

to be really the biology of the cell, animal and vegetable, and of the simpler animal and vegetable organisms? The amount of botany which the average student learns is, I suspect, minimal in quantity, and certainly not enough to be of any use to him in the subsequent stages of his professional training. The general structure of vertebrates can certainly be as well learned in two or three years of human dissection as in a few hours' examination of a rabbit. On the other hand, some study of the protozoa, the microscopic anatomy of simple vegetable tissues, some work with cultures of commonplace and innocent micro-organisms, would interest the student by introducing him to a world of which he had not hitherto dreamed, and to conceptions which lie at the foundation of all his after-studies; conceptions which at present become vital in his mind only towards the end of his course, if, indeed, in the majority they ever take life at all. This is a reform which I hope to see effected before long.

ART. XVIII.—*A Case of Melanuria.*^a By T. GILLMAN
MOORHEAD, Physician, Royal City of Dublin Hospital.
[Illustrated.]

THE passage of extremely dark coloured or black urine, or of urine which darkens after exposure to air, is an event of no unusual rarity, and may be the product of many pathological conditions. Of such urines some are of comparatively frequent occurrence, as, for example, that found in cases of prolonged jaundice, while others are only occasionally met with, and to this class belongs the variety of urine to which the term "melanuria" *par excellence* has been applied. The following case presented during life this interesting symptom:—

A. N., aged thirty, by occupation a housekeeper, unmarried, was admitted to hospital on October 13th, 1905, complaining of swelling of her abdomen and feet.

Previous History.—The patient stated that she had always enjoyed good health until two months previously, except that she had noticed some defect of vision in her left eye as long ago

^a Read before the Section of Pathology in the Royal Academy of Medicine in Ireland on Friday, November 24, 1905.

as 1897. In that year she had attended as an out-patient at an ophthalmic hospital, and had been advised to have the eye removed. She however refused, and did not return to the hospital for four years, when she was again urged to permit removal of the eye, but again refused. Finally, in July of 1905, she consented to its removal, owing to the fact that it had become rather disfiguring. The operation was performed, and a typical melanotic sarcoma, involving the whole of the eyeball, but not encroaching upon the other orbital structures, was removed. While in hospital she suffered once or twice from abdominal pain and vomiting, which, however, quickly passed off, and was not of sufficient severity to attract notice. Early in August she began to notice that she was losing flesh, and about the beginning of September first observed that her abdomen and feet had begun to swell. Her periods had been quite regular up to July, but had ceased since that month.

On admission the patient was found to be greatly emaciated; her weight was eight stone and three pounds; her face was drawn and rather yellow-looking; the scar in the orbit was quite healthy and normal in appearance, and the right eye was quite healthy. The chest muscles were very atrophic; heart normal; the lungs exhibited râles and rhonchi over almost their entire extent, both back and front, but showed nothing abnormal to percussion. The abdomen was enormously distended, the superficial veins standing out quite prominently and presenting a flow from below upwards, and the skin was thin and glossy. On palpation hard nodules of about the size of a walnut could be distinctly felt all over the upper two-thirds of the abdomen, and even extending downwards into the iliac fossæ on both sides. These nodules could be felt, and even at times seen to move, under the abdominal wall with respiration. Intervening between them and the wall, however, there was a thin layer of fluid, which fluctuated freely, and which could be displaced readily by gentle pressure. This layer of fluid was most noticeable over the right side, and extended upwards to the level of the ribs. It only moved slightly with change of posture. On percussion the abdomen was found to be dull over its anterior aspect, from the costal margin down to below the level of the iliac spines on each side, except for a transverse area of resonance a couple of inches above the level of the umbilicus. The flanks were resonant on each side in every position, and even on sitting up; there was no dulness above the symphysis pubis. The lower edge of the liver

DR. T. GILLMAN MOORHEAD on "A Case of Melanuria."



Under-surface of Liver, showing Cyst-like Melanotic Tumours.

could not be distinctly defined either by feel or by percussion; the spleen dulness appeared normal in extent. By vaginal examination some indistinct fluctuating masses were felt, but no definite diagnosis as to what they were was arrived at. There was considerable œdema over the lumbar region and in the legs. Temperature normal; pulse 80; respirations 24.

Blood Examination.—Red blood corpuscles, 3,000,000 per c.m.; white cells, 12,000 per c.m.

Differential Count.—Neutrophiles, 76 per cent.; lymphocytes, 19 per cent.; hyaline cells, 4.5 per cent.; eosinophile cells, .5 per cent.

The blood when tested for melanin gave a negative result, and no melanotic granules were present, such as have occasionally been described.

Shortly after admission the amount of fluid in the abdomen increased greatly, and had to be removed, 80 ounces being withdrawn on October 16th. The ascitic fluid contained a large quantity of blood, but failed on this and on other occasions to give any melanin reactions. A few days before the patient's death 40 ounces of fluid were again removed, and presented similar characters to those of what was first drawn off. The blood picture underwent a gradual change, the leucocytosis gradually increasing up to 35,000 per c.m., with a count of neutrophiles up to 87 per cent., while a few myelocytes, both granular and hyaline, made their appearance. The red cells sank to just under 1,500,000 per c.m., and a few nucleated red cells (normoblasts, some of which contained dividing nuclei) were found. Death occurred from asthenia on October 26th.

Post-mortem—Only a partial examination was permitted, and consequently it was impossible to examine the stumps of the left optic nerve, the brain, spinal cord, or joints.

The lungs were somewhat œdematous, were very anæmic, and were studded over the surface with a few small melanotic growths. The heart was normal, except for one small tumour situated in the anterior wall of the left ventricle. The liver was enormous, weighing thirteen and a quarter pounds, and extending right down over both iliac fossæ. Its whole substance was infiltrated with black tumours, varying in size from that of a pea to that of a Tangerine orange. Many of them projected on the surface, and constituted the nodules felt by palpation through the abdominal wall. The liver substance between the masses was microscopi-

cally normal. The transverse colon lay in front of the liver in the position of the transverse area of resonance above alluded to. The stomach and intestines were normal, except for the fact that the small intestines was only fourteen feet in length, and presented valvulæ conniventes right down to the ileo-cæcal valve. The peritoneum did not contain any actual melanotic nodules, but in many places was of a diffuse black colour. The spleen contained two small nodules, and was normal in size. The kidneys, slightly fibroid, also contained a few scattered nodules, as did the supra-renal capsules. Both these last-named structures were unusually large. The pancreas and abdominal lymph glands were normal. Two large ovarian cysts were present, floated up by ascitic fluid above the brim of the pelvis, their wall being constituted by dense black melanotic tissue, about one-fourth of an inch in thickness. The fluid contained within them was of a dirty brown colour, but did not give the melanin reaction.

Urine.—The quantity of urine passed in the twenty-four hours never exceeded twenty ounces in volume. When first passed it was of a deep amber or slightly reddish tinge, but after standing for a few hours it became darker in colour, and ultimately almost black. It usually contained a deposit of urates, of a deep brownish tinge. A slight trace of albumen was present, but no blood. It gave the following reactions:—

1. Von Jaksch test.—The addition of a few drops of dilute perchloride of iron resulted in the production of a deep violet black colour and of a violet grey precipitate, which re-dissolved in excess of the re-agent. When the precipitate was dissolved in sodium carbonate and an acid added a blackish precipitate was again thrown down.

2. The addition of sodium nitroprusside and a few drops of liquor potassæ produced a violet colour, changing to blue with acetic acid.

3. Blackening was also obtained with the following concentrated acids:—Nitric acid, sulphuric acid, chromic acid, hydrochloric acid, and with bromine water. Weak acids had very little effect or else caused a slight deepening of the already dark colour of the urine.

4. Phosphomolybdic acid and strong sulphuric acid gave a light green coloured precipitate.

5. The addition of caustic alkalies caused the colour of the urine to become lighter and to assume a reddish tinge, which was,

however, again changed to violet on the further addition of an acid. Concentrated phosphoric acid produced much the same effect as the alkalis.

6. The copper test for sugar and the phenyl-hydragine test gave negative results, but Nylanders re-agent was immediately reduced on boiling.

7. The iodoform test for acetone was negative.

8. The indican test (hydrochloric acid and bleaching lime) gave a deep violet-black coloration, but this colour was not absorbed by chloroform.

9. When the urine was precipitated with barium chloride and filtered, the filtrate gave the characteristic reaction with the perchloride of iron.

From the above reactions no doubt at all can be felt that the substance present within the urine, and to which it owed its deep colour, was melanin, although what exactly melanin may be is a matter which has not yet been decided. Garrod has pointed out that the condition of melanuria in its wider sense was recognised even before the days of Hippocrates, but the clinical recognition of the above described variety dates only from 1861, when Eiselt of Prague reported that the urine of patients suffering from melanotic sarcoma became dark on the addition of strong acids.

In 1887 an elaborate paper by Mörner appeared in the *Zeitschrift für physiologische Chemie*, and contains a complete bibliography up to that period. It contains an account not only of the pigment of melanotic tumours, but also of the other dark pigments of the body, including that of the negro's skin and of the chorioid coat of the eyeball. Mörner points out that the various analyses that had up to that time been made public differed in two important particulars—namely, in the proportion of sulphur which the pigment was found to contain and in the presence or absence of iron within its molecule. His own conclusion was that it contained both sulphur and iron, and subsequent observations have confirmed that view, though most systematic writers still persist in their denial that it is an iron-containing body, or rather, to express the view of von Jaksch, that it is a group of iron-containing bodies.

Apart, however, from its chemical constitution the substance is of considerable diagnostic importance. When its

presence in urine was first announced many cases were reported in which no melanotic growths were present, but an analysis of these cases seems to show that all of them were examples of extreme indicanuria. Since, however, the publication of the iron test by von Jaksch in 1889 a ready means of differentiating the two conditions exists, and it is now almost universally believed that melanuria is pathognomonic of the existence of melanotic neoplasms. Not all cases of such, however, give the reaction, and the weight of evidence seems now in favour of Garrod's opinion—that melanuria occurs only when the tumours have extended from their primary site to the internal viscera, and more especially to the liver. In this case it is, of course, impossible to say at what time the reaction appeared, but the *post-mortem* findings are at any rate in agreement with his opinion that the amount of melanin present is in direct relation to the liver involvement.

In conclusion, it is interesting to note the large number of years that the tumour remained localised and the rapid progress, measured by weeks, which the case made once the primary barrier was overstept.

ART. XIX.—*Notes on a Year's Asylum Work.*^a By W. R.

DAWSON, M.D., F.R.C.P.I., Medical Superintendent,
Farnham House, Finglas, Co. Dublin.

THE following are a few brief notes with reference to some of the more interesting points which have arisen in the practice of the year ending March 31st, 1905 :—

Causation.—On looking over the admissions of the year, it appears that hereditary diathesis played a part in the causation of no less than 66.6 per cent. of the cases, and was judged to be the chief factor in 33.3 per cent. These percentages include a case of alcoholism, not exactly insane, in which there was an inherited tendency to alcoholism only, so far as known. The admissions for the year therefore showed a larger proportion of cases with inherited diathesis than those of the previous year, in which it was known to be present only in 50 per cent. of the cases ; but, on the other hand, diathesis

^a Modified from a paper read in the Section of Medicine in the Royal Academy of Medicine in Ireland on Friday, November 10, 1905.