The cost of the Clinic is £25,000 a year. It provides primarily a service to the local population and, in passing, a very fine teaching service for medical students. The students see the living conditions of the lower socio-economic groups at their worst, and any seeds of social service are nurtured by the 2½ weeks' experience.

DISCUSSION

Common to all these schemes is the experience of seeing patients outside the general hospital in the more natural environment of the home and the community. Short as the period of such experience may be, it is sufficient to enable the student to picture his hospital patients in the environment to which they return on leaving hospital.

In schemes like those at Edinburgh and at the Alexandra Township students learn self-reliance and responsibility, in that they have to decide whether to ask for guidance in the management of patient situations or cope with such situations themselves.

They experience for the first time the traditional confidence which is placed by patients in the doctor. Some preen themselves in this reflected glory of an age-old profession, some pride themselves and some are humble and rather frightened by the trust and confidence that is placed in them. It is revealing to see that on occasions the patients place more confidence in their medical-student 'doctor' than in the consultant who happens to be called in to see their case.

The social conscience, even if present in the most embryonic form, is stimulated by experience of this type, particularly where the environment is as dramatically sub-economic as that of Alexandra Township.

The system of apprenticeship to general practitioners enables the student to see patients in their home environment, and to see a cross section of the work of the general practitioner. It lacks the facilities that permit the student to undertake responsibility, and to get to know people. From the general practitioner's point of view, the effect is the same as that which the student has upon the hospital teacher, putting him on his mettle and stimulating constant attention to his patients.

There are difficulties in the administration of the apprenticeship system. Personal incompatibilities between student and practitioner, which are bound to occur, have a greater impact on both student and teacher than in a hospital teaching scheme where the multiplicity of teachers smooths over the effects of individual incompatibilities. The geographic and multi-racial aspects of practice in South Africa add difficulties probably peculiar to South Africa.

By and large, the apprenticeship system would appear to be less effective and constructive than the health centre system.

'Attachment schemes' and 'day visit schemes' have very little to commend them as part of the medical curriculum. Voluntary attachments of this type during vacations may have an interest-stimulating effect.

In deciding whether to introduce a compulsory training scheme of one of the types described, a medical faculty should give due weight to the opinion held by many authorities that an adequately accommodated and staffed hospital out-patient department, with a social workers' service included, and with facilities for domiciliary visiting by students, provides experience equivalent or superior to any of the general-practice training schemes described.

The best way to provide experience equivalent to general practice or in general practice itself will depend on the local conditions that apply at each medical school.

BISMUTH EDTA COMPLEX

N. Sapeka, B.A., M.D., Ph.D.

Department of Physiology and Pharmacology, University of Cape Town

The water-soluble stable chelated compound, lead ethylenediamine tetraacetic acid (lead EDTA complex), has been shown experimentally to have value as a contrast medium for oral and parenteral administration.1, 2, 3 The less soluble lead calcium EDTA complex also produces good shadows of the alimentary canal, but by intravenous injection it does not produce shadows of the kidneys.4

It was considered desirable to investigate other metallic complexes of related type for possible radiographic use. Since certain bismuth compounds have been used in diagnostic radiology, it was of interest to study the bismuth complex of ethylenediamine tetraacetic acid. The atomic weight of bismuth is 209, as compared with that of lead, which is 207. The bismuth compounds used in the past proved toxic and have been superseded by other radiopaque compounds. Since the complexes formed by ethylenediamine tetraacetic acid with divalent and trivalent metals are stated to be generally stable, soluble, unhydrolysed compounds, in which the metal is bound in a form which is inactive, it was considered that this type of chelated bismuth compound might prove of more value. A supply of the bismuth complex was prepared by the Geigy Company, and some of its properties are reported here.

Experimental Results

Bismuth EDTA complex proved to be less soluble than the lead complexes previously investigated. The highest concentration prepared in warm Locke's solution was a 2.5% solution, and this was used throughout the investigation. The pH value of this solution was 2.18.

Radiography. The solution was administered orally through a stomach tube to adult albino rats, which were subsequently anaesthetized for radiography. A shadow of the gastro-intestinal tract was obtained, not of very
dense degree and provided 2 ml. or more of the solution was administered (Fig. 1).

The intravenous injection of 2 ml. of the solution failed to produce shadows of the renal calyces and pelves in rats.

Toxicity. No ill effects were observed clinically in rats to which 2 ml. doses were administered orally. Rats which received 1—2 ml. of the solution intravenously during anaesthesia for urographic studies made good recovery. Intrapertioneal injection of large doses (5 ml.) produced death within 12 hours of administration.

Intravenous injection of 0.25—1 ml. per kg. body-weight in anaesthetized cats produced depression of auricular and ventricular contractions and disturbances of conduction of longer or shorter duration, depending on the dose administered; there was some decrease in the blood pressure and marked fluctuations at the lower and the higher levels until the return to normal. The effects recurred with repeated doses. Atropine did not prevent the effects. Recovery ultimately occurred from each dose. The heart was not arrested. The changes, due to a direct action of the complex on the myocardium, were demonstrated on kymographic and electrocardio-

![Fig. 1. Radiographs of alimentary canal (rat) to show relative densities of solutions of contrast media 1 hour after administration. Left to right: lead EDTA 25% (1 ml.); lead calcium EDTA 15% (1 ml.); bismuth EDTA 2.5% (2 ml.); emulsion of barium sulphate 1 ml.](image)

![Fig. 2. Cat 4 kg. Effect of bismuth EDTA 2.5% (0.5 ml. per kg.) on auricular and ventricular contractions, intestinal volume, and blood pressure.](image)

![Fig. 3. Electrocardiographic changes produced in cats by bismuth EDTA complex 2.5% solution.](image)
unsatisfactory for urography. This is again due to the relatively low solubility of the compound and the low concentration and dose that can be injected. Lead calcium EDTA also failed in this respect presumably for the same reason. On the other hand the very soluble lead sodium EDTA proved satisfactory for intravenous urography. The bismuth complex produced marked changes in the heart action, but recovery occurred even when the kymographic and electrocardiographic records suggested profound changes in myocardial activity. The myocardial changes may be due to altered (intracellular) electrolyte ratio as suggested for lead EDTA complex.\textsuperscript{2, 3} They are presumably not due to the action of bismuth, which is apparently firmly chelated and unionized in the EDTA complex. It is interesting for comparison that intravenous injection of the usual soluble bismuth preparations leads to dangerous and even fatal (flocculation) shock due to the formation of insoluble compounds. The fall of blood pressure produced by such soluble bismuth salts generally recovers promptly; it is chiefly cardiac, due to disturbed conduction and heart block.\textsuperscript{5} The kidneys, liver and other organs may also be affected by these soluble bismuth salts. Such effects have not been studied as far as bismuth EDTA complex is concerned.

**SUMMARY**

Bismuth EDTA complex in 2.5% solution gives a shadow of the stomach and intestines. A larger dose must be administered than with the more soluble lead complexes and the shadow is not so dense. By intravenous injection it is not satisfactory for urography. It produces depression of the heart and striking electrocardiographic changes, from which recovery occurs.

The bismuth complex was supplied as ‘Sequestrol-bismuth complex NA’ by the Geigy Company Ltd., Rhodes, Middleton, Manchester, to whom grateful acknowledgment is made. Expenses were partly defrayed by a grant from the C. L. Herman Research Fund. Mr. J. W. Bates assisted in the investigation. Dr. B. Isaacsen recorded the electrocardiograms.

**REFERENCES**


**IN PARLIAMENT**

**THE REVIVED SUPPLEMENTARY HEALTH SERVICES BILL**

*From a Parliamentary Correspondent*

Among the Bills introduced at the outset of the current parliamentary session, the one of most direct interest to the medical profession is the revived Supplementary Health Services Bill, whose purpose is to provide for the registration and control of the activities of persons engaged in the performance of supplementary health services.\textsuperscript{4} For all practical purposes it is identical with the measure that was introduced in 1952 but was allowed to lapse in the following year.

This one is intended to be piloted in due course by the Minister of Health, Mr. J. F. Naude. In view of its important bearing on the livelihood of many persons and the wide interest and conflicting views to which it gave rise at its first publication the Bill has been referred to a Select Committee.

The classes of persons to whom it is contemplated the Act will apply are listed in a schedule to the Bill as follows: chiroprists, diagnostic radiographers, dietitians, food inspectors, health inspectors, hygiene officers, masseurs, medical technologists, occupational therapists, optometrists, orthopaedic mechanics and surgical appliance makers, optometrists, physiotherapists, radiographers and speech therapists.

However, the Bill provides in clause 2 (2) and (3) that the Governor-General may at any time, upon the recommendation of the South African Medical and Dental Council, by proclamation in the Government Gazette amend the schedule by including any class of persons engaged in the performance of supplementary health services: and that the Minister of Health may, whenever he deems it necessary, by notice in the Gazette, define the scope of the calling of any class of persons engaged in the performance of supplementary health services.

The Medical and Dental Council will maintain registers for persons engaged in the various classes of supplementary health services. It may hold, or arrange for, examinations for persons engaged in the various classes of supplementary health services. It may hold, or arrange for, examinations for any class for whom a register is required to be kept, and it may prescribe the certificates of competency, granted after examination, which will entitle any person to registration in the relevant class. If the Council prescribes a certificate issued by an examining authority outside the Union it must be satisfied that the standard of training indicated is not lower than that represented by a certificate granted by the Council and entitling the holder to be registered.

**LIMITED SELF-ADMINISTRATION**

Each class will have a form of limited self-administration through a committee. The Medical and Dental Council may make rules within the framework of the intended Act, provided it consults the committee or committees concerned and obtains the approval of the Minister of Health. These rules may prescribe the standard of general education required of candidates entering for examination for certificates of competency, the persons who may be admitted to such examinations, the courses of study and the training required and other such details.

The rules may also prescribe the conditions under which any class of persons to whom the Act applies may carry on their callings, the degrees, diplomas and certificates that may be registered under the Act, and the titles which may be used by any class of persons registered. The Bill is designed to take effect piecemeal for the various classes, the dates being fixed by proclamation in the Gazette. Twelve months' grace will then be allowed, but after that any unregistered person performing for gain any act pertaining to the calling of the relevant class or holding himself out to be entitled to perform any such act will be liable to a fine not exceeding £50.

Any person registered under the Medical, Dental and Pharmacy Act when this Bill takes effect will be deemed to be registered in terms of the new measure.

The committee for any class covered by the Bill will include one or two persons appointed by the Medical and Dental Council from among its members, but the Bill is so designed that committee members elected within the class will be in the majority. All the committee members will have to be European South African citizens.

Section 20 of the Bill ensures that no individual should become involved in any conflict between its terms and those of the Medical, Dental and Pharmacy Act. Once a class of persons to whom any provision of the Medical Act applies is proclaimed to be subject to the terms of the Supplementary Health Services Act, then the relevant provision in the Medical Act will cease to affect that class.