have active metabolic change going on as the result of the action of the exciting cause of cancer upon the epithelial cells—for we are agreed that we can only look upon the cell activity as the result of some special stimulus—we have a much larger quantity of effete material passing from the breast, material which, because of its irritative nature, rapidly calls into play the development of this special filtration apparatus. That this is not purely theoretical is evident from the fact that every surgeon looks for enlarged glands when examining a cancerous patient; the best demonstration of the process is to be seen, however, as Stiles has pointed out, in the small lobules of fat that occur in the axilla; these small lobules, each supplied by a small vessel and its branches with the corresponding perivascular lymphatics, gradually assume a perfectly characteristic appearance. At the margin of the lobule, away from the entrance of the vessels, a few small cells are seen to accumulate; these form a kind of crescent, usually on the side away from the entrance of the vessel to the lobule. Gradually this line of cells becomes broader and broader, a delicate reticulum may be seen, and eventually the whole of the fat disappears, and we have a small cellular structure which in all its microscopical appearances resembles a small lymphatic gland. This has been demonstrated specially in the axilla, but a similar process takes place also in the connective tissue and fasciæ covering the pectoral muscles. These masses of cells, as we have said, appear to form transformers or filters for the chemical products of metabolism and for such other *débris* as has to be carried from the tumour by the lymphatic system. It is apparently in the network thus formed that the epithelial cells with their parasitic coccidia are intercepted; for it is here that the small secondary growths make their appearance, first in the glands covering the pectoral muscles, and also in some cases between the strands of the muscles, especially at their lower margin, and then in the lymphatics of the skin and glands in the axilla; not only in the glands that are normally present, but also in those that are formed as the result of the special requirements of the lymphatic system, in consequence of the growth of the cancerous tumour.

I shall not to-day attempt to enter into any discussion as to the relative frequency of the spread of cancer by blood vessels and by lymphatics, although latterly some doubt has been thrown on the accuracy of our present teaching in regard to this question. I will merely state that I am more and more convinced that cancer extends almost entirely by the lymphatic vessels, that this takes place not only locally by direct extension, but in some cases where the lymphatics are especially wide, and especially after they have been called upon to do temporary extra work, the cells may make their way for some distance without leaving any intermediate trace between themselves and the parent mass.

It may appear that I am taking much for granted, of which at present we have extremely insufficient proof, but I hold that until we have more definite knowledge on all these points, we must for the sake of our patients accept them as proved, and certainly take them into consideration when planning out our method of treatment, in which the main element must be free removal of the organ affected and of all those parts and structures—muscle, skin, lymphatic glands—between which and the original tumour there is any lymphatic (either perivascular or around ducts) communication, however imperfect under normal conditions this may be.

On going over the literature of cancer, one cannot but be struck by the extreme accuracy of the observations that have hitherto been made and recorded. They did not, when they were made, admit of any explanation, and many of them are still inexplicable, but we cannot but feel that by following up many of the older observations, and by gradually fitting them in to fill up gaps as new facts are accumulated and old or new theories proved, we may be able to obtain a fresh coign of vantage from which to start afresh, and at the same time often save ourselves much needless trouble. A recent novelist speaks of the track of the snow shoe as remaining invisible until spring comes round and the snow begins to melt. Then it begins to stand out, and remains as an evidence for some time after the untouched snow has disappeared that someone travelled that way during the dark and cold

winter months. So it is with all accurate and carefully-recorded observation. We may be sure that if our work is as thorough and as honest as that of the men who have preceded us, it also will take its place in the grand system of acquired knowledge that is being built up and buttressed now as it was not only fifty years ago, but in all preceding ages.

OBSERVATIONS ON THE COMPOSITION AND FLOW OF THE BILE IN MAN.

By D. NOËL PATON, M.D., F.R.C.P.E.,

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IN vol. iii of the *Laboratory Reports* of the Royal College of Physicians of Edinburgh I published, in conjunction with Dr. J. Balfour, the results of a prolonged series of observations on the composition and flow of bile in a woman with a complete biliary fistula, which had resulted from an operation for the relief of jaundice produced by obstruction of the bile duct. The main conclusions arrived at were stated as follows:—

That the bile is to be regarded rather as an excretion than as a secretion playing any essential part in digestion. Although the liver undoubtedly develops primarily as a digestive gland, in adult life its relationships with the general metabolism are much more intimate than with the alimentary processes. All researches on the subject have clearly shown that the entrance of bile into the intestine is not essential for the maintenance of the individual in a perfectly healthy condition. The only digestive disturbance produced is the diminished absorption of fats; and, as we have already seen, there is good reason to believe that this is simply due to the withdrawal of a stimulant to the absorbing cells of the intestinal wall. But even with bile excluded from the intestine, no less than about 70 per cent. of the fats is still used. Again, all the constituents of the bile are bodies derived either from the decomposition of the red blood corpuscles—a process which is known to occur in the liver—or of these along with proteids from other sources. Of the pigments in this respect we need say nothing. Of the constituents of the bile acids it is sufficient to recall the fact that glycine and taurine are both amido-acids. In connection with the cholesterolin and lecithin there can be little doubt that these are derived from the stroma of the red corpuscles, since they form a by no means unimportant part of that stroma. The vague view that they are derived from the nervous system, taught by certain physiologists, is based upon no better evidence than the fact that both substances occur in these tissues. The absence of any direct proportion between the excretion of nitrogen and sulphur in the bile and in the urine—instituted on by Bunge—we do not think can be taken as disproving the connection of the biliary function, as well as the other functions of the liver, with the general metabolism. A careful study of the experiments of Kunkel and Spiro, upon which Bunge bases his conclusions, does show a more or less marked relationship; while the correspondence between the amount of bile solids produced and the amount of nitrogen excreted in the urine in our case strongly supports the view of their close connection. While health can be perfectly maintained when the bile is directed to the outside of the body, any interference with the general metabolism of the liver at once produces serious disturbances. And inasmuch as these are manifested by changes in the biliary secretion, the conclusion has been come to by physicians that these changes in the bile secretion are the cause and not the accompaniments of the disturbance. The undoubted beneficial action of the so-called cholagogues we believe to be due to their influence upon the general metabolism of the liver, and not specially upon its biliary function. This point one of us has dealt with more fully in a previous paper.¹

In support of these statements, I now give an account of the present condition of the patient, Mrs. W.

She left the infirmary for her home in March, 1891. At this time a short rigid tube in the fistula was attached, by means of a piece of flexible tubing, to a caoutchouc bag suspended at her side in a loop of bandage. The whole of the bile passed through the tube, rarely did any escape round the outside. During the whole period—from June, 1890, to the present date, March, 1892—every drop of bile has been poured out on the surface, and there has been no evidence that any has entered the duodenum. Nevertheless, her health and strength have steadily improved.

At my request, she visited me on February 22nd, 1892. I have never seen a more healthy-looking woman. Her complexion is clear and ruddy; her conjunctivæ perfectly clear; she is fat, and must weigh between eleven and twelve stone. She tells me that since her return home she has never had a day's illness, and that she is up every morning at her household work at five o'clock. She states that her appetite is very good, and that she can eat all kinds of food, even the most fatty, with perfect impunity. Her bowels move regularly once a

¹ BRITISH MEDICAL JOURNAL, 1886, vol. ii, p. 207.

day; she has not taken opening medicine since leaving the infirmary.

It would be impossible to adduce stronger evidence against the view that bile plays any important part in the digestive processes. It can in no sense be considered an essential digestive juice.

Being anxious to ascertain if the bile had undergone any change in amount or composition since the patient was under observation, I requested her to keep the whole bile secreted during two periods of twenty-four hours, and to send it to me at the laboratory. This she did, and on February 27th I received two specimens. 1. Passed between 4 p.m. on February 24th to 4 p.m. on February 25th. 2. Passed between 4 p.m. on February 25th to 4 p.m. on February 26th.

I did not consider it necessary to make a detailed examination of all the various constituents. A determination of the amount of solids soluble in ether, of solids soluble in alcohol after extraction with ether, of solids insoluble in alcohol and ether, but soluble in water, and of the insoluble residue, affords data sufficiently full for our purpose.

The following table gives the amount and composition of the bile on the above two days, the average of these two, and, in the fourth column, the average amount and composition of the bile during our previous series of observations:

	Feb. 24th-25th, 1892.	Feb. 25th-26th, 1892.	Average of Two Days.	Average of Former Series of Observations.
Amount secreted... ..	500	680	590	638
Specific gravity—				
Ether extract—percent. (cholesterin, lecithin, fats)... ..	0.069	0.07	0.0699	0.075*
Alcohol extract—percent. (salts of bile acids, with some pigment and soaps)... ..	1.469	1.192	1.331	0.35
Watery extract (mucin, soluble salts, and pigment)... ..	0.910	0.884	0.923	1.102*
Insoluble residue (insoluble salts and pigment)... ..	—	0.053		
Total solids—				
Per cent.	2.248	2.199	2.323	1.31
In twenty-four hours...	12.240	14.953	13.596	8.378

* Average of analysis of September 7th, 1890, on which day the total solids amounted to 8.556 grammes.

This table shows that, with the patient no longer under hospital restraint, but living at home, eating well, and doing plenty of hard work, the following changes have occurred in the bile:

1. The total amount secreted is not increased. 2. The total solids are much increased. 3. This increase in the solids is due chiefly to an increase in the salts of the bile acids, which form the chief part of the alcoholic extract. 4. The ether extract (cholesterin, lecithin, and fats) is practically unaltered. 5. The mucin and salts are also unaltered in amount.

This increase in the bile acids, which are of the nature of amido compounds, is doubtless the result of a diet richer in proteids, and of a more active proteid metabolism. The absence of any increase in the cholesterin and lecithin would indicate, if my view of the source of these substances in the bile is correct, that no increase in the hæmolysis had occurred.

THE summer session of the London Post-Graduate Course commenced on May 2nd, and will end on June 25th. Lectures and demonstrations will be given at the Hospital for Consumption, Brompton; the Hospital for Sick Children, Great Ormond Street; the Hospital for the Paralysed and Epileptic, Queen Square; the Moorfields Ophthalmic Hospital, the Blackfriars Skin Hospital, Bethlem Hospital, the London Throat Hospital, at the Bacteriological Department of King's College, at the Pathological Department of the Great Northern Central Hospital, and at the Parkes Museum. The course on Midwifery and Diseases of Women is given at Charing Cross Hospital. The Secretary, Dr. Fletcher Little (60, Welbeck Street), will furnish any additional information.

REMARKS ON A CASE OF TRIPLE BIRTH.

By T. ARTHUR HELME, M.D., F.R.S.E.,
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Mrs. McH., aged 35, multipara, was delivered of triplets on March 2nd, 1892. She had had five previous pregnancies; the first four went on to full time, and ended in the birth of living children, two male and two female; the fifth pregnancy was interrupted at the third month, ending in a miscarriage fifteen months ago.

No special fecundity or tendency to multiple pregnancy was to be noted in her family history. No multiple birth was known to have occurred either among the husband's or the patient's relatives, with the exception of one twin birth in the case of the patient's own sister. The patient's mother bore four children, three girls and one boy, all being single births. Of the two sisters, one had been married eight years, and had no children (though her husband was a widower who has children by a previous wife), the other had had ten children, and borne twins once.

During this, her sixth, pregnancy the patient had suffered greatly from the sixth month, owing to her unusually large size and consequent difficulty in breathing; for three weeks before confinement she was confined to bed on account of the dyspnoea, abdominal distension, and oedema of legs. The urine was quite healthy, and the heart sounds were normal, though the beat was feeble and rapid. The question of induction of premature labour because of the dyspnoea and cardiac embarrassment was discussed, but eventually pregnancy ended spontaneously at the eighth month.

The diagnosis of triplets before labour was impossible; it was evident that the uterus was over-distended, but palpation revealed no foetal parts, nor could any heart sounds be heard on auscultation.

Labour lasted 17 hours, 13½ being occupied by the first, 2½ by the second, and one by the third stage. Before the membranes ruptured a footling presentation was recognised, but as soon as the waters (of which there was a huge quantity) escaped, four feet and a funis were felt occupying the cervical canal. The first child (female) was stillborn and had evidently been dead for some days. After a short interval of ten minutes, a second child, also a female, was born living. Examination of the patient showed the uterus to be very large, the fundus still reaching above the umbilicus, and on vaginal examination another bag of membranes was felt filling the cervix, and in it another foetus presenting by the breech. After an interval of twenty minutes, I ruptured the membranes, and the third child, a male, was born alive a quarter of an hour later. After this there was a cessation of uterine action for nearly an hour; at the end of that time, owing to the occurrence of some hæmorrhage, it was necessary to strip off the placenta manually; this seemed to clothe the whole interior of the uterus except a small area on the posterior wall. Examination of the afterbirth showed it to consist of one large placental mass, with the foetal sacs each having its own amnion and chorion with a common decidua; one sac had contained the male child, the other sac had contained the two female children, and the umbilical cord of one of the latter (the stillborn child) had a velamentous insertion, its vessels separating and being attached to the membranes 3 inches from the placental margin.

This case presented almost all the typical features of a multiple birth.

1. *Date of Onset of Labour.*—Premature labour is very frequent in multiple pregnancies, due partly, no doubt, to the over-distension of the uterus. Even in twins this is so. "Of 192 twin births reported by Reuss from the Würzburg clinic, 51 did not complete the full term of gestation" (Lusk). And this agrees with our every-day experience. In this case pregnancy ended spontaneously at the beginning of the eighth month.

2. *Character of Labour.*—Labour presented the usual features: the first child was born without difficulty, followed by the second and third, with the usual intervals (10 minutes between the first and second, and 35 minutes between the second and third). Owing to the uterine inertia and the misdirection of what little uterine force there was on account of the pendulous state of the abdomen the third stage had to be artificially completed.

3. *Presentation.*—This was unusual, the first two children presenting by the feet and the third by the breech. In twin cases the relative frequency of head and pelvic presentation is as follows:—Both heads, 49 per cent.; head and breech, 31.7 per cent.; both pelves, 8.6 per cent.; other, 10.7.

4. *Origin.*—In this feature, too, the present case illustrates the general rule. The three children were developed from two ova; the male child being developed from one ovum