

# The Bethesda-Ballerup Group Of Paracolon Bacteria

The Bethesda-Ballerup group of bacteria was formed by combining the Bethesda group of Edwards, West, and Bruner (1948) and the Ballerup group of Bruner, Edwards, and Hopson (1949). The latter group is typified by the culture described as *Salmonella ballerup* by Kauffmann and Moeller (1940). The two groups were combined because there were no consistent differences in their biochemical reactions and, as the study progressed, it was found that a marked community of O and H antigens existed between the two. Strains previously classified in the Bethesda group were agglutinated by serums derived from type cultures of the Ballerup group, and vice versa. Both groups could be classified among the organisms referred to as *Paracolobactrum intermedium* of Borman, Stuart, and Wheeler (1944) and both belonged to the more strictly defined type 14011 of Stuart, Wheeler, Rustigian, and Zimmerman (1943).

Upon isolation mediums and in preliminary biochemical tests the Bethesda-Ballerup strains resembled *Salmonella* and produced confusion in diagnosis. Further, they were found frequently in the stools of persons affected with diarrhea and gastroenteritis and were thought by some workers to be capable of causing those conditions. Thus the organisms not only complicated the diagnosis of salmonellosis, but possibly played some role in the causation of enteric infection. It was to facilitate the recognition of the bacteria and to provide a means whereby their role in enteric infections could be assessed that the work was undertaken.

A total of 506 cultures was included in the study. The bacteria were derived almost entirely from the intestinal tracts or stools of

man and the lower animals. Many cultures were isolated from persons with enteric infection but others were from normal individuals. The cultures of animal origin were largely from normal dogs, cats, monkeys, and other animals,



Public Health  
MONOGRAPH

No. 22

This article is a summary of the principal findings presented in Public Health Monograph No. 22, published concurrently with this issue of Public Health Reports. The authors are bacteriologists at the Enteric Bacteriology Laboratory, Communicable Disease Center, Public Health Service, Atlanta, Ga.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, Government Printing Office. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch, Public Health Service. Copies will be found also in the libraries of professional schools and the major universities, and in selected public libraries.

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West, Mary G., and Edwards, Philip R.:  
The Bethesda-Ballerup Group of Paracolon  
Bacilli. Public Health Monograph No. 22  
(Public Health Service Publication No.  
362). U. S. Government Printing Office,  
Washington, D. C., 1954. Price 30 cents.

and fowl. All of the cultures produced H<sub>2</sub>S, were methyl red positive, Voges-Proskauer negative, failed to produce indol, utilized Simmons' citrate and D-tartrate, and failed to hydrolyze urea. All fermented glucose promptly, usually with the production of gas. None utilized adonitol nor liquefied gelatin. Fermentation of lactose, sucrose, and salicin was variable. Fermentation of these substances usually was delayed and often was negative.

Serologic examination of the organisms revealed that they composed a closely integrated group with interlocking O and H antigens and that relationships existing between and among the strains were numerous and complex. In spite of these complex relationships, it was possible to establish 32 O groups which included 35 O types. The H antigens were more diverse, and 88 H antigens which occurred in 75 combinations were recognized. On the basis of these O and H antigens a schema which included 167 serologic types was established. Among cultures of the Bethesda-Ballerup group received for diagnosis, 95 percent could be assigned to the above-mentioned O groups and both the O and H antigens of 85 percent of such cultures could be recognized.

Once the antigenic limits of the group had been established, the production of polyvalent serums for screening procedures was investigated. This problem was complicated by certain O antigen relationships to the *Salmonella* group. In spite of this difficulty polyvalent screening serums were produced which, when

used in conjunction with polyvalent *Salmonella* serum, were a distinct aid in diagnosis.

The Bethesda-Ballerup group of paracolon bacilli possessed biochemical characteristics similar to the indol negative strains usually classified as *Escherichia freundii*. The only difference between the latter species and the Bethesda-Ballerup group was that *E. freundii* fermented lactose rapidly, whereas the paracolon bacteria fermented lactose slowly. Therefore, the diagnostic serums prepared for the classification of the paracolon bacteria were used to examine 79 typical cultures of *E. freundii*, most of which were isolated from soil, water, and stools. Using the Bethesda-Ballerup antiserums, either the O or H antigens, or both the O and H antigens of 70 percent of the cultures could be recognized. It was noted that speed of lactose fermentation was not correlated with serologic properties since both slow and rapid lactose fermenters were found in the same serologic types.

From these results it seems likely that the Bethesda-Ballerup group actually is a part of a larger *E. freundii* group. No definite conclusions could be drawn regarding the role of the organisms in enteric infection. However, since serologic types were established and means provided for the recognition of identical strains, henceforward it will be possible better to assess the significance of the bacteria in the production of disease. In addition, methods were established for the production of screening serums which were a distinct aid in the recognition of the group.

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# technical publications

## Health Manpower Source Book

### County Data From 1950 Census and Areas Analysis.

*Public Health Service Publication No. 263, section 4. 1954. By Maryland Y. Pennell and Marion E. Altenderfer. 247 pages; tables and maps. \$1.75.*

### Industry and Occupation Data From 1950 Census, by State.

*Public Health Service Publication No. 263, section 5. 1954. By Marion E. Altenderfer and Maryland Y. Pennell. 215 pages; tables. \$1.50.*

Special tabulations from the 1950 Census of Population are the basis of the information in sections 4 and 5 which conclude the health manpower source book series. Data are presented on the following 18 health occupations which are treated as specific categories: chiropractors, dentists, dietitians and nutritionists, professional nurses, student professional nurses, optometrists, osteopaths, pharmacists, physicians and surgeons, psychologists, medical and dental technicians, veterinarians, attendants in physicians' and dentists' offices, attendants in hospitals and other institutions, opticians and lens grinders and polishers, midwives, practical nurses, and therapists and healers not elsewhere classified (including chiropodists, occupational therapists, physical therapists, and certain other health personnel).

Section 4 presents information on the number of employed persons in the health occupations of individual counties and data on population, hospital beds, and selected socioeconomic factors. Because of the interdependence of counties in the utilization of health resources, the data are presented for several different geographic aggregates which can be evaluated as health service areas. The text gives an analysis of health

facilities and personnel resources in these groups of counties.

In section 5 a set of tables shows the characteristics of workers in each health occupation, for the 4 regions and for the 48 States and the District of Columbia. This publication also includes material on the occupation, class of worker, and sex of persons in the two health service industries—hospitals and health services excluding hospitals. Details are provided about occupations within the health service industries for the United States and on major occupation groups within the health service industries for regions and States.

## Nursing Aide Instructor's Guide

*Public Health Service Publication No. 342. 1953. 26 pages; illustrated. 25 cents.*

This guide was prepared by the Division of Nursing Resources to help nurses in hospitals who are called on to teach nursing aides. It is designed for instructors who use the illustrated "Handbook for Nursing Aides in Hospitals" as their text.

The booklet suggests ways the teacher may expand and adapt the handbook material to fit the individual hospital's policies and practices, and tells how to organize a planned program of instruction. The flexible teaching method recommended allows the instructor full freedom to use her own ideas and imagination in training nursing aides.

The guide is part of a nationwide training project in which the Public Health Service, the American Hospital Association, and the National League for Nursing have collaborated. The Division of Nursing Resources staff wrote the basic handbook, the American Hospital Association published it in Chicago, and

the league is carrying on institutes to teach the training method.

The American Hospital Association has purchased stocks of the guide from the Superintendent of Documents and supplies one copy free of charge to each hospital placing a bulk order for the handbook. Bulk orders of the guide should be placed with the Superintendent of Documents, U. S. Government Printing Office.

## Nurses

*Public Health Service Publication No. 345. 1954. 16 pages. 15 cents.*

This booklet discusses the opportunities a nurse has to set in motion proper procedures for dealing with the emotional problems of her patients and their families. It tells of the nurse's potential ability to be a major influence in building sound mental health among people. It suggests that the nurse can apply to her work the principle common to both nursing and mental health care: satisfying human needs.

The booklet explains that because a nurse works directly with people and because she frequently is called upon to help at critical periods in their lives, she needs knowledge and understanding of human behavior and the ability to apply these to best advantage.

There is also in the booklet a list of source material, including films and radio program transcriptions, with information on availability.

## Training and Research Opportunities Under the National Mental Health Act

*Public Health Service Publication No. 22. Mental Health Series No. 2. Revised 1954. 15 pages. 10 cents.*

This pamphlet describes the opportunities available under the National Mental Health Act of 1946 for support of training leading to a career in one of the mental health disciplines or for training as a re-

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search investigator in the field of mental health. It also describes the National Institute of Mental Health's research grants program which provides funds for the support of fundamental, applied, and developmental research in the field of mental health. Eligibility requirements and procedures for applying for traineeships, research fellowships, and research grants are outlined.

The program for support of research and training in the field of mental health is administered by the National Institute of Mental Health—1 of the 7 National Institutes of Health of the Public Health Service.

## Rehabilitation Centers In the United States

*By Henry Redkey. Published and distributed by the National Society for Crippled Children and Adults, Chicago, Ill. 1953. 128 pages; illustrated. Reprinted by the Office of Vocational Rehabilitation, U. S. Department of Health, Education, and Welfare, 1954.*

This publication is a compilation of information submitted by 40 rehabilitation centers for the First National Conference on Rehabilitation Centers, December 1-3, 1952, under the sponsorship of the National Society for Crippled Children and Adults and the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare.

The material is intended to be useful as a guide to help those persons wishing to provide up-to-date facilities for the disabled in their communities, as well as a reference for those already engaged in the operation of rehabilitation centers.

With the exception of one center which serves only the tuberculous, this survey is limited to those centers serving several disability groups.

The centers have been divided into 6 classes: teaching and research centers, centers operated by hospitals and medical schools, community centers with beds, community outpatient centers, insurance centers, and vocational rehabilitation centers.

## Health Abroad: A Challenge to Americans

### Iran: One of Many

*Public Health Service Publication No. 349. 1954. 13 pages; illustrated.*

This pamphlet describes the Foreign Operations Administration's health program in Iran, as a representative sample of such programs in 39 countries throughout the underdeveloped areas of the world. The story of Iran embodies most of the characteristics of the United States overseas missions and of the activities carried on by United States health workers abroad. In Iran are seen all of the contrasts in health knowledge, attitude, and conditions that American workers are encountering in their battle against disease in many parts of the globe.

Through the Division of International Health, the Public Health Service now recruits and assigns staff to the United States Operations Missions, provides technical and program support and evaluation, and operates a fellowship program for trainees sent to this country by United States Operations Missions, the World Health Organization, and foreign governments.

The missions are comprised of physicians, sanitary engineers, sanitarians, nurses, malariologists, health educators, and other specialists in the various disciplines of public health and sanitation.

Because of the expanding program and replacement of personnel completing the prescribed 2 years of

duty, there is a continuous need for all types of qualified public health personnel in this important program. This pamphlet includes information on how to join the overseas health program.

## Public Health Service Research Grants and Fellowships, 1953

*Public Health Publication No. 339. 1954. 55 pages. 25 cents.*

The Public Health Service research grants and fellowships program, administered by the Division of Research Grants of the National Institutes of Health, is intended to increase the research potential and accelerate the research effort throughout the United States. Research assistance of approximately \$23 million was granted for the fiscal year of 1953 and covered investigations in the full range of medical and related biological studies. The awards were made in support of individuals in training or research in 301 institutions located in 44 States and several foreign countries.

This pamphlet lists the recipients of the 2,084 research grants and the 543 research fellowships alphabetically by State or country and by institution. The amount of the award and the subject of study are given. A brief description of the processing of applications is included.

## Statistical Summary of Water Supply and Treatment Practices in The United States

*Public Health Service Publication No. 301. 1953. By John R. Thoman. 53 pages; tables. 20 cents.*

Based on the 1948 Inventory of Water and Sewage Facilities (unpublished), this report analyzes, discusses, and summarizes data on public water supply and treatment facilities in the United States. Supplemental statistical data from various sources have been used in the

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comparisons and development of trends.

The summary is considered a valuable tabulation of basic data on American water supplies. The detailed information was collected from sanitary engineering divisions of the State health departments, covering data of incorporated communities of over 100 population and unincorporated communities of over 500 population. Data furnished include estimated population served, ownership, source of supply, rated capacity and average daily output, type of laboratory control, and distribution system storage.

This is one of a continuing series of reports issued by the Public Health Service concerning water and sewerage practices in the United States. The most important of these are: Inventory of Water and Sewage Facilities in the United States, 1945 (published in 1948); Statistical Summary of Sewage Works in the United States, Public Health Reports Supplement No. 213 (April 1950); Water Pollution in the United States, Public Health Service Publication No. 64 (1951); Public Sewage Treatment Plant Construction, 1952, Public Health Service Publication No. 291; Public Sewage Treatment Plant Construction, 1953 (in preparation).

## Management of Venereal Diseases

*Public Health Service Publication No. 327. 1953. 14 pages.*

Designed for physicians, nurses, students in professional schools, medical societies, and allied professional groups, this pamphlet contains in brief form the latest information available as of September 1, 1953, on the treatment and re-treatment of venereal diseases. Schedules for treatment of primary and secondary syphilis are based upon experience of the Therapy Evaluation Unit of the Venereal Disease Program, Public

Health Service. The schedules for treatment of other stages of syphilis and other venereal diseases are based upon the experience of various workers and have been used satisfactorily by the treatment centers of the program.

Besides syphilis, the pamphlet contains information on the management of gonorrhea, nonspecific urethritis, saprophytic spirochetal balanitis, chancroid, granuloma inguinale, and lymphogranuloma venereum.

State health departments, as well as the Public Health Service, will supply single copies or limited quantities upon request.

## A Comprehensive Program for Water Pollution Control for the Mississippi-Des Moines-Skunk Rivers Basin

*Water Pollution Series No. 55. Public Health Service Publication No. 314. 1953. 35 pages; appendices; tables. Available from the State water pollution control agencies of Iowa, Illinois, Minnesota, and Missouri and the Mississippi-Des Moines-Skunk Rivers Basin Office.*

This document is one of a series presenting comprehensive pollution abatement programs developed by the States and adopted by the Surgeon General of the Public Health Service in accordance with the Water Pollution Control Act.

This report contains the comprehensive water pollution control program for the Mississippi-Des Moines-Skunk Rivers Basin developed by the Iowa State Department of Health, Illinois Sanitary Water Board, Minnesota State Department of Health, and the Missouri Division of Health. Additional sewage treatment plant construction is recommended, as well as expansion of some of the existing facilities. In-

tensification of State water pollution control educational programs is also urged.

The Mississippi-Des Moines-Skunk Rivers Basin is composed of portions of the States of Iowa, Illinois, Minnesota, and Missouri, with the largest part lying in central Iowa. The basin comprises a part of one of the most productive agricultural areas in the United States. From this region comes a large part of the Nation's hogs and cattle. Production of farm grains and dairy products, as well as industrial production, meat packing and associated products are also of economic importance in the area.

The waters of the streams are utilized for numerous purposes, including municipal water supply, industrial water supply, waste disposal, development of power, livestock watering, recreation, game fishing, and fish and wildlife propagation. There are 134 population centers in the basin served by sewage systems having a connected population of over 547,000. Of these centers, 29 provide no treatment for their wastes; 60 existing municipal sewage treatment plants have an inadequate capacity. The total organic wastes still being discharged into the streams, including those from industries not connected to municipal sewers, are equivalent to the wastes of a population 35 percent larger than the actual population reported.

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This section carries announcements of all new Public Health Service publications and of selected new publications on health topics prepared by other Federal Government agencies.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications issued by other agencies.

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