when vegetative life alone survives; or, it may be, as I have witnessed, that the intellect is left to watch, unmoved, the onward march of that advancing disorganisation which marks the degradation of the earthly tabernacle, calmly anticipating the moment when the last prop shall be withdrawn from the tottering fabric, and seeing in "the damp vault's dayless gloom" the welcome portal to unbounded liberty and unfailing light.

OBSTETRIC MEMORANDA.

HEAD AND HAND PRESENTATION.

[By R. B. RUDDOCK, Esq., Clifton.]

DR. TENISON'S case in the JOURNAL of the 4th inst. reminds me of a similar presentation I met with last year.

Mr. Hore called on me late one night, asking me to assist him in a case of turning. The woman had been in labour twenty-four hours; the membranes had ruptured eight hours. On visiting the patient, the midwife, an experienced woman, who had called in Mr. Hore, told us that the case had made considerable progress in his absence, and was going on very well. Under these circumstances, we thought it prudent not to interfere, and left. Next morning, ten hours afterwards, we found the patient in precisely the same state we had left her over-night. Mr. Hore administered chloroform whilst I turned the child. It was by no means an easy matter, jammed as it was into the pelvis. She was under chloroform about two hours, and about three ounces were used. The child, a large male, was dead. The woman made a good recovery.

HEAD AND RIGHT HAND PRESENTATION, TOGETHER WITH FUNIS.

By C. H. COLLINS, Esq., Chew Magna.

MRS. H., aged 35, in labour with her fourth child, had been attended for some hours by her mother, who acted as a midwife. On my arrival, I found about two or three inches of the cord down externally, and, on examination, the head and right hand presenting. The pains were regular and persistent; but the expulsive efforts appeared unable to overcome the difficulty of forcing the head, which was, together with the hand, rather firmly impacted in the brim. All pulsation had long ceased in the cord. Not having my instruments with me, I despatched a messenger for them, with the intention of performing craniotomy, as it was quite impossible to force the hand back. During the interval, not wishing to be idle, I succeeded, by a little manipulation, in hooking my finger over the ridge of the orbit; and, by using as much traction-power as I was able to command by that means, during the expulsive efforts of the pains, I managed to deliver the patient of a dead child, of full size and development. The patient herself made a good and rapid recovery.

PUERPERAL CONVULSIONS SUCCESSFULLY TREATED BY DEPLETION.

By W. WEAVER JONES, Esq., Cleobury Mortimer.

IN the year 1863 (May 23rd) I reported in the BRITISH MEDICAL JOURNAL five cases of puerperal convulsions successfully treated by depletion. All the patients are now living. I now beg to forward the notes of another case that occurred on the 29th of May.

J. C., aged 24, married, of full habit, primipara, was at the full period of utero-gestation. Labour commenced at 5 A.M.; she was seized with convulsions immediately after a thunder-clap, 8 A.M. Several fits occurred, and at 10 A.M. she became totally insensible. I saw her at 2 P.M.; she had had up to this time seven convulsions; the pulse was 120; the countenance blue; the breathing stertorous; the pupils dilated; the tongue protruded and swollen; the os uteri was open fully, and the membranes tense. She was bled to twelve ounces; the membranes were ruptured; cold was applied to the head. She was delivered by forceps of twins; the first child was a male, still-born; the second a female, living. Up to 8 P.M. she had five convulsions, not so violent; the breathing was less stertorous, but she was quite insensible. An injection of gruel, with two ounces of brandy, was administered. On the 30th, at 8 A.M. she had had four convulsions since 8 o'clock on the previous night, the last occurring at 1 A.M. She was now conscious: another injection was administered. She has progressed favourably since.

REPORT OF THE EDINBURGH COMMITTEE

ON

THE ACTION OF MERCURY ON THE LIVER.

BY J. HUGHES BENNETT, M.D.,

CONVENER AND REPORTER.

PART I.

It may be remembered that, in an Address I had the honour of delivering two years ago at Chester, I urged upon the British Medical Association the propriety of doing something, in its collective capacity, towards solving one or more of those doubtful points in practical medicine connected with the action of medicines or the treatment of diseases. The proposal, having met with the general approbation of the meeting, was committed to the Council; and, in the middle of the following October, I received a letter from the Secretary, informing me—"That, in accordance with a resolution passed at the last annual meeting, the sum of £25 be granted, out of the funds of the Association, to a Committee, to be appointed by, and under the direction of, Professor Hughes Bennett, to investigate the Action of Mercury on Animals." After hesitating for some time, in consequence of the inadequate sum voted, and after communicating with the President, who explained that although small there was no further balance available, I finally accepted the commission. In doing so, I was actuated by the feeling that this first effort of the Association to investigate an important medical question, with the aid of its funds and by a combined effort of its members, ought to be prosecuted at all risks; I also felt confident that an earnest effort in this direction would ultimately receive the support of the Association.

My next step was to secure the co-operation of gentlemen who were capable in various ways of assisting the inquiry; and ultimately I secured the cordial co-operation of—Dr. Christison, Professor of Materia Medica and Therapeutics, Edinburgh; Dr. MacLagan, Professor of Medical Jurisprudence, Edinburgh; Dr. James Rogers, formerly of St. Petersburg; Dr. William Rutherford, Assistant to the Physiological Department of the Edinburgh University; Dr. Frazer, Assistant to the Materia Medica Department of the Edinburgh University; and Dr. Gamgee, Assistant to the Medico-legal Department. The Physiological, Materia Medica, and Medico-legal Laboratories of the University were also to be placed at our disposal.

The Committee thus formed appeared to me to unite in itself all those elements required to give confidence in the results arrived at; viz., "The skill of the anatomical operator, the analytical power of the chemist, and the varied knowledge, theoretical and practical, of the histologist, physiologist, physicist, pathologist, and therapist, as well as of the physician whose knowledge of diagnosis is unimpeachable." In the Committee thus constituted, it appeared to me, every confidence might reasonably be placed, as "the energy and sanguine character of youth were sufficiently tempered with the caution and reasoning power of age, while every necessary instrument, appliance, and chemical, together with a public hospital, were at its disposal."

The Committee met on Nov. 16th, 1866, and, after discussing what branch of this extensive subject should be first investigated, it unanimously agreed to direct its attention to the Action of Mercury as a Cholagogue. On proceeding to consider by what method this was to be accurately ascertained, it was clearly pointed out by Dr. Gamgee, as the result of the opinion of modern chemists, that no kind of examination of the feces would yield trustworthy results. Supposing that the chief and characteristic constituents of the bile found their way into the alvine evacuations unchanged, imperfection in the analytical methods at our disposal render their quantitative analysis impossible. The plan of ascertaining bile-acids indirectly by means of nitrogen and sulphur determinations of the alcoholic extract, while most unsatisfactory in the case of

pure bile, is still more so when applied to the alcoholic extract of feces. The method of Professor Hoppe-Seyler of Tübingen, who calculated the amount of bile-acids from the effect which their solutions exert upon the ray of polarised light, presents such complexity and difficulty as to render its systematic employment in any series of analyses altogether inapplicable. As to the colouring matters of bile, there is no direct method known by which they can be estimated. But, it was further argued that, did we even possess proper means of estimating the bile-products, it is only a small portion of such as are secreted by the liver which can be found in the alvine discharges. Bidder and Schmidt ascertained that the amount of unoxidised sulphur in them only represented one-eighth part of the total sulphur which the liver secretes, and that, of the other constituents of the bile, the larger proportion are absorbed. Indeed, the utter impossibility of detecting the constituents of bile in the feces is admitted by one of the most reliable physiological chemists of Europe, viz., Professor Hoppe-Seyler. That, under the influence of purgatives, unchanged bile is occasionally discharged from the bowel is true; but this furnishes no proof of any increase of that secretion; for, under ordinary circumstances, it is decomposed and absorbed in the alimentary canal, and any cause which increases the rapidity of its passage there, must render absorption and decomposition less complete.

These arguments convinced the Committee that no accurate information as to the amount of bile secreted by the liver, was to be obtained by an examination of the feces. They, therefore, arrived at the conclusion, that the formation of biliary fistulæ in living animals, and collecting the bile directly through such fistulæ from the gall-bladder, was the only means open to them of determining how far mercury influenced that secretion.

HISTORY.

It next became necessary to ascertain what had been made out by previous observers, as to the amount of bile secreted by the liver, under varied circumstances, through biliary fistulæ. For literary researches into this matter, the Committee are greatly indebted to Dr. Rogers. He informs the Committee, in his report on this branch of the inquiry, that efforts to establish biliary fistulæ, and to collect the bile, have been attended with extreme difficulty in the hands of all experimenters, and have led to a large mortality among the animals operated on. Of 18 dogs operated on for this purpose by Professor Schwann of Louvain, 10 died within a week after the operation, from its immediate effects; 6 in from eight to eighty days from inanition, although the appetite remained good. In 2, the choledic duct was re-established. Some years afterwards, he operated on 12 other dogs, so that the total number operated on amounted to 30; and Bidder and Schmidt inform us, that of these one lived four months, and another a whole year, after the operation. The last mentioned authors say, "We shall not take into account the unsuccessful cases, of which the number at the commencement of our investigation of this subject was not very small." Again, they say, "After ten or twelve unsuccessful attempts to establish permanent biliary fistulæ in cats, we were obliged to have recourse to dogs." Dr. Flint, in his paper on a New Function of the Liver, does not mention the number of dogs in which he performed the operation; but it is evident that a great number perished. He says, "all the experiments made during the winter 1860-61 were unsuccessful, no animal surviving the operation more than three days." After a number of trials during the following winter, which were not more successful than the previous ones, he succeeded at last with one animal. There is every reason to believe that, had other experimenters informed us of their failures, the number of these would have been equally great. In the few cases which have succeeded, however, it is important to remember that a large amount of valuable information regarding the bile has been obtained, that never would have been arrived at without them.

The operation performed by physiologists on animals in order to establish biliary fistulæ, has, with a few modifications, been essentially the same, and will be subsequently described when detailing the experiments of the Committee.

The results arrived at may be divided into: 1, the amount of the biliary secretion in health, and the causes which influence it; 2, the special effect of mercury on the secretion of bile.

1. Previous Researches to Determine the Amount of Bile Secreted in Dogs, and the Circumstances which influence it.

Haller.†—In Haller's Physiology, reference is given to several cases

* Verdauung's Säfte und der Stoffwechsel, 1852, page 125.

† "Physiologia", tom. vi, page 605.

in which attempts had been made to ascertain the quantity of bile secreted in a given time by experiments on living dogs. The description of them, however, is so very vague and general, that they possess little interest for the physiologists of the present day. Van Reverhord found the quantity of bile secreted by a dog in twenty-four hours to be 6 oz.; and Haller, estimating the secretion in the human subject at four times that in the dog, suggested 24 oz. to be the quantity secreted daily in the healthy human adult. He likewise alludes to an interesting case of a man in whom a biliary fistula was formed in consequence of a wound of the gall-bladder. Tacconus, who saw the case, estimated the amount of bile discharged by the fistula at 4 oz.; but whether the expression "eodem tempore" refers to six or twenty-four hours, it is impossible to say—probably to the former.

Schwann.*—It was not till 1844 that any serious attempts were made to investigate this subject by Professor Schwann of Louvain. He made several interesting experiments, by means of biliary fistulæ, to ascertain the utility of bile in the animal economy. Unfortunately, he does not appear to have carried out his intention of ascertaining accurately its amount.

Blondlot.†—In 1846, Blondlot succeeded in establishing a biliary fistula in a dog of middle size, in which he gives approximately 40 to 50 grammes as the amount of bile secreted in twenty-four hours. His estimate, however, was not made with great precision; for he only collected the fluid for short periods at a time, and could not, therefore, ascertain its exact amount in twenty-four hours.

H. Nasse.‡—Heinrich Nasse of Marburg published in 1851 an interesting memoir, giving an account of a series of experiments performed on one dog in which a biliary fistula had been established, and which lived afterwards five months and a half. His object was to ascertain the influence of the quantity and quality of the food on the biliary secretion. As we have not succeeded in obtaining the original work, the result of his researches will be subsequently tabulated as obtained from the abstract given of them in Canstatt.§

Bidder and Schmidt.||—In 1852, Bidder and Schmidt, in their work on the Digestive Fluids, gave an account of the most elaborate experiments yet made to determine the amount of the biliary secretion. They succeeded in establishing biliary fistulæ in four dogs. In one dog, the daily observations extended from Feb. 17th to April 15th, when he was killed. The bile was collected by holding a balloon-shaped glass over the fistulous opening for fifteen minutes at a time; and this was repeated daily from six to ten times successively. The varying amount of biliary secretion obtained at one period was corrected by the results obtained at other periods, and the average amount calculated from a large number of observations. This method, though excellent for determining the amount of the secretion at different periods of the digestive process, is, as regards the daily quantity, evidently unsatisfactory. Besides, as the dog did not consume the same amount of food under these varied circumstances, that might vitiate the result. To simplify the tables, and render calculating easier, they estimated the amount of bile secreted at so much per kilogramme weight of dog. Thus, if a dog weighing 5 kilogrammes secreted 100 grammes of bile in twenty-four hours, it would be said that 20 grammes of bile were secreted for each kilogramme of dog in twenty-four hours. They estimate the average amount of bile per kilogramme in twenty-four hours at 19.999.

The following table gives the average amount of biliary secretion in the four dogs, with the average amount of food per kilogramme taken hourly and daily. One kilogramme weight of dog gives six grammes.

	1	2	3	4	5	6
<i>In 1 Hour.</i>						
Fresh bile	0.539	0.663	0.696	1.023	1.198	0.824
Dry residue	0.040	0.035	0.029	0.049	0.057	0.042
<i>In 24 Hours.</i>						
Fresh bile	12.936	15.912	16.704	24.550	28.750	19.99
Dry residue	0.960	0.840	0.696	1.176	1.268	0.988
Daily amount of food per kilogramme weight of dog		32.49 flesh; 1.74 bacon and butter.	17.85 flesh. 7.87 milk.	79.51 flesh. 8.32 bread.	66.42 flesh; 8.59 bread (rye).	

The first column gives the quantity of bile obtained from recently

* Müller's Archiv. 1844, page 127.

† Essai sur les Fonctions du Foie, 1846.

‡ Commentatio de bilis quotidie a cane secreta copia et indole. Marburg, 1851.

§ Canstatt, Jahresbericht, 1856, 1st Heft, p. 87.

|| Verdauung's Säfte und der Stoffwechsel, 1852.

formed biliary fistulæ; the four following ones the quantity obtained in cases of fistulæ of some standing; and the sixth gives the average amount of the different observations.

Bidder and Schmidt found that the amount of bile secreted in a given period varies much in different species of animals. Thus, for every kilogramme of animal there is produced on an average:

CAT.	DOG.	SHEEP.	RABBIT.	GOOSE.	CROW.
<i>In 1 Hour.</i>					
0.608.....	0.824.....	1.059.....	5.702.....	0.491.....	3.004 Fluid
0.034.....	0.042.....	0.056.....	0.103.....	0.034.....	0.219 Solids
<i>In 24 Hours.</i>					
14.50.....	19.990.....	25.416.....	136.84.....	11.784.....	72.096 Fluid
0.816.....	0.988.....	1.344.....	2.47.....	0.816.....	5.256 Solids

It appears remarkable that the rabbit should secrete five times as much bile as the other larger animals do, and that the crow should secrete so much more than the goose; but from the manner in which the bile-collections were made, little confidence can be placed in these results. They found that the amount of the biliary secretion was much influenced by the quantity and quality of the food and drink. Taking from six ounces to ten ounces of water produces a rapid increase of the secretion, attaining its greatest measure in from forty-five to sixty-one minutes after it has been taken, and diminishing as rapidly. They found that, when the food of cats consisted almost exclusively of fat, the secretion of bile was reduced to about the quantity furnished by fasting animals. Blondlot (p. 62) says that the use of fat increases the amount of bile; and Ritter and Nasse say that the addition of fat to the food increases the secretion—at least, when the supply of flesh at the same time is not great. Bidder and Schmidt also ascertained that the quantity of the biliary secretion varies at different periods of the digestive process, and that it attained its maximum thirteen to fifteen hours after a meal. On this point, it may be here observed, that Arnold supposed it to reach its maximum two to four hours after solid food was taken; Kölliker and Müller generally from five to eight hours; and Dr. Flint from two to eight hours. Dr. Dalton, from observations made on a case of duodenal fistula, thinks biliary secretion is at its maximum an hour after feeding. Ritter and Nasse, like Arnold, remarked two maxima in the course of the day: the first occurring during the first or second hour after feeding; the other so much the earlier the more scanty the supply of food.

In Bidder and Schmidt's tabulated observations on the first dog, it will be seen that the greatest amount of fresh bile was secreted between six and seven hours after a meal. It is true, that the greater amount of dry biliary residue was found in one of the collections made from fourteen and a half to fifteen and a half hours after feeding; but, in another quantity collected at the same period after feeding, the amount both of fresh bile and dry residue was much less than in that collected between six and seven hours after a meal. Again, of two quantities collected respectively on the 2nd and 6th of November, from fourteen to fifteen hours after feeding, the amount of fresh bile in the first collection was only about the half of what was secreted from three to four hours after a meal; and in the second collection it was about half of that secreted from four and a half to five and a half hours after a meal. The tabulated observations on the third dog seem to give more support to Bidder and Schmidt's opinion; but the quantities of biliary secretion given for different periods after feeding are too fluctuating to permit the amount of bile secreted at any given stage of digestion to be accurately estimated. The observations of Bidder and Schmidt themselves, therefore, do not support their own conclusion; and, as this is opposed to those of other experimenters, it must be concluded that the amount of bile secreted varies considerably in the same animal, and at the same period of digestion, even independently of food and drink.

Arnold.*—In 1854, Dr. Arnold published a work on the *Physiology of the Bile*, and afterwards made some additional experiments on the subject in 1857. The apparatus he employed consisted of a cannula 4½ centimètres long and 4 centimètres wide, attached by a screw to an elastic caoutchouc bag 10 centimètres long and 1 centimètre broad. Fifteen millimètres above this attachment, and at right angles with the cannula, was a metallic plate, 12 millimètres in diameter. This plate was placed between the skin and the muscles; and the wound healed perfectly over it, preventing all escape of bile between the soft parts and the cannula. The distal extremity of the bag had a cork-stopper, by taking out which the bile collected in it could be removed. The operation was performed in the usual manner on a healthy dog of middle size, weighing 9.250 kilogrammes, on the 18th of June, 1853. The common duct was first tied close to the duodenum, and again half

an inch from the gut. The portion between the two ligatures was then excised. Although, after the operation, the dog was exhausted, and vomited its food more than once, on the following day he appeared to be quite well. The bile flowed freely through the cannula until July 1st, when it ceased. Another and wider cannula, with a broader border, was then inserted. This also, subsequently, was so forced forwards by the contraction of the wound, that no bile could flow, and the cannula was withdrawn. The apparatus first inserted was then employed, and answered perfectly, as the cannula was firmly fixed in its place by the wound healing over it; so that not a drop of bile escaped at its edges. From the 18th of June until the 6th of July, the dog was fed on bread, milk, flesh, and potatoes. It lost 375 grammes in weight during this period, without any perceptible derangement of digestion. The fæces were pultaceous, without any trace of bile-pigment; had a putrid odour; and contained a considerable quantity of fat, but no trace of muscular fibre. To prevent him from licking the bile, he was muzzled. From July 6th to August 2nd, he was fed entirely on flesh. From the 6th to the 9th of July, he ate daily 500 grammes of fat flesh. During this period, the fæces were like clay, soft, and contained a quantity of fat. The weight of the body diminished rapidly, so that on the 8th it was 8.203 kilogrammes, and on the 9th 7.750 kilogrammes. He was then lean, but lively, and had 750 grammes of flesh, pretty free from fat, divided into three portions, which he ate morning, midday, and evening. During the period he lived on flesh, his hair fell out largely, and could easily be pulled out in tufts without causing pain. There was also a large development of gas in the intestines, with borborvgmi and liquid fæces. About the 20th of July, they assumed their natural consistence, and were brown externally, though of an ash-colour internally. Each time the fistulous opening was interfered with or irritated, the fæces became softer and more liquid, and their odour more cadaverous; while, when consistent, it was less penetratingly putrid. From August 3rd to September 1st, the food consisted of old rye bread, of which there was consumed, on an average, daily 470 grammes, and was commenced because the dog refused all animal food. During this period, its weight increased to 8 kilogrammes, the emaciation disappeared, and the falling off of the hair diminished. Indeed, the hair in a few months grew abundantly, so that it presented a black shining coat, as before the operation. The appetite returned, and he ate greedily. The digestion was good; the fæces of firm consistence, of a yellowish-grey colour, like that of the bread, and less offensive than when he was fed on flesh. Their quantity also was increased as three to two. Their average daily weight was 320 grammes; whereas, when fed on flesh, it was 210 grammes. He also drank more. When the diet was bread, he drank daily the average quantity of 450 cubic centimètres; when fed on flesh, only 340 cubic centimètres.

The quantity of bile secreted on the average, when fed upon 750 grammes of flesh and upon 470 grammes of rye bread, is shown in the following table.

Daily food.	Weight of dog.	Bile secreted daily.	Bile-solids daily.	Bile secreted daily per kilo.	Bile secreted hourly p.kil.
750 gr. flesh...	7.750 kilos...	90.295 gr...	2.892 gr. to...	11.65 gr...	0.486 gr.
			3.056 gr.		
470 gr. rye-bread...	7.812 kilos...	63.024 gr...	1.662 gr. to...	8.067 gr...	0.336 gr.
			2.634 gr.		

From hourly observations it appears that, the largest quantities of bile were secreted during the first hours after getting food; drinking water also increased the secretion. The dog caught cold September 1st, and died September 3rd, from peritonitis. On September 4th, the body of the animal weighed 7.512 kilogrammes. On dissection, it was found that where the ductus communis choledochus had been cut out, a new one three lines long was formed, having on one side of it a small collection of pus containing the ligatures. It was therefore believed that in a short time the common duct would have been re-established. Round the plate of the cannula a newly formed mucous membrane was discovered, continuous with the gall-bladder.

The following are the more important conclusions drawn by Arnold from the whole inquiry (p. 19.) 1. Cutting off the bile from the intestines, if a sufficiently increased quantity of food can be digested, is not injurious to an animal. For two dogs of the same weight, one with, and the other without fistula, the first will require five-eighths more flesh or three-fifths more bread than the second. 2. The quantity of bile secreted is influenced by the quantity and quality of the food. A dish of bread gives rise to a less secretion of bile than one of flesh. 3. From experiments on dogs with biliary fistulæ, in consequence of the increased diet they require, no conclusion can be drawn as to the quantity of bile likely to be secreted in healthy dogs in proportion to the amount of food they take. 4. The quantity of bile secreted in propor-

* Zur Physiologie der Galle, 4to, Mainz, 1854.

tion to the weight of the animal is estimated too highly by Bidder and Schmidt, and also by Nasse; because all animals with biliary fistula require much more than their ordinary food to keep up their usual weight, while the quantity of the diet influences the amount of bile secreted. 5. Besides food, the drinking of water considerably increases the secretion of bile. 6. The nature of the food does not much influence the solid constituents of bile. Arnold admits, however, that in this respect Nasse's observations may be more accurate than his own. 7. The secretion of bile, apart from the influence that it exerts on the absorption of fat, plays an important part in the process of nutrition. 8. In Arnold's dog, the biliary secretion was most copious during the first hours after taking food. After the fourth hour it began to diminish until the twenty-fourth hour, when it was least, but the diminution was not regular. His manner of collecting it, however, like that of Bidder and Schmidt, is objectionable—viz., at varying periods of fifteen minutes, half an hour, and an hour. Instead, therefore, of determining how much bile flowed in twenty-four hours, this was made to appear by multiplying so many times the half hour or hour collections.

Kölliker and Müller* made some experiments on the bile during the years 1853 and 1854, of which they published an account in the *Würzburg Abhandlungen* for 1855. They succeeded in establishing biliary fistulae in three dogs. For one kilogramme of dog, they found in twenty-four hours—

Hours after food.	Fresh bile.	Dry residue.	No. of observations.
1 to 2.....	1.450.....	0.051.....	8
3 to 5.....	1.407.....	0.047.....	5
6 to 8.....	1.514.....	0.048.....	8
16 to 22	1.320.....	0.051.....	7

Another dog gave the largest quantity four to five hours after feeding, and least after nineteen to twenty-one hours. A third dog gave the maximum five to six hours after a meal, and not much less after sixteen or seventeen hours. They found, as other observers had done, that the quantity of food consumed has a decided influence on the quantity of the biliary secretion. When, for example, a dog ate 18½ ounces of flesh in twenty-four hours the bile collected amounted from 5.3 to 6.6 grammes in an hour, but when it ate 33½ ounces of flesh, it was increased from 7.5 to 7.8 grammes. It is important to observe that the calculation of Kölliker and Müller, like those of Bidder and Schmidt, were derived from collections of bile made during a quarter of an hour, half an hour, and occasionally one hour, and the amount per day was estimated from the averages of these. In no case was it collected continuously for twenty-four hours.

Scott.†—Dr. Scott appears to have been the first who collected all the bile secreted by a dog during twenty-four consecutive hours. We must refer to his paper for a description of the method he adopted for collecting it, and for the account he gives of his interesting and carefully conducted experiments and analyses. He avoided the error liable to occur in calculating the amount of bile secreted in twenty-four hours, from quantities obtained during a part only of that period. He estimated the amount of fresh bile given off in twenty-four hours at about 23.15 grammes; of dried residue at 1.13 per kilogramme.

Dalton.‡—Dr. Dalton of New York attempted to ascertain the amount of bile which passed into the duodenum from the choledic duct by means of a duodenal fistula. But, as in this manner it is obviously impossible to determine the amount of the entire quantity given off by the liver, no account of his researches need be given.

Flint.§—The last experimenter we need cite is Dr. Flint of New York. As his object, however, was rather to ascertain the amount of cholesterol secreted by the liver, than to determine the quantity of biliary secretion, he does not give us much information on this point. In one dog, the bile was collected for thirty minutes at a time during various periods of the day, and was found to be secreted at its maximum four hours, and at its minimum twenty hours, after feeding. The dog weighed 10 pounds; and there were collected, in the twenty-four hours, 243.233 grains—an amount which gives an index of the quantity secreted during that period. He further says that, disregarding slight variations, which might be accidental, it may be stated in general terms, that the maximum flow of bile from the liver is from the second to the eighth hour after feeding, during which period of time it is about stationary.

We here subjoin a table containing the results of the experiments of different physiologists who have investigated the subject of the biliary secretion. With the exception of the results of those of Dr.

Flint and Dr. Scott, the table, of which the arrangement is slightly changed, is taken from Canstatt's *Jahresbericht* for the year 1863, No. 1, p. 141. The weight is given in grammes.

Names of observers.	Amount of bile secreted in 24 hrs. per kilogramme weight of dog.		Food taken in 24 hours per kilogramme weight of dog.	Quantity of bile secreted in 24 hrs. for 100 grammes of food.	
	Fresh bile.	Dry residue.		Fresh bile.	Dry residue.
Nasse, 1851	19.2	0.685	155 flesh	12.3	0.440
	22.8	0.700	208 „	11.1	0.337
	23.1	0.784	260 „	8.9	0.300
	24.0	0.765	At will	...	...
	28.4	0.760	...	...	...
	17.7	0.446	100 flesh and 100 br.	...	...
	17.9	0.400	130 „ 100 „	...	...
	12.2	0.500	87 bread	13.9	0.575
Bidder and Schmidt, 1852.....	15.9	0.840	32.4 flesh, 1.7 fat	49.3	2.608
	16.7	0.696	17.8 „ 7.8 milk	83.5	3.48
	24.5	1.176	79.5 „ 8.3 bread	25.7	1.23
	28.7	1.268	66.4 „ 8.5 „	35.1	1.54
Arnold, 1854-57.....	11.6	0.373	96 flesh	12.0	0.385
	8.1	0.215	60 bread	13.4	0.357
Kölliker and Müller, 1853.....	32.7	1.034	...	...	...
	32.6	1.290	98 flesh	...	...
	26.1	1.013	92 „	28.56	1.694
	21.5	0.748	94 „	22.85	0.792
	36.1	1.162	94 „	56.50	1.816
	53.6	1.683	94 „	56.7	1.79
	32.1	...	37.9 bread, 90 cubic centimetre of milk	...	...
Scott, 1858	23.11	1.128	58.7 flesh, 10.3 milk	35.0	1.6
Flint, 1862	11.98	0.440	...	...	...

II. Previous Researches to determine the Influence exercised by Mercury on the Biliary Secretion.

Nasse.*—Professor H. Nasse was the first who attempted to ascertain, by experiment on the dog with biliary fistula, the influence of mercury on the secretion of bile. It is stated in Canstatt that the result of his experiments was, that calomel increased the absolute quantity of the bile, but diminished its solid constituents.

Kölliker and Müller administered to one of their dogs which had a biliary fistula, 4 grains of calomel at ten o'clock on the morning of the 28th. Five half-hour observations made after midday gave an average of 3.823 grammes of bile excreted, an amount a little above that of previous averages. On the following day, however, four half-hour observations gave on an average 3.267 grammes,—that is rather less than the usual average.

On the 21st and 29th days the dog took again 4 grains of calomel, but the biliary secretion, instead of increasing, diminished. Seven observations of half-an-hour each, from the 28th to the 31st day, gave an average of only 2.183 grammes, and the bile at the same time was of a brownish colour, and so thick that at last it scarcely dropped from the cannula. This circumstance was undoubtedly owing to the dog's health, which was bad. It had lost weight, had diarrhoea, greyish coloured, and even later bloody stools. For several days at this period the animal took only a little bread and milk.

Dr. Mosler,† in his investigations, proposed to himself the question, "What substances introduced into the blood appear in the bile?" In some of the experiments a solution of the substance to be tried was injected into the blood, in others the medicine was given by the mouth, and the bile afterwards tested, to ascertain if it contained any trace of the substance administered. With regard to mercury, he tells us, that on the 23rd of May, at seven o'clock A.M. 5 grains of calomel in a little bread and milk were given to a dog, who had a completely healed biliary fistula. All the bile secreted till three o'clock P.M. was collected by means of a sponge and tested for mercury, but not the slightest trace of it could be discovered. At 4 o'clock P.M. 10 grains of calomel were administered to the same animal, and for greater accuracy a small tube with a caoutchouc bag attached was introduced into the fistula, and kept there till next morning. No trace of mercury was found in the collected bile, and no striking increase of the biliary secretion was remarked. After this experiment the animal was dull, ate less than usual, and had thin very offensive stools. To make a trial of the drug in smaller doses, Dr. Mosler gave the same animal one grain of

* Würzburg Abhandlungen für 1855, Band v.

† Beale's Archives, vol. i.

‡ Physiology, p. 190, 3rd edit.

§ American Journal of Medical Sciences, vol. xlv, p. 366.

* Canstatt's Jahresbericht, 1852, Heft i, p. 156.

† Virchow's Archiv, Band xiii, S. 29, 1858.

calomel every hour from the 25th to the 26th of May, so that altogether 25 grains of calomel were given,—no trace of mercury could be found in the collected bile. To another powerful dog with biliary fistula he gave, on the 19th of August, at nine o'clock, three pills, each containing 3 grains of calomel. Next morning at six o'clock A.M., three similar pills were given, and at nine o'clock two more—so that the dog had 30 grains of calomel in eighteen hours. The bile discharged from the fistula was carefully collected by a sponge, from three o'clock on August 11th till the same hour on August 12th. Compared with the quantity collected during twenty-four hours on the day previous to that of the experiment, there was no striking increase of bile, nor did it contain any trace of mercury. He repeated this experiment with 24 grains of calomel with the same negative result. Dr. Mosler concludes from these experiments that, when mercury is administered in the form of calomel, either in small or large doses, it does not pass so rapidly into the bile, nor produce the marked increase of the biliary secretion that medical men imagine. It is much to be regretted that Dr. Mosler did not measure the bile passed during these experiments, which would have given far more value and precision to his observations.

Scott.—The only other experiment made to determine the influence of mercurial preparations, or rather of calomel on the biliary secretion, with which we are acquainted are those of Dr. Scott, who deserves great credit for the careful and scientific manner in which he has carried them out. We shall have occasion, however, to point out some circumstances which seem clearly to shew that they must be regarded rather as valuable contributions to aid us in determining the influence of calomel on the biliary secretion, than as data which, of themselves, warrant any definite conclusion; indeed, Dr. Scott himself has fully admitted the truth of this remark. Dr. Scott made four trials with calomel, in which he estimated the amount of increase or decrease of the biliary secretion by taking the average of two days previous, and of two days subsequent to its administration.

In the first trial 3 grains of calomel were given to the dog at three o'clock P.M. on the 13th of June.* The daily average amount of bile secreted on the 11th and 13th of June was 1960 grains, and that of bile secreted on the 14th and 15th, 1358 grains, showing an average diminution of 602 grains for each of the two days subsequent to the administration of the calomel.

In the second trial, 6 grains of calomel were administered at eleven o'clock A.M. on the 16th of June.† The amount of bile secreted during twenty-four hours, and collected on the morning of the 16th, was 1639 grains, and of that secreted during the subsequent twenty-four hours, and collected on the 17th June, was 518 grains, indicating a diminution of 1121 grains in the biliary secretion during twenty-four hours after the administration of the calomel.

In the third trial, 12 grains of calomel were given at 4.30 P.M. on the 3rd of July, the average daily secretion of bile for two previous days (2nd and 3rd of July) amounting to 3044 grains, and that for the two subsequent days (4th and 5th of July) to 2720 grains, showing a diminution of 323 grains on the average daily quantity of bile secreted after the administration of the calomel.

In the last trial, 12 grains of calomel were given at 5.45 P.M. on July 7th; the daily average amount of biliary secretion on the two preceding days (the 6th and 7th) being 2658 grains, and on the 8th and 9th July being 1724 grains, shewing a diminution of 933 grains in the daily average quantity of bile secreted after the administration of the calomel.

We subjoin a table of the daily amount of fresh bile, collected for several days, in order that our subsequent remarks may be intelligible to the reader. The cross before the dates indicates the days on which calomel was administered.

Amount of Bile secreted in Twenty-four Hours, in Grains.

June 11	1628.00		July 1	2168.051
„ 12	1767.700		„ 2	2941.239
† „ 13	2293.527	† „	„ 3	3148.400
„ 14	1819.636		„ 4	2560.300
„ 15	896.680		„ 5	2881.500
† „ 16	1639.968		„ 6	2644.300
„ 17	518.701	† „	„ 7	2672.900
„ 18	1810.450		„ 8	1963.500
„ 19	817.717			

Dr. Scott concluded that all the trials gave but one result; viz., “a diminution in the amount of bile and bile-solids secreted after the administration of large doses of calomel”. We are of opinion, however,

* The bile secreted during twenty-four hours was always collected on the morning of the day indicated. The amount obtained on June 12th was not used in calculating an average, as a considerable quantity was lost in collecting it.

† The amount of bile collected on the 15th was not used in making an average, probably because Dr. Scott supposed the secretion of the previous twenty-four hours was still under the influence of the calomel.

that the diminution is not nearly so great as he has made it appear; thus, for example, if, in the first trial, we set aside the results of June 12th (as Dr. Scott has done), and only take the amount of bile secreted during the twenty-four hours previous, and subsequent, to the administration of calomel (as Dr. Scott has done in the second trial), the amount of decrease will be considerably less than he has calculated it to be.

Again, if we take the average amount of bile collected during two days previous, and two days subsequent, to the administration of the second dose of calomel, the result will be very different from what Dr. Scott's calculations make it. Instead of a diminution of 1121 grains, it will amount only to 104 grains; and we must not overlook the fact that, on the day when the calomel was administered, the dog did not get any food.

Dr. Scott does not mention at what hour of the morning the bile was collected. If we suppose it was collected at 10 o'clock A.M., twenty-three-hours would thus be left for the action of the calomel, which was administered at 11 o'clock A.M. on the preceding day. It might be said, that the action of the calomel would not be exhausted in that time; and that we ought not, therefore, to admit the collection of bile of the 15th into the calculation for obtaining a daily average amount on the two days previous to the administration of the calomel. On June 18th, however, the second day after the second administration of calomel, the amount of biliary secretion increased from 518 grains on the 17th to 1810 grains on the 18th, 171 grains more than the quantity secreted on the 16th, a day on which calomel could not have had any influence on the amount. Consequently we must conclude, that the influence of the calomel did not extend, in this case, to the second day after its administration; or, if it did, it was not to diminish, but to increase very largely the secretion. Up to the present time, we know little or nothing of the duration of the action of a dose of calomel on the biliary secretion; so that we have no reason to assign a period of two days, rather than of one or of three, as the duration of its action. It would be to ascribe, in the one case an increase and in the other a diminution, to the same cause; that is, the action of the mercury on the second day after its administration. In short, the number of Dr. Scott's observations are far too few, and not sufficiently long continued, to allow us to draw any definite conclusions from them.

It must, I think, be evident, from this notice of all that has been previously accomplished, that no exact information has yet been obtained as to the influence of mercury on the secretion of bile, or as to any other action it may exercise on the liver.

It has been thought better to publish the historical part of the subject at present for two reasons: 1, because it may enable the members of the Association to take a greater interest in the results of the Committee, which are to be brought before the Oxford meeting; and 2, because, if any other researches are known that have not been embraced in the above Report, they may be communicated to the Reporter, and the whole inquiry rendered as complete as possible.

THE POSITION AND PROSPECTS OF THE MEDICAL PROFESSION:

BEING PART OF THE PRESIDENT'S ADDRESS.*

By C. E. PRIOR, M.D., Bedford.

[AFTER some preliminary remarks, in which he congratulated the Branch on its progress, Dr. Prior made the following remarks on the Position and Prospects of the Medical Profession.]

The days of the village apothecary, whose natural science came at second hand from the curate or village schoolmaster, whose experience comprised little beyond the virtues of some special form of aperient, the value of some favourite specific for measles, or the treatment of the ordinary emergencies of midwifery, it would appear to me, are passing away. The medical profession of the future, if it be to retain its proper rank, must consist of men distributed over the country, of liberal education, conversant with natural science, and socially, as well as intellectually, on a level with the clergy of the establishment. . . . In order to place us in such a position, several things appear to me to be required: a more liberal preliminary education; a longer curriculum of study; an increased rate of remuneration; a more certain tenure of appointments; a certain amount of that leisure which is considered indispensable in all other learned and laborious professions. I can see no reason that the amount of classical, mathematical, and historical knowledge required for entrance upon professional studies should be less than the moderate demands of our universities at matriculation. Theirs, be

* Delivered at the annual meeting of the South Midland Branch, June 18, 1868.