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Proceedings of a Meeting of the Society held on Friday, February 18th, 1921, at 8.45 p.m., at 11, Chandos Street, Cavendish Square, W. 1., Professor W. J. R. SIMPSON, C.M.G., M.D., F.R.C.P. (*President*), in the Chair.

FIVE CASES OF FASCILOPSIS INFECTION, WITH REMARKS.

BY

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The rarity of such infections is obvious from a study of the literature; the existence of an endemic focus where material for clinical and pathological study is always available is not generally known.

Although about one hundred miles from the district in point, a large number of patients admitted to the wards of the C.M.S. Hospital, Ningpo, from Shao-hying-fu, were infected, and the notes on five cases appended by no means represent all the cases seen.

As regards the histology of the flukes, I regret to say that of the many hundreds of sections made by me in attempting to differentiate the species, I have lost every one during the war. From my study of the sections—longitudinal, transverse and horizontal—I did not observe any differences of moment between the so-called *F. buskii*, *rathouisi* and *goddardi* types.

A well illustrated and most thorough paper by N. W. BROWN, "Fasciolopsinae of China," *Bulletin Johns Hopkins Hospital*, Vol. 28, pp. 322-329, goes into the question of cuticular spines, opercula, variations in size of ovum and parasite; and J. W. W. STEPHENS, after describing the Fasciolopsis group in *Animal Parasites of Man*, remarks, in conclusion: "It is evident that a re-examination of fresh material is required before the validity of all these species can be accepted."

It is with some diffidence that one attempts to add anything to N. W. BROWN's

monograph on Chinese Fasciolopsinæ, but having had the privilege of examining some hundreds of *fresh* flukes—in many cases alive and squirming like a freshly caught flatfish—I wish to suggest that the differences in measurement of length and width and thickness are compromised by the fact that a dead fluke when passed may be in any stage of degeneration, from mere muscular relaxation to actual commencing maceration and digestion. Kwan's fluke (so-called) illustrates how a new species may be discovered; by inspection of the original specimen in the helminth collection at Endsleigh Gardens Tropical Diseases Hospital, it is obvious that it has no claim on recognition as anything more than a macerated *F. buskii*. Scores of similar specimens were noted whilst investigating case 729.

The freshly passed flukes appear reddish brown, like raw beef, with marked movements in many cases. They did not alter position in the fæcal pot, but I have no doubt they do so within the bowel; the cuticular spines and the musculature would conceivably act to this end, and the epigastric discomfort and irregular diarrhoea, commonly complaints in these cases, might be caused by migratory movements. Whilst on the subject of movement, I may say that I have no recollection of having seen any specimen of N. W. BROWN's Group I. unspined Fasciolopsinæ in actual motion. This may point to the unspined feature being merely a post-mortem product; if so, the differentiation into *F. buskii* and *F. spinifera* becomes useless. Elongation, flattening, visibility of the vitellaria, as seen by naked eye in freshly passed specimens, may be explained by the same post-mortem action, and may account for discrepancies in the records of various observers of the spines in this group. The ova illustrated by Dr. N. W. BROWN may also point in the same direction—the contents degenerating and the opercula tending to be missing.

I have endeavoured to avoid the question of identification of species and have failed. As a result of my own observations, I incline to the belief that in the part of Che-kiang province where I have lived, it has not been clearly shown that there is more than one species, *Fasciolopsis buskii*. As regards clinical facts, the cases appended suggest:—

(1) The parasites live in the stomach, duodenum and the first part of the small intestine only; when found in the large bowel they are nearing the end of their existence.

(2) Their ill effects are not in the direction of blood destruction, but are produced by toxic absorption, which leads to secondary anæmia, dyspnoea, general oedema, ascites, and skin changes. There is no fever directly caused by them.

(3) No melæna has been noted, even in the massive infection case 729. Diarrhoea is common. Many of the patients state they have passed blood, but a freshly passed fluke in a mass of pultaceous fæces exactly simulates blood clot; moreover, there is a Chinese proverb: "Ten men, nine hæmorrhoids; Ten women, nine leucorrhœas"; which bears on the subject of melæna.

(4) No cases were observed in infants or young children; this may be connected with the fact that weaning is often delayed to the third and fourth year.

(5) The disease may be fatal unless the parasites are expelled by art or by accident. I had one death (not here recorded) within twenty-four hours of admission for bowel troubles, in which the typical ova were demonstrated before death.

(6) Rapid recovery follows when the parasites are evacuated, unless the patient is in the later stages of exhaustion.

(7) Fæcal examination and re-examination are the essentials for success, the fasciolopsis ova being characteristic. Certain observations were made on the relative sizes of ova *in utero* and in the fæces; also in the analogous case of *Fasciola hepatica* infection in the pig of Shanghai abattoirs.

CASE 502. Case under Dr. A. F. COLE. September, 1908.

Ningpo boy, æt. 15, quite well in Ningpo. Went to work as apprentice to carpenter in Siao-saen, near Shao-hying-fu, Chekiang. After six months there developed symptoms which brought him to Hospital in Ningpo.

On admission he was unable to stand from weakness, lies in an extremely dyspnoeic condition, and there is advanced general oedema. No history of melæna (no note made of presence or absence of diarrhoea.—A. F. C.).

History of having vomited flukes, and faeces contain certain ova averaging $135\mu \times 85\mu$.

Large doses of male-fern extract no effect; three doses of thymol, amounting to 45 grains, on an empty stomach produced 113 flukes per anum. Patient insisted that he could hear the flukes crying out before they were passed! Measurements of flukes from 29 to 42 mm. in length by 9 mm. to 16 wide.

CASE 519. Case under Dr. A. F. COLE. July, 1910.

Servant of Rev. H. Barton, C.M.S., Shao-hying-fu, Chekiang.

Complains of great weakness, and irregular diarrhoeal attacks without any blood. Appetite fair, not feverish, tongue is coated, great discomfort in epigastrium. No oedema present. Wasted appearance.

Examination of faeces on three days, some 20 slides in all, gave in addition to ova of *Trichocephalus dispar*, five oval single contour granular ova of following measurements:—

$$\left. \begin{array}{l} 170\mu \times 85\mu \\ 170\mu \times 85\mu \\ 200\mu \times 90\mu \\ 180\mu \times 80\mu \\ 170\mu \times 95\mu \end{array} \right\} \text{Mean} = 178\mu \times 87\mu.$$

Eucalyptus oil 5i with chloroform 3s, and oleum ricini 3ss was given, and five hours later he was said to be in agony, which was relieved by vomiting. In spite of the strictest orders his motions and vomit were thrown away into the common lot, and, though search was made, no discovery of flukes. In January, 1911, the patient says he has been in good health ever since the above treatment; living now in Ningpo.

CASE 606. Under care of Dr. A. C. HUTCHESON, Kashing, Chekiang. June, 1911.

Slave girl, æt. 7, from Siao-saen, near Shao-hying-fu, walked into Dispensary with five flukes on a mulberry leaf, which flukes she had vomited. History of having both vomited and passed flukes per anum on several occasions. Child is pale and weak, looks very sick, motions very loose and frequent, and ova of liver flukes present, average of 20 ova = $143\mu \times 82\mu$.

Thymol grs. xii. on three occasions brought away some fifty flukes. Child left Hospital in fine condition, improving rapidly.

CASE 729. Under care of Dr. A. F. COLE. April, 1911.

Schoolboy, æt. 17, Hangchow bred, from C.M.S. Trinity College, Ningpo, admitted for wasting and general debility. Commenced with mild diarrhoea 2-3 times a day about 2½ months ago, about the same time that he was in Shao-hying-fu, but he says he was there only two days and already unwell. He says he never has passed blood; he is too weak to play any games, or even to hold a tennis racquet firmly. He has a mild diarrhoea of a chronic nature.

Present condition.—Patient looks wasted and seems very weak; skin and face dry and scaly. Pulse 72. Respiration normal, Temp. normal. Breathlessness on exertion. Urine 1010, acid, no albumen, reduced Fehling's solution on one occasion (?). Lungs normal. Heart, all 2'-sounds accentuated, no murmurs. Discomfort in epigastrium. Faeces said by dresser to contain only *Ascaris* ova. Blood contains no parasites: reds 3,443,000, whites 8,000, hæmoglobin 90% (differential white count not made). About 30-40 ounces of urine passed in 24 hours. There is no oedema and no cough.

For 25 days patient was under observation and treatment, being given tonics, and bismuth mixtures for the diarrhoea. Faeces were examined some four times by same student, who reported only *Ascaris* ova to be present. Finally examined by Dr. COLE, who found quantities of *Fasciolopsis buskii* ova, and treatment was forthwith commenced. Faeces greyish and bulky.

April 10.—After 45 grs. thymol 11 flukes passed: average, 15·7 mm. $\times$ 10·2 mm.

Ova seemed to be of two sizes: average of 30 large ones = $123\mu \times 77\mu$.

Small and large lying side by side: average of 13 smaller = $78\mu \times 52\mu$.

Possibly mature and immature. average of total 43 = $109\mu \times 69\mu$.

April 11.—Thirteen additional flukes: average, 20·8 mm. $\times$ 10·2 mm.

April 12.—Seven more passed, some much larger than before: average, 28·5 mm. $\times$ 11·7 mm. Of these the two largest measured 42 mm. $\times$ 1·75 mm. and 40·25 mm. $\times$ 12·25 mm.

April 21.—After two courses of β -Naphthol (B. W. & Co.), grs. 45, each divided into three doses, without the use of a purgative, three more flukes passed: average size = 19·4 mm. by 8·6 mm.

April 24.—Diarrhoea still continuing, four more passed per anum: average size = 28·4 mm. $\times$ 11·4 mm. Patient says he is immensely improved; his skin no longer dry.

April 28.—After another course of thymol, grs. 45, patient evacuated 128 flukes of the smaller type. Not measured.

April 29.—Eleven more flukes to-day.

May 5.—Another course of thymol, grs. 45, resulted in 180 more flukes being passed. They seemed much larger parasites: average, 28 mm. by 10·75 mm. (Only 21 measured out of 180.)

May 6.—No less than 71 more passed to-day, all very small, Average of ten measured, 17·7 mm. by 10·40 mm.

May 12.—Ova having been found in faeces, another course of thymol. Measurement of ovum = $150\mu \times 100\mu$.

May 14.—After a whole day without a motion 27 more flukes passed, large and small kinds mixed. Nearly all were whitish yellow from commencing digestion in bowel.

May 21.—Ova still present in fæces. Calomel, grs. 6, at night, followed by thymol, grs. $\frac{1}{2}$, on empty stomach in morning in three doses at an hour's interval, and white mixture $\frac{1}{2}$ subsequently. Twenty-six more flukes passed.

June 3.—Three successive daily examinations of fæces have shown no ova, and as patient seems a new creature, and fairly fit, he is allowed to return to College, having passed a grand total of 485 flukes whilst under treatment, six distinct courses of thymol or β -Naphthol having been given. Thymol seemed to give better results.

CASE 972. Case under Dr. G. J. EVANS, Hangchow. September, 1911.

Man, æt. 31, admitted for distension of abdomen and general discomfort. History that the distension had been gradual, and dated back some two years; that he had had some fever, but he had not been laid up by illness; during the last four months abdomen increasing in size rapidly.

On admission there is definite ascites, the abdomen is generally enlarged, spleen and liver not palpable, heart and lungs normal. Urine acid, no albumen or sugar, specific gravity 1023. Pulse 76. Not specially anæmic, does not appear "ill." Fæces are yellowish-green and well formed, and contain ova of *Fasciolopsis* species. No history of passing blood, and he denied diarrhoea in the past two years. No œdema of legs and no dyspnoea. He feels discomfort after a meal, not specially in epigastrium.

He was given on an empty stomach the following:—

Oleum eucalypti ...	$\frac{1}{2}$ ss	} Repeated after half an hour.
Chloroform ...	$\frac{1}{2}$ ss	
Oleum ricini ...	$\frac{1}{2}$ ss	

He passed the same day about 100 flukes of very varying sizes and shapes, of which the longer type (usually called *Fasciolopsis buskii*) predominated. Dr. EVANS selected three specimens of each of three types, and, except for washing them in rainwater, measured them untreated in any way:—

Type A—"Longest"	50·8 millimetres long.		
	50·8	"	"
	53·3	"	"
Type B—"Medium"	38·1	"	"
	44·3	"	"
	38·1	"	"
Type C—"Shortest"	25·4	"	"
	27·9	"	"
	27·9	"	"

In addition, Dr. EVANS measured ova from the uterus of each of these three types, and the average of ten ova in each case was as follows:—

Type A—"Longest."	Average of ten ova	156 μ × 99 μ .
Type B—"Medium."	"	" " 142 μ × 97 μ .
Type C—"Shortest."	"	" " 142 μ × 102 μ .

The note was made that the measurements of the ova in the fæces before treatment was practically identical with the average of the ova removed from the uterine coils.

Specimens of *Fasciola hepatica* from cattle (Shanghai slaughter-house):—

1. Very long fluke.	Average of 14 ova from uterus =	190 μ × 105 μ .
2. Medium-sized fluke.	Average of 20 ova from uterus =	182 μ × 112 μ .
3. Short fluke, No. 1.	Average of 7 ova from uterus =	168 μ × 109 μ .
4. Short fluke, No. 2.	Average of 2 ova from uterus =	167 μ × 88 μ .

DISCUSSION.

Colonel CLAYTON LANE: I would like to make a few remarks on this paper, and, first, as to the unity, or otherwise, of the species. GODDARD has recently done much work on the matter, and he has had a larger quantity of material, fresh and preserved, than, I think, anyone else except Dr. COLE has had; and he has concluded that between *Fasciolopsis buskii*, *F. rathouisi* and *F. goddardi* there is a regular series of gradations, so that there is only one species, namely, *F. buskii*. With regard to