A REPORT ON THE BILIARY SECRETION OF THE DOG: WITH REFERENCE TO THE ACTION OF CHOLAGOGUES:

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ACTION OF ATROPIA.

It is known that atropia causes purgation and diuresis in dogs (Garrod's *Materia Medica*, 1874, p. 322). On the other hand, it paralyses the chorda tympani, and the secretory nerves of the sweat and milk glands, and thereby arrests their secretions. It therefore seemed desirable to give atropia previously to the administration of any other substance, in order to determine its influence on the liver.

Experiment 3.—Dog that had fasted eighteen hours. Weight, 16.1 kilogrammes. (Fig. 3.) In this experiment, the secretion of bile rose at the end of the first hour, although no drug had been administered. Our previous experiments have convinced us that this is due to reaction, which is apt to ensue unless great care is taken to pull as little as possible at the bile-duct during the operation for inserting the cannula.

Half a grain of atropia sulphate, dissolved in twenty minims of water, was injected into the jugular vein at *a*, *a'*, *a''*, and again at *a'''*; and one grain was injected at *a''''*. Thus three grains were given in all. The fall of secretion after the first dose may be discarded, as it would probably have taken place had no atropia been given. It is evident that the atropia does not arrest the secretion of bile as it does that of saliva, sweat, and milk. Nor can it be said to augment it; for the increased secretion that followed the third dose is trivial, and may be discarded in view of the sequel to the second dose in Experiment 2.

Ten grains of acetate of lead, dissolved in 20 cc. of tepid water, were injected into the duodenum at *l* without producing any notable effect.

Having, in other experiments—mentioned in the sequel—discovered that the alkaline salts of benzoic acid are powerful hepatic stimulants, we suspected that the alkaline salts of salicylic acid would be found to have a similar action. Accordingly, twenty-five grains of sodium-salicylate, dissolved in 25 cc. of water, were injected into the duodenum, and within half an hour a very rapid secretion of bile had begun; and this, notwithstanding the previous administration of lead-acetate and three grains of atropia-sulphate.

Result of Experiments with Atropia.—Atropia-sulphate does not paralyse the hepatic cells, neither does it appear to excite them. Whether or not it possesses the power of paralysing the hepatic secretory nerves is doubtful; but, seeing that it antagonises the effect of physostigma on the liver, and remembering the actions of these substances on the nerves of the heart and salivary glands, the suspicion is entertainable that physostigma stimulates the hepatic cells through a nervous apparatus that is affected in an opposite sense—possibly paralysed—by atropia; while the hepatic cells, and perhaps some nervous mechanism like the motor ganglia of the heart in close relation to them, are unaffected by atropia.

ACTION OF "MENISPERMIN".

The substance termed "menispermin" by Keith and Co. of New York is a resinous matter derived from the root of the yellow parilla (*Menispermum Canadense*). Messrs. Keith have informed me that the crude root of the plant is dried, crushed, and percolated with alcohol. The alcohol is then evaporated or distilled off, leaving the active principles in the form of an extract, which is then "freed from impurities", dried, and pulverised. How it is freed from impurities is not stated. This is also the manner in which they prepare baptisin, phytolaccin, hydrastin, and juglandin—substances whose actions are described in the sequel.

Menispermin is stated by Keith to be "alterative, tonic, laxative,

diuretic, stimulant, and resolvent, and to be useful in hepatic torpor, indigestion", etc. (*Handbook of Practice*, by B. Keith, New York: Jersey City, 1876.) On this account, we experimented with it on the liver; but we probably would not have taken the trouble had we at the time been aware of the account given of its effects in Wood and Bache's *United States Dispensatory*, 1869, p. 1555. In that account, the root is said to be a gently stimulating tonic, probably very closely allied to calumba, which also belongs to the Menispermaceae. The medium dose of Keith's menispermin for a man is two grains.

Experiment 4.—Dog that had fasted eighteen hours. Weight, 23.1 kilogrammes. (Fig. 4.) Seven grains of menispermin, triturated with 1.5 cc. of bile and 3 cc. of water, was injected into the duodenum at *m*; and, as no obvious effect ensued, seven grains of baptisin similarly treated were injected into the duodenum at *b*. The secretion of bile thereafter speedily rose. The result was evidently somewhat equivocal, and therefore another experiment, in which menispermin was alone given, was performed.

NECROPSY.—The duodenal mucous membrane showed only one slightly reddened patch. There was but scanty evidence of purgative action, for the upper part of the small intestine contained only 35 cc. of fluid; but whether due to a purgative action of the menispermin, or of the baptisin, could not be apparent from this experiment.

Experiment 5.—Dog that had fasted seventeen hours. Weight, 15.7 kilogrammes. (Fig. 5.) Two cc. of bile and 2 cc. of water were injected into the duodenum at *b*. This producing no perceptible effect on the secretion, five grains of menispermin were triturated with the same amount of bile and water, and injected into the duodenum at *m*; and the same dose was repeated at *m'*. The secretion remaining unaffected, ten grains with bile and water, as before, were injected at *m'*. The bile-secretion was remarkably constant, and the experiment clearly proved that this substance, even in large doses, does not excite the liver; and that the rise of secretion observed in Experiment 4 could not be ascribed to the menispermin. Indeed, the chart of this experiment (Fig. 5) simply shows the normal curve of bile-secretion in a fasting animal.

NECROPSY.—The mucous membrane of the upper third of the small intestine was slightly reddened, and there was evidence of decided purgative action; for, while only 16 cc. of fluid had been injected, the small intestine contained 170 cc. of a yellowish fluid containing much mucus.

Result of Experiments with Menispermin.—This substance is an intestinal, but not a hepatic, stimulant.

ACTION OF "BAPTISIN".

The substance termed "baptisin" is a resinous matter prepared from the root of the wild indigo plant (*Baptisia tinctoria*) after the same manner as "menispermin". The specimen employed in these experiments was obtained from Keith and Co. of New York. The root of this plant is said to be a powerful emetic and cathartic in large, and a mild laxative in small, doses. Stevens of Pennsylvania recommends a decoction of the root in epidemic dysentery. It is said to have proved useful in scarlatina, typhus fever, and in that state of the system that attends mortification (Wood and Bache's *United States Dispensatory*, 1069, p. 1469). The physiological actions of this plant have apparently not been investigated, and it is nowhere stated that it is a cholagogue. The dose of baptisin for a man is from one to five grains.

In Experiment 4, it has already been shown that baptisin increases the biliary secretion; but, as in that experiment its administration followed that of menispermin, it was desirable to give baptisin first, in another experiment.

Experiment 6.—Dog that had fasted seventeen hours. Weight 18.7 kilogrammes. (Fig. 6.) Seven grains of baptisin triturated with 2 cc. of bile and 5 cc. of water were injected into the duodenum at *b*. In half-an-hour, its stimulating effect on the liver was perceptible, and in the course of an hour it became very evident. As this result confirmed the observation made in Experiment 4, no more baptisin was given.

With a view to follow up the observations made with lead-acetate in Experiments 2 and 3, eight grains of lead-acetate dissolved in 15 cc. of water were injected into the duodenum at *l*, and twelve grains of the same in 25 cc. of tepid water were injected at *l* into the lower part of the small intestine. The result was equivocal, in so far as the secretion of bile would doubtless have diminished had no lead been given. The experiment is, therefore, decisive as regards the action of baptisin, but inconclusive as regards that of lead.

NECROPSY.—Considerable redness of the mucous membrane of about fifteen inches of the upper part of the small intestine. Slight evidence of purgative action.

* Continued from page 863 of last number.

Experiment 3.

Secretion of bile per 15".	Secretion of bile per kilogramme of dog : per hour.
cc.	
0.65	
0.50	
0.60	
0.60	
1.00	
1.30	
1.55	
1.45	
1.50	
1.35	
a	
1.20	
0.70	
0.55	
0.60	
0.60	
0.65	
a'	
0.60	
0.70	
a''	
0.75	
0.80	
0.90	
a'''	
1.05	
1.00	
a'''	
1.00	
1.00	
1.10	
0.95	
1.05	
1.10	
0.95	
1.10	
s	
1.50	
2.75	
2.90	
2.60	
2.45	

Secretion of bile before and after atropia sulphate, lead acetate, and sodium salicylate. $\frac{1}{2}$ grain of atropia sulphate in 20 minims of water injected into jugular vein at a, a', a'', and a''': 1 grain injected into vein at a''': 10 grains of lead acetate in 20 cc. of warm water injected into the duodenum at l; 25 grains of sodium of salicylate in 25 cc. of water injected into the duodenum at s.

Fig. 3.

Fig. 4.

Experiment 4.

Secretion of bile per 15".	Secretion of bile per kilogramme of dog : per hour.
cc.	
1.65	
2.00	
1.95	
1.80	
1.55	
m	
1.45	
1.40	
1.30	
1.25	
1.05	
1.30	
1.40	
1.35	
1.35	
b	
1.50	
1.65	
1.95	
2.10	
3.00	
2.05	
1.95	
1.75	

Secretion of bile before and after menisperm and baptisin. 7 grains of menisperm in 1.5 cc. of bile and 3 cc. of water injected into the duodenum at m; 7 grains of baptisin in 2 cc. of bile and 3 cc. of water injected at b.

Experiment 5.		Experiment 6.	
Secretion of bile per 15".	Secretion of bile per kilogramme of dog: per hour.	Secretion of bile per 15".	Secretion of bile per kilogramme of dog: per hour.
cc.		cc.	
1.4		0.75	
1.4		0.80	
1.3		0.55	
1.4		0.60	
<i>b</i> —		0.75	
1.4	} 0.34 cc.	0.65	} 0.120 cc.
1.3		0.45	
1.25		0.40	
<i>m</i> —		0.45	
1.25		0.50	
1.25		0.75	
1.30		1.35	
1.15		1.45	
<i>m'</i> —		1.45	} 0.256 cc.
1.30		1.30	
1.25		1.25	
1.15		1.15	
1.25		1.15	
1.30	} 0.315 cc.	0.95	
1.25		0.75	
1.30		0.85	
1.25		0.65	
<i>m''</i> —		0.55	
1.30		0.50	
1.15		0.45	
1.10	} 0.287 cc.	0.40	} 0.098 cc.
1.25		0.50	
1.05		0.40	
1.05		0.50	

Experiment 7.		Experiment 8.	
Secretion of bile per 15".	Secretion of bile per kilogramme of dog: per hour.	Secretion of bile per 15".	Secretion of bile per kilogramme of dog: per hour.
cc.		cc.	
1.10		1.65	
0.85		1.60	
0.90		1.60	
1.10		1.65	
1.30	} 0.144 cc.	<i>b</i> —	} 0.338 cc.
1.20		1.60	
<i>p</i> —		1.65	
1.45		1.55	
1.55		1.75	
1.65		1.90	
1.85		1.80	
1.85		2.15	
1.90		2.30	
1.90	} 0.244 cc.	2.20	} 0.471 cc.
2.00		2.15	
<i>a</i> —		2.25	
1.80		2.15	
2.25		2.30	
<i>a'</i> —		2.00	
1.90		2.25	
2.20		2.30	
2.30	} 0.299 cc.	2.15	
<i>a''</i> —		2.10	
2.40		1.60	
2.35		1.95	
<i>a'''</i> —			
2.35			
2.30			

Result of Experiments with Baptisin.—The two experiments with this substance prove it to be a hepatic stimulant, and Table 2 indicates its power as such.

TABLE II.

Baptisin.	Total Dose in grains.	Grains per Kilogramme of Body-Weight.	Secretion of Bile per Kilogramme of Body-Weight per Hour.	
			Before.	After.
Experiment 4	7 with bile	0.303	0.223 cc.	0.393 cc.
" 6	7 "	0.374	0.120 cc.	0.296 cc.

Taking into account the fact that in Experiment 6 the coefficient of bile-secretion did not rise higher than 0.296 cc., when nothing but baptisin had been administered, and at the same time the dose being relatively larger than in Experiment 4, it may be concluded that this substance is a hepatic and also an intestinal stimulant of moderate power, and it may possibly be found of service as a hepatic stimulant

in cases of torpid liver with a depressed condition of the system tending to gangrene.

ACTION OF PHYTOLACCIN.

The poke plant (*Phytolacca decandra*) grows abundantly in the United States. The root is the part employed; and in small doses it is said to act as an alternative, and has been highly recommended in chronic rheumatism. In large doses, it produces excessive vomiting

Fig. 5.

Secretion of bile before and after menisperm. 2 cc. of bile and water injected into the duodenum at *b*; the same, with 5 grains of menisperm, injected at *m*, and again at *m'*; the same, with 10 grains, injected at *m''*.

Fig. 6.

Secretion of bile before and after baptisin and lead acetate. 7 grains of baptisin, with 2 cc. of bile and 5 cc. of water, injected into the duodenum at *b*; 8 grains of lead acetate in 15 cc. of water injected at *l*; 12 grains in 25 cc. of warm water at *l'*.

Fig. 7.

Secretion of bile before and after phytolaccin and atropia. 2 grains of phytolaccin in 2 cc. of bile and 4 cc. of water injected into the duodenum at *p*; 1-10th of a grain of atropia sulphate injected into the jugular vein at *a'*, *a''*, and *a'''*.

and purging, with great prostration of strength, and sometimes with convulsions (Wood and Bache, *United States Dispensatory*, 869, p. 646). The preparation employed by us was a substance termed "phytolaccin", prepared from the root of the plant by Keith and Co. of New York, after the same manner as menispermis, above mentioned. The dose for a man is from one to three grains. The physiological actions of the Phytolacca have not hitherto been investigated.

Experiment 7.—Dog that had fasted eighteen hours. Weight 31.1 kilogrammes. (Fig. 7.) Two grains of phytolaccin triturated with 2 cc. of bile and 4 cc. of water were injected into the duodenum at *p*. The subsequent excitement of the liver was unequivocal. When the increase of secretion was well declared, one-tenth of a grain of atropia-sulphate dissolved in ten minims of water was injected into the jugular vein at *a*, and again at *a'*, *a''*, *a'''*—in all four-tenths of a grain; but the stimulating effect of the phytolaccin was not antagonised thereby. Had this experiment been performed after instead of before Experiment 1, a larger dose of atropia would have been given. Remembering the non-exciting effect of atropia on the liver, the high secretion at the close of the experiment may be safely referred to the continued action of the phytolaccin.

NECROPSY.—The duodenal mucous membrane was slightly red-dened, but there was no evidence of purgative action worthy of mention.

Experiment 8.—Dog that had fasted seventeen hours. Weight 19.2 kilogrammes. (Fig. 8.) Two cc. of bile and 2 cc. of water were in-

Fig. 8.

Secretion of bile before and after phytolaccin. 2 cc. of bile and 2 cc. of water injected into the duodenum at *p*; 2 grains of phytolaccin with 2 cc. of bile and 2 cc. of water injected at *p*.

jected into the duodenum at *p*, and two grains of phytolaccin triturated with the same fluids were injected at *p*. A considerable increase of bile-secretion ensued. Owing to the high secretion previous to the administration of the drug, the result is less striking than in the preceding experiment; yet, in this case, the coefficient of secretion was much higher than in the former experiment (Table 3), a circumstance which was probably largely due to the fact that, while the same dose was given in both cases, the subject of Experiment 8 was much smaller than that of Experiment 7. The liver of the eighth dog was, therefore, more powerfully affected than that of the seventh.

NECROPSY.—The small intestine contained 40 cc. of liquid, indicating a mild purgative effect.

TABLE III.

Phytolaccin.	Total Dose in Grains.	Grains per Kilogramme of Body-Weight.	Secretion of Bile per Kilogramme of Body-Weight: per Hour.	
			Before.	After.
Experiment 7	2 with bile	0.064	0.144 cc.	0.299 cc.
" 8	2 "	0.104	0.338 cc.	0.471 cc.

Result of Experiments with Phytolaccin.—It is a mild intestinal, but a powerful hepatic stimulant, as is shown by Table 3.

Considering the small dose that was given, the high coefficient of secretion in Experiment 8 is probably to be regarded as a nearer indication than that in Experiment 7 of the power of phytolaccin as a hepatic stimulant. This substance appears to be eminently worthy of the attention of physicians.

[To be continued.]

OBSTETRICS AS A BRANCH OF EDUCATION:

*Being an Address introductory to the Course of Lectures in Obstetric Medicine in the Queen's College, Galway, for the Session 1878-79.**

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I HAVE now to prove the importance of obstetrics in relation to the practice of medicine and surgery in general. I have shown that you will be almost daily concerned with some one or other of the ailments of the female genital system. Is it a case of suspected phthisis for which you are consulted? You must be able to tell whether the deficiency of the menstrual flux is due to the constitutional disease, or whether that bad habit of body which has predisposed the patient to the invasion of tubercle is the result of some derangement. Is it a case of chlorosis? You must be able to decide whether the amenorrhoea is the cause or the result of the affection.

Again, so various are the symptoms, so Protean are the phenomena of uterine disease, that, unless you have a competent knowledge of gynaecology, you will infallibly fall into errors in diagnosis alike injurious to your patients and yourselves. This is no idle warning. I have seen patients treated for gastric derangement, pulmonary consumption, hepatic disorders, and stone in the bladder, where the uterine system was alone at fault. I have known patients (some who could hardly afford it) sent abroad winter after winter for a consumptive tendency, where the sole cause of their ill-health was some uterine or ovarian disorder. Make the case your own; fancy yourself a professional man with a small income, a business man struggling up in the world, able to get along respectably, but badly able to afford extra expenditure. You take your wife, who has a nasty pain in the side, who is becoming thin and pale, and perhaps has a cough, to your doctor. He tells you that there is no absolute disease in the lung yet, but that there is great delicacy; that this country is too trying in winter for her in her present low condition, and that she must go to a warmer climate. You feel all the difficulty of your situation: the separation from her in her delicate state of health; your house left without a head; your limited means insufficient. And yet for her sake it must be done; and you pinch and save; you wear shabbier clothes; you stint yourself and your children; and yet she comes back no better than she went. Then you try some other doctor, until finally you find out that all along it was some uterine affection which was the source of all the ailments, and which probably could have been set right in a short time. I ask you, What would be your feelings towards the man who needlessly caused you all this trouble and expense; who occasioned you many a sleepless night, many a weary hour? Would you think it a valid excuse, if he told you he did not undertake diseases of women? Would you not reply, "You have a perfect right to decline to treat such affections; but you are bound to be able to recognise them when they exist, and to send me to some one who would and could have remedied them".

Gastric and nervous disorders will be simulated and even produced by abnormal conditions of the genital organs. Epileptiform fits, peritonitis, retention of urine, symptoms closely resembling stone in the bladder, obstruction in the bowels, will be produced by various genital ailments; so that it is absolutely essential that, if you never touch a speculum or make a vaginal examination, you should be thoroughly conversant with the general symptoms of these diseases, so that you may avoid errors of diagnosis alike injurious to your patients and discreditable to yourselves.

But, apart from and beyond this, the study of obstetrics and gynaecology has a most important bearing on the investigation and treatment of disease. No man can rightly understand or properly treat disease unless he has a competent knowledge of physiology.

Disease being a deviation from the laws of normal life, how can you estimate the amount of deviation? How can you tell what changes, either immediate or remote, that deviation may produce? How can you gauge the results of the changes thus produced in any organ or in

* Concluded from page 871 of last number.