UROCYSTITIS HAEMORRHAGICA OF NATIVE CATTLE IN FORMOSA.

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Since olden times the red urine of the Zebu breed of cattle has been noticed by Formosan farmers and several primitive treatments have been carried out. The prefecture of Shinchiku annually records about one hundred cases, but the other districts are less affected. The disease has hitherto been investigated clinically, pathologically, and aetiologically, but from my experimental researches I may say that the red urine is not similar to the "Stallroth", and it is also definitely distinguishable from the tick-fever, or other haemoglobinuria caused by protozoal infections, nor is it caused by such parasites as *Bilharzia*, *Filaria*, etc. The disease usually takes a chronic course, the body temperature remains normal, the general condition and appetite are not appreciably affected. At the Fourth Congress of the F. E. A. T. M. at Weltevreden in 1921, I presented the result of my research under the title "Haematuria in the Cattle of Formosa", and Dr. De Moulin stated that Prof. Wester explained the haematuria of calves as a reflex phenomenon of the wall of the blood-vessels after drinking cold water, that means, the blood pressure increases and by consequence capillary haemorrhage occurs in the kidneys.

Thereafter I continued my researches regarding this subject until 1923, and now I intend to describe briefly the pathological changes of the cystitis haemorrhagica.

CLASSIFICATION OF UROCYSTITIS HAEMORRHAGICA, HAEMATURIA.

141 cases were clinically observed, of which 74 cadavers were dissected, and 60 cases of these 74 were microscopically investigated; moreover, several cyst specimens received from the

slaughterhouse were examined. The so-called "Haematuria" may be classified as follows :

Simple haematuria indicating almost no clinical symptoms of sickness.

(a) Slight acute cystitis. This shows generally infiltration and inclination to haemorrhage and growth of cyst wall. The blood corpuscles in the urine may only be proved microscopically.

(b) Cystitis acuta recidiva. The acute cystitis as above may often result in permanent growths of the cyst wall.

Blood-tinged urine which covers two sub-groups.

(c) Cystitis acuta of severe type. The urine becomes red and dim, but after a course of time this symptom disappears.

(d) Cystitis chronica recidiva. The symptom of haematuria is almost unrecognizable as in sub-group (a) or (b).

(e) Haematuria cystitis. Urine deep red, and dim, the colour sometimes changing (deep or light) according to the degree of labour imposed, the condition of temperature, or season of the year. Though there may sometimes occur remittent or even intermittent cases, in general it develops into stable haematuria i, e, chronic neoplastic cystitis already with primitive growth of benignant or malignant tumour, or even concrete tumours.

(f) Necrotic cystitis. Primary and also secondary growths develop in the cyst, accompanying the degenerative changes and necrosis of some parts of these growths, also at times croupous or diphtheric pseudo-membrane inside the cyst.

The urine becomes extremely dim and of dirty brown colour, with much sediment, consisting of necrotic detritus, pseudomembranous fragments, blood coagula and some salts, etc.

The course of haematuria is liable to sudden change by accidental complications. Several diseases complicate haematuria, for example, Bovine Influenza, Pneumonia, Gastro-enteritis, and the increase of endo-parasites, especially their migration and penetration.

Also chronic cases are changed to acute by incidents such as the sudden fall from a height, or a heavy tumble.

Haematuria of cows is often provoked by pregnancy, especially by repeated parturition. The urine, however, becomes clear

some days after parturition. Haematurial cows give birth to healthy calves, in which, however, develop the disease, although they appear healthy.

Haematuria of Buffaloes. This occurs generally in the males and oxen, very rarely or practically never in the female buffaloes. The cause is almost invariably *retentia urinae*, by which the cyst enlarges, congestion and stasis take place in the circulatory apparatus of the cyst wall, and by consequence extravasation and haemorrhage in mucosa and submucosa. The retained urine increases its volume by the admixture of the blood, finally resulting in *ruptura cystis* and death. The cause of *retentio urinae* is, in all cases, the lithiasis pyelidis. The calculi formed at the pelvis renalis which are generally grain-shaped, though not so large (but usually numerous), descent gradually to the bladder, enter the urethra, and stop near the penile orifice, where the canal is comparatively very narrow, and does not yield to distention.

SOME STATISTICS RELATING TO THE OCCURRENCE.

I. Division by age.

37 cases mentioned containing 5 bulls and 32 oxen.

Ages	No. of patients	Ages	No. of patients
1	1	7½	1
4	1	8	4
4½	1	9	3
5	3	9½	1
6	1	10	6
6½	1	11	4
7	2	11½	1
12	2	13	3
17	1	18	1
	Total		37

II. Division by pathological changes, age and sex.

A. Changes without tumour. 12 cases mentioned.

Changes	No. of patients	Sex and Age.			
		ox	age	cow	age
Cystitis haemorrhagica	4	2	{ 7 12	2	{ 4½ 9
Retentio urinae	2	2	0	0	0
Cystitis productiva	4	2	{ 4½ 5	2	{ 7 8
Cystitis diphtheritica	1	1	0	0	0
Cystitis crouposa.	1	0	6	1	8
Total	12	7	0	5	0

B. Cystitis with tumefaction. 21 cases mentioned.

Changes	Animals	Ages
1. Young papilloma.	Cow 1	4
2. Papilloma.	Ox 1	6½
	Cow 1	9½
3. Papilloma partly carcinoma with the growth of prostata.	Ox 1	9½
4. Papilloma and carcinomatous growth.	" 1	9
	" 1	11
5. Papilloma and productive cystitis.	" 1	18
	" 1	8
6. Carcinoma durum.	" 1	1
	" 1	5
	" 1	10
7. Carcinoma.	" 1	8
	Cow 1	10
8. Carcinoma and papilloma.	Ox 1	8
9. Young carcinoma.	Cow 1	7
10. Spindle, polymorphous cell sarcoma and papilloma.	Ox 1	10
11. Young sarcoma and carcinoma.	" 1	11
12. Polymorphous cell sarcoma and papilloma.	" 1	0
13. Superficially carcinoma, deeper part sarcoma.	" 1	10
14. Small cell sarcoma.	" 1	10
15. Polymorphous cell sarcoma.	" 1	13
Total.	21	

III. Relation between Pregnancy and Haematuria.

A. Haematuria in pregnant cow. 4 cases.

- a. 8 years old Carcinoma in the cyst.
- b. 9½ years old Papilloma.
- c. 4½ years old Cystitis haemorrhagica.
- d. 7 years old Productive cystitis.

B. Haematuria with or without parturition.

- a. 7 years old cow, haematuria from 2 months after parturition.
- b. 1½ years virgin cow, temporarily haematuria.
- c. 1½ years Indian hybrid, temporarily.
- d. 8 cases passed one or more parturitions; their ages: 4, 4½, 8, 11, 9, 9, 10, 10.

IV. Heredity.

6 cattle belonging to the same owner, bred and reared in the same stall.

- (1) Mother cow, (2) First female calf, 1 year and 7 months old, (3) Second female calf, one year old, (4) First grand son, that is the calf of (3), (5) Sire of (4), (6) Second grand son, that is the younger brother of (4), all the above were attacked except the last one (6).

V. Stall relation. 2 cases.

1. Farmer R's native ox, 10 years old, died on June 10th, 1919., papilloma, carcinoma, ulcer and rupture are seen in the cyst. The owner introduced another young bull, 5 years old, to fill up the vacancy in the stall, but after 1 year the new one was slaughtered on account of haematuria. Post-mortem examination disclosed papilloma in the cyst, but this may have originated prior to the introduction of the ox into the stall.

2. Farmer Y's ox bred in his own stall discharged from September 1919 red urine without any noticeable cause.

Another ox of the same owner, bred in 1913, also began to discharge bloody urine from March 1921, and so on.

THE CLASSIFICATION OF THE PATHOLOGICAL CHANGES OF UROCYSTITIS HAEMORRHAGICA.

Of sixty specimens collected under considerable difficulty and recorded minutely 40 cases were observed post-mortem. The bladder and other organs related to it were studied microscopically by preparing double stained preparates. Pathological changes of each specimen are not fully demonstrated so as to shorten this paper. Except 2 cases which were haemoglobinaemia and another 2 which were proved to be haemorrhage caused by retentio urinae and ruptura cystis of carabao, the remaining 36 cases might be classified in 2 principal groups.

I. Urocystitis without tumor (12 cases).

II. Urocystitis with tumor (24 cases).

There is no exact differentiation between these groups. The 1st is gradually transformed into the 2nd. There were remarked in them incomplete tumefaction, simple primary tumour, progressive hypertrophic state of epithelial cells, complex forms of tumours and secondary invasions or partial regressive degenerations.

Subdivision of the 1st Group.

1. According to the locality of pathological change.

- a. Whole surface of m.m. of cyst, 8 cases (about 67%)
- b. Chiefly the fundus of cyst, 2 cases. (about 16%)
- c. Remarkable changes from fundus to apex, 1 case (about 8%)
- d. Remarkable change in apex, 1 case (about 8%)

2. According to the size of cyst or quantity of content.

a. Somewhat shrunken, empty	2 cases	16%
b. Dilated	4 "	33%
c. Somewhat enlarged	1 case	8%
d. Fairly enlarged	4 cases	33%
e. Widely enlarged	1 case	8%

3. By the degree of pathological changes.

a. Cystitis simplex,	2 cases	16%
b. Cystitis haemorrhagica,	4 "	33%
c. Cystitis haemorrhagica, purulenta et pseudomembranacea,	1 case	8%
d. Cystitis hypertrophica et progressiva.	4 cases	33%
e. Cystitis diphtheritica, pseudomembranacea cum psammoma.	1 case	8%

Subdivision of the 2nd Group.

1. By the locality at which the growth exists.

a. The fundus and triangular part of cyst, Papilloma 3, Sarcoma 4, Carcinoma 7.	14 cases	(58%)
b. Generally diffuse in whole cyst, Papilloma 1, Sarcoma 1, Carcinoma 3.	5 "	(21%)
c. From fundus to apex, Papilloma 2, Sarcoma 1, Carcinoma 1, the carcinoma occupying about $\frac{1}{4}$ of the surface of m.m.	4 "	(16%)
b. Scattered form, Papilloma, 1.	1 case	(0.8%)

2. By the degree of changes.

A. Papillomatous growth, complete papillo-carcinomatous growth.

1. Papillomatous hypertrophy,	1 case
2. Numerous bush-like papillomatous growths and connective tissue hypertrophy, papilliform, callositas-like, and nodulous new formation, thickness 2.5 cm.	1 "
3. Papillomata, one large and several small hanging with stem or cord	1 "
4. Papillomata, 2 large and 16 small hanging	1 "
5. Gland-cell papilloma, thickness 2 or 3 cm.	1 "
6. Papilloma and carcinomatous growth containing lymphomatous part, hanging with stem or forming protuberance, thickness 2.5 cm.	1 "
7. Papilloma and papillomatous growth of prostata, partly carcinomatous growth and angioma, with stem and protuberances, thickness 3 cm.	1 "
8. Young carcinoma and papillomatous growth, thickness 0.5-2.0 cm.	1 "

B. From progressive hypertrophic cystitis to carcinomatous growth and from papillomatous hypertrophy to carcinoma.

9. Young carcinomatous hypertrophy, thickness 1.5	1 case
10. Young carcinomatous growth, thickness 2.0	1 "
11. Carcinomatous growth, partly carcinoma durum, large ulcer formation, thickness 1.3 cm.	1 "
12. Carcinoma and papillomatous hypertrophy, thickness 1.0-4.0 cm.	1 "
13. Carcinoma, flat progressive infiltrated form, thickness 1.0-4.0 cm.	1 "
14. Carcinoma durum, thickness 1.5 cm.	1 "
15. Carcinoma, thickness 2.0-2.5 cm.	1 "
16. Carcinoma durum, thickness 2.5 cm.	1 "

17. Carcinoma, and large ulcer formation, thickness 3.0 cm. 1 "
 18. Carcinoma durum, papillomatous growth, wide and hard connective tissue cell hypertrophy including fibroma and sarcomatous parts, thickness 3.0-5.0 cm. 1 "
- C. Progressive hypertrophic cystitis to benignant and more often to malignant tumour.
19. Young carcinomatous and sarcomatous growths, thick hypertrophic form. 1 case
 20. Small spindle cell and polymorphous cell sarcom, and papilloma which consisted of baby's head-sized protuberance and several cm. long polypoid or fimbriated membrane 1 "
 21. Superficially carcinoma, deeper part large spindle cell sarcom, and ulcer, that is, papilliform, protuberant and ulcerated form 1 "
 22. Superficially round cell or polymorphous cell sarcom, deeper part chiefly spindle cell sarcoma, the whole forming a large cauliflower-like protuberance 1 "
 23. Superficially plastic granulating cells, deeper part long spindle cell sarcoma, partly forming a large papilloma covered with dense fimbriate or polypous growths, and imbedded myxoma and angioma.
 24. Small round cell sarcoma showing intergrowth with surrounding organs 1 "

AETIOLOGY OF CYSTITIS HAEMORRHAGICA OR HAEMATURIA.

From the recorded cases, it may be seen that there are some relations among those changes regarding their causation, and the following may be expressed.

1. Malignant growths (e. g. the complication of carcinoma and sarcoma) may be caused by complicated form of malignant and benignant growths.

2. These may grow from simple malignant growths which may be caused by benignant simple or complicated growths.

3. Chronic hyperplastic cystitis which may be originated from acute simple cystitis may give rise to simple benignant growths.

Regarding the origin or cause of malignant tumors Virchow's "Irritation Theory" has been experimentally proved, in 1917, by Drs. Yamakiwa and Ichikawa who succeeded in producing artificial tar-carcinoma in rabbit ears. Dr. Yamakiwa's students also succeeded in producing artificial sarcoma by irritation. My researches naturally do not serve to show the history of the formation of tumour in one and the same animal as the pathological changes were confined to the inner organs.

But from my investigations for more than four years (1918-1922), relating to 141 patients and numerous pathological exhib-

itions of bovine cysts, I found that all the cases may be arranged according to the gravity of their pathological changes.

Comparing each specimen, I found that the changes resembled very much the recorded history of the rabbit tests referred to.

The only difference is that in my investigations the cause of disease was natural ailments while in the rabbit tests the unnatural irritant.

And I may say that the cause of simple slight cystitis haemorrhagica will develop into, or give rise to true tumours if it irritates the cyst wall repeatedly or continuously.

The difference between the above-classified groups and those between the sub-classes of the same groups are not sharp or clearly defined, evolving very gradually from slight to grave, from simple to complex, and so on. But the rate of gradual change is not equally applicable to each cystitic stage on account of the pathological changes influenced in general by the pathogenic agents or physical condition of the animals.

On the other hand, the secondary irritating agents, either micro-organism or chemical substance, are not the same. Even in one and the same animal, the irritating substances vary very much by season, or circumstance, so that in a chronic case several different irritants can act as causes of the disease. The irritants are not always necessarily of a severe character, even mild irritants may give rise to the several kinds of pathological change.

It may be safe to say that the *causa irritans* of haematuria need not be limited to only one, may be double or more, that means, there may be one or more secondary attributors.

1. Micro-organisms suspended in the urine may decompose the latter, producing certain substances which irritate the mucous membrane of the bladder.

2. The animal may accidentally take up some irritable matter or toxic herb with its food.

3. Certain harmful, decomposed or irritating products which are discharged with the urine during a state of fever, may not only cause inflammation but may at the same time cause *retentio urinae* by the paralysis of *M. accelerator urinae* or by the spasm of *M. sphinctor vesicae*.

Beside these facts, endoparasites or mechanical trauma from outside can be taken into consideration, so I can enumerate the following facts which may possibly have some significance aetiologically.

1. Micro-organisms. Bacteriae, especially diplostreptococci in the patient's urine.

2. Feverish disease. An influenza-like feverish disease of cattle prevails in several villages in Shinchiku prefecture, this is not fatal, recovery takes place within a week or more. Aetiological research of this disease is not yet completed.

3. Ophthalmitis. In the affected locality, there occasionally prevails a kind of ophthalmitis in cattle. It is not yet proved that there is any aetiological relation between this eye affection and haematuria.

4. Scanty grass. The haematuria localities are mainly mountainous, intersected by valleys and gravel-beds, while the tillable lands are often narrow, limited terraces or slopes, poor in grass, but also scanty in toxic herbs. The cattle are fatigued and in bad condition throughout the seasons; the urine is frequently retained for a long period.

5. Trauma. Caused by blows or the straining of the cyst or other abdominal or pelvic organs while wandering over very uneven ground, clambering down irregular steep tracks, and stumbling about rocky ground.

6. Weather. Windy, temperature not so high as in other localities. Soil largely consists of delugeal gravel, dense hard mud, and red acetic soil. Water soft and clear, the cattle drink from springs, brooks and ponds.

7. Parasites. These may not seem to have much aetiological significance, but the following may be noted.

Filaria labiopapillosa's larvae were found causing peritonitis and a number of them penetrated the cyst wall, the lymph glands in the abdominal cavity and the cyst were changed entirely into a large sarcoma.

Filaria labiatopapillosa. Larvae imbedded in the carcinomatous tissue of cyst. Also *Fasciola hepatica*, *Eurytrema pancreaticum*, *Filaria lacrymalis*, *Homologaster Taiwana*, *Amphistoma conicum*, and in one

case renopelvic calculus.

Schistosomum Japonicum and its eggs were found in Vena portae, Vena mesenterica, Vena recti, but not in cyst nor at all in the urine. *Nephrophagus urinae* were seen in the urine. But these parasites may not be essential causal agents and may merely be accidental companions. In short, no special causal agent, such as organisms or materials, has yet been determined.

On the other hand, the appearance of the slight cystitis is not dependent upon special infection, nor an irritating agent, nor a violent incident.

Abundant diplococci and other bacteriae were always detected in the haematurial urine or in the preparate. But even in healthy cattle, bacteria will be found in the urine.

Normal bovine urine is not good nutritive medium for bacteria, and it rather checks the growth of bacteria.

The healthy mucosa of cysts does not readily admit the invasion of bacteria. Some circumstances or conditions, however, may weaken the resistance of the mucous membrane of the cyst.

The inflammation of the cyst may be caused by agents which are present in the urine.

INFECTION EXPERIMENTS.

1. Materials.

Five diseased Formosan cows were introduced one by one from their native locality to Taihoku; one of them died in Taihoku station on arrival, the other 4 survived for 2 weeks up to 6 months and supplied their bloody urine as material.

2. Animals.

Holstein hybrid calves, male and female rabbits, guinea-pigs, and a native bull, were used; these animals were injected to their empty cysts with fresh bloody urine or emulsions of diplococci which were isolated from the urine, and sometimes with both together.

3. Examination.

- a. Observation of the animal as to general condition, the colour and quantity of urine, and frequency of urination.
- b. Demonstration of bacteria and spirochaeta in haematuria. The

centrifugal sediments of patient's urine were examined through dark field apparatus or smears of the sediment by Giemsa staining or silver gilding method.

- c. Agglutination and complement fixation test on 2 kinds of diplococci.
- d. Artificial urination of healthy animals, and injection of bloody urine into the empty cysts.
- e. Auxiliary means to urge the invasion of the disease into healthy animals.
- f. Existence and distribution of micro-organisms in the tissue of cysts.

4. Artificial urination.

I succeeded in making a new catheter which is a metallic pipe plated with nickel, about 15 inches long, its diameter is equal to that for the horse, toward the end it is slightly crooked and on both sides near the end there is an oblong hole, so-called eye, at unequal distances from the end.

Open the vagina with an uterine speculum for women, inspect the orifice of urethra, and insert the catheter.

This work is not so easy at first, but after repeated training there is no necessity to use the vaginal or uterine speculum.

5. Infection to the healthy calf

Open the vagina with recto-speculum or by the finger of the operator or assistant, inspect the orifice of urethra and insert slowly the catheter. There is usually some resistance due to the contraction of the urethral muscle, stop the insertion when the orifice of urethra is reached, connect the catheter with syringe, never insert more deeply into the cyst, so that not to penetrate the cyst wall by the catheter.

6. Artificial urination of diseased bull or ox.

Red urine is drawn not only from a sick cow but from a sick bull or ox. For the bull, the catheter is not to be applied, the following method is advisable.

- A. In order to let the animal, which is commonly trained to pull a plough or waggon, discharge urine fit the utensil to the animal's body and urge the animal to go on with heavy ploughing by oral encouragement, then the animal draws with

both hind legs extended backwards and thereby tightens his belly, and soon he begins to pass water. It is also advisable for the same purpose to pour water suddenly on the rump of the animal.

B. It is most important at first to know fully the natural discharging process of each animal; I watched the patients continuously through many hours with a vessel ready to receive the discharge. Meanwhile I succeeded in getting urine by such irritation of urethra or penis as rubbing along the course of urethra or the sheath of penis from above towards the end but by this method the spermatozoa are often mixed in the urine.

7. Cyst injection in rabbit.

In rabbits, male or female equally, the rubber catheter is inserted and the urine flows out through it and the catheter may be connected with the syringe for injection purposes.

8. Cyst injection in bull or ox.

It is not possible to introduce the material in to the bladder from the end orifice of the urethra by fine rubber catheter or long beak of a syringe because the course is long, inflected three times and is in ascending direction against the pushing press of the animal. Therefore the urethrotomy is only employed in order to complete the injection, at the part of ischiadic bending of the urethra.

RESULTS OBTAINED FROM EXPERMENTS.

Details of the experimental processes are omitted.

1. Microorganisms in the tissue of the cystitis with tumour.

11 cattle and 1 rabbit invaded naturally or artificially were examined.

A. Bacteria present chiefly in the mucous membrane.	1 case
B. Abundant in the part of haemorrhagic inflammation, a few in indurated part,	1 "
C. Diplo- and streptococcus present in intraepithelial tissue of cyst-tumor,	1 "

Note: The detected bacteriae were diplo- and streptococci and in a few cases they were accompanied by bacillus.

2. Microorganisms in the bloody urine.

Native cattle No. 1. Female, $8\frac{1}{4}$ years old, with productive cystitis and haematuria.

Duration of observation $6\frac{1}{2}$ months, from Nov. 23, 1921. to June 6, 22, examined 67 times, haemolysable diplococcus detected.

Native cattle No. 2. Female, $8\frac{1}{2}$ years old, with productive cystitis and formation of pseudomembrane, haemorrhagic purulent nodulous nephritis and haematuria. Duration 81 days, examined 30 times. Detected non-haemolysable diplococcus and diplo-streptococcus.

Native cattle No. 3. Female, 8 years old, with haemorrhagic inflammation of submucosa and papilloma. Duration 12 days, examined 8 times. Detected non-haemolysable diploand streptococcus.

Native cattle No. 4. Male, $2\frac{1}{2}$ years old, with carcinoma durum. Duration 75 days, examined 10 times. Detected haemolysable diplococcus.

Control. The urine of healthy cattle (3), water buffalo (1) and Holstein hybrid (1) was proved to be all negative regarding the diplococcus above mentioned. Spirochaeta was not present in the urine of all the animals.

3. Agglutination.

A. The agglutinating rate of the serum of diseased cattle to the diplococcus.

Serum	Dilution	Results
Native patient	320—640	Positive
Native healthy	160—320	Negative
Holstein hybrid	80—160	"

It seems that the diplococcus has little significance as one of the causal agents.

B. Complement absorption.

Antibody did not absorb the complement, therefore the aetiological meaning of the diplococci is by no means important.

4. Infection by the injection of bloody urine or the isolated diplococcus into the healthy bladder, assisted by the cyst injection of AgNO_3 or Tinctura cantharides and by the cooling of the part.

a. Injected materials.

5 kinds of bloody urine originating from 5 patients.

3 strains of diplococcus in emulsion or nutritive media.

1 kind of healthy urine which contained a few mono-or diplococci.

b. Healthy animals for injection.

Native cow, 1 year old	1
Holstein hybrid calves	3
Rabbits	9
Guinea-pig	3
Total	16

Details of protocol, post-mortem examination and microscop-

ical changes are omitted here.

Injected animal.	Injections.	Duration of examination	Termination of animal.	Result.
Rabbit. No. 1	8	40 days	Survived	Positive
" " 2	94	about one year (Dec. 30.21-Oct. 13.22)	Died	Negative
" " 3	21	3 Months	"	"
" " 4	25	94 days	"	Positive
" " 5	29	6½ months	Killed	Negative
" " 6	6	95 days	Died	"
" " 7	17	44 "	Survived	"
" " 8	21	47 "	"	"
" " 9	2	14 "	"	"
Calf. " 1	2	55 "	Died	"
" " 2	21	25 "	"	Positive
" " 3	15	45 "	"	"
Guinea-pig No. 1	1	22 "	"	Negative
" " 2	9	40 "	"	"
" " 3	8	30 "	Survived	"

Short description.

Rabbit. No. 1	At autopsy bladder enlarged, and haemorrhagic inflammation of the mucous membrane.
" " 2	Obstinately resisted to artificial invasion, clinically slight cystitis, not dissected.
" " 3	Died of coccidiosis, examination not performed.
" " 4	At autopsy congestion of the m.m. of bladder and diplococci in the epithelial cells.
" " 5	Clinically negative, not dissected.
" " 6	Died of septicaemia, examination not performed.
" " 7	Depressed by the injection but recovered soon after the injection.
" " 8	Clinically negative, examination stopped, not dissected.
" " 9	Body weight decreased gradually but negative in post-mortem.
Calf. " 1	Not dissected, the cause of death not related to the injection.
" " 2	At autopsy congestion and round cell infiltration of the mucous membrane and the inclination to productive hypertrophy of epithelial cells and submucous connective tissue.
" " 3	At autopsy excoriation of cyst epithelia, partial growth of mucous membrane, round cell infiltration, congestion and extravasation of blood in the tissue.
Guinea-pig No. 1	At autopsy bladder enlarged, also kidney hypertrophic, but no pathological changes of the bladder.
" " 2	Died, but the cause not related to the injection.
" " 3	Examination not performed, negative.

SUMMARY.

1. It is very difficult to produce cystitis in healthy animals by injection into the cyst of bloody urine containing abundant diplococci and other microorganisms, or of their pure cultures. The normal mucous membrane of cyst has very strong self-protective power against the invasion, or may probably soon recover from the slight lesion, and the normal urine has usually certain controlling power against some injurious microorganisms.

2. Two kinds of diplococcus isolated from the patient's urine, temporarily named "*Diplococcus haematuriae bovis*", have no special aetiological meaning compared with other microorganisms and other urine ingredients.

But because these 2 kinds are most abundant and common, and they are also proved occasionally in the tissue or in cells of the inflammatory m.m. and the growth of the cyst, it may be said that they are more serious actors than the other several changeable and unstable microorganisms and ingredients in introducing as well as promoting the cystitis.

3. There are several factors (see above) which may contribute to produce the cystitis but the actual irritants of the urocystitis haemorrhagica are not yet decided.

CONCLUSION.

1. The haematuria which is observed in the native yellow cattle and water buffaloes is quite different from the haemoglobinuria which is seen hitherto in other cattle, and also from the haematuria which develops by some other causes.

2. Based on the large number of haematurial patients, especially on the anatomical changes of 56 cases, it may be safe to say that haematuria originates from the haemorrhage of mucous membrane of cyst where the pathological changes take place primarily.

3. From the examination of the cyst it is to be acknowledged that there exist several morphological changes such as cystitis, and, moreover, benignant and malignant new formation.

It may be added here (a) that these various changes are

caused by the inflammation of the mucous membrane of cyst, notwithstanding the changes seen so very rich in variety at a glance, (b) that when once cystitis occurs the haematuria may appear and if the cause is chronic then new formation goes on, (c) that the haematuria is based in the first event upon the existence of cystitis.

On the other hand, from the change of these tumefactions of cyst, it may be true as Virchow's irritation theory insists, that the chronic irritation may be the cause of the several tumefactions, and it may be of interest to note the comparative research of new formation seeking for the analogy to the result of experimental research of new formation (Drs. Yamakiwa and Ichikawa).

4. Notwithstanding that cystitis is the cause of the chief fundamental changes, spirochaetes, parasite eggs and diplococci cannot be the causal agents of the disease.

臺灣牛ノ出血性膀胱炎

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(臺北中央研究所)

(昭和3年7月28日受附)

1. 臺灣土産ノ黄牛及水牛ノ血尿症ハ從來他ノ牛畜ニ見ラレタル血色素尿症及他ノ原因ニ依テ發スル血尿症ト全ク異ナレリ

2. 多數ノ血尿症患者殊ニ 56 例ノ解剖的變化ニ據リテ本症ハ病理的變化ヲ原發スル膀胱粘膜ノ出血ニ原因スルモノナリト云フヲ得ベシ

3. 膀胱ヲ検査シテ膀胱炎良性及惡性新生物ノ如キ諸種ノ形態的變化ノ存スルヲ認メタリ而シテ此等ノ變化ハ膀胱粘膜ノ炎症ニ依テ發生シー且膀胱炎ヲ發生スルトキハ血尿症ヲ呈シ其原因慢

性ナルトキハ新生物ヲ生ズ之ヲ要スルニ血尿症ハ膀胱炎ノ存在ニ
因ルモノトス

又一方ニ於テハ此等ノ膀胱腫瘍形成ノ推移ヨリシテ慢性刺戟ガ
終ニ諸種ノ腫瘍形成ノ原因タリ得ベキハ Virchow 氏刺戟説ノ主
張スルガ如ク眞ナルベシ

4. すびろき一た寄生虫卵及でいぶろこつかすハ本病ノ原因ニア
ラズ