ON THE CLINICAL SIGNIFICANCE
OF
COLOURLESS OR CLAY-COLOURED STOOLS
UNACCOMPANIED BY JAUNDICE,
AND THEIR CONNECTION WITH
DISEASE OF THE PANCREAS;
AND ON THE PART PLAYED BY THE PANCREAS IN
ELIMINATING BILE FROM THE INTESTINES.

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THE colour of the fæces of the healthy human adult is brown ;—the shade may vary in perfect health according to the nature of the ingesta or other circumstances, but the brown colour is invariable. It is an accepted clinical fact, that any cause which prevents the entrance of bile into the intestine deprives the stools of this normal brown colour.

Hence the appearance of colourless or clay-coloured stools is almost universally accounted for by the supposition that there is a deficiency of bile in the intestines. But the colour of fresh bile is a bright yellow, and the colour of stale bile, and of bile which has been exposed to the air, is green. Bile stains the urine and all the tissues in which it may be detected yellow and not brown. The

most recent chemical authorities tell us that the colouring matter of the bile is bilirubin ($C_{32}H_{36}N_4O_6$), which by oxidation becomes biliverdin ($C_{32}H_{36}N_4O_8$). These colouring matters are not found in the fæces, but another matter, which is called stercobilin or most recently hydrobilirubin ($C_{32}H_{40}N_4O_7$), and which is said to be identical in composition with urobilin.¹ Further, it has not escaped the observation of physicians that cases occur in which colourless or clay-coloured stools are persistently present without jaundice or other evidence of disorder of the liver.

In the face of these facts it is not surprising that many accurate observers who have given attention to this matter cannot accept as full and sufficient the explanation that colourless stools depend on defective bile-supply.

Physiologists still speak in uncertain tones of the cause of the colour of the fæces; thus, Michael Foster sums up his remarks on the subject in words which clearly show his sense of the insufficiency of the present knowledge on the subject:

“The fact that the fæces become ‘clay-coloured’ when the bile is cut off from the intestines shows that the bile pigment is at least the mother of the fæcal pigment.”

Among physicians I will quote only from Dr. Wickham Legg the following passages, as showing that the most recent writer on a subject of which he has made a special study also feels that the usual explanation is only a partial one.

“The want of colour in the fæces is almost universally set down to a decrease in the secretion of bile. But I should like to point out that of this there is no evidence. The absence of bile is, no doubt, the cause of the white stools in jaundice; but it would be highly imprudent to assert that it is the only cause of want of colour in every disease. In many kinds of brutes the fæces are grey or even white in health, and in some of these, as in the dog,

¹ By whatever names these ingredients of bile and of fæces respectively may be called, the fact remains that the colouring material of the fæces is neither chemically nor in outward appearance identical with that of bile.

there is evidence that the liver is as active as in man. The colour of the fæces, then, is not due to the want of the secretion of bile ; it is rather more likely to be due to the absorption of the bile after it has passed into the intestine. Then on certain diet, as milk, the stools often become light coloured ; yet there is no evidence of a decreased secretion of bile, or of an increased absorption of bile from the intestine. It is easy to imagine a cause for this lack of colour, but there is no certain knowledge about it. . . .”

“To tell the truth, very little knowledge exists as to the cause of the colour of the fæces, either in health or in disease. . . .”

“The only proposition that can be safely upheld is that bile is not the sole cause of all the changes of colour,” &c.

My object in this paper is to establish the following facts, namely : That the presence of the pancreatic juice in the intestines is as essential as that of the bile to produce the brown colour of the dejections ; that the so-called colourless stools may consequently be caused by disease of the pancreas, when the liver is perfectly healthy ; that they may be caused either by cutting off the supply of pancreatic juice or the supply of bile ; *that the bile which appears in the fæces is that only which has been acted on by the secretion of the pancreas* ; and that consequently the latter organ *has a hitherto unsuspected physiological and pathological importance* as a factor in the elimination of bile.

After giving particulars of the two cases which led me to this discovery, I shall adduce confirmatory evidence in support of my views, and I shall, I think, be able to show that the facts if accepted are of the greatest practical value to physiologists, pathologists, and practitioners.

CASE 1.—T. W—, a medical practitioner, of robust frame and active habits, in the summer of 1862, being then sixty-five years of age, began to suffer from a relaxed condition of the bowels and from slight pain in the epigastric

region, accompanied with a certain amount of derangement of the general health. Soon after these symptoms set in, the absence of colour in the motions attracted notice.

The late Dr. Budd and other men of eminence were at various times consulted, and could give no opinion but that there was obscure disease of the liver which prevented the formation of the colouring matter of the bile.

The epigastric pains passed off, and the general health became apparently as good as possible, but the passage of large colourless stools, of a peculiar putrid rather than fæcal odour, remained as a persistent symptom. In the course of time it was found that the dejections were occasionally accompanied by free oil or fat which floated either as a liquid or solid substance on the surface of water, and that the stools themselves were greasy. From these indications it was assumed that the pancreas was implicated.

As these symptoms continued through many years, while the patient remained apparently otherwise in perfect health and actively pursuing his profession, I came to the conclusion that, notwithstanding the colourless stools, the diagnosis of disease of the liver must be wrong, and that the pancreas alone was probably at fault.

In November, 1876, when the symptoms had lasted for fourteen years T. W— had a slight attack of pneumonia, accompanied at its onset by severe constitutional disturbance altogether disproportionate to the local mischief and followed by an illness having the character of pyæmia lasting through several weeks. This brought him almost to death's door, but he ultimately recovered from it.

In the course of this illness there was for some few days distinct icterus with deep staining of the conjunctiva, skin, and urine. This proved that no organic disease of the liver which prevented the formation of bile existed. During the ten years which Dr. W— survived this attack the stools remained, as before, absolutely devoid of brown colour. Their consistence and appearance varied somewhat with the character of the ingesta. On exclusive milk diet they were occasionally as white as snow, but they were

usually the same large, rather relaxed, putrescent, greasy, clay-coloured stools noted at the onset of the symptoms.

There was never, excepting at the time noted above, in 1876, when jaundice occurred, any evidence of the secretion of bile.

On the 14th December, 1886, T. W—, being then in his ninety-first year, died, the cause of death being chronic cystitis and double orchitis.

Necropsy.—On December 15th, Dr. Kirkwood and Dr. W. E. Paley examined the abdomen, and gave me the following report.

“Abdomen only examined. No marked absence of fat considering the age of Dr. W— (ninety years), and the three weeks of exhausting illness which had preceded death.

“Liver normal in size and appearance, though perhaps somewhat less firm than usual.

“Gall bladder contained about an ounce and a half of bile and four small soft gall-stones. Bile-ducts, cystic duct, and common duct normal, absolutely patent, and on opening the duodenum recent fresh bile was seen in it. The blow-pipe passed readily through the opening into the duodenum up through the bile-ducts to the liver.

“The mucous lining of the duodenum appeared rough, as though the glands were larger and more crowded than usual.

“Pancreas large, the head measuring three inches across, and the length being about nine inches; in structure it appeared almost pure fat, except near the duct, where it was more fibrous. The duct was dilated (on making a transverse section it stood out in the middle of the gland as an opening that would take in about a No. 14 urethral bougie); the various branches of the duct were also dilated, and two of them contained small calculi. Tracing the duct towards the duodenum the dilatation was found to extend up to within an inch of the duodenum, where the duct was blocked and rendered *absolutely impervious* by a very irregular stone, about eight lines long and between three and four lines wide at its broadest point.

The duct closely embraced the stone, fitting its various interstices and appearing to adhere to it. Beyond this stone the duct was found with difficulty, but it was pervious to a probe."

CASE 2.—Mr. H—, æt. 56, civil engineer, was seen by me in consultation with Dr. Cane in the summer of 1881. He presented indications of chronic phthisis, but in addition I was informed that for some years Mr. H— had suffered from diarrhœa, passing copious, loose, greasy, stone-coloured evacuations, one of which had been saved for my inspection. I recognised at once that the fæces had the same characteristics which were present in the case of T. W—, especially the absence of the slightest brown or yellow colouring matter. Mr. H— was said to have had various severe illnesses, and seven years previously he had been suddenly attacked when resident in Monte Video with hæmatemesis and melæna so severe as to cause prolonged syncope. It was since this attack that he had become liable to the peculiar condition of the bowels, for which he had consulted the late Dr. Wilson Fox and other authorities. The want of colour in the stools was specially noticed and remarked upon at this time, and Mr. H—'s widow tells me that her husband, being well aware of this peculiarity in his case, would say over and over again, "Do look and see if there is any colour ; I think if there were I should be better." He had also suffered from glycosuria. *He was not jaundiced.*

The condition of the bowels remained the same up to Mr. H—'s death, which took place in November, 1881. A post-mortem was made by Dr. Cane in my presence. The lungs showed advanced disease. The liver was normal ; the gall bladder and ducts contained normal bile, and the ducts were pervious up to and into the duodenum, but close to the opening of the duct and involving the portion of the intestine in which the termination of the duct of Wirsung runs was the puckered cicatrix of an old ulcer (doubtless that which had bled in Monte Video seven years before).

The pancreatic duct and its branches were greatly enlarged. The duct could be traced and was pervious up to the point where it entered the duodenal wall, but here it was lost in the cicatrix. As I was anxious that the genuineness of this link in the evidence which I was accumulating should be vouched for by some high authority, Dr. Cane cut out the portion of the duodenum, with the cicatrix and the adjoining portions of the bile and pancreatic ducts, and sent them to an eminent pathologist with a request that he would carefully dissect out the ducts, and report whether the result of his examination confirmed our opinion, that the bile-duct was absolutely free, and that the pancreatic duct was partially destroyed and completely occluded by the ulceration and cicatrization which had occurred some years before. After waiting some time for the report Dr. Cane wrote to his friend, who in reply told him that the specimen had been put on one side and lost before he had an opportunity of examining it. I am consequently unable to show you the specimen or to confirm Dr. Cane's report by the authority whose aid we sought.

In these two cases we have the condition brought about by disease in the human subject which experimentalists have induced in animals by ligature of Wirsung's duct, and we have it brought about in such a way that there is no disturbance of the neighbouring parts and no interference with the function of other organs.

The two cases are intimately interwoven. On the one hand, the true significance of the colourless stools in the second case would not have been recognised but for the concurrent symptoms which had been observed during life in the first case ; on the other hand, it was the result of the post-mortem examination in the second case which first afforded proof of the correctness of my conjectures as to the significance of the stools in the first case.

However imperfect my description may have been I hope to have impressed upon you these facts :

In Case 1—

1st. Dr. W— for twenty-four years passed only clay-coloured, stone-coloured, or colourless stools.

2nd. He showed no other symptoms whatever of derangement of the excretive or secretive functions of the liver.

3rd. He passed in the dejecta free oil and fat recognised as a sign of pancreatic disease.

4th. From the symptoms during life I diagnosed pancreatic disease and excluded hepatic disease.

5th. The necropsy revealed absolute occlusion of the pancreatic duct by a calculus and a perfectly normal condition of the liver and its ducts.

In Case 2—

1st. Mr. H— for several years passed stools devoid of colouring matter.

2nd. Although it was not observed that he passed free fat or oil,¹ the similarity of the greasy, pultaceous, absolutely colourless stools to those of Dr. W—, and the absence of any other symptoms of hepatic disease except the stone-coloured stools, led me in this case also to surmise obstruction of the pancreatic duct and to exclude hepatic disease.

3rd. The necropsy revealed the blocking of the pancreatic duct by ulceration and cicatrisation, and a perfectly normal condition of the liver and its ducts.

From these facts I conclude :

1st. That the formation of the colouring matter of the fæces (hydrobilirubin ?), depends on *the mutual reaction of the bile and pancreatic fluid, under the influences met with in the intestinal tract.*

2nd. That in disease a deficiency of pancreatic juice will, equally with a deficiency of bile, cause the pathological condition of colourless or clay-coloured stools,—that is, stools destitute of hydrobilirubin.

3rd. Since, according to the most recent physiological researches, that portion only of the coloured constituents

¹ Since writing this paper I have been informed by Dr. Cane that after I saw Mr. H—, and suggested that the white stools depended on pancreatic disease, he watched for the passage of free oil and several times detected it.

of the bile which has been converted into hydrobilirubin is excreted in the fæces, while the bilirubin, bilifuscin, and biliverdin not so converted are absorbed, it follows that if hydrobilirubin (the colouring matter of the fæces) cannot be produced without the aid of the pancreas, that organ must have an important rôle in regulating what proportion of the bile secreted by the liver shall be absorbed in the intestine, and what shall be thrown off in the fæces.

In seeking in clinical records for confirmatory evidence of these conclusions which I wish to establish as axioms, we are met by the difficulty that the pancreas has received even in the present day but little, and until recently no attention, either clinical or pathological.

This neglect has arisen mainly from our ignorance of the clinical symptoms which may be accepted as diagnostic of pancreatic disease, and from a belief in the extreme rarity of uncomplicated cases. Without multiplying quotations to prove this assertion I will merely point out that the author of the article on the diseases of the pancreas in Quain's 'Dictionary of Medicine,' does not even allude to fatty stools except casually as a symptom of cancer of the pancreas. And taking the most recent English text-book on medicine, that of Bristowe, I find that, although he treats the matter more fully, he commences his remarks on the subject by saying, "Very little of clinical value is known about the diseases of the pancreas;" and later on, after discussing the pathology, he says, "It would be a waste of time to discuss the diagnosis of the above lesions. . . . It would be equally a waste of time to enter upon the discussion of the treatment of pancreatic affections."

Friedreich, in his elaborate article in 'Ziemssen's Cyclopædia,' writes, "The pancreas does not possess any special function, the disturbance of which would produce not pathognomonic but even appreciable symptoms;" and he introduces the subject of symptomatology at the conclusion of his remarks on general pathology thus, "All these facts explain why our knowledge of the pathology of the pancreas is so scant and so far behind that of all the other

internal organs. How little we have to rely upon for our diagnosis will be seen from the following description," &c.

But even where attention has been given to this organ there is the further difficulty arising from the fact that those who have observed and recorded cases of pancreatic disease are, with one notable exception, so prepossessed with the idea that the occurrence of colourless or clay-coloured stools necessarily indicates disease of the liver that they either ignore the condition of the stools or draw wrong inferences from them. I have said with one notable exception, that being no less an authority than Claude Bernard, to whom is mainly due our knowledge of the action of the pancreatic fluid on fats, &c.

In an essay published thirty-two years since¹ he says, "It is remarkable that bile only colours matters a very bright yellow, while with the pancreatic juice the bile takes a decided brown tint. The pancreatic juice then contributes indirectly to the colouring of the faecal matter."²

Extract from p. 491 :

"Conclusions des observations pathologiques. Toutes les observations précédentes dans lesquelles l'autopsie a permis d'établir l'état du pancréas, montrent clairement que la lésion fonctionnelle du pancréas se traduisait symptomatiquement par la présence des matières grasses dans les excréments, de même que chez les chiens auxquels nous avons opéré la destruction du pancréas. Nous avons pu voir jusqu'à quel point ces symptômes se ressemblent. Amaigrissement, émaciation, voracité, même apparence des matières fécales qui sont argileuses, pâles et grisâtres. Il est remarquable que le bile ne colore que les matières en jaune très clair, tandis qu'avec le suc pancréatique le bile prend une teinte très brune. Le suc pancréatique contribue donc indirectement à la coloration des matières

¹ 'Supplement aux Comptes rendus hebdomadaires des Séances de l'Académie des Sciences,' tome première, Paris, 1856.

² Ibid., 'Mémoire sur le Pancréas, et sur le rôle de suc pancréatique dans les phénomènes digestifs, particulièrement dans la digestion des matières grasses neutres,' par M. Claude Bernard,

fécales. Dans l'ictère les matières sont aussi décolorées, mais par une cause inverse. Enfin il est dernier trait de ressemblance ; ce sont les stries sanguinolentes que nous avons observées sur les excréments chez les chiens, ainsi que des ulcérations intestinales ; ces lésions se sont aussi rencontrées chez des malades. Tous ces faits sont dignes des méditations des pathologistes et des physiologistes, parce qu'ils sont de nature à montrer la liaison étroite qui unit la pathologie à la physiologie et combien cette dernière science peut jeter de lumière sur la première."

This important conclusion of Claude Bernard appears to have escaped the notice of all physiologists and physicians, excepting that of M. Ancelet.¹ He quotes the paragraph, but expresses his opinion that "the conclusion is erroneous." The majority of those who report cases or treat of pancreatic disease only mention the decolouration of the stools as evidence that the liver is implicated, but the facts as reported by them do not always support this view. Thus in one of the very earliest cases in which attention was drawn to the presence of fat and oil in the dejecta, that of Mrs. W—, Case 16, reported by Elliotson in the 'Medico-Chirurgical Transactions' for 1833, while the stools are described as without the least appearance of bile, it is mentioned that the urine was pale, from which it may be inferred that there was no jaundice. A case is reported by Dr. James Kilgour of a suppurating cyst of the pancreas, in which the gland was converted into a single sac containing purulent fluid ; during life the stools were described as containing no bile, but post mortem the liver was found to be normal. And to show how even the most careful modern observers have ignored such facts, I will point out that Senn, the performer of a most valuable series of experiments, and author of an exhaustive essay on the surgery of the pancreas published in the 'Transactions of the American Surgical Association,' in commenting on this case and on the probability that it would now have been correctly diagnosed, fails to note

¹ The author of an essay entitled, 'Études sur les Maladies du Pancréas.'

the character of the stools, which were really, in the absence of signs of disease of the liver, diagnostic of pancreatic disease.

As this paper must necessarily be limited in length, I am unable to single out further those published cases which support my views, but a careful study with an open mind of the records of pancreatic disease will show that these cases are numerous, and I feel certain that so soon as the profession is freed from the false idea that decolourised stools in all cases imply disorder of the liver, many cases will be observed and reported, confirming the axioms which I have laid down.

I now pass to the fact accepted by physiological chemists that the meconium does *not* contain hydrobilirubin, while bilirubin and its derivative biliverdin are present.

This supports the view that the former brown pigment is produced by the action of the pancreatic fluid on the bile; for while it is known that the liver secretes bile in the foetal state, it is known also that the pancreas is a gland which does not act until after birth, and that therefore the bile constituents found in the intestines at birth cannot have been exposed to the action of the pancreatic fluid. As bearing directly on this point, I must refer to Case 8, reported by Claude Bernard in the paper previously referred to. It is that of a child six years old, in whom after death the pancreas was found diseased throughout, with the exception of two small, apparently healthy, patches; the motions are described by Bernard as having the appearance and consistence of meconium.

As pertinent to the question, I may be permitted very briefly to allude to "icterus neonatorum." The variety in the causes assigned by divers authorities is evidence that as yet no one fully satisfactory explanation of this condition has been given, but assuming as proven the part played by the pancreas in converting the absorbable bilirubin into non-absorbable hydrobilirubin, we have the following data for coming to a conclusion as to the cause of the jaundice of new-born infants:

1st. Unchanged bile is absorbed into the blood in its passage through the intestines, and an excess of bile in the blood beyond what can be dealt with by the eliminating organs will cause jaundice.

2nd. At birth the intestinal tract is charged through its whole length with meconium containing absorbable bilirubin and biliverdin.

3rd. The liver is actively secreting bile during foetal life and immediately after birth; and the bile passes into the intestines.

4th. The pancreas is a gland which acts only after birth and under the stimulus of food.

5th. Until the pancreas becomes active, there will be an excess of unchanged bile in the intestines, and so soon as absorption sets in the blood will be liable to become charged with an abnormal amount of bile, which, if not eliminated as rapidly as absorbed, will cause jaundice.

The next point to which I shall allude in support of my deductions is the action of reputed cholagogues. Practical physicians find that certain of these remedies cause dejections copiously charged with the brown pigments, which are known to be derived from the constituents of bile; and they find further that these drugs relieve symptoms which are attributed to the presence of bile in the blood, or to a liver evidently suffering from its inability to perform the functions devolving on it. On the other hand, physiologists tell us that their experiments prove conclusively that, at all events in animals, these same drugs have little or no effect in increasing the secretion or excretion of bile by the liver. Of this discrepancy there can be no doubt, and to reconcile the conflicting testimony it has been suggested that the so-called cholagogues exert their beneficial effect by hurrying the bile through the intestinal tract—giving no time for its absorption, and compelling its expulsion with the dejecta; but even those who make this suggestion must be aware that it is fallacious. If the hurrying-on theory is worth anything, why have calomel and other preparations of mercury, sulphate of soda, and the mineral

waters containing this and other similar salts a reputation as cholagogues, while such rapidly-acting aperients as castor-oil, gamboge, colocynth, elaterium, and others have none? And why are the stools a dark brown instead of the bright yellow, which they should be if the bile were hustled through from the liver to the anus unchanged? But if we accept the fact that while unaltered bile-pigment is absorbed, that only which has been acted upon by the pancreatic fluid remains unabsorbed and passes off with the fæces, then it follows that remedies which increase the activity of the pancreas and facilitate the reaction between its secretion and the bile will, by converting the absorbable bilirubin into the non-absorbable hydrobilirubin, lead to the passage of stools charged with the latter; and, by preventing the entrance of bile from the intestine into the blood, they will relieve the patient of the symptoms caused by bile in the circulation, and will take from the liver the duty of eliminating the re-absorbed bile, leaving it only to excrete *pari passu* with secretion.

It is by the results of their experiments on animals that physiologists have unsettled our views on the action of cholagogues, but taking as an instance of these drugs calomel, it is no mere assumption to say that in animals this drug, which acts so powerfully on the salivary glands, acts similarly on the analogous gland, the pancreas; for it is proved, by the large quantities of leucin and tyrosine found in the fæces of dogs after calomel has been administered, that it acts on the pancreas of those animals. If we assume that its action on the human pancreas is similar, the discrepancy between clinical observation and physiological experiment ceases to exist, and the empirical use of remedies is once more justified on scientific grounds.

The physician says that calomel relieves the symptoms caused by an excess of bile in the blood, and eases the over-burdened liver. The physiologist says that calomel has little or no action on the healthy liver, and that it promotes neither the secretion nor the excretion of the bile by that organ, though (in the dog) it acts on the pancreas.

Accepting these facts, the physician explains his results by the action of the drug in increasing the pancreatic fluid in the intestine, and thus furnishing the material for that reaction which forbids the absorption of bile into the blood and ensures its extrusion in the excrement.

Lastly, in support of my views I must revert to what I said, in introducing the subject, as to the observation of cases in which colourless stools are a permanent symptom, but from which every other indication of disordered liver is wanting. There are few practitioners of large experience who have not felt the need for an explanation of these cases. Such an explanation is afforded by the new facts in reference to the functions of the pancreas to which I have drawn your attention.

These cases are not rare, and since I have been aware of the part played by the pancreas in the excretion of the bile I have in several instances experienced the value of the knowledge as an aid to diagnosis. At the very moment that I am writing this paragraph I am returning from seeing with a colleague a patient who has an epigastric tumour and almost colourless stools, but whose urine and conjunctiva show not the slightest tinge of bile colouring, a combination of symptoms which to me would be inexplicable did I not know that bile is absorbed from the intestines, and does not show in the *fæces* unless acted on by the pancreatic fluid. Within the last few days a medical friend mentioned to me that he had made a post-mortem examination in which he found cancer confined to the pancreas. In reply to my question whether he had observed anything peculiar in the motions during life, he said, "Nothing but a deficiency of bile," by which he meant colourless stools. But this patient had no persistent jaundice accompanying the colourless stools.

To recapitulate, I ask you, in the first place, to note the prominent facts of the two cases which to my mind conclusively prove the action of the pancreatic juice on the bile pigment, and its controlling influence over the absorption of bile from the intestine by the conversion of more

or less of the fluid into hydrobilirubin, the brown colouring matter which is expelled with the fæces; and, in the second place, to note that these conclusions are supported:

1st. By the clinical records of other published cases, when these are examined by the new light afforded by my two cases.

2nd. By the physiological facts as to the condition of the bile in the intestines of the new-born infant.

3rd. By the explanation which these conclusions afford of the discrepancy at present existing between the results of clinical observation and experimental physiology on the action of so-called cholagogues.

4th. By the explanation afforded of cases constantly observed in which no bile appears in the fæces, although there is evidence that the secretive and excretive functions of the liver are being perfectly performed.

On the practical bearing of the facts I have brought forward it is not necessary for me to enlarge. If my conclusions are accepted not only must their value in the diagnosis and consequently the treatment and prognosis of pancreatic disease be evident, but also it must be clear that the knowledge of the controlling influences of the pancreas on the elimination of the bile will materially assist us in the treatment of the whole class of maladies which we may include under the head of bilious derangement. In every case in which a colourless state of the stools is observed, we must look to the presence or absence of other symptoms to determine whether the case is one of hepatic or of pancreatic disease; and in the treatment of all disorders in which a diminution of bile in the blood or lightening the work of the liver is indicated we must seek such remedies as will, by stimulating the pancreas, increase the formation of hydrobilirubin and its expulsion with the fæces.

Although I cannot expect the profession to accept these views, novel as they are, without careful consideration of the facts on which they are grounded, I bring them forward with more confidence because in studying the

writings of such workers as Lauder Brunton, Harley, Legg, Senn, of Claude Bernard and other foreign authors, it appears to me that they are all tending towards the discovery of the facts which I regard as established by the cases I have recorded. And I trust that the judgment of the distinguished Society, to which, through the kindness of Sir Andrew Clark, I am enabled to make this communication, will be such that I may hope to see other more able men than myself take the subject up, and, working at it in a wider field, add fresh facts to those which, with the conclusions I have drawn from them, I have now laid before you.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 98.)