T. CONGOLENSE DISEASE.

Method of Treatment.	Animal.	Previous History.	Condition Prior to Treatment.	Administration.*		Effects of Inoculation.			Further Remarks.
				Date.	Amount.	Immediate.	Local.	Ultimate.	
(i) Tartar emetic alone	Ox Ba 2.	Came to district early in 1920. In winter of 1921 lost condition and nagana suspected. Condition, however, improved on approach of spring. Smear showed *T. congolense*, 6/3/22	An advanced case.—Right eye watering and emaciation marked	7/3/22 16/3/22 17/3/22 18/3/22 20/3/22	gm. c.c. 1·5 drug in 50 saline.... 1·5 „ „ 40 „ ... 1·5 „ „ 40 „ ... 1·5 „ „ 30 „ ... 1·5 „ „ 30 „ ...	Nil „ „ „ „	Nil „ „ „ „	Marked improvement—appetite good, eyes normal.	Symptoms 7/3/22 suggest Anaplasmosis, and blood smears show punctate basophilia. Discharged 20/3/22 and continued well throughout year. (Apparent permanent recovery.)
	Cow E. 1..	Probably contracted disease in Jan., 1922. Smear showed *T. congolense*, 7/3/22	Fair — nasal catarrh, cough, milk yield diminished	14/3/22 15/3/22 16/3/22 17/3/22 18/3/22	gm. c.c. 1·5 drug in 50 saline.... 1·5 „ „ 50 „ ... 1·5 „ „ 40 „ ... 1·5 „ „ 50 „ ... 1·5 „ „ 50 „ ...	Nil „ „ „ „	Nil „ „ „ „	Marked improvement—nasal catarrh and cough disappeared	Discharged 18/3/22 and sold, but reported died of nagana in August, 1922. (Temporary recovery.)
	Donkey D.9	Smear showed *T. congolense* 14/8/22 Donkey had been running with zebras in "fly" the previous month.	Good.....	21/8/22 22/8/22	gm. c.c. 1·5 drug in 30 saline..... 1·5 „ „ 30 „ ...	Nil Staggered	Nil „	Worse. Died 25/8/22	Death probably due to overdose of tartar emetic, for 1·5 gm. was rather a larger dose for animal of its size. (Died.)

* Except where otherwise stated, administration given intrajugularly.

T. CONGOLENSE DISEASE.

Method of Treatment.	Animal.	Previous History.	Condition Prior to Treatment.	Administration.*		Effects of Inoculation.			Further Remarks.
				Date.	Amount.	Immediate.	Local.	Ultimate.	
(iia) Tartar emetic preceding other drugs	Heifer Cm3	Probably contracted disease in Nov. 1921. Smears positive for *T. congolense*, 16/12/21	Poor, coat staring, weak and stumbling when walking	17/12/21	1·5 gm. tartar emetic in 30 c.c. saline	Nil	Swelling left jugular		
				19/12/21	1·5 gm. tartar emetic in 30 c.c. saline	,,	Swelling right jugular		
				23/12/21	1·5 gm. tartar emetic in 30 c.c. saline	,,	Nil	No change..	16/1/22. Both jugulars had become necrotic, and diseased portions removed. It was therefore necessary to give drugs which need not be administered intravenously.
				24/12/21	1 gm. arsenic per os.....				
				27/12/21	1 gm. ,, ,, ...				
				30/12/21	1 gm. ,, ,, ...				
				3/1/22	1 gm. ,, ,, ...				
				6/1/22	1·5 gm. ,, ,, ...				
				10/1/22	1·5 gm. ,, ,, ...				
				14/1/22	1·5 gm. ,, ,, ...			Improving	
				28/1/22	1·5 gm. ,, ,, ...				
				28/2/22	1·5 gm. ,, ,, ...				*T. congolense* in blood-smear, 7/2/22.
				1/3/22	1·5 gm. ,, ,, ...				
				2/3/22	1 gm. ,, ,, ...			Condition fair	
				3/3/22	1 gm. ,, ,, ...				
				7/2/22	3 gm. drug 189 in 30 c.c. subcutaneous	,,	,,		
				11/2/22	3·5 gm. drug 189 in 35 c.c. subcutaneous	,,	,,	No change	
				9/3/22	2 gm. atoxyl in 20 c.c. subcutaneous	,,	,,		
				13/3/22	2 gm. atoxyl in 20 c.c. subcutaneous	,,	,,		
				21/3/22	2 gm. atoxyl in 20 c.c. subcutaneous	,,	,,	Better.....	Discharged 22/3/22. (Temporary recovery.)

* Except where otherwise stated, administration given intrajugularly.

T. CONGOLENSE DISEASE.

Method of Treatment.	Animal.	Previous History.	Condition Prior to Treatment.	Administration.* Date.	Administration.* Amount.	Effects of Inoculation. Immediate.	Effects of Inoculation. Local.	Effects of Inoculation. Ultimate.	Further Remarks.
(iib) Tartar emetic following other drugs	Dog O.1...	Probably contracted disease when in "fly" in March, 1922. Smears *T. congolense* 6/5/22; when first ill, biliary fever suspected	Poor — jaundice, catarrhal discharge both eyes	6/5/22	0·8 gm. trypan blue in 40 c.c. subcutaneous	Nil	Large abscess	Worse.....	As soon as *T congolense* diagnosed owner was advised to bring animal to Laboratory for tartar emetic treatment. Animal arrived 10/5/22; tartar emetic injected into saphena vein.
				10/5/22	0·175 gm. tartar emetic in 5 c.c.	Nil	Left leg stiff		
				11/5/22	0·175 gm. tartar emetic in 5 c.c.	,,	Right leg stiff		
				12/5/22	0·175 gm. tartar emetic in 5 c.c.	,,			
				13/5/22	0·175 gm. tartar emetic in 5 c.c.	,,		Slight improvement	Improvement became rapid a week after treatment and dog reported in excellent condition thereafter until 31/8/23, when nothing further heard. (Apparent permanent recovery.)
(iii) Drugs other than tartar emetic	Maritzburg, Cow 224	Artificial infection and *T. congolense* appeared 14/9/22	Fair.....	9/10/22	Bayer 205	Nil	Nil		Trypanosomes very much reduced in numbers for eight days, but later increased until 27/10/22, when they were present in large numbers. Trypanosomes disappeared 29/10/22, and not seen again. Death due to overdose of Badenhorst's cure (Cooper's Powder). (Died.)
				10/10/22	,, ,, ...	,,	,,		
				11/10/22	,, ,, ...	,,	,,		
				27/10/22	12" gm. Badenhorst cure per os.	,,	,,	Worse—acute diarrhoea, 28/10/22. Died 8/11/22	

PROBABLY *T. CONGOLENSE* INFECTION (BLOOD-SMEARS NEGATIVE).

(i) Tartar emetic alone	Bovine P.3.	From farm in "fly" country. All smears examined were negative	Advanced case.—Losing condition and lachrymation	24/4/22	1·5 gm. tartar emetic in 30 c.c. saline	Nil	Nil		Owner states animal in good condition at end of year. (Apparent permanent recovery.)
				26/4/22	,, ,, ,, ,,	,,	,,		
				2/5/22	,, ,, ,, ,,	,,	,,		
				6/5/22	,, ,, ,, ,,	,,	,,		
				10/5/22	,, ,, ,, ,,	,,	,,		
				20/5/22	,, ,, ,, ,,	,,	,,		
				31/5/22	,, ,, ,, ,,	,,	,,	Marked improvement	

* Except where otherwise stated, administration given intrajugularly.

PROBABLY *T. CONGOLENSE* INFECTION (BLOOD-SMEARS NEGATIVE).

Method of Treatment.	Animal.	Previous History.	Condition Prior to Treatment.	Administration.* Date.	Administration.* Amount.	Effects of Inoculation. Immediate.	Effects of Inoculation. Local.	Effects of Inoculation. Ultimate.	Further Remarks.
ii*a*) Tartar emetic preceding other drugs	Donkey D. 16	From farm in "fly" country. All smears examined were negative	Condition fair, but both eyes show films on cornea. Dull and lethargic	20/9/22	1 gm. tartar emetic in 30 c.c. saline	Nil	Nil		Discharged 13/10/22, although neck still swollen. Condition good, but left eye still shows film. Worked until June, 1923, when again treated. (Temporary recovery.)
				23/9/22	,, ,, ,, ,,	,,	Swelling left jugular		
				26/9/22	0·25 gm. drug 1811 in 250 c.c. saline	,,	Swelling right jugular.	Much improvement	
(iii) Drugs other than tartar emetic	Donkey B. 11	One of a span of 20 donkeys which proceeded to Conjweni, White Umfolosi River, in Nov. – Dec., 1921. (4 animals positive to *T. brucei* and 4 to *T. congolense*). This animal always negative	Losing condition.—Photophobia, dull, and temperature irregular	7/2/22	0·75 gm. arsenic per os.				Discharged 20/3/22, and since then no relapse. (Apparent permanent recovery.)
				9/2/22	0·75 ,, ,, ,,				
				10/2/22	1 ,, ,, ,,				
				11/2/22	1·5 ,, ,, ,,				
				12/2/22	2 ,, ,, ,,				
				13–28/2/22	1 gm. daily ,, ,,				
				9/3/22	2 gm. atoxyl in 20 c.c. subcutaneous	Nil	Nil	Much improved	
				13/3/22	,, ,, ,, ,,	,,	,,		
					T. VIVAX DISEASE.				
(i) Tartar emetic alone	Cow Cry 1	Smear showed *T. vivax*, 5/3/22	Poor, being weak and lame	16/3/22	1·8 gm. tartar emetic in 45 c.c. saline	Nil	Nil		Discharged 21/3/22, and kept well throughout the year. (Apparent permanent recovery.)
				17/3/22	1·35 gm. tartar emetic in 40 c.c. saline	,,	,,		
				18/3/22	1·65 gm. tartar emetic in 50 c.c. saline	,,	,,		
				19/3/22	,, ,, ,, ,,	,,	,,	Still lame, but condition improving	
	Cow M. 2	**Smear showed *T. vivax* 1/6/22**	Poor, being weak & eyes watering. An advanced case	1/6/22	1·5 gm. tartar emetic in 30 c.c. saline	Nil	Nil	Improving	Discharged 8/7/22. Owner states that in December, condition poor, and animal would not take bull. (Temporary recovery.)
				26/6/22	,, ,, ,, ,,	,,	,,		
				27/6/22	,, ,, ,, ,,	,,	,,		
				28/6/22	,, ,, ,, ,,	,,	,,		
				29/6/22	,, ,, ,, ,,	,,	,,		
				30/6/22	,, ,, ,, ,,	,,	,,	Improving	
	Cow Jn 1	Smear showed *T. vivax*, 28/3/22	Old cow, in poor condition and oedema of throat	1/4/22	1·5 gm. tartar emetic in 40 c.c. saline	Nil	Nil	Better. Died 30/4/22	*T. vivax* seen in blood, 28/4/22. (Died.)

* Except where otherwise stated, administration given intrajugularly.

Method of Treatment.	Animal.	Previous History.	Condition Prior to Treatment.	Administration.*		Effects of Inoculation.			Further Remarks.
				Date.	Amount.	Immediate.	Local.	Ultimate.	
(iia) Tartar emetic preceding other drugs.	Donkey 14738	Artificially infected by 50 c.c. citrated blood from Bovine 865 10/8/22, *T. brucei* appeared 18/8/22	Losing condition. Lachrymation and dull	29/8/22	1·5 gm. tartar emetic in 35 c.c. saline	Staggered	Nil		
				30/8/22	250 gm. arsenite in 50 c.c. saline of soda	Nil	Swelling left jugular		Animal struggled during inoculation.
				31/8/22	1 gm. tartar emetic in 30 c.c. saline	,,	Swelling right jugular		,, ,, ,, ,,
				1/9/22	250 gm. arsenite of soda in 30 c.c. saline	,,	Nil	Losing condition	
				23/9/22	0·250 gm. drug 1811 in 250 c.c. saline	,,			
				27/9/22	1 gm. drug 1811 in 100 c.c. saline	,,	,,	Died 29/9/22	(Died.)
(iii) Drugs other than tartar emetic.	Donkey B. 6	Arrived 17/12/21 for treatment. Nagana contracted while on transport to Conjweni, White Umfolosi River, Nov.-Dec., 1921. *T. brucei* seen 19/12/21	Fair condition.—Photophobia, lachrymation and slight oedema of belly	19/12/21	5 c.c. electrargol	Nil	Nil		*T. brucei* not seen again in blood-smears after 19/12/21. (Died.)
				20/12/21	2 c.c. neosalvarsan in 40 c.c. saline	,,	,,		
				23/12/21	10 c.c. thiarsol.....	,,	,,	Worse. Died 23/12/21	

* Except where otherwise stated, administration given intrajugularly.

VII.—CONCLUSION.

1. Summary.

The matter dealt with in this paper may be summarized as follows:—

(1) As a result of the heavy mortality in stock which occurred during the nagana epizootic of 1920, the Union Government established a nagana research laboratory in the Ntambanana Settlement, Lower Umfolosi Division, where the losses had been particularly severe.

(2) Systematic inquiries showed that the occurrence of nagana corresponded with the known distribution of *Glossina* spp. (see Map 1.) With one exception, viz., Obanjeni Tank Area in the Mtunzini Division, the " nagana area " overlaps " fly country " to a distance varying from 5 to 15 miles, depending on the topographical features of the district.

(3) Nagana was shown to be caused by the three trypanosomes, *T. congolense, T. vivax* and *T. brucei*. *T. vivax* was recognized for the first time in 1921 as being one of the organisms responsible for the disease.

(4) The susceptibility of domesticated animals to the above types of trypanosomes was investigated. Cattle were particularly susceptible to *T. congolense; T. brucei* was most pathogenic to equines and canines, and *T. vivax* was demonstrated only in cattle.

(5) Experiments regarding infectivity of blood of game animals were negative.

(6) The trypanocidal effects of several drugs was studied with the result that tartar emetic proved most satisfactory. During the period October, 1921, to January, 1923, over 4,000 doses of this agent were distributed gratis to farmers. In laboratory observations the mortality in cattle from *T. congolense* disease was 16 per cent., whereas untreated, the disease is fatal in probably 95 per cent. cases.

2. Acknowledgments.

In this endeavour to deal with the nagana problem, it has been my duty to correspond with and visit hundreds of people, including Government officials, settlers, and traders. To all, obviously too numerous to name, who assisted, I have pleasure in recording my best thanks. There are some, however, who went out of their way to render me assistance, and to them I am particularly grateful. To Captain Lockhart, R.N., O.B.E., of Empangeni, I express my appreciaton for hospitality, especially during the period the laboratory buildings were being erected. Others, who not only assisted, but took a keen interest in the investigations, were Sir Charles Saunders, K.C.M.G., of Melmoth; Mr. J. M. Hershensohn, Provincial Secretary, Pietermaritzburg; and Mr. H. Braatvedt, Special Justice of the Peace, Ubombo. Lieutenants Hedges and Von Kaiserlingk of the South African Police helped me considerably in my journeys through the sparsely inhabitated Districts of Ingwavuma and Ubombo, and to the non-commissioned officers and men at the various police outposts I am obliged for many kindnesses. Records and other data bearing on their particular subjects were willingly supplied by the following

Government Departments:—Provincial Administration, Natal; Native Affairs; Lands; Surveyor-General; Census; Meteorology, and Botany. Mr. Austin Roberts, of the Transvaal Museum, has also been most kind in supplying me with information relating to the zoological aspect of the problem. I take this opportunity of expressing my indebtedness to Dr. Guy A. K. Marshall, C.M.G., Director of the Imperial Bureau of Entomology, London, for the free issue of Vols. I-XII of the Bulletin of Entomological Research, and to Mr. Rupert Jack, F.E.S., of Salisbury, Rhodesia, for literature bearing on his researches on tsetse fly. To the dipping supervisors, especially Mr. R. McRae, of Hlabisa, and Mr. E. C. Collings, of Ubombo, I am grateful for much information regarding conditions in their respective areas. Of the settlers who were anxious to assist, Messrs. V. V. Comins, C. H. Coffey, and O. Curry, of Ntambanana, deserve special mention, particularly for their painstaking application of the tartar emetic treatment during the early days of the investigations. To Sir Arnold Theiler, Dr. P. J. du Toit, and other colleagues whose interest and assistance have been most encouraging, I tender my cordial thanks. I also have pleasure in recording my appreciation to the following gentlemen for reading certain portions of the MS.:—Captain H. E. Hornby, F.R.C.V.S., and Mr. W. M. Power, M.R.C.V.S. Last, but by no means least, special thanks are due to my lay assistants, Mr. E. F. George, who proved invaluable during the pioneering stage of the investigations, and Mr. W. W. Davis, whose reliability saved me much unnecessary worry. Miss C. Wright, who is responsible for the coloured plates and maps, also deserves much praise for her excellent work.

---

3. Literature.

1913. Andrews, W. H., "Some Experiments on the Drug Treatment of Trypanosomiasis," Second Report, Division Veterinary Research, Union of South Africa, Oct., 1912, p. 362.

1919. Bassett Smith, P. W., "The Infection of their Young by Trypanosome-infected Mothers," *Jnl. Trop. Med. and Hyg.*, Vol. 22, p. 198.

1910. Bevan, Ll. E. W., "Notes concerning *T. dimorphon*," *Vet. Jnl.*, Vol. 17, p. 12.

1908. Boyce, R., and Breinl, A., "Atoxyl and Trypanosomiasis," *Ann. Trop. Med. and Para.*, Vol. II, p. 6.

1904.* Broden, A., "Les Infections à Trypanosomes au Congo chez l'homme et les Animaux," *Bull. Soc. d'Etud, Colon, Feb.*

1895. Bruce, D., Preliminary Report on the Tsetse-fly Disease or Nagana in Zululand, Ubombo, Zululand, Dec.

1896. Bruce, D., Further Report on the Tsetse-fly Disease or Nagana in Zululand, Ubombo, Zululand, May.

1903. Bruce, D., "Appendix to Further Report on the Tsetse-fly Disease or Nagana in Zululand, London.

1914. Bruce, D., "Classification of the African Trypanosomes Pathogenic to Man and Domestic Animals," *Trans. Soc. Trop. Med. and Hyg.*, Vol. 8, p. 1.

1915. Bruce, D., "The Croonian Lectures on Trypanosomes causing Disease in Man and Domestic Animals in Central Africa," Second Lecture, *Brit. Med. Jnl.*, 3rd July, p. 7.

---

* Not seen in the original.

1922. Curson, H. H., "Nagana and the Tartar Emetic Treatment," *Jnl. Dept. Agric.*, Union of South Africa, Vol. V, p. 249.
1924. Curson, H. H., "Nagana and the Tartar Emetic Treatment," *Jnl. Dept. Agric.*, Union of South Africa, Vol. IX, p. 363.
1926. Curson, H. H., "Die behandlung von 'Nagana' mit Brechweinstein in Zululand in den Jahren 1921-1923." Thesis for Dr.Med.Vet., Hannover.
1923. Dale, H. H., "Chemotherapy," *Phys. Rev.*, 3rd July.
1903. Dutton, J. E., and Todd, J. L., First Report of the Trypanosomiasis Expedition to Senegambia (1902), Dec.
1914. Fantham, H. B., "Discussion on '1914, Bruce, D.'," *q.v.*, p. 25.
1914. Frosch, P., and Knuth, P., "Steigerung der Wirkung des Salvarsans durch Kombination mit Optochininum hydrochloricum und Natrium salicylicum bei künslich hervorgerufenen Trypanosomenkrankheit der Pferde," *Berliner Tierärzt. Wochensch.*, Vol. 30, p. 133.
1911. Helm, "Heilung von Trypanosomiasis in Zwei Fällen," *Archiv. f. Schiff u. Trop. Hyg.*, Vol. 15, p. 789.
1921. Hornby, H. E., "Trypanosomes and Trypanosomiasis of Cattle," *Jnl. Comp. Path. and Ther.*, Vol. 34, pp. 211-240.
1915. Jones, H. L., "The Treatment of Trypanosomiasis in Cattle caused by the *T. pecorum*," *Jnl. Comp. Path. and Ther.*, Vol. 28, p. 154.
1910. Jowett, W., "Note on a Cattle Trypanosomiasis of Portuguese East Africa," *Jnl. Comp. Path. and Ther.*, Vol. 23, p. 251.
1911. Jowett, W., "Further Note on a Cattle Trypanosomiasis of Portuguese East Africa," *Jnl. Comp. Path. and Ther.*, Vol. 24, p. 21.
1898. Kanthack, A. A., Durham, H. E., and Blandford, W. J. H., "On Nagana or Tsetse-fly Disease." *Proc. Royal Soc.*, Vol. 64, p. 100.
1921. Knuth, P., and Du Toit, P. J., "Handbuch der Tropen-Krankheiten," Leipzig.
1919. Lanfranchi, A., "Sur la possibilité du passage des Trypanosomes dans le lait," abstract in *T.V.B.*, Vol. VII, p. 178.
1904. Laveran, A., and Mesnil, F., "Sur un Trypanosome d'Afrique Pathogène pour l'Equidés *T. dimorphon*, Dutton et Todd," *C.R. Acad. Sc.*, Vol. 138, p. 732, 21st March.
1922. Martin, A. N., "Sur l'Emploi de l'Aminophénolarsinate de soude dans le Traitement des Trypanosomiases," *Ann. de l'Inst. Pasteur*, Vol. 36, p. 38.
1906. Mesnil, F., and Nicolle, M., "Traitement des Trypanosomiasis," *Ann. de l'Inst. Pasteur*, Vol. XX, p. 513.
1913. Montgomery, R. E., "Trypanosomes and Trypanosomiasis—A System of Veterinary Medicine by Wallis Hoare," Vol. I, p. 1054.
1899. Plimmer, H. G., and Bradford, J. R., "A Preliminary Note on the Morphology and Distribution of the Organism found in the Tsetse-fly Disease," *Proc. Roy. Soc.*, Vol. 65; see also *Nature*, Vol. 60, p. 309.
1921. Pearce, L., "Studies on the Treatment of Human Trypanosamiasis with Tryparsamide," *Jnl. Exp. Med.*, Supplement I. Vol. XXXIV, No. 6, p. 6.
1919. Sergent, Edm. and E., and Lhéritier, A., "Passage de Trypanosomes de la mère au foetus dans le 'Debad'," *Bull. Soc. Path. Exot.*, Vol. 12 pp. 177-8.
1913. Shilston, A. W., "Notes on Zululand Trypanosomes," Second Report, Division of Veterinary Research, Union of South Africa, October, 1912, p. 345.
1919. Taute, M., and Huber, F., "Die Unterscheidung des *T. rhodesiense* vom *T. brucei*. Beobachtungen und Experimente aus dem Kriege in Ostafrika," *Archiv. f. Schiffs. u. Trop. Hyg.*, Vol. 23, pp. 211-226.
1901. Theiler, A., "Die Tsetse Krankheit," *Schwez. Archiv. f. Tierheilkunde*, Vol. 53.
1909. Theiler, A., "Sur l'existence de *T. dimorphon* ou d'une espèce voisine au Mozambique et au Zoulouland," *Bull. Soc. Path. Exot., Vol.* 2, *p.* 39.
1909. Theiler, A., "Sur un nouveau Trypanosome de l'Afrique du Sud," *Bull. Soc. Path. Exot.*, Vol. 2, p. 392.
1905. Thomas, H. W., "The Experimental Treatment of Trypanosamiasis in Animals," *Proc. Roy. Soc.*, Vol. 76B, p. 589.
1911. Tsuzuki, M., "Die Kombinationstherapie der Trypanosomen-Infektionen," *Ztschft. f. Hyg. u. Inftkt.*, Vol. 68, p. 364.
1924. Van Zyl, J. P., "Note on the Composition of Various Samples of Arsenite of Soda," Ninth and Tenth Reports, Division of Veterinary Education and Research, Union of South Africa, April, 1923, p. 775.

MISCELLANEOUS.

1892. Correspondence respecting certain boundary questions in Zululand (C. 6684) (Second Boundary Commission).
1880. Dispatch No. 49 of 16th February, 1880, from General Wolseley to Colonial Office (First Boundary Commission).
1909. Report of the German Commission on Sleeping Sickness, 1906-7. Bulletin of the Sleeping Sickness Bureau No. 11, p. 420. Original article in *Arb. a. d. Kais: Gesundheitsamte*, XXXI, Jan., 1909.

EXPLANATION OF FIGURES 1–36.

Fig. 1.—Nagana Research Laboratory, Ntambanana Settlement, from the south.
Fig. 2.—High veld (1,500 feet) near the Eshowe-Melmoth and Eshowe-Empangeni cross-roads; the commencement of the middle veld is seen on the right.
Fig. 3.—Middle veld, showing typical vegetation at Nagana Research Laboratory (Farm No. 273). Looking south from laboratory.
Fig. 4.—Middle veld, south of Umhlatuzi River along Eshowe–Empangeni Road. In distance is Ngoye Range, the southern limit of Glossina in Africa.
Fig. 5.—Low veld, coastal grassveld. Note open nature of country between Palmveld and Dune Bush. In distance are sand dunes, the most prominent eminence being Mlalelo, Ubombo Division.
Fig. 6.—Low veld, looking south-west from Otobotini Drift across the Pongola River. Note dense bush and Lebombo Range (2,000 feet) which prevents westward spread of Glossina.
Fig. 7.—Pongola River, looking upstream from Otobotini Drift. In distance is Pongola Poort in the Lebombo Range.
Fig. 8.—Mkuzi River, looking upstream. The right bank is part of the Mkuzi Game Reserve.
Fig. 9.—White Umfolosi River, looking upstream from Munywane Confluence. Note Nqoloti Hill and the dense bush extending inland along the valley.
Fig. 10.—White Umfolosi Valley, looking south towards Ntambanana Settlement from Nqoloti Hill. According to native tradition cattle were grazed in this valley a century ago, but it is now a tsetse area.
Fig. 11.—Ntambanana Valley, looking east from Farm No. 272, showing bush clearings along the river. In distance is Ntondweni Hill.
Fig. 12.—Umhlatuzi Valley, looking north from Eshowe-Empangeni road. Note bush-lined ravines leading to the high veld. In distance is Nkwenkwe Hill.
Fig. 13.—Ntambanana Valley, Farm No. 250. Note height of grass (*Anthistiria* spp.) at end of summer.
Fig. 14.—Ntambanana Valley, Farm No. 250, after a grass fire. Note the dense bush along the river banks. Leaves were scorched up to 30 feet from ground and the two euphorbias were also badly burnt.
Fig. 15.—A valley on Farm No. 273, showing influence of autumn fire on leaf growth. In foreground, grass burned 1/4/22 and on 4/8/22, majority of trees in full leaf. In background, grass unburnt for over a year, and only species in leaf was *Acacia* sp. (" mpuzi ").
Fig. 16.—South bank, White Umfolosi River at Munywane Confluence. Note leafless condition of chief major shade trees, *Acacia* sp. (" mkaya ") and *Spirostachys africana*, in winter.
Fig. 17.—*Acacia natalitia*, Farm No. 273, showing effect of exposure to cold north-east winds in winter. Tree being unprotected has lost its foliage.
Fig. 18.—*Acacia natalitia*, Farm No. 273, showing result of protection by tall grass (*Andropogon* spp.) from cold north-east winter winds. Although August, only top twigs were bare. Tree had been chopped down previous year, and in place of a single trunk there were three stout stems.
Fig. 19.—Nagana Research Laboratory. *Acacia* sp. (" mpuzi ") in full leaf, new growth, in midwinter, whereas *Sclerocarya caffra* still retains part of past year's foliage
Fig. 20.—Farm No. 273. Typical bare ridge vegetation in winter.

Fig. 21.—Farm No. 273. Although winter, there are many shrubs and trees which retain their foliage, and thus afford protection to Glossina. The major shade trees are usually deciduous.

Fig. 22.—Native system of chopping trees. A clearing on Farm No. 312. The trees, *Acacia* sp. (" ngawe "), were used for building goat kraals, and the high grass (*Panicum* spp.) is growing on an old site.

Fig. 23.—Enseleni Valley, Farm No. 312, showing clearing of bush for cultivation, but trees along river banks continue to harbour Glossina.

Fig. 24.—Ntambanana Valley, Farm No. 250, showing ploughing up of rich soil. The dense bush along river banks remains untouched.

Fig. 25.—First natural case of *T. vivax* infection. Note half-closed eyes, drooped ears, oedema of throat, and emaciation.

Fig. 26.—Experimental infection; on left, Ox 872 (*T. congolense*), and on right Ox 865 (*T. brucei*). Both animals infected on same day, 28/1/22, and two months later Ox 872 emaciated, whereas Ox 865 in good condition, in spite of hard work.

Fig. 27.—Experimental infection; on left, Donkey 14733 (*T. congolense*), and on right, Donkey 14736 (*T. brucei*). Reverse condition now seen, Donkey 14736 being emaciated (died following day, 29/3/22), whereas Donkey 14733 in good health.

Fig. 28.—Parasitic gastro-enteritis of yearling calf, the so-called swamp disease of the coastal grassveld of Ubombo. Note dunes in distance and flat swampy nature of country.

Fig. 29.—Another case of parasitic gastro-enteritis in Ubombo Division. Note emaciation and stunted appearance of animal.

Fig. 30.—Native cattle kraal situated on the border of bushveld and coastal grassveld in Ubombo Division. Nagana and parasitic gastro-enteritis might co-exist in such a locality.

Fig. 31.—Zebra at distance of 20 yards. Note ox-pecker (*Buphaga erythrorhyncha*) on right hindquarter.

Fig. 32.—Bushveld, south of the White Umfolosi River, Empangeni-Conjweni road, after a grass fire; the zebra show up clearly against the blackened ground.

Fig. 33.—Nagana Research Laboratory. *Buphaga erythrorhyncha* searching for ticks on resting oxen. The signifiance of this in mechanical spread of nagana is evident.

Fig. 34.—Mounted specimen of *Buphaga erythrorhyncha*, half natural size. Note strong bill.

Fig. 35.—White Umfolosi Valley, south bank. A dry " pan " in winter, showing old game path leading therefrom. Surrounding it is *Euphorbia* sp.

Fig. 36.—White Umfolosi Valley, south bank, near Munywane Confluence. A native kraal site deserted a century ago. Notice mound and broken grinding-stones.