Methods of rendering Golgi-sublimate Preparations permanent by Platinum Substitution.

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ALL histologists who have worked with the silver and sublimate methods of Golgi have experienced the great inconvenience arising from the facts that the preparations are not durable, and that in mounting them a cover-glass cannot be employed in the ordinary way. Preparations by the silver method generally remain in good condition for a somewhat longer period than those by the sublimate method; Golgi has indeed stated he has some which have remained unaltered for nine years. The sublimate method is now most commonly employed in the form of the modification of Cox, in which only one fluid is required instead of two. In preparing sections of tissues that have been kept for the necessary time in this fluid, it is practically essential to blacken the originally steel-grey deposit by one or other of the several methods by which this may now be done. Such preparations, when new, are probably unsurpassed by those obtained by any other Golgi-method; but, unfortunately, when mounted in the orthodox manner without a cover-glass, and in spite of the most careful attention to various other technical details that have been recommended for the purpose of increasing their durability, they almost constantly show disintegration of the black deposit in from four to six months, and are certainly absolutely useless within a year. Ever since Golgi's methods came into use, histologists have been endeavouring to find some means of overcoming this great disadvantage of want of durability of the preparations. The only measure of success that has so far been achieved is that obtained by means of various processes of gold toning. All gold methods are, however, notoriously uncertain in their results. This, of course, simply means that in carrying them out it is necessary to fulfil certain very precise conditions, and that these conditions are as yet imperfectly understood. Certainly the gold toning processes that have been recommended for rendering Golgi-preparations permanent are no exception to this rule. Our

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own observations and experiments have been made chiefly upon sections of tissues preserved in Cox's solution, because we are convinced that Cox's method is for various reasons the most trustworthy process of this class that has yet been devised, and therefore the one most likely to be of service in studying pathological changes. We have tried the methods of Obregia and Golgi for toning sublimate sections with gold. With that of the former we have not had any success. On the other hand, with that of the latter (as briefly described in Jack's translation of Pollack's *Methods of Staining the Nervous System*) we have obtained some very beautiful purple-black preparations, which have now remained unchanged under a cover-glass for considerably over a year. In the great majority of instances, however, the results have been unsatisfactory, the deposit rapidly undergoing disintegration.

About two years ago we commenced a series of experiments with a view to obtaining a method of replacing the mercurial deposit in Cox-preparations by platinum. Such a replacement appeared to us to be possible in theory; it has proved also to be so in practice. We have each worked out a separate process, with which we are constantly able to obtain preparations that are permanent under a cover-glass. The only question that remains is whether or not the substitution is always complete. In many sets of sections it is certainly practically so. The details of the two methods are as follows:

Dr. Robertson's Method.— 1. Place sections in saturated solution of lithium carbonate (filtered) for fifteen minutes.

2. Wash shortly in water.

3. Place in equal parts of 1 per cent. chloroplatinite of potassium in distilled water, and of 10 per cent. citric acid in distilled water, for from one to two days. Keep in the dark. Both of these solutions must be freshly prepared.

4. Wash in water for from one to two hours. Change the water at least twice.

5. Place in equal parts of (*a*) saturated solution of iodine in 1 per cent. potassium iodide in water, and (*b*) water, for five minutes.

6. Wash in water.

7. Place for five minutes in a bowl of water to which two or three drops of strong ammonia have been added.

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8. Wash well in water.

9. Dehydrate thoroughly in absolute alcohol. Clear in benzole. Mount in benzole balsam, with a thin cover-glass.

Dr. Macdonald's Method.—Wash piece of tissue, impregnated according to Cox's method, in a large quantity of distilled water, over night.

Transfer to rectified spirit for half an hour. Cut on Cathcart microtome by Coats's method, transferring each section to a watch-glass containing rectified spirit.

Neglect altogether the under part of the tissue in contact with the anise oil.

When the necessary sections have been obtained proceed as follows:

1. Transfer them from the rectified spirit to distilled water for a few minutes.

2. Place for twenty-four hours in { Solution No. 1 ♏120. / Solution No. 2 ♏ 30.

Solution No. 1.

1 per cent. potassium chloroplatinite in distilled water.

Solution No. 2.

Sodium hyposulphite	1½	oz. avoirdupois.
Sodium sulphite	¾	„ „
Sodium chloride	¼	„ „
Distilled water	10	fluid ounces.

3. Transfer sections directly to a watch-glass containing one in eighty hydrochloric acid in distilled water; allow them to remain in this for two minutes; repeat this bath a second and a third time.

4. Pass sections into a watch-glass containing solution No. 2. Allow them to remain for ten minutes.

5. Transfer sections to watch-glass containing equal parts of (*a*) 1 per cent. iodine in rectified spirit; (*b*) distilled water. Allow sections to remain in this till they are of same colour as solution—no longer.

6. Clear and fix in solution No. 2 for ten minutes.

7. Wash in large quantity of distilled water for two hours.

8. Dehydrate. Clear in benzole and mount in benzole balsam, with cover-glass.

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A brush or quill should be used in lifting the sections; metal needles and sections-lifters are inadmissible. It is necessary, too, that distilled water be used throughout the entire process.

Both of these methods are easy of application and, if their details are faithfully carried out, will yield fairly constant results. It must be borne in mind, however, that the initial impregnation in Cox's fluid is somewhat capricious in its behaviour. It may be incomplete and irregular to such an extent that the individual sections cut from the same piece of tissue vary greatly in the amount of detail which they show. To ensure the ultimate production of a satisfactory permanent specimen it is therefore necessary to see that the mercurial impregnation has been successful in the first instance. It is probable, however, that these platinum methods are still capable of further improvement.

Briefly stated, the special advantages possessed by the preparations are that they are permanent under a cover-glass, that they can be readily examined with ordinary high powers and with oil immersion lenses, and that the deposit is black, or nearly so. Our special object in working out these processes has been to endeavour to render Golgi's method more serviceable than it has hitherto proved in the study of pathological changes affecting the cortical nerve-cells in cases of insanity. We shall not, however, enter upon this subject here, but reserve it for a future communication.

Morbid Changes in Dementia. By JOSEPH SHAW BOLTON, B.Sc., M.D., B.S.Lond.

THE demonstration I am about to give on the "Morbid Changes in Dementia" is a preliminary report of an investigation which I have nearly completed, and which I propose to publish in detail later.

I have during the past four years carried out a micrometer study of the cerebral cortex from the point of view of general

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