varying according to local conditions, can be put on the full-time plan in the beginning. This can be done with the confident expectation that the principle which is the more sound toward improving education will win out in the end.

The development of modern scientific medicine with all its expert skill, and especially the skill of modern surgery, has brought the same possibilities of exaggerated financial reward into medicine that has followed the development of machinery into industry. Moreover, in the practise of medicine, a chair in a great institution serves as the same enormous financial asset as advertising in business. These facts are conspicuous and hence overestimated. The number of men making conspicuous wealth in medicine is not large. The skill of the physician deserves an adequate reward. Unfortunately it has been made to appear as if the fundamental reason for the full-time scheme was an attack on commercialism in medicine. It is not true; the fundamental reason is much more profound, more constructive, it concerns the development of higher ideals of research and teaching. It is true that the development of the full-time scheme makes large demands in terms of ability; it needs men with ability for research, for teaching, and for organization, but men for whom ideals and the chance for a brilliant achievement may outweigh the pursuit of excessive wealth. I say excessive wealth advisedly; the advantages to the community have already been so enormous in the development of scientific medicine, and it is so logically the next step to bring clinical medicine under the principle underlying this progress, that it should be possible to give adequate support to this new development.

I said at the beginning that there had been considerable opposition on the part of the medical profession to the full-time scheme. This opposition I believe to be due to a lack of understanding of the principles involved and to the difficulties of transition. One certainly hears some suggestion, vaguely expressed, perhaps not wholly consciously formulated, of a fear of preventive medicine. To this there can be only one answer. To preventive medicine the medical profession must adjust itself. It is obvious that eliminating typhoid, malaria, typhus, smallpox, cholera and so forth have so far not emptied our hospitals nor diminished the need for doctors; indeed, along with preventive work, many conditions have come into the range of treatment which were formerly untouched, so that up to the present time the effect of preventive medicine has been expressed largely in a lengthening of the expectation of life. This fact, together with the eliminating of many of the weaker schools of medicine, makes it sure that the effects of preventive medicine on the profession belong to another generation, not to ours. When the time comes, the medical profession will make the only possible adjustment of training fewer physicians.

In conclusion, I may say that I do not think that all the problems associated with the practical extension of the full-time scheme to the clinical side have been solved. Adjustments may have to be made, perhaps radical ones, but I profoundly hope that the plan will be given an adequate trial and that it can win the support of those who are teaching in our medical schools, because I believe it of the utmost importance to the community to range the ablest minds in the medical profession on the side of preventive medicine. Besides an occasional school of hygiene and public health we need to have all of the leaders of medical education engaged in research to advance medicine. It is my sincere conviction that the opposition to extending the modern standards of professional education to clinical medicine will yield readily to sound constructive leadership on the part of those who desire this reform.

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PRELIMINARY REPORT ON AMERICAN BIOLOGICAL STAINS

As previously mentioned in this journal,[1] a committee was organized under the auspices of the National Research Council last fall for

[1] "The Standardization of Biological Stains," SCIENCE N. S. LV, 43-44; Conn, H. J.: "American Biological Stains Compared with Those of Grübler," SCIENCE, N. S. LV, 284-285.

the investigation of the biological stains produced in this country. This committee is working in cooperation with the Society of American Bacteriologists, the Botanical Society of America and the American Society of Zoologists. Through the cooperation of these different organizations stains are being tested in their bacteriological applications, and in their histological and cytological uses, both in connection with zoology and botany. The field is a very large one and in some lines the work is only just barely started; but enough information has been obtained in connection with certain uses of some of the stains so that a preliminary report is justified at the present time.

The most important conclusion reached in this work is that in general as good stains can be obtained in this country now as were available before the war. In some cases the American products are distinctly better than were the Grübler stains. The only important stains we have so far failed to find in satisfactory quality in this country are methyl green and safranin. In regard to these it must be mentioned that not all Grübler samples were satisfactory, some of the samples we have tested which were of unquestionable Grübler origin proving as unsatisfactory as the poorest American samples. It must be remembered that Grübler did not manufacture stains, but bought from other concerns in large quantities, and the constancy of his stains was due wholly to the large bulk he was able to buy at once, on account of the large market which he supplied. In general his stains were in no sense pure, and one of the greatest difficulties in this country at present is that as soon as a biologist obtains poor results with a stain he immediately calls for a purer product, which the manufacturer tries to supply, often obtaining stains that are too pure to be used by the same formulæ originally used with Grübler stains. It is not purity so much as agreement with the Grübler products in staining properties that should be desired.

It is hoped that eventually one line of stains may come to have official approval in this country, not necessarily all manufactured by the same house but the production of each stain limited to one concern, so that responsibility of its manufacture can be definitely fixed. Arrangements for this have not yet been made and can not be until more preliminary investigation has been carried on, but at the present time it is possible to recommend certain brands of the most common stains for certain particular purposes.

METHYLEN BLUE

There are various grades of methylen blue on the market, but so far as we have been able to find out, one grade, namely, the medicinal grade generally designated as methylen blue U.S.P., seems to be satisfactory for all purposes. This is the purest grade of methylen blue on the market and, although there are other grades of slightly less purity, designated by such terms as "BX" or "rectified for blood stains," which are perfectly satisfactory for staining purposes, nevertheless the difference in price between them and the medicinal grade is insignificant. It is the committee's recommendation, therefore, that methylen blue U.S.P. be regularly specified. The following brands have been very carefully tested for bacteriological purposes and prove to be very satisfactory. Indications are that they can be used equally well in histological work, although for this purpose they have not been so fully tested. These brands are: Coleman and Bell Company, National Aniline and Chemical Company and Providence Chemical Company.

Of these three brands, the first and last mentioned have been tested in vital staining of shrimps and sea worms. In this work quite a large number of other methylen blues were run for comparison. Of those tested, the sample of medicinal methylen blue from the Providence Chemical Company was the only American sample of known manufacture to compare with Grübler's methylen blue for bacilli when used for this purpose. Only one report on the stains used in this way has been received, but as it is by a specialist in this line of work the results are regarded as quite conclusive.

FUCHSIN, BASIC

This stain has been tested for two different purposes: (1) Staining bacteria, primarily the tubercle organism; and (2) for use in the Endo medium for differentiating the colon and

typhoid organisms. For staining bacteria several satisfactory samples have been found, namely, those obtained from Coleman and Bell, Dicks, David & Co., the Goldin Biological Laboratories, the H. S. Laboratories, National Aniline and Chemical Company, the Newport Chemical Works and the Providence Chemical Company. Used in the Endo medium all of these samples have given as good results as Grübler's basic fuchsin, but one of them, namely, that of Coleman and Bell, gives even better results for this purpose than Grübler's samples or any of the others tested.

GENTIAN VIOLET

Gentian violet is not a textile dye. It is not recognized in the regular dye industry and is not listed in Schultz's index, the recognized list of textile dyes. The name was apparently introduced by Grübler and is certainly found nowhere except in the literature relating to biological stains. Grübler's gentian violet was a mixture of various pararosanilin dyes, but its exact composition is a little difficult to determine because of conflicting statements that have been made about it. Somewhat simpler mixtures of these pararosanilin dyes are known to the textile trade under the name of methyl violet, the name being followed by a designation indicating the shade such as B, 2B, 3B, etc.

The methyl violets are regarded as being various mixtures of the following three compounds: Tetramethyl-pararosanilin, pentamethyl-pararosanilin, hexamethyl-pararosanilin, which differ from each other as the names imply in containing 4, 5 and 6 methyl groups respectively to the molecule. The more highly methylated the compound, the bluer its shade, and as in the trade designation of these dyes the number of B's following the name indicates the depth of the blue in the violet, it may be assumed that the more highly methylated compounds are distinguished by the greater number of B's, although these trade designations do not refer to definite chemical formulæ. In the case of methyl violet 5B, 6B and 7B, there is apparently a still different compound introduced in which one or more of the methyl groups have been replaced by benzyl groups.

Only two of these compounds have to our knowledge been put upon the market in a pure form, namely, the pentamethyl and the hexamethyl compounds. The former of these has been claimed to have been obtained pure for use in microscopic work but has never been put on the market widely. The latter is a well-known textile dye sold under the name of crystal violet.

It will thus be seen that there are quite a variety of dyes and biological stains all falling within the group commonly referred to by biologists as gentian violet. Now that it is certainly difficult, and perhaps impossible, to obtain the same mixture sold by Grübler as gentian violet, it becomes a question just what to use in its place. Certainly it is not wise to purchase "gentian violet" at the present time, because every dealer has his own idea as to what to sell under this name and the different gentian violets at present on the market vary from pure crystal violet to various mixtures of methyl violets with crystal violet, some of them possibly containing other dyes as well.

The first point, therefore, that the committee wished to test was as to what dye to substitute for gentian violet. The work so far done along this line has been mostly in connection with the Gram staining technic, the procedure for which the bacteriologist most frequently employs this stain. Work is at present in progress to see whether the conclusions reached in this work will apply also to this stain when used for histological purposes. The indications are that they will.

It has been found that for the Gram stain the compounds of low methylation such as those known under the names methyl violet, methyl violet B and methyl violet 2B are rather unsatisfactory, but that methyl violet 5B and crystal violet can be well substituted for gentian violet. Now, crystal violet is a definite chemical compound and is generally recognized as a textile dye; hence, the source of supply is much more constant than in the case of any of the other dyes in this group, and it seems to be the most logical substitute to use. The committee therefore recommends that, except for work where it is known that crystal violet will not work, this dye be substituted for gentian violet, and that it be regularly substituted for it in the Gram stain for bacteria.

There seem to be but two sources of crystal violet in this country—namely, the du Pont Company and the National Aniline Company. The du Pont product we have tested and found to be of very good quality. The National Aniline product was not obtained in time to include in the cooperative tests, but upon examination by the writer it appears to be entirely satisfactory for the Gram stain.

Crystal violet can be obtained from nearly all the dealers in biological stains but we are informed that nearly all of them buy the du Pont product and rebottle it without any purification or standardization. The du Pont Company does not sell this dye in small bulk, so when ordered for staining purposes it is well to buy it through one of the dealers in stains but to specify the product desired. The National Aniline Company sells crystal violet both in bulk as a dye and in small containers as a stain.

If gentian violet is ordered it is recommended that it be purchased from one of the following concerns, all of which have been tested for the Gram stain and found to be very satisfactory: Coleman and Bell, Goldin Laboratories, H. S. Laboratories, National Aniline and Chemical Company and Providence Chemical Company.

In using any of these dyes it must be remembered that owing to the presence of a large amount of dextrin and possibly other impurities in the Grübler product the American stains are two to four times as strong. This must be allowed for in preparing the formulæ. Those formulæ which call for a definite amount of saturated alcoholic solution of gentian violet do not need to be changed, but those calling for a definite number of grams per 100 cc. must be modified to suit these more concentrated products.

HÆMATOXYLIN

One source of American hæmatoxylin proves to be very satisfactory for general purposes and is specially recommended for cytological work. This is the c.p. product prepared by McAndrews and Forbes. It is handled by all of the dealers in stains but generally without indicating the manufacturer on the label. Although this is probably the only c.p. hæmatoxylin on the market and is handled without modification by every concern that deals in these products, nevertheless users of this stain are recommended to specify the McAndrews and Forbes product in order to discourage dealers of these stains from omitting the manufacturer's name from the bottles when all they do themselves is to rebottle the stains. The McAndrews and Forbes hæmatoxylin has been enthusiastically endorsed by practically every one who has used it, generally with the statement that it is better than some Grübler samples.

EOSINE

The situation in regard to eosine is not quite so satisfactory, but even in this case it is not discouraging. The Grübler samples of eosine seem to have varied considerably, certain samples proving poorer than certain American samples and others distinctly better. For the present it can merely be said that the most promising American samples so far tested have been those from the Geigy Chemical Company and from the Heller and Merz Company, among the manufacturers, while among the dealers in biological stains, apparently satisfactory samples have been obtained from D. H. Pond of Cleveland, Ohio, from the Providence Chemical Company and from Coleman and Bell. The latter has been tested with good results in Mallory and Wright's methylen-blue-eosine formula. These samples have also been used in counterstaining against hæmatoxylin in histological work and for staining red blood cells, and have proved distinctly better than the Grübler samples submitted for comparison with them but not as good as some Grübler samples that the individual investigators have had on hand in their laboratories. These results must be regarded as very preliminary findings. Further work is now in progress and it is hoped in a later report to have more definite information in regard to eosine. For the present no definite recommendations are made. It is suggested that where unsatisfactory results are obtained in counterstaining against hæmatoxylin, Orange G may be substituted for eosine to great advantage.

ORANGE G

Samples of Orange G have been tested from Coleman and Bell, the du Pont, the Geigy

Chemical Company, the Grasselli Chemical Company, and from the National Aniline Company. All of these have been found to work satisfactorily as a counterstain with the hæmatoxylin. They all seem to be more concentrated, however, than the Grübler product and have a tendency to overstain, especially if used in alcoholic solution. In aqueous solution, although they give a slightly browner color than Grübler's Orange G, they have proved very satisfactory. Any tendency to overstain can be counteracted by using weaker solutions. The results are not yet complete but are very encouraging so far as they go.

PYRONIN

Some difficulty has been experienced in obtaining a good American source of pyronin, which is now considerably used in the Pappenheim stain and as a counterstain in the Gram technic. Only two samples have so far been tested under the direction of the committee, one from Providence Chemical Company and the other from the National Aniline Company. The former proves satisfactory, the latter less so. Other concerns list this stain, but their products have not yet been tested. More work on this stain is now in progress.

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GEORGE BRUCE HALSTED

GEORGE BRUCE HALSTED, son of Oliver Spencer and Adela (Meeker) Halsted, was born at Newark, N. J., November 25, 1853. He received the degrees of A.B. (1875) and A.M. at Princeton, and Ph.D. (1879) at Johns Hopkins.

For a few years he was instructor in post-graduate mathematics at Princeton, then (1884-1903) professor of mathematics in the University of Texas. Here he rendered with marked success his most important services as a teacher of mathematics. After leaving this institution he was professor of mathematics at St. John's College, Md. (1903), and at Kenyon College, Ohio (1903-6), and finally at Colorado State Teachers' College (1906-12), when he retired from teaching and devoted himself to practical work in electrical engineering. Six or seven years later his health began to fail and in 1921 it broke down completely, so that he could not do any work. He spent his last few months in hospitals and sanitariums, and finally passed away, March 16, 1922, at the Roosevelt Hospital, New York.

After retiring from teaching, Dr. Halsted continued his labors in the field of mathematics so far as his occupation permitted, nor did he abandon them, even after his failing health had become serious, until further work was physically impossible.

At Johns Hopkins he studied under Sylvester, for whom he had the greatest admiration and from whom he seems to have imbibed the view that, whatever else mathematics may be, it is poetry. To this fact may possibly be due his inclination to employ poetic diction in discussing mathematical subjects.

Dr. Halsted was preeminently a geometrician, though he wrote some articles on higher mathematics. He was an ardent devotee of non-Euclidean geometry. Some of his utterances justify the opinion that he believed, not only that space is a genus comprising more than one species, but that our space is actually non-Euclidean and (with Riemann) that, though boundless, space may be finite. He wrote several works on geometry (including mensuration) one of which was translated and republished in France. He wrote many articles for periodicals, most of them on non-Euclidean geometry. He also contributed articles to the *Century Dictionary* and the *Encyclopedia Britannica*. He translated a good many works, written in different modern languages and two written in Latin—Bolyai (the well-known *Appendix*) and Saccheri (*Euclides Vindicatus*). He seemed to attach more importance to his having translated these two works and Lobatschewsky's non-Euclidean geometry than to anything else he ever did. When he was compelled to cease from work of any kind he