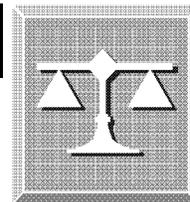


TS-43 December 1962

**General Schedule
Position Classification Standards**



WCPS-2 August 2002

**POSITION CLASSIFICATION
STANDARD
FOR
MICROBIOLOGY
SERIES, GS-0403**



**Workforce Compensation
and Performance Service**



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SERIES DEFINITION

This series includes all classes of positions the duties of which involve the performance of scientific and professional work in the field of microbiology. Microbiology deals with the study of the characteristics and life process of microorganisms, the interrelationships among microorganisms, their relationships to other living forms, and their reactions to the environment in which they are found. This includes (a) work with the protozoa, bacteria, algae, fungi, viruses, rickettsiae, microscopic parasites and similar microscopic and submicroscopic forms; (b) work in such fields as immunology, medical parasitology, physiology, serology, genetics, taxonomy, and cytology as they relate to microorganisms; (c) studies of the form, structure, reproductive processes, genetics, taxonomy, and cytology as they relate to microorganisms and the products of their chemical activities; (d) studies of the distribution of microorganisms in natural and man-made environments including agricultural and non-agricultural products and food processing establishments), their reaction to physical and chemical factors in the environment, their role as pathogenic and immunizing agents, and their isolation, cultivation, identification and systematic classification; and (e) work which involves the development of scientific microbiological methods, procedures, and techniques, and the production and use of microorganisms in agricultural, industrial, medical, sanitary, and other practical applications.

This standard is based on an occupational study of positions in the Microbiology Series, GS-0403, the Bacteriology Series, GS-0420, and related positions in the Federal service, and reflects the advances of modern science in this general occupational area. As now defined, the Microbiology Series, GS-0403, covers a broad scientific complex encompassing a number of recognized specialized fields of biological science, and portions of still other biological sciences as they relate to microorganisms. The Bacteriology Series, GS-0420, the Mycology Series, GS-0431, and the Microanalysis Series, GS-0494, are hereby abolished and the classification standards for those series are rescinded. Bacteriology and mycology are considered to be scientific areas of microbiology.¹ Microanalysis is considered to be a specific technique related more directly to the field in which it is applied, e.g., chemistry, food or textile technology, entomology, etc., and should be classified on that basis.

INCLUSIONS AND EXCLUSIONS

Scientists working in occupations somewhat related to microbiology perform work which bears a strong resemblance to microbiology whenever they work with or use microorganisms or microbiological techniques. The growing of microorganisms in vitro and in vivo, the examination of them under the light microscope and electron microscope, the study or utilization of their chemical, pathogenic, immunologic, serologic, enzymatic, and other effects, reactions, responses, and life processes, are methodologies which may be employed in many lines of

¹ Some mycologist positions involve work which, while partially concerned with microscopic forms is more properly identified with an area of [botany](#), and should be classified accordingly.

scientific endeavor in the biological, physical and engineering sciences and technologies, and even to a very limited extent in certain social sciences (e.g., research psychology, physical anthropology, etc.).

This similarity of work is most likely to occur with respect to the following professional series:

[Biology Series, GS-0401](#)
[Zoology Series, GS-0410](#)
[Systematic Zoology Series, GS-0411](#)
[Parasitology Series, GS-0412](#)
[Physiology Series, GS-0413](#)
[Entomology Series, GS-0414](#)
[Botany Series, GS-0430](#)
[Plant Taxonomy Series, GS-0433](#)
[Plant Pathology Series, GS-0434](#)
[Plant Physiology Series, GS-0435](#)
[Genetics Series, GS-0440](#)
[Fishery Biology Series, GS-0482](#)

[Wildlife Biology Series, GS-0486](#)
[Medical Officer Series, GS-0602](#)
[Medical Technology Series, GS-0644](#)
[Veterinarian Series, GS-0701](#)
[Sanitary Engineering Series, GS-0819](#)
[Chemical Engineering Series, GS-0893](#)
[Physics Series, GS-1310](#)
[Chemistry Series, GS-1320](#)
[Nautical Science Series, GS-1360](#)
[Forest Products Technology Series, GS-1380](#)
[Food Technology Series, GS-1382](#)

The difference between microbiology and similar work in these other occupations can usually be resolved by considering (1) the professional training and experience of the incumbent, (2) the way he approaches his work, and (3) the purpose of the work. Each of the professional series listed above has a paramount requirement for a knowledge of a distinguishable and recognized discipline or sub-discipline of science or technology other than microbiology. The scientific approach for each of these series follows the lines characteristic of the discipline involved, and typically microbiological methodology (as hereinafter described) and microorganisms are used as scientific tools in accomplishing work with an end purpose significantly different from the basic purposes of microbiology. For example, a microbiologist may study a plant virus for the basic purpose of increasing man's knowledge about viruses and their relationships and life processes. A plant pathologist's study of the same virus, on the other hand, is directed toward the control of the virus as an economic pest, and normally approaches the problem from the standpoint of the host plant as well as the virus. Similarly, as another example, while the study of microbial genetics is a field of microbiology, geneticists or biochemists often utilize microorganisms as convenient vehicles for studying basic inheritance factors or the composition of the chains of molecules making up the genetic materials themselves.

Cytologists, histologists and hematologists, although using microscopic techniques, primarily work with plant or animal tissues and cells as distinguished from microorganisms. Such work is properly classified in the [Botany Series, GS-0430](#), or the [Zoology Series, GS-0410](#), depending upon the type of tissues involved.

The *taxonomy* of microorganisms is a field of microbiology. Other taxonomic work is classifiable in the [Plant Taxonomy Series, GS-0433](#), or the [Systematic Zoology Series, GS-0411](#), depending upon the kind of organism (i.e., plant or animal) involved. Mycology work which



deals primarily with taxonomy and closely related work of a botanic nature, and which requires thorough preparation in botany, is classifiable in the [Botany Series, GS-0430](#).

The work performed and the methodology utilized by lower-grade microbiologists (typically at GS-5 and GS-7) and the work and methodology of medical or biological technicians ([GS-0645](#) or [GS-0404](#)) and of medical technologists ([GS-0644](#)) are sometimes especially hard to differentiate. In such cases, the microbiologist is usually performing such work for training purposes. The introductory material for the [Engineering Group, GS-0800](#), and the [Medical Technology Series, GS-0644](#), provide applicable criteria for distinguishing professional work from technician work. Although working at professional levels, medical technologists are not generally confined to microbiological work alone, nor do they characteristically work intensively in that field. Essentially, they do medical laboratory testing in a number of fields, including cytology, chemistry, histopathology, and hematology in addition to the several fields encompassed by microbiology. In extreme cases, it may be necessary to consider qualifications required, career ladders and career goals in differentiating individual positions having somewhat similar work characteristics.

GENERAL DISCUSSION

It has often been the custom in scientific circles to treat the disciplines and fields of inquiry which make up microbiology as separate and discrete entities and to apply appropriate differentiating titles, e.g., bacteriologist, mycologist, protozoologist, virologist, immunologist, etc. Within these groups further specializations such as soil bacteriologist, industrial bacteriologist, medical mycologist, and many others are also recognized. In numerous cases, the work tends to specialize in rather small areas or facets of one of the sciences constituting the broad science of microbiology. However, this standard is based upon the broadest frame of reference, and recognizes that this complex of disciplines and sub-disciplines is bound together by common basic qualification requirements and common basic methodology. Thus, common treatment for classification and recruitment purposes is entirely practicable.

Basic qualification requirements:

Regardless of the degree of specialization, microbiology requires: (a) a basic knowledge of biological science, (b) a fundamental knowledge of microorganisms and their life processes, (c) a broad knowledge of microbiological methods, techniques and procedures and (d) a strong background knowledge of chemistry, physics and related mathematics.

Basic microbiological methodology

The methodology involves the application of the following kinds of general techniques:

Cultural Techniques. -- Culturing, or the growing under controlled conditions of *cultures* of microorganisms containing myriads of individuals, is essential to the science of microbiology. Media for growth may include nutrient broths, nutrient agars, and other mixtures, tissue cultures, plant materials, chicken embryos, and living animals. Whether the microbiologist is a *virologist* developing a vaccine, or an *industrial bacteriologist* operating a fermentation process for the large-scale production of chemicals, he is essentially working with cultures of microorganisms. Emanating from the basic methodology of culturing, for example, is the entire technology of industrial microbiology, including the production of antibiotics, enzymes, alcohols, and other chemicals, and many other useful products. A more recent development is the use of tissue culture having the ability to support the growth of viruses previously difficult or impossible to grow, hence essential to virological research and vaccine production. A thorough understanding of the genetic behavior of microorganisms is also an essential part of cultural work.

Identification Techniques. -- Microorganisms are identified by means of systematic studies of their morphological, cultural, and physiological characteristics, fermentation abilities, reactions to environmental and cultural factors such as temperature and pH of the medium, pathogenic and antigenic effects, and staining reactions. Identification, an essential microbiological technique, in turn, requires a basic knowledge of taxonomy, and a good knowledge of biochemical and serological techniques. The basic methodology of identification has evolved techniques going far beyond the basic purpose of the methodology. For example, the metabolic activity of certain microorganisms can be used with great precision to detect the presence or absence, and the amount, of certain chemical substances in a compound. The methodology of identification of pathogens by means of biochemical tests has paved the way to many new developments in diagnosis.

Measurement Techniques. -- The determination of the physical characteristics and biological and chemical activity of microorganisms is fundamental to many aspects of microbiology. Included is the direct measurement of organism characteristics by optical and electron microscopy for study of morphological characteristics or for detailed examination of organism components or activities such as the cytology of bacterial cells or study of the structure of cell walls and cytoplasmic membranes. Other measurements must be made by indirect means such as the response of host animals or plants to inoculation with cultures of the organisms or the response of the microorganism to cultivation on specific substrates and resulting production of metabolites (e.g., toxins) or other chemical reactions (e.g., formation of nitrates).

Thus, while the science of microbiology and the methodology of microbiology are not synonymous terms (the first being considerably broader in scope and the second considerably broader in use and application), microbiology as a science is founded upon the three fundamental kinds of general techniques discussed above and their many and varied derivatives. Advances in this general scientific area depend upon the availability or the development of appropriate microbiological methods and techniques. Some such advances have been contributed by scientists in fields other than microbiology. For example, the latest tools of physical science are

especially valuable in biology. Modern genetic studies are highly dependent upon complex statistical methods. Such tools provide means of studying life almost on a molecular basis. Microbiology has taken full advantage of these developments and is undergoing rapid change because of them.

The work of microbiologists

Microbiologists are involved in basic and applied research, development, regulatory and control work, laboratory diagnosis, and related activities as applied to such fields as medicine and public health; agriculture; production of antibiotics, sera, vaccines, antitoxins, and other biological products; testing of food and dairy products; investigation of human, animal and plant diseases; and various fermentation processes.

Most of the work is performed in a laboratory environment. In the Federal service, this work is generally concentrated in three types of activities -- (1) research and development organizations; (2) regulatory and control agencies; and (3) public health or medical laboratories.

Research and development organizations may be interested in extending the body of knowledge of microbiology itself, or may use microbiology as a means to investigate other scientific areas, or both. Depending upon the specific problems involved, this work usually entails a variety of microbiological, biochemical, biophysical, immunological, taxonomic and other studies and tests on applicable microbiological species or substances derived from these microorganisms. Research work may lend itself to a high degree of specialization.

Regulatory and control work involves the testing of such items as food products, antibiotics, sera, antitoxins, etc., to see that they conform to legal standards such as those established for purity, potency, and safety. It is also concerned with the establishment of such standards, and with the inspection of production facilities producing biologicals for conformance with approved methods and procedures.

Public health and medical laboratories conduct a variety of tests to determine serological and immunological reactions; isolate and identify microorganisms from tissues, body fluids, excreta or lesions; conduct antibiotic sensitivity tests; and perform other related microbiological procedures for the purpose of diagnosing and controlling diseases caused by pathogenic microorganisms.

In some organizations research is carried on in conjunction with medical laboratory or regulatory and control work, and, accordingly, some positions may involve more than one of the functions. Microbiology can be concerned with (1) a general class of microorganism, such as the bacteria or algae, (2) an area of the science which has general implications, such as immunology or soil bacteriology, or (3) application in a particular field, such as medicine or industrial production. In spite of considerable specialization, many assignments require thoroughly competent generalists -- individuals who can carry out a variety of procedures in a laboratory and who are particularly skilled in adapting and applying the methodology of the science in a number of ways. This is especially true of support scientists in teamwork situations which may be concerned with either research and development activities or the application of microbiology.

The work of microbiologists extends to a variety of work situations not described above, for microbiology is an extremely broad occupation. Therefore, while the examples given cover the most typical work situations, and those encountered a majority of the time, they should be considered to be illustrative and not all inclusive.

SPECIALIZATIONS AND TITLING

Due to the breadth of the science of microbiology, specializations in the profession vary and overlap in content, depending upon the viewpoints and objectives of the particular program to which a microbiologist may be assigned. Literally hundreds of specializations which would be valid from one standpoint or another could be established. However, an attempt to classify microbiologist positions in the Federal service by type of work, class or type of microorganism, or field of application would complicate personnel management far beyond the point of practical value. Recognition of needed ability in highly specialized fields can be met by selective certification and related techniques.

Accordingly, the basic title for all positions in this series is "*Microbiologist*."

[Supervisory positions](#) are to be identified by prefixing the word "*Supervisory*" to the basic title.

APPLICATION OF GRADE-LEVEL CRITERIA

The grade-level criteria provided in this standard are descriptive and not restrictive, and should be interpreted as generally illustrative of grade levels.

Research positions at the GS-11 and higher grades are not covered by the criteria in this standard, but are to be evaluated by reference to the [Research Grade Evaluation Guide](#) issued in June 1960. However, a general discussion of research is included in this standard to supplement the information contained in the guide.

Some positions, such as those involving high-level consultant or liaison work and some atypical higher-grade research assignments, may involve work which is of a research nature, yet not readily classifiable by the criteria listed in the guide. Such positions should be classified on an individual basis, using both the guide and these standards as general frames-of-reference.

Evaluation factors

Four classification factors are pertinent in evaluating positions in this series:

Nature and variety of work. -- As expressed in the grade-level criteria, this factor covers the nature of the work assignment and the nature of the supervision or review received by the microbiologist. Due to the breadth of the occupation the factor is covered in rather general terms (although some examples are given), and needs to be considered in close relation to the other factors in arriving at grade-level determinations.

Scientific and technical competence and originality required. -- This factor measures the scientific skills needed to perform the work, especially as regards the exercise of ingenuity and originality in applying, adapting or modifying methods and techniques. At the higher levels it recognizes the scientific competence and authoritativeness of incumbents in a given field as applied to nonresearch situations where such scientists function as experts.

Qualifications required. -- This factor is expressed in terms of depth and intensity of knowledge required in one or more fields of microbiology, as well as the knowledges required in other fields of science, public relations, project management, etc.

Significance of work. -- This is a factor only at the higher levels and deals with the degree to which the position influences the work of others, has an impact on other programs or areas of science, or has an effect on industry operations. It ties in closely with nature and variety of work, and helps to measure the responsibility aspects of that factor.

Application of factors-General considerations

In applying the factors above by reference to the grade-level criteria, it will generally be found that all pertinent factors typical of the grade must be present for the position to be classifiable at that grade. The number of factors has been reduced to an absolute minimum for ease of evaluation, and the factors progress together, generally speaking. For example, a position which is otherwise typical of GS-11 but functions under very close supervision would be rare because scientific work at this level of difficulty is not ordinarily carried out this way. The unusual position of this nature would not be of GS-11 level, but would be evaluated at GS-9.

The "man in the job" concept does not fully apply to many nonresearch situations, especially when the nature of the assignment requires use of standard methodology under prescribed work conditions. This standard gives reasonable recognition to the degree of scientific competence and originality required, and expected, for performance of work at given grade levels. However, findings which reflect a demand for unusual scientific competence in work situations permitting consideration of such a factor (e.g., where significance of the work is highly influencing) should be taken into account in the evaluation.

Typical examples of work assignments, although provided, are only moderately helpful in a standard covering so many varied fields of endeavor as does this standard, since they do not necessarily provide definitive criteria for evaluating positions not in the field cited. In considering the grade-level criteria, classifiers should not assume that one field, e.g., immunology, is more difficult, per se, than another field, e.g., industrial bacteriology. Further, it cannot be assumed that work connected with a rare or unusual organism, or with procedures verging on the limits of human knowledge, is, per se, of higher level than work with organisms more commonly studied, or with procedures which have become established. As a concrete example, a support microbiologist in a research and development environment may be producing experimental vaccines which, if perfected, would represent a great contribution to human health, whereas a regulatory microbiologist may be inspecting an establishment routinely producing accepted and well-established vaccines. In the first case, the employee may be following in detail procedures and techniques prescribed by the microbiologist in charge of the research,

which considerably limits the need for scientific competence and originality. The second employee may be passing on the validity of changes in production methods, requiring a high degree of scientific competence. Thus, the "halo effect" of novel or unique endeavor may have no bearing on the evaluation of nonresearch positions in this series.

Absence of criteria above grade GS-14 does not preclude the classification of positions at higher grades when indicated by a comparison with the specific grade-level criteria indicated for GS-14.

MICROBIOLOGIST, GS-0403-05

This grade is the entrance level in the field of microbiology, requiring sound professional training in the specific principles and theories of microbiology and, to a lesser degree, the general principles and theories of chemistry. The work is selected to provide experience and training in the application of basic professional knowledges and abilities and in the use of scientific methods, procedures, and techniques; to orient and indoctrinate the employee in agency programs, policies, and procedures; and to provide a basis for more responsible assignments in the field of microbiology. Assignments require the ability to make close observations, to handle and manipulate laboratory equipment, and to report findings orally and in writing.

The work is closely supervised, detailed instructions are provided on the use of specific procedures and techniques, and reviews are comprehensive to insure proper application of instructions and methodology. Results are closely checked for accuracy and to evaluate the development of the employee.

MICROBIOLOGIST, GS-0403-07

Assignments at this level typically consist of specific problems that involve the use of a greater range of standard procedures and techniques, and require a greater grasp of scientific theories and principles than does the work performed at the GS-5 level. There is a requirement for some working knowledge of microbiology, chemistry, and methodology above the fundamental training described for the GS-5 level as well as the ability to recognize problems of a microbiological nature; to make pertinent observations; to apply the procedures and techniques in common use in the area of assignment with increasing skill; and to draw tentative conclusions from the laboratory observations as to the cause of these problems.

Assignments and instructions are increasingly general and are related to the development of the employee; work in progress is not reviewed in as much detail as at the GS-5 level or is only spot-checked; and results are not checked in detail except when reported observations are inconclusive or deviate from those normally expected in a given situation.

An employee at this level may be assigned, under the technical guidance of another scientist, to perform standard tests to assay the potency and purity of the antibiotic components of therapeutic products; to prepare and maintain cultures of tissues or cell lines in vitro; or to perform a variety of diagnostic tests and make macroscopic and microscopic examinations of cultures of numerous species of bacteria and fungi for the purpose of positive identification.

MICROBIOLOGIST, GS-0403-09

Nature and variety of work. -- The work performed at this grade level involves a broader range of more complex assignments than is typically found at the GS-7 grade level. Assignments are usually limited to an important segment of a scientific area or applied field of microbiology, such as that dealing with the commonly known pathogenic bacteria and fungi, a group of viruses, serology, pollution work, a recognized group of soil bacteria, or a specific segment of an industrial process. The duties of positions at this level involve a range of activities concerned with collecting specimens and making tests to determine what forms are present or absent, establishing data to support other work, and ascertaining readily identifiable relationships that have an important bearing on the work.

The nature of typical assignments at this grade level is such that the incumbent must perform the work independently and use a much more comprehensive knowledge of his specialty than at the GS-7 level. Typically, the duties of positions at this grade level involve the responsibility for seeing that the assigned phases or segments of the work are performed satisfactorily in their entirety, and require the application of a full range of methods, procedures, and techniques peculiar to the area of the science or the phase of the applied field of microbiology involved.

At this level the work is reviewed periodically to see that it generally conforms to established policies and procedures and to ascertain that it is technically accurate.

A microbiologist at this level might be assigned, as part of a study of the effects of irradiation on immunity and susceptibility to infection, to develop by known methods a strain of microorganism resistant to a given antibiotic, and to carry out given portions of the overall experiment under the guidance of the microbiologist responsible for the research project. Some microbiologists at this level, receiving general instruction and guidance from a higher-grade microbiologist in charge of the laboratory, may be responsible for microbiological diagnostic services in a medical laboratory when such work involves difficult identifications of pathogenic organisms, the evaluation of the bacteriostatic effects of new drugs, and rendering advice to physicians on such problems as appropriate diagnostic tests, antibiotic therapy, and special sterilization procedures.

Scientific and technical competence and originality required. -- At this grade level, the incumbent must be a thoroughly competent and productive worker in his area of assignment, and must be able to apply the general scientific theories and principles of microbiology and chemistry to his work. Characteristically, at this level the incumbent also makes independent decisions in a somewhat limited or restricted area or field of microbiology. In addition, the duties of most positions require him to apply, adapt, and use the methods, procedures and techniques peculiar to the area of assignment in his day-to-day work.

Qualifications required. -- In addition to meeting the basic qualifications indicated for the next lower grade level, the incumbent of positions at this grade level must have a sufficient amount of fundamental training and experience in applying the theories the principles of microbiology and chemistry to his work, and in applying the methods, procedures, and techniques peculiar to his



assigned area or phase of the work, to constitute a general working knowledge of these sciences and methodologies; must be able to solve problems by applying these theories and principles and by applying, modifying, or adapting these methods, procedures, and techniques; and must have ability to use a high degree of judgment.

MICROBIOLOGIST, GS-0403-11

Nature and variety of work. -- Characteristically, the assignments at this grade level involve work which either (1) is concerned with a larger variety of problems in a number of related scientific areas, e. g., bacteriology, mycology, immunology, etc., or (2) involves the intensive application of a specialized knowledge of the scientific area or an important phase or segment of an applied field of microbiology. The duties of positions at this level involve a full range of activities pertinent to the scientific area or phase or segment of an applied field of microbiology involved and are typically performed independently under general supervision. At this level the work is reviewed to see that it generally conforms to established practices and procedures and may be checked periodically to see that it is technically accurate.

A microbiologist at this level, receiving general instruction and guidance from a higher-grade microbiologist in charge of the laboratory, may be responsible for veterinary microbiological diagnostic services in a reference laboratory serving other laboratories and maintaining technical surveillance over their microbiological activities. Also typical of this level is the preparation, based upon the literature, of standards of identity, strength, quality and purity, as well as test methods to be used, for antibiotic drugs; the conduct of very difficult non-standard tests and assays of antibiotics; and participation with higher-grade microbiologists in the inspection of antibiotic production facilities.

Scientific and technical competence and originality required. -- The degree of scientific and technical competence required at this level is evidenced by the wide range of assignments or the intensity of the work, and by the inherent complexity of the problems encountered. At this grade level, the work requires the application of a broad knowledge and understanding of the science of microbiology and related sciences in skillfully applying, adapting, and modifying methods, procedures, and techniques in solving a wide range of problems or in meeting the needs of many situations. The incumbent typically must display initiative and originality in planning and carrying out his work.

Significance of the work. -- In some assignments, the significance of the work has an effect on grade-level determination, particularly where the duties involve segments of highly important or highly sensitive areas or fields of microbiology. For example, this is the first level at which the work typically involves making recommendations on actions to be taken in connection with carrying out regulatory and control programs, or the responsibility for seeing that an important and sensitive segment of a production program is carried out properly.

Qualifications required. -- The work performed at this grade level requires the application of a broad professional knowledge of the scientific theories and principles which underlie microbiology, chemistry and physics as these apply to microbiology, and the application of a current and up-to-date working knowledge of the microbiological methods, procedures, and

techniques which are applied in the general area or field of microbiology involved; the ability to recognize a substantial range of microbiological problems and the scientific implications of these problems; the ability to select ways in which microbiological methods, procedures, and techniques can be applied, adapted, or modified to solve these problems; the ability to employ this methodology skillfully and with precision to a number of different work situations; and the ability to make refined observations; to interpret their microbiological implications, and to make accurate and precise reports on the results of these observations.

MICROBIOLOGIST, GS-0403-12

Nature and variety of work. -- The work at this grade level is characterized by its complexity and difficulty as evidenced (1) by the variety of assignments, or (2) by its intensity. Assignments normally cover a considerable range of problems peculiar to a general work situation, a highly intensive scientific area of microbiology, or a major segment or phase of an applied field of microbiology. The duties and responsibilities of positions and the nature of the problems encountered at this level require the incumbent to apply, adapt, and modify a wide range of methods, procedures, and techniques, and to interpret his findings on the basis of the scientific implications involved, often without having any very clear precedents established for the specific work situation involved.

At this level, the duties of the positions are performed under general guidance. The incumbent must be able to recognize the various implications of any of the wide range of problems he encounters as they arise, has to approach each on a scientifically sound basis, and must be able to solve the majority partly by applying his knowledge and understanding of the general field of microbiology and partly on the basis of his training and experience in the specific area or field of microbiology involved.

A microbiologist at this level may be responsible for a scientific program for the regulatory evaluation and control of a group of germicidal or pesticidal agents, involving the development of methods of analysis of the efficacy of such agents, the provision of authoritative advice on germicidal agents to enforcement officials, and the conduct of various special investigations, including presenting expert testimony in court cases. Also typical of this level is complete administrative and technical responsibility for a clinical, public health, or medical laboratory providing a full range of laboratory services (including microbiological).

Scientific and technical competence and originality required. -- The work performed at this grade level characteristically requires the application of knowledges, abilities, and skills which are indicative of full scientific and technical competence in the field of microbiology and a broad knowledge of the disciplines of chemistry and physics. It also requires the application of a high degree of skill in applying, adapting, or modifying methods, procedures, and techniques to meet the needs of specific work situations. At this level, the duties and responsibilities are generally such that they can only be performed by a fully competent microbiologist in a scientific area or a highly important segment of an applied field of microbiology. Because the problems vary so much, the work at this level characteristically requires the exercise of a great deal of initiative and originality, if the problems are to be solved or the interpretations are to be made correctly.



Significance of the work. -- At this grade level the nature of the work is often such that it has a significant impact on other work and on other work programs. Microbiologists working at this grade level appear as expert witnesses, make full inspections of production facilities, and make firm recommendations on actions to be taken in connection with carrying out regulatory and control programs; are normally placed in charge of clinical, public health, or medical laboratories providing a full range of services; or serve as specialists in a restricted and highly specialized field of microbiology.

Qualifications required. -- The same general knowledges, abilities and skills indicated as requirements for the GS-11 grade are also required at this grade level. However, the incumbent of positions at this grade level must be more thoroughly conversant with the scientific theories and principles involved, be more broadly and more thoroughly grounded and better trained in the use of methods, procedures, and techniques, and be able to apply, adapt, and modify these procedures to meet the exacting needs of specific work situations with greater skill and precision. Where the work is highly specialized and intensive, a highly specialized working knowledge of the scientific area or particular field of applied microbiology involved, and a full working knowledge of the methodology peculiar to that area or field, are required.

For positions which involve administrative or public relations responsibilities, the ability to work with a laboratory staff or the ability to work effectively with people in other organizations, and the ability to negotiate solutions to controversial scientific and technical problems are also required.

MICROBIOLOGIST, GS-0403-13

Nature and variety of work. -- The work performed at this grade level is characterized (1) by its scope, breadth, and complexity, or (2) by its depth and intensity. Assignments at this level normally cover a very broad range of microbiological problems in a general work situation, or are concerned with the intensive nonresearch exploitation of a scientific area or field of applied microbiology, where the work is designed to probe the area or field in considerable depth. The nature of the work performed at this level is usually such that existing theories, principles, and methodology are only generally applicable and often inadequate, and the problems characteristically require the application of a comprehensive and refined scientific knowledge of microbiology, chemistry, and physics, and of the methods, procedures, and techniques involved. Positions at this level usually provide leadership and guidance in an important scientific area or major segment of an applied field of microbiology and require the application of a highly specialized and intensive knowledge of the subject-matter area or field involved.

A microbiologist at this level, in a regulatory and control program, may be responsible for carrying out the in vitro assay of all antibiotic products under regulatory control, including the development of assay methods, the interpretation and reporting of findings, and the recommendation of standards for the industry based on such findings. Microbiologists at this level may also be completely responsible for large and important medical laboratories, usually with a standardization, control, or reference function which goes beyond the scope of the usual hospital microbiological laboratory; or help administer large public health or medical laboratory programs involving a number of hospitals or medical installations.

Scientific and technical competence and originality required. -- The incumbents of positions at this level are recognized for their authoritative scientific and technical competence in their subject-matter field of microbiology, and generally function as such authorities in their day-to-day work. The nature of the assignments at this level is such that guidelines, methods, procedures, and techniques are seldom adequate, and background information is usually inadequate or unavailable. Because of this, the microbiologist at this level adapts, modifies, and develops methodology to meet his precise needs, and arrives at sound conclusions on this basis.

Significance of the work. -- At this grade level the work usually has a direct impact on the specialized field involved, affects the nature of the parent program, and has an indirect effect on a number of related programs and on microbiological work in general. For example, microbiologists at this level appear in court as expert witnesses and are accepted as recognized authorities in their field, make full investigations and inspections of all kinds of production facilities, and make firm recommendations on what actions, including those of a very controversial nature, should be taken in connection with the carrying out of regulatory and control programs. In medical and clinical programs the work has more than local significance, and usually affects the work of a number of other laboratories.

Qualifications required. -- In addition to the knowledges, abilities, and skills indicated as requirements for GS-12, incumbents of these positions must have a highly specialized and intensive knowledge of the general subject-matter area of microbiology in which they work, must be thoroughly conversant with the refinements of the methodology applied in the work, and must have the ability to apply a broad understanding of the various scientific theories, principles, and practices which are involved in the various facets of their everyday work. 19, 12/62, TS-43

Nature and variety of work. -- The work performed at this grade level is highly complex and extremely difficult and (1) requires the application of an extremely broad and comprehensive understanding of microbiology, and of the sciences which underlie microbiology, to an extremely wide range of problems; or (2) requires the application of a highly intensive and specialized knowledge to a highly important and little understood area or field of microbiology, where the knowledge is either only partially developed or lacking. An incumbent at this level functions as a fully recognized authoritative source of knowledge in his area of assignment and provides the leadership necessary to carry out a complex microbiological program, such as that concerned with a major segment of the laboratory and related operations of a national regulatory and control program, a major segment of an industrial production program, etc. As an example, such a microbiologist in a regulatory program responsible for certifying the efficacy of all antibiotics may function as a technical expert in formulating certification procedures, developing advisory opinions and recommendations submitted by the organization, passing on the adequacy of new and revised manufacturing techniques, reviewing factory inspections made by other microbiologists, and advising the head of the organization on policy matters having scientific implications.

Scientific and technical competence and originality required. -- At this grade level microbiologists are recognized for their outstanding competence, serve as authoritative sources of information, and function as leaders in their program.

Significance of work. -- At this grade level the nature of the work is always such that it has a significant impact on the program involved, similar programs, and on microbiological work in general. Characteristically, the microbiologists working at this grade are placed in charge of important segments of major microbiological programs, supply the leadership necessary to provide very essential and critical laboratory support services, e.g., concerned with providing full support for a national program, a highly important segment of a national standardization program, etc., or perform work of similar difficulty.

Qualifications required. -- In addition to the qualifications indicated for the GS-13 grade, the work at this level requires the ability to provide outstanding leadership in an extremely broad or highly specialized and little understood area or field of microbiology, and the ability to plan, execute, and carry out a broad and highly essential microbiological program.