

heart as it lay in its normal position, the other setting forth the clinical evidence of great displacement of the heart into the right chest. I never ceased to believe that the heart had been contained within the right chest before the chest was laid open and that the displacement might have been visible had the pericardium been opened from the abdomen before opening the chest. The second necropsy,<sup>4</sup> that of the case of bronchiectasis, showed the cardiac displacement without any difficulty, thanks to the powerful adhesions which retained the heart in the position which it had occupied during life; and this confirmed me in the view which I had taken of the first. Both cases were, practically speaking, identical in their clinical signs, and the pulmonary lesions were closely analogous—viz., considerable destruction of pulmonary tissue and fibrosis involving the posterior part of the upper lobe and extending into the inferior lobe almost to the base. The leading difference was that in one case the right pleuro-pericardial adhesions were continuous with the retracted fibrous tissue of the lung, in the other they were not. If this source of fallacy be borne in mind by the pathologist he may so conduct the operation as to demonstrate the actual condition. But even should the heart have been allowed to slide back unobserved into the left chest, owing to the admission of air into the pleuræ, it may not be impossible to reconstruct the true pathological anatomy of the thoracic contents. Thus in the cases reported by Dr. Hale White and by Mr. Southwick Willmore, both of which, as is essential for the production of the fallacy in question, were free from collapse of the right thoracic wall, a considerable proportion of the total capacity of the right half of the thorax corresponding to the extensive destruction of lung tissue had to be accounted for. This surplus of space we must assume to have been filled by the heart since it could not have been occupied by the right lung owing to the pneumonic condition of the lower lobes in one of the cases and to their diseased and airless condition in the other. I would therefore suggest for both these instances the same explanation which I had adopted at the necropsy on my own case—viz., that when the sternum and costal cartilages were removed the heart must have dropped backwards by its own weight and to the left owing to the partial subsidence of the over-stretched left lung. The heart would then have been seen in apparently natural lateral contact with the right lung; yet by reapplying the sternum it might have been possible to show that the damaged lower right lobes, practically incapable of expanding, could not have completely tenanted the vacated right parasternal region.

Taking, then, the view that these were instances of *mobile hearts held in the right chest by atmospheric pressure* owing to extensive destruction of the right lung without compensating collapse of the chest wall, it may perhaps be suggested to clinicians that skiagraphy might place their diagnosis of displacements of the heart beyond any chance of scepticism, and to pathologists that they might in investigating cases of this kind modify their method of section in some suitable manner likely to afford a view of the heart before there had been any possibility of its relations having been disturbed.

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## A NEW PREPARATION FOR RAPIDLY FIXING AND STAINING BLOOD.

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MOST persons will agree that the only justifications for introducing a new histological stain are (1) that it should demonstrate something new, or (2) that it should demonstrate something more plainly and readily than before, or (3) that it should be a simpler method than that in general use. It is claimed for the following new compound blood stain that it at any rate fulfils the last two conditions. The stain is a single solution, easy to make up, which keeps well, which will fix and stain ordinary blood films in two minutes, and which demonstrates with perfect clearness and in well-marked contrasts red blood discs, blood platelets, the nuclei

of white blood cells, the fine granules of the polymorpho-nuclear leucocyte, coarse oxyphil granules, basophil granules, and when present, erythroblasts, bacteria, the malaria parasite, and filariæ. It has been primarily designed for bedside work where rapid and certain methods are the main consideration.

In absolute alcohol we have one of the most reliable fixatives known, and eosin and methylene blue possess the requisite properties for demonstrating all the ordinary characteristics of normal and of pathological blood. Eosin itself, however, cannot under ordinary circumstances be made to stain certain cell granules and for this purpose various combination stains have been used; of these the most generally used are the Ehrlich-Biondi and Ehrlich's later triacid. These, however, are undoubtedly troublesome to use and require special fixing methods. When to a solution of eosin some solution of methylene blue is added a precipitate falls—brilliant grass-green crystals if alcoholic solutions and alcohol-soluble eosin (Grübler) are used, but amorphous and of a dark metallic-green colour if watery solutions and water-soluble eosin are used.

The eosin methylene blue mixtures at present in use, as far as I know them, are designed with a view to avoiding the precipitates which form when solutions of these dyes are mixed or after they have been kept a short while. These precipitates are, I believe, compounds of eosin (acid) and methylene blue (base).

The brilliant grass-green crystals obtained from alcoholic solutions are very sparingly soluble in alcohol in the cold, but more soluble in hot alcohol, from which they can be re-crystallised in the same form. That they represent a definite compound body is, I think, rendered probable by the fact that the same crystals are obtained, though in varying amounts, however the proportion of the original ingredients is varied, and that the crystals so obtained have identical melting points—viz., 227° C. taken on the surface of mercury. The suggestion to test them in such ways I owe to Mr. E. White of St. Thomas's Hospital. These crystals from their sparing solubility in alcohol are not useful as a blood stain without previous fixation of the film. They are, as a matter of fact, soluble in chloroform and in aniline oil, the solutions in each case being of a dark violet colour.

The amorphous precipitate obtained from watery solutions of the two dyes is in its turn very sparingly soluble in water, but in alcohol it gives a blue solution with strong green fluorescence; it is more soluble in methyl alcohol. It is such a solution which I find to work admirably as a blood film fixative and stain. It is made up in the following way. Equal parts of a 1·2 per cent. to 1·25 per cent. solution of Grübler's water-soluble eosin, yellow shade, in distilled water and of a 1 per cent. solution of Grübler's medicinal methylene blue, also in distilled water, are mixed together in an open basin (not in a flask) and thoroughly stirred with a glass rod. The mixture may with advantage be left for 24 hours. It is next filtered and the residue is dried either in the air or more quickly in an incubator or water oven. I have dried it at 55° C. without harm. When quite dry the residue is scraped off the filter-paper and is powdered. It is then shaken up with distilled water and washed on a filter, when the washings should be of a thin dirty-purplish colour. Finally, it is again dried and powdered and may be stored in suitable bottles. For use, thoroughly shake up 0·5 gramme of the powder in 100 cubic centimetres of pure methyl alcohol (E. Merck "for analytical purposes")<sup>1</sup> and then filter. The solution keeps well.

Cover-glass preparations are made in the ordinary way and on to them as soon as the films (which should be extremely thin) are dry a few drops of the staining and fixing solution are poured, no previous fixation being required; it should, however, be noted that it is essential to the correct working of the stain that the cover-glasses used should be absolutely clean and should have no trace of acid or alkali on them. After they have been cleaned and well washed in distilled water they should be kept in absolute alcohol only. The specimen is covered with a watch-glass to prevent evaporation and consequent precipitation. In from one to three minutes the stain is rapidly poured off and the specimen is at once rinsed in *distilled* water till the film has a pink colour which usually occurs in from five to 10 seconds. It is then dried either very high

<sup>1</sup> Certain other brands work quite well, but to most of the less pure preparations it is necessary to add absolute ethylic alcohol in greater or less amount to reduce their acidity and to obtain proper fixation.

up over a flame or (better) by agitation in the air and is mounted in xylol balsam.<sup>2</sup>

The red discs are of a terra-cotta colour; the nuclei of the white corpuscles are blue; the platelets are mauve; the granules of the polymorpho-nuclear white cells and of myelocytes are red; the granules of the basophils (mast cells) when present are dark violet; and bacteria, filariæ, or malaria parasites are blue. If the specimen has been washed in tap water and not in distilled water the red colours are more pronounced and the blue of the white cell nuclei is almost washed out, while the dark blue of the bodies of the smaller hyaline white cells (lymphocytes) stand out in strong contrast to the now pale nucleus.

It seems to me that the results obtained by this method rather point to the granules of the polymorpho-nuclear leucocytes being basic—i.e., oxyphil—a fact which seems still disputed by some.

The differential staining results from the decomposition of the compound substance by the various elements of the blood, those parts which are acid combining with the basic colouring matter and those which are basic with the acid. That the stain is readily so split up is seen by adding weak acids or weak alkalies to such a watery solution of it as can be made—acids turning the solution blue and alkalies changing it to a pink, the stain acting, in fact, as a fairly delicate indicator. The same result is brought about by heating such weak watery solutions, which turn blue on warming, the original colour returning on cooling.

The stain may be equally well-made by dissolving the eosin and the medicinal methylene blue directly in absolute methylic alcohol and mixing them in the proportions given above—viz., 125 cubic centimetres of a 0.5 per cent. solution of the eosin and 100 cubic centimetres of a 0.5 per cent. solution of the medicinal methylene blue. Although this gives quite as good results the simpler method for ordinary practice is obviously to make a solution of the compound body which may be purchased in the solid state from Mr. R. Kanthack, 18, Berners-street, W., who also supplies the solution ready for use.

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## NOTES ON A CASE OF RAPIDLY FATAL GLYCOSURIA IN A SUBJECT OF FRIEDREICH'S DISEASE.

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THE patient, a girl, aged 14 years, commenced at the age of seven years to suffer from difficulty in walking and loss of power in the legs and from that time the train of symptoms characteristic of Friedreich's ataxy slowly developed, following exactly the same course as in the case of a sister two years older. There was complete ataxic gait, with extreme talipes and loss of coördination in movements of the hands. Lateral curvature of the spine and certain involuntary movements of the head as well as complete absence of knee-jerks were other signs present. With reference to the family history, a great uncle on the father's side was said to have suffered from difficulty in walking at the age of seven years and this was followed in the course of time by paralysis of the lower limbs, but he lived to the age of 50 years. The father and mother were both healthy. The course of the patient's final illness was as follows. On August 23rd, 1898, whilst seeing another member of the household I was consulted for the first time with reference to the patient's indisposition. The mother had noticed her daughter getting thinner for the past fortnight—that is, since her return from a seaside holiday. By a curious coincidence the last case of diabetes which occurred in my practice came on immediately after the patient's return from his annual seaside holiday. On questioning her I found that there were marked thirst and polyuria. She got out of bed at least three times at night and each time passed a fair quantity of urine. The bowels were moved regularly every day, the tongue was covered with a light brown fur and was rather dry with red margins. The skin was dry and

harsh. There was a fair colour in the cheeks which was diffused over the face though at times she was pale. Examination of the chest failed to find any lung disease. There was a slight mitral systolic bruit heard over the heart's apex but no displacement of the apex beat or other abnormality of the heart. She was emaciated. The pulse was 60 and fairly full and regular and the temperature was sub-normal. The quantity of urine passed in 24 hours was about four quarts; it was of light colour but rather turbid and acid in reaction; the specific gravity was 1045. On testing with freshly prepared Fehling's solution the brick-red discolouration showed immediately; the dark brown, on boiling with liquor potassæ as in Moore's test, showed equally well. The same applied to the picric acid test, the discolouration in the latter being very opaque. There was no albumin in the urine. On the following day (the 24th) she was placed on diabetic diet, though allowed a small quantity of toast at first. A quarter of a grain opium pill was given three times a day and Vichy water two or three times daily. She took a good proportion of meat with plenty of fat among other things. On the 25th—that is, after one day's treatment—the more troublesome and obvious symptoms, such as thirst and languor, commenced to abate. On the 26th Dr. F. J. Smith was called in consultation. He confirmed the diagnosis and advised a continuation of the same treatment with the addition of 10-grain doses of sodium salicylate three times a day. He also agreed with the diagnosis of Friedreich's disease in both girls. Dr. Smith was much interested in the case and I am indebted to him for some valuable hints as to treatment, &c. On the 27th the improvement was maintained; less urine was passed and the patient had been only disturbed once during the night. Examination of the urine, however, showed little change. On the morning of the 28th she appeared still to be improving and was quite cheerful. In the afternoon abdominal pain with some diarrhoea and sickness came on, much prostration resulting. These symptoms were followed in a few hours by sighing respiration, the breathing being deep and loud. There were extreme coldness of the extremities, small pulse, and all the signs of marked collapse accompanied with short paroxysms of dyspnoea, but the patient could very easily be aroused from the stupor. The acute bowel symptoms quickly subsided though slight vomiting still occasionally occurred. The odour of the breath was decidedly peculiar and suggestive of that described in text-books as accompanying diabetic coma. All the ordinary means of stimulation appeared to be useless though many were tried, such as mustard poultices to the chest and brandy, ether, and strychnine hypodermically administered. Though the pulse seemed to momentarily improve after giving by the mouth a strong solution of ammonia in small doses well diluted with cold water, this had to be discontinued through sickness and the bowel was too irritable to retain any saline solution which was injected. The patient was not delirious at any time; indeed, she retained consciousness to near the very end. She remained in this condition for three days, a certain amount of dyspnoea occurring up to the last. Unfortunately a post-mortem examination was not obtained.

In view of the paucity of our knowledge concerning the etiology and pathology of diabetes and of its association in this case with Friedreich's ataxy, the morbid pathology of which is comparatively well known, this case appeared to be worth recording though the absence of a post-mortem examination very considerably detracts from its possible value as a record. It is hoped that it may be of some little interest (brief and very incomplete as it is, partly through the unexpected and abrupt ending of the case), more especially to those engaged in investigating the nervous side of the origin of diabetes.

*Remarks by Dr. F. J. SMITH.*—This case seems to me to be well worthy of record because both diseases were so very distinctly marked. Both sisters I have since been given to understand have been seen several eminent neurologists and, I believe, have been shown at societies as typical cases of Friedreich's ataxy, while about the glycosuria with acute diabetic coma there could be no doubt. To speculate on the advance of cord-sclerosis as affecting the nerves controlling visceral function would be rather futile when based on one case only, which may be but a coincidence, but should other similar cases be reported of a like nature this one would add considerable weight to the argument.

Ilford.

<sup>2</sup> If distilled water is not available tap water may be used provided the specimen be only momentarily immersed in it and then dried between filter-paper or rapidly over a flame. Pictorially such a specimen is not so perfect.