975

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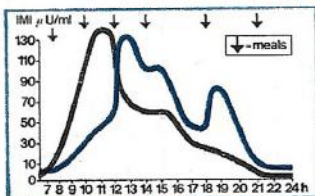
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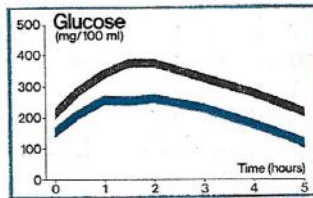
Clinical evidence

Comparison of the effects of single morning doses of a conventionally-acting sulphonylurea and Daonil.



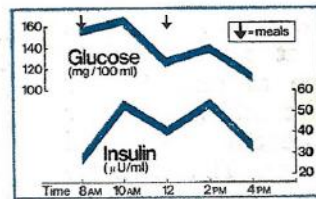
(Modified from Raptis, S., G. Rothenbuchner, K. E. Schröder und E. F. Pfeiffer: Möglichkeiten und Grenzen der modernen Tabletten-therapie, Therapiewoche 23 [1973], No. 11, p. 936-952)

Blood sugar curves from diabetic patients undergoing glucose tolerance tests before and two months after commencing treatment with Daonil.



(Modified from Feldman, J. M. and H. E. Lebovitz: Endocrine and Metabolic Effects of Glybenclamide, Diabetes 20 [1971], p. 745-755)

The relationship between dietary intake, increase in blood sugar concentration, and insulin secretion in diabetics treated for two months with Daonil.



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plants shows encouraging results. In 1943, Osborn screened 2,300 species of plants from 166 families and found 63 genera exhibiting antibacterial properties. Hayes (1946) found 46 species out of 231 active against various test organisms. Atkinson (1946) observed that 57 species out of 1,200 Australian plants studied showed anti-bacterial activity. A very recent study made in our laboratory proved extracts from four out of the five plants studied from the family *Connaraceae* to have antibacterial activity against four test organisms (Boakye-Yiadom and Konning, 1975).

Plants in Folklore Medicine

It should be worthwhile to take a serious look at plants used in folklore medicine as remedies for infections when considering higher plants as a potential commercial source of antibiotics. The literature shows that some of these plants do contain antimicrobial substances. Thus, oil from fruit shells of *Anacardium occidentale* which has long been used in Brazil as a remedy for leprosy and as an anthelmintic drug has been shown to contain Anacardic acid, (Eichbaum 1946). Anacardic acid has been used clinically with encouraging results in the treatment of urethritis. *Larrea divaricata* plant

extracts used by the Indians as a medicine for venereal diseases, has been found to contain nordihydroguaiaretic acid, a potent antibacterial substance (Tsuchiya et al. 1944). It has also been found that extracts from the plant *Centella asiatica* which have long been used in the treatment of leprosy in India and Madagascar contain a biologically active compound which has been named Asiaticoside (Boiteau et al. 1949).

Conclusion

Time does not permit me to deal at very great length on the incidence of antimicrobial agents in higher plants. But there is ample evidence to sustain the idea of looking at higher plants as a potential commercial source of antibiotics. As pharmacists we are aware of other important classes of drugs commercially obtained from higher plants, and I believe these same plants could be and should be exploited for commercial production of antibiotics.

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COMMONWEALTH PHARMACY - I. AUSTRALIA CORRECTION

Our attention has been drawn to the fact that the article entitled "Commonwealth Pharmacy I. Australia" by A. G. Mervyn Madge originally published in the "RETAIL CHEMIST", London, which appeared in the *Ghana Pharmaceutical Journal*, Vol. 3, No. 2 & 3 of August 1975, pages 48 to 50 was not written under the auspices of the Commonwealth Pharmaceutical Association as was indicated in the footnote on page 48 of the *Journal* published in August 1975.

Our sincere apologies go to the author, the publishers of the "Retail Chemist", and the Commonwealth Pharmaceutical Association for any embarrassment which the inadvertent publication might have caused them.

Editor

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THE PHARMACOLOGICAL ACTIVITY OF O-METHYLFLAVINANTINE COMPARED WITH MORPHINE ON THE GUINEA-PIG ILEUM *

By E. A. Gyang, D. Dwuma-Badu, J. S. K. Ayim, B. K. Noamesi, R. Ansa-Asamoah,
Faculty of Pharmacy, University of Science & Technology, Kumasi.

ABSTRACT

The pharmacological activity of O-methylflavinantine has been compared with that of morphine on the guinea-pig ileum and in mice.

On the guinea-pig ileum, the alkaloid was found to be about a thousand times less potent than morphine. It inhibited responses to coaxial electrical stimulation. It also abolished contractions of the circular and longitudinal muscles in the peristaltic reflex.

In the hot-plate analgesic test using mice, O-methylflavinantine is about a third as potent as morphine. The effect of O-methylflavinantine was not antagonised by nalorphine. O-methylflavinantine was less toxic in mice compared to morphine.

Introduction

Plants of the family Menispermaceae have been extensively investigated for their alkaloidal contents. Investigations carried out at the Faculty of Pharmacy, University of Science and Technology, Kumasi, have yielded some interesting results. Notable among these is the work of Tackie, Dwuma-Badu and Paul Schiff (1974) on the plant *Rhigiocarya racemifera* which yielded one major alkaloid which had a morphinan structure. This alkaloid was confirmed to be o-methylflavinantine (Fig. 1).

Interest in this plant was aroused because it is well-known in folklore medicine in which many medicinal

properties have been claimed for it. The plant itself is a climbing shrub with slender twining stems. It occurs as an undergrowth of evergreen forests in Axim, Ashanti and Kwahu. The natives use the powdered leaf extract and juice as nasal drops and they also use the leafy twigs, roots and sometimes the seeds as aphrodisiacs.

Since the alkaloid, as stated earlier, has a morphinan structure, it was thought to investigate its possible morphine-like properties with particular reference to its analgesic activity.

Paton (1957) showed that morphine and morphine-like analgesic drugs depress the twitch of the longitudinal muscle of the isolated guinea-pig ileum in response to

coaxial electrical stimulation of the intramural nerve fibres. By means of this preparation, Paton demonstrated among other characteristics a state of physical dependence on morphine. His findings were confirmed by Gyang (1965) and Gyang and Kosterlitz (1966).

Cox and Weinstock (1966) observed that the inhibition of contractions in transmurally stimulated isolated guinea-pig ileum was due to the reduction in the release of acetylcholine, the degree of inhibition being proportional to the concentration of the analgesic drug.

Trendelenburg (1919) demonstrated the inhibitory effect of morphine on the peristaltic reflex in the isolated guinea-pig ileum. O. Schumann (1952), O. Schumann, Giova-

* This paper was presented at the 33rd Ghana Pharmaceutical Conference & Exhibition, State House, Accra, August 28—30, 1975

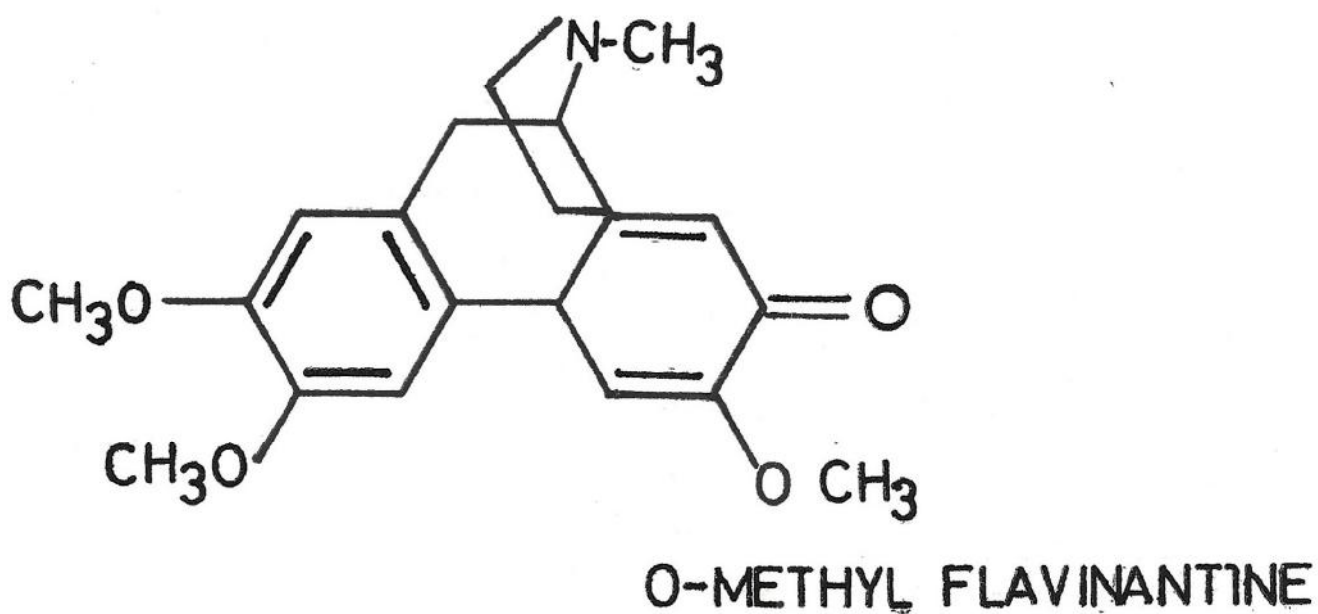
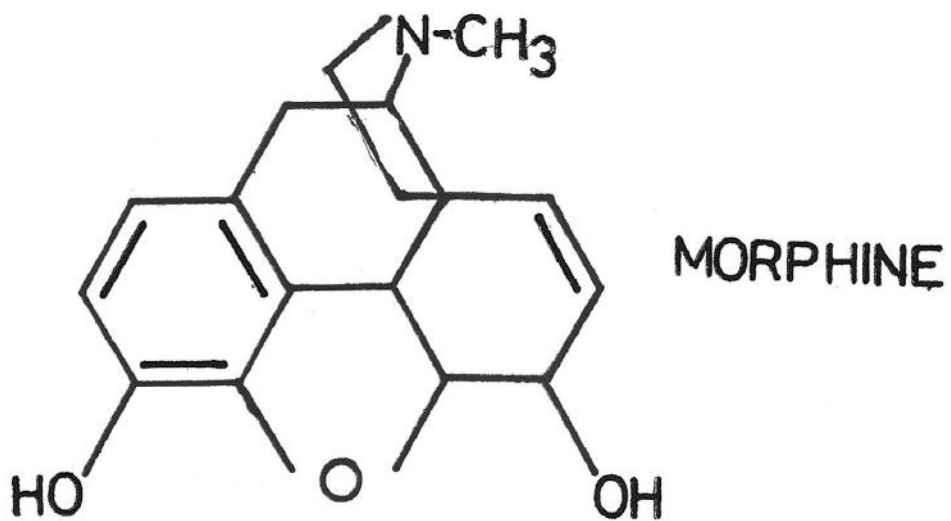


Fig 1

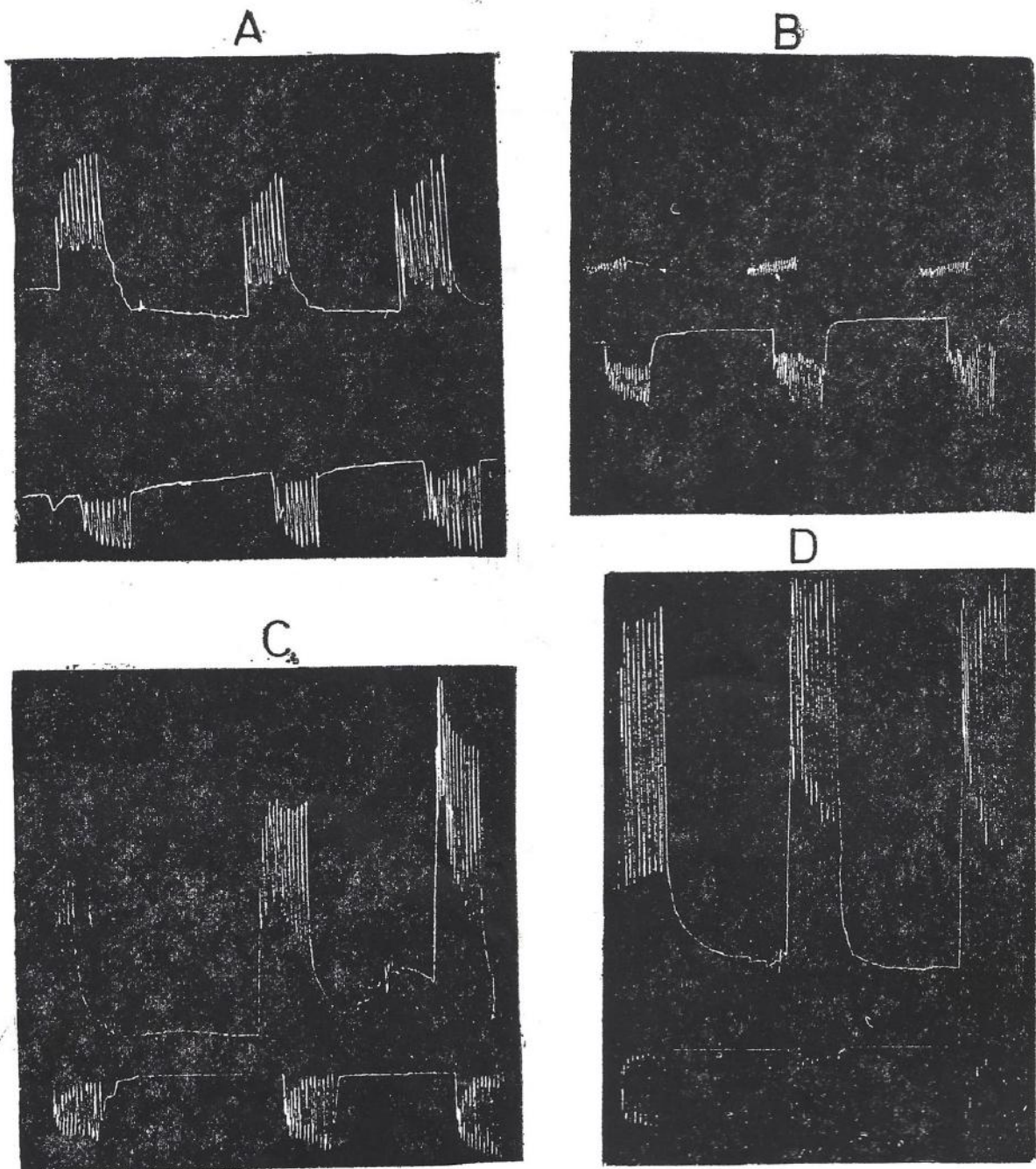


Fig. 2: The effect of morphine on the peristaltic reflex, and the antagonism of this effect by nalorphine. A: Control B: 3 minutes after the addition

of morphine 0.05 ug/ml. Between B and C, morphine was washed out. C: 30 minutes after the addition of nalorphine 0.05 ug/ml. and

15 minutes after the addition of morphine. 0.05 ug/ml. D: Contractions 3 minutes after washing out morphine and nalorphine.

nini and Jochum (1952) confirmed this observation and also found that a number of potent analgesic drugs such as pethidine and levorphan could inhibit the peristaltic reflex in the isolated guinea-pig ileum. Gyang (1963) studied the effects of analgesic drugs on the peristaltic reflex of the isolated guinea-pig ileum. He observed particularly that morphine and related analgesic drugs inhibited the graded contractions of the longitudinal muscle coat of the isolated guinea-pig ileum in the presence of hexamethonium which blocked the contractions of the circular muscle coat. He found that the potencies of the drugs in inhibiting the reflex were closely correlated with their analgesic potencies. This preparation therefore also appears to be a good test object for studying the actions of o-methylflavainantine.

In other experiments, an attempt was made to study the analgesic activity of o-methylflavainantine in mice by the hot plate method and also to establish the toxic dose level of the alkaloid in these animals.

MATERIALS AND METHODS

Animals

Male and female guinea-pigs weighing between 200g and 750g were used for the coaxial electrical stimulation and the peristaltic reflex experiments. Male mice weighing between 15.0g and 25.0g were used for the hot plate analgesic test and the toxicity test.

Drugs

The drugs used in the work presented in this paper are: Morphine, o-methylflavainantine and nalorphine.

Morphine Hydrochloride (Macfarlan Smith)

A stock solution of morphine was made with distilled water.

O-Methylflavainantine

The alkaloid is not soluble in water. It was dissolved in dilute hydrochloric acid at pH 6—7 to give an almost colourless alkaloidal salt solution. The solution was found to be photosensitive, developing a pink colour on standing. This was prevented by wrapping black paper round the container.

Nalorphine Hydrobromide (Bor-

roughs Wellcome)

This is a known narcotic antagonist which antagonises the effects of morphine. Solutions in distilled water, in vials of 5 mls, and containing 1 mg/ml, were used.

Method

Experiments were performed using both isolated tissue and intact animals.

For the isolated tissue, the experiments were performed on strips of guinea-pig isolated ileum, using the terminal portions after discarding the 10cm nearest to the ileo-caecal junction.

In the first set of isolated tissue experiments the depressant actions of morphine and o-methylflavainantine were tested on the twitch of the longitudinal muscle in response to coaxial electrical stimulation (Paton 1955). The tissue was suspended in tyrode solution (50ml) containing hexamethonium bromide (15ug/ml), mepyramine maleate (50ug/ml) and was aerated with oxygen.

The bath was kept at 32°C. Supra-maximal square current pulses of 1 m-sec. duration were applied to the electrodes at a frequency of 6 to 7/min. The twitches of the longitudinal muscle were recorded by means of a pendulum auxotonic lever. The ileum was exposed to morphine and o-methylflavainantine for 1 to 2 minutes within which a maximal inhibition was obtained. The percentage by which the control twitch was reduced was plotted against the logarithm of the concentration of the drug.

In the second set of experiments the inhibitory action of morphine and o-methylflavainantine on the peristaltic reflex in the isolated guinea-pig ileum was investigated (Trendelenburg 1917). The contractions of the longitudinal muscle were recorded by means of a pendulum auxotonic lever. The filling and emptying of the lumen resulting from contractions of the circular muscle were recorded by means of a piston recorder. The experimental procedure was to elicit for 45 sec. the peristaltic reflex 2 or 3 times by distending the lumen with different intraluminal pressures. Time intervals of 3 min. were allowed between the individual experimental procedures, such as eliciting the reflex or

addition of a dose of morphine or o-methylflavainantine to the bath. The bath fluid was renewed at least every 6 minutes to prevent a rise of the initial pH when the fluid was bubbled with oxygen.

In experiments with intact animals, the analgesic effect of morphine and o-methylflavainantine in mice was investigated by means of the hot-plate test. Doses of morphine and o-methylflavainantine used in the hot-plate test were calculated on mg/kg basis. The temperature of the hot-plate was maintained between 55—57°. The doses were administered intraperitoneally and the animals were used once only. A 60-second cut-off time was used. If a mouse did not respond before 60 seconds had elapsed, it was removed from the hot-plate and was taken as 100 per cent effect.

In the first series of experiments the analgesic activity of o-methylflavainantine was investigated and compared with that of morphine. In the second series of test the morphine-antagonizing property of small doses of nalorphine was investigated.

RESULTS

A. Hot-Plate Test

In the hot-plate analgesic test with mice, o-methylflavainantine showed one-third the analgesic activity of morphine. There were however characteristic differences between the two drugs:

1. The analgesic effect of morphine was antagonised by nalorphine, but nalorphine did not antagonise the effect of o-methylflavainantine.
2. The straub's phenomenon, a prominent feature of narcotic analgesics was conspicuously absent from the effect of o-methylflavainantine.
3. Whereas morphine in doses as low as 50mg/kg was toxic to the mice, o-methylflavainantine at dose-levels as high as 200mg/kg were non-toxic.
4. The analgesic effect of o-methylflavainantine, compared with that of morphine, was demonstrably not dose-dependent. There was no difference between the effects of 25mg/kg and 50g/kg o-methylflavainantine.

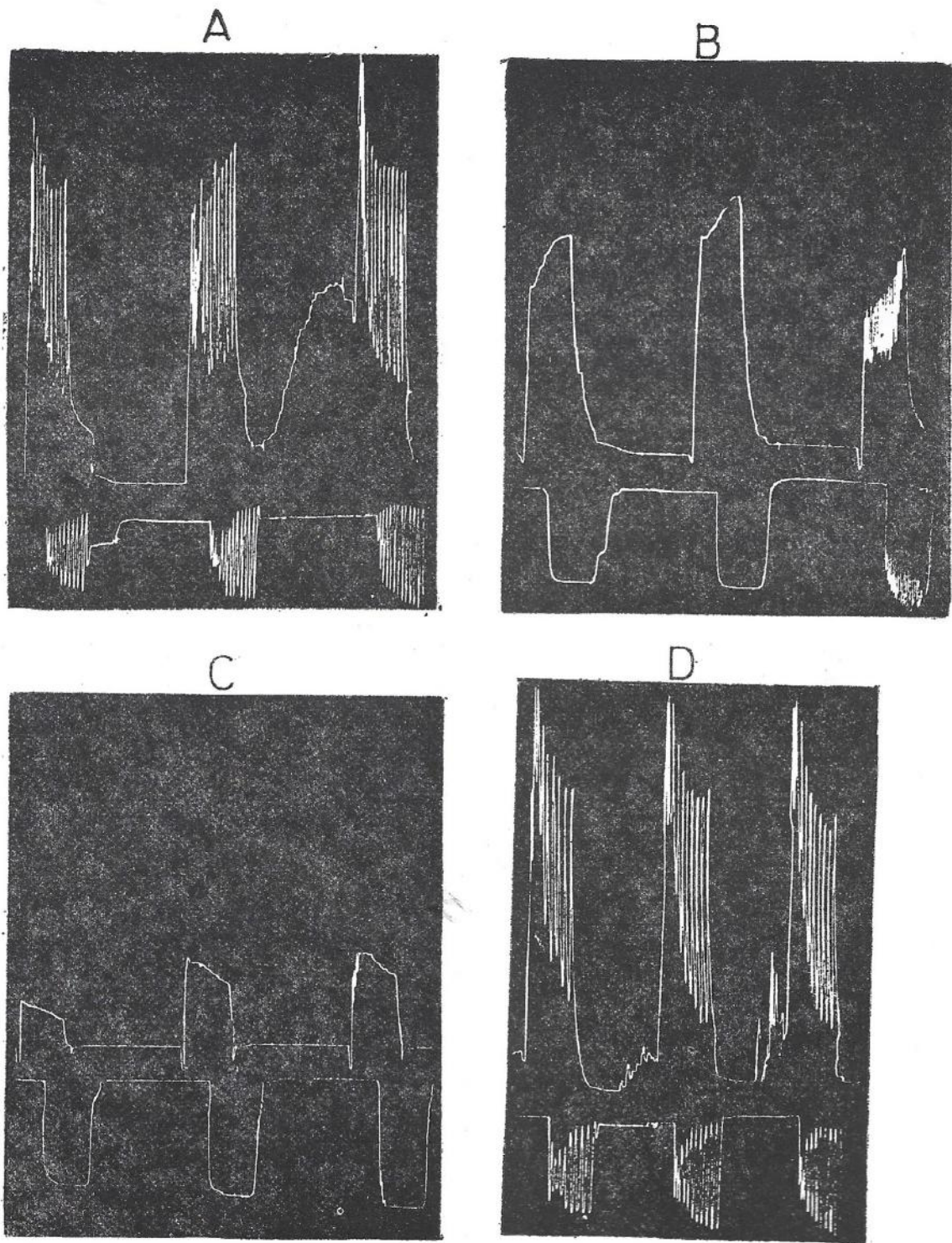


Fig. 3: Effect of o-methylflavinantine on the peristaltic reflex and the antagonism of this effect by nalorphine. A: Control; B: 3 minutes after the addition of o-methylflavinantine

80 ug/ml. Between B and C, O-methylflavinantine was washed out. C: 30 minutes after the addition of nalorphine 0.05 ug/ml and 15 minutes after the addition of

O-methylflavinantine 80 ug/ml. D: contractions 3 minutes after washing out O-methylflavinantine and nalorphine.

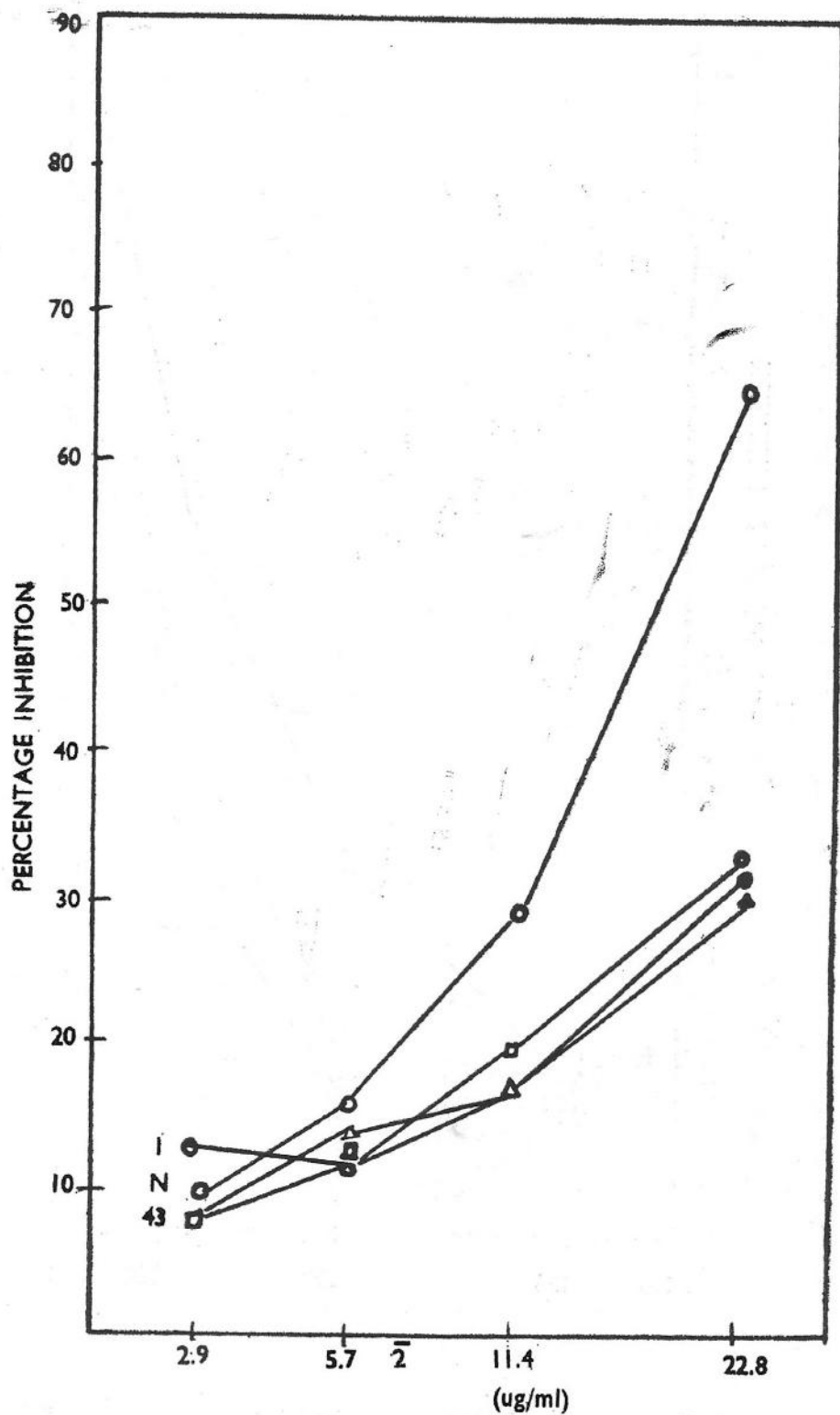


Fig. 4: The effect of morphine on the twitch of isolated guinea-pig ileum in response to coaxial electrical stimulation. - Normal and cumulative dose-

●-● response curves for morphine
 Normal dose-response curve for morphine
 ○-○ first cumulative dose-response curve for morphine.

△-△ second cumulative dose-response curve for morphine
 □-□ third cumulative dose-response curve for morphine.

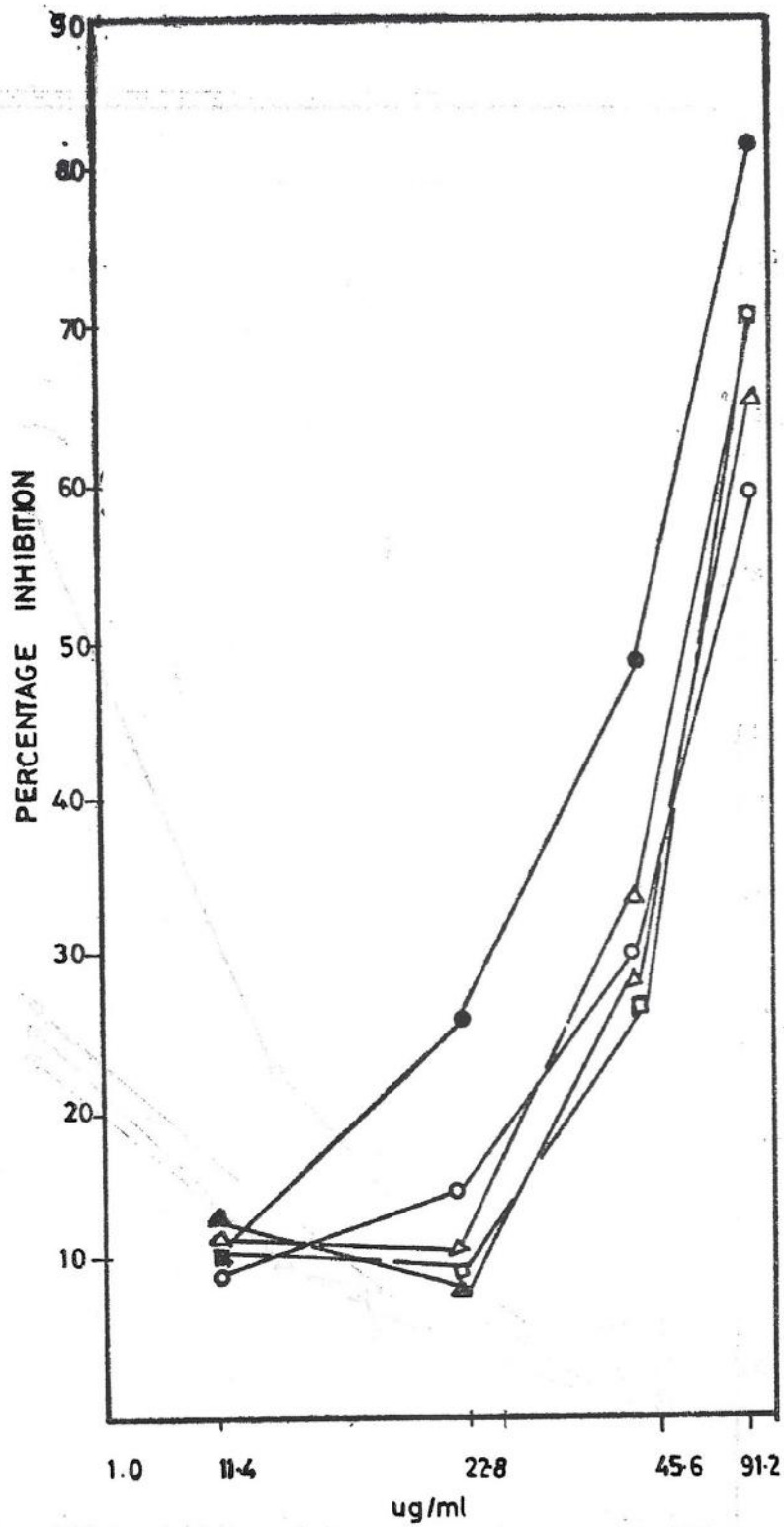


Fig. 5: The effect of o-methylflavanine on the twitch of the isolated guinea-pig ileum in response to coaxial electrical stimulation. Normal and cumulative dose-response curve

for o-methylflavanine.
 ●—● normal dose-response curve
 ○—○ first cumulative dose-response curve.
 △—△ second cumulative dose-

response curve
 □—□ third cumulative dose-response curve.
 ■—■ fourth cumulative dose-response curve.

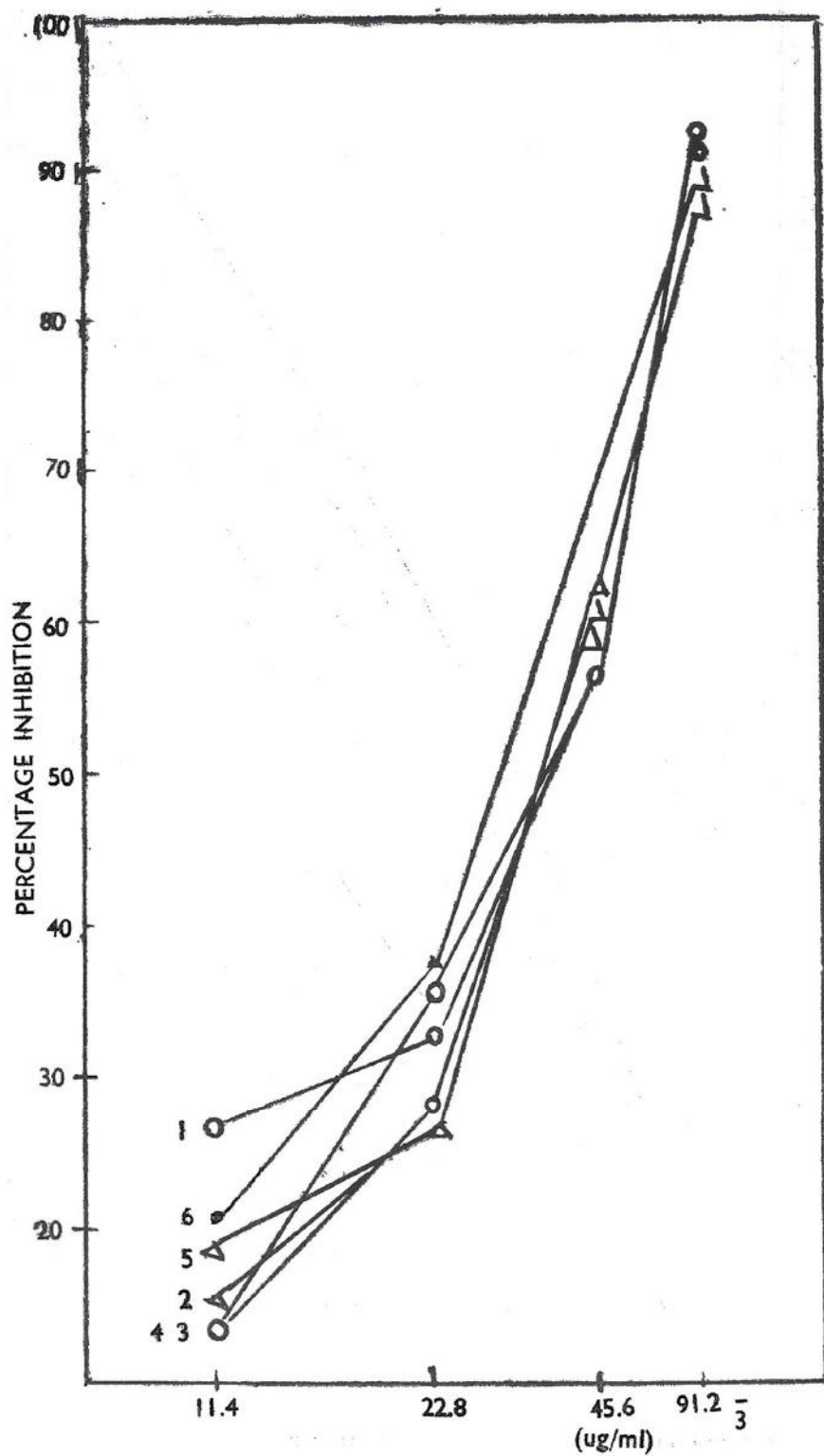


Fig. 6: The effect of o-methylflavinarine on the twitch of the isolated guinea-pig ileum in response to coaxial electrical stimulation. Dose response curves for o-methylflavinarine

constructed with 15 minutes intervals between doses, over a period of 6 hours.

○-○ first curve

- △-△ second curve
- third curve
- fourth curve
- △-△ fifth curve
- X-X sixth curve

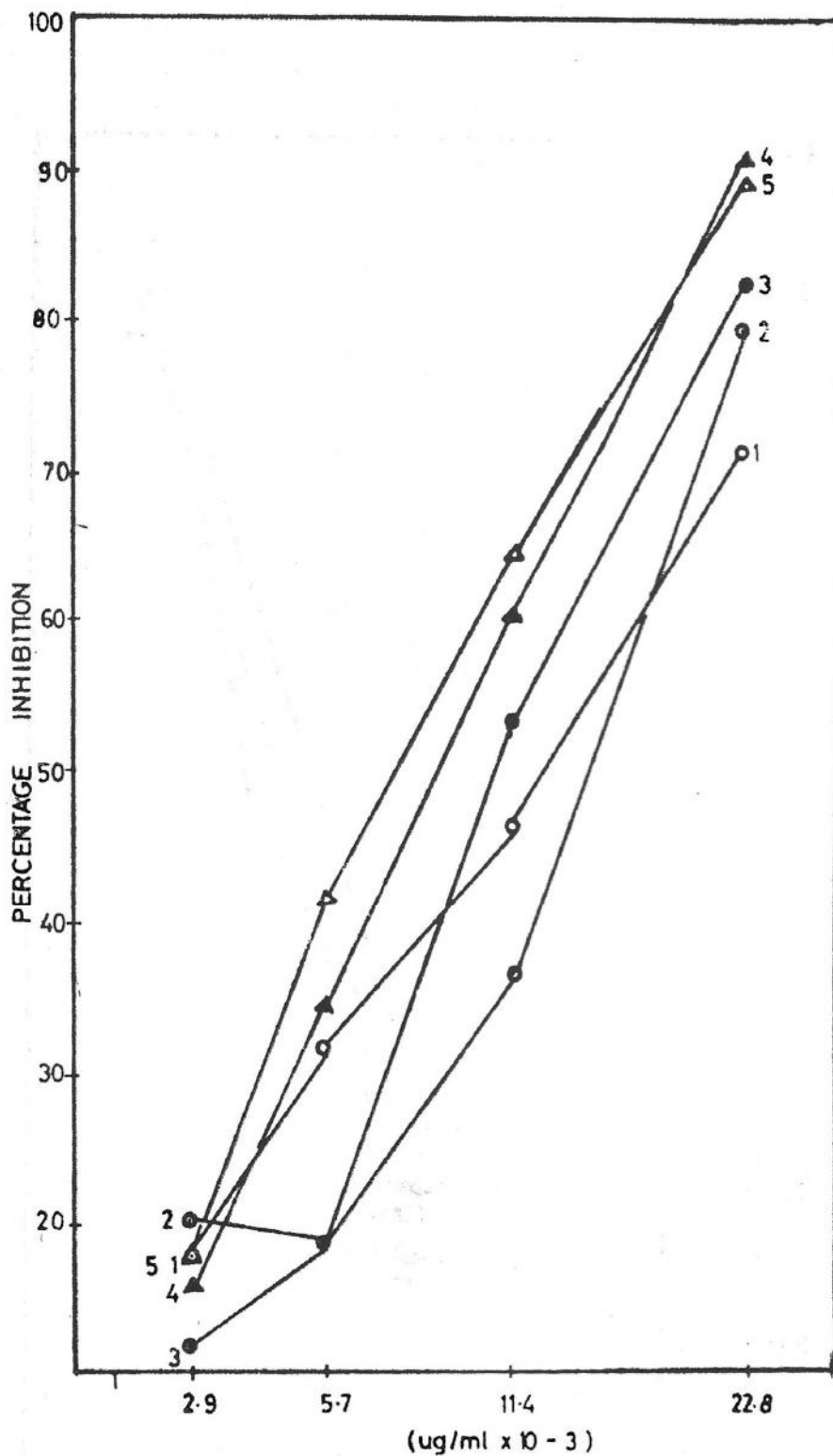


Fig. 7: The effect of morphine on the twitch of the isolated guinea-pig ileum in response to coaxial electrical stimulation. Dose response curves for

morphine constructed with 15 minutes intervals between doses over a period of 5 hours

○-○ first curve

○-○ second curve
 ●-● third curve
 ▲-▲ fourth curve.
 △-△ fifth curve

B. Peristaltic Reflex

Morphine and o-methylflavainantine inhibited both phases of the peristaltic contractions of the isolated guinea-pig ileum. Here again there were some observable differences between the effects of the two drugs. At comparatively low concentrations, morphine inhibited both phases of the reflex contractions equally. O-methylflavainantine on the other hand inhibited only the circular muscle contractions in the emptying phase and did not significantly affect the longitudinal muscle contractions in the preparatory phase. Only at higher doses was the latter inhibited. While nalorphine antagonised the inhibitory effect of morphine, it had no antagonist action against the inhibitory effect of o-methylflavainantine. (Fig. 2 and 3). On account of the above mentioned difference, it was not possible to correlate the effects on the peristaltic reflex with their analgesic potencies.

C. Coaxial Electrical Stimulation of the Guinea-Pig Ileum

Using the responses to coaxial electrical stimulation in the isolated guinea-pig ileum, the equi-active concentration of o-methylflavainantine was found to be about a thousand times that of morphine. Up to a point, there were both qualitative and quantitative similarities between morphine and o-methylflavainantine. The speed of onset of effect of both drugs was similar. Tachyphylaxis, however, developed more easily with morphine than with o-methylflavainantine as demonstrated in the cumulative dose-response experiments. (Fig. 4 and 5). Apart from the latter experiment in which slight tachyphylactic effect was observed for o-methylflavainantine, there was no demonstrable tachyphylactic effect and uniformly reproducible dose-response curves were obtained (Fig. 6 and 7). In this preparation also nalorphine antagonised the effects

of morphine but did not antagonise the effects of o-methylflavainantine.

Discussion

For many years the tail-flick and the hot-plate tests have been used to predict analgesic activity of drugs. There has been a high degree of correlation between activity in the laboratory and clinical effectiveness. However, with the discovery of nalorphine as a potent analgesic in man, this correlation broke down since nalorphine is inactive in most of these test procedures.

Although o-methylflavainantine has been shown to possess some analgesic activity, the non-dose dependence of this effect and the fact that nalorphine failed to antagonise this effect point to some fundamental difference in the mode of action of these two drugs. On the isolated guinea-pig ileum in response to coaxial stimulation, o-methylflavainantine seemed to possess almost pure agonistic action with little or no antagonist actions, as compared with morphine which was found to be a partial agonist with potent agonistic activity and some antagonist actions too.

On the peristaltic reflex one of the important features of antagonism by antagonists like morphine, which seem to indicate the manner in which it is brought about, is that concentrations which have been shown to antagonise morphine have little or no inhibitory effect on the reflex by themselves. The antagonists, therefore seem to elicit their morphine-antagonising action by slowly desensitizing the preparation of themselves and to morphine.

Granting that o-methylflavainantine is, as has been pointed out, a pure agonist with very high intrinsic activity, it does not seem likely that it will be easily antagonised as in the case of morphine. This being so, it is likely that although it may be acting on the same receptors as morphine, its effects as regards particularly its antagonism by nalor-

phine may not be the same as in the case of morphine, since o-methylflavainantine has been shown to have some properties which are absent in morphine. The other alternative to the argument is that it is acting on receptors quite different from those affected by morphine.

This is not to be unexpected since the structure of o-methylflavainantine is slightly different from the known morphinan structure.

In conclusion it should be said that if o-methylflavainantine can be confirmed as an analgesic and also proved to be clinically useful, it is hoped it will be a better analgesic compared with morphine, since it lacked the untoward effects of morphine like an easy development of tachyphylaxis.

Acknowledgements

The authors wish to thank Miss Victoria M. Sackey for assistance in separating the pure compound for this work and Mr Yaw Owusu-Ansah for typing the manuscript.

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HON. GENERAL SECRETARY'S REPORT

On the Activities of the Society for the Period August 1973 to August 1975 Presented to the 33rd Ghana Pharmaceutical Conference, State House, Accra, 28th-30th August, 1975

Introduction

Mr President, it is my bounden duty to present to this Conference a report of two years of work by the National Council beginning from August 1973 to August, 1975.

Mr President, two years ago we had on our Register names of some nice brothers of ours whom we most regretably lost through death.

Name	Regn. No.
1. Mr Smart Abbey ...	3
2. Mr K. Agyemang-Duah ...	335
3. Mr A. O. Ampah ...	385
4. Mr C. S. T. Caesar ...	118
5. Mr Seth Kwadwo Konadu	174
6. Mr J. A. Koranteng ...	167
7. Mr E. A. Osekre ...	246
8. Mr Nii Tetey Okuley ...	236
9. Mr I. Quartey Papafio ...	262
10. Mr S. E. D. Quaye-Foli	265

In each case, there was representation of the Society at the funeral celebrations and donations were made.

Mr President, fellow Pharmacists, may we all rise and stand to observe one minute silence in the memory of the dead. May the souls of the faithful departed rest in peace.

Membership of the Society

Two years ago the strength of the Society stood at 442; today the figure has gone up to 480. There has been some improvement in the pattern of Retention Fee payment following the firm stand Council took in February 1973. As of now, 57 members have not paid up for 1974. The amount involved is over ₵2,000.00

This Conference is informed that the same style will be employed to retrieve the arrears.

The National Council

The 2-year period was one in which the National Council experienced very trying moments. An unfortunate incident led to the Society and some members of the National Council acting on behalf of the Society being sued for libel by a member of the Society which case is still in court. With the determination and dedication to serve the Society, we worked closer and harder than before, and today we are happy to say that we have come to the end of our journey.

You will recall that two years ago, I was not the elected Hon. General Secretary even though I was elected by the 32nd Conference as a Council Member. Mr Ohene-Manu was then elected Hon. General Secretary but for reasons which were very personal and which by any human endeavour, were beyond his control he had no choice but to resign after being in office for only seven months (August 1973-March 1974). By the Constitution the then Assistant Hon. General Secretary, Mr J. Y. Binka became the Secretary. Council therefore elected me as the Assistant Hon. General Secretary.

Seven months later, Mr Binka also had to resign in October, 1974 due to pressure of work both local and international. And so I took over from him as the Hon. General Secretary.

In the same month of October, 1974, the then President, Mr V. K. Aidoo resigned and which resignation he confirmed by a letter to the Commissioner for Health. The Vice-President, Dr K. Sarpong then became the President under the constitution. The National Council immediately elected the Editor at that time, Mr Ago Simmonds as the Vice-President. Three members from outside the Council were also elected:— Mr Ohene-Manu, for his experience was made the Editor and Mr A. M. Ghansah, a Council Member and Mr J. Y. Binka was elected back as the Assistant General Secretary, which office he could hold irrespective of his heavy official assignment. People may not be aware of it and in fact they may not even appreciate the herculean job of the Editor but on behalf of the Council and on my own behalf, I would wish to put on record our most sincere gratitude to Mr Ohene-Manu for his tireless effort.

Within the last two years the National Council held 11 meetings on the following dates:

1. 21st July, 1973
- * 2. 28th August, 1973
3. 2nd March, 1974
4. 11th May, 1974
5. 6th July, 1974
6. 12th October, 1974
7. 11th January, 1975
8. 8th March, 1975
- * 9. 24th May, 1975
- * 10. 19th July, 1975
11. 28th August, 1975

* Emergency Meetings.



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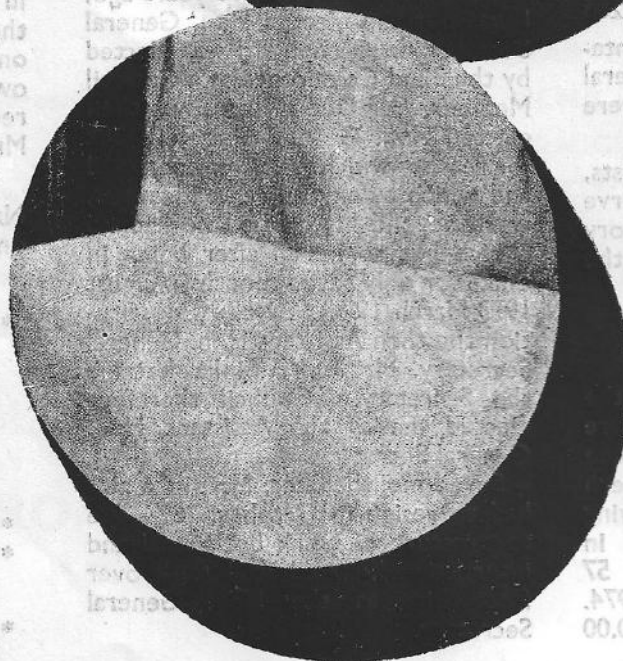
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On the whole, attendance was very high. Even though we offer to reimburse transport expenses, the Northern and Upper Regional Branch never bothered to respond to Council meeting notices.

We are also disappointed that the nominees of the Commissioner for Health never attended any of our meetings.

Standing Executive Committee

A total of four meetings were held on the following dates:

1. 27th August, 1973
2. 23rd November, 1974
3. 17th May, 1975
4. 31st July, 1975

Society's Representatives on Public Committees

In 1974, the National Council in response to requests from the Ministry of Health and the Pharmacy Board appointed two Society members to represent the Society. Mrs E. R. Gavu served on the Drugs Committee of the Ministry of Health and Mr D. Anim-Addo served on the Price Control of Drugs Committee of the Pharmacy Board.

Society Library

On the 25th of May, 1974, Council approved a report on the setting up of a Library at the National Headquarters as will be found in the "Matter for Consideration by Conference". On behalf of the National Council, I am appealing to all members of the Society to donate books to the library.

The Pharmaceutical Press

Again on the 25th of May, 1974, the National Council approved a report for the establishment of a Ghana Pharmaceutical Press. Such a press would go into commercial

printing as a source of income for the Society and also print the Society's Journal. This Conference will be asked to give effect by resolution to the implementation of this laudable idea.

The National Headquarters

Building Fund

It is a big shame that this subject which is so dear to our hearts has not been treated with the seriousness it deserves.

At our 32nd Conference in this same Conference Hall, we all resolved to pay up our contributions before this Conference and what has been the result? Only 31 of us have paid up in full.

The Ghana Pharmaceutical Journal

We have not done badly so far. But if we do not help by writing articles, the Editorial Board will be compelled to print the Journal twice a year or not print it at all. Let us admit that perhaps we are not used to writing articles but the question is if we do not begin to learn to do it, who else should keep our Journal going? It is a serious matter and we entreat all members to think about it.

Cape Coast Conference 1974

In August last year there was an annual general meeting at Cape Coast, at which draft proposals for a New Pharmacy Decree was thoroughly discussed. These proposals have been placed before Government and we are still anxiously awaiting Government's response.

Regional Branches

I must say that our Branches have either deliberately or through igno-

rance of their Secretaries, totally neglected their duty of sending reports of their activities regularly to the National Secretariat. The only branches that should be mentioned in despatches at this Conference are the Ashanti and Eastern Regions.

There is a lot of room for improvement and therefore we should expect to see more efforts being made in the coming months.

Conclusion

Mr President, the report given by me here reflects on what took place in the last two years. Under the conditions that prevailed while in office, I would say that the National Council has done its best.

But a word of caution here to all. A Council member holds a political office and therefore is susceptible to all the risks attendant to such positions. Let those here who aspire to serve the Society take note. The work is not at all easy, and it is very time and energy consuming—One must therefore examine oneself before accepting responsibility.

We appointed a Committee to plan this particular Conference and many of the Committee members were disappointing and yet their names would appear in the Journal as having done some good work.

The same goes for the Editorial Board and Branch Executive Committees.

However, to the very few who contributed in their small diverse ways to make it possible for this Conference to take off as it has, I say a big thank you on my own behalf and on behalf of the entire Society.

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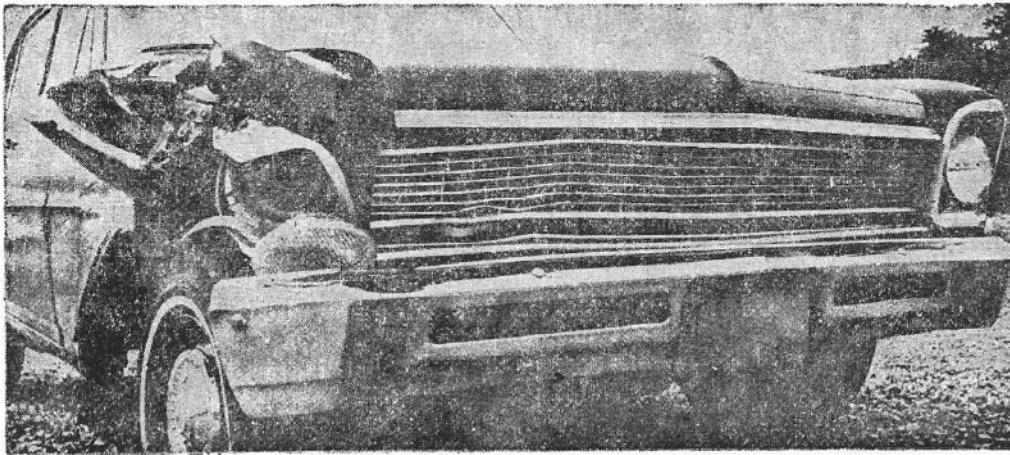
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SOCIETY NEWS

1. 1975 Annual Conference:

The 33rd Annual Conference of the Pharmaceutical Society was held at the State House from 28th - 30th August, 1975. There were about 500 participants. The theme of the Conference was "Pharmaceutical Industry and the National Economy."

Mr C. C. Stevens OBE, LLB., FPS., immediate past President of the Pharmaceutical Society of Great Britain delivered the key-note address. Delegates from the Anglo-phone West African countries also attended. Mr C. U. Efobi and Mr Olarogun, President and Secretary respectively represented the Pharmaceutical Society of Nigeria. Mrs C. B. Parker, President of the Pharmaceutical Society of Liberia represented her country and from the Sierra Leone Pharmaceutical Society came Mr Nic Palmer. Mr Efobi acted as returning officer for the National elections.

(a) *Annual Retention Fees* — A resolution for the increase of the Retention Fees from ₵30.00 to ₵50.00 was adopted unanimously with immediate effect pending of course, the approval of the Commissioner for Health.

(b) *Building Fund*: It was resolved that names of members who failed to pay their contributions to the Building Fund by the end of December, 1975 be struck off the register of Pharmacists.

2. 48th Annual Conference of the Pharmaceutical Society of Nigeria

The Hon. General Secretary joined

Mr Abraham Gyesie in Lagos to represent the Pharmaceutical Society of Ghana at the Ibadan Conference in Nigeria from the 12th to 15th November, 1975.

3. West African Pharmaceutical Union (WAPU)

A union of all West African Pharmaceutical Societies, which has already been mooted at two separate conferences in Nigeria and Ghana, was discussed in depth at the Ibadan Conference. A draft constitution having been accepted for study by the various West African Societies present, was distributed to all delegates for their study and comments by their respective Societies.

The delegates from Liberia, Sierra Leone and Nigeria were requested to contact the French-speaking West African Countries on this issue. A tentative decision was taken to convene a follow-up meeting of delegates in Liberia, Monrovia in the 2nd week in April, 1976. At the proposed Monrovia Conference, draft Constitution and Bye-Laws will be recommended for ratification by member-societies.

Until WAPU is well established and financially stable, the Working Committee held the opinion that the Secretariat be provisionally attached to one of the existing national Secretariats in West Africa.

4. Regional News

The Greater Accra Branch have elected in the meeting on 28th October, 1975, the following officers for the period 1975-77:

1. Capt. M. T. Quarcoo, *Chairman*
2. Mr E. K. Addae, *Vice-Chairman*
3. Mr S. A. Abbey, *Secretary*
4. Miss Constance Allotey, *Treasurer*
5. Mr M. T. Djan, *Member of Committee*

5. Retention Fees

The Secretariat wishes to remind members of Section 12 of the Pharmacy and Drugs Act (Act 64), 1961 which states:

"The Registrar shall cause a list of all pharmacists whose names appear in the register of pharmacist on the 31st December in each year to be published in the Gazette during the following January."

Furthermore, attention is drawn to Sections 17, 18 (i), (ii) and (iii) of the Professional Bodies Registration Decree (NRCD 143) which we quote below:

17. A professional body registered under this Decree shall submit to the Registrar before the 31st day of January in each year a return in respect of the preceding year which shall include:—
 - (a) a copy of its audited accounts;
 - (b) an up-to-date list of its members;
 - (c) any changes which have occurred in its constitution;
 - (d) such other information as the Registrar may require.
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admitted or enrolled as or otherwise accepted to be a member of any professional body registered under this Decree shall be entitled to be registered in the Register by the Registrar in respect of that professional body upon the production to the Registrar of a certificate issued by the said professional body that he is of good standing with that professional body.

(2) The registration of a person under subsection (1) of this section shall lapse at the end of each calendar year and shall upon the production to the Registrar of a certificate referred to in subsection (1) of this section, be renewed by the Registrar.

(3) No person shall practise any profession in respect of which a professional body has been registered

under this Decree unless he has been duly registered by the Registrar under this section.

As of the time of going to Press, 138 members had not fully settled their retention fees. They owe to the Society arrears of ₵5,724.45. Members in default should note that unless settlement of all arrears are made, Council would be obliged to delete their names from the list of Registered Pharmacists who are entitled to practice the profession.

THE PHARMACEUTICAL SOCIETY OF GHANA

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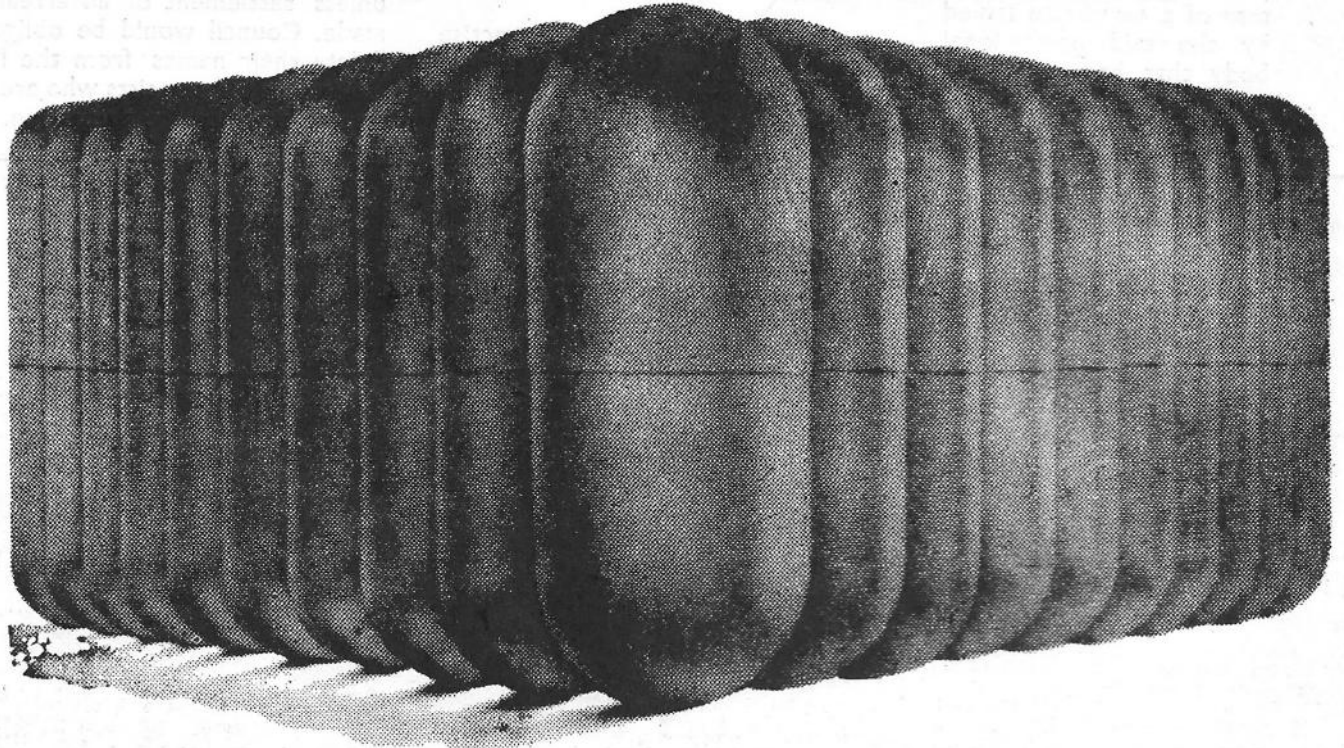
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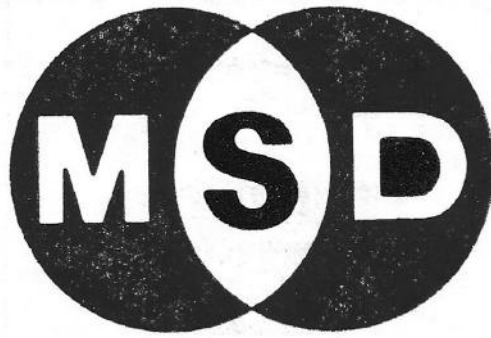
THE SOCIETY'S NEW PRESIDENT SWORN-IN

Mr Ago Simmonds, who was elected President of the Society at the August 1975 Conference for a two-year term was formally sworn-in at the Society's Headquarters in Accra on Saturday, 27th September, 1975.

The Swearing-in ceremony which preceded the first meeting of the new Council was performed by Mr B. E. D. Ofori-Atta, a fellow and a former President of the Society.

The picture below shows the President, Mr Simmonds with his chain of office donned and right-hand raised taking the oath of office administered by Mr Ofori-Atta (standing second from right) while Mr J. Pearce-Biney (first on the left) Vice-President, looks on.





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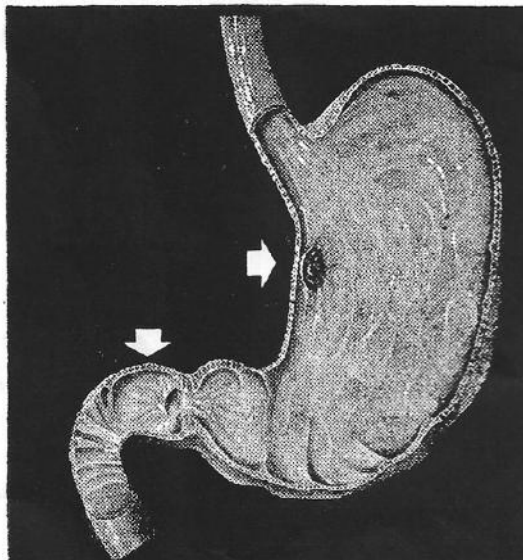
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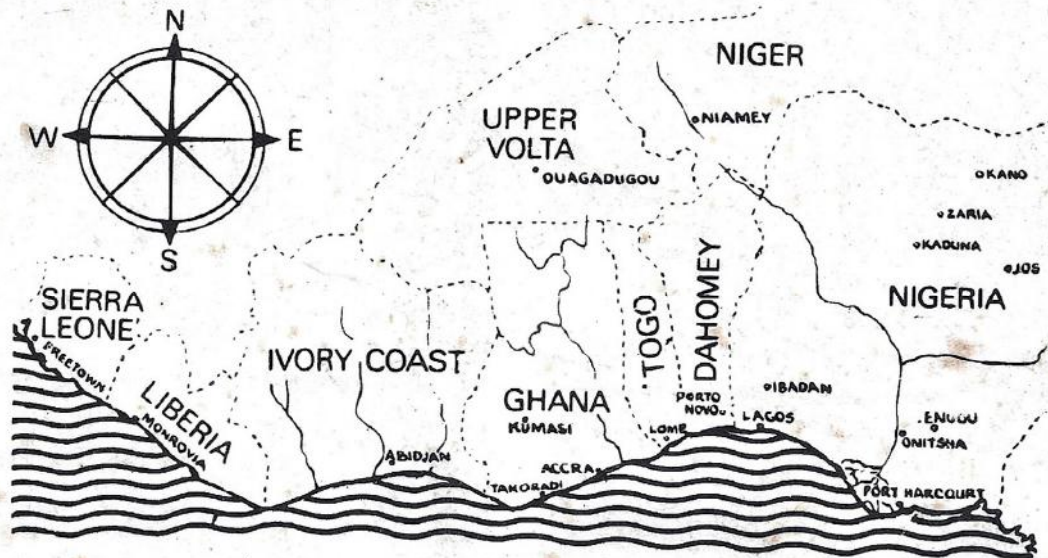
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