

Table XXV.—Comparison of the Measurements of the Breadth of the Trypanosomes of the Human Strains VI to X.

Date.	Experiment No.	Strain.	Animal.	In microns.		
				Average breadth.	Maximum breadth.	Minimum breadth.
1913	2239	VI, Manakumpara ...	Rat	2·76	4·50	1·25
1913	2236	VII, Yoram.	„	2·51	4·50	1·25
1913	2300	VIII, Mekka	„	2·68	5·00	1·25
1913	2386	IX, Mkanthama	„	2·56	5·00	1·25
1913	2437	X, Dongolosi	„	2·71	4·50	1·25
				2·65	5·00	1·25

CONCLUSION.

These further five strains of this trypanosome, isolated from five natives in Nyasaland, belong to the same species, *Trypanosoma brucei vel rhodesiense*, the trypanosome causing disease in man in Nyasaland.

The Trypanosome causing Disease in Man in Nyasaland.

II. *The Wild-game Strain.* III. *The Wild Glossina morsitans Strain.* Part II.—*Susceptibility of Animals.*

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(Received May 5,—Read June 25, 1914.)

INTRODUCTION.

In previous papers* the morphology of these strains of trypanosomes was described, and it was concluded that they are identical with the trypanosome causing disease in man in Nyasaland, the *Trypanosoma rhodesiense* of Stephens and Fantham, the *T. brucei* of this Commission.

This paper tabulates the action on animals of the two strains, and they are compared in this respect with each other and with the Human strain.

* 'Roy. Soc. Proc.' B, vol. 86, pp. 394 and 408.

ANIMALS SUSCEPTIBLE TO THE TRYPANOSOME CAUSING DISEASE IN MAN IN
NYASALAND.II. *The Wild-game Strain.*

Table I.

Date.	No. of expt.	Source of virus.	Period of incubation, in days.	Duration of disease, in days.*	Remarks.
Goat.					
1912.					
July 1...	718	Hartebeeste 779.....	7	67	Died of Wild-game strain.
" 23...	796	" 957.....	13	60	" "
" 27...	975	" 1000.....	9	27	" "
Aug. 21...	1126	" 1142.....	5	25	" "
" 24...	1121	Eland 1202.....	16	82	Also showed <i>T. pecorum</i> .
" 24...	1127	Waterbuck 1180	9	49	Died of Wild-game strain.
" 28...	1213	" 1210.....	19	49	Also showed <i>T. capræ</i> .
Average.....			8·6	45·6	
Monkey.					
June 19...	785	Reedbuck 783.....	8	17	Died of Wild-game strain.
July 1...	776	Hartebeeste 779.....	7	30	" "
" 8...	864	Oribi 863.....	7	59	" "
" 23...	961	Hartebeeste 957.....	13	21	" "
" 27...	1001	" 1000	9	10	" "
Aug. 24...	1181	Waterbuck 1180	9	40	" "
" 28...	1211	" 1210	8	79	" "
Sept. 13...	1348	Reedbuck 1347	10	19	" "
" 23...	1436	" 1435	10	66	" "
Average.....			9·0	39·9	
Dog.					
June 30...	784	Reedbuck 783	8	11	Died of Wild-game strain.
July 1...	733	Hartebeeste 779.....	7	58	" "
" 10...	846	Monkey 785	5	48	" "
" 10...	848	Dog 733	8	43	" "
" 23...	892	Hartebeeste 957.....	6	31	" "
" 26...	991	Monkey 864	6	48	" "
" 27...	1002	Hartebeeste 1000	9	59	" "
Aug. 21...	1144	" 1142	1	23	" "
" 24...	1182	Waterbuck 1180	9	40	" "
" 28...	1212	" 1210.....	8	26	" "
Sept. 7...	1266	" 1264	16	64	" "
" 13...	1349	Reedbuck 1347	10	38	" "
" 23...	1437	" 1435	10	42	" "
Average.....			7·9	41·2	
Rat.					
July 10...	847	Monkey 785	5	30	Died of Wild-game strain.
" 10...	849	Dog 733	8	39	" "
" 26...	992	Monkey 864	6	21	" "
Aug. 13...	1070	Dog 1002	6	17	" "
" 16...	1022	" 892	3	30	" "
Sept. 3...	1220	Monkey 1181	3	54	" "
Average.....			5·2	31·8	

* Duration includes the days of incubation; it dates from the day of inoculation.

In making up the average incubation and duration, mixed infections are not included. It must be admitted that these averages are only approximate, as it is impossible to deal only with animals of the same age, weight, health, and powers of resistance. Dogs, for example, fall away very much during the rains, when biting flies and ticks are numerous.

Table II.—The Average Duration, in Days, of the Disease in Various Animals caused by the Wild-game Strain of the Trypanosome causing Disease in Man in Nyasaland.

	Goat.	Monkey.	Dog.	White rat.
Average duration, in days.....	46	38	41	32
No. of animals employed	5	9	13	6

Compare this with the following Table :—

Table III.—The Average Duration of Life, in Days, of Various Animals infected with the Human Strain of the Trypanosome causing Disease in Man in Nyasaland.

	Goat.	Monkey.	Dog.	White rat.
Average duration, in days.....	42	26	24	30
No. of animals employed	29	20	25	21

Table IV.—The Percentages of Recoveries in Various Animals infected with the Wild-game Strain of the Trypanosome causing Disease in Man in Nyasaland.

	Goat.	Monkey.	Dog.	White rat.
Percentages.....	0	0	0	0
No. of animals employed	5	9	13	6

Compare this with the following Table :—

Table V.—The Percentages of Recoveries in Various Animals infected with the Human Strain of the Trypanosome causing Disease in Man in Nyasaland.

	Goat.	Monkey.	Dog.	White rat.
Percentages	0	0	0	0
No. of animals employed	29	20	25	21

III. *The Wild Glossina morsitans Strain.*

Table VI.

Date.	No. of expt.	Source of virus.	Period of incubation, in days.	Duration of disease, in days.*	Remarks.
Cattle.					
1912.					
April 13...	437	Dog 325	9	—	Recovered.
„ 13...	438	„ 325	9	—	„
Goat.					
Jan. 21...	35	Wild flies	19	35	Died of wild fly strain.
Feb. 1...	117	Monkey 20	11	50	Also showed <i>T. simia</i> .
„ 13...	202	Wild flies	6	24	Died of wild fly strain.
„ 17...	201	Dog 116	12	27	„ „
„ 17...	207	„ 116	9	40	„ „
April 13...	421	„ 325	19	130	„ „
„ 13...	423	„ 325	9	82	„ „
„ 13...	424	„ 325	9	99	„ „
May 15...	416	Wild flies	5	19	Also showed <i>T. simia</i> and <i>T. pecorum</i> .
June 12...	637	Rat 543	29	82	Died of wild fly strain.
„ 12...	638	„ 543	12	46	„ „
„ 12...	639	„ 543	12	—	Still alive after 224 days.
„ 27...	716	Wild flies	10	60	Died of wild fly strain.
Oct. 31 ...	1538	„	8	24	Also showed <i>T. pecorum</i> and <i>T. capra</i> .
Nov. 23 ..	1626	„	7	56	Died of wild fly strain.
„ 27...	1638	„	15	64	Also showed <i>T. pecorum</i> .
Dec. 5...	1667	„	11	80	„ <i>T. pecorum</i> and <i>T. capra</i> .
„ 9...	1676	„	4	40	„ <i>T. capra</i> .
„ 13...	1685	„	7	38	„ <i>T. pecorum</i> .
1913.					
April 16...	2084	Rat 2020	5	41	Died of wild fly strain.
„ 16...	2085	„ 2020	19	32	„ „
„ 16...	2086	„ 2020	8	32	„ „
„ 16...	2087	„ 2020	8	39	„ „
„ 16...	2088	„ 2020	8	44	„ „
		Average.....	11.8	54.3	
Pig.					
1912.					
Nov. 25...	1636	Wild flies	14	98	Also showed <i>T. simia</i> and <i>T. pecorum</i> .
1913.					
Jan. 21...	1781	„	6	230	„ <i>T. pecorum</i> .
April 12...	2075	„	11	24	„ <i>T. simia</i> .
May 14...	2169	„	8	25	„ „

* Duration includes the days of incubation; it dates from day of inoculation.

Table VI—continued.

Date.	No. of expt.	Source of virus.	Period of incubation, in days.	Duration of disease, in days.*	Remarks.
Monkey.					
1912.					
Feb. 26...	287	Dog 157	7	28	Died of wild fly strain.
" 27...	286	" 211	6	52	Also showed <i>T. simia</i> .
Mar. 13...	332	Goat 117	8	31	Died of wild fly strain.
April 13...	406	Dog 325	9	71	" "
" 27...	492	" 436	5	63	" "
May 8...	523	Wild flies	4	5	Also showed <i>T. simia</i> .
" 31...	601	"	6	31	<i>T. pecorum</i> .
June 7...	625	"	9	83	Died of wild fly strain.
" 25...	739	"	5	45	" "
July 24...	970	Rat 658	8	—	Still alive after 162 days.
Sept. 27...	1459	Wild flies	9	13	Died of wild fly strain.
Oct. 29 ...	1536	"	10	12	" "
1913.					
Jan. 13...	1757	"	6	32	" "
May 14...	2151	Rat 2082	5	30	" "
" 14...	2152	" 2082	5	41	" "
" 14...	2153	" 2082	5	22	" "
" 14...	2154	" 2082	5	28	" "
" 14...	2155	" 2082	8	33	" "
Average.....			6·9	38·7	
Dog.					
1912.					
Feb. 1...	116	Monkey 20	8	23	Died of wild fly strain.
" 16...	211	Wild flies	6	—	Killed March 2.
" 17...	157	Dog 116	9	11	Died of wild fly strain.
" 17...	243	" 116	5	23	" "
" 17...	244	" 116	5	23	" "
Mar. 9...	325	Monkey 286 ...	9	41	" "
April 12...	436	Wild flies	7	36	" "
" 13...	440	Dog 325	5	29	" "
" 13...	441	" 325	9	60	" "
" 27...	493	" 436	5	60	" "
May 10...	525	Wild flies	3	8	" "
" 13...	542	"	6	42	" "
" 17...	549	Monkey 523 ...	10	51	Also showed <i>T. pecorum</i> .
" 17...	551	Wild flies	8	25	" "
" 29...	595	"	3	18	" "
" 31...	602	"	5	—	Still alive after 175 days.
June 8...	626	"	8	53	Died of wild fly strain.
" 26...	729	"	5	26	" "
July 24...	971	Rat 658	8	32	" "
Oct. 30...	1537	Wild flies	5	30	" "
Nov. 22...	1625	"	4	30	" "
" 26...	1637	"	12	38	" "
Dec. 7...	1675	"	6	25	" "
" 12...	1684	"	4	19	" "
1913.					
Jan. 22 ..	1782	Wild flies	9	21	" "
May 14...	2146	Rat 2082	5	17	" "
" 14...	2147	" 2082	8	17	" "
" 14...	2148	" 2082	8	17	" "
" 14...	2149	" 2082	5	11	" "
" 14...	2150	" 2082	5	24	" "
Average.....			6·4	28·6	

* Duration includes the days of incubation; it dates from day of inoculation.

Table VI—*continued.*

Date.	No. of expt.	Source of virus.	Period of incubation, in days.	Duration of disease, in days *	Remarks.
Rabbit.					
1912.					
April 13...	439	Dog 325	—	—	Never showed trypanosomes.
Dec. 14...	1543	Pig 1636	19	13	Died of wild fly strain.
" 14...	1544	" 1636	19	39	" "
" 14...	1545	" 1636	33	90	" "
		Average.....	23·7	47·3	
Guinea-pig.					
Feb. 17...	239	Dog 116	16	80	Died of wild fly strain.
" 17...	240	" 116	16	72	" "
April 13...	442	" 325	—	—	Never showed trypanosomes.
May 14...	544	Monkey 492 ...	—	—	" "
June 14...	676	Dog 549	—	—	" "
" 14...	677	" 549	—	—	" "
" 14...	678	" 542	13	116	Died of wild fly strain.
" 14...	679	" 542	20	104	" "
" 14...	680	" 551	13	39	Also showed <i>T. pecorum</i> .
" 14...	681	" 551	20	42	" "
" 14...	682	" 595	—	—	Never showed trypanosomes.
" 14...	683	" 595	—	—	" "
1913.					
Jan. 4...	1731	Wild flies	15	100	Died of wild fly strain.
Mar. 28...	2034	Guinea-pig 1731	10	53	" "
" 28...	2035	" 1731	10	89	" "
April 16...	2077	Rat 2020	15	61	" "
" 16...	2078	" 2020	12	61	" "
" 16...	2079	" 2020	8	72	" "
		Average.....	13·5	80·8	
Rat.					
1912.					
Feb. 17...	241	Dog 116	5	17	Died of wild fly strain.
" 17...	242	" 116	5	15	" "
April 13...	443	" 325	9	24	" "
" 27...	494	" 436	12	14	" "
May 7...	519	" 440	6	12	" "
" 14...	543	Monkey 492 ...	6	29	" "
" 17...	550	Rat 519	6	12	" "
June 11...	655	Dog 549	5	36	" "
" 11...	656	" 542	6	19	" "
" 11...	657	" 551	13	31	Also showed <i>T. pecorum</i> .
" 11...	658	" 595	8	43	Died of wild fly strain.
" 12...	660	" 602	5	70	Also showed <i>T. pecorum</i> .
Dec. 3...	1664	Monkey 970 ...	13	40	Died of wild fly strain.
1913.					
Jan. 13...	1755	Rat 1664	7	71	" "
Mar. 25...	2020	" 1755	13	22	" "
" 25...	2021	" 1755	13	22	" "
April 16...	2080	" 2020	1	27	" "
" 16...	2081	" 2020	5	31	" "
" 16...	2082	" 2020	5	28	" "
" 16...	2083	" 2020	5	27	" "
May 15...	2166	" 2082	8	11	" "
		Average.....	7·3	26·3	

* Duration includes the days of incubation; it dates from the day of inoculation.

Table VII.—The Average Duration, in Days, of the Disease in Various Animals caused by the Wild *Glossina morsitans* Strain of the Trypanosome causing Disease in Man in Nyasaland.

	Ox.	Goat.	Monkey.	Dog.	Rabbit.	Guinea-pig.	White rat.
Average duration, in days	Rec.	54	38	29	47	81	26
No. of animals employed	2	16	14	25	3	10	19

Compare this with the following Table:—

Table VIII.—The Average Duration of Life, in Days, of Various Animals infected with the Human Strain of the Trypanosome causing Disease in Man in Nyasaland.

	Ox.	Goat.	Monkey.	Dog.	Rabbit.	Guinea-pig.	White rat.
Average duration, in days	134	42	26	34	28	67	30
No. of animals employed	1	29	20	25	7	15	21

Table IX.—The Percentages of Recoveries in Various Animals infected with the Wild *Glossina morsitans* Strain of the Trypanosome causing Disease in Man in Nyasaland.

	Ox.	Goat.	Monkey.	Dog.	Rabbit.	Guinea-pig.	White rat.
Percentages ...	100	6	7	4	0	0	0
No. of animals employed	2	17	15	26	3	10	19

Compare this with the following Table:—

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Table X.—The Percentages of Recoveries in Various Animals infected with the Human Strain of the Trypanosome causing Disease in Man in Nyasaland.

	Ox.	Goat.	Monkey.	Dog.	Rabbit.	Guinea-pig.	White rat.
Percentages ...	80	0	0	0	0	0	0
No. of animals employed	5	29	20	25	7	15	21

COMPARISON OF THE WILD-GAME AND WILD GLOSSINA MORSITANS STRAINS WITH THE HUMAN STRAIN OF THE TRYPANOSOME CAUSING DISEASE IN MAN IN NYASALAND.

Table XI.—The Average Duration, in Days, of the Wild-game, Wild *Glossina morsitans* and Human Strains of the Trypanosome causing Disease in Man in Nyasaland, in regard to their Virulence towards Various Animals.

Strain.	Ox.	Goat.	Monkey.	Dog.	Rabbit.	Guinea-pig.	White rat.
Human	134	42	26	34	28	67	30
Wild-game	—	46	38	41	—	—	32
Wild <i>G. morsitans</i>	Rec.	54	38	29	47	81	26

Table XII.—The Percentages of Recoveries in Various Animals of the Wild-game, Wild *Glossina morsitans* and Human Strains of the Trypanosome causing Disease in Man in Nyasaland.

Strain.	Ox.	Goat.	Monkey.	Dog.	Rabbit.	Guinea-pig.	White rat.
Human	80	0	0	0	0	0	0
Wild-game	—	0	0	0	—	—	0
Wild <i>G. morsitans</i>	100	6	7	4	0	0	0

CONCLUSIONS.

1. The pathogenic action on various animals of the Human strain, the Wild-game strain and the Wild *G. morsitans* strain is so much alike, that it may be concluded that they all three belong to the same species of trypanosome.

2. This species is *T. brucei vel rhodesiense*, the trypanosome causing disease man in Nyasaland.