VI CONGRESSO INTERNAZIONALE DI MICROBIOLOGIA

ROMA 6-12 SETTEMBRE 1953

Segretario Gen.: E. BIOCCA *Presidente: V. PUNTONI*

ATTI
DEL VI CONGRESSO INTERNAZIONALE DI MICROBIOLOGIA

VOLUME I

SEZIONI I-V

N. 1-300

SEZIONE I - Microbiologia generale

SEZIONE II - Fattori di inibizione

SEZIONE III - Genetica dei micro-organismi

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SEZIONE V - Tecnica e diagnostica microbiologica

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La pubblicazione degli Atti del VI Congresso internazionale di microbiologia ha presentato alcune serie difficoltà di ordine teorico e di ordine pratico, dovute alla complessità del Congresso stesso ed al numero molto elevato delle comunicazioni e delle discussioni.

A lato di contributi pregevolissimi sono stati inviati i testi di comunicazioni che non sarebbero degne di comparire a lato dei primi se non fosse prevalso il concetto della massima liberalità.

Tutti i lavori, seguiti dalle relative discussioni, sono stati inviati ai Presidenti di Sezione per la loro approvazione; il Comitato di redazione si è limitato a richiamare l'attenzione dei Presidenti su alcuni contributi poco raccomandabili, al fine di controllare se essi corrispondessero alle comunicazioni esposte in sede di Congresso.

Le bozze di stampa di tutti i lavori, seguiti dalle relative discussioni, sono state inviate agli Autori; la redazione degli Atti non può assumere responsabilità per eventuali errori tipografici dovuti a mancato rinvio delle bozze di stampa da parte degli Autori stessi.

Il Comitato di redazione non ha creduto opportuno di apportare proprie correzioni ad eventuali inosservanze delle regole di nomenclatura e di regole delle citazioni bibliografiche, lasciando agli Autori la responsabilità dei loro testi.

La maggior difficoltà incontrata dal Comitato nella redazione, è stata rappresentata dalla raccolta e dalla pubblicazione delle discussioni; alcuni fogli manoscritti sono stati decifrati con molto sforzo ed il Comitato si scusa di eventuali inesattezze perchè, ad evitare notevoli ritardi della stampa, non è stato possibile inviare le bozze agli oratori intervenuti nelle discussioni.

Gli Atti del Congresso sono stati riuniti in 7 volumi, raggruppando in ciascuno di essi le Sezioni nella forma più razionale a giudizio del Comitato di redazione ed obbedendo ad esigenze editoriali.

V. Puntoni, *Presidente*

E. Biocca, *Segretario Gen.*

ATTI

DEL

VI CONGRESSO INTERNAZIONALE DI MICROBIOLOGIA

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1.

NOMENCLATURE OF VIRUSES: THE PRESENT POSITION

C. H. Andrewes

(National Institute for Medical Research, London, England)

At the International Congress of Microbiology held at Rio de Janeiro in 1950, discussions were held on the application of binomial nomenclature to viruses. A virus subcommittee of the International Nomenclature Committee was set up and this made suggestions as to principles which should be used in the classification of viruses. Further, arrangements were made for study groups of about three people to consider the advisability of applying binomials to certain better understood groups of animal viruses and to make proposals. Action on parallel lines was to be taken by sections of the subcommittee dealing with plant viruses and phages. Reports of those concerned will now be before the virus subcommittee and the International Nomenclature Committee itself. This comunication will attempt to sum up the present position.

2.

SEROLOGICAL RELATIONSHIP BETWEEN MENINGOCOCCI OF THE FRENCH TYPE C AND GROUP II *ALPHA*

SARA E. BRANHAM and MARION F. WORMALD

(Laboratory of Biologics Control, National Microbiological Institute, National Institutes of Health, Bethesda, Maryland, U.S.A.)

Types A and B of the French classification of meningococci have long been known to correspond with Groups I and II of the British, but the relation of Types C and D to other schema has been unknown. This situation has recently become of taxonomic importance since the Sub-Committee on Nomenclature of Neisseriaceae has recommended, following the International Code of Nomenclature, the classification of the meningococcus into Groups A, B, C and D, assigning Group C to those meningococcci now designated as II *alpha*. Recent evidence justifies this action.

Six strains of Type C and a small amount of C agglutinating serum were received from France. They were compared by simple agglutination tests with strains that represented the groups found in the United States during recent years. Five of the six C strains were agglutinated well by a number of different II *alpha* sera. Likewise, the sample of C serum and the sera of rabbits immunized with the five C strains agglutinated II *alpha* strains specifically.

The sixth C strain was agglutinated by sera representing Groups I, II, and II *alpha*. It had apparently become rough. It was atypical in colonial appearance and did not ferment any sugars. Sera prepared from it agglutinated all French C strains as well as many of II *alpha* and some of Group I and II.

The study of these strains has shown that the French Type C and Group II *alpha* are very closely related, and probably identical, and that the designation Group C for this serological subdivision of the meningococcus, as recommended by the Sub-Committee on Nomenclature of Neisseriaceae, is justified.

(Complete paper appears in the Journal of Bacteriology).

3.

INTERIM REPORT OF SUB-COMMITTEE ON THE FAMILY *NEISSERIACEAE*

E. G. D. Murray, S. E. Branham

(Department of Bacteriology and Immunology, McGill University, Montreal, Canada and National Institutes of Health, Bethesda, Maryland, U.S.A.)

The first report of this Sub-Committee was presented at the 5th Congress in Rio during 1950. The principal recommendation made in this report was a proposed reclassification of *Neisseria meningitidis* according to the International Bacteriological Code of Nomenclature. The Proceedings of the Rio Congress have not been published as yet, so that bacteriologists working in this field have not had an opportunity to become familiar with this A, B, C, D nomenclature. This proposed classification, however, will be used in the forthcoming Seventh Edition of Bergey's Manual, with its relationship to previous classifications presented in tabular form. The Section on Neisseriaceae in this Edition of Bergey's Manual has been revised by Dr. Branham and Dr. Pelczar, and reviewed by Dr. Murray. Several other recommendations made by our Sub-Committee have been included.

The members of this Sub-Committee have maintained a lively interest in the *Neisseria* with the result that this interim report contains appreciable progress along several lines.

Classification : Through the cooperation of the Pasteur Institut in Paris and the Pasteur Institut Annexe in Dordogne, 6 strains of meningococcus representing the Type C of Nicolle, Debains, and Jouan (1918) were received and studied by Dr. Branham. They were found to be very closely related to, and probably identical with, the group that has been designated during recent years as II *alpha*. Thus the designation of Group II *alpha* as Group C, as proposed by our Committee at the Rio Congress, seems fully justified.

Dr. Bensted has been making intensive effort to find strains of Group IV in order that a suitable study can be made.

Dr. Pelczar has been searching for anaerobic *Neisseria* but has found only strains that seem to be *Veillonellas*.

Epidemiology of Serologic Groups : Several members of the Sub-Committee have had access to newly isolated meningococci which they have typed. See Table below:

	Period	I	II	III	IV	Unclassified	Total
Cohen	1950-52	1	29	20	—	3	53
Bensted	1952	15	75	—	—	—	90
Branham	1952-53	1	13	11	—	—	25

Incidence of meningococcal infection during 1952 and at present in the United States of America is higher than for the previous few years, although it cannot be said to have reached epidemic proportions. Group I, the usual epidemic strain, is conspicuously absent. Miss Cohen found one Group I strain in a total of 53 during these last 3 years, and Dr. Miller and Dr. Branham each encountered one such strain during 1952. In England Group I has been more common as Dr. Bensted found 15 strains of I and 75 of II during that year. The 2 strains which he obtained from the outbreak in Southern Sudan were of Group II. No strains of Group IV were encountered.

Maintenance: Preservation in a « lyophile » or « freeze-dried » state is so desirable that all workers are making every effort to keep their cultures in this way. Lack of facilities for this procedure handicapped Dr. Bensted's attempts to receive viable cultures from the Sudan. Dr. Prévot has observed that his collection of *Veillonella* strains has survived for a long period in such a « freeze-dried » state, whereas all of his strains of *Neisseria* that were stored by that method have been lost.

Metabolism and Nutritional Requirements: Both Dr. Thjötta and Dr. Pelczar have given much attention to this phase of study. One of Dr. Thjötta's assistants has been studying the metabolism of the meningococcus, and another has been investigating the « external » and « internal » antigens of the meningococcus by both immunological and physico-chemical means. This work is still in progress.

Dr. Pelczar's metabolic studies have dealt chiefly with *N. gonorrhoeae*, *N. perflava*, and *N. catarrhalis*. He and his students have established that the compound putrescine is a necessary growth substance for *N. perflava;* they have studied and reported the amino acid requirements for *N. perflava* and *N. catarrhalis;* and have shown that acetic acid and CO_2 represent the end products of glucose metabolism with *N. perflava* and that with minimal amounts of glucose complete oxidation is effected. In contrast *N. gonorrhoeae* was unable to oxidize acetate. The only amino acid oxidized by the gonococcus was glutamic acid.

Suggestions and plans for future work : Dr. Pelczar plans a reexamination of the aerobic pigmented species of *Neisseria (N. perflava, N. flava, N. subflava)* with the idea of establishing a definite opinion as to the validity of species designations in this group. He would like to receive additional strains of *N. subflava*. Dr. Branham suggests that *N. flavescens* and *N. hemolysans* be studied with this group.

Other suggestions that have been made by both Dr. Murray and Dr. Pelczar are: 1) a search for anaerobic members of the genus *Neisseria*. Dr. Prévot's collection was destroyed during the war, and there are no cultures known to be in existence; 2) a search for *Neisseria* and *Veillonella* in animals other than man. The examination of the validity of the named varieties of the two species of *Veillonella* is also suggested by Dr. Murray who feels that identification would be difficult on the basis of the characteristics described.

A very interesting suggestion comes from Miss Cohen: « The Committee may wish to consider, in planning future studies, Dr. Hattie Alexander's current work on the transformation of meningococcus types. An abstract has been published « Indication of new type specificity of *Neisseria meningitidis* by desoxyribonucleric-acid-containing extracts », American J. Dis. of Children, 1952, *84*, 737-738. She says: I have been especially interested in these studies because a number of years ago we noted the spontaneous occurrence of Group I microorganisms in a Group II strain in the course of experiments on the viability of meningococci in sodium chloride solutions ».

Subjects for discussion: All of the above suggestions for further work should be discussed in detail since, with the exception of Dr. Pelczar's plan for work with the pigmented *Neisseria,* the other proposed studies are neither planned nor assigned, Dr. Pelczar would like to hear the views of others regarding species designation in the aerobic pigmented group; i. e. does anyone have recent data which favors either the classification as presented in Bergey's Manual, or the concept of Wilson that these strains are all varieties of one species?

DISCUSSIONE

(Sophie M. Cohen, New York State Dept. of Health, Division of Laboratories and Research, Albany, N. Y.).

Dr. Alexander's paper has been published in full in a recent issue of the *Journal of Experimental Medicine*. Her findings on the transformations of types were with Groups I and II a. Our earlier observations — which were not proved — were with a Group II strain, from which Group I colonies were obtained.

(S. E. Branham, National Institutes of Health, Bethesda, Maryland, U.S.A.).

We have found some cultures Group II of meningococci to develop a tendency to be more related to Group I. Group I was not, however, isolated, as such, from the cultures.

4.

THE FAMILIES DEVELOPED FROM *BACTERIACEAE* COHN WITH A DESCRIPTION OF THE FAMILY *BREVIBACTERIACEAE* BREED, 1953

ROBERT S. BREED

(Cornell University, Geneva, New York, U.S.A.)
(Presented by Prof. E. G. D. Murray, Mc Gill University, Montreal, P. Q., Canada)

In Riassunti d. Comunicaz., VI Cong. Internaz. di Microbiol., Vol. I, No. 4 (Roma, 1953), a description is given of a proposed new family of bacteria, the family *Brevibacteriaceae* Breed. The purpose of the present paper is to describe the relationships of this family and of the species included in the family more adequately.

As knowledge has increased since the time when Cohn (1872) used the expression « Gruppe der *Bacteriaceae* » (*) as a name to include all bacteria, there has been a tendency for bacteriologists to give this family name a more and more restricted meaning. Migula (Arb. bakt. Inst. Karlsruhe, *1*, 1894, 237) for example, in his first classification outline, subdivides the group of bacteria into five families. The third family, *Bacteriaceae*, includes all straight, rod-shaped bacteria. Advancing knowledge caused Buchanan (*) (Jour. Bact., *2*, 1917, 155) to suggest the subdivision of Cohn's original *Bacteriaceae* into five orders. Three years later, the Committee appointed by the Society of American Bacteriologists of which Buchanan was a member (Winslow et al., Jour. Bact., *5*, 1920, 191) suggested the subdivision of one of these orders, *Eubacteriales* (the true bacteria), into six families, four of which were composed of straight, rod-shaped bacteria. The four families were: *Nitrobacteriaceae* (autotrophic nitrifiers), *Pseudomonadaceae* (polar flagellate bacteria), *Bacteriaceae* (all other non-spore-forming, rod-shaped bacteria), *Bacillaceae* (spore-forming, rod-shaped bacteria).

During the period between the publication of Migula's System der Bakterien (1900) and Chester's Manual of Determinative Bacteriology (1901), and the time when the first edition of Bergey's Manual of Determinative Bacteriology (1923) appeared, only Lehmann and Neumann, in seven editions of their Bakteriologische Diagnostik (1896-1927), attempted to gather descriptions of all species of bacteria.

(*) Buchanan (General Systematic Bact., 1925, p. 205) gives an excellent résumé of the introduction of this family name into bacteriological literature.

As their interest was primarily in the medical field, they eventually gave up the attempt to cover the entire field of bacteriology. In the preface to their seventh edition (1927), they describe the situation that faced them at that time as follows: « The broad flowing stream of literature has almost overwhelmed us: It is impossible to write a Kolle-Kraus-Uhlenhuth in two octavo volumes, but the 8000 citations that we give will be sufficient for preliminary work ». However, the ten volume encyclopedia that Lehmann and Neumann mention does not give descriptions of individual species of bacteria.

In 1923, Bergey attempted to bring Chester's Manual up to date. Even with the assistance of an advisory committee appointed by the Society of American Bacteriologists, the first manuscript that was prepared included descriptions of only 854 species. The publication of two more editions in comparatively rapid succession merely increased the number of species described in the first edition from 864 to 1100.

With the publication of the fourth (1936), fifth (1939) and sixth (1948) editions, under the supervision of an Editorial Board, it became possible to review the ever increasing literature more carefully. The sixth edition includes descriptions of 1543 species and a record in the appendixes of 3,828 additional species that are not described in the Manual, although they had been named and described in the literature before this edition went to press in 1947. Additional thousands of described, but unnamed species were ignored.

Few bacteriologists seem to appreciate the number of species of bacteria that have already been described, and new species are continually being described with little attempt being made to determine whether the so-called, new species are really new. The older descriptions are frequently assumed to be inadequate by subsequent authors without sufficient study of previous work. As the Editorial Board of the Manual is not in a position to make monographic studies, more species have been listed without description in the Manual than have been described. The best that can be done at present is to enlist the services of specialists in an effort to clarify this confused situation and to continue to list unplaced species in appendixes. Where the descriptions are sufficient to justify a tentative placing of the species in a recognized genus, the record of the tentatively identified species is associated with the genus where it probably belongs. However, even when this is done, hundreds of unplaced species remain.

The index of the sixth edition lists 12,090 binomials that have been published. Of these, 6719 are now regarded as synonyms. The record of the introduction of unnecessary binomials into the literature by bacteriologists is no worse than that of other biologists; but we have been slower in putting our house in order. Now that an alphabetical list of most of the binomials that have been proposed is available, little excuse can be made for those who do not consult this list before proposing a name for a species that is believed to be new. The record shows many duplications, names like *Micrococcus magnus* and *Bacillus nebulosus* having been proposed several times.

In the development of the six editions of Bergey's Manual, there has been recognition of the need for establishing additional families of rod-shaped bacteria. The four families of rod-shaped bacteria accepted by Winslow et al. (1920) are increased in the sixth edition to ten, as follows: *Nitrobacteriaceae* Buchanan, *Pseudomonadaceae* Winslow et al. and *Bacillaceae* Fischer are defined as they were defined by Winslow et al.

Six additional families have been recognized to care for natural groups of genera previously included in *Bacteriaceae* Cohn. These are *Azotobacteriaceae* Bergey, Breed and Murray, *Rhizobiaceae* Conn, *Lactobacteriaceae* Orla-Jensen, *Achromobacteriaceae* Breed, *Enterobacteriaceae* Rahn, *Parvobacteriaceae* Rahn. One family, *Corynebacteriaceae*, established by Lehmann and Neumann as a family more or less intermediate between the Order *Eubacteriales* (true bacteria) and *Actinomycetales* (mycobacteria and actinomycetes), has been transferred to *Eubacteriales*. Increasing knowledge indicates that the affinities of the corynebacteria with the true bacteria are closer than those of the corynebacteria with the mycobacteria and actinomyces.

However, even this attempt to bring order out of the confusion leaves a residual group of species in the family *Bacteriaceae*. The heterogeneous nature of this assemblage is outlined on pages 596 to 696 in the sixth edition of the Manual. Hundreds of species are listed on these pages, and this in spite of the fact that all of the specie included in *Enterobacteriaceae* that some would allow to remain in *Bacteriaceae* have been removed from that family.

The species left in *Bacteriaceae* include many that are well known and well described. In an effort to improve the placement of some of these species, it is proposed in the next edition of the Manual to transfer the species in *Cellulomonas* Bergey et al. to the family *Corynebacteriaceae* as suggested by Clark (Internat. Bull. Bact. Nomen. & Taxon., *2*, 1952, 45). A better arrangement for the luminescent bacteria has been suggested by Breed and Lessel in a recently published paper (Antonie van Leeuwenhoek, *20*, 1954, 58). The transfer of other groups of species such as the species of the agar-digesting (*Agarbacterium* Angst, 1929) and chitin-digesting bacteria to families other than the *Bacteriaceae* is also under consideration.

The genus *Brevibacterium* proposed in the Abstracts of the Papers presented at this meeting will be recognized in the seventh edition of the Manual, and, with the genus *Kurthia* Trevisan, will constitute the Family *Brevibacteriaceae*. All of the bacteria placed in this family are Gram-positive, non-spore-forming, rod-shaped bacteria. Those placed in *Brevibacterium* are short, usually non-motile rods. The species placed in *Kurthia* include larger, peritrichous, rod-shaped bacteria that grow into filaments.

The genus *Brevibacterium* Breed is characterized as follows: Typically short, unbranched, Gram-positive, non-spore-forming, rod-shaped bacteria that are not active in the production of acid from sugars, particularly lactose. Reproduction is by simple cell division. Some reduce nitrates, others do not. Some are proteolytic attacking