will still excite secretion in the bronchial mucous glands. The second type of expectorant is exemplified by potassium iodide. This drug is excreted partially by the bronchial mucous glands and in passing through them stimulates secretion. This certainly occurs in patients hypersensitive to iodide, but whether there is any such action in normal individuals is doubtful. Drugs in the third group of expectorants, of which tolu and benzoin are examples, are excreted by the bronchial mucous membrane, where by irritation they are said to excite secretion; drugs in this group also act as gastric irritants.

There is a tendency to divide expectorants into two groups—stimulant and sedative expectorants—although the only possible pharmacological effect of an expectorant is to promote secretion. At least three different interpretations of the term "stimulant expectorant" can be found in the literature: most commonly it means that the expectorant is one which induces a copious flow of secretion in the early "dry" stage of inflammation; it may also be applied to expectorants such as squill and ammonium carbonate, which have a secondary stimulating effect on the heart; and, thirdly, it is used to indicate that certain expectorants apparently stimulate repair of the bronchial mucous membrane. The term "sedative" is usually applied to a cough-mixture rather than to a single expectorant drug and indicates that the mixture contains both an expectorant to promote flow of secretion and a drug such as codeine or heroin to allay the patient's cough—a combination which does not sound completely logical. When the word "sedative" is applied to the expectorant drug itself it has no clear meaning, unless it be that the drug, in being excreted through the bronchial mucous membrane, at once stimulates the glands into activity and soothes the mucous membrane by some other property: but is there any evidence of such activity?

Often both stimulating and sedative expectorants are combined in the same mixture reminding one, perhaps not unjustly, of the tragi-comical classification of Polonius. Is there any real justification for the use of expectorants? Is it really justifiable to flood the system with gastric irritants in order to treat a cough? It will be argued that cough-mixtures are often effective: this is true, but is their action due to anything more than the sedative effect of chlorodyne, codeine, or heroin?

Secretion from the bronchial glands can be stimulated effectively by simpler means. Copious hot fluids by mouth will almost certainly be effective, with or without the addition of alkalis: the fluid and the heat are probably the essential constituents in the many recipes for gruel and also the varieties of alcoholic hot drinks. Inhalation of steam will also aid secretion, often very rapidly. It is doubtful if any combination of expectorant drugs can produce an effect comparable with that obtained by these two simple measures.

In many cases the mucous glands secrete abundantly, and the problem is to reduce secretion. The parasympathetic system controls secretion from the glands, so that atropine and belladonna, by antagonizing the parasympathetic, will tend to reduce secretion.

In an attempt to allay cough, then, we have seen that atropine or belladonna will allay spasm and dry up secretions if excessive: a painful, dry hacking cough can be soothed by steam inhalations, and these, along with copious hot drinks, will also help to promote secretion if this is thought necessary. In many cases cough can be relieved along these lines, but when it is specially persistent or distressing codeine should be given. Syrupus codeinae phosphatis *B.P.C.* contains $\frac{1}{4}$ gr. (16 mg.) of codeine phosphate in 1 dr. (4 ml.), and to an adult 2 dr. (8 ml.) three times a day for several days is not excessive—the *B.P.* dose of codeine is $\frac{1}{4}$ to 1 gr. (11 to 65 mg.). Small doses are not effective. There is the theoretical objection that cough should not be repressed when there are secretions to

be coughed up, but in a disease such as acute bronchitis there is no danger, except in very debilitated patients and young children. Linctus codeinae *B.P.C.* contains $\frac{1}{4}$ gr. (8 mg.) of codeine phosphate in 1 dr. (4 ml.). It is really the syrup of codeine diluted with the syrups of wild cherry and tolu, and there is no advantage in its use. The pill already mentioned, containing codeine phosphate, $\frac{1}{2}$ gr. (32 mg.), and extract of belladonna, $\frac{1}{4}$ gr. (16 mg.), brings great relief.

Specific Chemotherapy

It has been pointed out that a variety of organisms may be isolated from cases of acute bronchitis—pneumococci, streptococci, *Micrococcus catarrhalis*, and so on—and it cannot be claimed that any are responsible for the condition. Moreover, in a disease in which acute symptoms tend to subside so quickly there is little chance of bacteriological investigation, so that any treatment aimed at a causal organism must be a chance affair. Nevertheless the use of sulphonamides or penicillin often seems to produce good results, although it must be emphasized that improvement may be due to the general treatment of the patient. In children of school age who suffer from recurrent attacks sulphonamides do sometimes abort the attack if given at the onset; their repeated use requires caution.

Penicillin is best given by inhalation if possible: an electric atomizer is the ideal method, but there are available several small plastic inhalers which are satisfactory; these are usually charged with 100,000 units of penicillin, as powder in some and as liquid in others, and this treatment is carried out every three or four hours, one charge being enough for three or four treatments. If injections are given, then the best preparation is a mixture of plain penicillin and procaine penicillin, and injections need be given only once every 12 hours. There is no indication for any of the newer antibiotics, and it must be emphasized that the use of any anti-infective agent is entirely empirical. In most cases confinement to bed and simple methods of treatment will prove effective.

MEDICAL FIELD UNITS, NIGERIA: THEIR FUNCTIONS AND WORK

BY

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This article may not contribute any new knowledge to medicine, but it is intended to give a picture of a relatively new field in the work of the Colonial Medical Service. In Nigeria a system of hospitals, dispensaries, and their ancillary services has been established and is being expanded in the larger cities and towns, and a considerable amount of preventive work has also been accomplished, again largely in the cities and towns. In the rural areas, which are vast and have a population of some 20,000,000, much remains to be done. Until recently the staff available consisted of Government or native administration dispensary attendants and sanitary inspectors, who were given what supervision was possible by a medical officer already more or less fully occupied with the curative and preventive work at his headquarters station. The sole exception was the

Sleeping Sickness Service—a Government service fully described by Lester (1938), Harding (1940), and McLetchie (1948)—which, by a programme of mass surveys, repeat surveys, dispensary treatment, chemoprophylaxis, and anti-tsetse clearance, has in the last 20 years brought human trypanosomiasis under control. This service, although it undertook a variety of duties in rural areas, confined its activities to the endemic sleeping-sickness areas in the central northern provinces.

In 1946, as part of the 10-year development plan for Nigeria, a new rural service was formed to deal with major endemic and epidemic diseases on similar lines. Originally called the "epidemic teams," the new service is now known as the Medical Field Units, and is administered jointly with the older Sleeping Sickness Service. The intention was to have 18 provincial units, one for each of the larger provinces. Each field unit should have a medical officer, a superintendent (ex-R.A.M.C.), 18 to 24 dressers, and drivers, clerks, messengers, and other junior staff.

At present eight units have been trained and six are at work. The field of operations covers almost every type of country and climate of tropical Africa. In the extreme north, the Sokoto and Bornu units may work in semi-desert conditions; parts of Bornu still have excellent shooting. The Plateau Province unit operates partly on the tin-bearing high plateau with its rocky outcrops, and partly beyond the escarpments in the foothills, where sleeping sickness and resettlement schemes are major problems. In the so-called "Middle Belt," farther south, the Benue unit works in undulating well-watered orchard country; its work is described below. To the west a unit has been established in Abeokuta Province, north of Lagos, and to the east the Cameroons unit alternates between the coastal rain forests and the tsetse-free highlands of Bamenda, where fine herds of cattle are pastured. The two new units will go to Warri and to Rivers Provinces in the Niger delta to lead an amphibious life.

A primary duty of the units is, as their original title suggested, to assist local staff in controlling epidemics. Since 1946 they have been called on to deal with yellow fever, relapsing fever, smallpox, and cerebrospinal fever. In 1949 and 1950 a total of 100,000 cases of cerebrospinal fever were reported, and in the former year the Benue unit was transferred a distance of 800 miles to assist in the emergency. Transport is mainly in the medical officer's car, with lorries and kit-car for staff and equipment, but may be by rail, river, cycle, horse, or on foot. The last method, if an early start is made and the trek completed by moonlight or in early morning, is probably the most enjoyable for those who find delight in the countryside, which abounds in interest to the nature lover.

The other principal function of the units is to assess the incidence and relative importance of diseases in the rural population and to devise measures against those which are causing most damage to the public health. As in most parts even of the civilized world, our knowledge of disease incidence is faulty, and is based mainly on hospital in-patient and out-patient attendances. True incidence can be gauged only by examination of the whole population or of an adequate sample; such a survey is described here. This information is of first importance to the economics of a country 95% of whose population are peasant farmers producing groundnuts, palm oil, cocoa, beniseed, etc., on which the wealth of the country depends.

Survey Organization

This is best described by outlining the background of a survey done by the Benue unit during the 1950 dry season. The administrative district of Chinkai was chosen by consultation with local administrative officers. The aims of the survey were to examine quickly for sleeping sickness, scabies, ulcers, yaws, and other easily diagnosed conditions every man, woman, and child in the district, and, at the same time, to make a more detailed examination of about 300 people living in two hamlets near Chinkai town. In obtaining attendances a variety of local native administration officials assisted—district head, Emir's representative, tax census scribe, N.A. policemen, and village and hamlet heads. No previous full survey had been made, but surveys for sleeping sickness had been done. Attendance for sleeping sickness examination is obligatory, but for other work tact and persuasion have to be great to ensure full voluntary co-operation.

Chinkai district occupies a triangle of land bordered on the north by the Benue River, the main tributary of the Niger. Chinkai town is on the river at least three days' trek from divisional headquarters at Wukari. The obvious supply route was by river in canoes and poling barge, downstream some 30 miles from Ibi, the "port" for Wukari. The unit worked in two sections. "A" section had been trained by the medical officer in the technique of detailed surveys; "B" section, under the superintendent, did general surveys.

As usual there was no building suitable for survey work, and a temporary examination shelter of grass mats and poles was erected to the units' standard pattern (Fig. 1). For dry-season work a flimsy flat roof is sufficient; during the rains the roof is gabled and thatched. At the entrance, people assemble household by household and hamlet by hamlet according to their tribal groupings, and when called by the census scribe enter waiting shade-shelter No. 1, which has a shade roof only and no walls. The unit's scribe then records in his register each person by name, household, age, and sex, and for women of child-bearing age data such as number of pregnancies, number of children alive, etc. The medical officer then takes over. He examines each person for signs of vitamin deficiency, trypanosomiasis, yaws, scabies, leprosy, ulcers, eye diseases, evidence of previous vaccination, etc. He gives each a card with directions for laboratory investigations and treatment, if required. Purdah women, of whom there were a few at Chinkai, the wives of the more prosperous Moslem traders, were examined in privacy behind a spiralled mat screen; all adult males were examined for venereal disease behind a similar screen. After seeing the medical officer the people wait in a second waiting-room, where vaccination and revaccination are done.

The second waiting-room leads to the largest shelter, over 40 ft. (12.2 metres) long. This is divided into laboratory and treatment sections, the latter subdivided into a "clean" injection section and a "dirty" dressing and general section. Laboratory investigations are necessarily restricted to what is practicable under field conditions. Dust, heat, and flies can prove trying to the temper, to aseptic technique, and to the preparation of specimens.

At a detailed survey the routine investigations made on all attending are: wet blood film, 10 minutes; stained thick film (Field's or Giemsa), 10 minutes; stool; urine—tested for albuminuria; if positive the specimen is

FIG. 1.—Lay-out of temporary examination shelter.

FIG. 2.—Provinces in Nigeria covered by medical field units. *Note.*—Nigeria in area is greater than France, Italy, and Belgium combined; in population greater than populations of Canada, Australia, and New Zealand combined.

centrifuged and examined for red cells and schistosome ova; haemoglobin—the Sahli method is now replacing the Talquist.

In addition, in those with suspected glands, skin lesions, signs, or symptoms, gland juice is examined for trypanosomes, skin snips and nasal smears for leprosy, sputum for tuberculosis, and urethral smears for gonococci. Red and white cell counts, erythrocyte sedimentation rates, I_{de} tests, and examination of cerebrospinal fluid may also be done. On a busy day six microscopes may be manned continuously.

In the therapy section standardized treatment is given for trypanosomiasis, yaws, schistosomiasis, scabies, etc.,

and a good deal of general medical work is done. Dental extraction is a popular sideline, and one soon realizes what a fallacy it is that the African has good teeth. Apart from the "surveyees" for the day, there is usually an out-patient clinic of "strangers," mostly canoemen and traders, and of villagers from areas not yet surveyed. The cases seen at these out-patient gatherings are most varied and interesting.

At the back of the clearing in which stands the examination shelters is a row of in-patient huts, where the seriously ill are treated. Some are on sulphonamides for meningitis or pneumonia—the latter being surprisingly common in the cold dry season—others on penicillin for osteomyelitis; while at Chinkai we had a series of cases of acute amoebic dysentery which required emetine under supervision. One of the huts is generally reserved for minor operations, performed on a tubular steel stretcher raised on two boxes; this makes quite a useful operating table.

At the conclusion of a survey two reliable dressers remain behind to complete the courses of treatment. These are made as short as possible to reduce absenteeism. The intensive one-day "neo-halarsine" or "mapharside" treatment of yaws is efficient and non-toxic; trial is being made of "miracil-D" in schistosomiasis; daily pentamidine is replacing suramin ("antrypol") in trypanosomiasis, although all cases still get tryparsamide; scabies is effectively dealt with by "tetmosol" in palm oil.

Before starting a survey a varying amount of propaganda and explanation is required. The

medical officer or superintendent makes a preliminary propaganda visit to meet village heads and elders. During the survey specimens of vectors, such as tsetse fly, lice, and snails, and magnified coloured pictures of trypanosomes, itch mites, filaria, etc., are shown and explained; chiefs and elders are shown the larger parasites, filaria, and schistosome miracidia under the microscope; and a good deal of simple health propaganda is done. In the near future a section of the unit will be stationed in a special development area after an intensive survey, and an attempt will be made to control the more common and deadly endemic diseases in this limited area.

The Chinkai Survey Findings

At the special survey done by the medical officer, 271 people from a Jukun fishing village and from a Tiv farming community, two distinct cultures and tribes, were examined. The diseases in which they showed a possibly significant difference in incidence were:

Disease	Jukuns %	Tiv %
Trypanosomiasis	2	4.7
Malaria, spleen rate	57	29
" average enlarged spleen	1.75	1.5
Yaws	8	16
Gonorrhoea, adult males	—	7
Schistosomiasis	1.1	39
Ankylostomiasis	4.3	29
Filariasis	6.4	29.5
Avitaminosis	Low	Moderate
Anaemia	22	8.6

Other conditions noted were leprosy (0.5%), skin diseases (2.5%), ascariasis (2.6%), previous smallpox (14.4%), and goitre (0.5%).

At the general survey of the district 3,638 people were examined. Figures which are reasonably comparable because of their straightforward diagnosis are:

	Special Survey (271)	Chinkai District (3,638)
Trypanosomiasis	3.4	7
Yaws	12.3	8.8
Gonorrhoea, adult males	4.0	3.2
Ulcers	Nil	0.3
Skin diseases	2.5	3.8
Eye diseases	Nil	1.7
Previous smallpox	14.4	11.9
" vaccination	11.9	6.9

In 1937, 13% of the population of Chinkai had trypanosomiasis. By 1944 the incidence had been reduced to 4.4% and is now 1.7%. The principal public health problems throughout the district are malaria, trypanosomiasis, leprosy, yaws, venereal diseases, and smallpox, with schistosomiasis probably a local problem.

Summary

The functions and the work of the Nigerian Medical Field Units are described, and some of the findings of a field survey of Chinkai District, in Benue Province, are given.

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Dr. J. Greenwood Wilson, medical officer of health for Cardiff, writing in the December 29 issue of the *Municipal Journal*, comments on the cautious start made with B.C.G. vaccination in Britain. Only selected tuberculosis contacts are inoculated, and every child so treated must have been Mantoux tested, and must be away from all risk of tuberculous infection for the six weeks before inoculation and the six weeks after. For this reason local authorities have been very busy staffing and opening the necessary residential hostels where the children can be kept for twelve weeks. But, although the B.C.G. scheme is their responsibility to plan and operate, the vaccine is kept and distributed by the hospital boards, and almost any medical man can obtain some and give it, without even being obliged to keep any records. He believes it would be much better if B.C.G. were made wholly the responsibility of one body to administer and record, as is at present the case with immunization against diphtheria.

Reports of Societies

LIVERPOOL MEDICAL INSTITUTION

At an ordinary meeting of the Liverpool Medical Institution held on November 30, 1950, with the president, Dr. DAVID JOHNSTON, in the chair, Mr. R. MARCUS read a paper on "Tracer and Therapeutic Studies with Radio-isotopes."

Mr. MARCUS discussed the application of nuclear physics in medical and biological research. He described tracer and therapeutic studies done with Professor Rotblat and in collaboration with the staff of the Radium Institute and clinicians in Liverpool.

Radio-isotopes in Malignant Disease

The first application was to find a reliable test for doubtful superficial carcinomata of the breast. Diagnostic experiments were made after injecting 100 microcuries of ^{52}P intravenously. The method consisted in measuring simultaneously the activity over the carcinomatous breast and of a corresponding area in the normal breast by means of two Geiger-Müller counters. In most of the cases investigated the uptake over the carcinoma was found to be much faster and followed by a faster rate of decay than on the normal side. It was established, however, that this type of uptake was not specific for carcinoma and was in some cases due to increased vascularity.

The second application was in the study of multiple melanomatosis. The results showed that radioactive copper (^{64}Cu) and di-iodotyrosine labelled with ^{131}I were not preferentially taken up by the tumours. But radioactive phosphorus (^{32}P) was taken up in sufficient amounts to justify treatment with this isotope. A case treated with 20 millieuries of ^{32}P was reported. Remarkably few changes were noted in the blood, liver, kidneys, and bone marrow which could be directly attributed to internal radiation.

Radioactive Iodine and Thyrotoxicosis

The third application was in the diagnosis of doubtful cases of thyrotoxicosis, especially in cases following partial thyroidectomy. Out of 40 cases studied 21 fell into this category. It was possible in all but one case to establish a diagnosis, which was confirmed by the results of therapy or further observations made on the patient. The method adopted was to estimate the uptake in the thyroid, the urinary excretion, and changes in the ^{131}I content of the blood. An attempt was made to devise a simple method which would give a reliable result within an hour. So far this had not been accomplished, but the investigations were proceeding. Nor had it proved possible to confirm the reliability of easy methods published recently from various other sources.

^{131}I was shown to be of value in locating the position and size of functioning thyroid tissue in abnormal positions. In the post-operative cases investigated, recurrences were shown to occur in the pyramidal lobe, lateral lobes, in front and behind the trachea, and in the mediastinum.

Three cases of thyrotoxicosis each treated with 2 millieuries of ^{131}I were investigated. The first patient had recurrent thyrotoxicosis many years after thyroidectomy. Two months after treatment, tracer experiments were repeated. The thyroid tissue had shrunk and the urinary excretion had increased, showing that the thyroid function had been beneficially affected. The findings corresponded to the clinical improvement. The second patient had a toxic adenoma which caused cardiac failure. She did not tolerate thiouracil. ^{131}I was given pre-operatively with good effect. The third patient also had cardiac failure due to thyrotoxicosis. She too had benefited from treatment with ^{131}I , although it was too early to judge if the effect would be permanent.