corpuscles, but there was yet no definite evidence of the existence of such substances (autolysins). Similar "antibodies" could be produced by the injection of many other cells, as, for example, spermatozoa, etc., and the possibility of preparing a serum which should be capable of destroying the cells of a tumour was thus opened up.

Closely allied to these substances were "precipitins," which formed when the serum of one kind of animal was injected into the body of another species. It had been suggested that use might be made of them as a test for human blood.

Further bodies were those known as agglutinins, in virtue of which the serum of an immunized animal caused the micro-organisms of the same disease to adhere to one another (Gruber and Durham, the Widal reaction).

They were not the same as the antibacterial bodies, but seemed to develop *pari passu* in the blood serum. How they acted was not precisely known. Their effect was to render the bacteria less virulent.

THE SIDE-CHAIN HYPOTHESIS.

The theory of the production of immunity and allied phenomena, which at present held the field, was Ehrlich's side-chain hypothesis. Ehrlich looked upon a molecule of protoplasm as composed of a central atom cell with a large number of side-chains of atom groups. The central cell was the mother cell, the side-chains were receptors—or cells having combining affinity with food stuffs, by which nourishment was brought to the mother cell. These receptors were of two kinds—those having power of combining with molecules of simple constitution, and those having power of breaking up compound bodies by ferment action for the purpose of assimilation. If toxins were introduced into the system they were fixed to the receptors by their haptophorous elements, and their toxophorous elements were therefore free, and produced toxic changes. If the dose of toxin were small, the mother cell was able to throw off the receptor plus the toxin, which thereby became free in the blood. As a result of repeated loss there was an over-regeneration of receptors, and the excess became free in the blood as antitoxin molecules.

Haemolysis illustrated the working of this hypothesis. Here the two substances, alexine and copula, were necessary to effect destruction of the corpuscle. Ehrlich's theory supposed that the protoplasm of the corpuscle had not the power of combining directly with dissolved substance (alexine), but could attach itself to a second body produced in immunized animals which, in its turn, could grapple to itself the solvent. Thus the destructive matter was enabled to combine with the corpuscle and dissolve it.

The process by which a bacterial toxin acted on a cell, though at first sight more direct, was found to be very similar to the action of a haemolytic substance on a corpuscle, only the toxin consisted of both destructive substance and uniting substance joined together in one molecule. The two parts in this case were called toxophore and the haptophore. The combined toxic molecule seized on the appropriate side-chains of a cell, and if the number of side-chains thus took up poisonous groups, the cell itself died. If only one or two side-chains were thus attacked, they were themselves killed and dropped off, but the cell escaped. It then proceeded to put out a fresh supply of the particular kind of side-chains of which some had been killed, and the cell thus became furnished with an increasing number of side-chains capable of fixing the particular toxin. It was thus capable of dealing with a larger and larger amount of the poison in the blood around it. In this way animals gradually became able to tolerate much larger doses of the toxin, because the freed side were capable of uniting with the molecules of the toxin before it reached the cells, and in this way prevented any poisonous action resulting. If serum containing free side-chains was injected into another animal, they still performed the same office, and conferred on the second animal the same immunity as that possessed by the original one. The curative and prophylactic action of antitoxin was thus explained. If the bacteria had already gained a footing in the patient, and were pouring out constantly a stream of toxin, the injection of a dose of antitoxin neutralized the poison; so it was necessary to give a large dose of it in order to meet the continuous inflow of toxin. If, on the other hand, a person had not yet got, say, diphtheria, but was exposed to the chance of infection, then a protective dose might be given to anticipate infection. It was important to remember that by administering antitoxin only the free toxin present was neutralized. That which had already entered into combination

with the side-chains of the tissue-cells was practically beyond the reach of the remedy; hence antitoxin should be given early in the disease.

In the case of species or individuals naturally immune to certain infections, it must be supposed either that they possessed no side-chains capable of uniting with the toxin of the bacteria causing the disease, or that they normally contained in their system the two substances necessary to repel the bacteria—namely, the alexine and the copula. In those who had been artificially immunized, or who had recovered from a disease (acquired immunity), the copula had been produced by gradual education of the cells to throw it off, and the immunity was "active." When an animal had received into its system a dose of antibacterial serum, and was thereby enabled to resist a disease, it was called "passive," and only lasted so long as the injected serum remained in the body.

The source of the alexine was not quite certain, but it probably in part lay in the leucocytes; it was also a moot point whether there was only one sort of alexine capable, if a copula existed, of acting against all bacteria alike. It had been shown that in chronic maladies the quantity of alexine present tended to fall, and in this way might be explained the tendency to terminal acute infections in these conditions. The use of such remedies as yeast and cinnamic acid might lie in their power of supplying alexines—the yeast perhaps directly, and the cinnamic acid by stimulating leucocytosis, the leucocytes being the main source of alexine.

Of course Ehrlich's explanation of immunity was simply a hypothesis, but it had suggested new lines of research, and these so far had confirmed it.

Finally, it was to be noted that Ehrlich had shown antitoxin to be present in the milk of a nursing mother, and that immunity could therefore be transmitted to her child. This bore out an observation which the speaker himself made in 1898; after the epidemic of small-pox in the North, he had observed, and was the first to point out, that the child of a mother who had been revaccinated during pregnancy was immune to vaccination so long as it remained at the breast, and that the immunity was a passive immunity. This gave rise to considerable discussion in the *BRITISH MEDICAL JOURNAL*, *Lancet*, etc., but was amply verified after the London epidemic of small-pox.

The final result of his study of the whole matter was to lead him to anticipate that when the subject of immunity began to be more clearly opened out, it might be found that the method by which the effects of an invading bacterium were met were merely special manifestations of the normal interdependence of groups of the bodies' cells one on another.

AN EXPERIMENTAL CONTRIBUTION TO THE TREATMENT OF CHOLELITHIASIS.*

By WILLIAM BAIN, M.D., M.R.C.P.

[From the Brown Institution, London.]

THE experiments described in this paper were undertaken to ascertain (1) the changes, if any, undergone by gall stones introduced into the normal gall bladder, and (2) the fate of such calculi when cholecystitis was artificially produced. Various substances were also given to dogs with cholecystitis in the hope of finding a remedy. Behind these experimental aims there was a clinical one—namely, to learn, if possible, what happens in certain cases of cholelithiasis after a month's use of the Harrogate old sulphur water. One case briefly discussed will sufficiently illustrate this issue.

Mrs. X. had biliary colic, jaundice, and a raised temperature for some weeks before coming to Harrogate. The gall bladder was increased in size, and pressure over it caused pain. An exploratory incision had been advanced, but the patient preferred first to try a course of mineral waters.

When I saw her the temperature was normal, the jaundice had almost gone, and the gall bladder was easily palpated. It appeared about the size of a hen's egg, and was painful on pressure. It may be stated here that the best way of detecting tenderness in these cases is that suggested by Naunyn¹—namely, to press the fingers under the right costal arch below the hepatic margin, and then ask the patient to take a deep inspiration. When the sensitive gall bladder impinges upon the fingers inspiration suddenly ceases.

The patient also complained of pain in the right subscapular region, and tenderness on pressure was noted over an area about the level of the twelfth dorsal vertebra and $\frac{1}{2}$ in. to the right of the spine. When

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present this is a valuable sign of gall-stone disease, and I have observed it when direct pressure over the organ failed to show any tenderness. Boas's² description of this referred tenderness may be cited. "Least recognized as a symptom of cholelithiasis," he says, "is tenderness over the posterior surface of the liver. When well marked it extends laterally from about an inch external to the spines of the vertebrae to the posterior axillary line and vertically from the eleventh dorsal to the first lumbar spines. To demonstrate this the finger should be pressed against a point to the right of the tenth dorsal vertebra, then against successive points in lines running horizontally outwards opposite the other spinous processes down to the first lumbar spine, first on the one side then on the other. It is then evident which side is the most tender. This symptom, if present during the acute attack, is also invariably present in the intervals, that is, if once present it is always present, and is, therefore, of special diagnostic value in the latent stages; occasionally it may be found years after the last attack of colic. Conversely, if absent in the acute attack it is not found in the intervals."

After taking the sulphur water for three weeks the patient felt perfectly well, the gall bladder could not be recognized by palpation, and pressure over it did not cause any tenderness. Three years have elapsed since the patient was under treatment and she has remained well.

This is by no means a unique example of the effect of the old sulphur water in gall-stone disease, although most of the patients have not improved so rapidly, and the ultimate result has not generally been so satisfactory. The case suggests two questions: First, what produced distension of the gall bladder? and, secondly, why did it subside so quickly under treatment? The enlargement might be due to blocking of the cystic duct by a stone, but this would not account for the jaundice unless the stone was large enough to compress the common duct—a rare occurrence—or it might have resulted from the extension of the spasm to the common duct. The most likely explanation is that the jaundice was due to a catarrhal condition of the common duct, and the distension to the blocking of the cystic duct with a calculus which subsequently dropped back into the gall bladder.

Gall stones are often found after death although their existence was not suspected during life, but it does not follow that they had not produced symptoms. Indeed, Moynihan³ states that the most cursory examination into the history of a long series of cases treated by operation will show that, in almost all, the earliest symptom—that which has for years caused intense suffering at times—is "indigestion." It may be accepted that gall stones do produce symptoms which are sometimes attributed to the stomach, and that the success of medical treatment largely depends on early recognition of the disease.

As the literature of the subject is very extensive, only a brief reference to the experimental data will be attempted.

The quantity of cholesterine present in normal bile is small—about 0.5 per cent.—but in diseased conditions of the gall bladder it is secreted by the mucous membrane in much larger amounts. Herter⁴ found that the injection of bichloride of mercury or carbolic acid into the gall bladder caused an increased secretion of cholesterine. Hartmann⁵ examined the bile in 46 cases of cholelithiasis, and found bacteria in 36. Sherrington⁶ showed that when the bile stream is retarded an ascending infection from the duodenum quickly occurs.

The connexion between typhoid fever and cholelithiasis has been pointed out by a number of observers. Cushing⁷ found that 30 per cent. of gall-stone cases operated upon had suffered from typhoid fever. Curschmann⁸ observed that out of 42 cases 13 had a history of typhoid fever.

Gall stones have been produced experimentally by Mignot,⁹ Gilbert and Fournier,¹⁰ and others. Gilbert and Fournier injected an attenuated culture of the typhoid bacillus into the gall bladder of a rabbit, and found that in six weeks two small concretions had formed. According to Erhet and Stolz,¹¹ a diminished motility of the gall bladder or the introduction of a foreign body to retard the flow of bile appears to be a necessary antecedent of gall-stone formation.

Vaughan Harley and W. Barrett¹² performed two series of experiments. In the first series they introduced calculi into the healthy gall bladder, and the dogs were killed at periods varying from six months to a year after the operation. The stones had all disappeared. In the second series cholecystitis was set up by the introduction of micro-organisms. In these "the autopsy revealed cholecystitis, and no dissolution of gall stones occurred."

In my experiments the operative procedures were as follows: After the animal was anaesthetized the skin of the abdomen was prepared, and a median incision 2 or 3 in. long was made from the xyphoid downwards. The gall bladder was drawn forwards and held by Spencer Wells forceps. It

was then incised, the bile soaked up, and the stones inserted. Sutures were applied in the usual way, and in a majority of the experiments the gall bladder was stitched to the abdominal wall; in others it was dropped back into the abdominal cavity. When we wished to set up cholecystitis, a culture of the bacillus coli communis in normal saline was injected into the gall bladder before the last stitch was inserted. These cultures were supplied by Dr. Powell White, and were all of the same strain. The mucous membrane of the gall bladder was gently scraped just before the stones were introduced, so as to aid the action of the micro-organisms.

All the dogs increased in weight after the operation, with the exceptions of Nos. 1 and 16, the increase varying from $\frac{1}{4}$ to $2\frac{1}{2}$ kilos. No. 16 lost 2 kilos, although the animal appeared quite well and lively.

The gall stones used in these experiments were given to me by Mr. Moynihan and Mr. Shattock, to whom and to Dr. Powell White I express my obligations. I must also acknowledge my indebtedness to Professor Brodie for his advice and valuable aid during the operations.

DESCRIPTION OF THE EXPERIMENTS.

Experiment 1. Fox terrier, weight $7\frac{1}{2}$ kilos. Two stones, weighing 1,700 mg., were inserted into the gall bladder and the organ sutured to the abdominal wall. The dog was killed sixty-six days after the operation and the stones had disappeared. The gall bladder was perfectly healthy, and the bile was normal in appearance. The dog lost about 1 kilo in weight, but there was nothing observed at the *post-mortem* examination to account for this reduction.

Experiment 2. Fox terrier, weight $7\frac{1}{2}$ kilos. Two stones, weighing 1,640 mg., were introduced into the gall bladder and the organ stitched to the abdominal wall. As no trace of the stones was found in the previous experiment, this dog was killed thirty-eight days after the operation. The gall bladder was healthy, somewhat contracted, and the stones were in fragments; when collected and dried they weighed 400 mg.

Experiment 3. Irish terrier, weight 6 $\frac{1}{2}$ kilos. Two stones, weighing 1,486 mg., were inserted into the gall bladder and the organ sutured to the abdominal wall. The dog was killed sixty-three days after the operation. The gall bladder was contracted, the mucous membrane quite healthy-looking, and the stones were dissolved; only a blackish residue was seen. As it was fairly obvious from these three experiments that calculi became disintegrated in the normal gall bladder within a comparatively short period of time, it was considered unnecessary to perform further experiments of a similar kind.

Experiment 4. Black terrier, weight 16 $\frac{1}{2}$ kilos. Two stones, weighing 1,486 mg., were placed in the gall bladder, along with a culture of the bacillus coli communis, and the organ stitched to the abdominal wall. Sixty-two days after the operation the dog was killed, and the stones weighed, after drying, 835 mg. The walls of the gall bladder appeared thick, the mucous membrane was swollen, and of a deep mahogany-brown colour. Minute bubbles of gas could be seen on its surface, and there was an excess of mucus. Histologically the mucosa was thickened, and there was distension of the vessels in the deeper layers.

Experiment 5. Fox terrier, weight 5 $\frac{1}{2}$ kilos. Two stones, weighing 957 mg., were inserted into the gall bladder, which was then infected with bacillus coli, the incision stitched up, and the organ dropped back into the abdominal cavity. The dog was killed fifty-six days after the operation. The gall bladder was adherent to the liver, but the adhesions were easily broken down. The walls of the gall bladder appeared thick and the mucous membrane was swollen. The organ was full of bile, and the stones weighed 520 mg. Microscopically the appearances were similar to those of the previous gall bladder.

Experiment 6. Collie dog, weight 20 $\frac{1}{2}$ kilos. Two stones, weighing 1,220 mg., were inserted into the gall bladder, which was then infected with coli communis, and the organ dropped back into the abdomen. Fourteen days after the operation an exploratory incision was made to ascertain if the stones were in the gall bladder before treatment was begun, but as they could not be felt the animal was killed. As the stones were present this proceeding was not repeated in the remaining experiments. The gall bladder was adherent to the diaphragm. The mucous membrane was swollen, and the bile was scanty and watery. The gall bladder was not kept for microscopic examination. The stones weighed 920 mg., thus losing 300 mg. in fourteen days. This experiment is included to show that the reduction in the weight of the calculi occurs early.

Experiment 7. Maltese terrier, weight 7 $\frac{1}{2}$ kilos. Two stones, weighing 1,458 mg., were inserted into the gall bladder along with a culture of bacillus coli, and the organ stitched to the abdominal wall. The dog was given 10 oz. of the Harrogate old sulphur water daily for five weeks, and was killed fifty-four days after the operation. The gall bladder was adherent to the liver, its walls were thick, the mucous membrane swollen, and the bile scanty and somewhat watery. The stones were found in small fragments coated with mucus; they weighed 140 mg. The microscopic appearances were exactly similar to those of No. 4.

Experiment 8. Black terrier, weight 8 $\frac{1}{2}$ kilos. Two stones, weighing 1,570 mg., were inserted into the gall bladder, along with a culture of the bacillus coli, and the organ dropped back into the abdominal cavity. Two ounces of olive oil were given daily to this dog for seven weeks, and the animal killed sixty-one days after the operation. There was inflammation of the mucous membrane of the gall bladder, and the stones weighed 970 mg. I must thank Dr. Scott of Leeds for

examining microscopically this and the remaining gall bladders. As the histological appearances were very similar in all of them, one description will suffice. There was decided thickening of the mucosa, an excess of mucus, and vascular distension of the deeper layers, but no polymorphonuclear leucocytes were observed. In short, the changes were indicative of a mild degree of cholecystitis.

Experiment 9. Collie dog, weight 15½ kilos. Two stones, weighing 1,590 mg., were inserted into the gall bladder, which was then infected with the bacillus coli, and the organ dropped back into the peritoneal cavity. Two ounces of olive oil were given daily for eight weeks, and the animal killed sixty-three days after the operation. The gall bladder was adherent to the liver, but the adhesions were easily broken down. The gall bladder was contracted, its walls appeared thicker than normal, and the mucous membrane was swollen. There was very little bile in the organ. The stones weighed 750 mg.

Experiment 10. Whippet, weight 7 kilos. Two stones, weighing 1,705 mg., were inserted into the gall bladder with a culture of the bacillus coli, and the organ dropped back into the abdomen. Ten ounces of sulphur water were administered each morning for six weeks, and the dog killed seventy days after the operation. For a few days this dog was not quite well, but shortly after he began to take the water his condition improved and he gained rapidly in weight. The gall bladder was very similar to those described, its walls appeared thick, the mucous membrane swollen, and the bile grumous-looking. The stones were in fragments, covered with very sticky mucus; they weighed 400 mg.

Experiment 11. Irish terrier, weight 9½ kilos. Two stones, weighing 2,600 mg., were inserted into the gall bladder with a culture of the bacillus coli, and the organ sutured to the abdominal wall. Ten grains of ichthoform were given to the dog twice daily in cachet form for seven weeks, and the animal killed sixty-three days after the operation. On *post-mortem* examination the gall bladder was similar to those previously examined, the mucous membrane being swollen, the bile watery, and containing a good deal of mucus. The stones were not dissolved, but diminished in weight to 1,422 mg.

Experiment 12. Collie dog, weight 17 kilos. Two large stones, weighing 2,792 mg., were put into the gall bladder, which was then infected with bacillus coli, and the organ stitched to the abdominal wall. Five grains of urotropin and 1 gr. of iridin in tablet form was given twice a day to the dog for forty-eight days, and the animal killed sixty-four days after the operation. *Post-mortem* the walls of the gall bladder appeared very thick, the mucous membrane distinctly swollen, and there was a fair amount of bile, which looked healthy. One stone was in fragments; the other was markedly reduced in size, and appeared on the verge of breaking up. The stones and fragments only weighed 640 mg. The stones in this case were the heaviest used in any of the experiments.

Experiment 13. Long-haired mongrel, weight 10½ kilos. One stone, weighing 2,603 mg., was introduced into the gall bladder, along with a culture of the bacillus coli, and the organ stitched to the upper part of the wound and isolated from the peritoneal cavity. A cholelysin tablet containing 9 gr. was given twice daily to the dog for seven weeks, and the animal killed fifty-six days after the operation. The walls of the gall bladder appeared thick, the mucous membrane swollen, and the organ contained a quantity of watery bile. The stone weighed 2,186 mg.

Experiment 14. Fox terrier, weight 6 kilos. Two stones, weighing 935 mg., along with a culture of the bacillus coli, were inserted into the gall bladder, and the organ fixed to the abdominal wall. One-tenth of a grain of calomel was given three times a day for seven weeks, and the animal killed fifty-eight days after the operation. The gall bladder contained a moderate quantity of bile, which appeared more watery than normal; the mucous membrane was thickened. The stones weighed, after drying, 485 mg.

Experiment 15. Mongrel, weighing 10 kilos. Two stones, weighing 1,690 mg., were inserted, with a culture of the bacillus coli, into the gall bladder, and the organ stitched to the abdominal wall. Five grains of urotropin and 1 gr. of iridin were given twice daily for seven weeks, and the animal killed sixty days after the operation. The gall bladder was adherent to the liver, but the adhesions were easily broken down. The mucous membrane of the gall bladder was thickened, and of a deep mahogany brown colour. There was a fair amount of bile, which appeared moderately healthy, and the calculi had completely vanished.

Experiment 16. Irish terrier, weight 12½ kilos. Two stones, weighing 2,090 mg., were inserted into the gall bladder, which was then infected with the bacillus coli, and the organ sutured to the abdominal wall. Half a grain of barium chloride was given once a day to the dog for seven weeks, and the animal killed sixty days after the operation. The gall bladder was adherent to the liver, and there was some difficulty in separating the two organs. The gall bladder was full of rather watery bile; the mucous membrane was thickened; the stones were in fragments, their weight after drying being 660 mg. Apart from the extensive adhesions, there was nothing observed *post-mortem* to account for the animal's loss of weight.

GENERAL RESULTS.

These experiments show that the normal gall bladder will dissolve moderately large calculi in about nine weeks—results in accord with those of Harley and Barrett. That they have an important bearing upon the treatment of cholelithiasis is very evident. Instead of trying to find solvents for gall stones *in vitro* our aim should be to render the gall bladder aseptic, so that its functions are performed in a normal manner.

Table Showing the Chief Details of the Experiments.

No.	Weight of Dog.	Weight of Stones before Insertion.	Weight of Stones at Death.	Substance Given.	Number of Days Alive after Operation.	Condition of Gall Bladder <i>Post-mortem</i> .
	Kilos.	Mg.				
1	7½	1,700	Disappeared	Nothing	66	Healthy
2	7½	1,540	Fragments, 400 mg.	"	38	"
3	6½	1,750	Residue unweighable	"	63	"
4	16½	1,425	835 mg.	Control	61	Inflamed
5	5½	957	510 mg.	"	56	"
6	20½	1,220	920 mg.	"	14	"
7	7½	1,458	Fragments, 140 mg.	Sulphur water	54	"
8	8½	1,570	970 mg.	Olive oil	61	"
9	18½	1,590	750 mg.	"	61	"
10	7	1,705	Fragments, 400 mg.	Sulphur water	70	"
11	9½	2,600	1,422 mg.	Ichthoform	63	"
12	17	2,792	640 mg.	Urotropin and iridin	63	"
13	10½	2,603	2,186 mg.	Cholelysin	55	"
14	6	935	485 mg.	Calomel	53	"
15	10	1,690	Disappeared	Urotropin and iridin	60	"
16	12½	2,090	Fragments, 660 mg.	Barium chloride	60	"

The next point brought out by the experiments is that when cholecystitis is set up the stones do not disappear, although there is always a reduction in weight, but this diminution apparently chiefly occurred before the inflammation of the mucous membrane was established. In several instances, had it not been for the difference in weight, the opinion from visual inspection would have been that no change had taken place. This will explain the discrepancy between my results and those of Harley and Barrett, who did not weigh the calculi.

Regarding the effect of the various substances given to the dogs, two of them, namely, the mixture of urotropin and iridin, and the old sulphur water gave fairly positive results. Barium chloride was tried because it was suspected that the sulphur water owed its effect to this substance by increasing the motor power of the gall bladder. Unfortunately, the animal lost weight during the treatment. Whether this was due to the disease or the drug I cannot say, but the dose of ½ gr. was probably too large for a small animal.

Ichthoform, calomel, cholelysin, and olive oil had no appreciable effect on the calculi. It is rather remarkable the number of medical men who believe in the efficacy of olive oil in gall-stone disease. One may suppose that the improvement in the patient's condition is sometimes wrongly attributed to the treatment prescribed.

With respect to the sulphur water, the experimental results harmonize with its clinical use. That its beneficial effect in cholelithiasis depends to a certain extent, at least, upon barium chloride, I have little doubt, but further experiments are necessary to establish this.

Regarding urotropin and iridin, it remains to be seen whether clinical experience will confirm experimental results. The clinical test is the crucial one, and if its evidence be favourable it will be easy to determine whether the beneficial results are due to either one or both drugs. The iridin used should be obtained from a trustworthy chemist, as there are worthless imitations on the market. The late Professor Rutherford told me he regarded iridin as the most reliable chologogue—an expression of opinion with which I agree, so far, at any rate, as drugs are concerned. In estimating the value of mineral waters in this respect, the factors incidental to a health resort, which have a powerful collateral influence, cannot be excluded. Moynihan¹³ describes a case of typhoid pancreatitis in which he drained the gall bladder. It was found three weeks after the operation that the bile discharged from the biliary fistula contained large numbers of the typhoid bacilli. Ten-grain doses of urotropin were given three times daily, and they were after four days increased to 15 gr. Eleven days after the drug was first administered no typhoid organism was observed in the bile.

One must recognize that in these experiments the treatment was carried out in cases where the cholecystitis was mild and of recent development—a very different condition to

that which frequently obtains in the human subject. In those cases of cholelithiasis where the walls of the gall bladder are practically converted into fibrous tissue, or where there is persistent blockage of the cystic or common duct, medical treatment is useless; but in the early stage of the disease, with no gross pathological change beyond a slightly-inflamed mucous membrane, improvement may be expected. The importance of early diagnosis must therefore be emphasized. In this connexion two cases recently under my care are of interest:

A lady over 70 consulted me for what she termed digestive disturbance, of more than twenty years' standing—spasms of the stomach and flatulence. Although she described these spasms as being very severe, I do not think she ever had biliary colic. In this case the affection was not suspected, and the only sign of gall-stone disease present was tenderness over the posterior surface of the liver—Boas's sign—which was very well marked.

The second case was a lady of 33, who consulted me for acne. She incidentally mentioned that she had been "liverish" for the last four years, and had tried a number of prescriptions, with little beneficial effect. The symptoms which she ascribed to the liver were a disagreeable taste in the mouth, especially in the morning, muscae volitantes, irritability, and depression of spirits. She was not troubled with flatulence, nor had she any disagreeable sensations in the epigastric or other regions of the abdomen. On examination the liver was normal in size, but on asking the patient to take a deep inspiration with the fingers hooked under the right costal arch, inspiration ceased with a jerk when the gall bladder was brought against the fingers. The gall bladder could not be felt on palpation, but pressure over it caused distinct pain. Boas's sign was not present. She took a fair amount of exercise daily, and was not addicted to sweets. On inquiring into her history I found she had had typhoid fever four years before.

In treating such cases I would suggest a pint of the old sulphur water before breakfast (if a visit to Harrogate is practicable) and tabloids of urotropin and iridin twice or thrice daily for at least ten weeks. The diet should consist largely of nitrogenous food, and some pleasant form of exercise should be taken. The tenderness of the gall bladder is considerably relieved by the application of mustard bran packs to the hepatic region.

CONCLUSIONS.

1. That gall stones introduced into a normal gall bladder become dissolved within a comparatively short space of time, in about eight or nine weeks.
2. That when a mild degree of cholecystitis is set up gall stones inserted into the gall bladder do not disappear, although there is always a reduction in weight.
3. That ichthoform, cholelysin, olive oil, and calomel do not appear to have any effect in resolving calculi introduced into a gall bladder the mucous membrane of which is inflamed.
4. That during a course of the Harrogate old sulphur water gall stones become disintegrated in cases of cholecystitis experimentally induced.
5. That in the treatment of artificially-produced cholelithiasis a mixture of urotropin and iridin has a pronounced effect in causing dissolution of the calculi.
6. That in regard to the action of barium chloride further experiments are necessary to determine its rôle in experimentally-produced cholelithiasis.

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MOSQUITO REDUCTION IN CALIFORNIA.—The California State Board of Health, in its monthly leaflet for April of the present year, gives some particulars of an organized effort to reduce the chances of malarial infection in certain parts of the State. Last year's marshes near Saint Rafael were inspected by representatives of the Entomological Department of the University of California, and those which were found to be infested with mosquitos were treated with crude oil. The results were very satisfactory, but late in the year the work had to be suspended owing to lack of funds, and the number of mosquitos again increased. This year a large marsh area extending from South San Francisco nearly to San Mateo is the scene of operations. Fresh-water areas, which abound in the region, are filled up with earth, drained, or treated with oil.

SEVENTY-THIRD ANNUAL MEETING

OF THE

British Medical Association.

Held at Leicester July 24th, 25th, 26th, 27th, and 28th, 1905.

PROCEEDINGS OF SECTIONS.

SECTION OF STATE MEDICINE.

PHILIP BOOBYER, M.D., President.

PRESIDENT'S INTRODUCTORY REMARKS.

PUBLIC HEALTH AND PUBLIC OPINION.

By the memorandum issued to officers of Sections we are told that no addresses are expected from the Sectional Presidents, and that their introductory remarks should not occupy more than fifteen minutes in the making. With this rescript before us we have no option but the observation of extreme brevity in opening the proceedings of our Sections.

I propose to devote the few minutes at my disposal this morning to a consideration of some of the drawbacks from which the public health cause and the public health service suffer, mainly through the lack of organization for securing uniformity of policy and practice among local authorities throughout the country. Under the existing régime, although most of our large towns and districts have well-informed and competent medical officers of health, both large and small districts are frequently far too dependent upon imperfectly-instructed individual opinions for the shaping of their policy and practice, and are thus liable to commit themselves to courses which cannot find justification in the light of up-to-date expert knowledge and experience.

As a nation we are commonly accused of a tendency to muddle along in most of our undertakings, without sufficient system or previously-ordered aim, and I am afraid there is a great deal of truth in this accusation. Wherever we look we see manifestations of this tendency. In private and public business, in education, in diplomacy, in war—in every direction, in fact—we are conscious of its disastrous operation. We have plenty of information at our command if we will only use it aright, and plenty of skill, courage, and energy to execute whatever we undertake; but the want of orderly plan of action too often mars the success of our projects. Let us make a start, we say; we shall see what we have got to do as we go along. The unsoundness of such a slipshod policy is sufficiently obvious without further argument. Our performances in the Boer war afforded us a terrible example of the fruits of such a policy, and the recent achievements of the Japanese in their war with Russia are a fitting object-lesson of the converse. Our Service critics may carp at the carelessness of the Japs, but they would show better taste and more wisdom by a silent and respectful imitation of their methods. As in war, diplomacy, education, and in business, so in public health—we muddle along.

Let us consider very briefly some of the weak points in our machinery of public health administration. More or less independent units of local government constitute an excellent arrangement in theory, but the results of such an arrangement are far from satisfactory in practice when the governing bodies lack the necessary knowledge or desire to do what is best for the communities entrusted to their care. But, in addition to, and perhaps of more importance than, the natural inertia of persons imperfectly instructed in their duties as responsible representatives of the public, there is no regular machinery for instructing local public opinion, and the opinion of the local governing bodies in matters of public health policy, if we except the annual reports of the medical officers of health and the occasional action of the Local Government Board to this end. The report of the medical officer of health frequently fails to perform its ostensible purpose, and, when it fails, commonly does so for one or more of the following reasons:

1. It may be a short and perfunctory production by an underpaid official who is simply appointed to satisfy a minimum statutory requirement, and from whom, consequently, only a corresponding amount of work and expert advice are expected.
2. It may be regarded as the work of a medical faddist who is bound to justify his official existence;
3. It may be considered as a utopian counsel of perfection inapplicable to existing conditions;