

For a fortnight in hospital his temperature swung between 97° and 102°. Ova of *Schistosoma Mansoni* were detected in the stools in repeated examinations. No other parasite or pathogenic organisms were discovered. The urine did not contain any ova of *Schistosoma*. A course of intramuscular injections of Fouadin was begun. Within two days the blood ceased in the stool, though still watery and frequent. On the sixth day ulcers were still visible through the sigmoidoscope. A weak silver nitrate rectal irrigation increased the irritation and was not repeated. Injections of Fouadin alone were continued. On April 6 he was discharged free of symptoms, to report in a month for a check-up.

At the W.N.L.A. Hospital, where a large number of cases are treated annually, tartar emetic intravenously has been abandoned for some years and Fouadin is used exclusively with good results. Mild infections clear up with the one course of ten injections. The severe infections require more, generally a repeat course, or two at a later date.

TICK FEVER AND TICK-BITE FEVER.

Tick fever or relapsing fever, caused by the *Spirillum* of Obermeier, I have not come across in the Union of South Africa. I have seen some cases from Rhodesia and saw many in East Africa during the campaign.

TICK-BITE FEVER was dealt with thoroughly by Dr. Pijper in the *South African Medical Journal* in 1934.

The first case of this disease I encountered was in 1913, in Melville, a suburb of Johannesburg. I was called in to see an elderly female who had been ill some days with a splitting headache, a continued temperature, furred tongue and pains and aches in every part of the body.

There was a black slough on the abdominal wall just below the umbilicus, the size of a threepenny-bit. I was referred to a wineglass on the mantelshelf in which was a large grey tick full of blood. This she said she had pulled off her abdomen over a week before—all tests were negative for enteric. In the second week her temperature subsided and she made a slow convalescence to normal health without any complications.

Since then I can recall three other cases in people who contracted the infection apparently in Johannesburg; one only of these might have been infected by grass ticks in the Northern Suburbs of Johannesburg.

In April of this year a case provisionally diagnosed as enteric was placed in a nursing home under my care from the Northern Transvaal. He had farmed in that district for 15 years, and had often been bitten by ticks. He had headache, a rash, a temperature and a typical tick-bite slough on the abdominal wall.

In the second week his temperature subsided. It was tick-bite fever.

It is rather extraordinary that it should have taken him 15 years to pick up an infected tick in one of the most infected areas in South Africa.

The Medicinal Springs of South Africa.

By M. RINDE,

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We have in our medicinal springs a valuable potential national asset, and all we are doing at present is to advertise it without endeavouring to develop it. This process of development calls for the joint efforts of the medical man, the chemist, the physicist and the geologist. The chemist's function is to determine the chemical constituents of the medicinal spring. In addition to the chemical constituents, radioactivity and certain physical constants of the water, such as degree of ionization, hydrogen ion concentration and colloidal properties, are now recognized as being of importance. The physiological effect and the therapeutic value cannot be determined entirely from its chemical and physical data. These data may serve as an indication, but only prolonged clinical records reliably establish the effect of the water for various ailments. Some springs undergo periodical alterations in composition or temperature—they may become diluted near the eye by waters of a different composition, etc. The function of the geologist is to explain these changes, to find means for their prevention, if possible, such as tapping the water below the surface, and generally to establish a connection between the composition of the water and the geological formation.

It is hardly necessary to point out that waters vary largely in their composition. Practically all medicinal springs are very complex mixtures of salts, and they are usually classified in accordance with the predominating constituents. The main groups which are distinguished are:—

(1) *Indifferent Springs*: These are defined as such containing less than a gram of dissolved solid constituents and not more than a gram of carbon dioxide per litre. They are classed as "cold" if they have a temperature below 20° C., "warm" if they have a temperature above 20°. The Germans call this latter class "Wildbaeder." Examples of this type in South Africa are the Brandvlei at Worcester, with the remarkable temperature of 63° C.; the spring at Goudini of 40° C.; the hot baths at Olifants River, near Clanwilliam, of about 42°, and Montagu of about 45°.

(2) *Carbonated Waters*, rich in carbon dioxide and poor in solid constituents. This type is represented here by Van Riebeek water and is used mainly as a table water.

(3) *Earthy Waters* are defined as such containing at least a gram of solid constituents per litre, among which bicarbonates of calcium and magnesium predominate. None of the South African waters answer entirely to this definition.

(4) *Alkaline Waters* contain a minimum of a gram of solid constituents per litre, among which

carbonate or hydrocarbonate ions predominate. The only springs which approximate to this type in South Africa are at Warmbaths, Transvaal. Some very well-known Continental springs belong to this type—for instance, Karlsbad and Vichy.

(5) *The South African Salt Springs* are not comparable to any of the well-known Central European salt springs. The peculiarity of these is their high sodium chloride content, and the presence in most of them of appreciable quantities of potassium. In view of the widespread occurrence of saltpans in the North-Eastern Cape and parts of the O.F.S. and Transvaal, the almost entire absence of salt springs is rather striking. Many of the well-known German spas belong to the class of salt springs—Hartzburg, Homburg v. d. Hoehe, Kissingen, Kreuznach, Oeynhausen, Reichenhall and Wiesbaden. Florisbad, near Brandfort, and the two other springs in the O.F.S., Winburg and Dealesville, might be classed as salt springs, but their sodium chloride content is extremely low.

(6) *Bitter Waters* contain in one kilogram of the water more than one gram of dissolved solid constituents, among the anions of which the sulphate ions predominate. There are no pronounced South African springs of this type: Friedrichshall in Germany belongs to this group.

(7) *Chalybeate Springs* are in general defined as such which contain more than 0.010 gram of ferro or ferri ion in a kilogram of water and the efficacy of which is principally attributed to their iron content. The anion may be either hydrocarbonate or less frequently sulphate. Examples of the former type are Caledon and Zwartkops, both of which are characterized by their unusually high temperature. Chalybeate springs in other parts of the world are as a rule cold. We possess an iron sulphate spring in Balmoral, near Port Elizabeth.

(8) *Sulphur Springs* are such as contain hydro-sulphide irons and/or sulphuretted hydrogen. There are a large number of springs of this type: several of them enjoy a big reputation, particularly Aliwal North, Malmesbury and Machadodorp.

Very often springs partake of the characteristics of two or more groups, so that they are classified as alkaline-muriatic, or alkaline-chalybeate, or they may even belong to three groups.

Even though it were possible to determine the therapeutic value on the basis of the chemical composition, the problem becomes unduly complicated when one considers the complexity of these springs and their numerous constituents, which often influence one another in such a way that the effect can only be determined by prolonged clinical trials.

METHODS OF RECORDING THE CHEMICAL COMPOSITION.

It has been customary in the past in this country to express the composition of waters as salines in grains per gallon. Apart from the fact that the units grains and gallons are used only in a small part

of the world, the system entails an entirely arbitrary method of combining acid and basic constituents. When the water contains, as it often does, six bases and three or four acids, the number of possible combinations is clearly almost unlimited, and the method of combination has in the past been largely determined by the fancy of the analyst.

In very dilute aqueous solution salts are to all intents and purposes completely dissociated, and it has gradually become customary in most countries to express the constituents in the form in which they are actually present, namely, as ions. According to the international standard measurements, which have been put forward by a special committee of the International Society of Medical Hydrology and adopted by a large number of countries, these figures should be expressed in all cases as ions in milligrams per kilogram, or, what amounts to the same thing, in parts per million. In addition, concentration of ions and the sum of the ions is expressed in milligram normality. This is the concentration of the ions or salines in terms of the well-known chemical symbol $\frac{N}{1000}$, a conception with which every analyst is familiar.

It is clearly desirable that there should be an international standard, so that the medical man in any part of the world should be able to understand and interpret analyses referring to a spring anywhere, and that there should be no ambiguity about these figures. For instance, a medical man in South Africa may have occasion to send his patients to English, German or Czechoslovakian spas like Bath, Nauheim or Karlsbad, and he may desire to familiarize himself with the composition of the spring before giving a final opinion.

The National Society of Medical Hydrology mentioned above was founded in 1921 to encourage in all countries the clinical and experimental study of medical hydrology and form an international union of scientific workers in this branch of medicine, and to make better known the scope and nature of treatment by waters and baths in the prevention and cure of disease.

The usual saline constituents of mineral waters are the chlorides, bromides, iodides, sulphates, phosphates, carbonates and bicarbonates of sodium, potassium, lithium, calcium, magnesium, barium, strontium, iron and manganese, and in addition boric and silicic acids. Some of these saline constituents are present only in traces, but considerable significance is now attached to these very small quantities. These traces are apt to escape detection in a routine chemical analysis, and it is therefore now customary to supplement the chemical investigation by a spectroscopic analysis, using a quartz spectrograph, and exploring both the visible and the ultraviolet regions of the spectrum. Many of the constituent elements which occur in waters in traces only are constant constituents of the animal body—copper, zinc, silicon, arsenic, sulphur, fluorine, bromine, iodine, manganese and boron—but their function is in

most cases not, or imperfectly, understood. The more common gaseous constituents of mineral waters are carbon dioxide, sulphuretted hydrogen, nitrogen, marsh gas, hydrogen, and occasionally argon, helium and radium emanation.

These gases are partly dissolved, but the bulk bubbles up freely with and through the water. The healing effects of some waters are due to the sulphuretted hydrogen or carbon dioxide which they contain. A gas found in traces in many waters is radium emanation, also known as radon. To the presence of this gas, both in the water and in the air in contact with it, therapeutic virtues are ascribed, although its precise effect is still shrouded in mystery. The element radium is constantly undergoing a process of spontaneous disintegration, leading in the first instance to the formation of radon and helium gas. It is assumed that radium is very widespread in the earth's crust, and that in consequence many waters carry a small amount of radon which makes them radioactive. The helium which is a constituent of the gases escaping from many waters is derived from this source. This radon rapidly decays, with the result that such waters are more effective when taken at the source, and that they deteriorate on standing or keeping in bottles. Since radium compounds are a practically inexhaustible source of radon, waters containing traces of dissolved radium compounds in solution retain their radioactivity indefinitely. The terms "radium" and "radioactivity" have made an appeal to the popular imagination, and their advertisement value has been unduly exploited. Radioactivity can be measured and expressed in terms of figures, and international standards have been agreed upon. Statements that certain springs are radioactive have little value unless such statements are substantiated by figures. Muds, moors, peats and fangoes, now known under the generic name of "peloids," have long been used in hydrological practice. But it is only within the last few years that international standards have been laid down for their chemical and physical evaluation.

POSSIBLE FUTURE LINES OF DEVELOPMENT OF SOUTH AFRICAN SPRINGS.

In view of the sparse population of the country, South African medicinal springs cannot hope to provide all the amenities and facilities which the spas of other countries possess. But the number of people who can afford the time and expense entailed in a trip to Europe is insignificant in comparison with those in search of health and in need of treatment. Many people in this country would be willing to try a course of water treatment if they could get competent advice as to the particular spring which would be most likely to be beneficial to them.

In New Zealand, a country which has set an example in the co-operative development and scientific control of national springs, it has been found that the erection of expensive and sumptuously equipped sanatoria is not necessarily the most

effective way of developing medicinal springs. This experience is borne out by observations made at Continental spas, where it was found that the best success is attained if the individual makes his cure in surroundings corresponding to his social standing and tastes. Thus the hardy sons of the soil, camping in tents and wagons, and using the waters without medical advice and proper treatment, may nevertheless find their health improved, although the beneficial effect of the water may, to a certain extent, be nullified by the primitive conditions of living and by the inexpert treatment. By following modern lines of development in hydrology much could be achieved at our springs without excessive expenditure. The argument that the smallness of our population and the correspondingly meagre patronage of the springs must of necessity be an insuperable handicap to their development and growth is entirely fallacious.

Astonishing results have been achieved recently at some of the European spas in the treatment of tropical diseases. Partly as a result of the war, and partly in consequence of the more rapid development of tropical countries by European races, the incidence of tropical diseases—malaria, yellow fever and dysentery—is a problem assuming grave proportions, and this in spite of the establishment and development of hospitals and schools of tropical medicine. At La Bourboule thousands of French soldiers were cured of malaria during the war. Among them were many cases which resisted quinine treatment, but which yielded to a combined treatment with quinine and the arsenical waters of La Bourboule.

It is claimed that Vichy, Harrogate and Bath have afforded considerable relief in cases of tropical liver, and the suggestion is put forward by eminent hydrologists that spa treatment is most valuable as a prophylactic measure in helping to keep people who are compelled to live in the tropics in a healthy condition. North Africa has some excellent medicinal springs. But the Union is more accessible from tropical Africa than Egypt or Algeria, and much more so than Europe. The term "change of air" implies a change of climate and surroundings and freedom from the strain of business or profession. In respect of certain of the climatic health resorts of other lands, the geographical and climatic conditions furnish the healing factors, scenery, proximity of sea or forest, sunshine, air movements, etc. The Swiss spas make a feature of their climatological and meteorological advantages, pointing out that the majority of them are at altitudes ranging from 800 to nearly 6,000 feet. The lower atmospheric pressure at higher altitudes, the relative preponderance of ultra-violet rays in comparison to heat rays in the sunshine, the electric condition of the atmosphere, lower atmospheric humidity, all these are factors which are credited with having, in some mysterious way, a beneficial influence on health conditions. Some of our springs are situated nearly at sea-level, others at even higher altitudes than the

famous St. Moritz. Heliotherapy, sun treatment, is being extensively organized in most European countries. Our climatic conditions are exceptionally favourable for such treatment. Official records show that the percentage of the total possible hours of sunshine varies, according to the district, from 66 per cent. to as high as 78 per cent., which, when compared with London's 29 per cent. and New York's 56 per cent., indicates the possibilities of a remarkable combination of sunshine and medicinal waters in effecting cures.

In my humble opinion the time has arrived for a definition of attitude in this question of medicinal springs. Either we must plead indifference, or else we must ensure that the waters are used scientifically. With regard to the first alternative I fear that circumstances and developments had deprived us of all choice in the matter. A growing number of medical men do, as a matter of fact, send their patients to South African springs, and the Publicity Department of the Railways and Harbours is trying to exploit the springs as a potential attraction to oversea tourists by means of attractively illustrated brochures. It seems to me that medical men, scientists, owners of springs, Publicity Associations and the Department of Public Health ought to face the question of what steps are necessary to develop the springs, and to that end I beg to submit the following suggestions:—

(1) Establishments which advertise themselves as spas or sanatoria and profess to give treatment ought to be under the control of the Department of Public Health. Springs where farmers camp and provide their own food and accommodation, or which offer only some primitive facilities for accommodation, probably would be exempt from control as hitherto. There are in all some 70 springs known or reputed to be endowed with medicinal virtues, but of these under a dozen claim to offer facilities for treatment and could therefore be ranked as establishments subject to Public Health jurisdiction and control.

(2) Treatment should be taken out of the hands of amateurs, and should be on the responsibility and under the guidance of a qualified medical man. Such a medical man should be a trained hydrologist. With the facilities at present being provided oversea through Societies of Medical Hydrology, Balneological Societies, Medical Schools and Congresses, specialization in medical hydrology does not seem to offer the same difficulties or to entail the same sacrifices in time and money as specialization in other branches of medicine and surgery.

(3) No patient should go to a spring except on medical advice. When he gets there he should get proper instruction as to diet, exercise, suitable temperature of the water, length of period of immersion, rest periods, other treatment, such as sun-baths, electric or heat treatment, massage, etc.

(4) Apart from ordinary comforts, existing or potential amenities should be developed at the springs,

walks, drives, gardens, tennis courts, croquet lawns, golf links, swimming baths, etc. We cannot aspire to the theatres, concerts and other costly amusements and diversions which the famous European spas offer. Springs situated in attractive surroundings and in or near to towns or villages have natural advantages which are not always sufficiently appreciated or exploited. Mountains, forests, wild flowers, streams, the opportunity of mixing with the people of the town or village and joining in their games, occupations and entertainments, all these are psychological factors in the recovery process to which due weight must be attached.

(5) All the springs will have to be re-analyzed and should be periodically checked. In the light of international convention all existing analyses are incomplete. In many cases only the principal constituents were determined, and some of the analyses were carried out decades ago at a time when modern refinements of method were not available. There are springs basing their appeal on constituents and physical properties, the existence of which is not evident from the analyses available.

Bilharzia Infection in Blind Lagoons.

BY F. G. CAWSTON, M.D. (CANTAB.), DURBAN.

In 1923 Dr. Kay Sharpe reported that school children were contracting Bilharzia disease from the Natal lagoons, but this would seem to occur only when the mouth of a river is closed and the sea-water is unable to overcome the infection in the lagoon water.

I was recently asked to visit a small lagoon where a boy of four and another of six had become infected besides a little European girl. Only at high tide can sea-water enter this lagoon but the water percolates through the sand-bank. Two little girls approached the water whilst I was collecting examples of *Physopsis africana* from the edge and from a floating banana leaf and they picked up one of the many tadpoles it contained.

Approximately two thousand children from up-country, mostly from the Transvaal, visit this popular seaside resort each year and it is essential that active measures be taken to overcome the infection. In 1916 the Krugersdorp Municipality brought to the attention of the Public Health Department the fact that Bilharzia infection existed outside the township at a popular bathing-place and it was stated that the warnings issued by the Educational Department were sufficient to meet the case.

Though *Physopsis africana* has been recognised as the common host for the parasites in the Union ever since 1915, there is no authority which concerns itself with its control. Anophelines are destroyed by mosquito squads to control Malaria infection, but there