General Disclaimer

One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.

- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.

- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.

- This document is paginated as submitted by the original source.

- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.

Produced by the NASA Center for Aerospace Information (CASI)
ECOLOGY AND THERMAL INACTIVATION OF MICROBES IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS

Forty-fourth Quarterly Report of Progress

Order No. W-13411

January 1, 1976 - March 31, 1976

Conducted by

Division of Microbiology - Cincinnati Food Research Laboratory
Bureau of Foods
Food and Drug Administration

for the

National Aeronautics and Space Administration
Washington, D.C.

U. S. Department of Health, Education, and Welfare
Food and Drug Administration
1090 Tuculcum Avenue
Cincinnati, Ohio 45226

May 1976
ECOLOGY AND THERMAL INACTIVATION OF MICROBES IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS

Forty-fourth Quarterly Report of Progress

Order No. W-13411

January 1, 1976 - March 31, 1976

Contributors:

A. L. Reyes
A. J. Wehby
R. G. Crawford
J. C. Wimsatt
J. E. Campbell
J. T. Peeler

Report Prepared by:

A. L. Reyes
A. L. Reyes, Microbiologist

Report Submitted and Forwarded By:

J. E. Campbell, Ph.D.
Principal Investigator
Inactivation of Microorganisms and Viral Particles


R. B. Carver and J. T. Peeler

Division of Microbiology
Food and Drug Administration
Cincinnati, Ohio 45226

ABSTRACT

As a support to current research, the Division of Microbiology has identified almost 600 articles and books published since 1960 about microbial and viral inactivation. This bibliography is presented to facilitate literature reviews on chemical, heat, and radiation inactivation of microorganisms and viral particles.
Inactivation of Microorganisms and Viral Particles


R. B. Carver and J. T. Peeler

Division of Microbiology
Food and Drug Administration
Cincinnati, Ohio 45226

The Division of Microbiology, Bureau of Foods, provides the research and consultation expertise for the Bureau of Foods on problems related to microbial contamination in foods. This division undertakes a wide variety of projects related to methods for detecting and identifying microorganisms and routinely examines techniques to control or eliminate microorganisms and viral agents. At least five current projects deal with methods to destroy different species of organisms and viral particles.

Since the modern basis of thermal parameters was first presented in 1920, many strains of microorganisms have been studied under varying conditions to determine the best way to inactivate them and a large body of published work about this subject has been presented to the scientific community. The modes of inactivation can be broadly classified as chemical, heat, radiation, or a mixture of the three; and the references in this bibliography have been similarly classified.
Because comparative data from recent investigations are necessary to design current studies, a large number of references were examined. Almost 600 papers have been identified as having some bearing on the general topic of inactivation of microorganisms and viral particles. The following periodicals (from 1960 to mid-1975) were used as the primary source for the references: Applied Microbiology, Bacteriology Reviews, Canadian Journal of Microbiology, Food Technology, Journal of Applied Bacteriology, Journal of Bacteriology, Journal of Dairy Science, Journal of Food Science, Journal of General Microbiology, Journal of Milk and Food Technology, Microbiology Abstracts, Poultry Science, Virology, and the NASA Bibliography of Scientific Publications and Presentations Relating to Planetary Quarantine. Pertinent articles from other periodical sources are included also, as are some books and review articles. The bibliography is not comprehensive; some references may have been overlooked or the source material may be incomplete.

The bibliography is presented as an aid to anyone needing information on the subject of microbial and viral inactivation.
References

CHEMICAL INACTIVATION


**HEAT INACTIVATION**


87. Bond, W. W., Favero, M. S., Peterson, N. J., and Marshall, J. H.,
Dry-heat inactivation kinetics of naturally occurring spore popula-

88. Bond, W. W., and Favero, M. S., Thermal profile of a Bacillus species
(ATCC27380) extremely resistant to dry heat. Appl. Microbiol. 29(6):
859-860 (1975).

89. Boyd, D., Nixon, R., Gillespie, S., and Gillespie, D., Screening of
Escherichia coli temperature-sensitive mutants by pretreatment with

90. Brannen, J. P., On the role of DNA in wet heat sterilization of micro-

91. __________, Role of water activity in the dry heat sterilization

92. __________, An analysis of vacuum effects in the sterilization of

subtilis var. niger spores as a function of relative humidity.
Appl. Microbiol. 23(6); 1125-1130 (1972).

growth characteristics of microorganisms isolated from semiperishable

95. Bruch, M. K., and Smith, F. W., Resistance of spores of Bacillus
subtilis var. niger on Kapton and Teflon film to high temperature


148. ________, Heat injury of Bacillus subtilis spores at ultra-

149. Elliott, R. P., Improved temperature-gradient incubator and the
     maximum growth temperature and heat resistance of Salmonella.

     necessary for sterility testing of heat processed canned foods.

151. Fields, M. L., Chen Lee, P. O., and Wang, D., Relationship of soil
     constituents to spore counts and heat resistance of Bacillus

152. Filppi, J. A., and Banwart, G. J., Effect of the fat content of
     ground beef on the heat inactivation of poliovirus. J. Food Sci.

153. Fox, K., and Pflug, I. J., Effect of temperature and gas velocity

154. Fox, K., and Eder, B. D., Comparison of survivor curves of Bacillus
     subtilis spores subjected to wet and dry heat. J. Food Sci. 24(6): 518-521

155. Friesen, W. T., and Anderson, R. A., Effects of sporulation conditions
     and cation-exchange treatment on the thermal resistance of Bacillus

156. Fung, D. Y., Steinberg, D. H., Miller, R. D., Kurantnick, M. J., and
     Murphy, T. F., Thermal inactivation of Staphylococcal enterotoxins


RADIATION INACTIVATION


442. Rude, J. M., and Doudney, C. O., Relation between survival and
deoxyribonucleic acid replication in ultraviolet-irradiated
resistant and sensitive strains of Escherichia coli B/r.

443. Sasayama, S., Irradiation preservation of fish meat jelly products.
II. Classification of spoilage bacteria in irradiated Kamaboko.

444. Schimmel, D., Ahlendorf, W., and Burger, E., The irradiation
sensitivity of mycoplasmas in broth and colostrum.

I. Procedures for the evaluation of the radiation resistance of
spores of Clostridium botulinum in food products.

446. Schmidt, C. F., Nank, W. K., and Lechowich, R. V., Radiation
sterilization of food. II. Some aspects of the growth, sporula-
tion, and radiation resistance of spores of Clostridium botulinum,
Type E. J. Food Sci. 27: 77-84 (1962).

447. Schmidt, C., Lechowich, R. V., and Nank, W. K., Radiation resis-
tance of spores of Type E Clostridium as related to extension of
the refrigerated storage life of foods. J. Food Sci. 27: 85-89
(1962).

448. Sedliakova, M., Influence of physiological factors on the resistance
to ultraviolet radiation in bacteria. Stud. Biophys. (36-37) 59-66
(1973).


**COMBINATION (CHEMICAL, HEAT, RADIATION) INACTIVATION**


BOOKS AND REVIEW ARTICLES


