

macules. As a rule it is no longer visible at the termination of the pyrexia".

It is worthy of note that in no case of this series did the rash become papular or petechial, nor, with one exception, did the macules extend beyond the trunk. The macules were found chiefly on the abdomen and thorax; the face and neck and extremities were unaffected.

The inconspicuous nature of the rash no doubt affords the explanation of its apparent rarity in Indian patients, as it is presumably obscured by the pigmented skin.

The average duration of the rash, calculated from figures given in thirteen cases, was seven days. There was, however, difficulty in determining the exact time when it could be said to have disappeared.

Complications and sequelæ were by no means common [*sic*, ? uncommon]. Nine cases showed pulmonary symptoms, five developing bronchitis, two pneumonic symptoms, and two pleurisy. Three cases developed acute mental symptoms and two others varying degrees of transient paralysis.

The average duration of fever (33 cases) was 14.2 days. During the pyrexial period the pulse rate was relatively slow, resembling in this respect fevers of the enteric group.

Recovery was by lysis, and in some cases by crisis. In uncomplicated cases all other symptoms disappeared and convalescence was rapid as soon as the fever subsided.

The average stay in hospital (35 cases) was thirty-days'.

He considers that there is a strong clinical resemblance between the X2 group and the Poona-Ahmednagar group, and he does not attach any great importance to their antigenic differences; X2 and X19 are antigenically closely associated organisms and it has been shown in other endemic areas, where a number of people were obviously suffering from the same disease, that the serum of one patient would agglutinate X2 in high titre and X19 scarcely at all, whereas that of another would do the reverse.

From a clinical point of view the main difference between this second group and the XK group is in the rash. This is a constant finding in the X2 Poona-Ahmednagar group, even amongst the Indian cases, it is a florid, very marked rash, in some cases becoming raised and papular, it is generalized and not confined to the trunk; and it appears earlier, lasts longer and usually leaves a stain behind.

The Bangalore group are distinguished from the other group agglutinating X19 by the fact that that agglutination is in very much higher dilution, that the rash is a comparatively rare feature and less marked when it occurs, never becoming papular, and is evanescent, and that the whole disease is very much milder; this group Major Boyd thinks resembles Brill's disease, the flea-borne typhus.

Valuable as this study has been for showing the widespread distribution of the disease in India, it has provided practically no clues as to the nature of the vector. There was little evidence that a tick was the vector in any single case and in a number the possibility of a tick bite seemed to be definitely ruled out.

Little progress in controlling the disease can be made until we know the vector or vectors,

and we are glad to see that the subject is engaging the attention of research workers in this country. Some of the preliminary work on this subject carried out by Colonel Shortt was reported in our January issue and in the January number of the *Indian Journal of Medical Research* there are three papers on the same subject by Colonel Covell.

The former was able to show that the blood of the Kasauli squirrels agglutinated the OXK strain of proteus in much higher dilution than did that of the squirrels collected from the plains, whereas both sets of animals were almost entirely negative to the OX2 and OX19 strains. He also showed that the Kasauli squirrels harboured fleas, whereas the plains squirrels harboured lice.

Colonel Covell isolated a strain of typhus virus, which he was able to maintain by passing through guinea-pigs, apparently indefinitely (up to 10 passages at the time of writing), and he also isolated a typhus strain from a rat flea.

There are of course many insects and many possible carriers to be investigated, but parasitic insects that come in contact with man are more limited and, as Colonel Shortt has pointed out, it seems probable that if these were investigated systematically it should be possible to pick out the potential vectors. The finding of the carrier—and from the sporadic nature of the incidence of the disease it seems probable that the infection is maintained by an alternative host—may present a more difficult problem as this may be some animal that does not come into close contact with man; some domestic animal such as the dog may itself be immune and yet transport the infected insect into human quarters.

There is strong evidence to suggest that there are at least two types of typhus—this is a point about which all the workers we have mentioned are agreed—and it is very probable that each will have its vector and each its natural host, so that a promising vista for research in this disease is opened up.

Commentary

RATS, LICE AND HISTORY

PROFESSOR ZINSSER's book* is a, or perhaps the, Philosophy of Louseydom: nay, rather the encyclopædia of the subject, the only apparent omissions being any note of the Laplanders' custom of boiling lice in milk with plenty of salt and taking the decoction on

*Rats, Lice and History. (Being a Study in Biography, which after Twelve Preliminary Chapters indispensable for the preparation of the Lay Reader, deals with the Life History of *TYPHUS FEVER*). By Hans Zinsser. 1935. George Routledge and Sons, Limited, London. Pp. xii plus 301. Price, 10s. 6d.

an empty stomach for the cure of 'jaundice', and of Shipley's citation of Theo. Hook:—

'Her ladyship said when I went to her house
She did not regard me three skips of a louse,
I freely forgave what the dear creature said,
For ladies will talk of what runs in their head.'

The essence of the philosophy is a regard for typhus fever as the emblem of 'a protoplasmic continuity' throughout the ages influencing the lives of men, and the author has been led to cast his discourse in the form of a life-history of the adventurous career of his putative hero, Rickettsia, during birth, adolescence and maturity—His death not yet! This biographical fiction is perhaps the only thing in the book that may intrigue the reader. The subject by very token of the philosophy is an immortal, yet a biography in plain English means a story of but the vegetative and slough-destined mortal coil, the reason indeed why one finds, as the author has, that this method of literature goes 'into competition with the erotic memoir' and that its mines of information are 'keyhole indiscretions and other lubrications'.

Perhaps, however, the author may be allowed with W. S. Gilbert, Lewis Carroll and other artists the licence of clothing his blythe spirit in fancy dress. Anyway, his plot is certain to be a source of delight to the reader for it first leads him into a whimsical dissertation on the modes of biography, he reviews the classical models to the disadvantage of the modernists 'who sit between intelligence and beauty without possessing either' and who burn their fingers with 'Freudian high explosives' and 'appraise their heroes by their endocrine balances rather than by their performances'. 'Poor Shelley, poor Jesus', if it is to be their lot to have '*les petites de la vie privée*' exposed to the vulgar gaze. Of course the author chooses the classical model and claims that his subject needs no such assistance as 'psychoanalysis—mother complexes—early love affairs or later infidelities—perversions—the *réclame* of a libel suit barely averted—epidemiologists who talk like the hero of Arrowsmith'—and so on. Nevertheless, the public composed of such as doctors, bookbinders, ministers, and trained nurses want this sort of stuff at the end of a dull day, and so the modernists are not to be blamed overmuch for supplying it. One writer has tried both methods, sometimes satisfying the reasonably intelligent and sometimes 'luring a fat cheque with a story about the poor boy and boss's daughter'.

Then stung by a taunt that biography is work for an artist and not for a scientist the author goes into a flat spin. He protests against the stain-glass attitude of a specialist having no interest beyond his chosen field unless in 'contract bridge' and holds that one type of intelligent occupation increases the capacity for comprehension in general. In any case the essential difference between Art and Science cannot be stated; they are merely at opposite ends of the spectrum of human perception, one grading into the other, while 'beyond one end the senses give out and the physicist joins the Church; beyond the other the artist's brain collapses'; for instance he who perpetrated 'Balloons—coloured balloons—my coloured balloons—ballony balloons—they have punctured my categorical imperative' wrote of the spectrum, and vulcanizing the puncture would have done no good. Even those like Eddington, protagonists of 'mathematical science', 'are constrained to sit down comfortably in their metaphysical toboggans and swish back into the warm vales of theology, they scamper back to God', 'Kepler being a noble exception, he never wrote a book about God'. Still on this point the author has it that both scientist and artist accomplish no more than a new understanding of things that have always been. They are both observers of Nature and their achievements become Science or Art according to the degree to which the emotion or reason is impressed by them.

In consequence, on thinking over these things the author, luckily for the reader, decided it was safe for

him to write *A biography of typhus* and with a Parthian shaft wished that some of the psycho-analytical biographers could get psychic carbuncles and the lubricious writers of sexual neuropathics develop infection while playing with *Treponema* as easily as an anatomist can contract it while doing his honest work.

The author has many more digressions from his thesis, but just as important to the understanding of it as are physiology and chemistry to the Art of Medicine. The only pity is he stopped short of many that he provokingly only hints at, for instance on the origin of life he has it 'We all know already that it is a physico-chemical process though we have not yet succeeded in imitating it. And when we do we shall be philosophically just about where we are now'. The author excuses himself for such digressions on the ground that one Pierre Beyle has footnotes four times the length of his text!

Coming now to the biography of his hero and first his gestation in the womb of time he learns something of it from considering that any disease 'represents complex biological interadaptations and interactions covering thousands of years!' He thinks that the louse as a factor in the transmission of typhus arose from an actual discovery by the insect of blood beneath its normal epidermal diet, just as Bobo discovered that roast sucking-pig was food fit for kings and for Bobo, and further he sets forth the evidence of the medical laboratory in an attempt to elucidate the steps in the evolution of the condition, aided by researches in the laboratory of history. The latter method has forced him to ascertain how other diseases have behaved, sometimes appearing whence nobody knows, reaching a zenith and disappearing entirely and equally mysteriously—the disappearance of plague from Europe is not so inexplicable on the theory that the sewer rat exterminated the black rat and removed its close contact with man—or perhaps undergoing mutations, as in the neurotropism that has manifested itself in certain virus diseases such as vacciniasis.

His historical enquiries have led him to delve into the Ayurveda from which he learnt of fevers including malaria, and of cholera. On the subject of acquired tolerance he says 'another 1,000 years might produce a condition in which a peritoneal puncture of almost any *bon vivant* would reveal *T. pallidum* of which the host was all but unconscious. Arshpenamin has now probably ruined that prospect'.

Here indeed is a dissertation on a disease that should be read by all those who want to know not only of the local and present-day genesis of epidemics during their maturity but of their rise and fall as of the rise and fall of Nations. The author's scholarly methods cannot be too carefully studied.

In this crystallization of colloid material these *litteræ humaniores* are embellished with all the figures of speech that go to adorn a tale and to teach profound wisdom to crude minds. The author gets down to his 'muttons' garnished with *sauce piquante*. Every page ripples with aphorisms, axioms, epigrams, delicate ironies, laughter, *obiter dicta*, pretty wit, soothsayings, whimsical 'whimso whamsos' and here are some of the bonbouches (*anglicé*) more or less paraphrased. 'It was bad manners to kill fleas and lice in front of people, at any rate if you did not know them very well'. 'Would Cortez have burned his ships if his wife had been with him? No, he would have gone as far as Orizaba, returned to Spain, and written a book, *Hernando and Juana look at Mexico*'. 'Lice have been important in politics. Persons eligible for the mayoralty of a town would sit round a table with their beards resting on it. A louse would then be placed in the centre of the table and he to whom the louse went was the next mayor'. 'Nature has provided that the nymph of the louse, that is during its high school or flapper age is not yet possessed of sexual organs'—the louse by adapting itself to parasitism has attained the ideal of bourgeois civilization'. 'Bufon and Linnaeus were by this time famous and most likely were occupied in attending Conferences' [*sic*]. 'The Brown Rat appears to have

had a hard time in 'thrifty' countries. In Scotland it took 60 years to go from Selkirk to Morayshire and has never done very well among the Switzers—'it is obvious that Religion begins where Philosophy takes off from the solid shore of the exact sciences into speculative waters, the shallows of which are metaphysics'—citing Shelley 'to analyse a work of art into its elements is as useless as throwing a violet into a crucible'. 'Africa is a playground for museum administrators and their wives, who go there to have their pictures taken with one foot on a dead lion, while disgusted-looking bearers carry boxes of champagne and biscuits on their heads'. 'The louse does not become sexually mature till....but, then, Oh Boy!' 'The speculation has arisen among religiously-minded louse-scholars as to whether Adam and Eve—the neatest pair that ever joined hands, were lousy'—in Northern Siberia young women sportingly threw lice at a traveller, who ascertained that this indicated love—a sort of my louse is your louse ceremony! Let it be remarked that they were head lice.

Many examples among men who were not too unlike rats can be cited. Sam Wesley had 14 children with his good Sukey before he left her because she refused to pray for the lawful King. Then on the accession

of Queen Anne he was reconciled to Sukey and 'bestowed 5 more children on the fortunate woman'. 'Man and rat are utterly destructive, taking all that Nature offers; it is likely, biographically speaking, that the evolution towards higher things may gain velocity with time and that in another 100,000 years the comparison of men with rats may be less humiliatingly obvious'.

This commentary is composed mainly of citations from the book, but there are in it, say, forty times as much again of such good things and, quite apart from the pleasure of reading such a work of art—the spectrum shows the colours of Science and Art combined, there is that in it to make the Doctor worthy of his honorific and less of a *Kauffman*.

If the author modestly felt, when making certain criticisms of a brither Scot, like Neanderthal Man attacking a Mastodon with a peashooter, the reviewer feels rather like the Mayor's daughter when presenting the Princess with a posy.

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Special Article

SHORT-WAVE THERAPY

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THE use of long-wave currents with high frequencies or diathermy is now fairly well established in medical practice, but, during the last few years, the apparatus used in electro-medical technique has been considerably improved and further developed. It is now possible to produce waves of greatly reduced length with a corresponding increase in frequency. These have recently been applied therapeutically in practice. Schliephake, as the author of several essential suggestions regarding the method of applying ultra-short waves in therapy, has deservedly earned a great reputation. It was he who first introduced the use of short waves, on a large scale, into the therapy of various diseases.

At a frequency of approximately 1,000,000 per second, diathermic currents have an average wave-length of from three to four hundred metres, whereas short waves have a range of from 15 to 100 metres with a corresponding increase in frequency. Waves under 15 metres in length are designated ultra-short, their frequencies rising to 100,000,000 and even higher. In order to avoid such big numbers in connection with ultra-short waves, in practical use reference is confined to the wave-length. Naturally, the frequency, corresponding to the speed of electricity (300,000 kilometres per second), is a multiple of the wave-length. Just lately, apparatus has been constructed which makes it possible to use waves only a few centimetres in length. In this case the experimental stage has not yet been concluded. It is quite

possible that further and altogether new therapeutic possibilities may eventuate when these transmitters are further improved.

There are two methods of producing short and ultra-short waves—spark-gap, and valve apparatus. The waves produced by each of these differ to some extent. Spark-gap apparatus produces so-called 'damped' waves, that is, the amplitude of oscillation is uneven. On the other hand, valve apparatus produces undamped waves, the oscillation in this case being even. While this distinction is important from the technical point of view, it has not as yet affected actual practice as both types of apparatus have been used to a similar extent. Of late, however, valve apparatus has been increasingly used in spite of the fact that this type and its use is more expensive than the spark-gap apparatus. The problem thus raised and many others have, at present, not been finally settled.

What is the fundamental difference in practice between long and short waves? In both cases, the production of so-called Joule's heat is aimed at. In other words, electrical energy is transformed into heat when the current passes through a medium such as the human body, which is a bad conductor. By introducing currents of very high frequencies it became possible to administer sufficient quantities of electrical energy to the body without causing any unpleasant sensations, provided that there is close contact between the body and electrodes. Should the contact be incomplete or unequal at any point, diathermic currents are liable to produce sparks or local burns. In addition to this the long-wave diathermic current does not distribute the heat evenly through the body, as the current follows the path of least resistance,