

## A CHECK-LIST AND HOST-LIST OF THE ZOONOSES OCCURRING IN MAMMALS AND BIRDS IN SOUTH AND SOUTH WEST AFRICA

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### INTRODUCTION

The importance of zoonoses as a public health hazard is well known to all engaged in the studies and control of these diseases. Consideration of the publications on taeniasis and trichinosis which appeared more than a century ago, and of those brought to our notice during the last four decades makes it apparent that great advances have been made in recognizing the characteristic features of a very large number of diseases transmissible to man and animals. From epidemiological studies it has become evident that infectious agents, which are spread by contact, can be expected to establish themselves wherever susceptible animals occur. Those which require arthropod vectors for their propagation are restricted to certain regions. Their spread to other areas is dependent upon the presence of potential vectors as has been observed by the behaviour of East Coast fever and bubonic plague after their introduction into South Africa at the beginning of this century.

Since domestic and wild animals play a far greater role as carriers of infectious agents than man, the veterinarian, by virtue of his duties, has contributed far more to the improvement of public health than his medical colleague. This fact has caused the eminent Russian helminthologist Dr. Skryabin to state at the 17th World Veterinary Congress at Hanover, 1963, "that the physician serves man while the veterinarian serves mankind". It is gratifying to note that not only the veterinary and medical professions but zoologists are working in close collaboration with the authorities of the World Health and Food and Agriculture Organizations of the United Nations and the Office International de Épizooties for the advancement of public health.

Records on the presence of zoonoses in South Africa date back to the time when Cummings (1850) described bovine malignant catarrhal fever (snotsiekte) in his oxen which grazed in close contact with gnus (black wildebeest) in the Orange Free State, and when Livingstone (1857) drew attention to a fatal disease of man and animals, now known to have been anthrax (Viljoen, Curson & Fourie, 1928), on the borders of the Western Transvaal. Further records on diseases of man and animals were assembled and published by Thomas & Neitz (1933) and Lobry (1964).

This paper was compiled at the request of Dr. A. Vittoz, Director of the O.I.E., Paris. To the numerous diseases listed in his questionnaire a few more have been added for the sake of completeness. The available data on which the infectious agents, their vertebrate and invertebrate hosts, and their incidence and distribution are listed in a series of subjoined tables. Observations on the susceptibility of the common laboratory animals have also been included since studies conducted at the South African Institute for Medical Research, Johannesburg, have shown that certain wild rodents, reared in captivity, lend themselves extremely well for laboratory tests.

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The information presented in the appended tables is self explanatory. It will thus only be necessary to include a few relevant remarks in the text. Numerous references are cited from which further information can be gained. The hope is expressed that this form of presentation will assist the reader to determine in a short space of time what has been achieved in the zoonoses studies. It is fully realized that this check-list and host-list are not complete. It is, therefore, suggested that omitted data and new records be published as required from time to time in the form of supplements.

The disease-producing agents are listed in the text and tables under the headings:—(A) Virus Diseases; (B) Protozoa; (C) Thallophyta; (D) Protozoa; (E) Arthropoda; (F) Platyhelminthes and (G) Nematelminthes. The nomenclature used for recording the infectious agents or parasites will be found in several standard text books. The zoological nomenclature of mammals is based on that proposed by Roberts (1951), while that of birds is given in "Roberts' Birds of South Africa" revised by McLachlan & Liversidge (1961). These books are cited in the bibliography under the heading "General References".

#### (A) VIRUS DISEASES

The 19 virus zoonoses occurring in South Africa are listed in Table 1. With the exception of the form of rabies caused by what appears to be a European strain, canine distemper, foot and mouth disease due to the A virus type, rinderpest, contagious pustular dermatitis, fowl and pigeon pox all of them are typical African diseases. Louping ill does not occur in South Africa. It is listed as a warning as it has been determined experimentally that *Rhipicephalus appendiculatus* can serve as a vector. In the event of an accidental introduction it could establish itself in the brown ear tick infested regions of the Transvaal, Natal and the Eastern Cape Province.

Two distinct virus strains of rabies are recognized in South Africa. The indigenous viverrid strain occurs on the Highveld of Transvaal, the Orange Free State and the Western Cape Province. Most of the human victims have been bitten around or in their homesteads or huts by affected members of the family Viverridae (yellow mongoose, genet cat, etc.). The second strain behaves like the European strain, and is disseminated mainly by dogs and jackals. Its distinct behaviour was first recognized in South West Africa in 1947, and from there it spread through Bechuanaland into Northern and Southern Rhodesia and the Transvaal in 1949. From there it spread eastward and southward through the Eastern Transvaal and Mozambique into Natal, the Eastern and Western Cape Province. Immunization of dogs is practised for its control.

When canine distemper was introduced is unknown. It is widely distributed in dogs and has been diagnosed on several occasions in wild members of the family Canidae in zoological gardens. Immunization has been effective for its control.

African horsesickness was first recorded in the Cape Province in 1719. It occurs enzootically in the summer rainfall areas, and severe epizootics have occurred at irregular intermittent intervals. There is every reason to believe that the zebra served as the source of infection. Bluetongue in sheep was first described by Hutcheon in 1880. Domestic ruminants and possibly also antelopes serve as the source of infection. The incidence and distribution are similar to that of horsesickness. Both diseases are controlled by polyvalent vaccines.

Several outbreaks of foot and mouth disease occurred in South Africa up to 1903 (Henning, 1956). The disease-free period that followed was interrupted in 1933 when foot and mouth disease spread from Southern Rhodesia into the Transvaal. Investigations conducted at that time revealed that not only domestic but also wild ruminants were affected. In years that followed virus strains have been typed at Pirbright.

The identification of the S.A.T.<sub>1</sub>, S.A.T.<sub>2</sub> and S.A.T.<sub>3</sub> types, showed that they were distinct from the A, O and C types commonly found in Europe. It also transpired that African types were maintained by antelopes occurring in several large game reserves of Southern Africa, and that the disease was spread at irregular intermittent intervals by cattle along the routes of commerce. The erection of a substantial fence around the Kruger National Park has prevented close contact between domestic and wild animals, and there has been no recurrence of foot and mouth disease in the Eastern Transvaal since 1961 from this source. Immunization was practised for its control during recent outbreaks.

Rinderpest was introduced into the Transvaal in 1896. It spread right through Southern Africa and was responsible for severe losses in cattle and antelopes. The application of prophylactic measures resulted in its eradication by the end of 1903. There has been no recurrence of this disease since then in South Africa.

Lumpy skin disease was recognized in Northern Rhodesia in 1929 from where it was spread by cattle along the commercial routes to Ngamiland (Von Backström, 1945), and from there was soon introduced into the Transvaal in 1945. It spread rapidly right through South Africa and reached South West Africa in 1956. It occurs enzootically and is controlled by immunization.

Rift Valley fever was encountered first in 1951 while Wesselsbron and Middelburg virus disease were recognized as distinct infections in 1957. It appears that these three diseases have always been present in South Africa as evidenced by the existence of a silent focus of Rift Valley fever in the Addo Forest in the Cape Province. Soil and water conservation during the last three decades in South Africa appears to have encouraged the development of mosquito vectors which then spread these diseases to domestic ruminants and man. Transmission to man also followed the handling of meat of infected animals. It has been estimated that as many as 20,000 human beings contracted the disease in South Africa (Kaschula, 1961). Rift Valley fever and Wesselsbron virus disease are controlled by the immunization of domestic ruminants.

Contagious pustular dermatitis is widely distributed in sheep and goats but human infections have not yet been encountered.

Hog cholera was introduced into the Cape Province at the beginning of this century. Subsequently it spread to the Transvaal but was eventually eradicated by the slaughter policy in 1918. There has been no recurrence of this disease.

African swine fever occurs enzootically in the Northern and Eastern Transvaal and South West Africa. The source of infection has been traced in nearly all instances to the warthog which is the carrier of the virus. Outbreaks, sometimes followed by severe epizootics in domestic pigs, have occurred in the Transvaal and the Western Cape Province. The slaughter of affected and incontact pigs resulted in its eradication in domestic pigs. In the enzootic regions, maintenance of domestic pigs in paddocks, preferably double-fenced, has proved to be a highly efficient prophylactic measure.

Newcastle disease has been introduced from time to time into South Africa. Adequate prophylactic measures (quarantine, slaughter of affected and incontact birds and immunization) have been applied successfully.

Fowl pox is widely distributed in South Africa and South West Africa. Vaccine prepared either from fowl pox or pigeon pox virus has been used for the immunization of susceptible birds with satisfactory results.

Tern virus infection was identified for the first time during April and May of 1961 by Becker & Uys (1963). It has been responsible for the death of many hundreds of common terns along the coast line of the Cape Province. Studies on this disease are in progress.



TABLE 1.—*Virus diseases*

Virus	Host			Region					Authorities			
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.	
					Genus and species	Vernacular name	Incidence	O.		T.	N.	W.
Rabies.....	Mammalia Carnivora Viverridae	<i>Genetta felina</i> (Thunberg).	Small spotted genet	35 cases	+	°	°	+	°	°	°	Cluver, 1927; Du Toit, Thomas & Jackson, 1930; Neitz & Marais, 1932; Neitz & Thomas, 1933, 1934; Thomas & Neitz, 1933, 1936; Neitz, 1937; Snyman, 1937, 1940; Sutton & Marais, 1947; Maré, 1962; Tustin & Smit, 1962.
		<i>Genetta rubiginosa</i> Pucheran.	Rusty spotted genet	1	°	+	°	°	°	°	°	Mansvelt, 1956
		<i>Cynictis penicillata</i> (G. Cuvier).	Yellow mongoose	450	+	+	°	+	°	+	°	Cluver, 1927; Du Toit, 1929; Thomas & Jackson, 1930; Neitz & Marais, 1932; Neitz & Thomas, 1933, 1934; Thomas & Neitz, 1933, 1936; Neitz, 1937; Snyman, 1937, 1940; Sutton & Marais, 1947
		<i>Myonax pulverulentus</i> Wagner.	Cape grey mon- goose	1	°	°	°	+	°	°	°	Neitz & Marais, 1932; Neitz & Thomas, 1933; Thomas & Neitz, 1936; Neitz, 1937; Snyman, 1937, 1940
		<i>Myonax cauui</i> (A. Smith)	Slender mongoose	1 Lab. Test	°	+	°	°	°	°	°	Thomas & Neitz, 1933
		<i>Paracynictis selousi</i> (De Winton)	Selous mongoose	1	°	+	°	°	°	°	°	Mansvelt, 1956
		<i>Suricata suricatta</i> (Erxleben).	Suricate.....	5	+	°	°	+	°	+	°	Neitz & Marais, 1932; Neitz & Thomas, 1933; Thomas & Neitz, 1936; Neitz, 1937; Snyman, 1937, 1940; Sutton & Marais, 1947

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.

TABLE 1.—*Virus diseases (continued)*

Virus	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
Rabies.....	Protelidae....	<i>Proteles cristatus</i> (Sparman).	Aardwolf, Nadron jackal	2	+	°	°	°	°	°	Neitz & Schulz, 1949; Snyman, 1949
	Felidae.....	<i>Felis catus</i> Linn.	Domestic Cat....	90	+	+	+	°	°	°	Neitz & Thomas, 1933, 1934; Snyman, 1937, 1940; Maré, 1962; Tarr, O'Grady & Jenkins, 1962; Mansvelt, 1962; Tustin & Smit, 1962
		<i>Felis lybica</i> Desma- rest (= <i>Felis acreata</i> Thomas and Schwann).	Cape wild cat....	20	+	°	°	+	°	°	Neitz & Thomas, 1933, 1934; Snyman, 1937, 1940; Maré, 1962; Tarr, O'Grady & Jenkins, 1962; Tustin & Smit, 1962; Mansvelt, 1962
		<i>Microfelis nigripes</i> (Burchell).	Black-footed cat..	10	+	°	°	°	°	°	Neitz, 1937; Snyman, 1940
		<i>Caracal caracal</i> (Schreber).	Lynx.....	1	°	°	°	+	°	°	Neitz & Schulz, 1949
	Canidae.....	<i>Canis familiaris</i> Linn.	Dog.....	450	+	+	+	+	+	+	Cluver, 1927; Neitz & Marais, 1932; Neitz & Thomas, 1933, 1934; Snyman, 1937, 1940; Mansvelt, 1956; Maré, 1962; Tarr, O'Grady & Jenkins, 1962; Tustin & Smit, 1962
		<i>Crocuta crocuta</i> (Erleben).	Spotted hyena....	1	°	°	°	°	°	°	Thomas, 1939
		<i>Otocyon megalotis</i> (Desmarest).	Long-eared fox...	1	°	+	°	°	°	°	Mansvelt, 1956
		<i>Thos mesomelas</i> (Schreber).	Black-backed jackal	65	°	+	°	°	°	+	Thomas & Neitz, 1933; Von Maltitz, 1950; Mansvelt, 1956

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TABLE 1.—*Virus diseases (continued)*

Virus	Host				Region					Authorities	
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.	E.		S.
Rabies.....	Canidae.....	<i>Vulpes chama</i> (A. Smith) (= <i>Cynalopex chama</i> Thomas).	Silver jackal.....	1	+	o	o	o	o	o	Snyman, 1940; Sutton & Marais, 1947
	Mustelidae...	<i>Ichonyx orangiae</i> Roberts.	Skunk, polecat...	1	o	o	+	o	o	o	Neitz & Schulz, 1949
	Rodentia Sciuridae	<i>Geosciurus inauris</i> (Zimmermann) (= <i>Geosciurus capensis</i> A. Smith).	Ground squirrel..	3	+	o	o	o	o	o	Neitz, 1937; Snyman, 1937, 1940; Sutton & Marais, 1947
	Muridae.....	<i>Mus musculus</i> Linn.	Mouse.....	Lab. Tests	o	+	o	o	o	o	Neitz & Schulz, 1949
	Lagomorpha Leporidae	<i>Lepus cuniculus</i> Linn.	Rabbit.....	Lab. Tests	o	+	o	o	o	o	Thomas & Jackson, 1930; Neitz & Schulz, 1949
	Artiodactyla Bovidae	<i>Bos taurus</i> Linn.	Ox.....	500	+	+	+	+	o	+	Du Toit, 1929; Neitz & Marais, 1932; Neitz & Thomas, 1933, 1934; Snyman, 1937, 1940; Von Maltitz, 1950; Mansvelt, 1956; Maré, 1962; Tarr, O'Grady & Jenkins, 1962; Tustin & Smit, 1962
		<i>Capra hircus</i> Linn.	Goat.....	1	o	o	o	o	o	+	Neitz & Schulz, 1949
		<i>Ovis aries</i> Linn.	Sheep.....	30	+	o	o	o	o	o	Neitz & Marais, 1932; Neitz & Thomas, 1934; Snyman, 1937, 1940; Tustin & Smit, 1962
	Suidae.....	<i>Sus scrofa</i> Linn.	Domestic pig.....	10	+	o	o	+	o	o	Neitz, 1937; Snyman, 1937, 1940; Maré, 1962
	Perissodactyla Equidae	<i>Equus caballus</i> Linn.	Horse.....	8	+	+	o	o	o	o	Neitz, 1957; Snyman, 1949; Maré, 1962; Tustin & Smit, 1962

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TABLE 1.—*Virus diseases (continued)*

Virus	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
Rabies.....	Perissodactyla Equidae	<i>Equus asinus</i> Linn	Donkey.....	5	+	+	°	°	°	°	Neitz & Schulz, 1949; Mansvelt, 1956; Maré, 1962; Tustin & Smit, 1962
	Primates Hominiidae	<i>Homo sapiens</i> Linn.	Man.....	60	+	+	°	°	°	+	Cluver, 1927; Du Toit, 1929; Neitz & Marais, 1932; Neitz & Thomas, 1933, 1934; Snyman, 1937, 1940; Thomas, 1939; Turner, 1949; Snyman, 1949; Mansvelt, 1956
Pseudorabies (Aujeszky's disease)	—	—	—	—	—	—	—	—	—	—	—
Canine distemper	Carnivora Canidae	<i>Canis familiaris</i> Linn.	Dog.....	Enzootic	+	+	+	+	+	+	Alexander, 1933; Haig, 1948, 1949, 1956
		<i>Otocyon megalotis</i> (Desmarest).	Long-eared fox...	1, Z.G.	°	+	°	°	°	°	Hofmeyr, 1956
		<i>Lycyaon pictis</i> (Burchell).	Cape hunting dog	1, Z.G.	°	+	°	°	°	°	Hofmeyr, 1956
		<i>Vulpes chama</i> (A. Smith).	Silver jackal.....	1, Z.G.	°	+	°	°	°	°	Hofmeyr, 1956
	Mustelidae...	<i>Mustela eversmanni furo</i> (Linn.).	Ferret.....	Lab. Tests	°	+	°	°	°	°	Haig, 1958, 1949, 1956
	Aves Galli- formes Phasianidae	<i>Gallus domesticus</i> Linn.	Chick embryo....	Lab. Tests	°	+	°	°	°	°	Haig, 1948, 1949, 1956
Equine Encephalomyelitis	—	—	—	—	—	—	—	—	—	—	—

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Z.G. = Zoological garden.

TABLE 1.—*Virus diseases (continued)*

Virus	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
African Horse-sickness (Pan-tropic virus)	Perissodactyla Equidae	<i>Equus caballus</i> Linn.	Horse.....	Enzootic	+	+	+	+	+	+	Percy, 1830, Lambert, 1881; Sander, 1895; Theiler, 1893, 1901, 1921; Alexander, 1936; Schmid, 1955
		<i>Equus asinus</i> <i>somalicus</i> P. L. Slater.	Donkey.....	Sporadic	+	+	+	+	+	+	Theiler, 1921, 1930
	Carnivora Canidae	<i>Equus caballus</i> x <i>Equus asinus</i>	Mule.....	Enzootic	+	+	+	+	+	+	Theiler, 1908, 1921
		<i>Equus burchelli</i> (Gray)	Zebra.....	Lab. Tests	o	o	o	o	o	+	Rickmann, 1908
		<i>Canis familiaris</i> Linn.	Dog.....	Lab. Tests Field cases	o	+	o	o	o	o	Theiler, 1907, 1910; McIntosh, 1953; Haig, McIn- tosh, Cumming & Hemp- stead, 1956
		<i>Mustela evermanni</i> <i>fiuro</i> Linn.	Ferret.....	Lab. Tests	o	+	o	o	o	o	McIntosh, 1953, 1955
	(Neurotropic virus)	Rodentia Muridae	<i>Mus musculus</i> Linn.	Swiss white mouse	Lab. Tests	o	+	o	o	o	Nieschulz, 1932, 1933a; Alex- ander, 1933, 1935
			<i>Rattus norvegicus</i> (Berkenhout).	Albino rat.....	Lab. Tests	o	+	o	o	o	Nieschulz, 1933b, 1934b; Alex- ander, 1935
		Caviidae.....	<i>Cavia cobaya</i> Linn.	Guinea pig.....	Lab. Tests	o	+	o	o	o	Alexander, 1933; Nieschulz, 1934a
		Muridae.....	<i>Tetera lobengulae</i> (De Winton).	Gerbille.....	Lab. Tests	o	+	o	o	o	Alexander, 1935
		<i>Mastomys natalen- sis</i> (A. Smith) (= <i>Mastomys</i> <i>coucha</i> )	Multimammate mouse	Lab. Tests	o	+	o	o	o	Alexander, 1935	

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TABLE 1.—*Virus diseases (continued)*

Virus	Host				Region					Authorities	
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.	E.		S.
African horse-sickness (Neurotropic virus)	Aves Phasianidae	<i>Gallus domesticus</i> Linn.	Chick embryo....	Lab. Tests	°	+	°	°	°	°	Alexander, 1938
(Pantropic virus)	Insecta Diptera Chironomidae	<i>Culicoides</i> spp.	Midge.....	Enzootic	+	+	+	+	+	+	Du Toit, 1944, 1955
Foot and Mouth disease	Artiodactyla Bovidae	<i>Bos taurus</i> Linn.	Ox.....	Periodic epizootics	+	°	+	°	°	°	Hutcheon, 1892; Henning, 1892; Diesel, 1953
Period 1933 to 1964					°	+	°	°	°	°	Robertson, 1903
					°	°	°	°	°	°	D.V.S. (S.Afr.) 1933
					°	°	°	°	°	°	D. Agric. (S.W.A.), 1934
					°	+	°	°	°	°	D.V.S. (S.Afr.), 1937
					°	+	°	°	°	°	D.V.S. (S.Afr.), 1938
					°	+	°	°	°	°	D.V.S. (S. Afr.), 1939
					°	+	°	°	°	°	D.V.S. (S. Afr.), 1944
					°	°	°	°	°	°	D. Agric. (S.W.A.), 1945
					°	°	°	°	°	°	D. Agric. (S.W.A.), 1946
					°	°	°	°	°	°	D. Agric. (S.W.A.), 1949
					°	Sat. 2	°	°	°	°	D.V.S. (S. Afr.), 1951
					°	Sat. 1	°	°	°	°	D.V.S. (S. Afr.), 1954
					°	°	°	°	°	°	D.V.S. (S. Afr.), 1956
					°	°	°	°	°	Sat. 2	D.V.S. (S. Afr.), 1957
					°	Sat. 1	°	Sat. 1	°	°	D.V.S. (S. Afr.), 1958
					°	°	°	°	°	°	D. Agric. (S.W.A.), 1958
				°	Sat. 3	°	°	°	°	D.V.S. (S. Afr.), 1958	
				°	Sat. 3	°	°	°	°	D.V.S. (S. Afr.), 1959	
				°	Sat. 2	°	°	°	°	D.V.S. (S. Afr.), 1959	
				°	Sat. 2	°	°	°	°	D.V.S. (S. Afr.), 1960	
				°	Sat. 1	°	°	°	°	D.V.S. (S. Afr.), 1961	
				°	°	°	°	°	°	D. Agric. (S.W.A.), 1962, 1963	
				°	°	°	°	°	°	D. Agric. (S.W.A.), 1964	

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TABLE 1.—*Virus diseases (continued)*

Virus	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
Foot and Mouth disease	Bovidae.....	<i>Capra hircus</i> Linn. and <i>Ovis aries</i> Linn.	Goat and Sheep	Periodic outbreaks	o	+	o	o	o	o	D.V.S. (S. Afr.), 1938 D.V.S. (S. Afr.), 1944-45 D.V.S. (S. Afr.), 1958-60
		<i>Aepyceros melampus</i> (Lichtenstein).	Impala.....	Field obs.	o	+	o	o	o	o	Rossiter & Albertyn, 1947 D.V.S. (S. Afr.), 1958-59 Meeser, 1962
		<i>Alcelaphus caama selbornei</i> (Lydekker).	Hartebees.....	Field obs.	o	o	o	o	o	Sat. 1	Viljoen, 1961-62
		<i>Antidorcas marsupialis</i> (Zimmermann)	Springbuck.....	Field obs.	o	o	o	o	o	Sat. 1	Viljoen, 1961-62
		<i>Gorgon taurinus</i> (Burchell).	Blue wildebeest...	Field obs.	o	Sat. 3	o	o	o	o	Meeser, 1962
		<i>Kobus ellipsiprymnus</i> (Ogilby).	Waterbuck.....	Field obs.	o	+	o	o	o	o	Rossiter & Albertyn, 1947
		<i>Ozanna grandicornis</i> (Hermann)	Sable antelope...	Field obs.	o	+	o	o	o	o	Rossiter & Albertyn, 1947 Meeser, 1962
		<i>Oryx gazella</i> (Linn.).	Gemsbuck.....	Field obs.	o	o	o	o	o	Sat. 1	Viljoen, 1961-62; Basson, 1961-62
		<i>Raphiceros campestris</i> (Thunberg)	Steenbuck.....	Field obs.	o	o	o	o	o	Sat. 1	Viljoen, 1961-62
		<i>Strepsiceros strepsiceros</i> (Pallas).	Kudu.....	Field obs.	o	+	o	o	o	o	o

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TABLE 1.—*Virus diseases (continued)*

Virus	Host				Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.	E.		S.	
Foot and Mouth disease	Bovidae....	<i>Sylvicapra grimmia</i> (Linn.).	Duiker.....	Field obs.	°	°	°	°	°	Sat. 1	Viljoen, 1961-62	
		<i>Syncerus caffer</i> (Sparrman).	African buffalo..	Field obs.	°	Sat. 3	°	°	°	°	°	Meester, 1962 Viljoen, 1964 Viljoen, 1964
		<i>Taurotragus oryx</i> (Pallas).	Eland.....	Field obs.	°	°	°	°	°	°	Sat. 1	Viljoen, 1961-62; Basson, 1961-62
	Suidae.....	<i>Sus scrofa</i> Linn.	Domestic pig.....	Periodic outbreaks	°	Sat. 2	°	°	°	°	°	D.V.S. (S. Afr.), 1951 D.V.S. (S. Afr.), 1957
		<i>Phacochoerus aethiopicus</i> (Pallas).	Warthog.....	Field obs.	°	°	°	°	°	°	Sat. 1	Viljoen, 1961-62; Basson, 1961-62
Rinderpest..... Last outbreaks 1903 and no recurrence since	Artiodactyla Bovidae	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Diagnostic Tests	°	+	°	°	°	°	Robinson, 1933 D.V.S. (S. Afr.), 1933-1961	
		<i>Bos taurus</i> Linn.	Ox.....	Epizootic	+	°	+	+	°	°	°	D. Agric. (S.W.A.), 1934-1964
		<i>Capra hircus</i> Linn.	Goat.....	Lab. Tests Sporadic	°	+	°	°	°	°	°	Theiler, 1897 Koch, 1897 Rickmann, 1908

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.

TABLE 1.—*Virus diseases (continued)*

Virus	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
Rinderpest.....	Bovidae.....	<i>Ovis aries</i> Linn.	Sheep.....	Lab. Tests Sporadic	+	+	+	+	+	+	Theiler, 1897; Koch, 1897; Maberly, 1898 Rickmann, 1908
		<i>Strepsiceros strepsiceros</i> (Pallas)	Kudu.....	Field obs.	+	+	+	+	+	+	
		<i>Sybicapra grimmia</i> (Linn.)	Duiker.....	Field obs.	+	+	+	+	+	+	
		<i>Taurotragus oryx</i> (Pallas)	Eland.....	Field obs.	+	+	+	+	+	+	Hutcheon, 1897; Thomas & Neitz, 1933
		<i>Tragelaphus scriptus</i> (Pocock)	Bushbuck.....	Field obs.	+	+	+	+	+	+	
		<i>Syncerus caffer</i> (Sparrman)	African buffalo...	Field obs.	+	+	+	+	+	+	
		Zoological names not recorded	Antelopes.....	Field obs.	+	+	+	+	+	+	Rickmann, 1908
			Ox.....	Sporadic	+	+	+	+	+	+	Mettam, 1923; Du Toit & Alexander, 1938; De Kock & Neitz, 1950; Hofmeyr, 1956; Louw, 1958
			Sheep.....	Sporadic	+	+	+	+	+	+	Schatz, 1949; D. Agric. (S.W.A.), 1949
			Black wildebeest, gnu	Sporadic	+	+	+	+	+	+	De Kock & Neitz, 1950 Schatz, 1949
Bovine malignant catarrhal fever	Bovidae.....	<i>Commohaetes gnou</i> (Zimmermann)	Black wildebeest, gnu	Sporadic	+	+	+	+	+	Mettam, 1923; Thomas & Neitz, 1933; Du Toit & Alexander, 1938; Du Toit, 1947; Louw, 1958	
		<i>Gorgon taurinus</i> (Burchell)	Blue wildebeest..	Sporadic	+	+	+	+	+	Thomas & Neitz, 1933; Du Toit & Alexander, 1938; Du Toit, 1947; de Kock & Neitz, 1950	

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TABLE 1.—*Virus diseases (continued)*

Virus	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
Syncerine malignant catarrhal fever	Bovidae.....	<i>Syncerus caffer</i> (Sparrrnan)	African buffalo..	Sporadic	o	+	o	o	o	o	Neitz, 1963
Lumpy skin disease	Bovidae.....	<i>Bos taurus</i> Linn.	Ox.....	Epizootic	+	+	+	+	o	+	Thomas, 1945; Thomas & Mar.; 1945; Thomas, Robinson & Alexander, 1945; De Boom, 1947; Diesel, 1949 Haig, 1957
		<i>Ovis aries</i> Linn.	Sheep.....	Lab. Tests Kenya	o	o	o	o	o	o	Capstick, 1959
	Aves Phasianidae	<i>Gallus domesticus</i> Linn.	Chick embryo....	Lab. Tests	o	+	o	o	o	o	Haig, 1957; Van Rooyen, Kimm, Weiss & Alexander, 1959
Rift Valley fever	Bovidae.....	<i>Bos taurus</i> Linn.	Ox.....	Epizootics	+	+	+	+	o	o	Alexander & Dickson, 1951; Schulz, K., 1951; Schulz, K. H., 1951; Kaschula, 1953, 1961; Weiss, 1957 Haig, Kaschula & Alexander, 1953; Weiss, 1957; Steyn 1953 Weiss, 1957
		<i>Capra hircus</i> Linn.	Goat.....	—	o	o	o	o	o	o	No records even though diagnosed in Kenya. Daubney, Hudson & Garnham, 1931
		<i>Ovis aries</i> Linn.	Sheep.....	Severe epizootics	+	+	+	+	o	+	Alexander & Dickson, 1951; Schulz, K. H., 1951; Schulz, K., 1951; Van der Linde, 1953; Kaschula, 1953, 1961; Weiss, 1957, 1962 Weiss, 1957

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TABLE 1.—*Virus diseases (continued)*

Virus	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
Rift Valley fever	Hominidae...	<i>Homo sapiens</i> Linn.	Man.....	Numerous cases	+	+	+	+	°	°	Mundel & Gear, 1951; Gear, De Meillon, Measrock, Harwin & Davis, 1951; Haig, 1951; Joubert, Ferguson & Gear, 1951; Schulz, K. H., 1951; Weiss, 1957
	Mustelidae...	Zoological name not recorded	Skunk.....	<sup>1</sup> Lab. Tests	°	+	°	°	°	°	Gear, 1953
	Muridae....	<i>Mus musculus</i> Linn.	Mouse.....	Lab. Tests	°	+	°	°	°	°	Haig, 1951; Kaschula, 1953, 1961, and many others
		<i>Rattus norvegicus</i> (Berkenhout)	Albino rat.....	Lab. Tests	°	+	°	°	°	°	Kaschula, 1961
	Caviidae.....	<i>Cavia porcellus</i> Linn.	Guinea pig.....	Lab. Tests	°	+	°	°	°	°	Weiss, 1957
	Aves Phasiidae	<i>Gallus domesticus</i> Linn.	Chick embryo....	Lab. Tests	°	+	°	°	°	°	Kaschula, 1953, 1961
	Insecta Dip- tera Culici- dae	<i>Aedes (Ochlerotatus) caballus</i> (Theobald) <i>Culex (Culex) theileri</i> (Theobald).	Mosquito..... Mosquito.....	Common vector Lab. Test	+	+	+	+	°	°	Gear, De Meillon, Le Roux, Rofsky, Rose-Innes, Steyn, Cliff & Schulz, 1955 Gear <i>et al.</i> , 1955
		<i>Aedes (Banksiella) circumlateolus</i> Theobald.	Mosquito.....	Lab. Test	°	+	°	°	°	°	Kokernot, Heymann, Musspratt & Wolstenholme, 1957

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TABLE 1.—*Virus diseases (continued)*

Virus	Class Order Family	Host			Region					Authorities		
		Genus and species	Vernacular name	Incidence	O.	T.	N.	W.	E.		S.	
Wesselsbron virus disease	Artiodactyla Bovidae	<i>Bos taurus</i> Linn.	Ox.....	Lab. Tests	°	+	°	°	+	°	Weiss, Haig & Alexander, 1956; Weiss, 1957	
		<i>Ovis aries</i> Linn.	Sheep.....	Enzootic Lab. Tests	+	°	°	°	°	°	Weiss, Haig & Alexander, 1956; Weiss, 1957 Belonje, 1958; Le Roux, 1959	
	Suidae.....	<i>Sus scrofa</i> Linn.	Domestic pig....	Lab. Tests	°	+	°	°	°	°	Weiss, Haig & Alexander, 1956; Weiss, 1957	
		<i>Equus caballus</i> Linn.	Horse.....	Lab. Tests	°	+	°	°	°	°	Weiss, Haig & Alexander, 1956; Weiss, 1957	
	Primates Hominiidae	<i>Homo sapiens</i> Linn.	Man.....	5 Lab. infect. 1 Nat. infect. 2 Nat. infect.	°	+	°	°	°	°	°	Weiss, Haig & Alexander, 1956; Weiss, 1957 Smithburn, Kokernot & De Meillon, 1956 Heymann, Kokernot & De Meillon, 1958; Kokernot, De Meillon, Paterson, Hey- mann & Smithburn, 1957
		<i>Mus musculus</i> Linn.	Albino mouse....	Lab. Tests	°	+	°	°	°	°	°	Weiss, Haig & Alexander, 1956; Weiss, 1957, and others
		<i>Cavia cobaya</i> Linn.	Guinea pig (Foetal tissues)	Lab. Tests	°	+	°	°	°	°	°	Weiss, Haig & Alexander, 1956; Weiss, 1957
	Lagomorpha Leporidae	<i>Lepus cuniculus</i> Linn.	Rabbit (Foetal tis- sues)	Lab. Tests	°	+	°	°	°	°	°	Weiss, Haig & Alexander, 1956; Weiss, 1957
		<i>Gallus domesticus</i> Linn.	Chicken embryo..	Lab. Tests	°	+	°	°	°	°	°	Weiss, Haig & Alexander, 1956; Weiss, 1957
	Insecta Dip- tera Cullici- dae	<i>Aedes (Banksiella)</i> <i>circumlateolus</i> Theobald.	Mosquito.....	Nat infected	°	°	°	+	°	°	°	Smithburn, Kokernot, Wein- bren & De Meillon, 1957 Muspratt, Smithburn, Paterson & Kokernot, 1957
Mosquito.....		Lab. Tests	°	+	°	°	°	°	°	°		

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.

TABLE 1.—*Virus diseases (continued)*

Virus	Host				Region					Authorities			
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.	E.		S.		
												Genus and species	Vernacular name
Wesselsbron virus disease	Bovidae.....	<i>Aedes (Ochlerotatus) caballus</i> (Theobald)	Mosquito.....	Lab. Tests	o	+	o	o	o	o	o	Kokernot & Paterson, 1958	
		<i>Ovis aries</i> Linn.	Sheep (lamb).....	Lab. Tests	o	+	o	+	o	o	o	Kokernot, De Meillon, Paterson, Heymann, & Smithburn, 1957	
Middleburg virus disease	Homnidae...	<i>Homo sapiens</i> Linn.	Man.....	Sporadic	o	o	o	+	o	o	o	Kokernot <i>et al.</i> , 1957	
		<i>Cercopithecus aethiops pygerythrus</i> F. Cuvier.	Vervet monkey...	Lab. Tests	o	+	o	o	o	o	o	Kokernot <i>et al.</i> , 1957	
	Muridae.....	<i>Mus musculus</i> Linn.	Mouse.....	Lab. Tests	o	+	o	o	o	o	o	Kokernot <i>et al.</i> , 1957	
		<i>Gallus domesticus</i> Linn.	Day-old chicken..	Lab. Tests	o	+	o	o	o	o	o	Kokernot <i>et al.</i> , 1957	
	Culicidae.....	<i>Aedes (Bankstella)</i> sp.	Mosquito.....	Lab. Tests	o	+	o	o	o	o	o	o	Kokernot <i>et al.</i> , 1957
		<i>Aedes (Ochlerotatus) caballus</i> (Theobald)	Mosquito.....	Lab. Tests	o	+	o	o	o	o	o	o	Kokernot <i>et al.</i> , 1957
Sheep pox.....	—	—	—	—	o	o	o	o	o	o	o	—	
Bluetongue.....	Bovidae.....	<i>Bos taurus</i> Linn.	Ox.....	Enzootically	+	+	+	+	+	+	o	Spreull, 1905; Bekker, De Kock & Quinlan, 1933, 1934; De Kock, Du Toit & Neitz, 1937; Mason & Neitz, 1940	
		<i>Capra hircus</i> Linn.	Goat.....	Lab. Tests	o	o	o	o	+	o	+	Spreull, 1905	

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TABLE 1.—*Virus diseases (continued)*

Virus	Host				Incidence	Region					Authorities
	Class Order Family	Genus and species	Vernacular name			O.	T.	N.	W.	E.	
Bluetongue.....	Bovidae.....	<i>Ovis aries</i> Linn.	Sheep.....	Enzootically	+	+	+	+	+	°	Hutcheon, 1881, 1902; Theiler, 1904, 1907; Spreull, 1905; Neitz, 1948, and many others
		<i>Damaliscus albifrons</i> (Burchell)	Blesbok.....	Lab. Tests	°	°	°	°	°	+	Rickmann, 1908; Sigwart, 1927
		<i>Mus musculus</i> Linn.	Albino mouse....	Lab. Tests	°	+	°	°	°	°	Neitz, 1933; Thomas & Neitz, 1933
		<i>Rhabdomys pumilio</i> (Sparman)	Cape striped field mouse	Field Test	°	+	°	+	°	°	Van den Ende, Linder & Kaschula, 1954
		<i>Otomys irroratus</i> (Brants)	Vlei otomys.....	Field Test	°	+	°	°	°	°	Du Toit & Goosen, 1949
		<i>Gallus domesticus</i> Linn.	Chick embryo....	Lab. Tests	°	+	°	°	°	°	Du Toit & Goosen, 1949
		<i>Culex</i> spp.	Midgets.....	Lab. Tests	°	+	°	°	°	°	Alexander, 1947; Alexander, Haig & Adelaar; 1948; Alexander & Haig, 1951
		<i>Bos taurus</i> Linn.	Ox.....	Lab. Tests	°	+	°	°	°	°	Du Toit, 1944, 1955
		<i>Ovis aries</i> Linn.	Sheep.....	Lab. Tests	°	+	°	°	°	°	Alexander & Neitz, 1935
		<i>Equus caballus</i> Linn.	Horse.....	Lab. Tests	°	+	°	°	°	°	Alexander & Neitz, 1933, 1935
Louping ill.....		<i>Rhipicephalus appendiculatus</i> Neumann.	Brown ear tick...	Lab. Tests	°	+	°	°	°	°	Alexander & Neitz, 1935
	Laboratory observations only				°	+	°	°	°	°	Alexander & Neitz, 1933, 1935

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TABLE 1.—*Virus diseases (continued)*

Virus	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
Contagious pustular dermatitis	Bovidae.....	<i>Capra hircus</i> Linn. <i>Ovis aries</i> Linn.	Goat..... Sheep.....	Enzootically	+ +	+ +	+ +	+ +	° °	° °	28 1920; 1920; 1934
Hog cholera. No outbreaks since 1906	Suidae.....	<i>Sus scrofa</i> Linn.	Domestic pig....	Epizootics	°	°	°	°	°	°	Hutcheon, 1903; Robertson, 1905 Stockman, 1903; Grey, 1904, 1906; Theiler, 1905
African swine fever	Suidae.....	<i>Sus scrofa</i> Linn.	Domestic pig....	Epizootics	°	°	°	°	°	°	Quin, 1926; Steyn, 1928, 1932; De Kock, Robinson & Keppel, 1940 De Kock, Robinson & Keppel, 1940 Annual Mandate Reports, S.W.A., 1920; Neitz, 1951–1961
Period 1926 to 1964		<i>Phacochoerus aethiopicus</i> (Pallas).	Warthog.....	Carrier in enzootic area	°	°	°	°	°	°	Steyn, 1932; De Kock, Robinson & Keppel, 1940; Thomas & Kolbe, 1942 Thomas & Kolbe, 1942; Neitz, 1951–1961
		<i>Potamochoerus porcus</i> Linn.	Bush pig.....	Carrier	°	°	°	°	°	°	Thomas & Kolbe, 1942
	Leporidae....	<i>Lepus cuniculus</i> Linn.	Rabbit.....	Lab. Tests	°	°	°	°	°	°	Neitz & Alexander, 1952
	Phasianidae..	<i>Gallus domesticus</i> Linn.	Chick embryo....	Lab. Tests	°	°	°	°	°	°	McIntosh, 1952
Teschen disease	—	—	—	—	—	—	—	—	—	—	—
Myxomatosis....	—	—	—	—	—	—	—	—	—	—	—

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TABLE 1.—*Virus diseases (continued)*

Virus	Host			Region					Authorities	
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.
Shope fibroma...	—	—	—	—	—	—	—	—	—	—
Hare leukaemia	—	—	—	—	—	—	—	—	—	—
Fowl plague...	—	—	—	—	—	—	—	—	—	—
Newcastle disease	Aves Galliformes Phasianidae	<i>Gallus domesticus</i> Linn.	Fowl.....	Periodic epizootics	+	+	+	+	+	°
			Chick embryo....	Lab. Tests	°	°	°	°	°	°
		<i>Francolinus capensis</i> (Gmelin).	Cape francolin...	Lab. Tests	°	°	°	°	°	°
	Meleagridae..	<i>Meleagris gallopavo</i> Linn	Turkey.....	Periodic outbreaks	°	+	°	°	°	°
	Anseriformes Anatidae	<i>Anas platyrhynchos</i> Linn.	Duck.....	Lab. Tests	°	°	+	°	°	°
	Columbiformes Columbidae	<i>Columba livia</i> (Gmelin)	Domestic pigeon	Lab. Tests	°	°	+	°	°	°
		<i>Streptopelia senegalensis</i> Linn.	Laughing dove....	Lab. Tests	°	°	°	+	°	°
	Passeriformes Ploceidae	<i>Passer melanurus</i> (Müller)	Cape sparrow....	Lab. Tests	°	°	°	+	°	°

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TABLE 1.—*Virus diseases (continued)*

Virus	Host					Region				Authorities	
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.	E.		S.
Fowl pox.....	Phasianidae..	<i>Gallus domesticus</i> Linn.	Fowl.....	Enzootic	+	+	+	+	+	+	Canham, 1932; Coles, 1946; Haig, 1951; Abrams, 1964 Haig, 1951 Coles, 1946 Coles, 1946; Abrams, 1964 Abrams, 1964 Coles, 1946; Haig, 1951 Canham, 1932; Haig, 1951 Canham, 1932 Canham, 1932; Haig, 1951 Haig, 1951 Canham, 1932
	Meleagridae..	<i>Meleagris gallopavo</i> Linn.	Chick embryo....	Lab. Tests	°	°	°	°	°	°	
	Columbidae..	<i>Columba livia</i> (Gmelin).	Turkey.....	Enzootic	+	+	+	+	+	°	
	Passeriformes Fringillidae	<i>Pyrrhula canaria</i> Linn.	Domestic pigeon	Sporadic	°	°	°	°	°	°	
	Insecta Dip- tera Culci- dae	<i>Culex (Culex)</i> <i>theileri</i> Theobald.	Canary.....	Sporadic	°	+	+	+	+	°	
Pigeon pox.....	Columbidae..	<i>Columba livia</i> (Gmelin).	Mosquito.....	Enzootic	+	+	+	+	+	°	Canham, 1932; Haig, 1951 Canham, 1932; Haig, 1951 Haig, 1951 Canham, 1932
	Phasianidae...	<i>Gallus domesticus</i> Linn.	Domestic pigeon	Lab. Tests	°	+	+	+	+	°	
	Meleagridae..	<i>Meleagris gallopavo</i> Linn.	Fowl.....	Spread by vaccinations Lab. Tests	+	°	°	°	°	°	
Avian encephalo- myelitis	—	—	Turkey.....	Spread by vaccination	+	+	+	+	+	°	Becker & Uys, 1963 Becker & Uys, 1963
	Choradri- formes Sternidae	<i>Sterna hirundo</i> Linn.	Common tern....	Epizootic	°	°	+	°	°	°	
Tern virus infec- tion	Phasianidae...	<i>Gallus domesticus</i> Linn.	Fowl.....	Lab. Tests	°	°	+	°	°	°	Becker & Uys, 1963 Becker & Uys, 1963
	—	—	—	—	—	—	—	—	—	—	

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## (B) PROTOPHYTA

The 57 members of the class Schizomycetes and the 12 members of the class Microtatiobites responsible for zoonoses in South Africa are listed in Tables 2 (a) and 2 (b). The nomenclature used for these microorganisms is that proposed by Breed, Murray & Smith, 1957. In a few instances additional species names have been included as suggested by some South African investigators.

In determining the source of the pathogens it must be borne in mind that man and his domesticated animals migrated from Asia to Europe and Africa and that many, but not all, are necessarily of Asian origin. Since most of the listed Schizomycetes have a world-wide distribution it is extremely difficult to determine which were brought into South Africa by the indigenous peoples and their domestic ruminants and dogs after crossing the tropical diseases barrier of Central Africa, and which were either introduced or reintroduced from Asia or Europe during the last three centuries. It appears safe to state that some of the equine and porcine diseases are of European origin. Horses and pigs did not cross the Central African disease barrier and, with few exceptions in the case of the horse, were imported from Europe. In the case of the class Microtatiobites *Cowdria ruminantium* is the only pathogen that can be claimed, without reservation, to be a true African parasite. The remaining pathogens have been encountered outside Africa but conditions obtaining in South Africa, namely the presence of potential vectors and/or susceptible vertebrates, are suitable for their propagation.

It is beyond the scope of this article to discuss the various features of the listed organisms in detail. The information presented in Tables 2 (a) and 2 (b) is self explanatory and, therefore, the discussion on zoonoses, that follows, will be restricted to some aspects of general interest.

Class: Schizomycetes

Order: Pseudomonadales

Family: Pseudomonadaceae

*Pseudomonas pseudomallei*, responsible for melioidosis, does not occur in South Africa. It was isolated from a patient who had been on active service in India and Malaya. Laboratory tests revealed that five indigenous rodents are susceptible. In the event of an unsuspected introduction it could maintain itself in the proved hosts.

Family: Spirillaceae

*Vibrio foetus* is widely distributed in cattle but has, up to the present, not been encountered in sheep.

*Spirillum minus* occurs endemically but rat-bite fever does not constitute a serious public health problem.

Order: Eubacteriales

Family: Enterobacteriaceae

*Salmonella choleraesuis* has been isolated from pigs in several outbreaks of paratyphoid. There is no evidence that this organism has caused sickness in man in South Africa.

*S. typhimurium* has a wide host range. It has been responsible for several outbreaks of food-poisoning in man. Mortality has been recorded in infected calves, blue wildebeest calves in the Kruger National Park (Eastern Transvaal), foals, chickens, ducklings, pigeons, squabs, canaries and finches. Only isolated outbreaks

have been observed in the pig and rabbit. A case of purulent arthritis due to *S. typhimurium* var. *copenhagen* (Storrs) has been recorded in a foal by Henning & Clark (1938).

*S. enteritidis* has caused a few outbreaks of food-poisoning in man. It has been found to be responsible for about 2 per cent of calf paratyphoid outbreaks

*S. enteritidis* var. *dublin* infection is a serious hazard in the rearing of calves. It has been encountered in about 95 per cent of calf paratyphoid infections. Its occurrence in man is not common. Immunization of calves against salmonellosis is practised on a large scale.

*S. bovis morbificans* contaminated pork has caused food-poisoning in man.

*S. braenderup* contaminated food has produced food-poisoning in human beings in a restaurant. Investigations revealed that a rat, caught on the premises, harboured the infectious agent.

*S. newport* has been isolated from salted dry meat (biltong) which had caused food-poisoning in man.

*S. onderstepoort* has been isolated from man suffering from enteritis and from a sick sheep.

*S. poona* contaminated mutton has been responsible for food-poisoning and enteritis in man.

*S. typhosa*, responsible for typhoid fever, has been isolated fairly frequently from man and once from a chicken.

*S. abortusovaequina* has produced abortion in horse and donkey mares. Joint-ill due to this bacterium developed in a few foals born alive. Joint-ill also developed in a foal after injecting a bacteria-free filtrate of foetal organs into a pregnant mare. Purulent arthritis, bursitis or tendovaginitis due to this *Salmonella* sp. have also been recorded in adult horses and mules.

*S. gallinarum*, the causal agent of fowl typhoid, is still prevalent in fowls and turkeys. There are no records of it having caused food-poisoning or gastro-enteritis in man.

*S. pullorum*, which causes bacillary white diarrhoea in chickens, has nearly been eradicated. In the past it has been responsible for serious losses.

*S. amersfoort* has been responsible for two outbreaks of salmonellosis in chickens. The mortality rate was high. It has also been isolated from adult fowls. The infectious agent is listed for differential diagnostic reasons.

Several other *Salmonella* spp. have been isolated from man in South Africa. They have not been included in the appended Table 2 (a) as they have not been recorded in animals.

#### Family: Brucellaceae

*Pasteurella multocida* (*P. aviseptica*), the cause of fowl cholera, has been encountered at irregular intermittent intervals mainly along the coastal regions. Many outbreaks seem to have been initiated by seagulls harbouring the infectious agent. There is no evidence of its occurrence at present.

*P. multocida* var. *ictero-hepatitides*, the cause of ovine bacterial icterus, is widely distributed in South and South West Africa. It occurs sporadically on various farms. Affected sheep may show photosensitization as observed in *tribulosis ovis*. The mortality rate may be higher than 30 per cent. This causative agent is probably identical with *P. oviseptica* described from sheep and goats by earlier investigators [vide *infra* Table 2 (a)]. Bacterial hepatitis, caused by the newly described *ictero-hepatitides* variety, has also been observed in cattle in Natal where mortality was recorded in adult stock.

*P. suis* has been isolated from pigs in the Western Cape Province at the time when African swine fever occurred on various farms.

*P. multocida* infection in donkeys has been recorded once in South West Africa.

*P. pestis*, responsible for plague in man and rodents, was introduced at several seaports of South Africa at the beginning of this century. Rodents mainly concerned in the spread of infection were *Rattus norvegicus* and *R. rattus* in coastal towns, and the latter species, carried by rail in trucks laden with forage and other materials, in the inland centres (Fourie, 1938). A new chapter in the history of plague was opened in the Tarkastad district (Eastern Cape Province) when this disease was established in veld rodents. The disease had shifted from urban to rural districts (Mitchell, 1927). Human plague outbreaks that have occurred since 1914 have been localized almost entirely to farms and native areas in the rural regions, while the urban areas remained almost free from infection (Fourie *loc. cit.*). Subsequent investigations revealed that numerous wild rodent species served as the source of infection, and that a large number of fleas were involved in the transmission of plague to rodents and man. Evidence has been brought forward that transmission from rodent to rodent also follows cannibalism. From the listed records it is of interest to note that in urban areas domesticated carnivores (cat, ferret and dog) were sometimes affected, while in rural regions wild carnivores (suricate and yellow mongoose) became victims of the disease.

The reader, who is interested in the epidemiology of plague in South Africa is referred to the most instructive publication by De Meillon, Davis & Hardy (1961). For obscure reasons no cases of plague have been reported in man and rodents during recent years (Davis, 1964).

*Brucella melitensis*, the causal agent of Malta fever of man and goats has been encountered fairly frequently. The infectious agent was recognized in South Africa in the Western Cape Province in 1903, and in South West Africa in 1909.

*B. karakulensis* and *B. ovigenitalum* belong to the *B. melitensis* group. The first mentioned bacterium is responsible for abortions in Karakul flocks in South West Africa and the Western Cape Province. The second species is widely distributed in both geographical regions, and produces infectious infertility in rams.

*B. abortus* is responsible for contagious abortion in cattle and undulant fever in man. In cattle the disease was first recognized in Transvaal in 1916 and in man in the Orange Free State in 1915. The bovine infection is widely distributed, and serves as the source of undulant fever. Experimental evidence has been brought forward that sucking calves are insusceptible, thus making it possible to develop a disease-free herd by separating weaned calves from the infected herd, and maintaining them under strict isolation.

*B. abortus* is widely distributed and causes abortion in ewes.

It is of interest to note that brucellosis has not yet been diagnosed in wild animals. Further details on brucellosis will be found in the excellent review by Van Drimmelen (1961a, 1962).



*Actinobacillus ligniereseii* has frequently been observed in cattle suffering from wooden tongue but is a less frequent disease in sheep. Actinobacillosis may be the cause of a non-specific reaction to the tuberculin test, but a negative short thermal tuberculin test (Fourie, 1955).

*A. mallei* was once a prevalent disease of solipeds in South and South West Africa. Prophylactic measures (quarantine, application of the mallein test and slaughter of affected animals) resulted in its final eradication in 1934. No human cases have been recorded in the South African literature.

Family: Bacteroidaceae.

*Sphaerophorus necrophorus* is a common infection of cattle, particularly calves, sheep, pigs and solipeds. Necrobacillosis is usually prevalent in animals kept under unhygienic conditions but may also manifest itself under ideal sanitary conditions. Pododermatitis has been observed in cattle and solipeds maintained on moist pastures or wet stable floors. Lesions in the mucosa of the oesophageal groove were observed once at autopsy in a black wildebeest heifer kept in captivity at Onderstepoort (Neitz, 1935).

*Streptobacillus moniliformis* infection developed in a man who was bitten while handling a yellow-footed squirrel immediately after its arrival from South Africa at Hamburg, Germany. Nothing is known about the prevalence of this form of rat-bite fever in South Africa.

Family: Micrococcaceae

*Staphylococcus aureus* has a wide distribution. Its cause of furunculosis, pyaemia, osteomyelitis, suppuration of wounds and food-poisoning are well known. Drug resistant strains constitute a serious menace for man and animals. This complication has recently been subdued by the availability of improved chemotherapeutic agents (Bradlow, 1962).

*S. aureus* has also been recognized as a cause of acute bovine mastitis, and is thus of great public and animal health importance. The satisfactory control of this form of mastitis by the application of *S. aureus* vaccine, and the resulting immunity have been reviewed by Cameron (1963a, 1963b, 1964).

Family: Lactobacillaceae

*Streptococcus pyogenes* is a common infection in man but there is no evidence of it having caused active bovine mastitis in South Africa. Pullinger (1961), while working in Johannesburg, stressed the importance of *S. pyogenes* mastitis as a source of scarlet fever in man. He based this claim on the investigations by Pullinger & Kemp (1937) and Bendixen & Minett (1937) on this form of mastitis and its relationship to the incidence of scarlet fever in Europe. He emphasized that this relationship should not be overlooked in South Africa.

*S. agalactiae* is the most common cause of bovine mastitis. Milk from infected dairy herds as a source of a variety of human infections, especially those of the urogenital tract are well known.

Family: Corynebacteriaceae

*Corynebacterium pseudotuberculosis* is widely distributed in South African sheep. Infections do not only cause emaciation but reduce the market value of carcasses and even renders them unfit for human consumption due to the abscessation of the lymphatic glands. The infectious agent is also the cause of infectious infertility in sheep.



The artificial infection of horses and cattle is followed by the development of abscesses at the site of injection.

*C. pyogenes* has often been encountered in abscesses of cattle, sheep and swine, and also produces calf pneumonia. It also causes acute or chronic bovine mastitis. There is no record of its occurrence in man in South Africa.

*C. diphtheriae* is widely distributed and under normal circumstances man is the source of infection. In one instance milk-borne diphtheria in man was traced to cows suffering from *C. diphtheriae* mastitis in the Orange Free State.

*C. equi* has been found to be the cause of pneumonia in foals. There are no records of its occurrence in cattle and pigs in South Africa.

*Listeria monocytogenes* infection, also known as Tiger River disease, has been responsible for periodic epizootics in Lobengula's gerbilles. Laboratory tests have shown that at least 10 wild rodent species are highly susceptible. Several outbreaks have occurred recently in chinchillas (Du Plessis, 1964). Despite the wide distribution of listeriosis in the Transvaal, Natal and the Orange Free State no cases have been recorded in domestic animals, birds and man.

*Erysipelothrix insidiosa* infection occurs sporadically in swine. No cases have been seen in turkeys so far.

#### Family: Bacillaceae

*Bacillus anthracis* is widely distributed in South and South West Africa. It has been responsible for serious losses in domestic ruminants, solipeds and swine but only to a limited extent in ostriches reared in the Eastern Cape Province. Man has been affected quite frequently after handling infected carcasses, hides and wool.

Sporadic outbreaks in the zebra, hartebeest, springbuck, black wildebeest and kudu have been recorded up to 1943. During the period from September, 1950 to October, 1960, more than 1100 fatal cases have been diagnosed from various areas in the Kruger National Park in the Eastern Transvaal by Pienaar (1960, 1961). As time progressed the incidence increased. Animals involved were a baboon, wild carnivores, elephant, hippopotamus, wild pigs, many antelope species and a vulture. The highest incidence was in kudus. At least 837 cases were proved to be victims of anthrax.

Deaths in the listed blesbuck followed the administration of the so-called "goat vaccine" which was claimed to be milder than the "bovine vaccine" used for the immunization of cattle and sheep before Sterne's anthrax vaccine became available in 1939.

*Clostridium septicum* has been isolated from cattle and sheep that died from malignant oedema. Only sporadic outbreaks have been diagnosed in these animals so far. There are no records of its occurrence in man in South Africa.

*C. chauvoei*, the causal agent of blackquarter occurs enzootically in cattle and sheep. In cattle it is a pasture disease and sheep contract the infection after shearing, docking and castration. The goat is highly resistant but can be infected when a massive dose of the infectious agent is administered intramuscularly. Blackquarter has been described in cattle in the Cape Province as far back as 1780 (Le Vaillant, 1796).

The *C. perfringens* strain, commonly referred to as *C. welchii* Type A is the classic human gasgangrene organism. So far it has only been isolated once from an affected dog in the Western Cape Province but not in man.

*C. welchii* Type B causes lamb dysentery. It is widely distributed in the sheep-raising areas of South Africa and can be responsible for serious losses in lambs if immunization is not practised. It has also been described once as the cause of dysentery in young foals in the Western Cape Province.

*C. welchii* Type D affects sheep of all ages but has up to the present not exerted its pathogenicity in goats and horses in South Africa. It is known that sheep may harbour the pathogen in the intestinal tract and that a sudden change in diet or the administration of a vermicide may cause digestive disturbances which trigger an outbreak of enterotoxaemia.

*C. botulinum* Type C and Type D have been proved to be responsible for botulinus (lamsiekte) in South and South West Africa. Clinical cases of botulinus due to both types can be expected in cattle and horses. Cattle become infected by chewing decomposed bones in order to supplement their phosphorus intake in the extensive phosphorus deficient areas. In solipeds infection results when they ingest dead rat contaminated fodder. Natural sporadic outbreaks of botulinus due to Type D has been observed in sheep but not in goats. Type C has produced natural infections in a few turkeys, ducks and a variety of wild water birds. Laboratory tests have shown that the toxins of Types C and D can produce botulinus in domestic ruminants, solipeds, turkey, duck, goose and laboratory animals. The former type of toxin is also pathogenic for the ostrich. The domestic fowl is refractory to the toxins of both types.

*C. tetanii* is widely distributed. Tetanus has been observed from time to time in man and domestic animals. The infection in a domestic cat is exceptional.

Order: Actinomycetales

Family: Mycobacteriaceae

*Mycobacterium tuberculosis* is widely distributed and under normal circumstances man is the source of infection. It is an important and a serious health problem in Southern Africa. Human tuberculosis has been diagnosed in dogs and domestic pigs, and on one occasion in a wild animal, the giraffe. A natural infection has also been diagnosed once in a parrot.

*M. bovis* is a common infection in cattle, and is a serious animal health problem. In man approximately 30 cases of bovine tuberculosis have been diagnosed. Natural infections have been encountered in a goat, a large number of pigs, a cat, and a duiker and several kudus in their natural environment and in a few springbuck maintained in a zoological garden. In the vicinity of Grahamstown (Eastern Cape Province) bovine tuberculosis has caused high mortality in kudu.

*M. avium* occurs sporadically in fowls in various regions of South Africa. Its presence in turkeys has been recorded in the Transvaal and the Orange Free State. The domestic pig may also become infected.

*M. paratuberculosis*, the cause of Johne's disease, occurs sporadically in cattle and is gradually spreading further afield. There is no evidence about its incidence in sheep.

Family: Actinomycetaceae

*Nocardia asteroides* infection, which terminated fatally, has been recorded in a nine-months old male Alsatian dog. Although *Nocardia* sp. or spp. have been isolated from man at the South African Institute for Medical Research in 1958, 1960 and 1961, human nocardiasis due *N. asteroides* has not been recorded.

*Actinomyces bovis* is widely distributed and occurs sporadically in cattle and pigs.

*A. dermatonomus* is pathogenic for sheep, cattle and horses (Henning, 1956). In South Africa it has often been encountered in the Merino sheep-raising regions with a relatively high rainfall. Lumpy wool is of economic importance.

Order: Spirochaetales

Family: Treponemataceae

*Borrelia anserina* is a common infection of fowls where *Argas persicus* control measures are not practised. This parasite has also been encountered in ducks and geese. The relationship between *B. anserina* and the *Borrelia* sp. found in the jackass penguin still needs to be determined.

*B. duttoni* has been often diagnosed in man in various regions of South and South West Africa. The destruction of the vector, *Ornithodoros moubata* at centres where the disease has been observed, has markedly reduced the incidence of human borreliosis. Zumpt (1959) has determined that the multimammate mouse is susceptible, and suggests that this and possibly other wild rodents may serve as a source of infection in nature.

*B. theileri* causes a benign form of borreliosis in solipeds and domestic and wild ruminants. On some occasions alarming clinical symptoms, which persist for a few hours after the initial rise in temperature have been seen in horses and cattle. Only one fatal case, in the Western Transvaal, has so far been recorded in a Jersey cow which showed a pronounced blood parasitaemia (Frean, 1955).

*Leptospira icterohaemorrhagiae* and *L. canicola* have been diagnosed on several occasions in man and dogs. *L. pomona* has only been identified in man. Although rodents are susceptible all attempts to demonstrate these pathogens in wild caught species have failed so far.

Order: Mycoplasmatales

Family: Mycoplasmataceae

*Mycoplasma gallinarum* is the cause of chronic respiratory disease of poultry. It is widely distributed, particularly in fowls but has also been encountered in turkeys and ducks. Although a pure infection of the organism can exert its pathogenicity, its clinical appearance is usually triggered by concurrent virus or bacterial diseases or by various faults in poultry management. Since the incubation period of chronic respiratory disease varies from 10 to 30 days its clinical manifestations are usually only noticed in birds at the age of four weeks and older.

The disease is of great economic importance. The PPLO test is used as a flock test, and if positive is followed by depopulation for one month and introduction of day-old chickens.



TABLE 2 (a).—*Protochyta*

Parasite	Class Order Family	Host			Region					Authorities	
		Genus and species	Vernacular name	Incidence	O.	T.	N.	W.	E.		S.
Schizomycetes	Mammalia	<i>Homo sapiens</i> Linn.	Man.....	A case from East Asia	o	+	o	o	o	o	Mayer & Finlayson, 1944
Pseudomonadales	Primates	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	o	+	o	o	o	o	Mayer & Finlayson, 1944; Finlayson, 1944
Pseudomonadales	Hominiidae	<i>Tatara brantsii</i> (A. Smith)	Brants' gerbille...	Lab. Tests	o	+	o	o	o	o	Finlayson, 1944
Pseudomonadaceae	Rodentia	<i>Mastomys natalensis</i> (A. Smith).	Multimammate mouse	Lab. Tests	o	+	o	o	o	o	Finlayson, 1944
<i>Pseudomonas pseudomallei</i> (Whitmore, 1913) (= <i>Pfeifferella whitmori</i> ).	Cavidae	<i>Mus musculus</i> Linn.	Mouse.....	Lab. Tests	o	+	o	o	o	o	Finlayson, 1944
	Gerbillidae...	<i>Mystromys albicaudatus</i> (A. Smith)	White-tailed rat..	Lab. Tests	o	+	o	o	o	o	Finlayson, 1944
		<i>Rhabdomys pumilio</i> (Sparrman)	Striped mouse...	Lab. Tests	o	+	o	o	o	o	Finlayson, 1944
		<i>Otomys tugelensis pretoriae</i> Roberts.	Vlei rat.....	Lab. Tests	o	+	o	o	o	o	Finlayson, 1944
	Otomyidae...	<i>Lepus cuniculus</i> Linn.	Rabbit.....	Lab. Tests	o	+	o	o	o	o	Finlayson, 1944
	Lagomorpha Leporidae	<i>Bos taurus</i> Linn.	Ox.....	Enzootic	+	+	+	+	+	o	Snyman, 1931a, 1931b; Canham, 1948; Van Rensburg, 1953, 1954; Robinson, Van Rensburg, Van Heerden & Van Drimmelen, 1956
Spirillaceae <i>Vibrio foetus</i> Smith and Taylor, 1919.	Artiodactyla Bovidae	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	o	+	o	o	o	o	Snyman, 1931b; Robinson, Van Rensburg, Van Heerden & Van Drimmelen, 1956
Vibriosis.....	Rodentia Cavidae										

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.



TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
<i>Spirillum minus</i> Carter, 1888 Rat-bite fever	Rodentia Muridae	<i>Rattus rattus</i> Linn.	Rat.....	Endemic	o	+	+	o	o	o	S.A.I.M.R., 1948
Eubacteriales Enterobacteriaceae <i>Salmonella choleraesuis</i> (Smith, 1894) Weldin, 1927. Paratyphoid of pigs	Suidae.....	<i>Sus scrofa</i> Linn.	Domestic pig....	Sporadic	o	+	o	+	o	o	Theiler, 1905-1906; Martinaglia & Robinson, 1932; Henning, 1939; De Kock, Robinson & Keppel, 1940
<i>Salmonella typhimurium</i> (Loeffler, 1892) Castellani and Chalmers, 1919 Schütze, 1920	Hominidae...	<i>Homo sapiens</i> Linn.	Man.....	Sporadic	o	+	+	o	o	o	Robinson, 1937; Henning, 1938, 1942; Gear, Roux & Bevan, 1942; Levin & Roux, 1945; Le Riche & Dunstan, 1953
	Bovidae.....	<i>Bos taurus</i> Linn.	Ox.....	Sporadic	o	+	o	o	o	o	Martinaglia, 1929; Henning, 1939, 1953; Henning & Haig, 1939
		<i>Ovis aries</i> Linn.	Sheep.....	Sporadic	o	+	o	o	o	o	Henning, 1939
		<i>Connochaetes taurinus</i> (Burchell).	Blue wildebeest..	Endemic	o	+	o	o	o	o	Cameron, Tustin & Meeser, 1963
	Suidae.....	<i>Sus scrofa</i> Linn.	Domestic pig....	Sporadic	o	+	o	o	o	o	Henning, 1939
	Equidae.....	<i>Equus caballus</i> Linn.	Horse.....	Sporadic	+	o	+	o	o	o	Henning & Clark, 1938; Henning, 1939; Henning & Haig, 1939; Quinlan & Canham, 1956

\* K.N.P. = Kruger National Park.

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.

TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host				Region					Authorities	
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.	E.		S.
<i>Salmonella typhimurium</i>	Caviidae....	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	o	+	o	o	o	o	Martinaglia, 1929
	Leporidae....	<i>Lepus cuniculus</i> Linn.	Rabbit.....	Lab. Tests Sporadic	o	+	o	o	o	o	Martinaglia, 1929 Henning, 1939
	Aves Galliformes Phasianidae	<i>Gallus domesticus</i> Linn.	Fowl (chickens)..	Sporadic	o	+	+	o	o	o	Henning, 1939; Henning & Haig, 1939; Abrams, 1964
	Anseriformes Anatidae	<i>Anas platyrhynchos</i> Linn.	Duck.....	Sporadic	o	+	o	o	o	o	Coles, 1932; Abrams, 1964
	Passeriformes Fringillidae	<i>Pyrrhula canaria</i> Linn.	Canary.....	Sporadic	o	o	+	o	o	o	Martinaglia, 1929; Henning, 1939; Henning & Haig 1939
	Ploceidae....	Zoological name not given	Finches.....	Sporadic	o	+	o	o	o	o	Henning, 1939
	Columbiformes Columbidae	<i>Columba livia</i> (Gmelin)	Pigeon.....	Sporadic	o	o	+	o	o	o	Henning, 1939; Henning & Haig, 1939 Abrams, 1964
	Hominidae...	<i>Homo sapiens</i> Linn.	Man.....	Sporadic	o	+	o	o	o	o	Gear, Roux & Bevan, 1942; Henning, 1938, 1942; Levin & Roux, 1945; Pullinger & Scott-Millar, 1945; Bokkenheuser & Greenberg, 1959
	Bovidae.....	<i>Bos taurus</i> Linn.	Cattle.....	Sporadic	o	+	o	o	o	o	Henning, 1939

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Capr Province; E. = Eastern Capr Province; S. = South West Africa.

TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host				Region					Authorities	
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.	E.		S.
<i>Salmonella enteritidis</i> var <i>dublin</i> Bruce White, 1930.	Hominidae...	<i>Homo sapiens</i> Linn.	Man.....	One case	°	+	°	°	°	°	Henning, 1939
	Bovidae....	<i>Bos taurus</i> Linn.	Ox (Mainly calves)	Enzootic	+	+	+	+	+	+	Viljoen & Martinaglia, 1926, 1928; Robinson & Lawrence, 1928; Martinaglia, 1929; Henning, 1939, 1953a, 1953b, 1953c, 1954; Bishop, Schatz & Canham, 1943
	Caviidae.....	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Sporadic	°	°	°	°	°	°	Martinaglia, 1954
	Aves Anatidae	<i>Anas platyrhynchos</i> Linn.	Ducklings.....	Sporadic	°	°	°	+	°	°	Dunning, 1934
<i>Salmonella bovis morbilicans</i> (Basenau, 1894).	Hominidae...	<i>Homo sapiens</i> Linn.	Man .....	Sporadic	°	°	°	+	°	°	Greenfield & Judd, 1936; Henning & Greenfield, 1937; Henning, 1939
	Suidae.....	<i>Sus scrofa</i> Linn.	Domestic pig (pork)	Sporadic	°	°	°	+	°	°	Greenfield & Judd, 1936; Henning, 1939
<i>Salmonella braenderup</i> Kauffmann and Juel Henning- sen, 1937.	Hominidae...	<i>Homo sapiens</i> Linn.	Man.....	Sporadic	°	+	°	°	°	°	Gear, Roux & Bevan, 1942; Henning, 1942
	Muridae....	<i>Rattus rattus</i> Linn.	Black rat.....	Sporadic	°	+	°	°	°	°	Gear, Roux & Bevan, 1942; Henning, 1942
<i>Salmonella newport</i> Schütze, 1920.	Hominidae...	<i>Homo sapiens</i> Linn.	Man.....	Sporadic	+	°	°	°	°	°	Neser, Louw, Klein & Sachs, 1957
	Bovidae....	Species not stated	Salted dry meat (biltong)	Sporadic	+	°	°	°	°	°	Neser, Louw, Klein & Sachs, 1957
<i>Salmonella onderstepoort</i> Henning, 1936.	Hominidae...	<i>Homo sapiens</i> Linn.	Man.....	Sporadic	°	+	°	°	°	°	Buchanan, 1941-1948; Anon, 1949-1952
	Bovidae....	<i>Ovis aries</i> Linn.	Sheep.....	Sporadic	°	+	°	°	°	°	Henning, 1936, 1939

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.

TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host				Region					Authorities	
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.	E.		S.
<i>Salmonella poona</i> Briggs and Scott, 1935.	Hominiidae...	<i>Homo sapiens</i> Linn.	Man.....	Sporadic	°	+	°	°	°	°	Levin & Roux, 1945; Buchanan, 1941-1948; Anon., 1949-1952
	Bovidae.....	<i>Ovis aries</i> Linn.	Sheep (mutton)...	Sporadic	°	+	°	°	°	°	Levin & Roux, 1945
<i>Salmonella typhosa</i> (Zopf, 1884) White, 1930.	Hominiidae...	<i>Homo sapiens</i> Linn.	Man.....	Endemic	+	+	+	+	+	+	Buchanan, 1945-1948; Anon., 1949-1953; Bokkenheuser & Schrire, 1955-1956; Bokken- heuser, Schrire & Koornhof, 1957, 1958; Bokkenheuser & Richardson, 1959, 1960; Richardson, 1961
Typhoid fever...	Aves Phasiani- dae	<i>Gallus domesticus</i> Linn.	Fowl (chicken)...	One case	°	+	°	°	°	°	Henning, 1939
<i>Salmonella aborti- voequina</i> (Good and Corbett, 1916) Bergey <i>et</i> <i>al.</i> , 1923.	Equidae.....	<i>Equus caballus</i> Linn.	Horse.....	Sporadic Lab. Tests	°	+	+	°	°	°	Martinaglia, 1929; Henning, 1939, 1946; Henning, Keppel & Flight, 1943; Henning & McIntosh, 1946
Equine abortion		<i>Equus asinus</i> Linn.	Donkey.....	Sporadic Lab. Tests	°	°	+	°	°	°	Henning, 1946
		<i>Equus caballus</i> X <i>Equus asinus</i>	Mule.....	Sporadic	°	+	+	°	°	°	Martinaglia, 1929; Henning & McIntosh, 1946
	Caviidae.....	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	°	+	°	°	°	°	Henning, 1946
<i>Salmonella galli- narum</i> (Klein, 1889) Bergey <i>et al.</i> , 1925.	Aves Phasiani- dae	<i>Gallus domesticus</i> Linn.	Fowl.....	Enzootic	+	+	+	+	+	°	Martinaglia, 1928, 1929a, 1929b; Henning, 1939; Can- hann, 1948

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.



TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host				Region					Authorities	
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.	E.		S.
Fowl typhoid...	Meleagridae..	<i>Meleagris gallopavo</i> Linn.	Turkey.....	Enzootic	+	+	°	°	°	°	Martinaglia, 1929a; Henning, 1939; Abrams, 1964
	Caviidae.....	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	°	+	°	°	°	°	Martinaglia, 1929b
	Leporidae....	<i>Lepus cuniculus</i> Linn.	Rabbit.....	Lab. Tests	°	+	°	°	°	°	Martinaglia, 1929b
<i>Salmonella pul-</i> <i>lorum</i> (Rettger, 1909).	Phasianidae..	<i>Gallus domesticus</i> Linn.	Fowl (chickens)..	Enzootic	+	+	+	+	+	°	Martinaglia, 1927, 1928, 1929b; Henning, 1939; Can- ham, 1948; Abrams, 1964
Bacillary white diarrhoea	Caviidae.....	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	°	+	°	°	°	°	Martinaglia, 1929b
	Leporidae....	<i>Lepus cuniculus</i> Linn.	Rabbit.....	Lab. Tests	°	+	°	°	°	°	Martinaglia, 1929b
<i>Salmonella amers-</i> <i>foort</i> Henning, 1937.	Phasianidae..	<i>Gallus domesticus</i> Linn.	Fowl (chickens)..	Enzootic	°	+	°	°	°	°	Henning, 1937, 1939; Abrams, 1964
	Muridae.....	<i>Mus musculus</i> Linn.	Mouse.....	Lab. Tests	°	+	°	°	°	°	Henning, 1939
Brucellaceae <i>Pasteurella</i> <i>multocida</i> (Leh- man and Neu- mann, 1899) Rosenbusch and Merchant, 1939. ( <i>Pasteurella</i> <i>aviseptica</i> )	Aves Galli- formes Phasianidae	<i>Gallus domesticus</i> Linn.	Fowl.....	Sporadic	°	+	+	+	+	°	Spreull, 1909, 1910, 1911, 1926; Spreull & Jones 1910; Cur- son, 1915; Henning & Coles, 1933; Canham & Haig, 1942; Cooper, 1948; Stephan, Kaschula & Can- ham, 1949; Abrams, 1964
Fowl cholera....	Charadrii- formes Laridae	<i>Larus dominicanus</i> Lichtenstein.	Black-backed gull	Sporadic	°	°	°	+	°	°	Kaschula & Truter, 1951

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.

TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
<i>Pasteurella oviseptica</i>	Bovidae.....	<i>Ovis aries</i> Linn.	Sheep.....	Enzootic	o	o	o	o	o	+	Rickmann, 1908; Maybin, 1931 Henning & Brown, 1936
		<i>Capra hircus</i> Linn.	Goat.....	Enzootic	o	o	o	o	o	+	Maybin, 1931
		<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	o	+	o	o	o	o	o
<i>Pasteurella multocida</i> var. <i>icterohepatitidis</i> Cameron and Du Casse, 1962.	Bovidae.....	<i>Bos taurus</i> Linn.	Ox.....	Sporadic	o	+	o	o	o	o	Cameron & Du Casse, 1962
		<i>Ovis aries</i> Linn.	Sheep.....	Enzootic	+	+	+	+	+	+	Tustin, Adelaar & Cameron, 1960; Cameron & Du Casse, 1962
		<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	o	+	o	o	o	o	o
Bovine bacterial hepatitis and ovine bacterial icterus	Rodentia Caviidae	<i>Mus musculus</i> Linn.	Albino mouse....	Lab. Tests	o	+	o	o	o	o	Tustin, Adelaar & Cameron, 1960; Cameron & Du Casse, 1962
	Muridae.....	<i>Lepus cuniculus</i> Linn.	Rabbit.....	Lab. Tests	o	+	o	o	o	o	Tustin, Adelaar & Cameron, 1960; Cameron & Du Casse, 1962
		<i>Sus scrofa</i> Linn.	Domestic pig.....	Sporadic	o	o	o	+	o	o	De Kock, Robinson & Keppel, 1940
<i>Pasteurella suisepitica</i>	Suidae.....	<i>Equus asinus</i> Linn.	Donkey.....	Sporadic	o	o	o	o	+	+	Schmid, 1920
<i>Pasteurella pestis</i> (Lehmann and Neumann, 1896) Holland, 1920.	Primates Hominidae	<i>Homo sapiens</i> Linn.	Man.....	Periodic epidemics	+	+	+	+	+	+	Watkins-Pitchford, 1904; Mitchell, 1927; Fourie, 1936, 1938; Ann. Rep. S.A.I.M.R., 1935-1961

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa,

TABLE 2 (a).—*Protochyta* (continued)

Parasite	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
Plague.....	Carnivora Canidae	<i>Canis familiaris</i> Linn.	Dog.....	Very rare	o	o	o	+	o	o	Mitchell, 1927; Fourie, 1938
	Felidae.....	<i>Felis catus</i> Linn.	Domestic cat....	Sporadic Lab. Tests	o	+	o	+	o	o	Mitchell, 1927; Grasset, 1935; Buchanan, 1935, 1938; Fourie, 1938; Ordman, 1938
	Mustelidae...	<i>Ictonyx striatus</i> Perry.	Pole cat.....	Lab. Tests	o	+	o	o	o	o	Pirie, 1927
		<i>Mustela eversmanni</i> furo Linn.	Ferret.....	Sporadic	o	o	o	+	o	o	Mitchell, 1927
	Viverridae...	<i>Cynictis penicillata</i> (G. Cuvier)	Yellow mongoose	Sporadic Lab. Tests	+	+	o	o	o	o	Mitchell, 1927; Pirie, 1927; Fourie, 1938
		<i>Suricata suricatta</i> (Erxleben)	Suricate.....	Sporadic Lab. Tests	+	+	o	o	o	o	Mitchell, 1927; Pirie, 1927; Fourie, 1938
	Rodentia Bathyergidae	<i>Georchilus capensis</i> (Linn.).	Cape mole rat....	Sporadic Lab. Tests	o	+	+	+	+	o	Pirie, 1927
	Caviidae.....	<i>Cavia porcellus</i> Linn.	Guinea pig.....	Lab. Tests	o	+	+	o	o	o	Watkins-Pitchford, 1904; Ord- man, 1938; Mason & Amies, 1948; Ann. Rep. S.A.I.M.R., 1941, 1948
		<i>Desmodillus auricularis</i> (A. Smith).	Namaqua gerbille	Periodic epizootics Lab. Tests	+	+	o	+	+	+	Powell, 1925; Pirie, 1927; Fourie, 1938
	Gerbillidae...	<i>Tatera brantsii</i> (A. Smith).	Brants' gerbille...	Sporadic	+	o	o	+	+	o	Amies, Davis & De Meillon, 1950; Ann. Rep. S.A.I.M.R., 1951, Davis, 1953b

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.

TABLE 2 (b).—*Protophyta* (continued)

Parasite	Host			Region						Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.	E.		S.	
<i>Pasteurella pestis</i>	Gerbillidae...	<i>Tatera lobengulae</i> De Winton.	Lobengula's gerbille	Periodic epizootics Lab. Tests	+	+	+	+	+	+	Powell, 1925; Pirie, 1927; Fourie, 1938	
	Muridae.....	<i>Dendromus mesomelas</i> (Brants).	Climbing mouse..	Sporadic	o	+	o	+	+	o	o	Powell, 1925
		<i>Malacothrix typicus</i> (A. Smith).	Long-eared mouse	Sporadic Lab. Tests	+	+	+	+	+	+	+	Powell, 1925; Pirie, 1927
		<i>Mastomys natalensis</i> (A. Smith) (= <i>M. coucha</i> A. Smith).	Multimammate mouse	Periodic epizootics Lab. Tests	+	+	o	+	+	o	o	Powell, 1925; Pirie, 1927; Fourie, 1938; Ann. Rep. S.A.I.M.R., 1941, 1942; Mason & Amies, 1948
		<i>Mus musculus</i> Linn.	Mouse.....	Sporadic Lab. Tests	+	+	+	+	+	+	+	Mitchell, 1927; Pirie, 1927; Fourie, 1938; Ann. Rep. S.A.I.M.R., 1955
		<i>Mystromys abietatus</i> (A. Smith).	White tailed rat..	Sporadic Lab. Tests	+	+	+	+	+	+	+	Powell, 1925; Pirie, 1927
		<i>Rattus norvegicus</i> (Berkenhout).	Brown rat.....	Periodic epizootics Lab. Tests	o	o	+	+	+	+	+	Watkins-Pitchford, 1904; Powell, 1925; Mitchell, 1927; Pirie, 1927; Fourie, 1938
		<i>Rattus rattus</i> Linn.	Black rat.....	Periodic epizootics Lab. Tests	+	+	+	+	+	+	+	Watkins-Pitchford, 1904; Powell, 1925; Mitchell, 1927; Pirie, 1927; Grasset, 1935; Fourie, 1938; Ann. Rep. S.A.I.M.R., 1935-1961
		<i>Rhabdomys pumilio</i> (Sparrman).	Striped mouse....	Sporadic Lab. Tests	+	+	+	+	+	+	+	Mitchell, 1927; Pirie, 1927; Ann. Rep. S.A.I.M.R., 1956

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.



TABLE 2 (b).—*Protochyta* (continued)

Parasite	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
<i>Pasteurella pestis</i>	Muridae....	<i>Steatomys krebsii</i> Peters.	Krebs' fat mouse	Sporadic Lab. Tests	+	+	+	+	+	+	Powell, 1925; Pirie, 1927
		<i>Leggadia minutooides</i> (A. Smith).	Cape dwarf mouse	Lab. Tests	+	+	+	+	+	+	Pirie, 1927
	Otomyidae....	<i>Otomys irroratus</i> (Brants).	Vlei rat.....	Sporadic Lab. Tests	+	+	+	+	+	+	Powell, 1925; Pirie, 1927
		<i>Myotomys broomi</i> (Thomas).	Broom's Karoo rat	Sporadic Lab. Tests	+	+	+	+	+	+	Pirie, 1927
		<i>Myotomys unisul-</i> <i>catus</i> (F. Cuvier).	Cuvier's Karoo rat	Lab. Tests	+	+	+	+	+	+	Pirie, 1927; Ann. Rep. S.A.I.M.R., 1952
		<i>Parotomys luteolus</i> (Thomas and Schwann).	Eastern Karoo rat	Sporadic Lab. Tests	+	+	+	+	+	+	Pirie, 1927
	Pedetidae....	<i>Pedetes caffer</i> (Pal- las)	Springhare.....	Sporadic Lab. Tests	+	+	+	+	+	+	Powell, 1925; Pirie, 1927; Mitchell, 1927
	Sciuridae....	<i>Geosciurus inauris</i> (Zimmermann).	Ground squirrel...	Sporadic Lab. Tests	+	+	+	+	+	+	Pirie, 1927; Amies, Davis & De Meillon, 1950
	Lagomorpha Leporidae	<i>Lepus capensis</i> (Linn.).	Cape hare.....	Sporadic Lab. Tests	+	+	+	+	+	+	Powell, 1925; Pirie, 1927
		<i>Lepus saxatilis</i> (F. Cuvier).	Karoo scrub hare	Sporadic	+	+	+	+	+	+	Pirie, 1927
		<i>Lepus saxatilis</i> <i>zuluensis</i> Thomas and Schwann.	Zulu hare.....	Sporadic	+	+	+	+	+	+	Pirie, 1927

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.

TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host				Region					Authorities	
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.	E.		S.
<i>Pasteurella pestis</i>	*Insecta Siphonaptera Pulicidae	<i>Pulex irritans</i> Linn.	Common flea....	One record	+	+	+	+	+	+	De Meillon, Davis & Hardy, 1961
		<i>Echidnophaga gallinacea</i> (Westwood).	"Sticktight" flea of fowls	Sporadic	+	+	+	+	+	+	Burroughs, 1947; De Meillon <i>et al.</i> , 1961
		<i>Ctenocephalides canis</i> (Curtis).	Dog flea.....	Sporadic Lab. Tests	+	+	+	+	+	+	Ann. Rep. S.A.I.M.R., 1930 De Meillon <i>et al.</i> , 1961
		<i>Ctenocephalides connatus</i> (Jordan).	Flea.....	Poor vector	+	+	+	+	+	+	De Meillon <i>et al.</i> , 1961
		<i>Xenopsylla brasiliensis</i> (Baker)	Flea.....	Important vector Lab. Tests	+	+	+	+	+	+	Ingram, 1927; Davis, 1948a; De Meillon <i>et al.</i> , 1961
		<i>Xenopsylla cheopis</i> (Rothschild).	Flea.....	Important vector in "murine phase"	+	+	+	+	+	+	Davis, 1948a; De Meillon <i>et al.</i> , 1961
		<i>Xenopsylla eridos</i> (Rothschild).	Flea.....	May be important Lab. Tests	+	+	+	+	+	+	De Meillon <i>et al.</i> , 1961
		<i>Xenopsylla hirsuta hirsuta</i> Ingram.	Flea.....	Possible vector Lab. Tests	+	+	+	+	+	+	Ingram, 1930; De Meillon <i>et al.</i> , 1961
		<i>Xenopsylla philoxera</i> Hopkins.	Flea.....	Important vector Lab. Tests	+	+	+	+	+	+	Ingram, 1927; Davis, 1948b, 1953a; De Meillon <i>et al.</i> , 1961
					+	+	+	+	+	+	+

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\* The cited distribution of the Insecta does not necessarily imply that they were necessarily involved as vectors in all the regions.

TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host				Region					Authorities	
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.	E.		S.
<i>Pasteurella pestis</i>	Pulicidae....	<i>Xenopsylla phyllo-</i> <i>mac</i> De Meillon.	Flea.....	One epizootic	o	+	o	o	o	o	De Meillon <i>et al.</i> , 1961
		<i>Xenopsylla pirtiei</i> Ingram.	Flea.....	Importance unknown Lab. Tests	+	+	o	+	o	+	De Meillon <i>et al.</i> , 1961; Davis, 1948b, 1953a
		<i>Xenopsylla versuta</i> Jordan.	Flea.....	Sporadic Lab. Tests	o	+	o	+	o	+	De Meillon <i>et al.</i> , 1961
	Hypsophthal- midae	<i>Chiastoposylla</i> <i>numae</i> form <i>rossi</i> (Rothschild).	Flea.....	Sporadic Lab. Tests	+	+	o	+	o	+	Ingram, 1927; Davis, 1948a, 1953b; De Meillon <i>et al.</i> , 1961
		<i>Nosopsyllus fasci-</i> <i>atus</i> (Bosc.).	Flea.....	Not important Lab. Tests	+	+	+	o	o	o	Pollitzer, 1954; De Meillon <i>et al.</i> , 1961
	Leptopsyllidae	<i>Leptopsylla segnis</i> (Schönherr).	Flea.....	Sporadic	+	+	+	+	+	+	Pollitzer, 1954; De Meillon <i>et al.</i> , 1961
		<i>Listropsylla dorip-</i> <i>pae</i> (Rothschild).	Flea.....	Sporadic Lab. Tests	+	+	o	+	+	+	De Meillon <i>et al.</i> , 1961
	Hystrihop- syllidae	<i>Dinopsyllus ellobius</i> (Rothschild).	Flea.....	Not important but efficient Lab. Tests	+	+	+	+	+	+	Ingram, 1927; De Meillon, <i>et al.</i> , 1961
		<i>Pediculus humanus</i> var. <i>capitis</i> De Greef.	Head louse.....	Single Lab. Test	o	+	o	o	o	o	+

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.

TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host				Region					Authorities	
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.	E.		S.
<i>Brucella melitensis</i> (Hughes, 1892) Meyer and Shaw, 1920. Malta fever.....	Hominiidae...	<i>Homo sapiens</i> Linn.	Man.....	Sporadic	o	o	o	o	o	o	McKenzie, 1903; Thorton, 1936; Campbell & Green- field, 1937 Strachan, 1906, 1915, 1932; McCrea, 1908; Muir, 1912; Birt & Strachan, 1909 Washbourne 1901; Van Drim- melen, 1962 Werner, 1909; Summa, 1910, 1913; Nägelsbach, 1936; Sonnenschein, 1939; Van Drimmelen, 1962
	Bovidae.....	<i>Capra hircus</i> Linn.	Goat.....	Sporadic	+	o	o	o	o	o	Birt, 1906; Strachan, 1906; Muir, 1912 Robinson, 1960 Van Drimmelen, 1961 <i>b</i> , 1962 Karsten, 1939
	Caviidae.....	<i>Ovis aries</i> Linn.	Sheep.....	Enzootic?	o	o	o	o	+	+	Karsten, 1939; Van Drim- melen, 1953, 1962 Van Drimmelen, 1962
<i>Brucella kara- kulensis</i> (Member of <i>B. melitensis</i> group)	Bovidae.....	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	o	+	o	o	o	o	Van Drimmelen, 1961 <i>a</i>
	Caviidae.....	<i>Ovis aries</i> Linn.	Sheep.....	Not deter- mined	?	?	?	+	?	+	Van Drimmelen, 1953, 1962
<i>Brucella ovigeni- tatum</i> ( <i>B. ovis</i> ) (Member of <i>B. melitensis</i> group)	Bovidae.....	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	o	+	o	o	o	o	Van Drimmelen, 1961 <i>a</i>
	Bovidae.....	<i>Ovis aries</i> Linn.	Sheep.....	Enzootic	+	+	+	+	+	o	Van Rensburg, Van Heerden, Roux & Snyders, 1958; Van Heerden, 1963; Van Drimmelen, 1961 <i>b</i> , 1962 Scheben, 1921; Van Drim- melen, 1962

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.



TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host					Region					Authorities	
	Class Order Family	Genus and species	Vernacular name	Incidence		O.	T.	N.	W.	E.		S.
<i>Brucella abortus</i> (Schmidt and Weis, 1901) Mayer and Shaw, 1920. Undulant fever of man; conta- gious abortion of cattle	Caviidae.....	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Insusceptible		°	+	°	°	°	°	Van Drimmelen, 1961a
	Hominidae...	<i>Homo sapiens</i> Linn.	Man.....	Sporadic		+	°	°	°	°	°	Strachan, 1915 De Korte, 1924 Campbell & Greenfield, 1937 Buchanan, 1941, 1945 Van Drimmelen, 1962
	Bovidae.....	<i>Bos taurus</i> Linn.	Ox.....	Highly enzootic		+	+	+	+	+	+	Grey, 1906; Robinson, 1918, 1935, 1941, 1945; Quinlan, 1923; Pullinger, 1947; Van Drimmelen, 1948, 1949, 1962; Meara, 1950
		<i>Capra hircus</i> Linn.	Goat.....	Sporadic		°	+	°	°	°	°	Van Drimmelen, 1962
		<i>Ovis aries</i> Linn.	Sheep.....	Sporadic		?	+	?	?	?	+	Van Drimmelen, 1960, 1962
	Perissodactyla	<i>Equus caballus</i> Linn.	Horse.....	Suspected		°	°	°	+	°	°	Van Drimmelen, 1962
		<i>Equus caballus</i> X <i>Equus asinus</i>	Mule.....	Suspected		°	°	°	+	°	°	Van Drimmelen, 1962
	Caviidae.....	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests		°	+	°	°	°	°	Van Drimmelen, 1961a
	Bovidae.....	<i>Ovis aries</i> Linn.	Sheep.....	Enzootic		+	+	+	+	+	?	Van Drimmelen, 1962
	Caviidae.....	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests		°	+	°	°	°	°	Van Drimmelen, 1961a
Suidae.....	<i>Sus scrofa</i> Linn.	Pig.....	Suspected		°	+	°	°	°	°	Van Drimmelen, 1961b, 1962	
Bovidae.....	<i>Bos taurus</i> Linn.	Ox.....	Enzootic		+	+	+	+	+	°	Robinson, 1950; 1951; Fourie, 1955; Henning, 1956; Hugo, 1962	

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.

EMBRYOLOGICAL DEVELOPMENT OF THE PHARYNGEAL REGION OF SHEEP

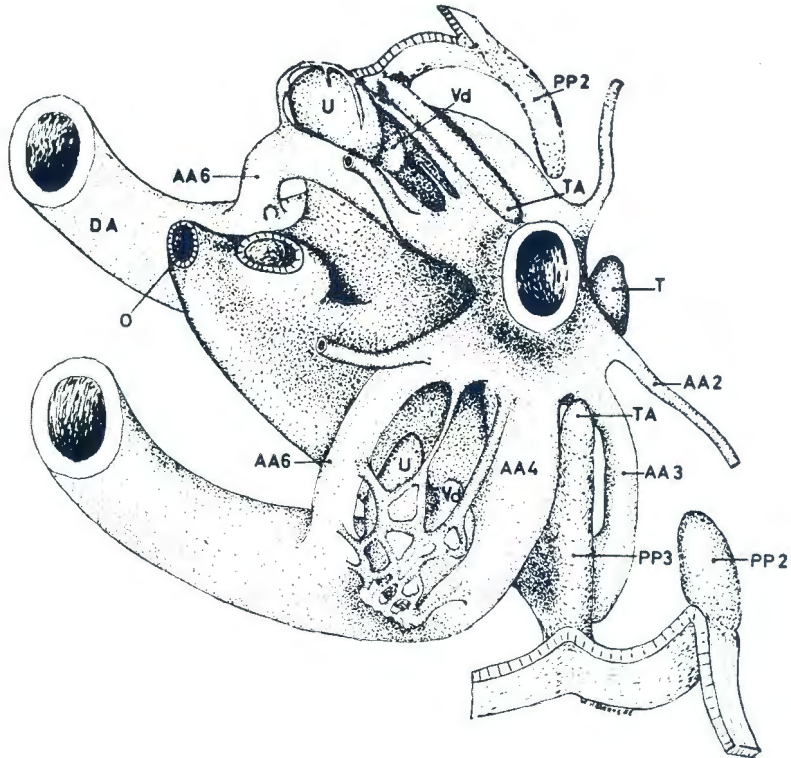


FIG. 6.—A ventro-lateral view of a reconstructed wax model of a portion of the pharynx and aortic arches of a sheep embryo of 23 days 23.5 hours. The lateral capillary plexus, its connections to aortic arches 4 and 6 and the two additional capillaries which could possibly represent additional aortic arches, are well shown.  $\times 100$ .

TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host				Region				Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
<i>Sphaerophorus necrophorus</i>	Caviidae....	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	°	+	°	°	°	°	Quinlan, Steek & Robinson, 1926
	Muridae....	<i>Mus musculus</i> Linn.	Mouse.....	Lab. Tests	°	+	°	°	°	°	Quinlan, Steek & Robinson, 1926
	Leporidae....	<i>Lepus cuniculus</i> Linn.	Rabbit.....	Lab. Tests	°	+	°	°	°	°	Quinlan, Steek & Robinson, 1926
<i>Streptobacillus moniliformis</i> Levaditi et al., 1925 (= <i>Streptothrix paraxeri</i> <i>cepapi</i> Schottmüller, 1914) Rat-bite fever	Hominidae...	<i>Homo sapiens</i> Linn.	Man.....	A single case at Hamburg	°	°	°	°	°	°	Schottmüller, 1914
	Rodentia Sciuridae	<i>Paraxerus cepapi</i> (A. Smith).	Yellow-footed squirrel from South Africa	Lab. Tests Hamburg	°	+	°	°	°	°	Schottmüller, 1914
Micrococcaceae <i>Staphylococcus aureus</i> Rosenbach, 1884.	Hominidae...	<i>Homo sapiens</i> Linn.	Man.....	Endemic	+	+	+	+	+	°	Burman, 1930; Petersen, 1935; Buchanan, 1936-1947; Gray, 1937-1941; Harrington, 1942-1948; Nesser, 1944- 1948; Cooper, 1959; Ranking, 1959; Shandling, 1960; Bradlow, 1962; Currey, 1962; Heese, 1962; Rose-Innes, Heese & Katz, 1962; Uys, 1962
	Bovidae....	<i>Bos taurus</i> Linn.	Ox.....	No systematic surveys	°	+	°	°	°	°	Pullinger, 1947; Cameron, 1963a, 1963b, 1964
		<i>Ovis aries</i> Linn.	Sheep.....	Lab. Tests	°	+	°	°	°	°	Cameron, 1963b

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.

EMBRYOLOGICAL DEVELOPMENT OF THE PHARYNGEAL REGION OF SHEEP

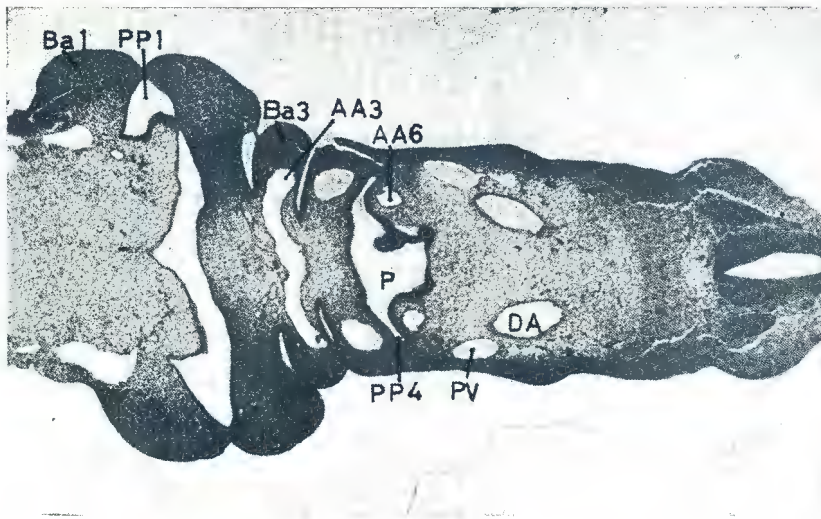


FIG. 9.—A photograph of a section through the pharyngeal region of a sheep embryo showing the sequence of the pharyngeal pouches, branchial and aortic arches (23 days).  $\times 30$ .

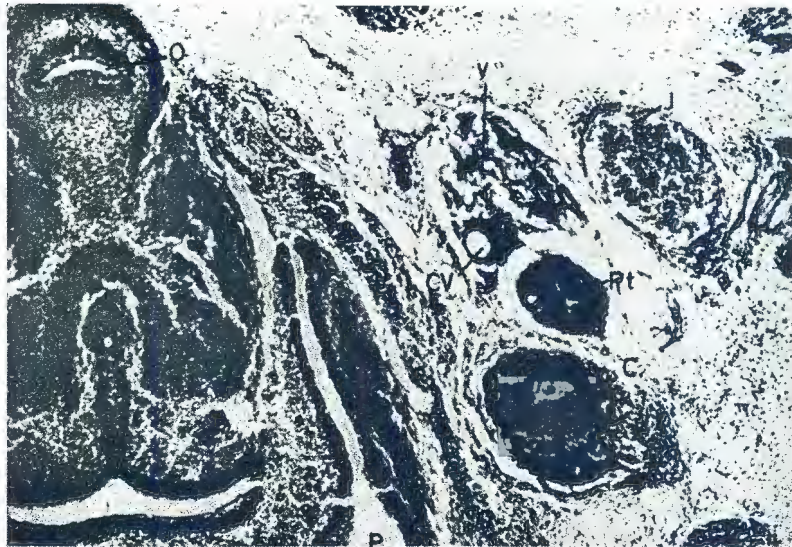


FIG. 10.—A photograph showing relations of cervical vesicle, parathyroid, carotid, ganglion nodosum and jugular vein as described on page 200 of text (31 days).  $\times 75.6$ .



TABLE 2 (a).—*Protothya* (continued)

Parasite	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
<i>Corynebacterium pyogenes</i>	Suidae.....	<i>Sus scrofa</i> Linn.	Pig.....	Enzootic	+	+	+	+	+	+	Henning, 1956
	Rodentia Muridae	<i>Mus musculus</i> Linn.	Mouse.....	Lab. Tests	o	+	o	o	o	o	Henning, 1956
	Lagomorpha Leporidae	<i>Lepus cuniculus</i> Linn.	Rabbitt.....	Lab. Tests	o	+	o	o	o	o	Henning, 1956
	Hominidae...	<i>Homo sapiens</i> Linn.	Man.....	Endemic	+	+	+	+	+	o	Buchanan, 1935-1947; Gray, 1935-1941; Murray, 1935, 1942, 1943a; Emmerson, 1937, 1941; Barnettson, 1942-1943; Harrington, 1942-1945; Murray, 1943b; Neser, 1944-1954; Pfeiffer & Viljoen, 1945; Woodrow, 1946; Anon., 1948-1953; Chigier, 1952; Mason, Robinson, Preiss & Turnbull, 1952; Hirsch, 1954; Bokkenheuser, 1955a, 1955b; Bokkenheuser & Heymann, 1954; Dubb, 1955
<i>Corynebacterium equi</i> Magnusson, 1923.	Bovidae.....	<i>Bos taurus</i> Linn.	Ox.....	Sporadic	+	o	o	o	o	o	Pfeiffer & Viljoen, 1945
	Caviidae.....	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	+	o	o	o	o	o	Pfeiffer & Viljoen, 1945
	Equidae.....	<i>Equus caballus</i> Linn.	Horse.....	Apparently sporadic	o	o	o	+	o	o	Grosskopf, Tustin & Muir 1957
<i>Listeria monocytogenes</i> (Murray et al., 1926) Pirie, 1940.	Rodentia Gerbillidae	<i>Tatera lobengulae</i> De Winton.	Lobengula's gerbille	Periodic epizootics Lab. Tests	+	+	o	o	o	o	Pirie, 1927, 1937, 1938
		<i>Tatera brantsii</i> (A. Smith).	Brants' gerbille...	Lab. Tests	o	+	o	o	o	o	Winter, 1946

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.

EMBRYOLOGICAL DEVELOPMENT OF THE PHARYNGEAL REGION OF SHEEP

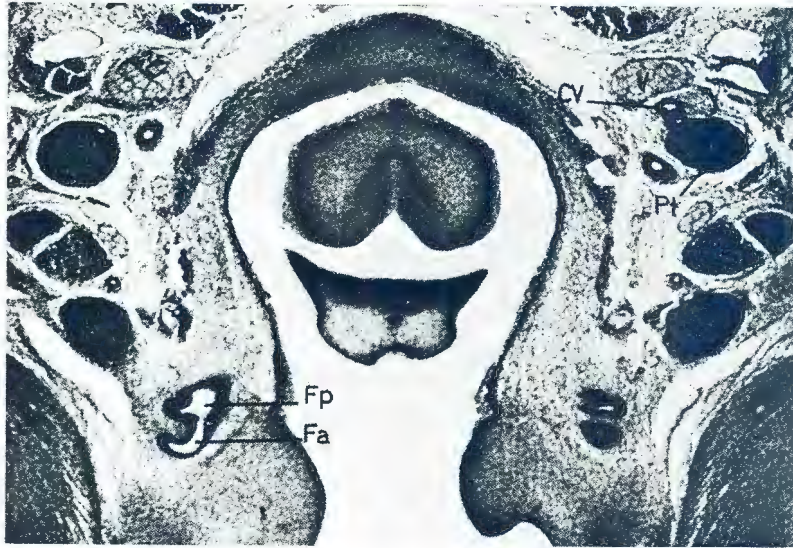


FIG. 13.—A photograph of a transverse section through the arytenoid swellings showing the union of the anterior and posterior fossae to form the sinus of the palatine tonsil. Deeper down (on right side) the fossae are separate. Parathyroid III and cervical vesicle IV attached to the cranial end of the thymus cord are also shown (34 days).  $\times 30$ .

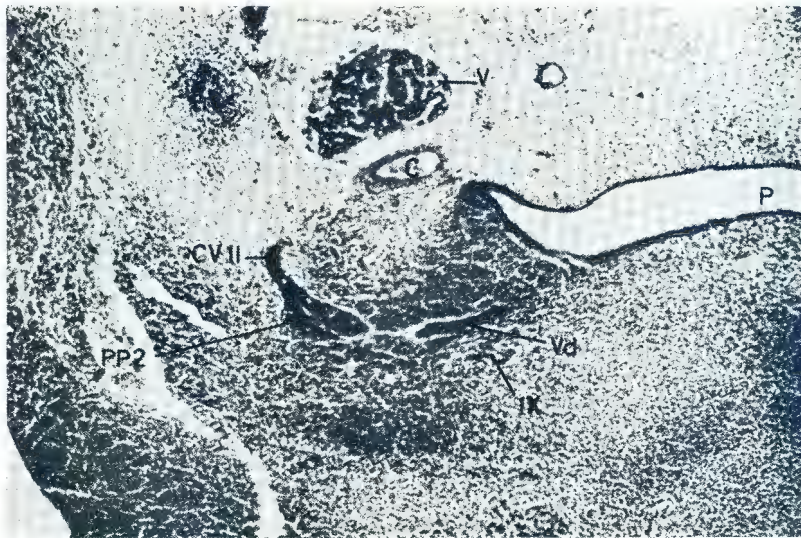


FIG. 14.—A photograph of pouch II (showing the cervical vesicle II attached to its caudo-lateral pocket). The ventral diverticulum is seen apart from the pharynx and pouch II (26 days).  $\times 75.6$ .

TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host			Region					Authorities			
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.	
<i>Erysipelothrix insidiosus</i> (Trevisan, 1885) Langford and Hansen, 1953 (= <i>Erysipelothrix rhusiopathiae</i> Winslow <i>et al.</i> , 1920. Swine erysipelas	Suidae.....	<i>Sus scrofa</i> Linn.	Domestic pig.....	Sporadic	o	+	+	+	o	o	Haig & Adelaar, 1944; Robinson, 1951; Loveday, 1962, 1964	
	Muridae.....	<i>Mus musculus</i> Linn.	Mouse.....	Lab. Tests	o	+	o	o	o	o	Haig & Adelaar, 1944; Robinson, 1951; Loveday, 1962	
	Leporidae....	<i>Lepus cuniculus</i> Linn.	Rabbit.....	Lab. Tests	o	+	o	o	o	o	Haig & Adelaar, 1944; Robinson, 1951	
	Aves Colum- bidae	<i>Columba livia</i> (Gmel.)	Pigeon.....	Lab. Tests	o	+	o	o	o	o	Haig & Adelaar, 1944	
Bacillaceae <i>Bacillus anthracis</i> Cohn, 1872.	Mammalia Primates Hominiidae	<i>Homo sapiens</i> Linn.	Man.....	Endemic	+	+	+	+	o	o	Livingstone, 1857; Kehoe, 1918; Viljoen, Curson & Fourie, 1928; Ann. Rep. S.A.I.M.R., 1935-1961	
	Cercopithe- cidae	<i>Papio ursinus</i> (Kerr).	Baboon.....	1 case	o	*	o	o	o	o	Pienaar, 1961	
	Carnivora Viverridae	<i>Civettictus civetta</i> Cabrera.	Civet.....	1 case	o	*	o	o	o	o	Pienaar, 1960	
	Felidae.....	<i>Genetta felina</i> (Thunberg).	Genet cat.....	5 cases	o	*	o	o	o	o	o	Pienaar, 1961
		<i>Acinonyx jubatus</i> (Schreber).	Cheetah.....	2 cases	o	*	o	o	o	o	o	Pienaar, 1960, 1961
	Mustelidae...	<i>Leo leo krugeri</i> Roberts.	Lion.....	2 cases	o	*	o	o	o	o	o	Pienaar, 1961
		<i>Panthera pardus</i> (Günther).	Leopard.....	4 cases	o	*	o	o	o	o	o	Pienaar, 1961
		<i>Mellivora capensis</i> (Schreber)	Honey badger, Ratel	2 cases	o	*	o	o	o	o	o	Pienaar, 1961

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\* = K.N.P. = Kruger National Park



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FIG. 16.—A photograph of a transverse section showing the relations of the oesophagus, trachea, thyroid, ultimobranchial body, thymus, jugular vein and carotid (28 days).  $\times 30$ .



TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
<i>Bacillus anthracis</i>	Bovidae. ....	<i>Bos taurus</i> Linn.	Ox.....	Enzootic	+	+	+	+	+	°	Kehoe, 1918; Viljoen, Curson & Fourie, 1928 Rickmann, 1908
		<i>Capra hircus</i> Linn.	Goat.....	Enzootic	+	+	+	+	+	°	Kehoe, 1918; Viljoen, Curson & Fourie, 1928 Rickmann, 1908
		<i>Ovis aries</i> Linn.	Sheep.....	Enzootic	+	+	+	+	+	°	Hutcheon, 1882; Kehoe, 1918; Viljoen, Curson & Fourie, 1928 Rickmann, 1908
		<i>Alcelaphus caama</i> (G. Cuvier).	Hartebeest.....	Sporadic	?	?	?	?	?	°	Henning, 1932
		<i>Aepyceros melanopus</i> (Lichtenstein).	Impala.....	7	°	*	°	°	°	°	Pienaar, 1961
		<i>Antidorcas marsupialis</i> (Zimmermann).	Springbuck.....	Sporadic	?	?	?	?	?	?	Henning, 1932
		<i>Damaliscus albifrons</i> (Burchell).	Blesbuck.....	Lab. Tests	°	+	°	°	°	°	Neitz, 1936
		<i>Damaliscus lunatus</i> (Burchell).	Sassaby.....	1	°	*	°	°	°	°	Pienaar, 1960
		<i>Kobus ellipsiprymnus</i> (Ogilby).	Waterbuck.....	92	°	*	°	°	°	°	Pienaar, 1960, 1961
		<i>Nototragus sharpei</i> (Thomas and Schwann).	Grysbok.....	2	°	*	°	°	°	°	Pienaar, 1961
		<i>Ozanna equina</i> (Desmarest).	Roan antelope...	47	°	*	°	°	°	°	Pienaar, 1960, 1961

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\* = K.N.P. = Kruger National Park.

EMBRYOLOGICAL DEVELOPMENT OF THE PHARYNGEAL REGION OF SHEEP

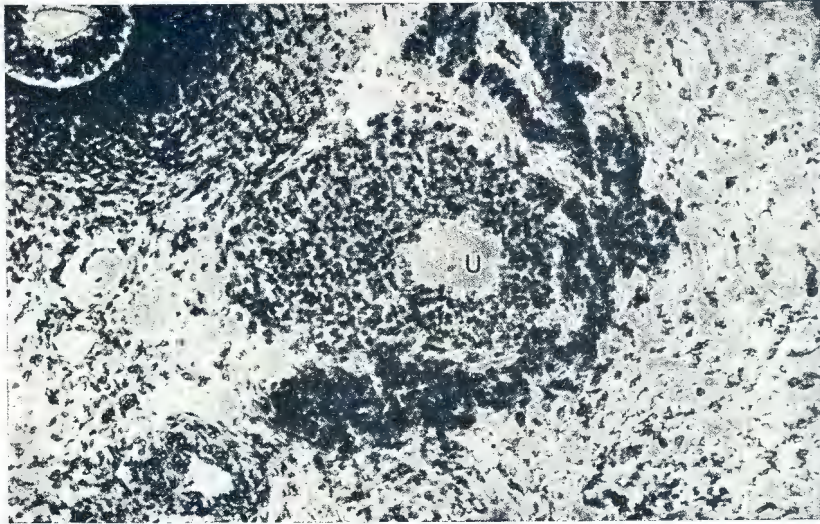


FIG. 18.—A photograph of a transverse section showing the caudal end of the lumen of the ultimobranchial body divided into two by a thin partition (36 days).  $\times 96.8$ .



FIG. 19.—A photograph of the ultimobranchial body showing its stratified epithelium containing a group of clear cells (36 days).  $\times 192$ .

TABLE 2 (a).--*Protozoophyta* (continued)

Parasite	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
<i>Clostridium septi-</i> <i>cum</i> (Macé, 1888) Ford, 1927.	Bovidae.....	<i>Bos taurus</i> Linn.	Ox.....	Sporadic	°	°	°	°	°	+	Viljoen & Scheuber, 1926
		<i>Ovis aries</i> Linn.	Sheep.....	Sporadic Lab. Tests	? °	? °	? °	? °	? °	°	Green, 1929 Viljoen & Scheuber, 1926; Green, 1929; Mason, 1936
Malignant oedema	Muridae.....	<i>Mus musculus</i> Linn.	Mouse.....	Lab. Tests	°	+	°	°	°	°	Mason, 1936
<i>Clostridium</i> <i>chauvoei</i> (Arloing <i>et al.</i> , 1887) Holland, 1920.	Bovidae.....	<i>Bos taurus</i> Linn.	Ox.....	Enzootic Lab. Tests	+	+	+	+	°	°	Theiler, 1894; Viljoen & Scheuber, 1926; Green, 1929; Mason, 1936; Mason & Scheuber, 1936; Scheuber, 1944
		<i>Capra hircus</i> Linn.	Goat.....	Lab. Tests	°	+	°	°	°	°	Viljoen & Scheuber, 1926; Rickmann, 1908
<i>Clostridium per-</i> <i>fringens</i> (Veil- lon and Zuber, 1898) Holland, 1920 <i>Clostri-</i> <i>dium welchii</i> Type A. Gas gangrene	Caviidae.....	<i>Ovis aries</i> Linn.	Sheep.....	Enzootic Lab. Tests	+	+	+	+	°	°	Viljoen & Scheuber, 1926; Green, 1929; Mason, 1936; Mason & Scheuber, 1936; Scheuber, 1944
		<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	°	+	°	°	°	°	Mason, 1936
		<i>Canis familiaris</i> Linn.	Dog.....	Single case	°	°	°	+	°	°	°

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.







TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host				Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.	E.		S.	
<i>Clostridium botulinum</i> Type C	Bovidae.....	<i>Bos taurus</i> Linn.	Ox.....	Lab. Tests	o	+	o	o	o	o	Theiler & Robinson, 1927; Robinson, 1930	
		<i>Capra hircus</i> Linn.	Goat.....	Lab. Tests	o	+	o	o	o	o	Theiler & Robinson, 1927; Robinson, 1930	
		<i>Ovis aries</i> Linn.	Sheep.....	Lab. Tests	o	+	o	o	o	o	o	Theiler & Robinson, 1927; Robinson, 1930
	Caviidae.....	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	o	+	o	o	o	o	o	Theiler & Robinson, 1927; Robinson, 1930
		<i>Rattus norvegicus</i> (Berkenhout).	Albino rat.....	Lab. Tests	o	+	o	o	o	o	o	Theiler & Robinson, 1927; Robinson, 1930
	Muridae.....	<i>Rattus rattus</i> Linn.	Black rat.....	Lab. Tests	o	+	o	o	o	o	o	Theiler & Robinson, 1927; Robinson, 1929b, 1930
		<i>Lepus cuniculus</i> Linn.	Rabbit.....	Lab. Tests	o	+	o	o	o	o	o	Theiler & Robinson, 1927
	Aves Galli- formes Meleagridae	<i>Meleagris gallopavo</i> Linn.	Turkey.....	Sporadic	o	+	o	o	o	o	o	Robinson, 1930
		<i>Anas platyrhynchos</i> Linn.	Duck.....	Lab. Tests	o	+	o	o	o	o	o	Theiler & Robinson, 1927; Abrams, 1964
	Anseriformes Anatidae	<i>Anser anser</i> Linn.	Goose.....	Lab. Tests	o	+	o	o	o	o	o	Abrams, 1964
		Zoological names not given	18 water birds (geese, ducks and others)	Sporadic Type C? Type D?	o	+	o	o	o	o	o	Robinson, 1929b

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TABLE 2 (a).—*Protothyta* (continued)

Parasite	Host		Region					Authorities			
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.		W.	E.	S.
<i>Clostridium botulinum</i> Type D Meyer and Gunnison, 1928.  Lamsiekte Botulism	Bovidae.....	<i>Bos taurus</i> Linn.	Ox.....	Enzootic Lab. Tests	+	+	+	+	+	+	Theiler, Viljoen, Green, Du Toit, Meier & Robinson, 1927; Theiler & Robinson, 1927; Robinson, 1930; Scheuber, 1929
		<i>Capra hircus</i> Linn.	Goat.....	Lab. Tests	+		+	+	+	+	Theiler & Robinson, 1927; Robinson, 1930
		<i>Ovis aries</i> Linn.	Sheep.....	Sporadic	+	+	+	+	+	+	Bekker & Rossouw, 1930; Robinson, 1930 Sigwart, 1929
		<i>Equus caballus</i> Linn.	Horse.....	Lab. Tests	+	+	+	+	+	+	Theiler & Robinson, 1927; Robinson, 1930
		<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	+	+	+	+	+	+	Robinson, 1929a
		<i>Rattus norvegicus</i> (Berkenhout).	Albino rat.....	Lab. Tests	+	+	+	+	+	+	Theiler & Robinson, 1927
		<i>Rattus rattus</i> Linn.	Black rat.....	Lab. Tests	+	+	+	+	+	+	Robinson, 1929a
		<i>Mus musculus</i> Linn.	Mouse.....	Lab. Tests	+	+	+	+	+	+	Theiler & Robinson, 1927
		<i>Lepus cuniculus</i> Linn.	Rabbit.....	Lab. Tests	+	+	+	+	+	+	Theiler & Robinson, 1927
		Aves Struthioniformes Struthionidae	<i>Struthio camelus</i> Linn.	Ostrich.....	Lab. Tests	+	+	+	+	+	+

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.

TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
<i>Clostridium botulinum</i> Type D	Galliformes Meleagridae	<i>Meleagris gallopavo</i> Linn.	Turkey.....	Lab. Tests	°	°	+	°	°	°	Abrams, 1964
	Anseriformes Anatidae	<i>Anas platyrhynchos</i> Linn.	Duck.....	Lab. Tests	°	+	°	°	°	°	Theiler & Robinson, 1927; Robinson, 1930; Abrams, 1964
		<i>Anser anser</i> Linn.	Goose.....	Lab. Tests	°	+	°	°	°	°	Abrams, 1964
	Columbiformes Columbidae	<i>Columba livia</i> (Gmelin).	Pigeon.....	Lab. Tests	°	+	°	°	°	°	Theiler & Robinson, 1927; Robinson, 1930
<i>Clostridium tetani</i> (Flügge, 1886). Tetanus "Lock jaw"	Hominiidae...	<i>Homo sapiens</i> Linn.	Man.....	Sporadic	+	+	+	+	+	+	Buchanan, 1935-1947; Gray, 1937, 1938, 1940; Ordman & Roux, 1941; Anon., 1950, 1951
	Equidae.....	<i>Equus caballus</i> Linn.	Horse.....	Sporadic	+	+	+	+	+	+	Hutcheon, 1901, 1904; Henning, 1956 Rickmann, 1908
	Bovidae.....	<i>Bos taurus</i> Linn.	Ox.....	Sporadic	+	+	+	+	+	+	Henning, 1956 Rickmann, 1908
		<i>Capra hircus</i> Linn.	Goat.....	Sporadic	°	°	°	°	°	+	Rickmann, 1908
		<i>Ovis aries</i> Linn.	Sheep.....	Sporadic	+	+	+	+	+	+	Henning, 1956 Rickmann, 1908
		<i>Sus scrofa</i> Linn.	Domestic pig....	Sporadic	°	°	°	°	°	+	Rickmann, 1908
		<i>Felis catus</i> Linn.	Domestic cat....	A single case	°	+	°	°	°	°	Parkin, 1948
		<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	°	+	°	°	°	°	Mason, 1943; Henning, 1956
		<i>Mus musculus</i> Linn.	Mouse.....	Lab. Tests	°	+	°	°	°	°	Henning, 1956

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.

TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
Actinomycetales Mycobacteriaceae <i>Mycobacterium tuberculosis</i> Zopf, 1883	Hominidae...	<i>Homo sapiens</i> Linn.	Man.....	Endemic	+	+	+	+	+	+	Marais, 1936; Hewitt, 1937; Thornton, 1937; Allan, 1939; Dormer, Friedlander & Wiles, 1941; Gale, 1943; Dormer, 1949, 1950, 1957, 1960; Osburn, 1956a, 1956b; Walker, 1956; Ann. Rep. S.A.I.M.R., 1935-1961
	Cercopitheci- dae	<i>Cercopithecus aethiops pygerythrus</i> (F. Cuvier).	Vervet monkey...	Lab. Tests	o	+	o	o	o	o	Buchanan, 1952; Murray & Grasset, 1946
	Canidae.....	<i>Canis familiaris</i> Linn.	Dog.....	Several	o	+	o	o	o	o	Robinson, 1942, 1953; De Kock & Le Roux, 1956
	Giraffidae....	<i>Giraffa camelopardalis</i> (Linn.).	Giraffe.....	1	o	+	o	o	o	o	Martinaglia, 1930
	Suidae.....	<i>Sus scrofa</i> Linn.	Domestic pig....	20	o	+	o	o	o	o	Fourie, De Wet & Van Drimmelen, 1950; Robinson, 1950
	Caviidae.....	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	o	+	o	o	o	o	Ann. Rep. S.A.I.M.R., 1935-1961; Martinaglia, 1929, and others
	Muridae.....	<i>Tatera afra</i> (Gray).	Gerbille.....	Lab. Tests	o	+	o	o	o	o	Murray & Grasset, 1946
		<i>Tatera brantsii</i> (A. Smith).	Gerbille.....	Lab. Tests	o	+	o	o	o	o	Murray & Grasset, 1946
	Psittacidae....	Species not recorded	Parrot.....	1	o	o	+	o	o	o	Martinaglia, 1929

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TABLE 2 (a).—*Protothytia* (continued)

Parasite	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
<i>Mycobacterium bovis</i> Bergey et al., 1934.	Bovidae.....	<i>Bos taurus</i> Linn.	Ox.....	Enzootic	+	+	+	+	+	°	Theiler, 1897; De Kock, 1932; Pullinger, 1942; Horwitz, 1944; Meara, 1950; Meara, Greathead & Huyser, 1957; Henning & Van Aswegen, 1950; Lambrecht, 1955; Lambrecht, Kluge & Hugo, 1956; Snyman, 1955; Schultz & Kleeberg, 1958; Kleeberg, 1963 Viljoen, 1964
		<i>Capra hircus</i> Linn.	Goat.....	1 Lab. Tests	°	+	°	°	°	°	Fourie, 1928 Robinson, 1944, 1955
		<i>Ovis aries</i> Linn.	Sheep.....	Lab. Tests	°	+	°	°	°	°	Robinson, 1955
		<i>Antilocapra marsu- pialis</i> (Zimmer- mann).	Springbuck.....	Zool. Garden	°	+	°	°	°	°	Robinson, 1953; Hofmeyr, 1956
		<i>Strepsiceros strep- sicerus</i> (Pallas).	Kudu.....	Enzootic	°	°	°	°	+	°	Paine & Martinaglia, 1928; Martinaglia, 1930; Thor- burn & Thomas, 1940; Robinson, 1944
		<i>Sylviscapra grimmia</i> (Linn.)	Duiker.....	1	°	°	°	°	+	°	Paine & Martinaglia, 1928; Martinaglia, 1930
		<i>Sus scrofa</i> Linn.	Domestic pig.....	Enzootic	+	+	+	+	+	°	Robinson, 1955, 1958; Van Rensburg & Du Casse, 1960
			Man.....	Sporadic	°	+	°	°	°	°	Harrington & Emmerson, 1939; Du Toit & Buchanan, 1942; Buchanan, 1952, 1953, 1954a, 1954b; Von Haebler, 1955; Dormer, 1957; Worthington, 1964
					°	°	+	°	°	°	Martinaglia, Hobbs & Blaine, 1957

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TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
<i>Mycobacterium bovis</i>	Felidae.....	<i>Felis catus</i> Linn.	Domestic cat....	1	°	+	°	°	°	°	Robinson, 1953
	Leporidae....	<i>Lepus cuniculus</i> Linn.	Rabbit.....	Lab. Tests	°	+	°	°	°	°	Martinaglia, 1930; Robinson, 1944, 1953, 1958; and others
	Caviidae.....	<i>Cavia porcellus</i> Linn.	Guinea-pig.....	Lab. Tests	°	+	°	°	°	°	Martinaglia, 1930; Robinson, 1944, 1953, 1958; and others
<i>Mycobacterium avium</i> Chester, 1901.	Aves	<i>Gallus domesticus</i> Linn.	Fowl.....	Sporadic	+	+	+	+	+	°	Canham & Blomefield, 1940; Smith, 1940; Robinson, 1958; Coles, 1958; Abrams, 1964
	Phasianidae										Abrams, 1964
Avian tuberculosis	Meleagridae	<i>Meleagris gallopavo</i> Linn.	Turkey.....	Sporadic	°	+	°	°	°	°	Smith, 1940; Abrams, 1964
	Suidae.....	<i>Sus scrofa</i> Linn.	Domestic pig....	Sporadic	°	?	°	°	°	°	Robinson, 1958
<i>Mycobacterium paratuberculosis</i> Bergey et al., 1923.	Bovidae.....	<i>Bos taurus</i> Linn.	Ox.....	Sporadic	+	°	°	+	°	°	Henning, 1956; Worthington, 1964
John's disease											
Actinomycetaceae	Canidae.....	<i>Canis familiaris</i> Linn.	Dog.....	A single case	°	+	°	°	°	°	Loveday, 1963
Nocardiasis											
<i>Actinomyces bovis</i> Harz, 1877	Bovidae.....	<i>Bos taurus</i> Linn.	Ox.....	Enzootic	+	+	+	+	+	°	Robinson, 1950; Henning, 1956

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.

TABLE 2 (a).—*Protozoophyta* (continued)

Parasite	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
Actinomycosis...	Suidae.....	<i>Sus scrofa</i> Linn.	Domestic pig....	Enzootic	+	+	+	+	+	°	Henning, 1956
<i>Actinomyces dermatonomus</i> Bull, 1929.	Bovidae.....	<i>Ovis aries</i> Linn.	Sheep.....	Enzootic	°	°	°	+	+	°	Bekker, 1928; Steyn, 1931; Mason & Bekker, 1934
“Lumpy wool”	Hominidae...	<i>Homo sapiens</i> Linn.	Man.....	Sporadic	°	+	°	°	°	°	Anon., 1955-1961; Goldin, 1945
<i>Actinomyces israeli</i> (Kruse, 1896) Lachner-Sandoval, 1898.											
Human Actinomycosis											
Spirochaetales	Aves Galliformes Phasianidae	<i>Gallus domesticus</i> Linn.	Fowl.....	Enzootic	+	+	+	+	+	+	Jowett, 1910; Lounsbury, 1910; Martinaglia, 1929; Coles, 1951; Abrams, 1964
Treponemataceae <i>Borrelia anserina</i> (Sak-hareff, 1891) Bergey <i>et al.</i> , 1925.	Anseriformes Anatidae	<i>Anas platyrhynchos</i> Linn.	Domestic duck...	Sporadic	+	+	+	+	+	°	Coles, 1951; Abrams, 1964
Fowl spirochaetosis	Arachnida Acarida Argasidae	<i>Anser anser</i> Linn.	Goose.....	Sporadic	+	+	+	+	+	°	Coles, 1951, Abrams, 1964
		<i>Argas persicus</i> Oken.	Fowl tampan....	Enzootic	+	+	+	+	+	+	Sigwart, 1914; Martinaglia, 1929; Bedford, 1932
<i>Borrelia sp.</i> Coles, 1941 (Relationship to <i>B. anserina</i> has not been determined)	Sphenisciformes Spheniscidae	<i>Spheniscus demersus</i> Linn.	Jackas penguin...	Enzootic	°	°	°	+	°	°	Coles, 1941
	Argasidae.....	<i>Argas talaje capensis</i> (Neum.).	Pengium tampan..	Enzootic	°	°	°	+	°	°	Coles, 1941

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.

TABLE 2 (a).—*Protophyta* (continued)

Parasite	Host			Region					Authorities		
	Class Order Family	Genus and species	Vernacular name	Incidence	O.	T.	N.	W.		E.	S.
<i>Borrelia duttoni</i> (Novy and Knapp, 1906) Bergey <i>et al.</i> , 1925.	Primates Order Hominidae	<i>Homo sapiens</i> Linn.	Man.....	Endemic	+	+	+	+	+	+	Park Davis, 1912; Ordman, 1935-1961; 1939, 1940, 1941, 1943, 1944, 1955, 1957; Girdwood, 1938; Annecke, 1939; De Meillon, 1939; Le Helloco, 1939
	Rodentia Muridae	<i>Mus musculus</i> Linn.	Mouse.....	Lab. Tests	o	+	o	o	o	o	Wolstenholme & Gear, 1948
		<i>Mastomys natalensis</i> (A. Smith)	Multimammate mouse	Lab. Tests	o	+	o	o	o	o	Zumpt, 1959
	Arachnida Acarida Argasidae	<i>Ornithodoros moubata</i> Murray	Eyeless tampan...	Enzootic	+	+	+	+	+	+	Ordman, 1935-1961, 1939, 1940, 1941, 1943, 1944, 1955, 1957
Ixodid-borne borreliosis	Artiodactyla.	<i>Bos taurus</i> Linn.	Ox.....	Enzootic	+	+	+	+	+	o	Laveran, 1903; Theiler, 1904, 1905, 1906a, 1906b, 1906c, 1906d, 1909a; Dodd, 1906; Onderstepoort Records; Kaschula, 1948
		<i>Capra hircus</i> Linn.	Goat.....	Lab. Tests	o	+	o	o	o	o	Theiler, 1909a
		<i>Ovis aries</i> Linn.	Sheep.....	Enzootic	+	+	+	+	+	o	Theiler, 1904, 1905, 1906d; Dodd, 1906; Basson, 1962d
		<i>Damalisca albigrons</i> (Burchell).	Blesbuck.....	Lab. Tests	o	+	o	o	o	o	Neitz, 1935
	Perissodactyla Equidae	<i>Equus caballus</i> Linn.	Horse.....	Enzootic	+	+	+	+	+	o	Theiler, 1904; Onderstepoort Records
		<i>Equus asinus</i> Linn.	Donkey.....	Sporadic	o	+	o	o	o	o	Kaschula, 1948

O. = Orange Free State; T. = Transvaal; N. = Natal; W. = Western Cape Province; E. = Eastern Cape Province; S. = South West Africa.