BIBLIOGRAPHY

on

CLEAN ROOMS

by the

Biological Sciences Communication Project

of

The George Washington University

Work performed by

Donald E. Wright

Assisted by

Lydia Homann
Lynn Zabriskie

C. W. Shilling, M.D.
Director, BSCP

Work performed under NASA contract

NSR-09-010-027

TABLE OF CONTENTS

I. Preface

PREFACE

Millions of dollars and thousands of man-hours have been lost as a result of particulate contaminants. With the burgeoning growth of the electronics industry, newer techniques required newer standards of cleanliness; both were the off-spring of newer requirements laid down by the aerospace program of the National Aeronautics and Space Administration. In just a few short years the state of the art of contamination control has been refined and polished to a high degree of operational success.

As recently as the Korean War the army found that 75% of its electronic equipment was inoperable at any given time (Austin, 1965). Similar consequences were reported by the other military services. Under the added impetus of aerospace requirements, it was imperative that standards for clean rooms be established.

1963 proved to be a milestone year in the field of contamination control. In order to establish criteria for its own programs, the Air Force first published Tech. Order 00-25-203 in 1961. Revisions and reclassification brought out the revised technical order in 1963. At the same time, the Sandia Corporation of Albuquerque, New Mexico (a prime contractor to the Atomic Energy Commission) hosted a group of industry and government representatives who developed guidelines applicable to problems of contamination control. The final result was Federal Standard No. 209, revised in the summer of 1966 and released as FS 209a. Its objective is "to prescribe air cleanliness classes and other air environmental conditions required for achieving and maintaining the levels of cleanliness specified in the product specification" (FS 209a, 1966).

The history of clean room operations may be said to have had its beginnings in the last century with the struggle of Semmelweiss to promote cleanliness in hospitals and the work of Lister in developing and promoting aseptic techniques. Over the years improvements in instruments, garments and sterilization techniques have been gradually accepted as standard in surgical suites. However, where the surgeon was concerned only with the control of infectious agents, the clean room worker was concerned with both viable and non-viable particulate matter.

The importance of contamination control is perhaps best realized by citing specifics: the two square meters of skin surface of an adult may release up to 30 million particles per sq. foot; exercise will increase this shedding rate even more. Average body movements produce one million particles per minute (Austin, 1966). Thus comes the realization that the human being is a continuous source of contaminants. To control this source of contamination requires the combined protective effects of proper clothing, techniques, design and operation.

The engineering contributions to the development and operation of clean rooms have been phenomenal. The use of HEPA (high efficiency particulate, air) filters reduces contamination by greater than 99%. Improved design and operation of ventilating systems have resulted in easier maintenance at lower cost. Instruments for detection of contaminants and for checking the efficiency of filters and clean room operation have been developed and refined. Proper use of air showers, garments and strict enforcement of rules have all contributed to the successful control of contaminating particles. Newer techniques of packaging reduce the number of contaminants released during handling and protect sensitive components from damaging humidity as well as dust.

Technological "feed-back" has enabled the medical profession and pharmaceutical industry to adopt techniques and methods originally designed for the aerospace industry. Indeed, such techniques may be required in the future by the cognizant federal agencies. Surgical suites benefit from improved knowledge of ventilating techniques, non-shedding, static-free garments and packaging and sterilization of instruments. Pharmaceutical houses have adopted clean room designs for their filling and packaging operations. Both benefit from the knowledge that personnel training and in-house regulations, rigidly controlled, can significantly reduce particulate "fall-out."

This bibliography on clean rooms was compiled in an effort to consolidate important developments for those persons involved in this rapidly advancing field of aerospace technology. Although the references cited are largely of work related to NASA-sponsored research, it is recognized that other government agencies such as the Food and Drug Administration, the Atomic Energy Commission, the Bureau of Standards and the Defense Department have supported research in clean room practices.

REFERENCES

AUSTIN, P.R. and TIMMERMAN, S.W. Design and operation of clean rooms. Detroit, Mich., Business News Publishing Co. 1965.

GENERAL SERVICES ADMIN. Federal Standard No. 209a. Wash. D.C. GSA Business Service Center. Aug. 1966.

AUSTIN, P.R. Contamination Index. Contamination Control Lectures. June 1966.

II. General Bibliography

1939-1966

GENERAL BIBLIOGRAPHY

1939 - 1966

1966

1. ANDERSON, D.C. Films vs. foil for clean packaging of aerospace hardware. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 4 p.

2. AUSTIN, P.R. Personnel emissions in laminar flow clean rooms. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 5 p.

3. BLANCHARD, M.B. and FARLOW, N.H. Contamination control during design, fabrication, test and launch of an upper atmospheric rocket payload. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 8 p.

4. BOLASNY, R.E. and PEARSALL, D.D. Ionized air for control of static charges. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 10 p.

5. CHARRON, G.R. Cleaning tubes for the Saturn S-1B. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 8 p.

6. CONLEY, D. Introduction to Apollo contamination control handbook. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 4 p.

7. CONNELLY, R.F. Relationships between contamination and system failure. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control. Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 8 p.

8. COWN, W.B. and KETHLEY, T.W. Dispersion of airborne bacteria in clean rooms. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 6 p.

9. CRAWFORD, J.G. and ZANKS, J.F. The assembly/sterilizer-A facility for the sterilization and assembly of spacecraft. Amer. Inst. of Aeronaut. and Astronaut./Amer. Astronaut. Soc., Baltimore, Md., Mar. 28-30, 1966. Proceedings. p.346-350.

10. ELLENBURG, J.Y. The field cleaning of corrosion-resistant steel tubing for lox and pneumatic service. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 4 p.

11. FAVERO, M.S. Assessment of microbial contamination on space hardware. Amer. Soc. for Microbiol., Los Angeles, Calif., May 1966. Proceedings.

12. FAVERO, M.S., PULEO, J.R., MARSHALL, J.H., et al. Comparative levels and types of microbial contamination detected in industrial clean rooms. Appl. Microbiol. 14(4): 539-551. July 1966. 10 Refs.

13. FINKELSTEIN, H., SCHEIR, R., and McDADE, J.J. Microbial accumulation on surfaces in industrial clean rooms. Amer. Inst. of Aeronaut. and Astronaut./Amer. Astronaut. Soc., Baltimore, Md., Mar. 28-30, 1966. Proceedings. p. 498-500.

14. FLANNER, L.T. Stability and compatibility characteristics of trichlorotrifluoroethane. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 9 p.

15. GOODRICH, E.O., Jr. Surgical application of laminar clean air flow. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 4 p.

16. GRAETZ, G.M. and SLATER, M.N. Operation of a class 100 down-flow room. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 8 p.

17. HALL, L.B. The objectives and technology of spacecraft sterilization. IN: PITTENDRIGH, C.S., VISHNIAC, W. and PEARMAN, J.P.T., Editors. Biology and the Exploration of Mars. Chapter 26. Pub. 1296. Wash., D.C., Natl. Acad. of Sciences, 1966. p. 463-466.

18. HALLIDAY, K.C., Jr. Cleaning in the aerospace industry. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 9 p.

19. HERTZSON, L. A standard method for determination of particle cleanliness in packaging films. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 8 p.

20. HEURING, H.F. Combining laminar flow with closed-loop cleaning. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 4 p.

21. HODKINSON, J.R. What aerosol counters and photometers measure. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 8 p.

22. HUME, W.A. Analysis of clean room practices. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 6 p.

23. INGRAM, F.A. A look at the role of the environment in surgical infections. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 4 p.

24. KAPELL, G.F., McDADE, J.J. and GAVIN, T.R. Experimental Assembly and Sterilization Laboratory (EASL) Operations: Phase I. NASA (CR-75152). Pasadena, Calif., Jet Propulsion Lab., Apr. 15, 1966. 30 p. Refs.

25. KENAGY, J.A. Application of a laminar down-flow clean room to dust and fume control in a developmental plastics facility. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 4 p.

26. KING, J. Latest revisions to Federal Standard 209. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 3 p.

27. KRANZ, P., LEVENSON, S.M. and LADUKE, M. Designing for germ-free environments. ASHRAE (Amer. Soc. of Heating, Refrigerating and Air-conditioning Engineers, Inc.) Jour. Mar. 1966. 12 p. 32 Refs.

28. KRETZ, A.P. Jr., and ERNST, R.R. The roving probe. Contamination Control V(7): 18-26. July 1966.

29. LANGER, G. A further development of an acoustic particle counter. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 6 p.

30. LE DOUX, F.N. Biological decontamination of a spacecraft system. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 8 p.

31. LEWIS, T.W. Evaluation of an automatic aerosol particle counter for measuring the airborne contamination level in a controlled environment. NASA (TM-X-53416). Huntsville, Ala., Marshall Space Flight Ctr., Mar. 24, 1966. 39 p. Refs.

32. LIEBERMAN, A. Current state of the art in particle detection and monitoring. Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 3 p.

33. MARSH, R.C. Modifications for improving the response characteristics of the Royco Model PC200A particle counter. Tech. Memo. (SC-TM-66-155). Albuquerque, N. Mex., Sandia Corp., Apr. 1966. 17 p.

34. MARSH, R.C. Cleanliness meter and its application to solvent cleaning. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 4 p.

35. McDADE, J.J. Clean room concept in the control of microorganisms. Amer. Soc. for Microbiol., Los Angeles, Calif., May 1966. Proceedings.

36. McDADE, J.J. and PAIK, W.W. Microbiological studies conducted in the experimental assembly and sterilization laboratory. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 3 p.

37. MATTHEWS, F.E. A summary of three years' clinical experience with patient isolation. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 8 p.

38. MICHAELSEN, G.S., RUSCHMEYER, O.R. and VESLEY, D. The bacteriology of clean rooms. NASA (CR-68729). Minneapolis, Minn., Univ. of Minnesota, School of Public Health. July 1966. 86 p. 33 Refs.

39. NATL. AERONAUT. & SPACE ADMIN. Standard procedures for the microbiological examination of space hardware. Wash. D.C., Office of Space Science & Applications, NASA Headquarters. June 1, 1966. 40 p. 6 Refs.

40. NASA-GODDARD SPACE FLIGHT CENTER. Sterilization--A selected bibliography from the literature retrieval system. NASA (TM-X-55457). Greenbelt, Md., Space Biology Branch, NASA. March 1966. 25 p. 168 Refs.

41. PAIK, W., CHRISTENSEN, M. and McDADE, J.J. Survival of surface-exposed microorganisms in spacecraft assembly areas. Amer. Soc. for Microbiol., Los Angeles, Calif., May 1966. Proceedings.

42. PHILLIPS, G.B. Absolute barrier concept in the control of microorganisms. Amer. Soc. for Microbiol., Los Angeles, Calif., May 1966. Proceedings.

43. PHILLIPS, G.B., BUSENBARK, H.L., EDWARDS, R.W., et al. Microbiological barrier equipment and techniques. A state of the art report. Amer. Assoc. for Contamination Control, Mar. 1966. 45 p. 84 Refs.

44. PHS-COMMUNICABLE DISEASE CENTER. Laboratory for monitoring bacterial contamination of space components. Quarterly Rept No. 12. NASA (CR-74868). Phoenix, Ariz. Jan.-Mar. 1966. 8 p.

45. RAMSEY, R.B. Jr., and JACKSON, E. Maintenance cleaning of thermal-vacuum systems. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 4 p.

46. RAPER, D.J. What's new in the T.O. 00-25-203. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 12 p.

47. REID, S.F. Aircraft hydraulic contamination control. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 5 p.

48. RENO, C.D. Cleaning the 'Zip' gun for Astronaut White's walk in space. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 3 p.

49. RICE, R.S. Contamination control features of a precision photogrammetric laboratory. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 7 p.

50. SALRIN, R.E. One year's experience on a laminar flow clean room. Fifth Annual Tech. Mtgs., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 7 p.

51. SMYTH, H.F., Jr. Experimental derivation of health standards for contaminated atmospheres. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 7 p.

52. SOLTIS, C.W. Design construction of a laminar flow operating room. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 3 p.

53. SULLIVAN, J.F. and SONGER, J.R. Role of differential air pressure zones in the control of aerosols in a large animal isolation facility. Appl. Microbiol. 14(4): 674-678. July 1966.

54. THOMAS, J.W. Aerosol properties and aerosol filtration. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 6 p.

55. TREXLER, P.C. and BROWN, T.E. Applications of gnotobiotic isolator techniques to sterile insertion. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 6 p.

56. TREXLER, P.C. and ROTHSTEIN, A.A. The application of gnotobiotic techniques to the sterilization problem. Amer. Inst. of Aeronaut. and Astronaut./Amer. Astronaut. Soc., Baltimore, Md., Mar. 28-30, 1966. Proceedings. p. 522-525. 12 Refs.

57. U.S. ARMY-FT. DETRICK. Design criteria for microbiological facilities at Ft. Detrick. Vol. I. Introduction. Contract (DA-18-064-AMC-401). Frederick, Md., Army Biol. Labs., Tech. Inform. Div., Mar. 1, 1966. 41 p. 189 Refs.

58. U.S. ARMY-FT. DETRICK. Design criteria for microbiological facilities at Ft. Detrick. Vol. II. Design criteria. Contract (DA-18-064-AMC-401) Frederick, Md., Army Biol. Labs., Tech. Inform. Div., Mar. 1, 1966. 255 p.

59. U.S. GOVERNMENT. Clean room and work station requirements, controlled environment. Federal Standard No. 209a. Wash. D.C., GSA, Business Service Center. Aug. 10, 1966. 21 p.

60. VAN DELLEN, D.B. A-prime surveys. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex., Mar. 29-Apr. 1, 1966. Proceedings. 4 p.

61. VESLEY, D., KEENAN, K.M. and HALBERT, M.M. Effect of time and temperature in assessing microbial contamination on flat surfaces. Appl. Microbiol. 14(2): 203-205. Mar. 1966. 7 Refs.

62. WHITFIELD, W.J. Monitoring a class 100 clean room. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex. Mar. 29-Apr. 1, 1966. Proceedings. 4 p.

63. WILLIAMSEN, C.T. Clean room for spacecraft assembly. Fifth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Houston, Tex. Mar. 29-Apr. 1, 1966. Proceedings. 3 p.

ADDENDUM

Recent acquisitions

1966

BEAKLEY, J.W., WHITFIELD, W.J. and MASHBURN, J.C. Evaluation of the efficiency of a class 100 laminar-flow clean room for viable contamination cleanup. (Part I of microbiological studies relating to clean environments). Rept. (SC-RR-66-385). Albuquerque, N. Mex., Sandia Corp., Sept. 1966. 9 p. 9 Refs.

BEAKLEY, J.W., WHITFIELD, W.J. and MASHBURN, J.C. Deposition of nutrients to surfaces by RODAC plates. (Part II of microbiological studies relating to clean environments). Rept. (SC-RR-66-386). Albuquerque, N. Mex., Sandia Corp., Sept. 1966. 9 p. 9 Refs.

WHITFIELD, W.J. and MASHBURN, J.C. Development of an increased sampling rate monitoring system. Rept. (SC-RR-66-585). Albuquerque, N. Mex., Sandia Corp., Oct. 1966. 9 p.

SULLIVAN, L. and WEHRENBERG, C. Investigation of the reliability of sterile insertion techniques for spacecraft. Final Rept. (VOY-CR-66-9). Denver, Colo., Martin Co., Oct. 1966. 46 p. 3 Refs.

1965

64. AMER. ASSOC. FOR CONTAMINATION CONTROL. (Local Chapter). Technical Symposium. Part I. Contamination control and industrial problems. Part II. Microbiological contamination control of spacecraft. Part III. Contamination control and medical problems. Albuquerque, N. Mex., Sandia Corp., Apr. 2, 1965. 80 p.

65. ARNOLD, V.E., JACK, A.J., KING, J.G., et al. Preliminary report on microbiological studies in a laminar down-flow clean room. Rept. (SC-RR-65-47). Albuquerque, N. Mex., Sandia Corp., Jan. 1965. 27 p.

66. AUSTIN, P.R. and TIMMERMAN, S.W. Design and Operation of Clean Rooms. Detroit, Mich., Business News Publishing Co., 1965. 421 p.

67. BALLARD, D.W. Contamination control considerations for designers and manufacturing engineers. Rept. (SC-R-65-888). Albuquerque, N. Mex., Sandia Corp., Apr. 1965. 10 p.

68. BEYERLE, F.J. and LORSCH, H.G. Manufacturing and handling procedures for planetary spacecraft to be sterilized by heating. First Natl. Conf. on Spacecraft Sterilization Technology, Pasadena, Calif., Nov. 16-18, 1965. Proceedings. In press.

69. BLACK, H.L., GREIF, E.E., and McDONNELL, J.A. A "Space Age" sterile technics laboratory. Amer. Jour. Hosp. Pharm. 22: 446-453. 1965.

70. DRUMMOND, D., ANGELOTTI, R. and LEWIS, K.H. Visual monitoring as an assay technique. First Natl. Conf. on Spacecraft Sterilization Technology, Pasadena, Calif., Nov. 16-18, 1965. Proceedings. In press.

71. DRUMMOND, D. and MAGISTRALE, V. JPL spacecraft sterilization technology program. A status report. Rept. (TR-32-853). Pasadena, Calif., Jet Propulsion Lab., Calif. Inst. of Technology, Dec. 31, 1965. 102 p.

72. FAVERO, M.S., PULEO, J.R., MARSHALL, J.H., et al. Comparative levels and survival of naturally occurring microorganisms deposited on surfaces through handling and aerial fallout. NASA (CR-67267). Phoenix, Ariz., Public Health Service-CDC. 1965.

73. FAVERO, M.S., PULEO, J.R., MARSHALL, J.H., et al. Detection and quantitation of microbial contamination to which spacecraft are subjected during manufacture. NASA (Contract No. R-137). Phoenix, Ariz., Public Health Service-CDC. Mar. 18, 1965.

74. FINCHER, E.L. Surface sampling for bacteria. Fourth Annual Tech. Mtg., Amer. Assoc. for Contamination Control, Miami Beach, Fla., May 25-28, 1965. Proceedings.

75. FJELSETH, D.E., DAVIS, D.M., JONES, L.K., et al. Clean assembly practices guide. Albuquerque, N. Mex., Sandia Corp., Oct. 1965. 71 p.

76. HALL, L.B. Spacecraft sterilization--A new engineering and sanitation technology. Annual Mtg., Amer. Publ. Health Assoc., Chicago, Ill., Oct. 1965. 8 p.

77. HALL, L.B. NASA requirements for the sterilization of spacecraft. First Natl. Conf. on Spacecraft Sterilization Technology, Pasadena, Calif., Nov. 16-18, 1965. Proceedings. 17 p. In press.

78. HALL, L.B., MILES, J.R., BRUCH, C.W., et al. The objectives and technology of spacecraft sterilization. Amer. Astronaut. Society Symp., Denver, Colo., Feb. 1965. 5 p.

79. HANSEN, W., et al. Experimental study of sterile assembly techniques. Vol. 1. Final Report. JPL (Contr 950993). Sunnyvale, Calif., Lockheed Missiles and Space Co., Mar. 21, 1965. 187 p.

80. HAYNES, B.W., Jr. and HENCH, M.E. Hospital isolation system for preventing cross-contamination by Staphylococcal and Pseudomonas organisms in burn wounds. Ann. Surgery 162: 641-649. 1965.

81. JONAS, A.M. Laboratory animal facilities. Jour. Amer. Vet. Med. Assoc. 146: 600-606. 1965.

82. KETHLEY, T.W. Air quality specifications (Microbial): The sampling problem. Fourth Ann. Tech. Mtg., Amer. Assoc. for Contamination Control, Miami Beach, Fla., May 25-28, 1965. Proceedings. 15 p.

83. MARSH, R.C. and OSWALT, F.W. A freon TF solvent residue analyzer. Tech. Memo. (SC-TM-65-279). Albuquerque, N. Mex., Sandia Corp., June 1965. 11 p.

84. McDADE, J.J., FAVERO, M.S. and MICHAELSEN, G.S. Control of microbial contamination. First Natl. Conf. on Spacecraft Sterilization Technology, Pasadena, Calif., Nov. 16-18, 1965. Proceedings. In press.

85. PHILLIPS, G.B. Safety in the chemical laboratory. XIII. Microbiological hazards in the laboratory. Part One - Control. Jour. of Chem. Education 42(1): 43-48. Part Two - Prevention. 42(2): 117-130. Jan. 1965-Feb. 1965. 32 Refs.

86. PHILLIPS, G.B. Microbiological barrier techniques. First Natl. Conf. on Spacecraft Sterilization Technology, Pasadena, Calif., Nov. 16-18, 1965. Proceedings. In press.

87. PHILLIPS, G.B., EDWARDS, R.W., FAVERO, M.S., et al. Microbiological contamination control: A state of the art report. Jour. Amer. Assoc. Contamination Control 4: 16-19, 11: 22-25. 1965.

88. PHILLIPS, G.B. and JEMSKI, J.V. Microbiological safety bibliography. Miscel. Publication 6. Ft. Detrick, Md., U.S. Army Biol. Labs., July 1965. 79 p. 1043 Refs.

89. PORTNER, D.M., HOFFMAN, R.K. and PHILLIPS, C.R. Microbial contamination in clean rooms. Tech. Manuscript 209. Ft. Detrick, Md., U.S. Army Biol. Labs., March 1965. 20 p.

90. PORTNER, D.M., HOFFMAN, R.K. and PHILLIPS, C.R. Microbial control in assembly areas needed for spacecraft sterilization. Air Eng. 7(10): 46-49. Oct. 1965.

91. POWERS, E.M. Microbial profile of laminar flow clean rooms. Tech. Memo. NASA (X-600-65-308). Greenbelt, Md., Goddard Space Flight Ctr., Sept. 1965. 40 p. 15 Refs.

92. ROBERTS, D.L. and STOCKHAM, J. Survey of bioclean facilities. Vols. I, II, and III. NASA (NASr-65(06)). Chicago, Ill., IIT Research Inst., 1965. 403 p.

93. SHADOMY, S., GINSBERG, M.K., LaCONTE, M., et al. Evaluations of a patient isolator system. Arch. Environ. Health 11: 183-200, 652-661. 1965.

94. TENNEY, J.B., Jr. and CRAWFORD, R.G. Design requirements for the sterilization containers for planetary landers. Second Annual Mtg., Amer. Inst. of Aeronaut. and Astronaut., San Francisco, Calif., July 26-29, 1965. Proceedings. 29 p. 16 Refs.

95. VESLEY, D., RUSCHMEYER, O.R. and BOND, R.G. Spacecraft contamination resulting from human contact. First Natl. Conf. on Spacecraft Sterilization Technology, Pasadena, Calif., Nov. 16-18, 1965. Proceedings. In press.

96. WHITCOMB, J.G., WHITFIELD, W., KING, J.G., et al. Ultra-clean operating rooms. The Lovelace Clinic Review 2(2): 65-69. Apr. 1965.

1964

97. ANGELOTTI, R. and WILSON, J.L. Comparative evaluation of the cotton swab and Rodac Method for the recovery of Bacillus subtilis spore contamination from stainless steel surfaces. Health Lab. Sci. 1: 289-296. 1964.

98. BOND, R.G., HALBERT, M.M., PUTMAN, H.D., et al. Survey of microbial contamination in the surgical suites of 23 hospitals. Final Rept. (PH 86-63-96). Publ. Health Serv., U.S. Dept. HEW. 1964.

99. ERNST, R.R. and KRETZ, A.P., Jr. Compatibility of sterilization and contamination control with application to spacecraft assembly. Jour. Amer. Assoc. Contamination Control. 11(3). 1964.

100. FOX, G.W. Design of clean rooms - A classified list of selected references 1955-1964. PHS (Publ. No. 1219). Bethesda, Md., Natl. Inst. of Health, 1964. 15 p. 139 Refs.

101. HALL, L.B. and HARTNETT, M.J. Measurement of the bacterial contamination on surfaces in hospitals. Publ. Health Repts 79(11): 1021-1024. Nov. 1964.

102. HARRIS, G.J., GREMILLION, G.G. and TOWSON, P.H. Test new electric incinerator design for sterilizing laboratory air. Heating, Piping and Air Conditioning 36: 94-95. 1964.

103. JEMSKI, J.V. and PHILLIPS, G.B. Aerosol challenge of animals. IN: GAY, W.I., Editor. Methods in Animal Experimentation. New York, N.Y., Academic Press, Inc. 1964. p. 273-341.

104. JOSHI, N., BLACKWOOD, A.C. and DALE, D.G. A simple chemical method for the detection of leaks in flexible isolators. Canadian Jour. Comp. Med. Vet. Sci. 28: 126. 1964.

105. KETHLEY, T.W. Air: Its importance and control. Natl. Conf. on Institutionally Acquired Infections, Minneapolis, Minn., (Sept. 4-5-6, 1963). PHS (Publ. No. 1188). Wash. D.C., Publ. Health Serv., U.S. Dept. HEW. 1964. Proceedings. p. 35-46.

106. KETHLEY, T.W. and COWN, W.B. Experimental verification of ventilation equations. Amer. Indust. Hyg. Assoc. Jour. 25: 67-78. Jan-Feb. 1964.

107. KOONSE, H.J. Design, construction and operation experiences of a sterile biological processing building. Bull. of the Parenteral Drug Assoc. 18(2): 9-18. 1964.

108. KRANZ, P. Two theoretical considerations for practical air cleaning. Jour. Amer. Assoc. Contamination Control 11(2): 37. 1964.

109. KRIEGER, G.L. Improvements in use of the indium adhesion test for surface cleanliness. Tech. Memo. (SCTM-64-1722). Albuquerque, N. Mex., Sandia Corp., Nov. 1964. 21 p.

110. LEU, M. A device for the external supply of sterile water and a simple air sterilizing filter for germfree units. Jour. Appl. Bacteriol. 27: 41-44. Apr. 1964.

111. LEVENSON, S.M., TREXLER, P.C., LaCONTE, M., et al. Application of the technology of the germfree laboratory to special problems of patient care. Amer. Jour. Surg. 107(5): 710-722. May 1964.

112. MARSH, R.C. A combination final rinsing station using freon TF solvent. Tech. Memo. (SC-TM-64-604). Albuquerque, N. Mex., Sandia Corp., May 1964. 18 p.

113. MARSH, R.C., WHITFIELD, W.J., NEITZEL, W.E., et al. Standard tests for laminar flow devices. Tech. Memo. (SC-TM-64-637). Albuquerque, N. Mex., Sandia Corp., June 1964. 34 p. 5 Refs.

114. McDADE, J.J. The microbiological profile of clean rooms. Space Programs Summary 3229. Vol. IV. Pasadena, Calif., Jet Propulsion Lab., Oct. 31, 1964. p. 8-13.

115. McDADE, J.J. and HALL, L.B. Effect of the environment on virulence. Natl. Conf. on Institutionally Acquired Infections, Minneapolis, Minn., (Sept. 4-5-6, 1963). PHS (Publ. No. 1188). Wash. D.C. Publ. Health Serv., U.S. Dept. HEW. 1964. Proceedings. p. 91-97.

116. PHILLIPS, G.B. Control of microbiological hazards in the laboratory. Eleventh Natl. Conf. on Campus Safety. Monograph No. 19. Chicago, Ill., Natl. Safety Council. 1964. Proceedings. p. 31-50.

117. PORTNER, D.M. The level of microbial contamination in a clean room during a one year period. (PBR Test No. 11-65). Ft. Detrick, Md., U.S. Army Biol. Labs. Dec. 4, 1964. 20 p.

118. PORTNER, D.M., HOFFMAN, R.K., BUCHANAN, L.M., et al. Microbial contamination in a clean room when occupied by operating personnel. (PBR Test No. 1-65). Ft. Detrick, Md., U.S. Army Biol. Labs., Aug. 12, 1964.

119. RUBBO, S.M. Liberation of organisms from contaminated textiles. Jour. of Hyg. 61: 507-513. 1964.

120. SCHMITT, W.H. Control and analysis of particulate matter by membrane filtration. Bull. of the Parenteral Drug Assoc. 18(6): 25-31. 1964.

121. SHAFFER, J.G. and McDADE, J.J. The microbiological profile of a new hospital. 1. Hospitals. Jour. Amer. Hosp. Assoc. 38: 40-51. Mar. 1, 1964.

122. SHAFFER, J.G. and McDADE, J.J. The microbiological profile of a new hospital. 2. Hospitals. Jour. Amer. Hosp. Assoc. 38: 69-74. Mar. 16, 1964.

123. TREXLER, P.C. Microbic contamination control. Bull. of the Parenteral Drug Assoc. 18: 8-12. 1964.

124. VESLEY, D. Surface sampling techniques for the institutional environment--Present status. Natl Conf. on Institutionally Acquired Infections, Minneapolis, Minn., (Sept. 4-5-6, 1963). PHS (Publ. No. 1188). Wash. D.C., Publ. Health Serv., U.S. Dept. HEW. 1964. Proceedings. p. 101-103.

125. WEDUM, A.G. Laboratory safety in research with infectious aerosols. Publ. Health Repts 79(7): 619-633. July 1964. 70 Refs.

126. WEDUM, A.G. Airborne infection - How important for public health. II. Airborne infection in the laboratory. Amer. Jour. Publ. Health 54: 1669-1673. 1964.

127. WEDUM, A.G. and PHILLIPS, G.B. Criteria for design of a microbiological research laboratory. Jour. of the Amer. Soc. of Htg. Ref. and Air Cond. Engrs. Inc. Feb. 1964. 8 p. 17 Refs.

128. WHITFIELD, W.J., MASHBURN, J.C., NEITZEL, W.E., et al. Basic design requirements for laminar air flow dust control devices. Rept. (SC-64-145A). Albuquerque, N. Mex., Sandia Corp., May 1964. (Rev. Aug. 1964). 24 p.

1963

129. AGNEW, B. Laminar/Flow Clean Room Handbook. Garden Grove, Calif., Agnew Higgins, Inc. 1963.

130. AIBA, S., NISHIKAWA, S. and IKEDA, H. A new type of air sterilization filter. Jour. Gen. Appl. Microbiol. 9: 267-279. 1963.

131. ALG, R.L., HARRIS, G.J. and BARBEITO, M.S. Disinfection of microbial aerosol chamber with beta-propiolactone. Tech. Rept. 35. Ft. Detrick, Md., U.S. Army Biol. Labs. 1963.

132. ANDERSON, J.S. Quantitative detection of surface contaminants. Jour. Amer. Assoc. Contamination Control 11(6): 9. 1963.

133. BARRETT, J.P., Jr. See also #186.

134. BOND, R.G., HALBERT, M.M., KEENAN, K.M., et al. Development of a method for microbial sampling of surfaces with special reference to reliability. Final Rept. (PH-86-62-182). U.S. Dept. HEW, July 1963.

135. GODDARD, K.R. A procedure for microbiological testing of air filters. ASHRAE (Amer. Soc. of Htg. Ref. and Air Cond. Engrs., Inc.). Jour. Feb. 1963. 8 p. 12 Refs.

136. HAMILTON, H.A. Are clean rooms really necessary? Jour. Amer. Assoc. Contamination Control 11(8): 15. 1963.

137. HARRIS-SMITH, R., PIRT, S.J. and FINMAN, J.R. A ventilated germ-free cabinet for the microbiological laboratory. Biotechnol. Bioeng. 5: 53-58. 1963.

138. HOF, G.J. Present practices in the verification of cleaniness. Tech. Memo. (SCTM 147-63(25)). Albuquerque, N. Mex., Sandia Corp., 19 p. 17 Refs. Sept. 1963.

139. JEMSKI, J.V. and PHILLIPS, G.B. Microbiological safety equipment. Lab. Animal Care 13: 2-12. 1963.

140. KETHLEY, T.W., COWN, W.B. and FINCHER, E.L. Operating room ventilation evaluated. Architectural Record, Mar. 1963. 5 p. 7 Refs.

141. LANDY, J.J. Treatment of the burned patient: Use of the germfree plastic isolator as a barrier against hospital pathogens. Southern Med. Jour. 56: 1084-1088. 1963.

142. LIEBERMAN, A. Cleaniness versus need. Conference on Clean Room Specifications. Rept. (SCR-652). Albuquerque, N. Mex., Sandia Corp., Apr. 9-10, 1963. Proceedings. p.17-24

143. MARSH, R.C. The adaptability of laminar air flow for contamination control. Rept. (SCR-691). Albuquerque, N. Mex., Sandia Corp., July 1963. 8 p.

144. NATL. AERONAUT. & SPACE ADMIN. Unmanned Spacecraft Decontamination Policy. NASA Manual No. 4-4-1. Wash. D.C. Sept. 9, 1963.

145. PHILLIPS, G.B. and JEMSKI, J.V. Biological safety in the animal laboratory. Lab. Animal Care 13: 13-20. 1963.

146. PILGRIM, H.I. and THOMPSON, D.B. An inexpensive, autoclavable germfree mouse isolator. Lab. Animal Care 13: 602-608. 1963.

147. TREXLER, P.C. An isolator system for control of contamination. Lab. Animal Care 13: 572-581. 1963.

148. USAF. Standards and guidelines for the design and operation of clean rooms and clean work stations. Tech. Order 00-25-203. Olmsted AFB, Pa. MAMA (AEPD) July 1, 1963.

149. U.S. GOVERNMENT. Clean room and work station requirements, controlled environment. Federal Standard No. 209. Dec. 10, 1963. 21 p.

150. WHITFIELD, W.J. State of the art (Contamination Control) and laminar airflow concept. Rept. (SCR-652). Conference on Clean Room Specifications. Albuquerque, N. Mex., Sandia Corp. Apr. 9-10, 1963. Proceedings. p.73-86

151. WHITFIELD, W.J. The design of a dust-controlled vented hood utilizing laminar air flow. Rept. (SC-4905(RR)). Albuquerque, N. Mex., Sandia Corp. June 1963. 20 p.

152. WHITFIELD, W.J., MASHBURN, J.C. and NEITZEL, W.E. New ways to control airborne contamination. Rept. (SCR-585). Albuquerque, N. Mex., Sandia Corp. Mar. 1963. 6 p.

153. WHITFIELD, W.J., NEITZEL, W.E., MASHBURN, J.C., et al. Evaluation of a curtained laminar down-flow clean room. Dev. Rept. (SCDR 221-63). Albuquerque, N. Mex., Sandia Corp. Aug. 1963. 15 p.

1962

154. AIBA, S. Design of fibrous air sterilization filters. Jour. Gen. Appl. Microbiol. 8: 169-177. 1962.

155. ARMBRUSTER, E.H. Evaluation of surface contamination. Jour. Environ. Health 25: 26-29. 1962.

156. CALIFORNIA, STATE OF. Cleaning, disinfection and sterilization. Berkeley, Calif., Dept. of Public Health, Bur. of Hospitals. 1962. 42 p. 18 Refs.

157. COLE, W.R. and HARVEY, R.B. Quantitative air sampling. Surgery 51: 658-662. 1962.

158. GARDEN, N.B. (Editor). Report on glove boxes and containment enclosures. Rept. (TID-16020). Wash. D.C. U.S. Atomic Energy Commission. June 20, 1962.

159. GREENE, V.W., VESLEY, D., BOND, R.G., et al. Microbiological contamination of hospital air. I. Quantitative studies. Appl. Microbiol. 10(6): 561-566. Nov. 1962.

160. GREENE, V.W., VESLEY, D., BOND, R.G., et al. Microbiological contamination of hospital air. II. Qualitative studies. Appl. Microbiol. 10(6): 567-571. Nov. 1962.

161. GREENE, V.W., VESLEY, D. and KEENAN, K.M. New method for microbiological sampling of surfac es. Jour. Bacteriol. 84: 188-189. 1962.

162. HALL, L.B. Patient accident causes and their control. 3. Sanitation: A part of the hospital program. Indust. Med. & Surg. 31(5): 223-225. May 1962. 10 Refs.

163. HALL, L.B. Air sampling for hospitals. Hospital Topics 40(6): 97-100. June 1962. 4 p.

164. LEVENSON, S.M., TREXLER, P.C., MALM, O.J., et al. A plastic isolator for operating in a sterile environment. Amer. Jour. of Surg. 104: 891-899. Dec. 1962.

165. MARSH, R.C. A comparison of dust count data obtained from different measuring methods. Special Tech. (Publ. #342). Amer. Soc. for Testing Matls., 1962. p. 24-28. 6 Refs.

166. MARSH, R.C. and WHITFIELD, W.J. Operating Manual for the Sandia clean bench. Rept. (SC-4733(M)). Albuquerque, N. Mex., Sandia Corp. Nov. 1962. 15 p.

167. MASHBURN, J.C., NEITZEL, W.E. and WHITFIELD, W.J. A portable clean work station. Rept. (SC-4690(RR)). Albuquerque, N. Mex., Sandia Corp. June 1962. 11 p.

168. SHAFFER, J.G. and McDADE, J.J. Airborne Staphylococcus aureus. A possible source in air control equipment. Arch. Environ. Health 5: 547-551. 1962.

169. WHITFIELD, W.J. A new approach to clean room design. Rept. (SC-4673-(RR)). Albuquerque, N. Mex., Sandia Corp. Mar. 1962. 28 p.

1961

170. BREWER, J.H. and McLAUGHLIN, C.B. Dehydrated sterilizer controls containing bacterial spores and culture media. Jour. of Pharmaceut. Sciences 50(2): 171-172. Feb. 1961.

171. BROWN, A.E. A portable protective cabinet for handling infective material. Jour. Med. Lab. Technol. 18: 272-275. 1961.

172. BRUCH, C.W. Decontamination of enclosed spaces with beta-propiolactone vapor. Amer. Jour. of Hyg. 73(1): 1-9. Jan. 1961. 15 Refs.

173. CHATIGNY, M.A. Protection against infection in the microbiological laboratory, devices and procedures. IN: UMBREIT, WAYNE W., Editor. Advances in Applied Microbiology, Vol. 3. New York, N.Y., Academic Press, 1961. p. 131-192.

174. U.S.ARMY-FT. DETRICK. Technical requirements for the design of bacteriological facilities. Ft. Detrick, Md., U.S. Army Chemical Corp. Biological Labs., Tech. Eng. Div., May 1, 1961.

175. WEDUM, A.G. Control of laboratory airborne infection. Bacteriol. Rev. 25: 210-216. 1961.

1960

176. ALG, R.L., BARBEITO, M.S. and HARRIS, G.J. Disinfection of aerosol chambers with beta-propiolactone. Proj. (4B11-05-015-01). Ft. Detrick, Md., U.S. Army Biological Labs. July 1960.

177. BLICKMAN, B.I. and LANAHAN, T.B. Ventilated work cabinets reduce laboratory risks. Safety Maintenance 120: 34-36, 44-45. 1960.

178. CHANDLER, G.I. Bibliographical study on dust control engineering: Methods, equipment and applications. Autonetics, Mar. 31, 1960.

179. GILES, F.J., Jr. Laboratory hoods - Their design and application. Safety Monograph No. 6. Third National Conference on Campus Safety, Chicago, Ill., National Safety Council. 1960. Proceedings. 5 p.

180. GREMILLION, G.G. The use of bacteria-tight cabinets in the infectious disease laboratory. Second Symp. Gnotobiotic Technol., Notre Dame, Ind., U. of Notre Dame Press. 1960. Proceedings. p. 171-182.

181. SCHLEY, D.G., HOFFMAN, R.K. and PHILLIPS, C.R. Simple improvised chambers for gas sterilization with ethylene oxide. Appl. Microbiol. 8: 15-19. 1960.

182. SPINER, D.R. and HOFFMAN, R.K. Method for disinfecting large enclosures with beta-propiolactone vapor. Appl. Microbiol. 8: 152-155. 1960. 8 Refs.

183. TREXLER, P.C. Flexible-wall plastic film isolators. Second Symp. Gnotobiotic Tech., Notre Dame, Ind., Univ. of Notre Dame Press. 1960. Proceedings. p. 55-60.

184. TREXLER, P.C. Sterile rooms. Second Symp. Gnotobiotic Technol., Notre Dame, Ind., Univ. of Notre Dame Press. 1960. Proceedings. p. 121-125.

1959.

185. ALLEN, H.F. Air hygiene for hospitals. II. Efficiency of fibrous filters against Staphylococcic droplet nuclei and bacteria-bearing dust. Jour. Amer. Med. Assoc. 170: 261-267. May 16, 1959.

186. BARRETT, J.P., Jr. Sterilizing agents for LOBUND flexible film apparatus. Proc. Animal Care Panel 9: 127-133. 1959.

187. COULING, C.W. and REES, R.J.W. A protective cabinet for the post-mortem examination of infected animals. Jour. Hyg. 57: 407-409. 1959.

188. DAVEY, D.G. Establishing and maintaining a colony of specific pathogen-free mice, rats and guinea pigs. Lab. Animal Centre Collected Papers 8: 17-39. 1959.

189. GUSTAFSON, B.E. Lightweight stainless steel systems for rearing germ-free animals. Ann. N.Y. Acad. Sci. 78(1): 17-28. May 8, 1959.

190. HOFFMAN, R.K., KAYE, S. and FEAZEL, C.E. Sporicidal surface coatings. Official Digest, Federation of Paint and Varnish Production Clubs. Aug. 1959. 12 p.

191. LIDWELL, O.M. Impaction sampler for size grading airborne bacteria-carrying particles. Jour. Sci. Instr. 36(3): 1959.

192. MITCHELL, R.I. and PILCHER, J.M. Improved cascade impactor for measuring aerosol particle sizes in air, pollutants, commercial aerosols, and cigarette smoke. Indust. Eng. Chem. 51: 1039-1042. 1959.

193. REYNIERS, J.A. Design and operation of apparatus for rearing germ-free animals. Ann. N.Y. Acad. Sci. 78(1): 47-79. May 8, 1959.

194. TREXLER, P.C. The use of plastics in the design of isolator systems. Ann. N.Y. Acad. Sci. 78: 29-35. May 8, 1959.

195. WOLF, H.W., SKALIY, P., HALL, L.B., et al. Sampling microbiological aerosols. Public Health Monograph No. 60. Publ. Health Serv., U.S. Dept. HEW. 1959. 53 p. 82 Refs.

1958

196. ANDERSEN, A.A. A new sampler for the collection, sizing, and enumeration of viable airborne particles. Jour. Bacteriol. 76: 471-484. 1958.

197. ANGELOTTI, R. and FOTER, M.J. A direct surface agar plate laboratory method for quantitatively detecting bacterial contamination on non-porous surfaces. Food Res. 23: 170-174. 1958.

198. ANGELOTTI, R., FOTER, M.J., BUSCH, K.A., et al. A comparative evaluation of methods for determining the bacterial contamination of surfaces. Food Res. 23: 175-185. 1958.

199. FREDETTE, V. The bacteriological efficiency of air conditioning systems. Can. Jour. Surg. 1(3): 226-229. Apr. 1958.

200. HOFFMAN, R.K. and WARSHOWSKY, B. Beta-propiolactone vapor as a disinfectant. Appl. Microbiol. 6(5): 358-362. Sept. 1958. 9 Refs.

1957

201. GORDIEYEFF, A.V. Studies of dispersion of solids as dust aerosols. A.M.A. Arch. Ind. Health 15: 510. 1957.

202. LIND, A. Ventilated cabinets in a tuberculosis laboratory. Bull. World Health Organ. 16: 448-453. 1957.

203. PHILLIPS, G.B., REITMAN, M., MULLICAN, C.L., et al. Applications of germicidal ultraviolet in infectious disease laboratories. III. The use of ultraviolet barriers on animal cage racks. Proc. Animal Care Panel 7: 235-244. 1957.

204. REYNIERS, J.A. The control of contamination in colonies of laboratory animals by the use of germfree techniques. Proc. Animal Care Panel 7: 9-29. 1957.

205. TREXLER, P.C. and REYNOLDS, L.I. Flexible film apparatus for the rearing and use of germ-free animals. Appl. Microbiol. 5(6): 406-412. 1957.

206. WEDUM, A.G. Development of specialized safety equipment in conjunction with biological warfare R and D programs. 12th Annual Mtg. Armed Forces Chem. Assoc., Wash. D.C. 1957.

207. WILLIAMS, R.E.O. and LIDWELL, O.M. A protective cabinet for handling infective material in the laboratory. Jour. Clin. Pathol. 10: 400-402. 1957.

1956

208. HERMAN, L.G. and MORELLI, F.A. Air sampling techniques in the hospital environment. Bacteriol. Proceedings, p. 114. 1956.

209. PHILLIPS, G.B. and NOVAK, F.E. Applications of germicidal ultraviolet in infectious disease laboratories. II. An ultraviolet pass-through chamber for disinfecting single sheets of papers. Appl. Microbiol. 4: 95-96. 1956.

210. REITMAN, M. and WEDUM, A.G. Microbiological safety. Public Health Reports 71: 659-665. 1956.

211. WEDUM, A.G., HANEL, E., PHILLIPS, G.B., et al. Laboratory design for study of infectious disease. Amer. Jour. of Public Health 46(9): 1102-1113. Sept. 1956. 31 Refs.

212. WEDUM, A.G., HANEL, E., and PHILLIPS, G.B. Ultraviolet sterilization in microbiological laboratories. Public Health Repts 71: 331-336. 1956.

213. WILLIAMS, R.E.O., LIDWELL, O.M., and HIRCH, A. The bacterial flora of the air of unoccupied rooms. Jour. Hyg. 54(4): 512-523. Dec. 1956.

1955

214. BRYCE, D.M. Tests for the sterility of pharmaceutical preparations: The design and interpretation of sterility tests. Jour. Pharm. Pharmacol. 8: 561-572. 1955.

215. HOFFMAN, R.K., YEAGER, S.B. and KAYE, S. A method for testing self-disinfecting surfaces. Soap & Chemical Specialties. Aug. 1955. 5 p. 28 Refs.

216. MILLER, O.T., SCHMITT, R.F. and PHILLIPS, G.B. Applications of germicidal ultraviolet in infectious disease laboratories. I. Sterilization of small volumes of air by ultraviolet radiation. Amer. Jour. Public Health 45: 1420-1423. 1955.

217. PHILLIPS, G.B., NOVAK, F.E. and ALG, R.L. Portable inexpensive plastic safety hood for bacteriologists. Appl. Microbiol. 3(4): 216-217. July 1955.

218. WALTER, W.G. Symposium on methods for determining bacterial contamination on surfaces. Bacteriol. Rev. 19: 284-287. 1955.

1954

219. JENSEN, K.A. Towards a standardization of laboratory methods. Bull. Intern. Union Against Tuberc. 24: 78. 1954.

220. SHERFEY. J.M. Concerning the types of dry boxes commercially available. Indust. Eng. Chem. 46: 435. 1954.

1953

221. KLARMANN, E.G., WRIGHT, E.S. and SHTERNOV, V.A. Prolongation of the antibacterial potential of disinfected surfaces. Appl. Microbiol. 1: 19-23. 1953.

222. WEDUM, A.G. Bacteriological safety. Amer. Jour. Public Health 43(11): 1428-1437. Nov. 1953.

1952

223. DECKER, H.M., GEILE, F.A., HARSTAD, J.B., et al. Spun glass air filters for bacteriological cabinets, animal cages and shaking machine-containers. Jour. Bacteriol. 63: 377-383. 1952.

1948

224. BREWER, J.H. Aseptic operation and control of ampul filling rooms. Jour. of the Amer. Pharmaceut. Assoc. Scientific Edition XXXVII(10): 415-420. Oct. 1948.

225. DALLAVALLE, J.M. Micrometrics: The technology of fine particles. New York City, N.Y., Pitman Publishing Corp. 1948.

226. DUGUID, J.P. and WALLACE, A.T. Air infection with dust liberated from clothing. Lancet 2: 845-849. 1948.

1945

227. SHEPARD, C.C., MAY, C.W. and TOPPING, N.H. A protective cabinet for infectious disease laboratories. Jour. Lab. Clin Med. 30: 712-716. 1945.

1943

228. REYNIERS, J.A. Introduction to the general problems of isolation and elimination of contamination micrurgical and germ-free techniques. Springfield, Ill., Charles C. Thomas Co. 1943. p. 95-113.

1939

229. WELLS, W.F., WELLS, M.W. and MUDD, S. Infection of air: Bacteriological and epidemiologic factors. Amer. Jour. Public Health 29(8): 863-879. Aug. 1939.

III. Permuted Index

Key words in the title of each of the articles referenced in this work have been rotated to the beginning of the title and alphabetized.

Thus, if one should search for "microbiological barrier techniques" it would appear alphabetically at the beginning of the line for all titles in which it actually occurs.

The number at the right refers to the bibliographical citation number.

IV. Author Index

The following is a listing of all authors, whether senior, sole or one of multiple authors whose works are cited in this bibliography. The numbers at the right refer to the bibliographical citation number.

AUTHOR INDEX