

***Salmonella enteritidis* Infection by a Parenteral Route.**

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In the spring of 1936 a small epidemic of *enteritidis* bacteriemia was reported from refugee camps in Peiping.¹ As the majority of these patients suffered from relapsing fever at the same time, and as *enteritidis* bacteriemia has in the past rarely been encountered locally,² an attempt was made to see whether there was a special route of infection. Body-lice caught from some of the patients were cultured and, in every case examined, they were found to be infected with *S. enteritidis*. In several cases, both *Spirochæta recurrentis* and *S. enteritidis* were found in the same ectoparasites. There was also evidence of multiplication of the infecting organisms in the body-lice by repeated cultures of the infected lice at different intervals. In one experiment clean body-lice were fed with blood from a patient who was found to have about 150 colonies of *S. enteritidis* per cc. of circulating blood. Lice that were fed on the patients were found to contain innumerable colonies of the same organisms. In view of the susceptibility of body-lice to infection with *S. enteritidis* and in view of the occurrence of combined infection with *Spirochæta recurrentis* both locally and in Russia,³ it seemed to us that it was not impossible that the 2 infections were introduced together by a parenteral route. With this idea in mind, the following experiment was undertaken on guinea pigs, which are naturally susceptible to *enteritidis* infection.

Guinea pigs were shaved over the nape with care so that no gross trauma was caused. After 24, 48 and 72 hours, animals were infected by repeated but gentle swabbing of this area with a 24-hour broth culture of *S. enteritidis*. Some animals were purposely traumatized shortly before the application of the culture. After the swabbed area appeared dry, it was covered by a large piece of adhesive plaster. In addition, unshaven controls were kept in the same cages in order to see whether there was possibility of infection by mouth. Body-temperature was taken daily and stool and blood cultures were frequently made. When an animal died, complete bacteriologic examination of the body was done.

¹ Huang, C. H., Chang, H. C., and Lieu, V. T., *Chinese Med. J.* In press.

² Wu, C. J., and Zia, Samuel H., *Chinese Med. J.*, 1935, **49**, 1217.

³ Hicks, E. P., *J. Hyg.*, 1930, **20**, 446.

As the results of several experiments were identical, those of only one are given. All guinea pigs shaved but not traumatized acquired *enteritidis* bacteriemia in 3 to 15 days. Longer incubationary periods were observed in those in which the intervals between shaving and swabbing were longer. One traumatized animal got fever on the second day. All these animals gave positive blood and stool cultures, both before and after death. Two controls showed no fever and stool cultures were always negative. They were discarded after one month's observation.

The results seem to show that bacteriemia with *S. enteritidis* may be readily produced in guinea pigs through a parenteral route with even a relatively small dose. The rapidity of infection seems to be related to the degree of trauma, and the more severe this is, the more rapidly the infection is produced. Animals with no apparent trauma may require an incubationary period of 15 days before fever appears. This brings *S. enteritidis* in line with *Br. melitensis*,^{4,5} yellow-fever virus,⁶ and *Mycobacterium tuberculosis*,⁷ in ability to pass through reasonably intact skin and to set up infection, which may explain the mode of infection in the cases of bacteriemia which have occurred in local epidemics.

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Pathogenicity of Different Types of *C. diphtheriae* for Chinese Hamsters.

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Since Anderson, *et al.*,¹ described 3 types of *C. diphtheriae*, the relative virulence of these organisms for common laboratory animals has been the subject of much study. Povitsky, Eisner, and Jackson² observed that it took 4 times smaller dose of *gravis* than *mitis* types to kill guinea pigs. Murray³ showed that in virulence for rabbits,

⁴ Hardy, A. V., Hudson, M. G., and Jordan, C. F., *J. Inf. Dis.*, 1926, **45**, 271.

⁵ Eyre *et al.*, *Report Mediterranean Fever Committee*, 1906-1907, Part VI, p. 44.

⁶ Bauer, J. H., and Hudson, N. P., *Am. J. Trop. Med.*, 1928, **8**, 371.

⁷ Ono, I., *Kekkaku Abstr. Sect.*, 1935, **13**, 20.

¹ Anderson, J. S., Happold, F. C., McLeod, J. W., and Thomson, T. G., *J. Path. and Bact.*, 1931, **34**, 667.

² Povitsky, O. R., Eisner, M., and Jackson, E., *J. Inf. Dis.*, 1933, **52**, 246.

³ Murray, J. F., *Brit. J. Exp. Path.*, 1935, **16**, 384.