University of California, has solicited the aid of the Smithsonian in rehabilitating the library of the Geological Institute of the Kyoto Imperial University, whose entire collections of specimens and publications were destroyed when that establishment was burned recently. I venture to bring the matter to your attention and to ask whether you will be good enough to insert in SCIENCE an appeal for geological publications for the library of the Geological Institute. Any publications donated for that purpose may be forwarded here for transmission through the International Exchange Service to Japan. Beyond the transportation charges to Washington, which should be prepaid, there would be no cost to the senders of the publications in forwarding them to Japan. Packages should be addressed to "The Smithsonian Institution, International Exchange Service, Washington, D. C.," a letter of announcement being sent to the institution at the time of shipment."

The Museum News reports that a six-story building to be called the Maison Française has been included in the plans for Rockefeller Center, New York. It will occupy the northwest corner of Fifth Avenue and Forty-ninth Street, and will contain four hundred and thirty-seven exhibits on the art, industry and trade of France. In design it will duplicate the British Empire Building planned for the southwest corner of Fifth Avenue and Fiftieth Street.

A GRANT of $1,232,652 from the Rockefeller Foundation to McGill University for the establishment of a neurological institution was recently announced. The cooperation of both provincial and civic authorities in this work has been assured; more than $150,000 has been pledged by friends of the university and members of the governing board, and plans are well under way to develop at the university a neurological center that will be second to none on this continent. The establishment of the institute will involve the construction of a new building, specially equipped for research in neurology, neurosurgery and the physiology and pathology of the nervous system. Dr. Wilder G. Penfield, clinical professor of neurological surgery at the university, has been appointed director. He will be assisted by a staff headed by Dr. Colin Russell, Dr. F. H. MacKay and Dr. W. V. Cone.

THE twenty-first annual report of the Brooklyn Botanic Garden, 1931, calls attention to the fact that during the past year the attendance at the Botanic Garden was nearly 96,000 more than the year before, and the permanent endowment funds increased by $12,420. The total attendance for the year was more than 1,100,000, equal to nearly half the population of Brooklyn, and the permanent endowment fund is now nearly $1,004,000. The report calls attention to the extensive educational program of the garden, including the extensive cooperation with the public and private schools of greater New York. The school service included the supplying of nearly 5,500 Petri dishes filled with sterilized agar for the classes in biology in the high schools of all five boroughs of greater New York, and the supplying of living plant material for botanical and nature study work to more than 5,700 teachers for the instruction of nearly 224,000 pupils. A special section of the report is devoted to the research work in progress at the garden along the lines of plant pathology, disease resistance in plants, forest pathology, especially in connection with the chestnut blight, an extensive beardless iris project, and work in systematic botany and genetics. Seven students are enrolled at the garden for graduate study and other research.

DISCUSSION

MISNAMED CULTURES AND STUDIES OF THE TUBERCLE BACILLUS

ONE of the recent trends of research with the tubercle bacillus, as reported in the literature, has been the attempts to demonstrate variations in that organism. The effect of these reports apparently has been to create a belief that the original Koch bacillus is only one form of a highly variable micro-organism. This belief has led certain research workers to use in their studies organisms which they designated as tubercle bacilli but which, in all probability, were only acid-fast saprophytes.

The only definite criteria for identifying an organism as a tubercle bacillus are those based upon the personal observations of the workers, since there is no adequate description given in the various classifications. We believe that an organism upon isolation from lesions or any other natural source should conform in general to the following description, in order to be classed as a human or bovine tubercle bacillus.

(1) It grows between 30 and 40° C., the optimum temperature being 37° C.

(2) It is a slow grower, requiring about 4 days to 1 week for visible growth to occur, and 2 to 4 weeks to reach its full development.

(3) It does not grow on plain agar.

(4) It grows only on the surface of liquid media, and the inoculum must be floated on the surface. There is no clouding of the medium at any time.

(5) When grown on liquid media, it produces the essential substances of tuberculin, *i.e.*, it will produce the tuberculin reaction when injected into tuberculous animals.

(6) To quote Calmette, "One should regard as tubercle bacilli only those which, when introduced into the body of a susceptible animal, such as the guinea pig, produce tuberculous lesions inoculable in series."

The identity of a stock culture which is labeled a human or bovine tubercle bacillus in any laboratory or collection, and which has properties markedly different from the above, should be questioned, unless it can be proved a descendant of a true tubercle bacillus.

We have noted that in three recent papers in the journals by Isaacs[1], Eberson and Sweeney[2] and Reed and Rice,[3] and in one published in 1913 by Wherry,[4] the descriptions given of an organism used as a human tubercle bacillus would lead one to suspect that the organism was only an acid-fast saprophyte. The culture employed was the same in each instance. Likewise, in the first study of the series by Reed and Rice,[5] it seems probable that a second saprophyte was used under the impression that it was a bovine tubercle bacillus. Subsequently, we obtained transfers of the two organisms, studied their cultural characteristics and investigated their histories.

The human saprophytic tubercle bacillus was listed as culture 607 in the American Type Culture Collection. The description was as follows:

R. D. Herrold, John McCormick Institute for Infectious Diseases, Chicago. Original strain of Koch, brought over by Novy in 1888. Has lost virulence and grows profusely and quickly on artificial media.

Inasmuch as the culture came from Dr. Novy, we addressed a letter to him, and quote the reply in part as follows.

I have your recent letter of inquiry regarding the tubercle bacillus which you mention as having the history of being brought from Koch's laboratory in 1888. Many years ago Dr. Vaughan was engaged in the study of bacterial proteins and this culture was used by him in the belief that it was a direct descendant of that which was brought from Berlin. I have always been very much in doubt about the matter and I have suspected that a mistake had entered into the history. About five years ago I again mentioned the matter to Dr. Vaughan and told him that I suspected that he had received a lot of saprophytic tubercle bacilli from someone and that a mixup must have taken place. I can not give you any exact history of the culture because the material was entirely in the hands of men in Dr. Vaughan's laboratory and only much later on was the culture taken over by my department, but I have always called it a saprophyte rather than by the name which refers to Koch's original culture.

The properties of the culture as brought out by our study are as follows:

Microscopically. Acid fast when destained with 3 per cent. HCl in 90 per cent. ethyl alcohol. Morphology similar to that of the tubercle bacillus.

CULTURAL CHARACTERISTICS

Dorset's egg medium. Abundant growth in 48 hours at 30 or 37° C., good growth after 48 hours at 20° C. Finely wrinkled, spreading growth becoming bright orange after several days.

Plain agar. Good growth in 48 hours.

Glycerine, phosphate, beef infusion broth. Inoculum very hard to sink. Heavy, very coarsely wrinkled, tan-colored membrane over the whole surface after 4 days at 37° C.

Dorset's asparagin, mineral salts medium. Develops more quickly when 1 per cent. mannite is present than when 3 or 7 per cent. glycerine is present. Clouding of the medium occurs after about two weeks.

It was reported in one of the papers[4] that culture 607 did not produce an allergic condition, *i.e.*, that a second inoculation with bacilli known to be virulent did not evoke the usual local reaction in animals inoculated with the saprophytic strain. In another paper[3] it was stated that the culture did not produce tuberculosis in guinea-pigs.

The bovine saprophytic tubercle bacillus was described as culture 599 in the American Type Culture Collection catalog as follows:

N. J. Lynch, Shelton, Conn. 69a. Original culture American Museum Natural History. 69a came to the museum from the University of Buffalo where it was isolated from tubercles in lungs of cow. 1921. It is non-pathogenic and grows profusely and rapidly.

In a letter dated March 27, 1931, Dr. Lynch, Shelton State Tuberculosis Sanatorium, Shelton, Connecticut, gave us the following information. This culture was sent to him from the American Museum of Natural History as a bovine culture (69a). It grew rapidly but always retained its acid resistance and was non-virulent when inoculated into guinea-pigs and rabbits.

According to our study, the characteristics of this

[1] M. L. Isaacs, "Factors which Influence Tests of Bacterial Survival. I. The Effect of Varying Periods of Incubation of the Survival Test Culture," *J. Bact.*, 20, 161, 1930.

[2] F. Eberson and M. A. Sweeney, "Tinctorial Transmutations of Acid-fast Micro-organisms and Virulence of Tubercle Bacilli," *J. Infectious Diseases*, 49, 301, 1931.

[3] G. B. Reed and C. E. Rice, "Studies in the Variability of Tubercle Bacilli. II. Correlation of Colony Structure, Acid Agglutination, and Virulence," *Can. J. Research*, 5, 111, 1931.

[4] W. B. Wherry, "Some Chemical Changes Favoring the Production of Spores in *Bacillus tuberculosis*," *Zentr. Bakt.*, etc., Orig. 70, 115, 1913.

[5] G. B. Reed and C. E. Rice, "Studies in the Variability of Tubercle Bacilli. I. A Rapid-growing Bovine Type," *Canadian J. of Research*, 4, 388, 1931.

organism are like those of culture 607, except that it develops more slowly at 20° C., requiring one week to attain a good growth at this temperature.

In view of both the cultural characteristics and the history of these cultures, it would seem that there is little or no basis for considering them tubercle bacilli. It is most unfortunate that the results of these three research projects were published as contributions to our knowledge of the characteristics of the tubercle bacilli.

The misleading information thus placed in the literature becomes part of the history of the tubercle bacillus, and through references thereto by the authors of subsequent papers is perpetuated. As an example, we found in a paper by Sweany[6] a reference to Wherry's paper[4] as follows "By growing '801'[7] (the original Koch strain) on synthetic media with various alcohols, Wherry, in 1913, produced spore-like bodies in the bacillus and altered the acid fast staining qualities very markedly."

The blame for these misnamed cultures can not be placed on the curators of type culture collections. Such collections can be only depositories, and it must be the responsibility of each worker to check for himself the identity of the cultures which he uses. We wish to emphasize this point in order that further work with the tubercle bacillus may mean progress rather than confusion in the field.

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READING KNOWLEDGE

THE inadequate language equipment of the average American student and research worker in science is fairly well known. Its consequences, however, are hardly well enough realized. It might serve a purpose to focus attention on this important point by giving a few illustrations. They have not been collected by any systematic search. On the contrary, they all happened to come to the writer's attention on one single day, when he had occasion for looking through the chief American contributions in a very limited field. In all, half a dozen papers by American authors were consulted. In this limited material, two instances were found where an inadequate knowledge of German had led the authors in question to fundamentally wrong interpretations on important points.

One author writing in *Soil Science* says:

> Winogradsky found the nitrate-forming organism in his cultures in two stages, one of which he terms "schwärmer" and the other the "free cell stage." It is doubtful if such forms were present in this work, though such might have been the case. The free-cell type was common in all the cultures, and many strains showed great masses of the organisms which resembled very closely the "schwärmer" stage; however, this latter character of growth differed but slightly from the forms found as free cells . . . although the organisms within the group were occasionally slightly smaller.

The passage quoted is about the only one in the paper from which it could be gathered with some definiteness how the American organism studied compares with the classical Nitrosomonas of Winogradsky. As the statement stands, however, it is devoid of any sense. Apparently because of an insufficient knowledge of German, the author must have taken "Schwärmer" to mean the so-called zooglea form, instead of the free, motile monad form which the German term actually signifies. But the zooglea and the monads represent the two opposite extremes within the series of forms characteristic of these organisms.

In a recent contribution in *Centralblatt für Bakteriologie,* dealing with the same organisms, an American author discusses the findings of a German colleague as follows:

> In this way he secured a culture which was either a new form having power of multiplication in 0.3 per cent. peptone solution or his culture was impure.

Then comes a reference to a footnote, reading:

> Heubült says: "Ohne Zusatz organischer Substanzen findet eine normale Entwicklung statt, auch konnte ich bei einer Zugabe von 0.5% [in the original 0.05%; L.G.R.] Glukose kaum eine Wachstumshemmung feststellen. Dagegen war z. B. bei einem Zusatz von 0.3% Pepton oder 2.0% Natr. butyric. überhaupt kein N_2O_3 nachzuweisen, noch fand Wachstum statt, wie die mikroskopische Kontrolle zeigte."

The American author has evidently translated "noch" by "still" or "yet," instead of by "nor," as would have been correct. Because of this error, he quotes the German author as having found exactly the opposite of what he actually did, and his comment is worded accordingly.

It is to be hoped that the present findings do not represent average conditions. But it seems to be too much in any branch of science to find errors such as those quoted in one third of the papers consulted, and this in papers justly claiming international attention, published in technical journals of high standing. This can not contribute to the international respect for American science. As long as the certified reading knowledge of American graduate students and Ph.D.'s remains as uneven as it is, it would seem to be a minimum requirement on the

[6] H. C. Sweany, "The Granules of the Tubercle Bacillus," *Am. Rev. Tuberc.*, 17, 53, 1928.

[7] Wherry's culture "801" has been identified as American Type Culture Collection Culture 607.