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TECHNICAL MANUSCRIPT 307

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AMONG INOCULATED MICE
AND GUINEA PIGS

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UNITED STATES ARMY
BIOLOGICAL CENTER
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U.S. ARMY BIOLOGICAL CENTER
Fort Detrick, Frederick, Maryland

TECHNICAL MANUSCRIPT 307

LACK OF CONTACT INFECTION AMONG
INOCULATED MICE AND GUINEA PIGS

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Industrial Health and Safety Division
INDUSTRIAL HEALTH AND SAFETY OFFICE

Project 1C622401A072

July 1966

In conducting the research reported here, the investigators adhered to "Principles of Laboratory Animal Care" as established by the National Society for Medical Research.

ABSTRACT

Mice injected intraperitoneally or intracerebrally with psittacosis agent or the viruses of Venezuelan equine encephalitis, Rift Valley fever, and yellow fever did not transmit infection to cagemate or adjacent cage control animals. Ultraviolet irradiation barriers are not necessary to prevent cross infection between cages when urine and feces drop from the cage.

Guinea pigs injected intraperitoneally with either R. rickettsi or C. burnetii did not transmit infection to cagemate or adjacent cage controls when excreta were present in the cage.

I. INTRODUCTION

In the microbiological research laboratory, adoption of precautions to reduce occupational infection among animal caretakers depends upon first knowing whether any risk of infection is present. Among diseases infectious for man, one sure indicator of danger is infection of normal animals by their inoculated cagemates. Transmission of infection to normal cagemates is common when the test animals are infected by whole-body exposure to microbial aerosol¹ unless a special air-washing technique is used.^{2,3} Cross infection is not common among parenterally inoculated animals,¹ so that the precautions required during caging and attending aerosol-exposed animals may be reduced somewhat. This study briefly reports experiments to determine whether normal animals are infected by their inoculated cagemates in the case of mice inoculated with the causative agents of psittacosis Borg strain, Rift Valley fever Van Wyck strain (RVF), Venezuelan equine encephalitis Trinidad strain (VEE), or yellow fever Asibi strain (YF), and guinea pigs inoculated with the agents of Q fever AD strain or Rocky Mountain spotted fever Bitterroot strain (RMSF).

II. MATERIALS AND METHODS

Swiss-Webster mice weighing 10 to 14 grams and Hartley strain guinea pigs weighing 200 to 400 grams were used. The microorganisms listed above, prepared in suspension or as blood from infected monkeys were injected into guinea pigs or mice by the intraperitoneal (IP) or intracerebral (IC) route.

Mice were held in wire-meshed cages measuring 4 by 4 by 8 inches. The cages were constructed so that urine and feces dropped from the cage onto collecting material. In some experiments uninoculated mice were caged with inoculated mice (four injected to one control or three injected to two controls), and in other experiments five uninoculated mice were in a cage adjacent to one containing five injected mice. Experiments were performed with and without ultraviolet irradiation barriers in front of the cages (Figure 1).

Guinea pigs were held in solid-sided and solid-bottomed cages made of stainless steel measuring 9 by 9 by 20 inches. In some experiments a control was caged with two injected guinea pigs, and in other experiments three uninoculated guinea pigs were in a cage next to one containing three injected guinea pigs. No ultraviolet irradiation was used. Cages were changed weekly.

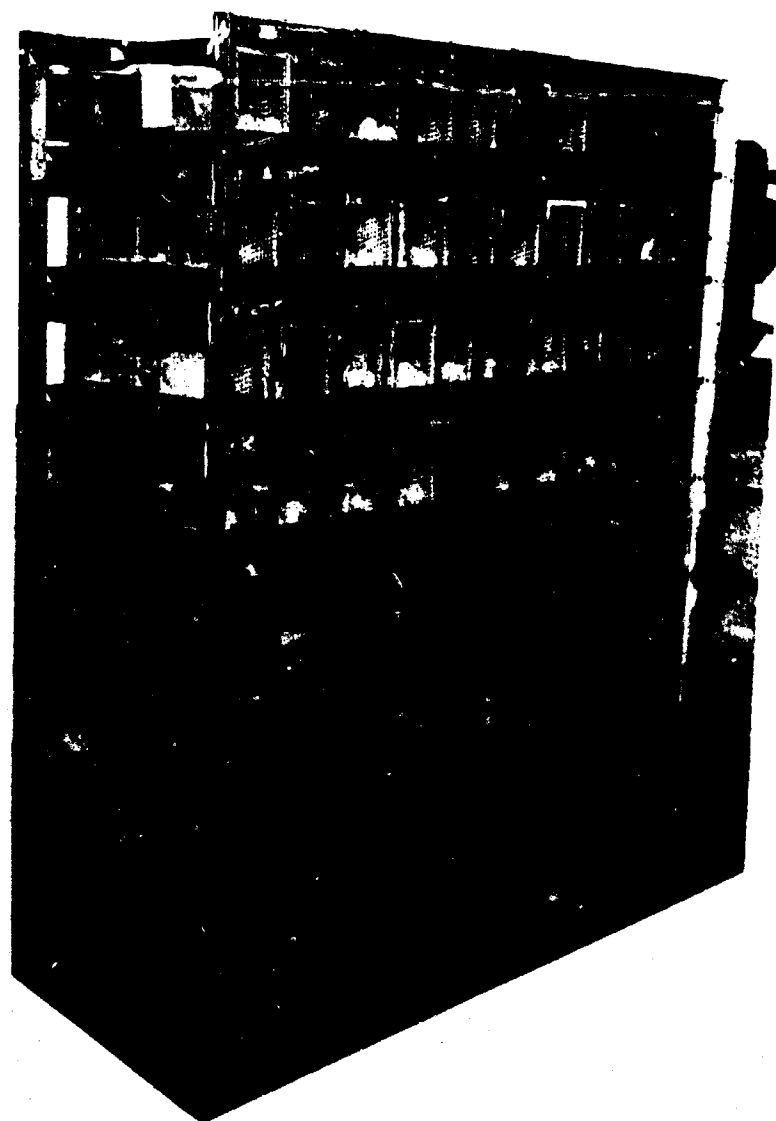


Figure 1. Cages for Parenterally Inoculated Mice.

III. RESULTS

Mice infected with pathogenic agent developed symptoms of the specific disease and died; the major portion of deaths occurred 5 to 9 days after inoculation. Regardless of the method of caging, with or without ultraviolet irradiation, cagemate and adjacent cage controls did not become infected with one exception: one YF cagemate control died, but cannibalism had occurred in the cage. Presence or absence of infection was established by serum neutralization tests. No cross infection occurred in guinea pig cagemate or adjacent cage controls, as determined by Coxiella burnetii serum agglutination tests,⁴ Rickettsia rickettsi complement-fixing antibody tests,* and the absence of lethality.

IV. DISCUSSION

Mice excrete VEE virus but not RVF or YF virus. No data were found on the excretion of psittacosis agent.⁵ The risk of cross infection among mice was reduced by cage construction that permitted potentially infectious urine and feces to drop from the environment of the cage. If urine and feces remained in the cage, cross infection presumably would have been facilitated. However, insofar as could be determined by a review of the literature, infection of normal cagemates rarely occurs after parenteral inoculation despite presence of the inoculated microorganism in urine or feces. Easterday⁶ reported that cross infection was absent among mice infected with RVF virus, Abinanti et al.⁷ similarly reported no cross infection when hamsters were injected with C. burnetii, and mice did not become infected when caged with mice injected IC with YF virus.**

In our experiments, guinea pigs exposed by parenteral injection of C. burnetii or R. rickettsi did not transmit infection to control animals despite the fact that excreta were present in the cages. There are no data available on excretion of R. rickettsi, but many investigators have recovered C. burnetii in excretions.⁸⁻¹⁰ Lennette et al.¹¹ injected guinea pigs IP with C. burnetii with no transmission of the disease to adjacent cage controls. Guinea pigs inoculated IP, intranasally, or intracardially with R. rickettsi did not transmit the infection to cagemate control animals.***

* Performed by Dr. Bennett L. Elisberg, Department of Rickettsial Diseases, Walter Reed Army Institute of Research, Washington, D. C.

** Edwin C. Corristan, personal communication.

*** Horace B. Rees, Jr., personal communication.

V. SUMMARY

Mice injected intraperitoneally or intracerebrally with psittacosis agent or the viruses of Venezuelan equine encephalitis, Rift Valley fever, and yellow fever did not transmit infection to cagemate or adjacent cage control animals. Ultraviolet irradiation barriers are not necessary to prevent cross infection between cages when urine and feces drop from the cage.

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