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EMS AND CONTROL MEASURES

SECTION A • LOUSINESS AND LICE CONTROL • GEAR

baseline rate. Because of that households with lice are sprayed; in early winter and again later, in the spring. enough money and medical author recommends the pro- the long-term application of It should last for at least five y interruption will doom the

J. H. S. Gear.¹ *Rickettsial diseases of southern Africa, with special reference to their control.* Four rickettsial diseases are known to infect man in southern Africa. They are: (1) epidemic louse-borne typhus, caused by *Rickettsia prowazeki* and transmitted by the human louse, *Pediculus humanus*; (2) murine flea-borne typhus, caused by *R. mooseri* and transmitted to many by rat fleas, particularly *Xenopsylla cheopis*; (3) tick-bite fever, a variety of tick typhus that occurs in southern Africa and is caused by *R. conori* var. *pyperti*, a parasite of various species of ixodid or hard ticks, and transmitted to man, usually by bite; and (4) Q fever, caused by *R. or Coxiella burnetii*, a parasite of ticks usually transmitted to man by the inhalation of infected dust or more rarely by the ingestion of infected milk or by tick bite.

behind him to mark the way he had come. During typhus epidemics, mourners gathered in the hut of a deceased relative to lament his fate and lice, seeking new hosts, readily found them. When a young wife became ill, she returned to her father's village to be nursed by her female relations who, if she had typhus, acquired it in their turn. In these various ways, typhus went round and round the Transkei, and now and then spread beyond its borders.

Control measures

In dealing with typhus, it is important to raise the standard of hygiene, nutrition, and housing of the affected people. Until such a long-term plan becomes effective, a short-term policy to deal with the immediate threat must be adopted. This consists essentially of delousing the affected population. In practice, the results of steam and hot air disinfection were disappointing, for the disease outbreak was often one jump ahead of the delousing team.

The manufacture of DDT in South Africa was begun to meet the threat of typhus during World War II. After pilot studies of the process, a large plant was built at Modderfontein near Johannesburg and its production met the needs of South Africa and some of those of the Middle East theater of war. Its use in the Transkei and neighboring territories solved many of the difficulties that had hindered the successful prosecution of antityphus campaigns in the past. The population readily made use of DDT to control not only lice but many of the other arthropod pests that bothered them.

Since the start of DDT's widespread use, louse-borne typhus has ceased to be one of the major epidemic diseases of southern Africa. There was a dramatic fall in its incidence in the year immediately following its introduction, and instead of several thousand cases only a few hundred were reported. As many have been reported in the year

Epidemic louse-borne typhus fever

In the past, before and including the early years of World War II, conditions in some regions of southern Africa, including the relatively temperate Transkei, Lesotho, and the highveld of the Orange Free State and the Transvaal, favored the spread of louse-borne typhus. The disease is essentially a rural one. It does not occur in the urban areas where living conditions are relatively good, where water is freely available, and where soap is commonly used. The cases that have been seen in the cities have come from rural areas where the disease was once endemic and, on occasion, would become epidemic. Age-old customs, many intrinsically praiseworthy, were sometimes to blame for its spread in the countryside. A traveler was made welcome and spent the night at whatever village he happened to be passing when evening fell. If he was convalescing from typhus and harboring infected lice, he left a trail of infection

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This brief and, of necessity, spotty summary provides some evidence to support the thesis that typhus infections in various forms and the typhus potential now constitute a grossly underestimated, worldwide problem deserving close attention.

SOURCE NOTES

1. Information herein on reported cases of louse-borne typhus was taken largely from the epidemiologic reports of the World and Pan American Health Organizations.
2. Much, but not all, of the pertinent literature, as well as concepts of typhus epidemiology and control, was reviewed for my paper, "The Use of the Living Attenuated E Strain Typhus Vaccine in Epidemic and Endemic Situations," presented at the 17th Oholo Biological Conference at Zichron Yaakov, Israel, in March 1972. Figures 3 and 4 herein were prepared to accompany that paper.
3. Some of the information herein about typhus in Burundi and Bolivia is contained in the following unpublished reports by my coworkers and me:
 - a. Report on investigations of the etiology of the alleged typhus epidemic in Burundi. Submitted to WHO on September 15, 1967.
 - b. Preliminary report on a controlled field trial of the attenuated living E strain typhus vaccine during an epidemic of louse-borne typhus in Burundi, May-September 1969. Submitted to WHO on February 10, 1970; addendum No. 1 submitted November 5, 1970.
 - c. Report on a field trip to Bolivia, July 8-20, 1968. Submitted to PAHO.
 - d. Interim progress report on a pilot typhus vaccination project in Bolivia. Submitted to PAHO on February 15, 1972.
4. Some of the information herein is derived from unpublished data in the Department of Microbiology, University of Maryland School of Medicine, about specimens collected by collaborating investigators in Ethiopia, Mexico, and former West Pakistan, by local health officials in those countries, or by departmental field teams.
5. Finally, some of the information in this paper has come from personal communications with physicians and hospital personnel in Afghanistan, Burundi, Rwanda, and Uganda.

Edward S. Murray¹ and Jakob A. Gaon²
Incidence of Rickettsia prowazeki infections in an endemic focus of louse-borne typhus: factors influencing the occurrence of epidemics. Louse-borne typhus, as Hans Zinsser has aptly described it, has not only been one of the major scourges of mankind but has also considerably changed the course of history through many of the strategic and catastrophic epidemics it has caused. The disease has, at one time or another, occurred almost everywhere in the world. With the improvement in living standards and the advances in technology of the past 100 years or so, however, particularly modern plumbing, the bathtub, central heating, washing machines, and the like, the louse has been reduced to impotence in most of the world's countries.

Wherever there has been marked reduction in the human body louse population, the incidence of typhus has shrunk to a few sporadic, recrudescence cases. The United States is a good example. The last epidemic of louse-borne typhus is reported to have occurred in Philadelphia in 1877, but during the 95 years since then many hundreds—and quite probably thousands—of recognized and unrecognized cases of Brill-Zinsser disease have occurred in this country.

Of particular interest is the fact that lice have not been eradicated in the United States. Lice can still be collected from alcoholics in the outpatient departments of the large hospitals in Boston and New York, the very areas where the largest numbers of Brill-Zinsser infections have occurred.

In the United States, then, the necessary elements are present for typhus epidemics to start, namely, the presence of lice, cases of recrudescence typhus, and susceptible persons. The fact that there have been no epidemics and in fact no suspected cases of genuine

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primary louse-borne typhus, an obvious explanation holds level for transmission. The United States is far below the threshold level of the numbers of recrudescence.

But there are areas in Bolivia, Burundi, and elsewhere where the threshold is being exceeded to discuss one such area—where the critical threshold has been exceeded for many years. The potential for transmission of typhus appears recent at that level.

Widespread epidemic typhus occurred in Europe during World Wars I and II. During World War II, sporadic cases continued to occur in that period show a decline from 50 to 95 cases of Bosnia 50 to 95 cases. Bosnia had suffered 100 cases. There were therefore probably 100 cases of *Rickettsia prowazeki*, as dates for contracting

Active measures were taken to control lice and curtail transmission between 1954 and the late 1960s. More than 57 documented typhus epidemics had occurred. Epidemics have slowly been ceasing. Cases of louse-borne typhus in 1967. The incidence continued unabated and only since 1967 has it been abating. The common Brill-Zinsser disease of louse-borne typhus is below that level for

We believe the threshold level involved in the transmission of typhus. They are cases, the prevalence of availability of