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# Records of the Zoological Survey of India

## The Ixodid Ticks of Zambia (Acarina : Ixodidae)

(A study of Distribution, Ecology and Host Relationships)

S. K. Tandon

Zoological Survey of India

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## THE IXODID TICKS OF ZAMBIA (ACARINA : IXODIDAE)

(A study of Distribution, Ecology and Host Relationships)

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# INTRODUCTION

Ticks in Zambia are known to infest a large variety of domestic and wild animals causing sever economic losses to the animal industry because they harbour and transmit causative agents of many fatal diseases which lower the productivity in the affected animals. besides transmitting diseases, they also cause severe anaemia; and degrade hides and skins as a result of massive infestation. A casual bite of ticks also causes paralysis and toxicosis. Therefore, in order to formulate schemes to improve the health and production of livestock it is essential to study the epidemiologicsl role of the tick fauna in the country in relation to the habitat, i.e., climate, vegetation and host. It involves all aspects of tick biology and their dynamics within the enviornment.

Modern biologists have expressed the opinion that there is no single species of ticks that can be considered unimportant.Actually,very little is yet known about some of them and the aetiology of the diseases they inflict. But, these ticks have shown themselves to be highly adapted to the transmission of a variety of disease agents. As such, it is unwise to dismiss any of them as insignificant.

Even though some of them have been recorded in small numbers, or from uncommon hosts, they may form an important component of a system about which much remains to be learnt. Others may be common on hosts but further investigation may be necessary to identify their unrecognised importance as disease reservoirs. These little known ticks would, in time, contribute to our knowledge of tick communities and definition of ecosystems.

Uvarov (1964) points out that with agricultural development which is invariably accompanied by ecological changes, hitherto apparently quite unimportant species may assume an unpredictable potential for harm. In this respect, he puts forward a general rule that the injurious fauna of a given crop, in a given country, is produced as a result of segregation of a reduced number of species already present in the wild habitat and reaching pest status owing to improved conditions for existence.

Many years ago, Donitz, Neumann, Nuttal and Warburton pioneers of African tick Taxonomy - described many important species of the African Ixodidae. Similarly, Koch, Lounsbury and Theiler - pioneers of arthropod vector studies - revealed how ticks cripple the cattle industry in the African continent. Even at that time, ways of preventing such losses were known but that knowledge was put to little use.

Today, the losses due to tick - borne diseases are even greater or as heavy as they were at the beginning of the century. Their annual total is said to exceed that due to all other disease agents put together.

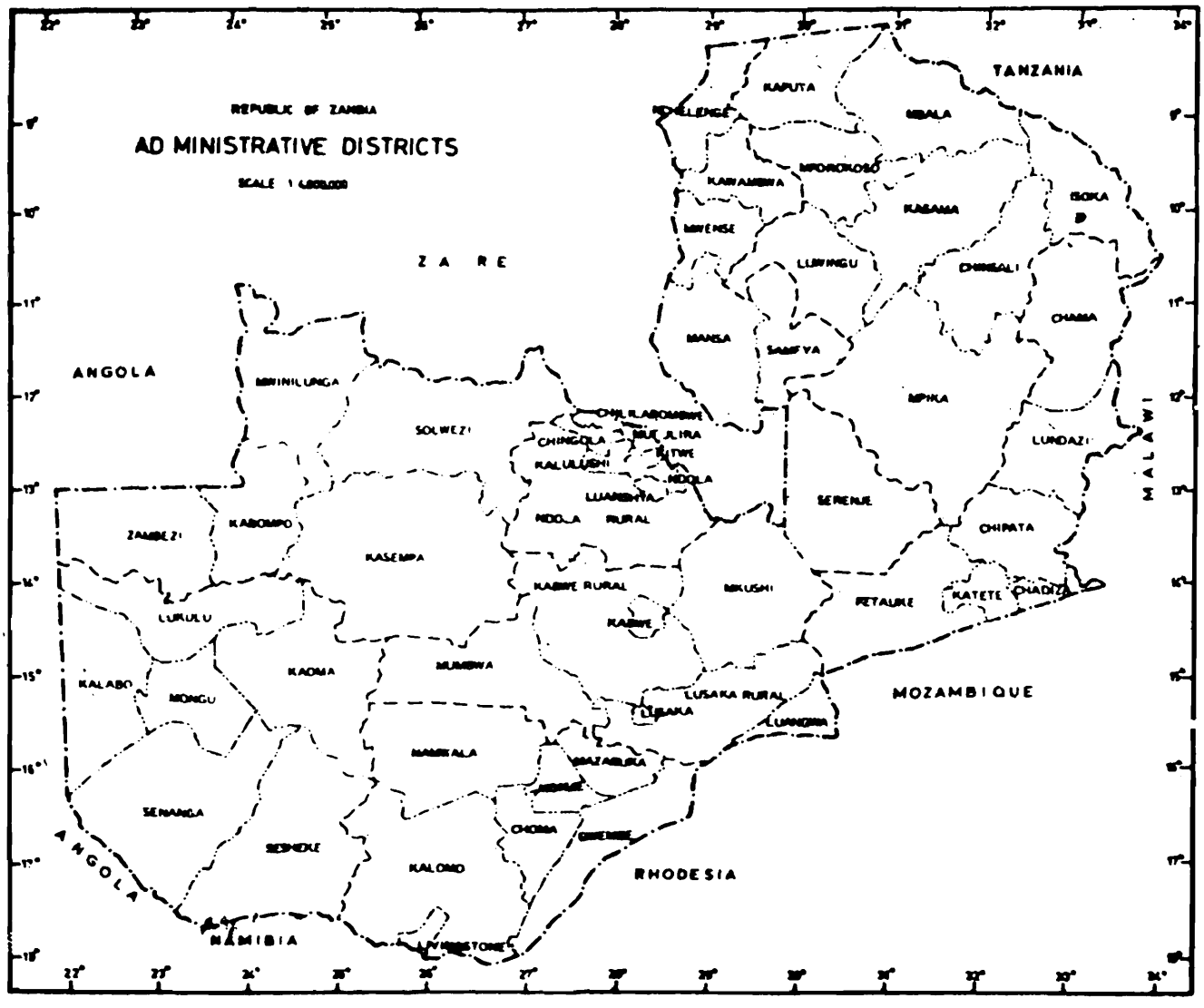
Biologists and veterinary parasitologists having spent many years on the control of tick borne diseases have now realised that a mere knowledge of the vector and a means of destroying it is not enough. There are other important factors, among them being a sound knowledge of the distrbution and ecology of the tick.

The present work was undertaken on that basis and three parallel lines of investigation were undertaken; (a) a survey and critical review of the literature of the ixodid ticks of southern Africa, in general, and Zambia in particular; (b) examination and identification of the already available ixodid tick collections amounting to over two

hundred thousand specimens; (c) collection and identification of new material including field and laboratory observations on the ecology of the tick species.

Considering that the findings would serve as a guide and reference for the future, all the information obtained is being embodied in this monograph. Here, an attempt has been made to assemble and analyse, as much as possible all available information, published and otherwise, with regard to descriptions available in literature and on the distribution, ecology and host relationship of ixodid ticks of Zambia that have been recorded so far.

This monograph is intended for the use of the student, the extension worker and the professional alike and serves as a basis for future investigations dealing with the basic problems of tick biology, within the rapidly changing ecological picture of the country.




Map 1. Political divisions (Provinces and Districts) of Zambia

## REVIEW OF THE LITERATURE

The first recorded scientific observation on Ixodid ticks of Northern Rhodesia (now Zambia) in the early part of the century were those of Neumann (1907; 1908 and 1911), Nuttal (1916) and Nuttal and Warburton (1908; 1915). Their records were based on collection during expeditions led by early travellers especially of S.S. Neave. Robinson (1926) in his monumental work under the series initiated by G.H.F. Nuttal and co-workers entitled *Ticks: A monograph of the Ixodoidea;* included *Amblyomma* ticks of this region.

Preliminary records on the range and distribution of Zambian ticks began appearing in the literature through various reports of the department of Animal Health in Northern Rhodesia; and reports of the veterinary Department of Northern Rhodesia (as the Department of Veterinary and Tsetse Control Services was then known). Among the early authorities who made some reference to ticks of Zambia were Bedford (1932; 1934), Le-Roux (1934; 1935 1937; 1947) and Morris (1933; 1934 a-b; 1936; 1937 a-b; - 1940).

Ticks from this region were also included in studies by G. Theiler who published her observations in a number of excellent papers from Onderstepoort. In 1954, Theiler and Robinson gave a complete list of ticks occurring in the country up to 1952. This list was based on the material collected under a tick survey programme of the Veterinary Department and sent to Onderstepoort for identification. Matthysse (1954) carried out a preliminary study on the biology and taxonomy of ticks in Northern Rhodesia (Zambia) and a comparison of various insecticides and methods of applying them. Between 1955-1961, Gray carried out some work on the ecology and biology of ticks at Mazabuka.

Besides two brief notes (1959; 1961), his work was not published. Hoogstraal (1956a) in his monograph on *Ticks of Sudan,* included the available records relating to Zambia. Theiler (1962) in her work on the Ixodid parasites of vertabrates in Afica south of the Sahara (Ethiopian region) brought the range and distribution of Zambian ticks up-to-date.

The detailed study on ticks of Zambia practically ceased till the arrival of Dr. J. MacLeod (FAO expert and later Advisor to the National Council for Scientific Research). He planned and executed both extensive and intensive tick surveys in the country to determine the tick infestation patterns in Zambia. His results are published in a series of excellent papers (MacLeod, 1970; Mac Leod and Colbo, 1976; Colbo and Mac Leod, 1976; Mac Leod et al 1977; MacLeod and Mwanaumo, 1978). These papers provide useful information for those interested in the biology and control of ticks in Zambia. Colbo (1973) compiled a check - list of the 58 species of ticks occurring in Zambia up - to 1971. This work was later expanded into a preliminary check - list and host-list of ticks of Zambia (Ganagarajan, 1976).

The recent taxonomic studies carried out in other parts of the African continent are relevant to studies on the ticks of Zambia. Zumpt (1942 a-c - 1943 a-b) studied the material of adults of Genus *Rhipicephalus* available in museums in Europe and published his findings in a series of papers. He dealt with much of the published and other information then available concerning the genus and also described new species.

Later in his 1950 publication, he gave a key to the adults of the genus and a catalogue of the species together with dscription of a new species.

G. Theiler working at Onderstepoort, produced a series of papers on taxonomy, ecology, distribution and zoogeography of different species of ticks (1941; 1943; 1945 a-c; 1947; 1948; 1949 a-b; 1956; 1959 a-c; 1962; 1964), accompanied by regional maps with analyses of factors such as rainfall and vegetation controlling their distribution. In collaboration with other workers she also published a number of papers such as those on the *Amblyomma marmoreum* group (Theiler and Salisbury 1959). Wilson (1946, 1950) contributed important papers on the ecology and distribution of ticks while working in Nyasaland (now Malawi) and Tanganyika (now Tanzania). In 1953, he published the results of the survey of tick vectors of East Coast Fever in east and central Africa.

Hoogstraal also put out a series of excellent papers on African ticks. His monumental work on the ticks of Sudan is still the most exhaustive work on African ticks and it includes some of the species found in Zambia. In addition his papers on the taxonomy of *Haemaphysalis* ticks of the world also provide valuable information on African species of the genus.

Arthur (1957 - 1959 and 1961) published a number of papers on the genus *Ixodes* where he described a number of new species. In 1965 he published a complete monograph on the genus. Mention must be made of the important contributions of Elbl and Anastos (1966 a, b, c, d) on Ixodid ticks of Central Africa. The above work is very exhaustive and deals with the taxonomy, distribution and hosts; biology, relationship to disease, description, and provides illustration of each species.

The readers attention may also be drawn to number of important papers on the taxonomy of ticks by Walker (1955; 1956; 1957; 1959 a-c; 1960 a-b 1961;1966 a & b) Moral and Vassiliades (1962) and the papers of Yeoman (1964; 1966 a-b; 1967 a-b; 1968 a-c), most of which were primarily concerned with field vector studies of epizootic East Coast Fever carried out in Sukumaland, Tanzania.The study of Yeoman and Walker (1967), and Walker (1974) on the Ixodid ticks of Tanzania and Kenya, respectively, should be read in conjunction with this work.

# PHYSIOGRAPHY, CLIMATE, VEGETATION, ETC. OF ZAMBIA

## PHYSIOGRAPHY

Zambia lies in South Central Africa between 08° and 18° south latitude, and 22°, and 34° east longitude. It is completely land-locked and extends over an area of 753000 $km^2$.The major physiographic regions affecting tick distribution are shown on map, which is based on map 3; Relief, Zambia in maps edited by D.Hywel Davies, ULP, 1971.

Zambia forms part of the great African plateau and is really a southward extension of its East African Lakes region, which is separated into a number of levels brought about by river erosion and to a lesser extent by earth movements. The relief of Zambia is made up of a series of gently undulating flat plateau, occasionally by isolated hills or low range resistant rocks. Generally speaking, the country can be divided into five levels.

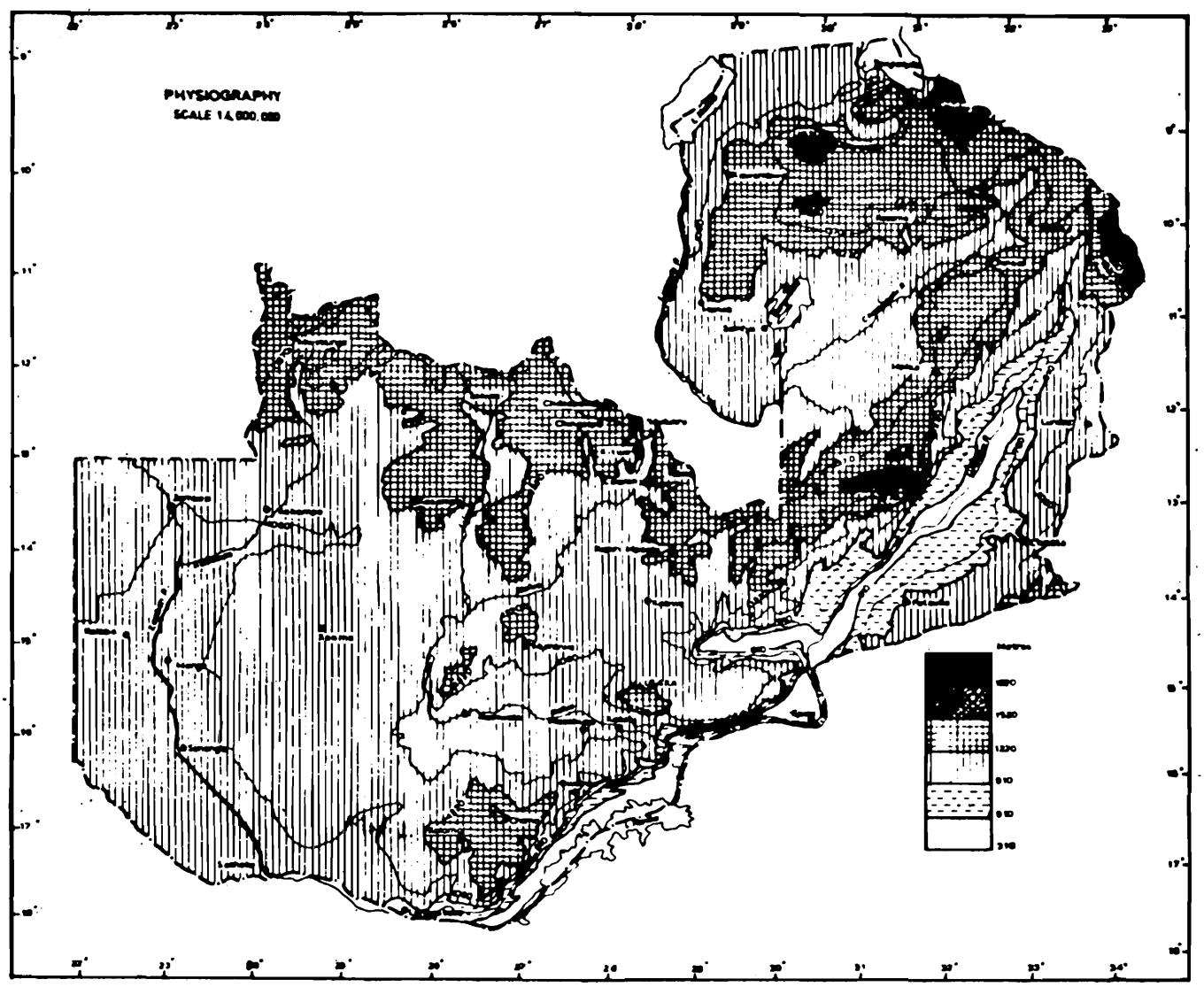
*Relief* (Map 2)

(i) *The Plateau.* The main plateau region stretches on either side of the main Zambezi-Zaire (formerly Congo) Water sheds from Kabwe to Isoka. It ranges in altitude from 1,230m. at Kabwe to over 1,535m. at Isoka.

Two other similar plateaus exist: The southern plateau in southern province around Choma and Kalomo region, a little over, 1,230m.; and the eastern plateau in Eastern Province, at about 1,025m. There are also two extensions of the main plateau where the topography is generally fairly undulating and at places hilly. The first is the highland surrounding the lake basin area, stretching from Kasama through Mbala, Mporokoso and Kawambwa to Mansa, and the second, separated only by the political boundary of Zaire, is the Copperbelt-Solwezi-Kasempa area. The average height of the land is between 1,320-1,535m. In some areas the land rises above 1,500m., particularly in the northern part of North-Western Province, the north-eastern part of Central Province and much of the Northern Province in which Sunzu Mountain reaches upto 2,065m. In the extreme north-east, a considerable area of eastern Isoka District and the very small north-eastern salient of Chama District exceeds 1,830m. This includes the Mafinga mountains, the Makutu mountains and the small Zambian portion of the Nyika plateau.

(ii) *Upper Valley.* This region embraces the areas surrounding Kafue flats on the north, east and south sides, extending to Mumbwa, Kabwe (just), Chisamba, Kafue, Mazabuka, Monze and Pemba. The topography is generally flat, except for some half buried inselbergs. It ranges in altitude from 920-1,075m.

(iii) *Lower Valley.* This region includes the faulted valleys of the Zambezi below the Victoria Falls and the Luangwa River, a tributary of the Zambezi and the Lake Tanganyika Basin in the North. All these basins are bordered by steep slopes known as escarpments. The Zambezi river below the Victoria Falls is bordered by Zambezi escarpment while the Muchinga escarpment forms the North-Western part of the Luangwa basin. The land on either side of the valley is broken by many hills and winding tributary valleys.




Map 2. Physiography of Zambia

(iv) *Lake Basins.* These areas can generally be described as undulating plateau with large areas of flat surface cut by Zambezi River and its tributaries in the south and west and the Luapula and Chambeshi in the north. The shallow depressions are formed by the slight warping of the flat surface. These depressions are occupied by swamps such as Bangweulu, Lukanga, Mwesu, etc.

(v) *Kalahari Basin.* The basin is almost completely covered by sand of Kalahari type and is tilted gently southwards dropping in altitude from 1,075m. at Zambezi to 950m. at Seshcke and to 960m. in South Africa. The topography is monotously flat over most of the area.

*Drainage*

Zambia is drained by four main rivers. These are the Zambezi, Kafue, Luangwa and Chambeshi-Luapula. All these rivers have the source on the Zambezi-Zaire watershed and with the exception of Chambeshi and Luapula, all flow south and then east into the Indian Ocean. The Zambezi system covers about three quarter of the total area and the Zaire system about one quarter.

The Zambezi has its source in the north-west Zambia in the Mwinilunga District, crosses into Angola some 75 km below and swings back into Zambia at the 13th parallel, north of Chavuma. From Katima Mulilo it forms the sourthern international boundary all the way down to Luangwa District. Near Livingstone are the famous mosi-o-Tunya Falls, with spectacular gorges below, and farther downstream is the man made Lake Kariba (approximately 270 km long and 48 km wide), which lies between the Devils Gorge and Kariba Dam.

The Kafue and Luangwa rivers are the main tributaries of Zambezi. The Kafue rises north of the Copperbelt, where the Zambezi-Zaire forms the national boundary, and flows in a generally southward direction. Gradients are low and extensive swamps occur along the main rivers and its tributaries. It leaves the Lukanga swamps region in a westerly direction and then flows south through the Itezhi-tezhi Gap and meanders for 384 km across the Kafue flats. It leaves the Kafue flats and joins the Zambezi near Chirundu after dropping 570m. in 35 km in the Zambezi escarpment near Kafue Gorge, where a major dam has already been constructed. The Luangwa river rises on the slopes of Mafinga Mountains and drops steeply to a broad valley, flows which slopes from about 900m. in the Isoka District to less than 450m. South of Mpika. The Luangwa is joined by its two main tributaries, the Lunsemfwa and Lukusashi, before it joins the Zambezi at Feira, the lowest point in Zambia (330m).

The Zaire drainage in Zambia comprises the basins of the Chambeshi, the Luapula and Lake Tanganyika. The Chambeshi rises in the Mbala District, flows first south-east of Lake Bangweulu, emerging as the Luapula River. From Mukuku at the top of Zaire Pedicle the Luapula forms the international boundary with Zaire before entering Lake Mweru, then it emerges at the northern end of the Lake Mweru in Zaire as Luvua, later known as the Zaire River.

## CLIMATE

Zambia experiences a tropical climate as it lies between the equator and Tropic of Capricorn. The climate is greatly influenced by the country's relief and compares more favourably with climates of more temperate regions. Zambia has three distinct seasons namely:

(i) The cool dry season (April to August)

(ii) The hot dry season (August to November)

(iii) The warm wet season (November to April)

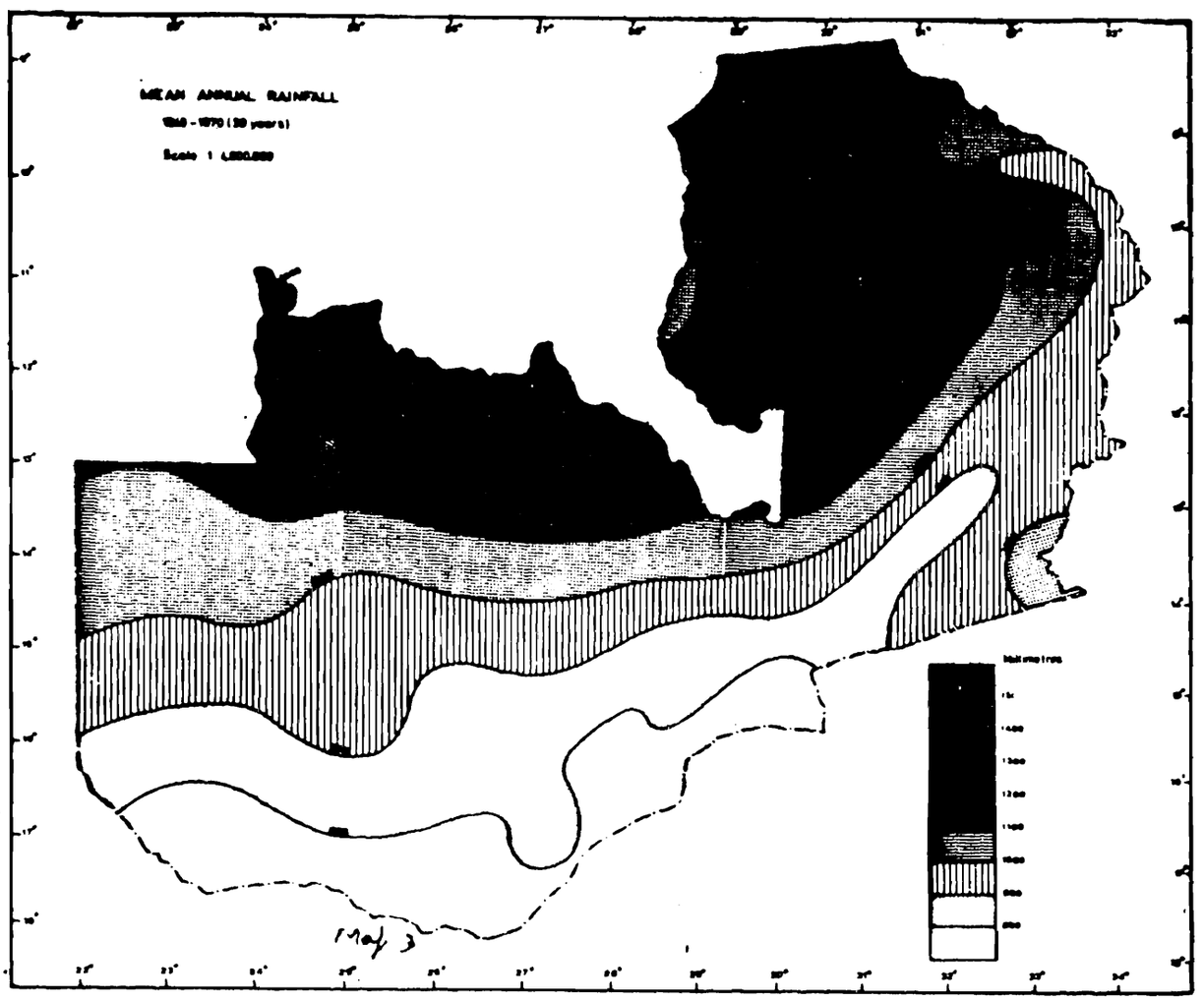
*Rainfall* (Map 3)

The main source of rainfall over Zambia during the wet season is the Intertropical Convergence Zone (ITCZ) - the name given to the zone where the north-east trades and south-east trades converge to meet. During this period three air streams converge over Zambia - from the north-east, south-east and the north-west. The north and north-west regions of Zambia receive maximum rainfall since in this zone the north-west wind (moist Zaire air) meets the south-east trade winds. The zone where these winds meet depends a great deal on the development and shifting of high and low pressure centres over Southern Africa.

The rains commence first to the north of Mwinilunga, on about the 10th of October on an average, then advance steadily south-eastwards reaching the Copperbelt by the end of October; Lusaka by 15th November, and covering the entire country by 25th November (Hutchinson, 1974). In most of the country the rainfall shows a single peak, January being the heaviest. According to Lineham (1965), the retreat rain starts on 15th March on an average, North of Lake Kariba with a northerly movement, finally leaving Zambia by the end of April. The above dates may not account for all the rain in Zambia, as isolated showers may occur earlier or later due to extended cold fronts or troughs. There is a general decrease in the amount of rainfall in the country fom north to the south, which may be attributed to the shorter time the south is influenced by ITCZ. Besides this, there are areas of higher rainfall resulting from above average altitude or from proximity to lakes and swamps. The northern half of the country has an annual total rainfall ranging from 1015 to 1520mm with the maximum north-west of Lake Bangweulu and Lake Tanganyika. The southern half of Zambia receives a total rainfall ranging between 635 to 1015mm, the lower figure being recorded in the middle Zambezi valley.

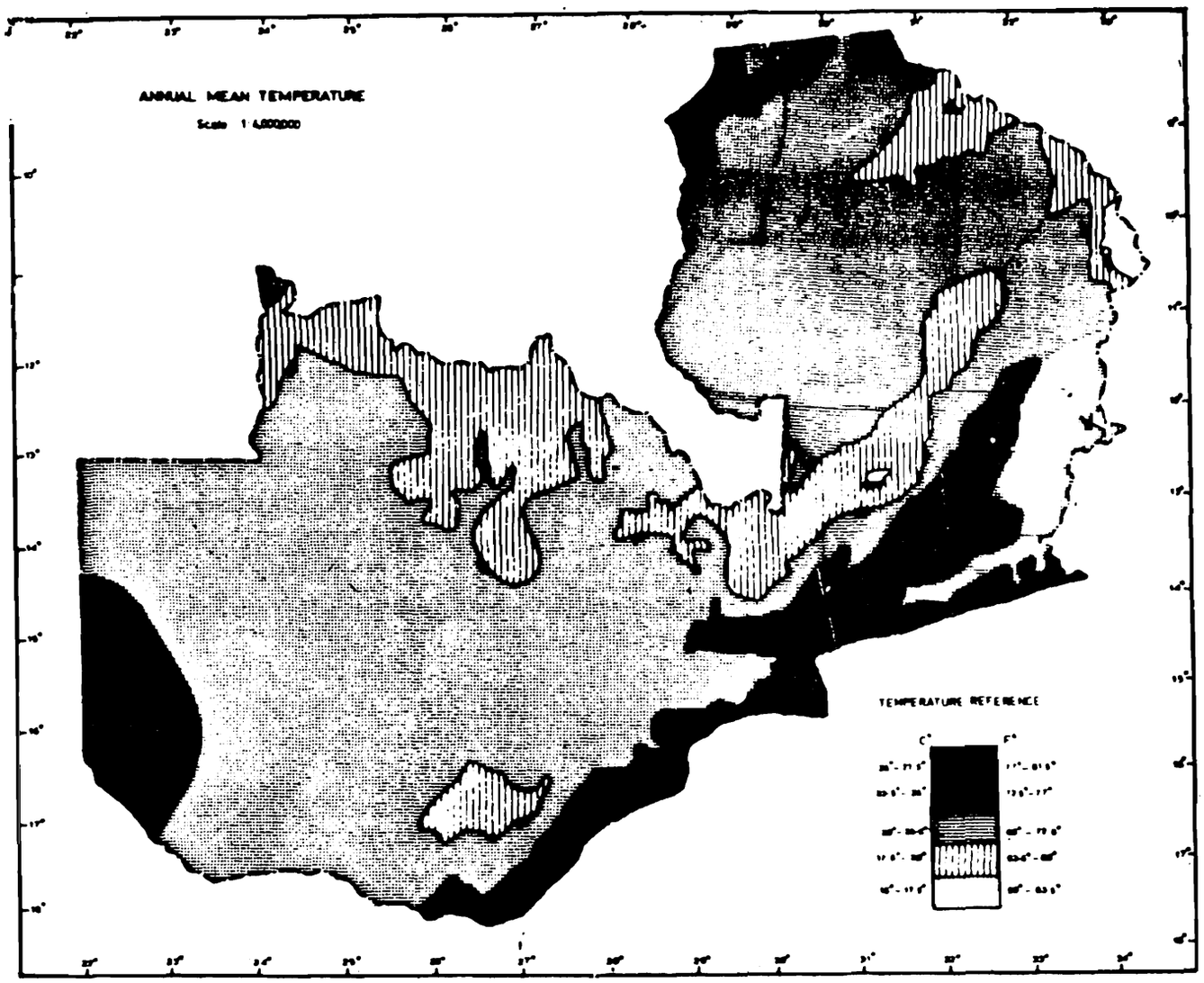
Anomalies to the above mentioned rainfall pattern are likely to occur in higher areas such as Muchinga escarpment and the Mafinga Mountains which receive increased rainfall due to their relief. The river basin lying to the leeward sides of these highlands are in the rain-shadow and therefore receive less rain.

The formation of ITCZ is not always very regular and this often results in very irregular rainfall in Zambia. Generally speaking, the variability is greatest in areas of lowest rainfall and least in areas of higher rainfall (Archer 1971 a).




Map 3. Mean annual rainfall in Zambia

*Temperature* (Map 4)




Map 4. Mean annual temperature in Zambia

The temperature conditions in Zambia were discussed by Archer (1971 b) and Hutchinson (1974).

Zambia experiences comparatively lower temperatures than other areas at similar latitudes due to altitude and cooling effect of showers and clouds during the potentially hottest time of the year.July is generally the coldest month almost every year, and has the lowest minimum temperature. Mean maximum temperature in July mainly demonstrates the effect of altitude. Generally, night temperature falls to between 7°C and 10°C (45°F-50°F) in the West of the country, the lowest temperature being experienced in the Seshcke District in the south- west of Western Province, where temperatures of less than - 7°C (20°F) have been recorded. In the East and North-East, minimum temperatures tend to be higher, ranging from 10°C to 13°C (15°F to 55°F) except in Muchinga Mountains along the Malawi border; maximum temperatures ranging from 27°C to 31°C (18°F to 87°F) are recorded in the low lying Luangwa and middle Zambezi valley.

At the end of August, temperature rises rapidly,marking the arrival of the hot dry season. October is nearly always the hottest month with mean daily maximum reaching upto 30°C. There is generally an increasing gradient from north to south with variations due more to altitude than any other cause. The highest temperature occurs in the low lying Luangwa ad Zambezi (below Seshcke) valley, while the muchinga ridges and the high ground to the north- east return the lowest maxima. The maximum temperature recorded so far in Zambia was 48°C to 118°F at Luangwa Boma, and most areas south of 15°s have rarely shown temperature rises over 38°C (100°F). There is a sharp decrease of temperature with the onset of rains in November. In January mean daily maximum temperature is 6°C (10°F) lower than in October throughout the country.

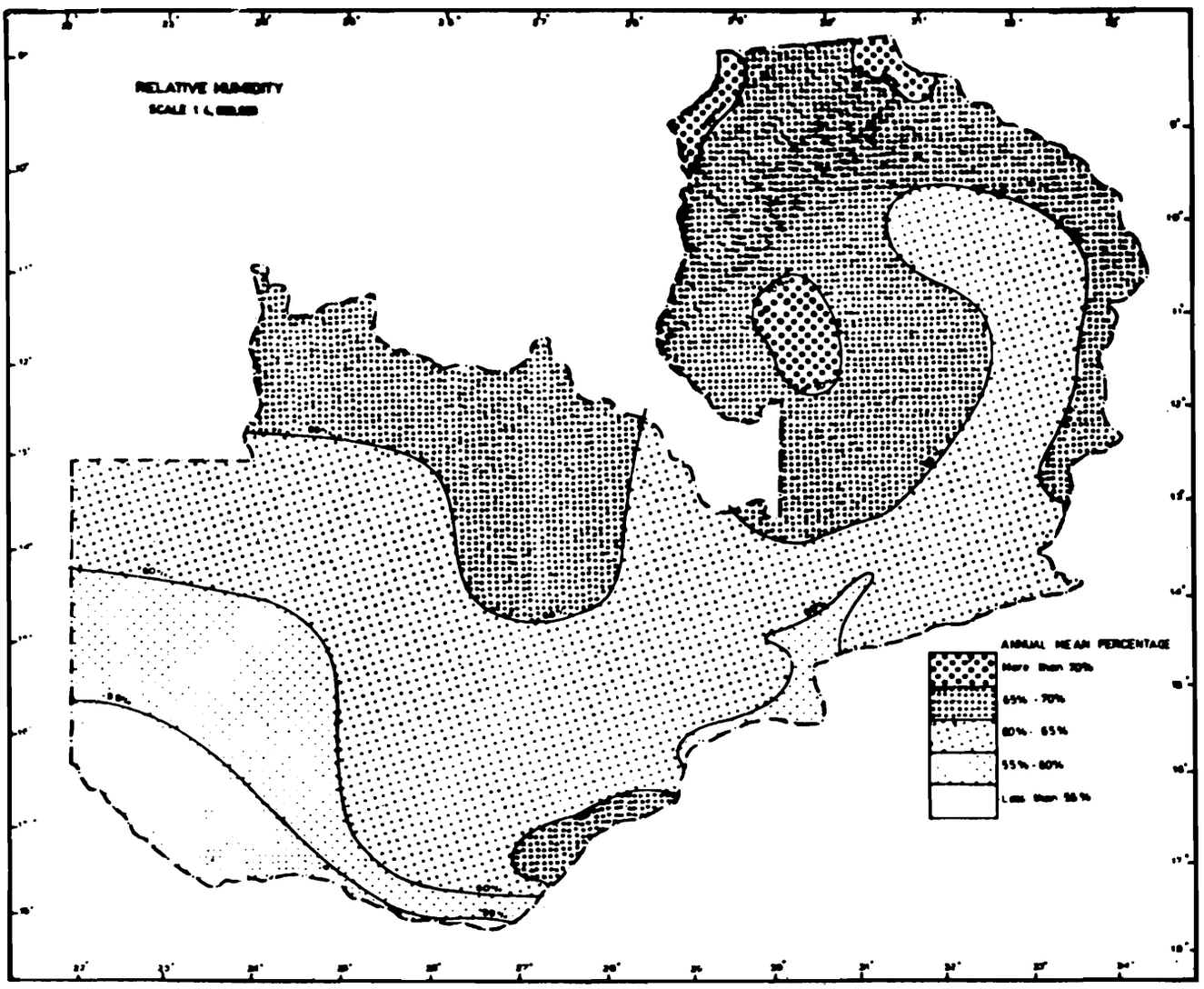
*Humidity* (Map 5)

There are considerable geographical variations of relative humidity in Zambia. Average relative humidity is less than 55% in the extreme south-west and exceeds 70% near some of the lakes eastward. Except near the lakes and swamps values are much higher in the mountains than in the lowlands. Average relative humidity in the country varies from 74-85 percent in the rainy season (November-April) to 45 percent in the hot season, August- October. Besides this, the humidity of any given area at microclimate level is effected by several other factors of climate, vegetation, soil, proximity to water mass and wind. The life of plants and animals is greatly effected by the relative humidity.

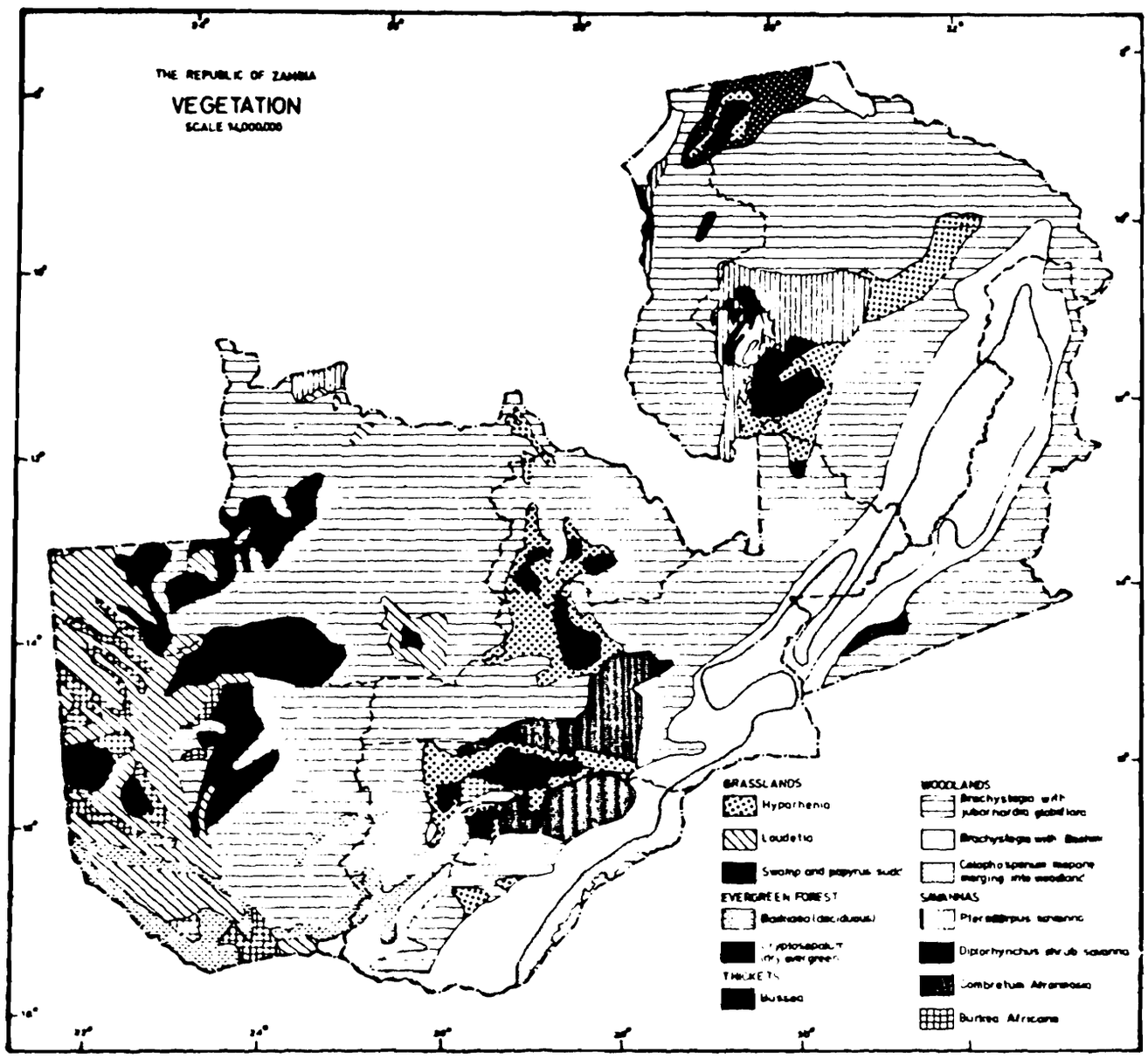
## VEGETATION

The major vegetation zones of Zambia are shown on Map 6 which is based on the federal Atlas map No.10.

An excellent account of the vegetation of Zambia has been given by Trapnell (1933 and 1957), and Fanshawe (1971). In general, the vegetation of Zambia varies from the extremes of evergreen forest to semidesert conditions and may be grouped into five main types.




Map 5. Annual mean relative humidity in Zambia




Map 6. Vegetation of Zambia

1. *Woodlands*

(i) *Miombo Woodland.* It covers about four-fifth of Zambia, mainly plateau and escarpment country; and is a two storeyed woodland with an open or lightly closed canopy of semi-evergreen trees 15-21m. high. This woodland is characterised by trees of genera *Brachystegia, Julbernardia, Isoberlinia* and *Marquesia* with species of *Pericopsis* and *Anisophyllea*, etc. The underwood consists of either a dense grass/suffrutex layer or dense evergreen thicket. The grass carpet may be moderately dense, dense or very dense. Fanshawe (1971) classifies this as an uninvasive type of vegetation of comparatively recent origin with regrowth after fire, cultivation or exploitation virtually unchanged. Miombo is sometimes referred to as a fire climax and is believed to have replaced dry evergreen forest, at least, in the higher rainfall zones.

(ii) *Relict Forest.* In the northern high rainfall part of Zambia relict patches of closed dry evergreen forest occur north of line from the Kabompo river in the west through Kasempa, Mumbwa and Kabwe districts and up the Zaire-Zambezi watershed to Isoka district in the northeast where the soils are deep and there is an ample supply of water.

(iii) *Kalahari Woodland.* It occurs widely on Kalahari sand in the southern part of Western Province and is derived from partial destruction of *Baikiaea* forest. Typical species are *Guibourtia coleosperma, Burkea africana* and *Erythrophleum africanum.* In the northern part of Western Province, this vegetation is replaced by dense, low evergreen forest dominated by *Cryptosepalum pseudotaxus.* It forms a catenary regression from Baikiaea forest suffrutex savanna to grassland on Kalahari sand, Trapanell (1957) Brachystegia- Isoberlinia woodlands on Kalahari sands and other deciduous woodland on Kalahari sand are all included.

(iv) *Mopane woodland.* It covers much of the deep valleys of Zambezi and Luangwa and also extend to the Southern Province plateau in the Livingstone, Kalomo and Namwala districts. Mopane is a one-storeyed woodland with an open deciduous canopy 6-18m high. It is chracterised by *Colophospermum mopane* and is almost monotypic but-may be mixed with *Kirkia accuminata, Sterculia africana* and other species. It has a sparse, often annual grass layer - mainly species of *Aristida, Eragrostis, Sporobolus, Tragus* and *Tricholaena.*

(v) *Munga Woodland.* It is an open type of, park-like,1-2 storeyed deciduous woodland with scattered or grouped emergents to 18m high, characterised by trees of the genera Accacia, Combretum and Terminalia species. The underwood is absent, parchy or very dense and thicket- like, 1.3-4m high, semi-deciduous. Climbers are usually occasional, locally common or some times absent; thickets occur here and there, and on plateau in the medium rainfall, such thickets are semi evergreen, in the valleys in the low rainfall zone they are deciduous. It follows a catenary sequence from woodland to scrub to suffrutex savanna to grassland. According to Fanashawe (1971) Munga woodland is an extremely fire resistant secondary woodland of invasive nature.

2. *Grass lands*

Vesey FitzGerald (1963a, 1963b) has described in detail the Central African grasslands with particular reference to the Northern Province and the adjacent portion of Tanzania.

According to Fanashawe (1971) this could well be applied to the rest of Zambia as a whole. In a subsequent paper, Vesey FitzGerald (1970) discussed the origins and distribution of valley grasslands in east Africa. The true grasslands are edaphic grasslands found on seasonally flooded kalahari sands; valley grasslands associated with the drainage lines along rivers, streams and dambos; great swampy depressions such as Lukanga, Lake Bangweulu and Kafue flats. the grasslands are characterised by species of *Hyparrhenia* and *Loudeti* etc. The permanently flooded areas of *Hyparrhenia* grasslands are occupied by swamp and papyrus sudd.

3. *Montane Communities*

Montane grasslands in Zambia are found in the montane areas of Nyika plateau and Mafinga mountains characterised by *Otomys typus* and *Otomys denti* species.

4. *Lowland Forest and Thickets*

Beneath the canopy, small trees, shrubs and climbers of many species form a dense undergrowth. The ground vegetatin is usually sparse, consisting of moss and forest grasses. Typical canopy trees include:- *Parinari excelsae, Syzyglum guineanse afromontanium, Olea capensis, Cryptosepalum pseudotaxus* etc.

5. *Fringing Forest*

Evergreen fringing forest is wide spread in the Western half of Zambia. The commonest species to be found are *Mitragyna stipulosa, Syzygium owariense* and *Xylopia aethipica.*

## SOILS

An excellent account of soils of Zambia has been given by Brammer (1973) in Soil Survey Reports of the Department of Agriculture (Land Use Branch). The major groups of soils of Zambia are shown on Map 7 which is based on the Republic of Zambia Atlas Sheet No, 12, 1967.

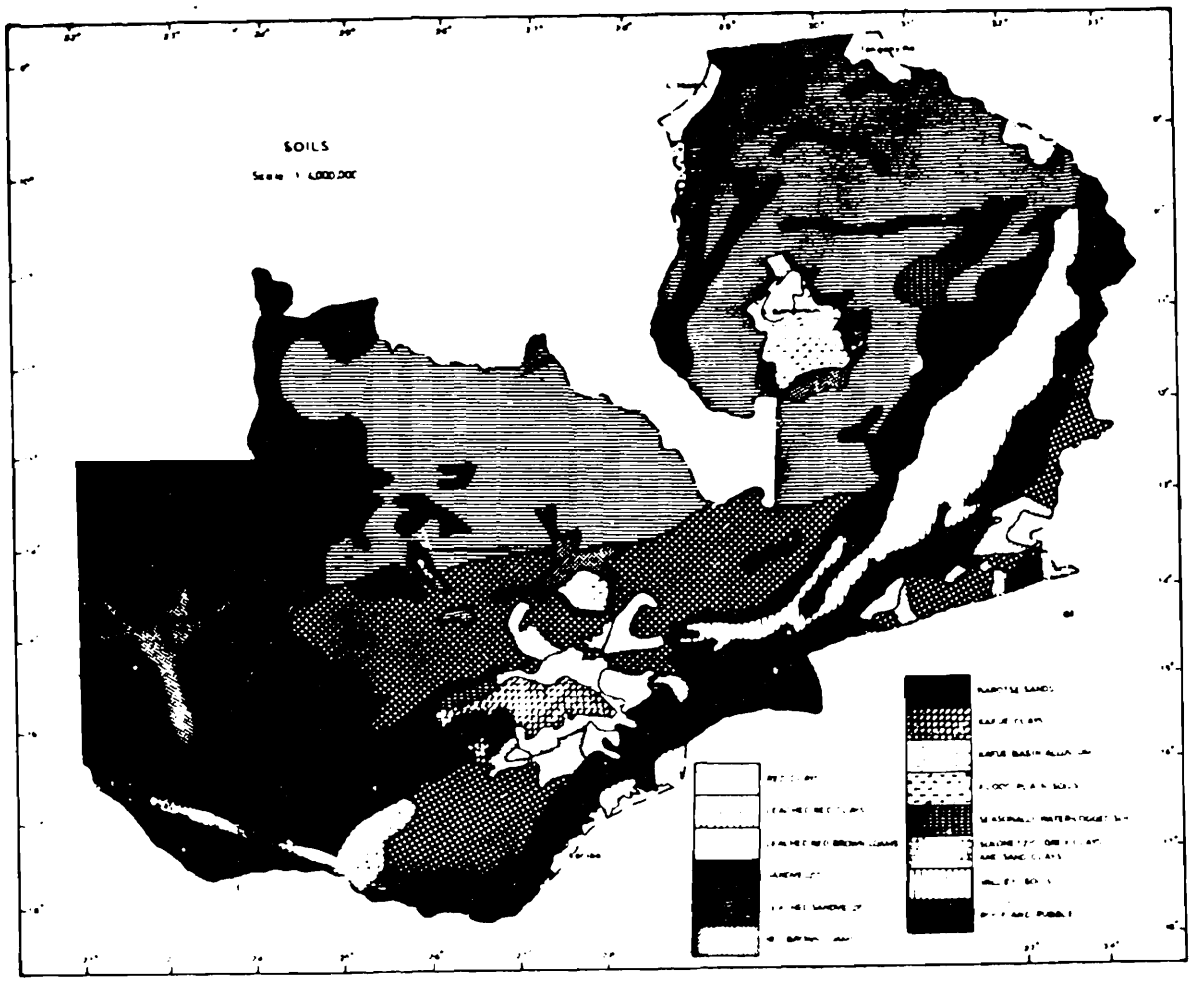
The soils of Zambia have been developed from a variety of parent rocks under diverse climatic conditions and subtropical deciduous or evergreen vegetation. The impact of savannah grasslands has also considerably contributed towards development of specific soil groups. The parent material also varied from sand stones, shales; granites, gneises basalts to limestones. These variables produced a variety of soils which have been divided into the following soil groups (Brammer, 1973).

(i) *Red Clays.* These are well drained soils developed from limestone and other basic rocks having a dark red, brown or yellow colour and grey mottles at certain depths.

The texture ranges from sandy clay loams to clay. These are deep soils having occasional rock outcrops. The red brown loams shown separately on the soil map of Zambia have higher top soil as compared to red clays. They are developed from granites or gneises containing large amounts of dark coloured minerals like muscovite, hornblende, augite, etc.These soils are mainly to the south of 1000m rainfall zone, slightly to medium in soil reaction and are fertile.

(ii) *Sandveldt Soils.* These soils consist of sandy top soil overlying a more clayey subsoil. The thickness of the top soil varies in different series as does the texture of

subsoil. In most cases there is gravel layer of varying thickness and depth in the subsoil. Sandveldts are mainly moderately to well-drained soils usually of dark grey to brown colour on top depending on organic matter. These soils vary in fertility and four subgroups, namely moderately leached, strongly leached, leached sandveldt and chipiya soils have been recognised. These soils span the South, Central, Eastern, North-Western, Copperbelt and Luapula Provinces.




Map 7. Soil types of Zambia

(iii) *Barotse sand.* There are several distinct kinds of these soils and six major variations have been recognised. The differences are due to mineral composition and climate.

Barotse sands are located mostly in Western Province but there are certain areas in North-Western and Southern provinces to be identified. These are red or reddish brown, dark brown and yellow in colour. The various kinds are designated as moderately leached red soils, strongly leached red sands, yellow soils, podsolic soils, podsoils and hydromorphic soils. They are slightly to medium in acidity and have moderate contents of calcium and magnesium. These soils though moderate to poor in soil fertility are best upland soils.

(iv) *Black Clays.* This group of soils consist of Kafue clay and solnetzic grey clays. It also includes many areas of black-clay dambo soils. Their most characteristic feature is their heavy clay texture. They are black to dark subsoil. Another characteristic feature is their irregular surface relief known as gilgai. These soils are very rich and have the capacity to hold large amounts of nutrients and are neutral to alkaline in soil reaction.Utilization of these soils is difficult due to management problems. Presently they are being used for dry season grazing.

(v) *Kafue Basin Alluvium.* These soils occur on the north side of the Kafue flood below Itezhi-tezhi dam site. These soils consist of long sandy ridges standing 1-15 metres above depressions which have more clayey soil. These soils are strongly acidic. The main soil in the ridges have dark- greyish brown sandy top soil which grades at about 40cm depth into a brown to reddish brown subsoil. These soils support dense thickets and a few cultivated patches near the Kafue river. The main soil in depressions has dark-grey brown sandy top soil. The depression soils are very acidic, fairly fertile but of limited usage due to wetness in the rainy season.

(vi) *Flood Plain and Swamp Soil.* This group includes soils of upper Zambezi, Chambeshi and Luangwa flood plains including Bangweulu, Lukanga and other major swamps. Zambezi alluvial soils occur in north Senanga in the Western Province. Smaller areas east of Shesheke are described with valley soils. These soils are pale coloured sands, strongly acidic with humic top soil which is loamy, overlying clayey subsoil. Most of the flood plain remains covered with grasses of various types and cultivation is restricted to old settlements and mounds on the flood plains. Luangwa alluvial soil are heavy black, while Chambeshi alluvial soils are dark-grey. swamp soils are around lake Bangweulu and Lukanga. these have dark-coloured peaty top soil with an underlying layer which is usually grey and mottled yellow, brown or red to varying degrees in different soils.

(vii) *Dambo Soils.* Dambos are seasonally or permanently wet grassy valleys, depressions or seepage zones or slopes. Dambo soils are of many kinds the major groups being grey dambo soil and dambo peats. The grey dambo soils range from sandy to clayey in texture. the top soil is mostly peaty. They are strongly or very strongly acidic in reaction with some exceptions.

(viii) *Valley soils.* Soils in the Gwembe valley are mainly developed over Karro rocks and in colluvial sediments. valley soils are divided into brown valley soil, brown padzolic soils and solonetzic soil. Brown valley soil has uniform brown or reddish brown appearence and sandy loam to sandy clay loam in texture. Brown podzolic soils occuring east of Sesheke are dark grey having brown top soils with white sand grains. Solonetzic soils range from dark-coloured clays under mopane woodland to grey sand or loamy texture: They have high sodium content and is saline in lower areas.

(ix) *Rock and Rubble.* This Unit includes areas of rocky hills and escarpments. the soils are on steep slopes over softer rocks. The soils are quite deep and usually of red colour. These soils are of limited agricultural use and should be kept under forest to avoid land erosion.

# LIVESTOCK OF ZAMBIA

*Populations* : The populations of domestic livestock in Zambia were as follows according to the 1977 census conducted by the Department of Veterinary and Testse Control Sevices:

| | |
|---|---|
| Cattle | 1,644,782 |
| Goats | 276,013 |
| Sheep | 25,128 |
| Pigs | 129,378 |
| Horses and Donkeys | 868 |

*Breeds of Cattle* : In Zambia, there are three main breeds or populations of native cattle: The Angoni, Barotse and Tonga.

The Angoni is a short- horn Zebu, both males and females being predominantly humped and found largely in the Eastern Province arround Lundazi and Chipata. they are medium-sized cattle, the colour being very variable, usually red, brown, black and white or red and white. The females under good management can reach 475 kg and the bulls about 725 kg. Whilst they are used as draft animals, their beef potential has been proved.

The Barotse is a fairly big longhorn Sanga, the females being unhumped and weigh about 500 kg at maturity while the males are neck-humped, the hump not being much pronounced and weigh up to 800 kg under good management. Otherwise, the females would be 400kg and males 575 kg in the range. The most usual colours are brown, black and dark red. their natural home is the flood plain of the Zambezi in the Western Province.

The Tonga is a typical shorthorn Sanga. the females are smaller, fine-horned and unhumped weighing about 360 kg and the bulls reaching 560 kg under good management. Under traditional management they would be 300 kg and 500kg, respectively. Their colour may be red, black, red and white or black and white. The body is not deep and the legs are long.

The Barotse and to a lesser extent the Tonga Cattle serve as subsistence dairy cattle while the Angoni is mainly used for beef and work.

The 3 breeds have many good point such as thin skin, short fine hairs with well-developed dewlaps. They also have small hard hooves facilitating walk over long distances in search of food or water. Thus, they are well-adapted for survival under the climatic conditions in Zambia.

*Potential for Improvement* : Research has indicated that the indigenous breeds are capable of "normal" productive and reproductive rates in Zambia with calving rates of 80-

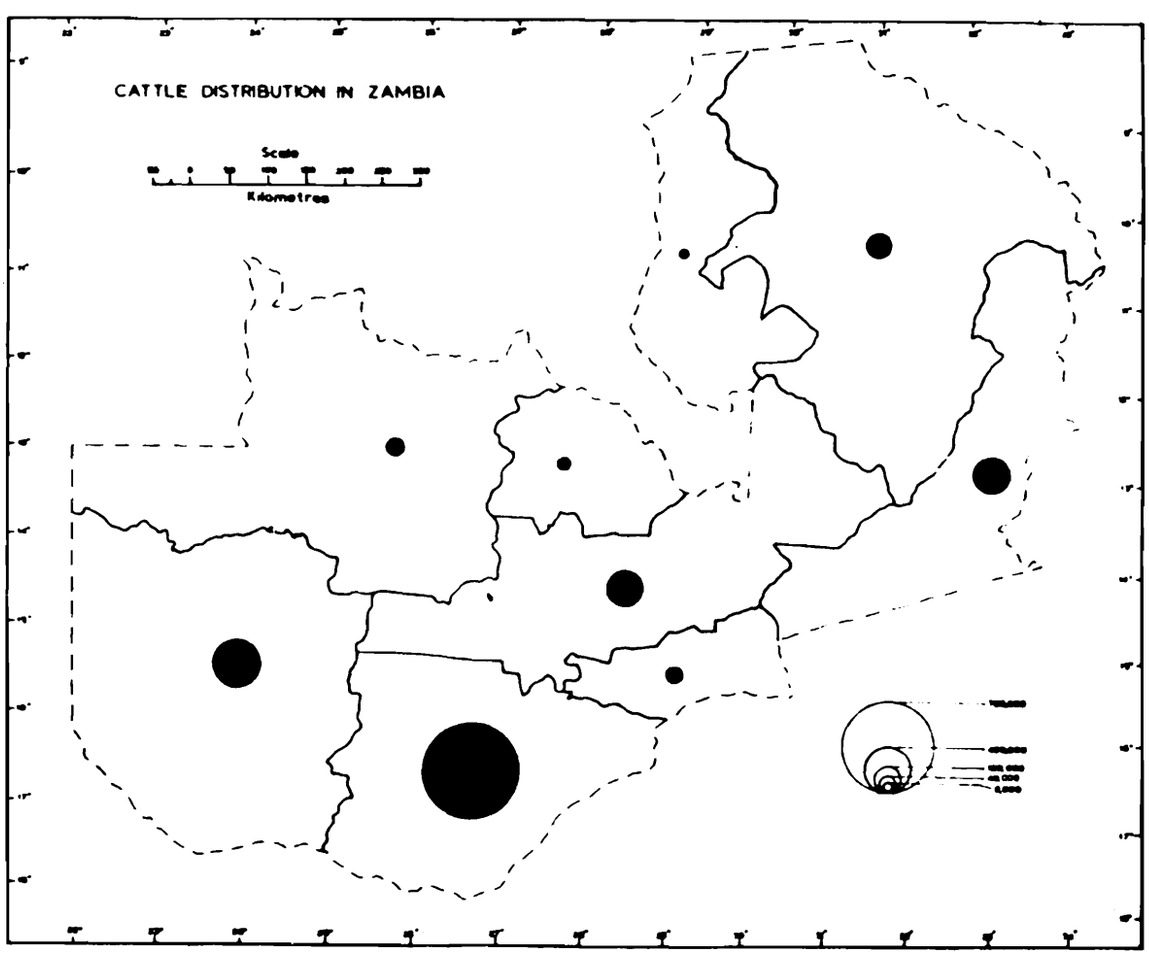
90% and weight gains of 1 kg per day, calving interval of 13-14 months, under improved management systems.

*Exotic Cattle* : The exotic types of cattle introduced into Zambia and maintained by the commercial sector are: Hereford, Sussex, South Devon, Friesian Shorthorn, Jersey, Simmanthal, Charolais, Boran, Sindhi, Bhagneri, Brahman, Afrikander, Mashona, Tuli.

Of these, the Afrikander and its crosses have made the greatest contribution to beef production. The Boran too is being used for the same purpose.

Several of these exotic breeds have been used for cross-breeding. The most popular breeding system is criss-crossing between an adaptable breed (Afrikander, Boran) and an exotic dual purpose or beef breed (South Devon, Simmanthal, Sussex). Some farmers also produce commercial crosses deriving from more than two breeds.

*Geographical distribution of cattle* (Map 8)



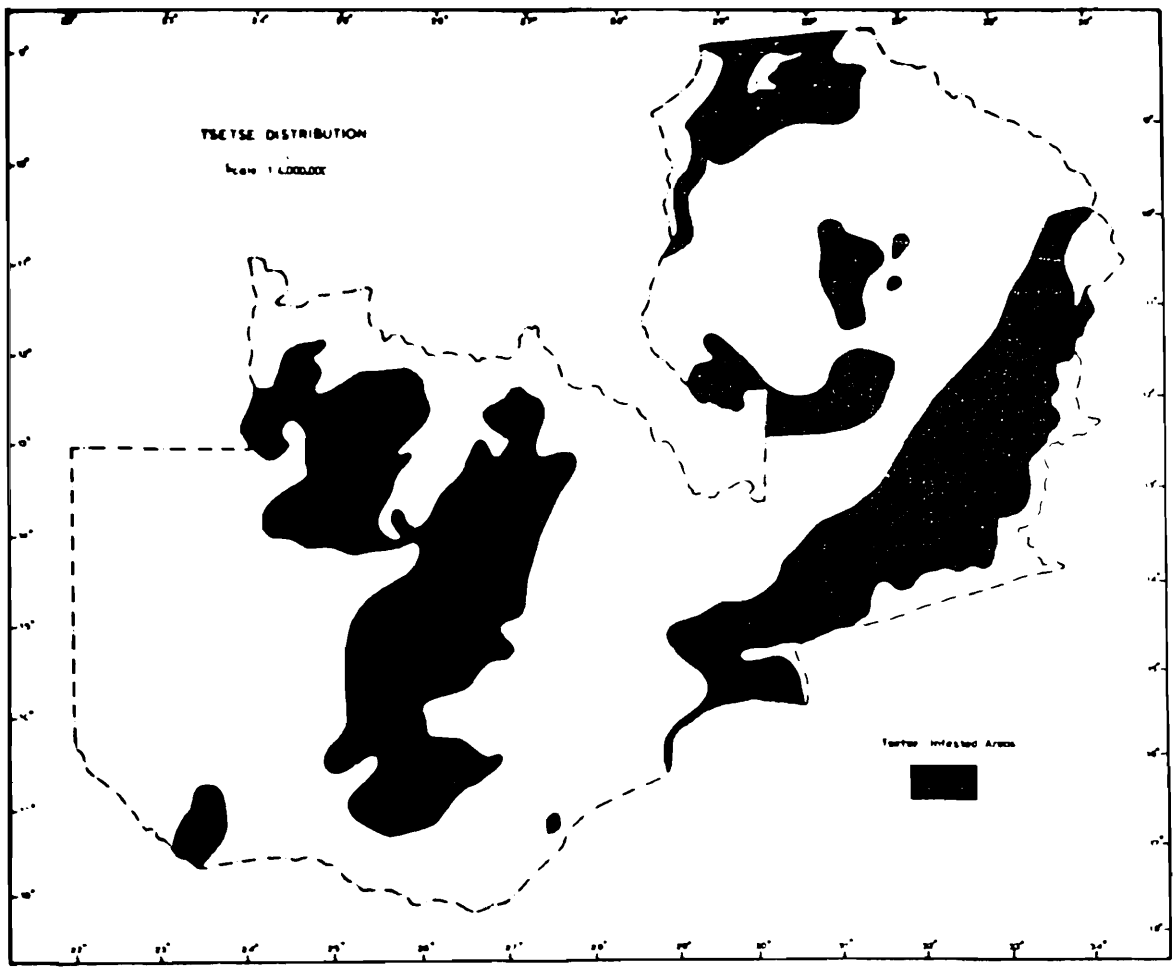

Map 8. Cattle distribution in Zambia

Actually, 3 main traditional cattle raising areas can be distinguished: the Southern, Eastern and Western Provinces which account for nearly 85 percent of all indigenous animals.

This distribution depends on the area free of tsetse flies which in turn relates to vegetation and climate. It is interesting to note that the favourable habitat of the tsetse are the woodlands, and here, the grass growth for grazing is poor making such areas less suitable for cattle, apart from the fact that they are disease areas.

The commercial herds comprising of exotic introduced breeds and their crosses are concentrated along the "Line of rail" which extends from Livingstone in the south to the Copperbelt in the north.

*Relationship to tsetse fly and tick- borne diseases* (Map 9)




Map 9. Tsetse distribution in Zambia

Cattle production is limited to the areas free of tsetse flies. The woodland vegetation covers almost half of the countryside, provides a suitable enviornment for these flies which are now confined to two main fly belts on either side of the line-of-rail. There are, in addition, scattered areas in the Northern, Luapula and Western Provinces. The authorities maintain vigilance and precautions such as bush-clearing, spraying and cordoning to prevent the spread and restrict the infested areas.

Tick-borne diseases are of the greatest importance. Among this group are East Coast Fever, Redwater, Gallsickness, Heartwater. The ticks not only transmit these diseases but interfere as ecto-parasites with the well being of the animals and also pre-dispose them to other infections. E.C.F. is confined to the eastern and northern parts of the country. It is the exotic breeds that are most susceptible to tick-borne infections but they are effectively controlled by regular dipping in the commercial farms. However, among traditional cattle the infections are widespread because dipping facilities though provided by the government are not available in all areas of the country. Even when they are situated within reach of most herds, ignorance of the farmers and lack of proper labour to take the animals prevents regular dipping resulting in ineffective control.

*Animal husbandry* : Traditional management system especially for livestock leave much to be desired of; because little effort has been directed to help the rural farmers and they remain a comparatively neglected lot.

The overwhelming majority of the farmers are still bogged down in custom and tradition and their indiscriminate adherence to age-old methods have limited the productivity of their animals. The low production so characteristic of the traditional herds is due mainly to improper management, poor nutrition and less resistance to disease.

Since livestock has been considered a form of wealth and prestige, more emphasis has been laid on increasing the numbers of animals than to exploiting their production potential.

More then 85 percent of the animals are in the traditional sector and the average herd size varies considerably from area to area and also within areas. A herd may consist of less than 10 to over 400 animals. Family labour is relied upon in most cases and small boys manage the herds. As communal grazing is the accepted practice, herds are taken out at about 08.00 hrs. from the kraals in which they are enclosed at night, for daytime grazing which, on an average, lasts for not more than 7 hours. This undoubtedly, restricts the time to forage for food and in the dry season when grass is scarce and its nutritive value low, the animals are in a state of semi-starvation losing upto 30kg in cases where long distances have to be travelled in search of water. However, those that are in the vicinity of dambos and browse trees and shrubs are able to maintain their health and condition. Almost no supplementary feeding is given except for some post-harvest remnants of field crops.

The calves are allowed to suckle their dams till weaning which could be over 10 months. There is no system of controlled breeding and calves may be born at any time of the year. However, two peaks or seasonality of calving has been observed in most areas suggesting that the cows conceived successfully after mating in the rainy season when the grass was of better nutritive value.

Another feature is that not all herds have bulls, and cows in such herds did not have year round possibilities to be served. In these instances, the farmers rely on the chance mating by bulls from other herds during times of communal grazing. Heifers can come into heat at about 20 months of age depending on the nurtritional status of the animal; the oestrous cycle is about 21 days which is not different from temperate breeds; they calve for the first time at an age over 4 years. The calving rates are on an average, 50-60 percent. One of the major problems confronting the local cattle is infertility. It is estimated that more than 40% of the indigenous cattle are infertile. The off-take from the traditional sector is only about 9% so that they make little contribution to the agricultural economy of the country.

*Commercial sector* : The comercial herds are composed of improved breeds of cattle, mainly imported European stock. They are under modern systems of management because the owners who are predominantly white farmers possess the know-how and have the necessary facilities. They provide about 70% of marketed milk in the urban areas. The average size of the herds is 88 cows and it is estimated that there are only about 60 farms in existence today although at independence there were over one hundred.

The state and parastatal farms may also be classed within this sector. They also have high quality dairy stock but most of them have Zambians at management level. Here, the average size of the herd is about 230 cows and they also contribute to the urban marketed milk supply.

The commercial farms are mostly situated along the "Line of rail" as stated earlier while the state and parastatal farms are distributed in the outlying provinces.

*Milk Production* : The indgenous breeds are utilised more as a source of beef than milk and these animals can never be expected to reach the milk producing capabilities of exotic stock.

There is a wide variation of yield rising up to 900 litres per cow per year from an average of 200 litres for the majority of breeds indicating that there is a mixed unselected population of both low and somewhat better milk producers. Generally, the yield per cow may be taken as 1 litre per day. In comparison,the cross-breeds give around 1500 litres per cow per year and the exotic stock in commercial farms have produced over 3000 litres in a lactation.

Only about 60 percent of all traditional cattle are milked. The owners exercise their discretion to a large extent depending on the circumstances and mindful of the fact that the calf's needs must be ensured. when milked, the mik is usually for family consumption or sale to neighbours, if in excess. Taking the country as a whole more milk is produced by the traditional cattle because of the large numbers but all this milk is consumed within this sector and little if at any comes to satisfy the urban demands which are entirely dependent on the commercial sector and imported milk.

## MATERIAL AND METHODS

The present work is based on the material collected throughout the country by the staff of the Pest Research Unit (now Livestock and Pest Research Centre) of the National Council for Scientific Research from 1965 to date. Although it is largely based on the ticks from cattle there are substantial collections from other domestic and wild animals. Most of these collections were made by trained staff during field trips designed to cover particular areas during a national survey of tick infestation patterns, and during the course of special long-term studies on *Theileriosis* in the Eastern Province of Zambia. The collection were usually made by deticking both domestic and wild animals; or by flagging; cone swooping; and blanket sweeping in pastures. Specimens from wild animals were collected as and when they became available during conservation measures taken by the Department of National Parks and Wildlife Services. Many samples were also received from the Department of Veterinary and Tsetse Control Services; Department of Biology, University of Zambia; farmers; hunters and other interested persons. These samples though obtained in a haphazard manner provide very valuable information especially on the distribution of the various tick species and their host-relationship.

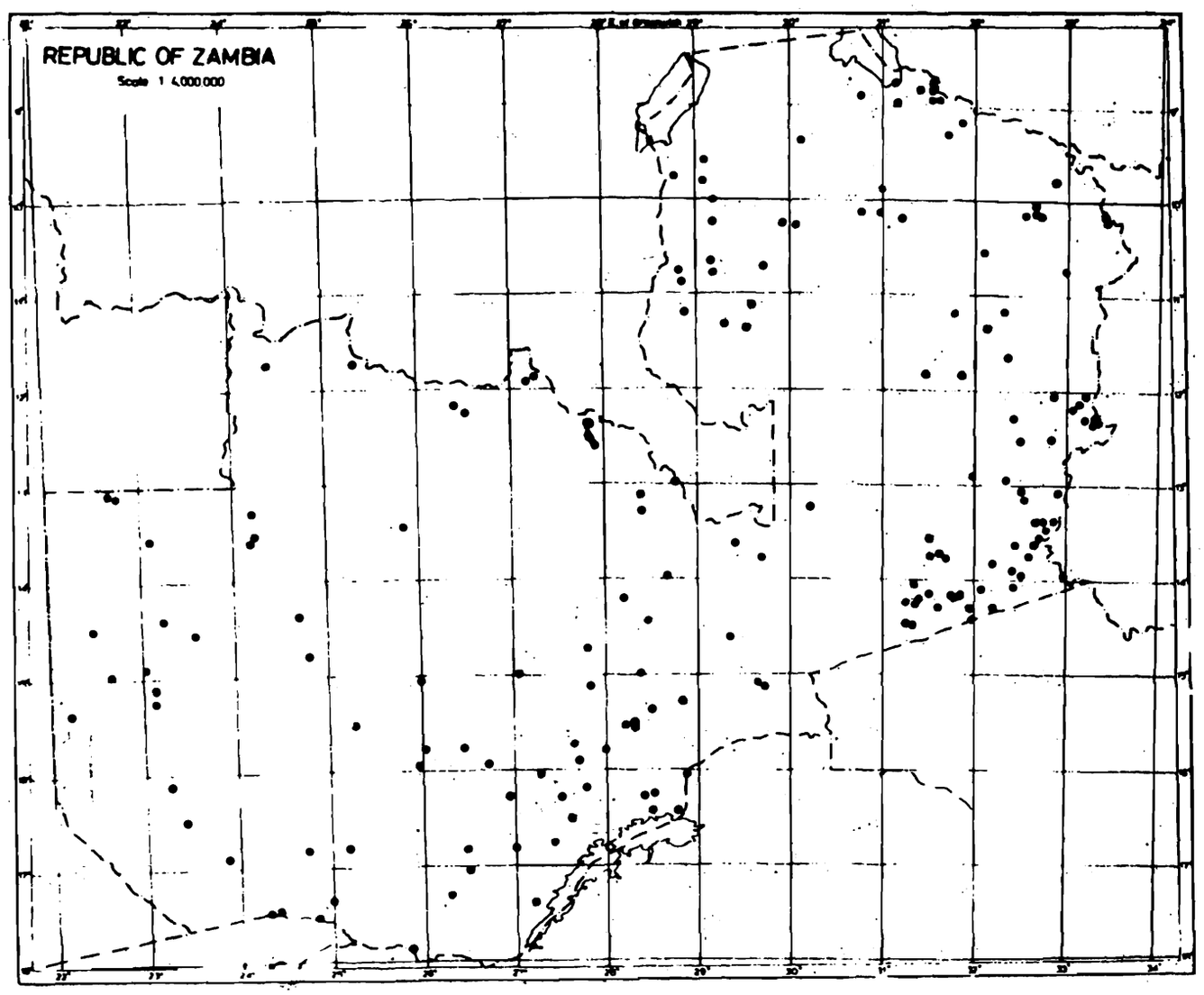
More than two hundred thousand specimens of ticks have been re-examined during the course of this work. Some earlier authentic record of Theiler and Robinson (1954); Theiler (1962); Colbo (1973); Colbo and MacLeod (1976); and MacLeod and Mwanaumo (1978) and Zulu (1981) have also been included. I have also utilized unpublished information and/or records generously placed at my disposal by the Secretary General, National Council for Scientific Research, at the then Pest Research Unit. In addition, information was abstracted from literature also. In some cases I was not able to examine the material of doubtful records but they have, nevertheless, been included and listed as provisional in the text.

Special efforts were made to identify, as precisely as possible, the locations from which collections were made particularly with regard to the place names referred to in the text and those on the labels simply refer to farm names such as "Tembo Farm" "Banda Farm", "Anchor-Ranch" and Chilinda Farm" etc.; most of these have been traced.

A further source of confusion was the duplication of place names, with and sometimes without variation of spelling. These names were traced in relation to provinces and districts. The correct spelling of place names has been followed in accordance with the official gazetteer of Geographical Names in the Republic of Zambia (1967) and are listed in the Gazetteer.

The distribution records for each of the tick species has been plotted on an outline tracing on transparent sheet of the base map used in the Atlas of population in Zambia, compiled and drawn by the Cartographic and Location Analysis Research Unit of the National Council for Scientific Research, Lusaka (scale 1:4,000,000 kms). This method provided direct correlations between the distribution of ticks and the administrative divisions; physiography; vegetation; soils; and rainfall of the country. The average rainfall was obtained from the

meteorological department of the Republic of Zambia. By compiling these records and plotting them on maps a fairly accurate picture of distribution within the country has emerged for the first time. The distribution of collecting localities is shown on map 10.




Map 10. Distribution of collecting stations in Zambia

# THE TICK SPECIES

## GENERAL

Ticks belong to the superfamily Ixodoidea, in the Order Acarina, which also includes the spiders, scorpions and mites. They are divided into two families, the Argasidae and the Ixodidae. The Argasidae lack a hard dorsal scutum and because of this are referred to as "Soft" ticks. The Ixodidae have a hard scutum and for this reason are usually known as hard ticks. This work chiefly deals with hard ticks; the larger group and more important from the veterinary point of view. Some species are also known as vectors of human pathogens. The result of this work indicates that there are to-date 64 species belonging to nine genera as follows :-

*Amblyomma* 10 species; *Aponoma* 3 species; *Boophilus* 2 species; *Dermacentor* 1 species; *Haemaphysalis* 7 species; *Hyalomma* 2 species; *Ixodes* 13 species; *Rhipicentor* 1 species and *Rhipicephalus* 25 species.

The genus *Aponoma* occurs exclusively on reptiles; the remaining genera have been found predominatly on mammals.

The sections that follow are dealt with each individual species of ticks, and are listed in alphabetical order of genera and species. An account is given of each species under the following headings: host relationship (chiefly based on the summary of collection data; in which the species distribution is given in relation both to administrative division of the country and its relation to physiography, vegetation, rainfall, soils and disease relationship. The distribution of each species in Zambia is supported by a map.

Host-parasite-lists, distribution lists according to provinces and districts of Zambia as well as gazetteer of places and a comprehensive bibliography are included.

## Genus 1. **Amblyomma**

### 1. ***Amblyomma eburneum*** Gerstacker, 1873

*DESCRIPTIONS* :

| | |
|---|---|
| Robinson (1926). | Ticks Part IV The genus *Amblyomma* : 116-119; Figs. Male and Female. |
| Tendeiro (1959). | Bolm cult. Guiné portug., 14, No.55:410-417; Figs. Male and Female. |

*SUMMARY OF COLLECTION DATA*

| *Host* | *No. of collections recorded* | *No. of collections containing this species.* |
|---|---|---|
| (a) Domestic *animals* | | |
| Cattle | 1,645 | 1 |

*DISTRIBUTION* (Map 11)

As yet, this tick has only been collected in Zambia in *Eastern Province* at Lundazi.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : This station lies on the northern end of the elevated eastern plateau system at about 1200m in altitude with belts of higher uplands, long broken ridges or isolated rocky hills.

Vegetation : This is an area of miombo woodland dominated by *Brachystegia* and *Julbernardia* species.

Rainfall : The locality lies in the 800 mm to 900mm rainfall belt.

Soil : Typically sandveldt.

*DISEASE RELATIONSHIP* : These have not been studied.

*HOSTS* *A.eburneum* is known to parasitise cattle, giraffe, lion, buffalo, antelope and varanus lizard. In Tanzania Yeoman and Walker (1967) has found this tick only from buffalo. Walker (1974) has recorded this tick from domestic cattle, black-rhinoceros, warthog, buffalo and oryx.

*REMARKS* : *A. eburneum* is typically an east african tick and is distributed from Zimbabwe on the south across Tanzania, Kenya into Somalia in the north and Mozambique in the east. The rarity of this species in collection suggests that its occurrence in Zambia is accidental.

### 2. ***Amblyomma hebraeum*** Koch, 1844

*DESCRIPTION* :

Robinson (1926). Ticks Part IV The genus *Amblyomma* : 104-106; Figs. Male and female.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No. of collections containing this species.* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 4 |

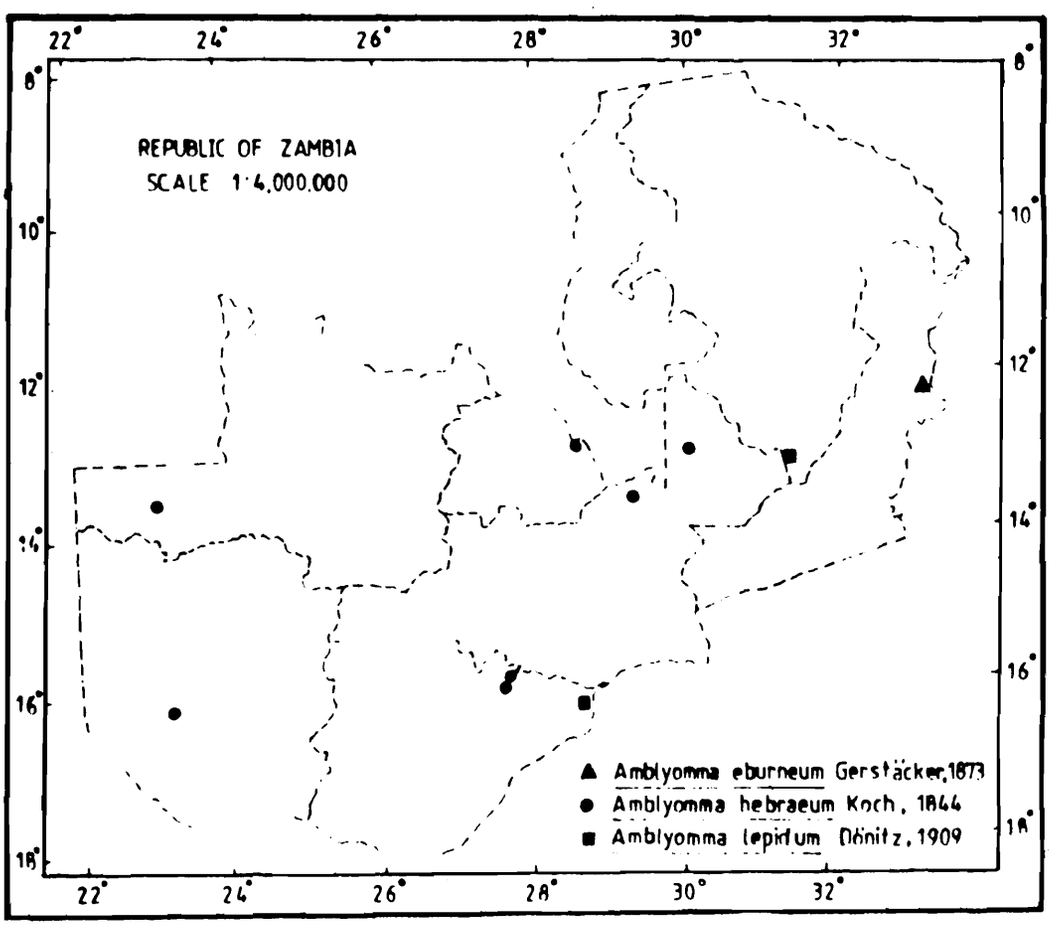
*DISTRIBUTION* (Map 11) :

A single specimen was found on cattle in *Lusaka* and *Southern Provinces* respectively; one specimen was taken from cattle at Mkushi in the Central Province. The other specimens were also taken from cattle in *Western* and *Northern Provinces.* Incidentally all the specimens collected were male.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : Two of the stations lie on the elevated part of the Central Province at about 1200m to 1500m,; one on the northern plateau in Copperbelt; one in the Kafue flats in Southern Province and one each in kasisi plains and Kalahari region in North-Western and Western Provinces respectively. All these stations are situated at an altitude of 900m to 1500m.

**Vegetation zones.** These locations fall in the woodland, dry evergreen forest and savanna




Map 11. The distribution of *Amblyomma eburneum*, *A. hebraeum* and *A. lepidum* in Zambia

**Rainfall** : They occur in rainfall zone extending from 600 mm to 1300mm per annum.

**Soil** : These areas lie in the barotse sand, kafue basin alluvium, leached red-brown loams and leached sandveldt.

*DISEASE RELATIONSHIP* *Rickettsia conori* a casual agent of tick bite fever has been found in *A. hebraeum*. This tick is also a transmitter of heartwater in cattle, sheep and goat. The bite of this tick also causes deep wounds which are liable to secondary infection.

*HOSTS* : *A hebraeum* is one of the most important cattle tick in southern Africa and feeds in all stages on cattle and other domestic and wild ruminants. It is also known to infest a wide range of wild animals. Theiler (1962) has given a detailed host-list of this species.

*REMARKS* : According to Theiler (1962) this tick is widely distributed in southern Africa and records from Ndola and Mazabuka in Zambia are probabaly introduced. I have come across this species very rarely in Zambia and it seems that this species has not yet been established in the country inspite of suitable vegetation.

3. ***Amblyomma lepidum*** Dönitz, 1909

*DESCRIPTIONS* :

Robinson (1926). Ticks Part IV The genus *Amblyomma* : 94-96; Figs. Male and Female.

Hoogstraal (1956a). African Ixodoidea. 1. Ticks of the Sudan : 216-223 ; Figs. Male and Female.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collection recorded* | *No. of collections containing this species.* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 1 |
| (b) *Wild Animals* | | |
| Buffalo | 72 | 1 |

*DISTRIBUTION* (Map 11) :

I have found this species in collection from Lusitu and Luangwa valley.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : Lusitu is in the south eastern part of the lower Zambezi river basin at an altitude of 305m-609m. In Luangwa valley the locality is on a rocky escarpment.

Vegetation : The records are from the *Colophospermum mopane* merging into woodland.

Rainfall : The localities in 700mm-800mm annual rainfall zone.

Soil : The area lies in valley soils and rock and rubbles, best suited for permanent vegetation.

*DISEASE RELATIONSHIP* : In Sudan Karrar (1960) and Karrar, Kaiser and Hoogstraal (1963) present circumstantial evidence, including a careful zoogeographical survey, suggesting that *A. lepidum* will transmit heartwater of ruminants. In laboratory Reiss Gutfreund (1956) was able to infect larvae and nymph of *A. lepidum* with *R. prowazekii* by feeding them on infected lambs and rabbits.

*HOSTS* : *A.lepidum* is primarily a cattle parasite with smaller domestic animals as secondary hosts; carnivores and large ground birds are occasional hosts (Hoogstraal, 1956a).

*REMARKS* : *A. lepidum* is an East African herbivore tick. This species is very common in the dry thorny parts of Uganda; in Kenya it mostly occurs in rather more arid conditions phasing out towards desert areas and in Sudan it is usually found in the central grasslands. Yeoman and Walker (1967) have found this tick fairly common in

Tanzania mainly on Central plateau and its troughs in wooded grasslands enclave and to the *semi-arid bush thicket* enclave. Theiler (1962) has given a detailed distribution and hosts lists of this species in Ethiopian region.

### 4. *Amblyomma marmoreum* Koch, 1844

*DESCRIPTION* :

Theiler and Salisbury (1959). *Onderstepoort J. vet. Res.* 28 : 54-66; Figs. Male, Female N. and L.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No. of collections containing this species* |
|---|---|---|
| *Wild Animals* | | |
| *Reptiles* | | |
| Tortoise | 7 | 1 |
| Puff adder (snake) | 13 | 1 |

*DISTRIBUTION* (Map 12) :

I have found this species in collections from single localities in the *Western* and *Northern Provinces.*

*PHYSIOGRAPHY ,VEGETATION* Etc.

Physiography : The records are from the flat surface in *Western Province* and from rocky escarpment in Luangwa valley.

Vegetation : Woodland dominated by *Brachystegia* and *Julbernardia* species and *Colophospermum mopane* merging into woodland.

Rainfall : The area falls within about 800mm zone.

Soil : Barotse sands and valley soils and rocks.

*DISEASE RELATIONSHIP* : These have not been studied in detail.

*HOSTS* : Adults and larvae are usually found on reptiles (Theiler 1962). According to Lewis (1939) cattle and buffalo are rarely attacked. Mettam (1932) found this species on guinea fowl in Uganda. Charters (1946) reported man as an occasional host of this species.

*REMARKS* *A. marmoreum* occurs throughout the Ethiopian faunal limits excluding the Arabian extension of the area. According to Hoogstraal (1956a) it appears to be more common in eastern and in southern Africa than it is in western and central Africa.

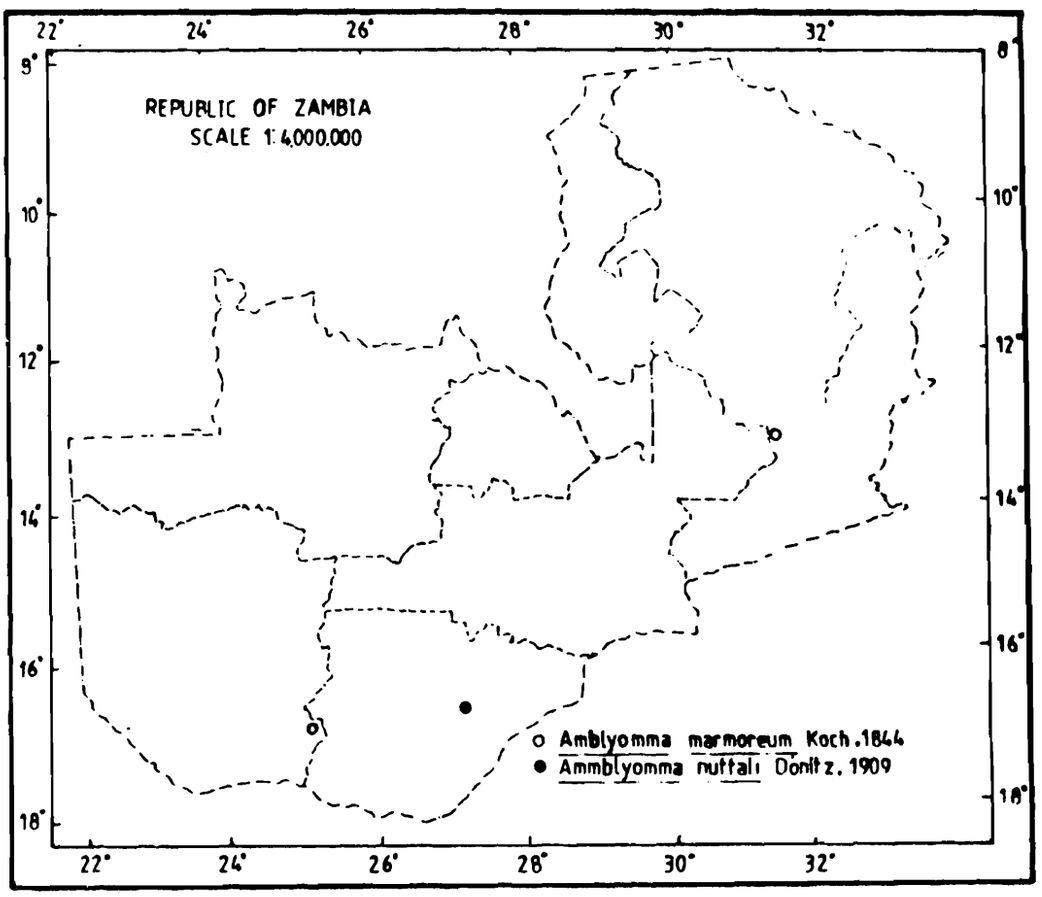
### 5. *Amblyomma nuttalli* Dönitz, 1909

*DESCRIPTION* :

Theiler and Salisbury (1959). Onderstepoort. J. vet. Res.28: 77-86; Figs. Male, Female N. and L.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No of collections recorded* | *No. of collections containing this species* |
|---|---|---|
| *Reptiles* | | |
| "Tortoise" | 7 | 1 |




Map 12. The distribution of *Amblyomma marmoreum* and *A. nuttali* in Zambia

*DISTRIBUTION* (Map 12) :

The single record is from an area between Monze and Choma; *Southern province.*

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : Flat area between 900m–1200m.

Vegetation : Probably a cultivated area near *Brachystegia* and *Julbernardia globiflora* woodland.

Rainfall Over 800mm per annum.

Soil : Red-brown loam and sandveldt.

*DISEASE RELATIONSHIP* : These have not been stidied.

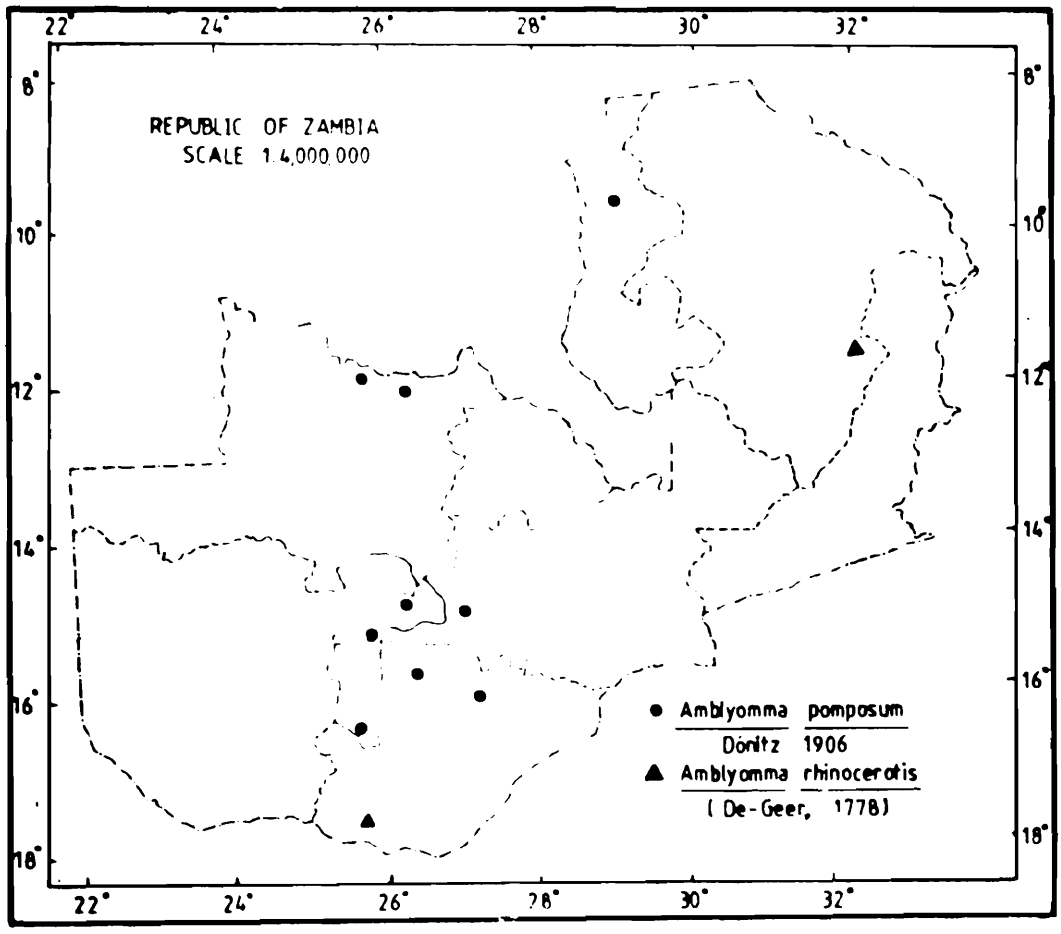
*HOSTS* : This tick cheifly infests reptiles especially the tortise. There are few records of its occurrence on birds and various mammals (Elbl and Anastos, 1966a).

*REMARKS* : According to Hoogstraal (1956a) this tick is widely distributed throughout the African continent within the Ethiopion faunal limits.

6. ***Amblyomma pomposum*** Dönitz, 1909

*DESCRIPTION*

Elbl and Anastos (1966a). Ixodid Ticks of Central Africa (Acarina : Ixodidae) Vol.1 : 71-76; Figs. Male and Female.




Map 13. The distribution of *Amblyomma pomposum* and *A. rhinocerotis* in Zambia

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No of collections recorded* | *No. of collection containing this species.* |
|---|---|---|
| *Wild Animals* | | |
| Buffalo | 72 | 4 |
| Bushbuck | 29 | 1 |
| Eland | 22 | 1 |
| Hartebeest | 16 | 1 |
| Roan Antelope | 6 | 1 |
| Sable Antelope | 13 | 4 |
| Wart-hog | 39 | 2 |

*DISTRIBUTION* (Map 13) :

I have found this species in collections from Kafue National Park; Kawambwa in *Luapula Province;* Two collections from *North-Western Province*, from Solwezi and Mukamba and from Namwala in *Southern province.*

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : The species occurs frequently in the Kafue flats at an altitude of 920m-1075m. It is also found in the upper valley region near the Lake Mweru in *Luapula* and in northern highland in *North-Western Province* at an elevation of about 1524m.

Vegation *A.pomposum* is almost entirely limited to *Brachystegia* and *Julbernardia globiflora* woodland and nearby *Busea thickets* in Namwala area.

Rainfall : These station lie in between 800mm to 1400mm per annum rainfall zone. This tick appears to prefer low rainfall area.

Soil : It is found in sandveldt, leached sandveldt, barotse sand, kafue clays and in rock and rubble.

*DISEASE RELATIONSHIP* : *A. pomposum* is known to transmit the agent of heartwater fever *(Rickettsia ruminantium)* (Neitz, 1947), and the causative agent of east coast fever *(Theileria parva)* to cattle (Theiler, 1962). According to Hoogstraal (1956a) this species serves as a reservior of *Asterococcus mycoides* and is responsible for pyolymphangitis of horses in Angola.

*HOSTS* : This species seems to infest domestic animals namely cattle, mules, horses, sheep, goats, and dogs as well as wide variety of wild animals like buffalo, eland, sable antelope, roan antelope, zebras and warthog.

*REMARKS* : *A.pomposum* has been reported in literature many times from East and Southern Africa. However, as a result of studies of Theiler (1962) the known zone of infestation of this species shows probably only Tanzania, Angola and Zambia. Yeoman and Walker (1967) in thier recent study has not found this species in Tanzania.

### 7. *Amblyomma rhinocerotis* (De Geer, 1778)

*DESCRIPTIONS* :

| | |
|---|---|
| Robinson (1926). | Ticks Part IV. the genus *Amblyomma* : 260-263; Figs. Male and Female (as *A. petersi* Karsch, 1878). |
| Elbl and Anastos (1966a). | Ixodid Ticks of Central Africa (Acarina: Ixodidae) Vol. 1.:77-83;Figs. Male and Female. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No of collections recorded* | *No. of collections containing this species.* |
|---|---|---|
| *Wild Animals* | | |
| Rhino | 5 | 1 |

*DISTRIBUTION* (Map 13) :

I have found this species in collection from a single locality in Zambezi valley. I feel that this simply indicates deficiency in our collecting as the host is widely distributed in the country.

*PHYSIOGRAPHY,VEGETATION* Etc.

Physiography : Locality is in Zambezi river basin at an altitude of 300m-600m.

Vegetation : Mopane woodland.

Rainfall : The limited location record fall in the 700-800mm zone.

Soil : The area lies in sandy and grey clays in lower valley and is subjected to flooding in the rains and most of lower valley soils are extremely dry in the dry season.

*DISEASE RELATIONSHIPS* : These have not been studied.

*HOST* : *A. rhinocerotis* is primarily a parasite of black and the white rhino. In literature there are records of its occurrence on eland, tortoise, python, domestic cattle. Yeoman and Walker (1967) have recorded the species from lion also.

*REMARKS* : *A. rhinocerotis* is distributed in central, eastern and southeastern Africa apparently wherever its host is found. Theiler (1962) has given a detailed distributional and host lists of this species.

### 8. *Amblyomma sparsum* Neumann, 1899

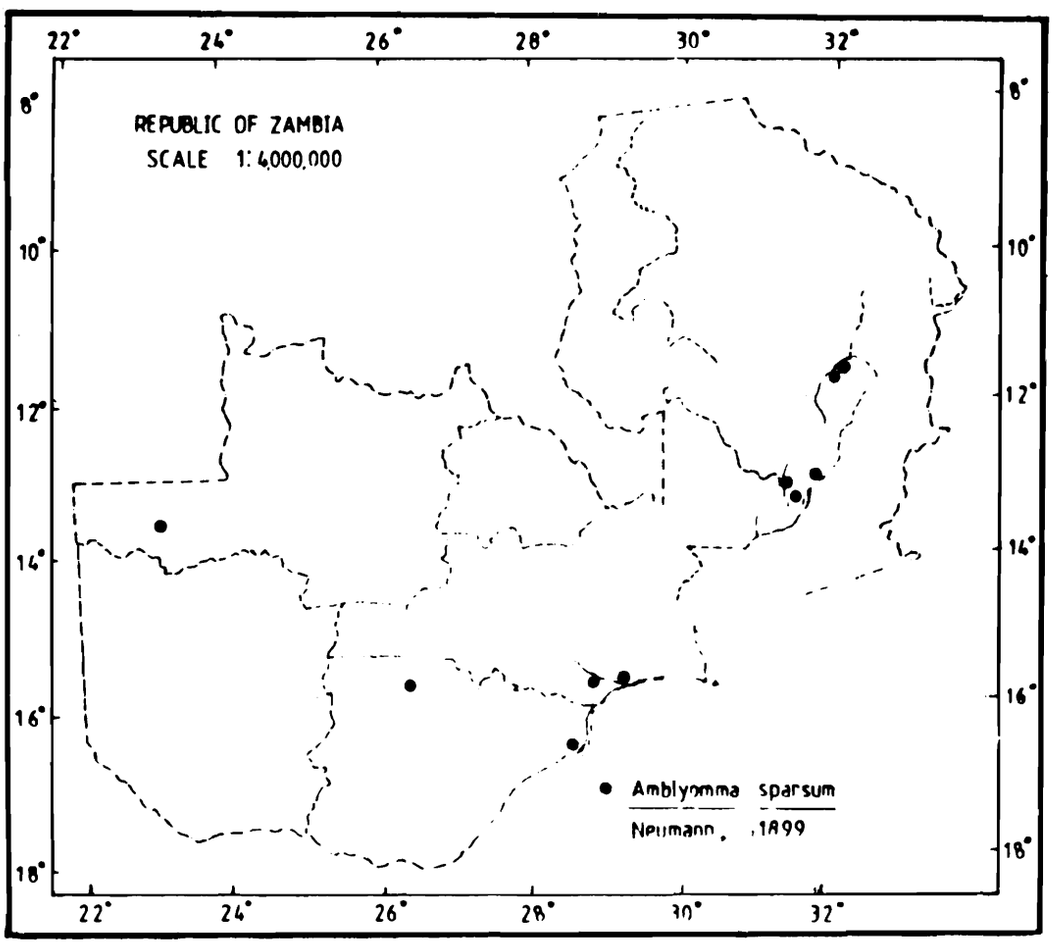
*DESCRIPTION* :

| | |
|---|---|
| Theiler and Salisbury (1959). | *Onderstepoort J.vet.Res.* 28 : 66-76; Fig. Male, Female, N and L. |

*SUMMARY OF COLLECTION DATA :*

| *Host* | *No. of collections recorded* | *No. of collections containing this species.* |
|---|---|---|
| *Wild Animals* | | |
| Buffalo | 72 | 11 |
| Lion | 16 | 1 |
| 'Tortoise' | 7 | 1 |

*DISTRIBUTION* (Map 14) :




Map 14. The distribution of *Amblyomma sparsum* in Zambia

I have found *A. sparsum* in collections from luangwa valley floor in the *Eastern Province* and northern escarpment from *Northern Province*. In *Lusaka Province* it was found in the Chongwe river valley. Records in *Southern Province* are from Namwala and lower Zambezi valley. In North-Western Province it occurred at upper Zambezi.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : The tick has been found in Kashizi plains in *North-Western Province;* on the Kafue flat it has been found on the Namwala area; and it has been found in the faulted river valleys and on the rising plains of Luangwa, and lower Zambezi and Muchinga escarpments respectively. It has been recorded at altitudes upto 1200m.

Vegetation : *A. sparsum* is found in the mopane woodland dominated by *Colophospermum mopane* including the *Brachystegia* woodland. It was also found in dry evergreen forest and bush thickets.

Rainfall : This species has so far been found in areas receiving 800mm to 1300mm rain per annum.

Soil : These stations are located in the valley soils; among rock and rubble near the rivers; Barotse sands in flood plains and in kafue clay.

*DISEASE RELATIONSHIP* : These have not been studied.

*HOST* : The chief hosts of *A. sparsum* are rhinoceros, tortoise and buffalo. In Zambia this tick is found most consistently on buffalo and less frequently on tortoise. There is a single record of its occurrence on lion. The low incidence on tortoise probably indicates deficiency in our collecting as this most preferred host is widely distributed in the country. I believe that systematic survey would show that this may be found throughout the country.

*REMARKS* : *A. sparsum* has been recorded frequently from central and southern Kenya and northern Tanzania (Theiler, 1962). Yeomen and Walker (1967) has found this species in Northern, Central and Southern highland province of Tanzania as well. In literature a few records of its occurrence are available from Uganda, south Sudan and isolated records from Eritrea, Ethiopia, Chad, Central African Republic, Malawi, Zimbabwe, Mozambique, Angola, Cameroons, Somalia, West Africa and a single record from South Africa. According to Theiler (1962) the records from Ethiopia, Eritrea and Somalia should be checked against records of *A. falsomarmoreum.*

### 9. *Amblyomma tholloni* Neumann, 1899

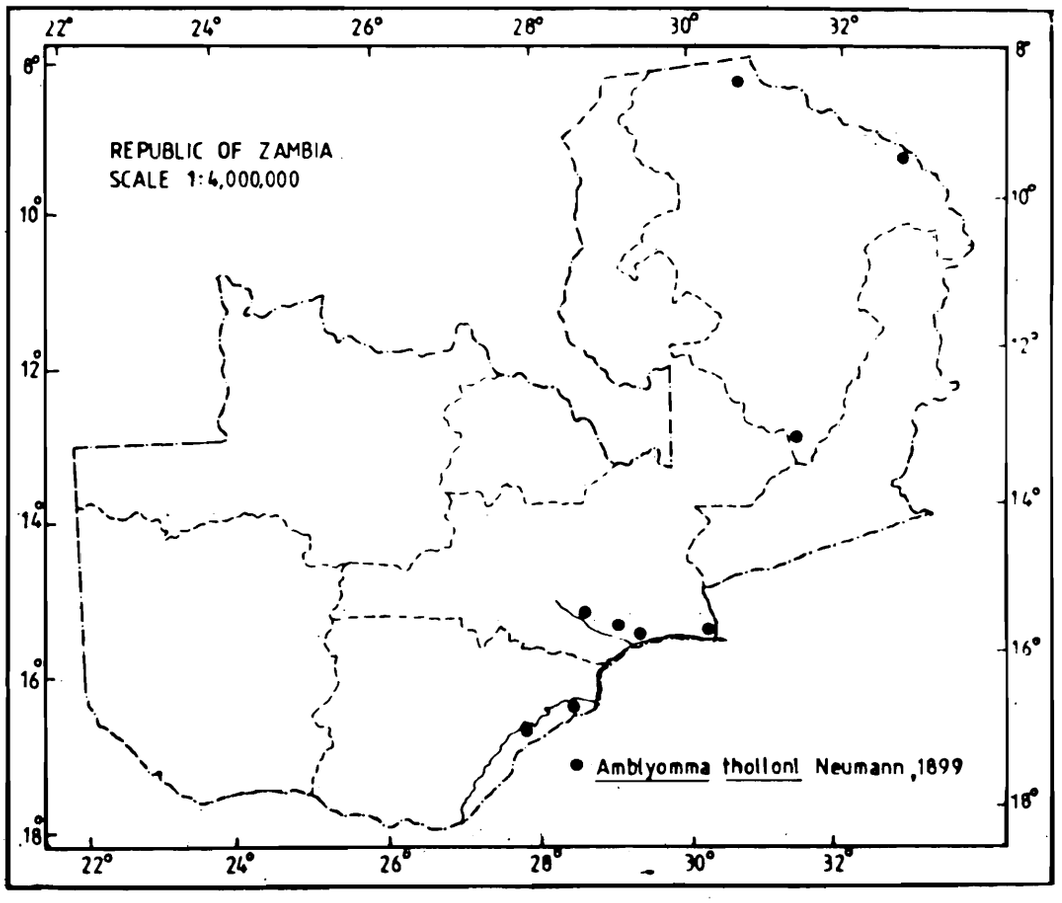
*DESCRIPTIONS* :

| | |
|---|---|
| Robinson (1926). | Ticks Part IV The genus *Amblyomma* : 249-252; Figs. Male, Female. |
| Elbl and Anastos (1966a). | Ixodid Ticks of Central Africa (Acarina : Ixodidae) vol.1 : 98-105; Figs. Male and Female. |

*SUMMARY OF COLLECTION DATA* :

| *Hosts* | *No. of collection recorded* | *No. of collections containing this species.* |
|---|---|---|
| *Wild Animals* | | |
| Elephant | 16 | 12 |

*DISTRIBUTION* (Map 15) :




Map 15. The distribution of *Amblyomma tholloni* in Zambia

The localities from which we have *A. tholloni* in collection simply represent those in which collector happens to have examined the host. It is undoubtedly far more widely distributed in the country specially in the Luangwa valley than the present records indicate.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : *A. tholloni* is confined primarily to the faulted valley of Luangwa and lower Zambezi rivers below 900 metres. It has also been recorded from the Mbala Highlands and Mafinga hills in the *Northern Province* where land rises to over 1500 metres above sea level.

Vegetation : These locations fall in the woodlands dominated by *Colophosphermum mopane; Brachystegia* with *Boehmii* and *Brachystegia* with *Julbernardia globiflora.*

Rainfall : These stations are in the 800mm to 1300mm rainfall zone.

Soil : These areas lie in the valley soils, rock and rubbles, leached s. .dveldt and redbrown loams.

*DISEASE RELATIONSHIP* : *A. tholloni* is probably a vector of Nuttallia loxodontis of elephants in congo.

*HOST* : I have found this tick in our collections only from elephants, African Elephant *Loxodonta africana* is the chief host of this species. In literature, rhinoceros bushpig, buffalo, gazzele, leopard and tortoise has been reported as the common hosts.

*REMARKS* : According to Hoogstraal (1956a), *A. tholloni* is distributed through most of Africa, wherever the African elephant is found, except possibly along the southern margin of the host range.

10. ***Amblyomma variegatum*** (Fabricius, 1794)

*DESCRIPTIONS* :

| | |
|---|---|
| Robinson (1926). | Ticks Part IV The genus *Amblyomma* : 101-103; Figs. Male and Female. |
| Elbl and Anastos (1966a). | Ixodid Ticks of Central Africa (Acarina: Ixodidae) Vol.1. : 106-114, Figs. Male and Female. |

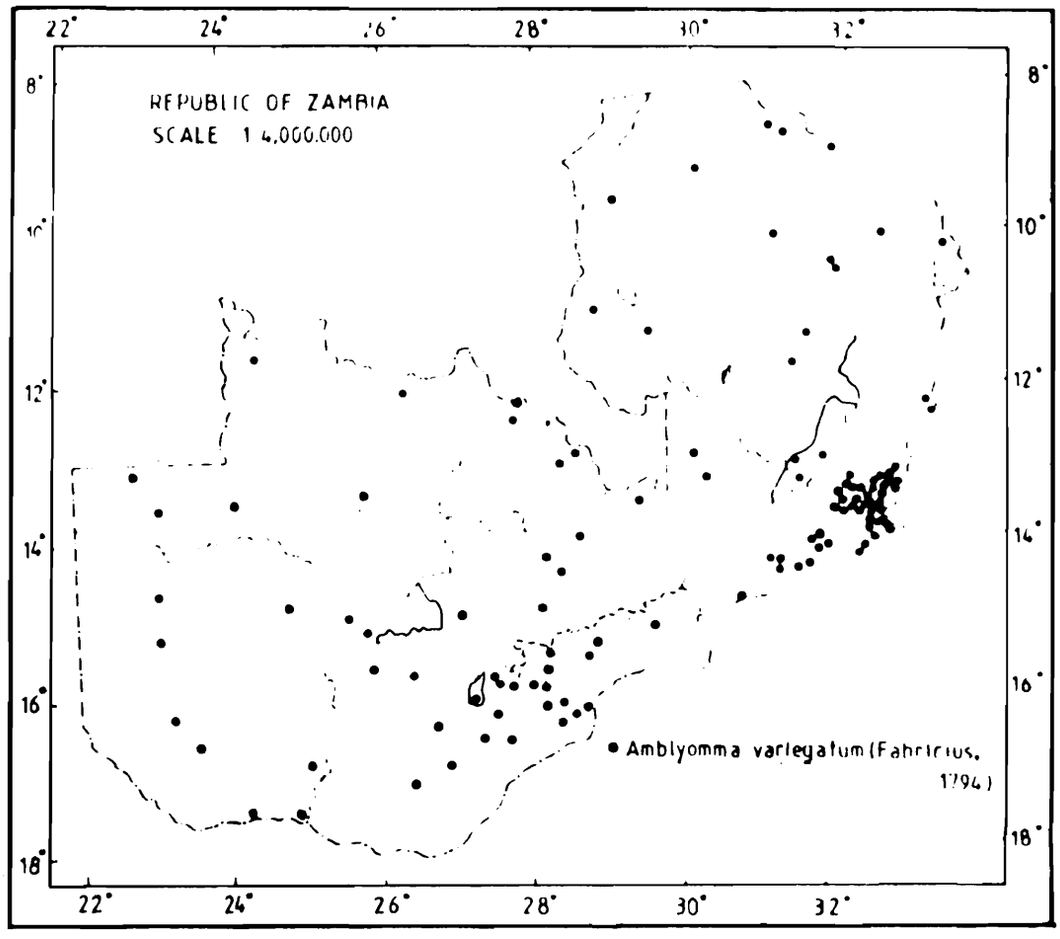
*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No. of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 542 |
| Goat | 122 | 9 |
| Dogs | 100 | 4 |
| Sheep | 91 | 4 |
| (b) *Wild Animals* | | |
| Buffalo | 72 | 3 |
| Bushbuck | 29 | 1 |
| Lechwe | 13 | 4 |
| Lion | 16 | 1 |
| Wildebeest | 20 | 1 |
| Zebra | 57 | 9 |

*DISTRIBUTION* (Map 16) :

*A. variegatum* is the commonest and most important member of the genus *Amblyomma* in Zambia. It is found in almost all the provinces of Zambia in relatively much higher infestations than any other species of this genus in the country. This tick is very important from the economic point of view and so its distribution is being given in some detail in every province of the country.

*Central Province* : *A.variegatum* is extremely common on domestic cattle and on wild animals specially wild bovids in Kafue National Park. It is uniformly distributed o:. Central plateau from Mumbwa area to Kcembc, Chipepo, Kapiri Mposhi, Mkushi, Serenje and Lupiya areas.




Map 16. The distribution of *Amblyomma variegatum* in Zambia

*Copperbelt Province* : This tick appears to be sparsely distributed in Copperbelt and we have few collections mainly from areas bordering Zaire namely Chililabombwe, Chingola, Luanshya and Ndola.

*Eastern Province* : In this province *A.variegatum* is found in heavy infestations wherever there are cattle. I have found this species in collections more or less throughout Chipata, Chadiza, Katete and Petauke districts in thousands. The species is fairly common in Lundazi also. However, there are no records of its occurrence beyond Lundazi which reflects the deficiency in our collections. There are also few records of its occurrence near the border with *Northern* and *Central Province* which needs to be surveyed. *A. variegatum* is found to infest a wide variety of wild animals in Luangwa National park.

*Lusaka Province* : Examination of material points out that *A. variegatum* is uniformly distributed in the province in the east up-to Rufunsa and south up-to Kafue Gorge. The largest number of collections were made in Chiota and Rufunsa areas.

*Luapula Province* : The very sparse and fragmented cattle population makes it difficult to draw a clear picture. Samfya, Mansa and Kawambwa districts has foci of infestation wherever cattle occurs and the infestation is usually heavy. There are virtually no collections from the rest of the province.

*Northern Province* : *A. variegatum* is widely distributed from Luangwa valley in the south up-to lake Tanganyika in the north, Mafinga mountains in the north-east and Luwingu in the West. The tick was found usually in heavy to very heavy infestations on cattle.

*North-Western Province* : In general the tick is found almost throughout the province on cattle but its distribution is patchy. The infestation is heavy on western part bordering Angola whereas it is sparse in areas in the north bordering Zaire.

*Southern Province* : The tick is very thickly distributed in the province except in parts of south eastern and western parts of the province and gradually fades towards southern region bordering Zimbabwe. Examination of collection reveals heavy to very heavy infestation in kafue flats, area bordering *Lusaka* and *Central Provinces* and the northern part of the Kariba lake and Kafue gorge. *A. variegatum* is found to occur on wide variety of game in Kafue flats, specially in Lochinvar National Park. We have records of its collection up-to Kalomo in south, Lusitu in east bordering Zimbabwe and Mashiteshi in western part of the province.

*Western Province* : I have found *A.variegatum* in collections more or less thoughout; from Sesheke in the south to Lukulu in the north. There are few record of its occurrence in areas adjoining *Southern Province*. The tick was found in heavy to very heavy infestation on cattle. A thorough survey in the province will reveal its distribution almost throughout the province.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : *A. variegatum* has been found in almost every type of the country from faulted valleys of Zambezi, Luangwa and the Lake Tanganyika in the north to Mafinga mountains and Mbala highlands. It occurs throughout the mountain ranges, massifs, rift valleys wherever there are cattle and is almost ubiquitous in the plains. Examination of present material reveals a very heavy concentration in the eastern plateau and Kafue flats.

Vegetation : *A. variegatum* has been recorded in various collections from all the five major types of vegetation viz, grasslands, evergreen forests thickets, woodlands and their subtypes. This species tends to prefer mainly woodlands dominated by *Brachystegia* with *Julbernardia globiflora*. However, there are number of records of its occurrence in varying degrees from other vegetational zones.

Rainfall *A. variegatum* is found between 600mm to 1400mm rainfall zone. The heavy infestation was found in areas having 900mm to 1100mm rainfall annually.

Soil : This tick is mainly found in the soils of *Luangwa* and lower *Zambezi* valleys, rock and rubble and valley soils. It is also found in barotse sand, kafue clays, red-brown loams, leached redbrown loams and leached sandveldt.

*DISEASE RELATIONSIIIP* : *A. variegatum* is known to transmit heart water of ruminants, caused by *Cowdria ruminantium*. It is regarded as chief vector of this organism in Eastern Africa. This species also transmits *Strephothrix* and the agent of *Ulcerative lymphangitis* in Madagascar. The bite of this tick causes large and deep wounds which are liable to secondary infection. According to Oteng, Simooya and Tandon (1980) this tick transmitts chronic theileriosis throughout the year in Chadiza district in Zambia.

*IIOST* : *A. variegatum* is primarily a parasite of cattle and practically every reference in literature pertains to parasitism of cattle by this species. Besides cattle it also attacks large variety of domestic and game animals throughout Africa. Hoogstraal (1956a) and Theiler (1962) have given a detailed host list of this species. In NCSR collections I have found this tick mainly on cattle though there are also collections from goats, sheep and dog. It also parasitises a wide variety of game in the National Parks of Zambia, especially buffalo, bushbuck, eland, lechwe, lion, waterbuck, wildebeest and zebras.

*REMARKS* : According to Hoogstraal (1956a) *A. variegatum* is distributed generally throughout the Ethiopian faunal region except in northern Sudan, most of South-West Africa, much of Mozambique and the entire Union of South Africa.

## Genus 2. **Aponoma**

### 11. ***Aponoma exornatum*** Koch,1844

*DESCRIPTIONS* :

| | |
|---|---|
| Theiler (1945a). | *Onderstepoort J. vet. Sci. Anim. Ind.* 20.: 165:172; Figs. Male, Female |
| Elbl and Anastos (1966d). | Ixodid Ticks of Central Africa, Vol. IV: 3-9; Figs. Male and Female. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No.of collections recorded* | *No. of collections containing this species* |
|---|---|---|
| *Reptiles* | | |
| 'Monitor Lizard' | 3 | 3 |

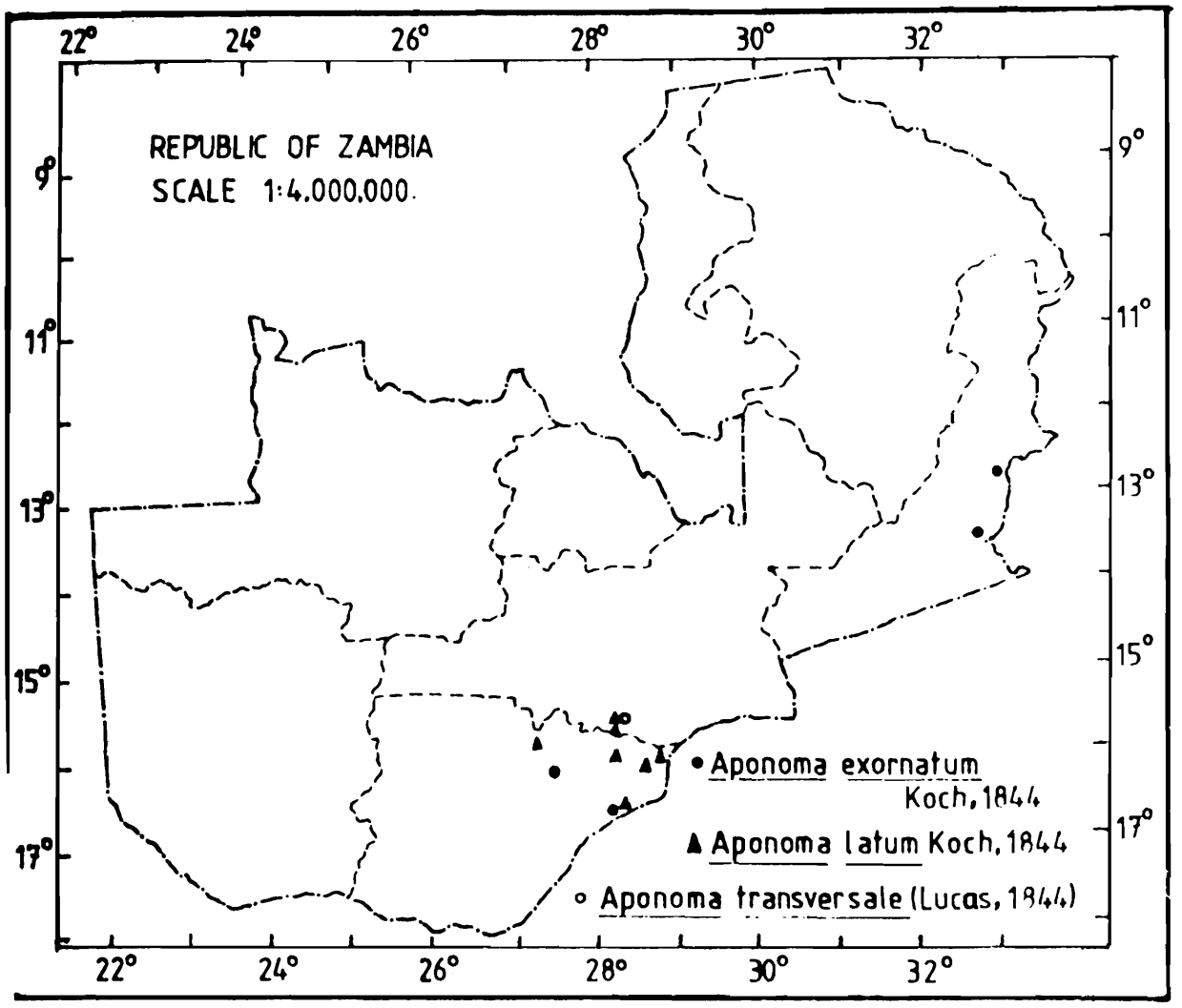
*DISTRIBUTION* (Map 17) :

Examination of collections reveals the presence of this species in *Eastern* and *Southern Provinces*. The collections came from Chipata (Msekera) and Chipata Lundazi Road and from Monze. It is recorded earlier from Kafue flats and Gwembe (Zambezi valley).

*PIIYSIOGRAPIIY VEGETATION* Etc.

Physiography : In *Eastern province* the localities fall in the Lungwa-Malawi watershed while in *Southern Province* in Gwembe trough in lower Zambezi and Kafue flats in the range of 900m to 1200m in altitude.

Vegetation : These stations are in areas of miombo woodland, dominated by *Brachystegia* and *Julbernardia* species; *Colophospermum* merging into mopane woodland and in savannas dominated by *Combretum* and *Afrormosia.*




Map 17. The distribution of *Aponoma exornatum, A. latum* and *A. transversale* in Zambia

Rainfall : They fall in rainfall zones extending from 800mm to 1100mm.

Soil : Red-clays, sandveldt, kafue clays and valley soils.

*DISEASE RELATIONSHIP* : These have not been studied in detail, though the species may transmit the hemogregarines, so frequently found in reptiles. It is claimed that natural infection of the fever *(Coxiella burnetii)* have been found in this species. (Hoogstraal, 1956a).

*HOST* : *A. exornatum* feeds primarily on repitles and usually found on lizards of genus *Varanus*. However, this species may parasitizes other animals occasionally (Hoogstraal, 1956a).

*REMARKS* : *A.exornatum* is distributed throughout most of Africa and its distribution is the same as that of *Varanus* lizard (Thieler, 1945a).

## 12. *Aponoma latum* (Koch, 1844)

*DESCRIPTIONS* :

| | |
|---|---|
| Theiler (1945a). | *Onderstepoort J.vet.Sci.Anim. Ind.*, 20: 183-188; Figs. Male and Female. |
| Elbl and Anastos (1966d). | Ixodid Ticks of Central Africa, Vol.IV: 10-15; Figs. Male and Female. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species.* |
|---|---|---|
| Reptiles | | |
| Boomslang | 4 | 1 |
| Blackmamba | 1 | 1 |
| Cobra | 13 | 5 |
| Puff adder | 13 | 6 |
| Red-brown snake | 1 | 1 |
| Grass-snake | 1 | 1 |
| Python | 3 | 2 |
| Monitor lizard | 3 | 1 |

*DISTRIBUTION* (Map 17) :

I have examined two collections of this species from Chilanga and Chipapa in *Lusaka Province*. The remaining collections came from Lochinvar National Park, Chirundu, Shamboko, Lusitu, and Zambezi valley in *Southern province.*

*PHYSIOGRAPHY, VEGETATION* Etc.

Physiography : Two of the stations lie on the broken hill country in the upper valley region at an altitude of about 1500m near the Kafue flats: three in the Zambezi escarpment and one in the Gwembe valley in the range of 900m to 1200m in altitude.

Vegetation : The stations fall in the type of grasslands, woodlands and savannas, that is chracterized by *Hyparrhenia*, swamp and papyrus sudd, *Colphospermum mopane*, *Combretum* and *Afrormosia.*

Rainfall : These stations came within 800-1000mm range.

Soil : These areas lie in Kafue clays, red-clays, valley soils, rock and rubble and red-brown loams.

*DISEASE RELATIONSHIP* : These have not been studied.

*HOST* : *A. latum* chiefly parasitises large, poisonous snakes including blackmamba.

*REMARKS* : This tick is found throughout the Ethiopian faunal limits.

### 13. *Aponoma transversale* (Lucas, 1844)

*DESCRIPTIONS* :

| | |
|---|---|
| Theiler (1945a). | *Onderstepoort J. vet. sci. Anim. Ind.* 20: 179-183; Figs. Male and Female. |
| Elbl and Anastos (1966d). | Ixodid Ticks of Central Africa. Vol. IV· 16-19. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No. of collections containing this species.* |
|---|---|---|
| *Reptiles* | | |
| Common African 'Python' | 3 | 1 |

*DISTRIBUTION* (Map 17) :

The single record is from Mt. Makulu (Chilanga), *Lusaka Province.*

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : Broken hill country at about 1220m in altitude.

Vegetation : It is not known exactly, where-about on Mt. makulu, the infested python was obtained; but these reptiles are occasionally found among grasses adjoining forest belts. The area is characterised by tall grasses and distinct trees such as *Afrormosia* and *Combretum.*

Rainfall : About 900mm-1000mm per annum supplemented by mists.

Soil : The station lie in red-clay zone.

*DISEASE RELATIONSHIP* : These have not been studied.

*HOST* : The reported hosts of this species are the *Python regius* and *Python sebae.* Clifford and Anastos (1962) reported six nymphs of this tick on *Hippotragus niger* from Upemba National Park in Congo and are of the view that the finding of this tick on mammal can be considered as accidental and needs confirmation.

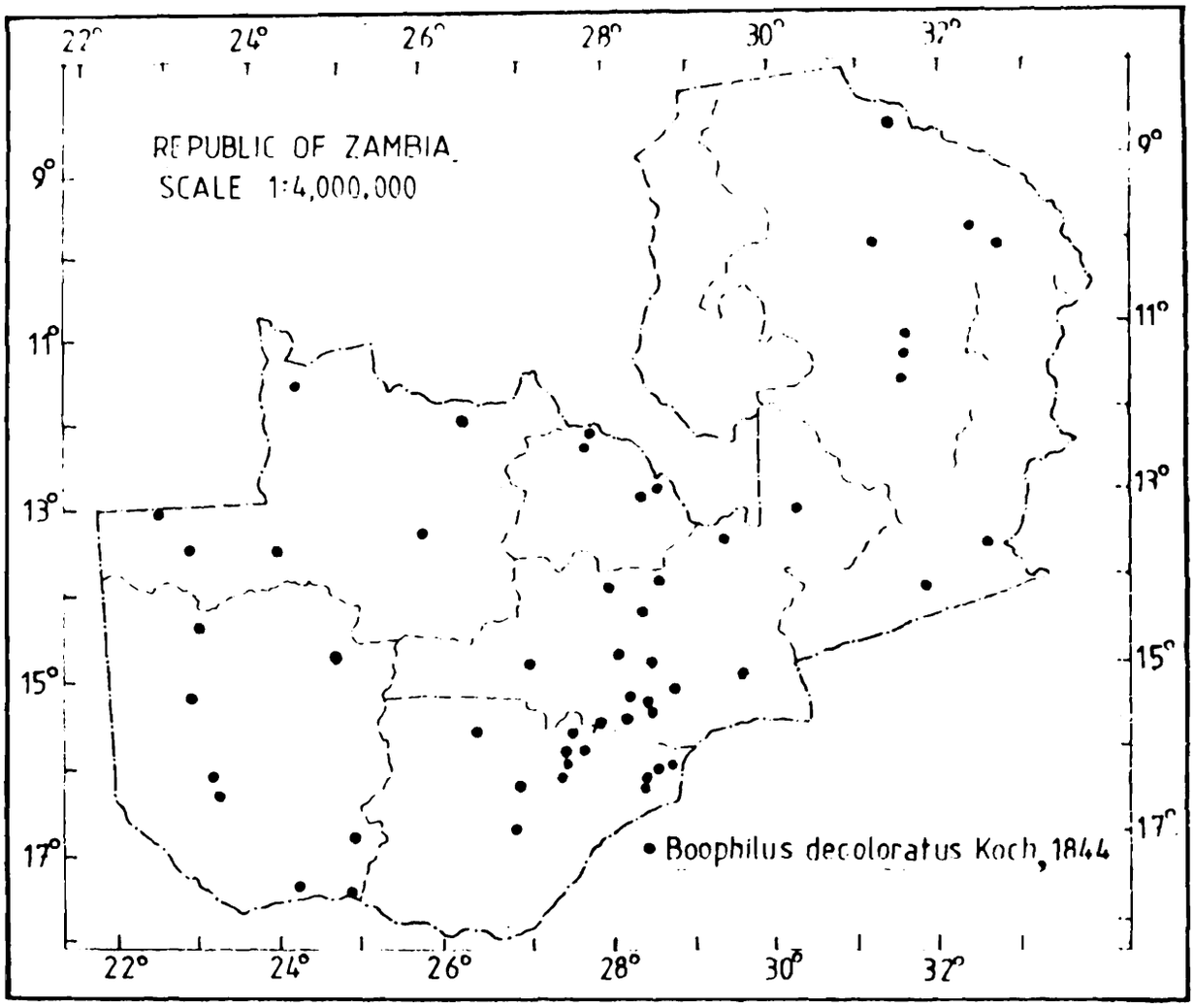
*REMARKS* *A. transversal* is widely distributed in Southern and West Africa. Several records of its occurrence are also available in Uganda and Cameroon.

## Genus 3. **Boophilus**

### 14. *Boophilus decoloratus* (Koch, 1844)

*DESCRIPTIONS* :

| | |
|---|---|
| Hoogstraal (1956a). | African Ixodoidea, Ticks of the Sudan: 305; Figs. Male and Female, 315-316 and 318 (Fig.Female). |
| Arthur (1960). | Ticks Part V On the genera *Dermacentor, Anocentor, Cosmiomma Boophilus and Margaropus* 214-218; Figs. Male, Female and N. |




Map 18. The distribution of *Boophilus decoloratus* in Zambia

*SUMMARY OF COLLECTION DATA :*

| *Host* | *No. of collections recorded* | *No. of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 255 |
| Goat | 122 | 9 |
| (b) *Wild Animals* | | |
| Bushbuck | 29 | 1 |
| Hartebeest | 16 | 2 |
| Impala | 24 | 3 |
| Sable Antelope | 13 | 1 |
| Wildebeest | 20 | 1 |
| Zebra | 57 | 7 |

*DISTRIBUTION* (Map 18) :

*B. decoloratus* is widely distributed in the country and has been collected in large numbers. In north eastern region of the country this tick has been replaced by *B. microplus* to a great extent. It has not yet been collected in *Luapula province.*

In *Central province* it is common throughout and has been found to infest herds of cattle in Chipembi, Chipepo, Kapiri Mposhi, Keembe, Mkushi, Mumbwa and Serenje in large numbers. In Kafue National Park this tick was collected from wildebeest and hartebeest. On the *Copperbelt Province* the records are from Chililabombwe,Chingola, Ndola, and Luanshya. It is found almost throughout the *Lusaka Province* on cattle at Chiota, Chimbwete, Chilanga, Lupiya, and Rufunsa. In *Northern Province* it is found in association with *B. microplus* at Mpika, Shiwa-Ng'andu' Kasama and Mbesuma. Theiler and Robinson (1954) recorded this tick from Mbala and Isoka. According to MacLeod and Mwanaumo (1978) *B. decoloratus* is replaced by *B. microplus* across the north eastern plateau. However, there are few isolated records of its occurrence at Katete, Petauke, and Chipata. It is interesting to note that *B. decoloratus* has been found in collections from wild animals in south Luangwa National Park in contrast to its near elimination on cattle in the adjacent areas on the plateau. In *North-Western Province*, it occurred in collections from Chavuma, Kabompo, Kasempa, Mwinilunga, Solwezi and Zambezi in large numbers.

In *Southern Province* this tick is very thickly distributed in the northern and eastern part. There is a very heavy foci of infestation in areas adjoining Mazabuka, Chirundu, Monze and Mapanza. In Lochinvar National Park this tick was found to infest zebras, eland, impala and bushbuck. In *Western Province* this tick is almost uniformly distributed throughout the province. It has so far been found in areas adjoining Kaoma, Kanja, Lukulu, Machili, Mongu, Senanga and Seshcke.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : *B. decoloratus* is predominantly a tick which is found under 1500m in altitude and frequently between 900m to 1200m with few isolated records over 1500m in Mbala highlands. Its main foci are on the central plateau, broken-hill country, Kafue flats and Barotse plain and lower valley region. It is also found in the moist and dry parts of northern plateau region. In north-eastern region it is found on main plateau but in the lesser-eastern plateau region it is very rare.

Vegetation : *B. decoloratus* is primarily an inhabitant of woodlands, dry savannahs and riverine grasslands. Majority of collections are from woodlands dominated by *Brachystegia* sp., in association with *Julbernardia* sp.; in dry savannahs amongst *Afrormosia* species .It is also found in Zambezi river valley areas of tall grasses of *Hyparrhenia rufa* together with various species of *Setaria.* There are also some records from woodlands dominated by *Brachystegia* with *Boehmii* sp. and *Colophospermum mopane.*

Rainfall : The great majority of collections fall in the areas receiving 800mm to 1000mm per annum with extensions as high as 1400mm. On the margin of these areas, however, there are few extension into the 1000mm-1200mm rainfall zones.

Soil : This tick is mainly found in the red-clays, red-brown loams, leached red-brown loams, sandveldt and leached sandveldt and barotse sand. It is also found in kafue clays, kafue basin alluvium, valley soils and rock and rubble.

*DISEASE RELATIONSHIP* : *B. decoloratus* is known to transmit *Anaplasma marginale* (Causing *anaplasmosis* or *gall sickness* in cattle); *Babesia bigemina* (Causiative agent of red water in cattle); *Borrelia theileri* (causing spirochaetosis in cattle, sheep and goats). According to Neitz (1956) it also transmits *Anaplasma centrale* based on Theiler's (1912) record. Hoogstraal's view (1956a) that this tick transmits boutonneuse fever *(Rickettsia conori)* in man appears to be presumptive. The acute cases of anaemia among the host animals are usually caused by heavy infestation of this species.

*HOST* : *Boophilus decoloratus* is a one-host tick and chiefly infests cattle. It also parasitises horses and less frequently sheep and goats. Among wild animals antelopes are usually attacked, but there are records from bush pig, buffallo, hares and zebra. In Zambia, this tick was found to infest eland, bush-buck, hartebeest, impala, wildebeest and zebra. Excellent information on its host- specificity is given by Hoogstraal (1956a), and Theiler (1962).

*REMARKS* : This tick is very widely distributed throughout most of the African continent. The details of its distribution in Africa have been excellently described by Hoogstraal (1956a), and Theiler (1962).

### 15. ***Boophilus microplus*** (Canestrini, 1887)

*DESCRIPTIONS* :

| | |
|---|---|
| Hoogstraal (1956a). | African Ixodoidea,1.Ticks of the Sudan: 317-318 (Figs.Male and Female) and 323-324. |
| Arthur (1960). | Ticks Part V On the genera, *Dermacentor, Anocentor, Cosmiomma, Boophilus* and *Margaropus*: 207-212; Figs. Male, Female N. and L. |

*SUMMARY OF COLLECTION DATA* :

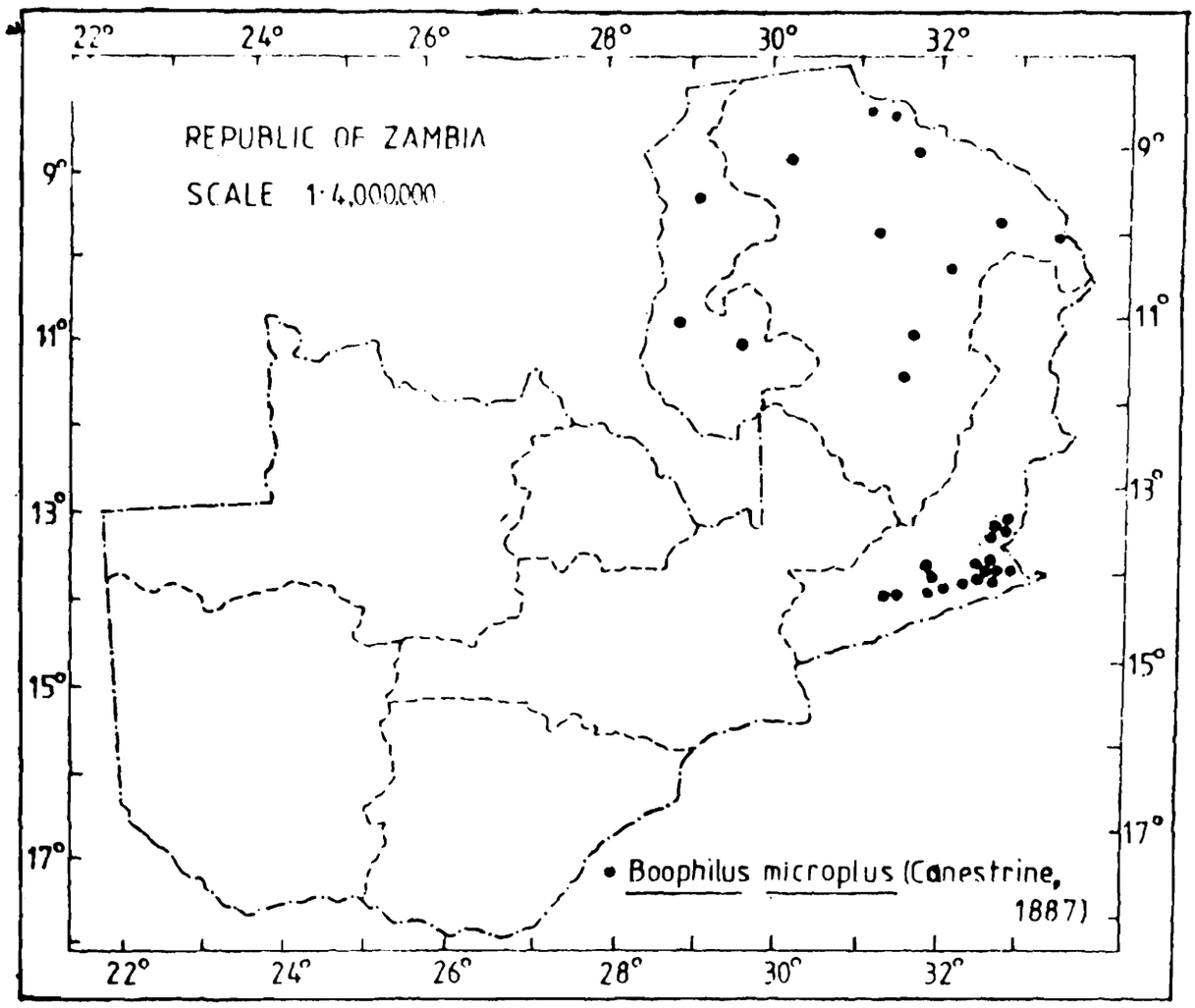
| *Host* | *No. of collections recorded* | *No. of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 294 |
| Dogs | 100 | 1 |
| Goat | 122 | 2 |
| Sheep | 91 | 1 |

*DISTRIBUTION* (Map 19) :

Examination of the collection reveals that *B. microplus* is confined to the elevated plateau region of greatly reduced relief, shallow Chambeshi valley, Bangweulu depression and on elongated plateau strip of the northern and eastern regions of Zambia.

In *Eastern Province* this tick has been found consistently on cattle in almost all the districts in heavy to very heavy infestation.It is spread uniformly in the province

wherever cattle are kept.It has not been found in collections from the wild herbivores in south Luangwa National Park although it is present as the dominant species on cattle in the adjacent areas on the plateau.




Map 19. The distribution of *Boophilus microplus* in Zambia

It is present throghout the *Northern Province* and has been collected in fairly large numbers in areas adjoining Mpika, Chinsali, Shiwa Ng'andu, Isoka, Thendele, Kasama, Nsokolo, Mbala, Mpulungu, Mporokos and Luwingu.

In *Luapula Province*, the collections have been obtained from Samfya,Mansa and Kawambwa in large numbers which reflects the foci of infestation in a sparsely cattle producing zone.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : This is primarily a tick of the north-eastern plateau and belts of higher uplands upto 1800m extending to the various lake basin areas towards the west, below 900m.

Vegetation This species occurs mainly in the miombo woodland (dominated by

trees of *Brachystegia* and *Julbernardia* amongst grasses with extensions into grasslands swamps and savannahs.

Rainfall This ranges from 800mm to 1800mm rainfall zone. Apparently these species thrive fairly well both in low and high rainfall zones.

Soil : It tends to prefer red-brown loams, sandveldt, leached sandveldt with extensions into rock and rubble of the river valleys.

*DISEASE RELATIONSIIIP* : These have not been studied in detail in Africa but *B. microplus* is important as the vector of red water or Taxas fever *(Babesia bigemina)* and anaplasmosis or gall sickness *(Anaplasma marginale)* in relation to cattle; *Babesia ovis* causing babesiosis in sheep and biliaryfever *(Nuttalia eqinuto)* in horses in America. According toYeoman and Walker (1967) there is circumstantial evidence based on the work of Matson (1961) that this tick may be responsible for the transmission of *B. bigemina* in shire valley (Malawi).

*HOST* : *Boophilus microplus* is a one-host tick and a primary parasite of cattle. It has also been recorded from horses (Minning, 1934; Buck and Ramambazafy, 1950), sheep (Buck,1935, 1948a-b; Theiler,1943; Yeoman and Walker, 1967; goats and lions (Theiler, 1943).

*REMARKS* : According to Hoogstraal (1956a) *B. microplus* is widely distributed in southern and east Africa.

## Genus 4. **Dermacentor**

### 16. ***Dermacentor (Amblyocentor) rhinocerinus*** (Deny, 1843)

*DESCRIPTION* :

Arthur (1960). Ticks part V On the genera, *Dermacentor, Anocentor, Cosmiomma, Boophilus* and *Margaropus* : 171-178; Figs. Male and Female.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No.of collection recorded* | *No. of collections containing this species.* |
|---|---|---|
| *Wild Animals* | | |
| Rhino | 5 | 1 |

*DISTRIBUTION* (Map 20) :

I have found all specimens of this species in collection off black rhinoceros from Lungwa National Park.

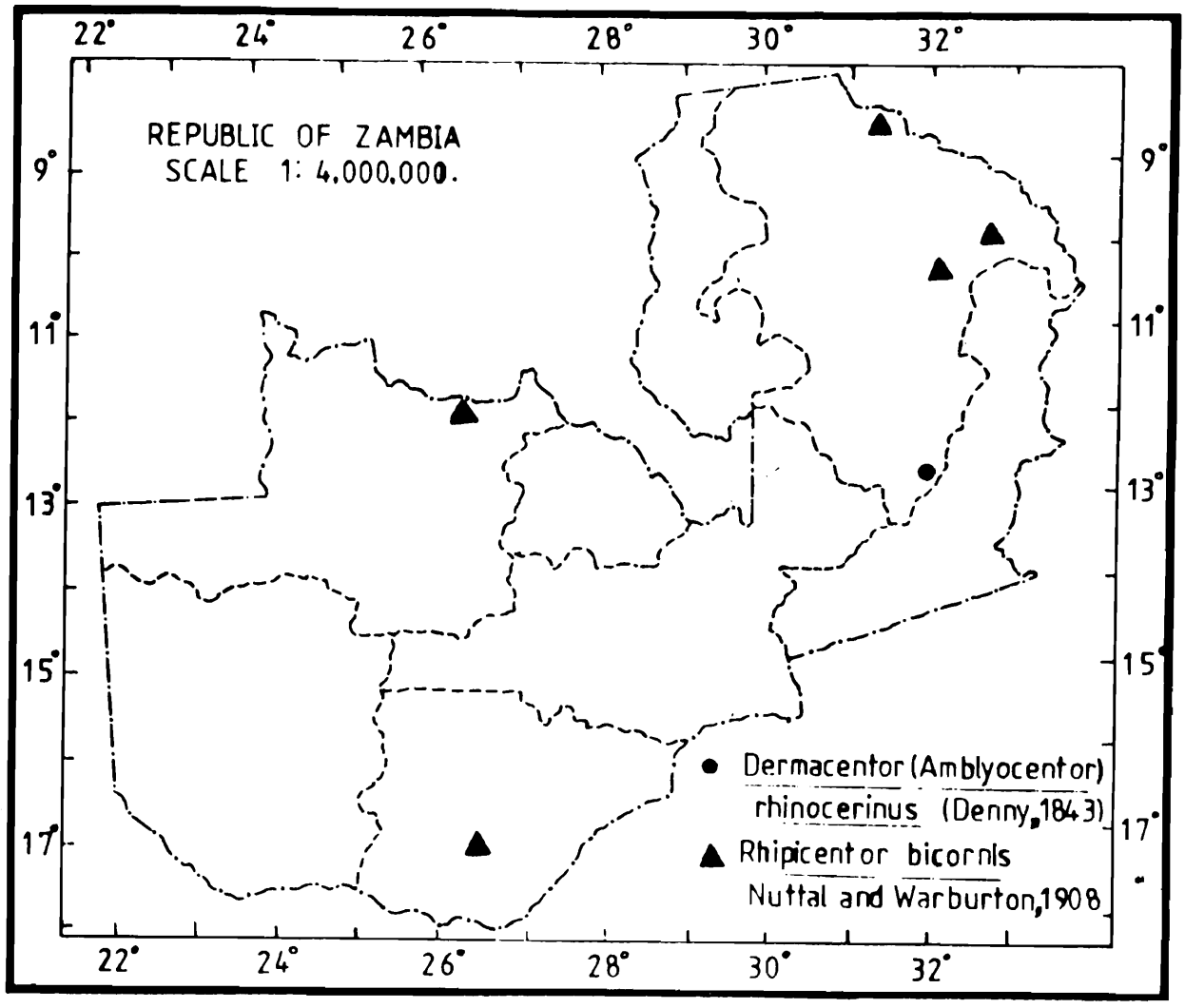
*PIIYSIOGRAPIIY,VEGETATION* Etc.

Physiography : The station lies in the faulted valley of the Luangwa river and is bordered by Muchinga escarpment at an altitude below 900m.

Vegetation : The area lies in woodlands dominated by *Colophospermum mopane.*

Rainfall About 900mm per annum.

Soil : The area is characterised by valley soils.




Map 20. The distribution of *Dermacentor (Amblyocentor) rhinocerinus* and *Rhipicentor bicornis* in Zambia

*DISEASE RELATIONSHIP* : These have not been studied.

*HOST* : *Dermacentor (Amblyocentor) rhinocerinus* chiefly parasitizes *Diceros bicornis* (black-rhinoceros) and *Ceratotherium simum cottoni* (white rhinoceros) in Africa. However, there are records of its occurrence on reptiles (*Varanus* sp.), carnivores (jackal), proboscids *(Loxodonta africana)* and artiodactyls *Taurotragus oryx, Syncerus caffer and Hippotragus equinus.*

*REMARKS* : According to Elbl and Anastos (1966d) this tick is distributed in central, east and southern Africa, ranging from South Africa in the south to the Sudan and Somalia in the north and from Chad, Niger to Kenya and Tanzania in the east. In Zambia this tick is so far reported only from Luangwa National Park but there is every likelyhood of its occurrence in Kafue National Park; scattered localities in middle Zambezi valley below Kariba and extreme northern Mporokoso District; the known distributional range of its host.

## Genus 5. **Haemaphysalis**

### 17. ***Haemaphysalis aciculifer*** Warburton 1913

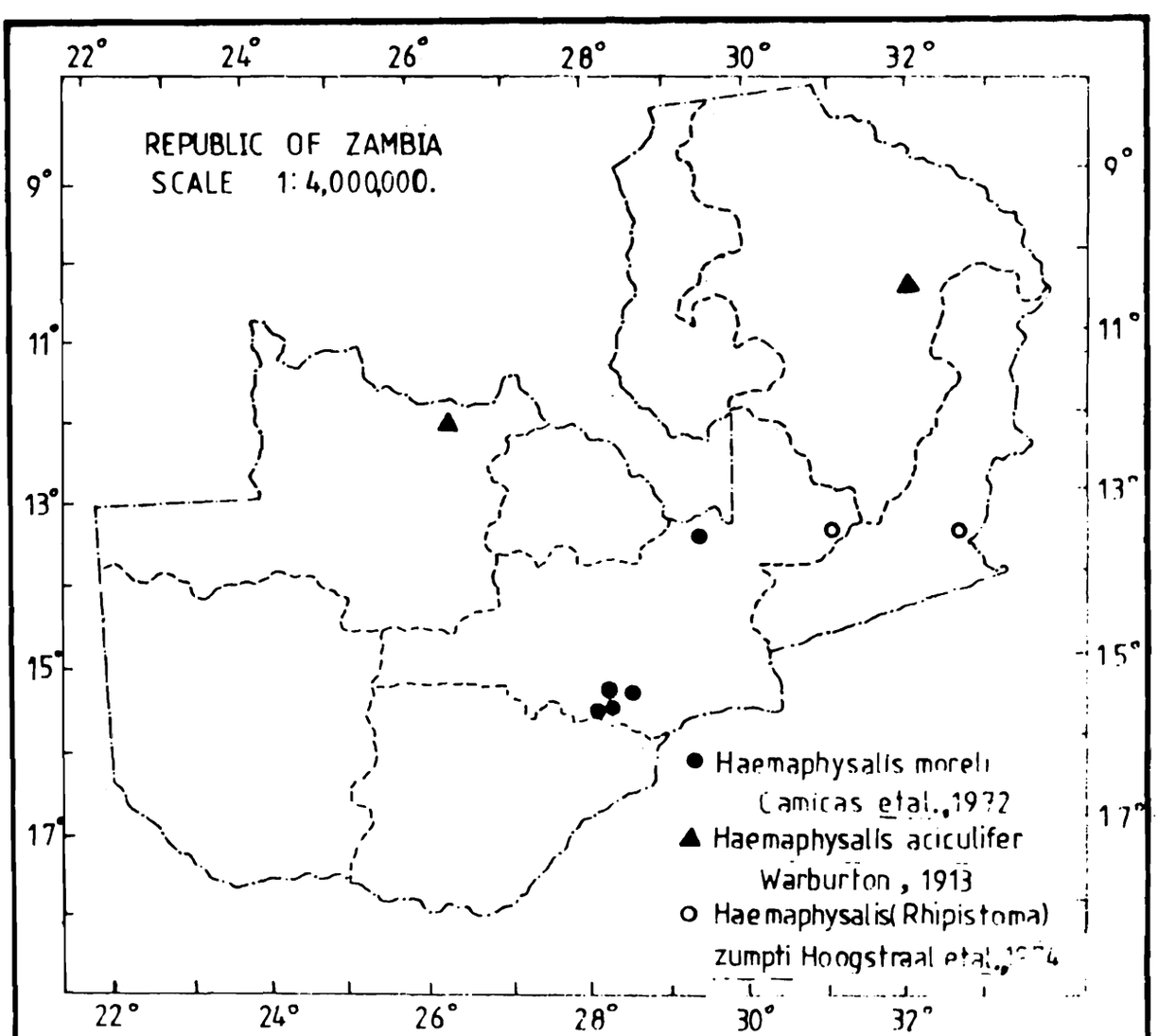
*DESCRIPTION* :

Theiler (1945c). *Onderstepoort J. Sci. Anim. Ind.*, 20 : 191-195; Figs. Male, Female N. and L.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| *Domestic Animals* | | |
| Cattle | 1,645 | 2 |

*DISTRIBUTION* (Map 21) :




Map 21. The distribution of *Haemaphysalis aciculifer, H. (Rhipistoma) moreli* and *H. (Rhipistoma) zumpti* in Zambia

A single female was collected at Kawama grazer scheme in Solwezi off cattle in *North-Western Province*, and a few specimens from the herd at Shiwa Ng'andu in Chinsali; also from cattle in *Northern Province*.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : One of the station lie on the upland where the northern plateau attains its maximum elevation (over 1500m) in *North-Western Province* and another one in the lower valley of the Chambeshi (about 600m) in *Northern Province*.

Vegetation : The areas are generally covered with miombo woodlands or bush of one type or another. Generally the regions are occupied by various forms of *Brachystegia* and *Isoberlinia*.

Rainfall : These stations fall within 1300mm to 1400mm annual rainfall zones.

Soil : The areas are characterised by leached sandveldt, seasonally water-logged soils and valley soils.

*DISEASE RELATIONSHIP* : These have not been studied.

*HOST* : The most common and preferred host of *H. aciculifer* is the antelope other domestic and wild animals are rarely attacked (Hoogstraal,1956a).Incidentally there are no records of this species parasitising antelopes in Zambia so far, and our limited records are only from cattle.Birds are also attacked by this species.In Tanzania, Yeoman and Walker (1967) have found this species parasitising domestic cattle.

*REMARKS* : In Africa, this tick is distributed from South Africa in the south to the Sudan in the north; and from West Africa in the west to Uganda, Tanzania and Kenya in the east.

18. ***Haemaphysalis hoodi hoodi*** Warburton and Nuttal, 1909

*DESCRIPTIONS* :

| | |
|---|---|
| Nuttal and Warburton (1915). | Ticks. Part III. The genus *Haemaphysalis:* 483-485 Figs. Male, Female, N. and L. |
| Elbl and Anastos (1966d). | Ixodid Ticks of Central Africa,Vol. IV: 57-62; Figs. Male and Female. |

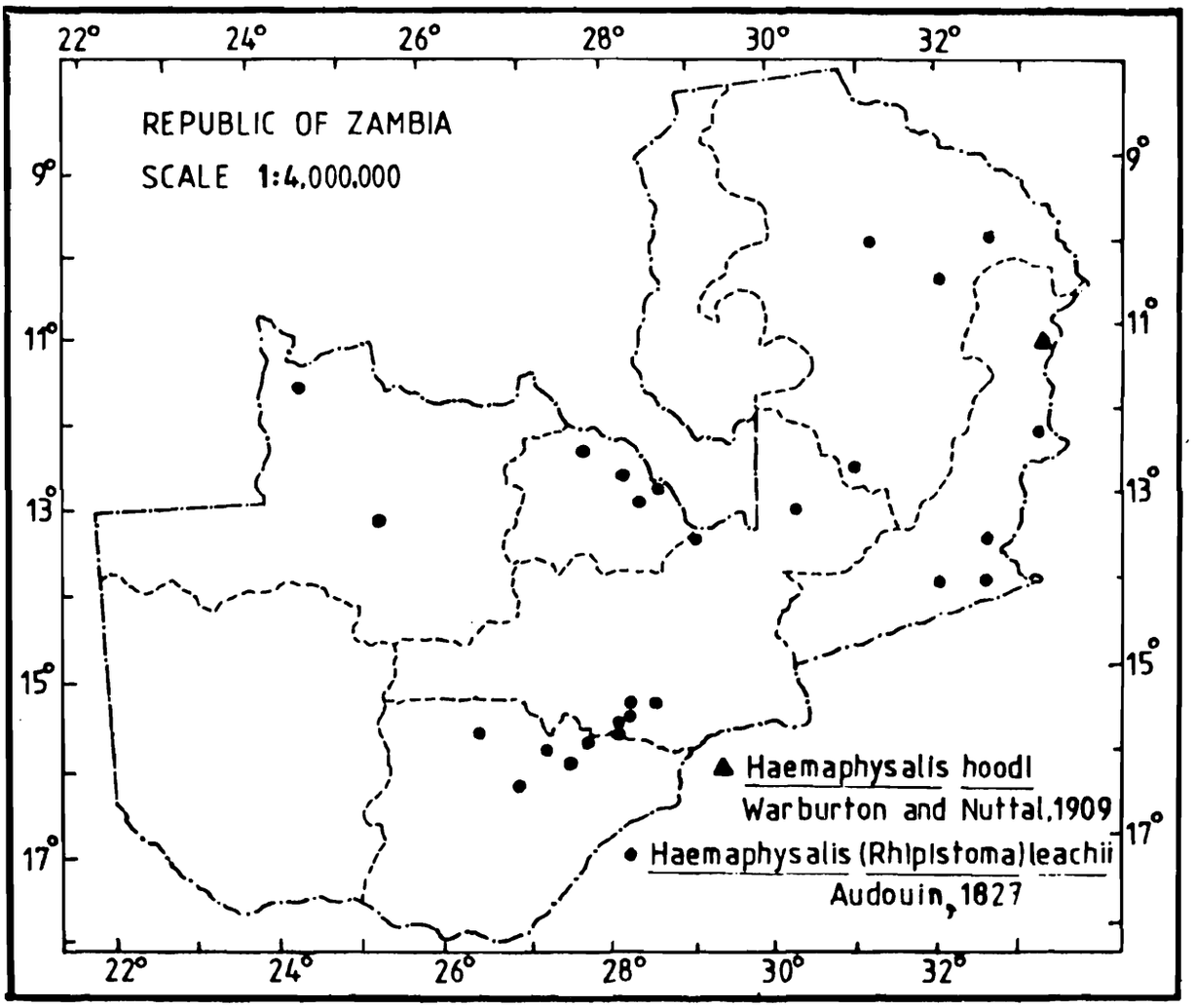
*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| *Bird* | | |
| Rufous-naped | | |
| Lark | 1 | 1 |

*DISTRIBUTION* (Map 22) :

A single female was collected at Nyika Plateau in the *Northern Province* from *Mirafra africana*. This is the only Zambian record of this avian parasite. Rufous naped

Lark occurs in open plains and grassy bush country of Southern Africa and there is no doubt that this tick has a much wider distribution in Zambia than this single record suggests.




Map 22. The distribution of *Haemaphysalis hoodi* and *H. (Rhipistoma) leachii* in Zambia

*PHYSIOGRAPHY, VEGETATION* Etc.

Physiography : The Nyika plateau is a tilt block with its steep escarpment facing Lake Malawi and the block tilting towards the Luangwa River at an altitude ranging from over 1500m to 2,200m.

Vegetation : Miombo woodland dominated by *Brachystegia* and *Julbernardia* species; and montane grasslands.

Rainfall : 1200mm-1300mm per annum.

Soil : The soils of the plateau region are characterised by rock and rubble.

*DISEASE RELATIONSHIP* : *H. hoodi* is known to causes severe to fatal anaemia in domestic chickens (Hoogstraal, 1956a).

*HOST* : *H.hoodi* parasitises mainly birds,especially those that are habitually

ground feeders. Hoogstraal (1956a), and Theiler (1962) have summarised the available information on parasitism by this species.

*REMARKS* : *H. hoodi* is widespread in Africa south of the Sahara ranging from south Africa and Botswana in the south to the Sudan in the north; from Guinea and Senegal in the west to Kenya and Uganda in the east. The distribution of this tick in Zambia, as well as in Africa, is probably much more extensive and continous than the present meagre records reflect.

19. ***Haemaphysalis (Rhipistoma) leachii*** (Audouin, 1827)

*DESCRIPTIONS* :

| | |
|---|---|
| Hoogstraal (1958). | *J. Parasit. 44 : 548-558; Figs. Male,* Female, N. and L. |
| Elbl and Anastos (1966d). | Ixodid Ticks of Central Africa, Vol. IV: 63-74, Figs. Male and Female. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 6 |
| Dogs | 100 | 19 |
| Cats | 2 | 2 |
| Pig | 2 | 1 |
| (b) *Wild Animals* | | |
| Fox | 2 | 2 |
| Jackal | 6 | 1 |
| Lion | 16 | 1 |

*DISTRIBUTION* (Map 22) :

Examination of the available collection reveals that this tick is widely distributed in Zambia. We have records of its occurrence on the *Copperbelt Province* fromChingola, Kitwe, Luanshya and Ndola. In *Central Province* it was found at Msufu and Serenje.Our collections in *Eastern Province* came from Lundazi, Chipata, Chadiza and Katete. In *North-Western Province* it occurred at Chizera and Mwinilunga. Records in *Lusaka Province* came from Chalimbana, Chilanga, Lusaka, Lilayi and Kafue. In *Southern Province* it has been found at Mazabuka,Monze, Mapanza, Lochinvar National Park and Namwala.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : *H. (R.) leachii has* been found on the central plateau region in *Central and Northern Provinces;* on broken hill country in *Lusaka Province*. In *Southern Province* it occurs on the Kafue flats where the topography is mostly flat; it has been found on the broken hill country of eastern plateau in *Eastern Province*. There are

records of its occurrence in northern plateau region in the *Copperbelt* and *North-Western Provinces.* The altitude range is from 900m to over 1200m.

Vegetation : The species occurs uniformly throughout the miombo woodland dominated by *Brachystegia* and *Julbernardia* species. It is also found in munga woodland dominated by *Afrormosia* and *Combretum* species amongst tall grasses.

Rainfall : The species is found in 800mm to 1400mm rainfall zones but may extend even in wide range.

Soil : *H. (R) leachii* is found in almost all of the major soils of the country.

*DISEASE RELATIONSIIIP* : *H. (R.) leachii* is known to transmit the agents of boutonneuse fever *(Rickettsia conori)* and Q fever *(Coxiella burneti)* to man; and of *Babesia canis* causing canine tick fever. Hereditary transmission of the parasite from one tick generation to another through the eggs takes place. Theiler (1962) also reports the transmission of *R. pijperi* by this tick. According to Hoogstraal (1956a) experimental evidence indicates the efficiency of this tick as a vector of Rocky Mountain Spotted fever.

*IIOST H. (R) leachii* in the adult stage chiefly parasitizes domestic dogs, cats and some wild carnivores. The reported host lists also include birds. Hoogstraal (1956a & 1958) and Theiler (1962) summarized the available data on the species. This species occasionally parasitises cattle especially in *Eastern Province* of Zambia.

*REMARKS* : This tick is found throughout most of the Ethiopian faunal region.

### 20. ***Haemaphysalis (Rhipistoma) moreli*** Camicas, Hoogstraal And Kammah, 1972

*DESCRIPTIONS* :

| | |
|---|---|
| Camicas, Hoogstraal and Kammah (1972). | *J. Parasit.* 58(6) : 1185-1196; Figs. Male and Female. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Dogs | 100 | 14 |
| Sheep | 91 | 1 |
| (b) *Wild Animals* | | |
| Jackal | 6 | 1 |

*DISTRIBUTION* (Map 21) :

*H.(R) moreli* is probably more widely distributed in Zambia than the present few records indicate. In *Lusaka Province* it occurs at Chilanga (Mt. Makulu), Lilayi and at Chalimbana. In *Central Province*, at Mkushi.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : This tick has been collected from broken hill country in the *Lusaka Province;* in *Central Province* it occurs on central plateau at Mkushi. These stations are situated between 900m to over 1200m altitudes.

Vegetation : The major habitat appears to be savannas and munga woodland dominated by *Combretum* and *Afrormosia* species and tall grasses, but there are some scattered locations in miombo woodland.

Rainfall : These areas lie in 900mm to 1300mm annual rainfall zones.

Soil : The localities are characterised by red-clays, red-brown loams and sandveldt.

*DISEASE RELATIONSHIP* : These have not been studied.

*HOST* : According to Camicas, Hoogstraal and Kammah (1972) the adults of this tick chiefly infests carnivores, like genets and civets It has also been found on the lion, leopard, wild cat, hyaena, jackal, fox, domestic dogs and cats. Immature stages were collected from rodents and the nest of a bush baby (*Galago senegalensis* subsp.)

*REMARKS* : *H.(R.) moreli* is distributed in western and eastern Africa in savannas between 15°N and 06°S. (Camicas *et al.*,1972). In Zambia this tick has been collected from domestic dogs and off vegetation.

21. ***Haemaphysalis orientalis*** Nuttal And Warburton, 1915

*DESCRIPTION* :

Hoogstraal (1956b). *J. Parasit.* 42 : 160-164; Figs. Male and Female.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No. of collections containing this species* |
|---|---|---|
| *Wild Animals* | | |
| Yellow spotted' 'Dassie' | 1 | 1 |

*DISTRIBUTION* (Map 23) :

Colbo (1973,1976) first recorded the presence of *H. orientalis* in Zambia from the mafinga-mukutu area in north eastern montane region of the country. Since then his original record has been cited in literature, but to the writer's knowledge no other collection of this species has been reported from Zambia.As it's known host *Dendrohyrax brucei* is distributed throughout the above region (Ansel,1960 and 1978),there is little doubt that this tick is more prevalent than this single record suggests.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : The mafinga-mukutu region is a high plateau, at altitudes upto 2,210m on the Malawi border.

Vegetation The area falls in the miombo woodland dominated by various forms of *Brachystegia* and *Julbernardia* species and montane grasslands.

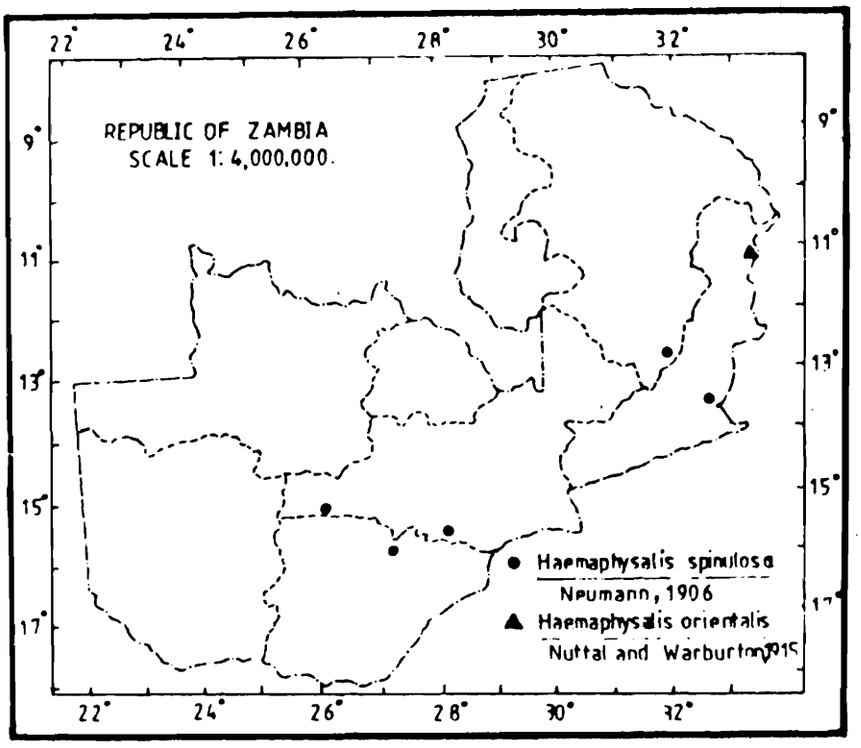
Rainfall : The annual precipitation is from 900mm to 1300mm.

Soil : The soils of the region is characterised by rock and valley soils.

*DISEASE RELATIONSHIP* : These have not been studied.

*HOST* : According to Theiler (1962) adults of this tick are found on mammals: Hyracoidea: *Dendrohyrax brucei* (yellow spotted dassie).

*REMARKS* : *H.orientalis* is a rare tick and has patchy distribution in Africa.It ranges from Mozambique to Malawi and Uganda.




Map 23. The distribution of *Haemaphysalis (Rhipistoma) spinulosa* and *H. orientalis* in Zambia

22. ***Haemaphysalis spinulosa*** Neumann, 1906

*DESCRIPTION* :

Hoogstraal (1964). *J.Parasit.*, 50(6): 786-791; Figs. Male and Female.

*SUMMARY OF COLLECTION DATA*

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Dogs | 100 | 1 |

| | | |
|---|---|---|
| (b) *Wild Animals* | | |
| Mongoose | 3 | 2 |
| Lion | 16 | 1 |

*DISTRIBUTION* (Map 23) :

The few records of *H. spinulosa* in Zambia are widely scattered. It has been collected in *Central Province* from Kafue National Park; in *Lusaka Province* in Chilanga; in *Southern Province* it was found at Lochinvar National Park. Finally there are records from Chipata and Luangwa National park in north eastern montane area.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : *H.spinulosa* has been found on the high inland central plateau region in *Central Province;* on broken hill country in *Lusaka Provice.* In *Southern Province* it was collected in the Lochinvar National park where topography is flat; and on the broken hill country of eastern plateau and Luangwa valley region.

Vegetation : These stations fall in the miombo and mopane woodlands and the river valley type of woodland with high grass in which fierce fires occur annually.

Rainfall : They occur in rainfall zone extending from 900mm to 1400mm per annum.

Soil : The localities are characterised by sandveldt, red-brown loams, kafue clay and valley soils.

*DISEASE RELANTIONSHIP* : These have not been studied.

*HOST* : The species is known to parasitise canidae; large cats and mongoose.

*REMARKS* : *H. spinulosa* was first described and figured by Neumann (1906) from two females from Uganda. Hoogstraal (1964) has redescribed this tick.

### 23. *Haemaphysalis (Rhipistoma) zumpti*
Hoogstraal, And Kammah, 1974

*DESCRIPTION*

Hoogstraal, and Kammah (1974). *J. Parasit.* 60(1): 188-197; Figs. Male and Female.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| *Wild Animals* | | |
| Genet | 1 | 1 |
| Mongoose | 1 | 1 |

*DISTRIBUTION* (Map 21)

*H. (Rhipistoma) zumpti* was first reported from Zambia by Hoogstraal et al (1974) from Chipata, Luangwa River and Lusingazi game camp in north eastern region of the country.

*PIIYSIOGRAPIIY VEGETATION* Etc.

Physiography : This tick has been collected from broken hill country in Chipata and from floor of Luangwa river and adjoining Muchinga escarpment.

Vegetation : These areas fall in the miombo and mopane woodlands and river valley type woodlands with high grasses.

Rainfall Approximately 900mm to 1100mm per annum.

Soil Amongst red-clays and valley soils.

*DISEASE RELATIONSIIIP* : These have not been studied.

*HOST* : *H. (Rhipistoma) zumpti* is mainly a parasite of small carnivores and also squirrels (Hoogstraal, and Kammah, 1974).

*REMARKS* : According to Hoogstraal *et al* (supracit) this species is present in south-eastern Africa from about 33°s (eastern cape province) to 13°s eastern Zambia. In Zambia, this tick is collected from *Herpestes sanguineus*, sub sp., and *Genetta tigrina rubiginosa*. According to Ansel (1960) both the host species are fairly well distributed in the country. This probably suggests that the species is more extensive and continous in distribution then the present record reflect.

## Genus 6. **Hyalomma**

### 24. ***Hyalomma rufipes*** Koch 1844

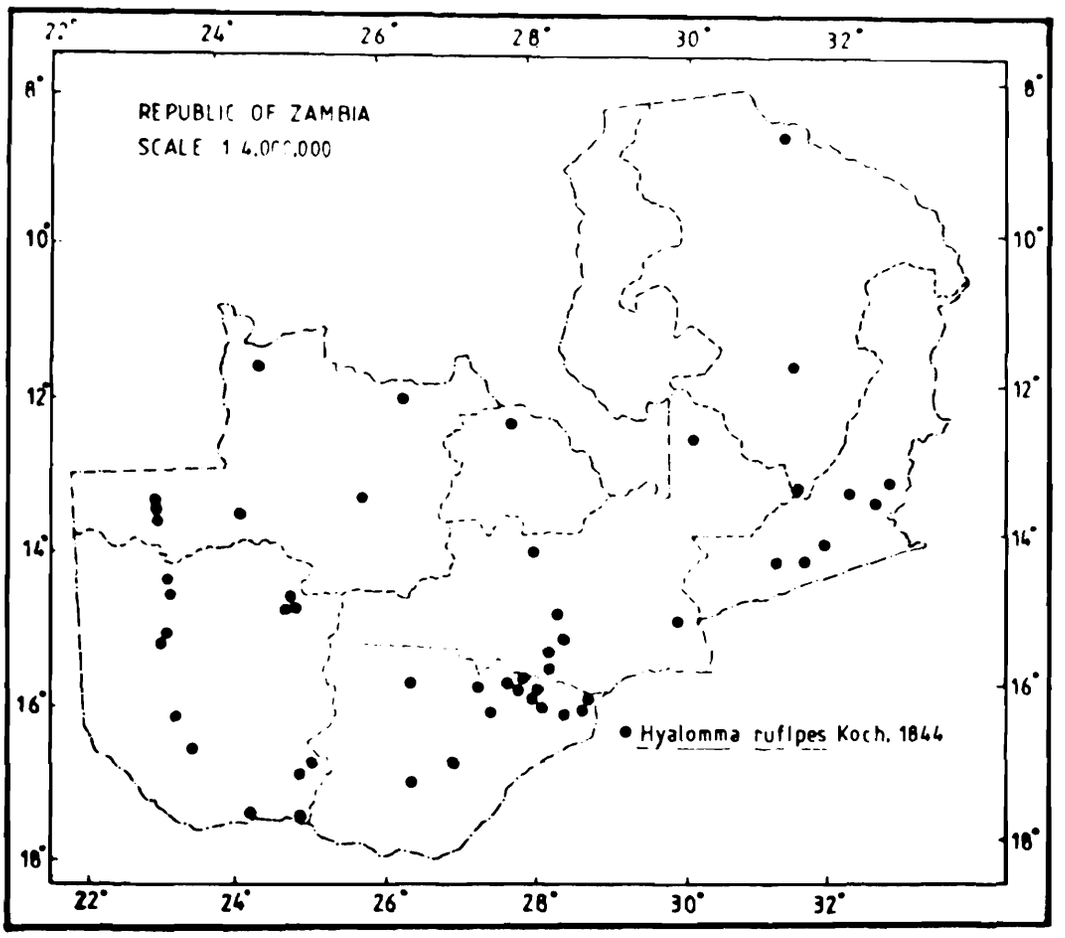
*DESCRIPTIONS* :

| | |
|---|---|
| Hoogstraal (1956a). | African Ixodoidea. 1.Ticks of the Sudan : 479 (Figs. Male and Female) 490. |
| Elbl and Anastos (1966d). | Ixodid Ticks of Central Africa, Vol. IV: 96-103; Figs. Male and Female. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 124 |
| Goat | 122 | 1 |
| (b) *Wild Animals* | | |
| Buffalo | 72 | 6 |
| Zebra | 45 | 2 |

*DISTRIBUTION* (Map 24) :




Map 24. The distribution of *Hyalomma rufipes* in Zambia

*H. rufipes* is fairly well distributed in Zambia except in *Luapula Province* where it has not yet been found.

In *Central Province* this tick is widely distributed and so far has been collected in Chisamba, Chipepo, Lupiya and lower Zambezi valley (Chongwe river). The infestation on cattle was low. In *Copperbelt Province* it was found only at Chignola so far.

In *Eastern Province, H. rufipes* is found at Chipata, Chiparamba, Chaanje, Katete, Petauke and Sinda mainly infesting cattle in low numbers in association with Luangwa National Park from buffalo. There is no record of its occurrence, as yet, from the northern part of this province.

Examination of collections from *Lusaka Province* indicate that *H. rufipes* is distributed in the province upto Chongwe river in the east and south upto Kafue river in association with *H. truncatum*. In the *Northern Province* it is very rare and so far has been collected singly from Mbala and Mpika.

In *North-Western Province* this tick is fairly uniformly distributed and has been found to infest cattle in rather low numbers in areas surounding Kasempa, Solwezi, Mwinilunga, Kabompo and Zambezi.

In the *Southern Province, H. rufipes* is thickly distributed except in the western and south eastern parts and gradually diminishes towards the southern region bordering Zimbabwe. Examination of collections reveals moderate infestation of cattle by this tick in Kafue flats, areas bordering *Lusaka* and *Central Provinces*, northern part of Kariba lake and Kafue gorge. In Lochinvar National park this tick was found to infest buffalo and occasionally zebra.

In the *Western Province, H. rufipes* was seen in collections more or less throghout from Seshcke in the south to Lukulu in the north with varying degrees of infestation on cattle. It has also been collected at Mulobezi, Machile bordering *Southern Province* and at Kaoma in the north, adjoing *Central* and *Northern Provinces*.

*PHYSIOGRAPHY, VEGETATION* Etc.

Physiography : H. rufipes has been found at altitudes below 1500m, frequently from 900m to 1400m with the exception of single record above 1500m in Mbala highlands. It occurs throughout the central plateau, broken hill country lesser eastern plateau, Kafue flats and Kalahari region. It is essentially a tick of the central plateau and medium altitude.

Vegetation : *H. rufipes* tends to prefer riverine grasslands and savannas dominated by *Loudetia* species; and area amongst *Combretum* and *Afrormosia* species. Minor extensions do occur into dry evergreen forest dominated by *Cryptosepalum* species; in woodlands amongst *Brachystegia* with *Boehmii* and *Colophospermum mopane* merging into woodland. It has also been found in small numbers in miombo woodland dominated by *Brachystegia* and *Julbernardia* species.

Rainfall : *H. rufipes* occurs between 800mm to 1100mm rainfall zone with some extension upto over 1300mm, in *North-Western Province*.

Soil : The soil of most of these stations range from barotse sand, red-clays, red-brown loams, leached red-brown loams, sandveldt, leached sandveldt, kafue-clays, kafue basin alluvium, valley soils to rock and rubble.

*DISEASE RELATIONSHIP* : Some members of genus *Hyalomma* are known to be capable of transmitting *T.parva* but *H. rufipes* has not been tested in this respect as yet (Yeoman, 1968c). According to Alexander, Mason and Neitz (1939); Mason and Alexander (1939), a rickettsia, identical with strains which produced tick typhus in man, was transmitted to a guinea pig by the nymph of *H. rufipes* in South Africa. It is also known to harbour *Rickettsia prowazeki* (Reiss-Gutfreund, 1956).

*HOST* : *H. rufipes* is known to infest a wide range of mammals and birds. Hosts of the adults are usually bigger animals like cattle, sheep, goats, horses and certain wild ungulates. Theiler (1962) has given a detailed list of hosts attacked by this species.

*REMARKS* : According to Hoogstraal (1956a), *H. rufipes* is widely distributed in many of the drier parts of Africa. Theiler (1962) has given a detailed summary of its distribution in Africa. According to Yeoman and Walker (1967) *H. m. rufipes* was mainly a dry- climate tick of the semi-arid bush and savannah woodland of the central plateau at altitudes of 700m-1400m and a rainfall of 900mm-1400mm. The above altitudes ranges embrace the eastern plateau of Zambia but not the northern and north-western plateau region.

## 25. *Hyalomma truncatum* Koch, 1844

*DESCRIPTIONS* :

| | |
|---|---|
| Hoogstraal (1956a). | African Ixodoidea. 1. Ticks of the Sudan: 491 (Figs. Male and Female):502-503. |
| Elbl and Anastos (1966d). | Ixodid Ticks of Central Africa, IV· Figs. Male and Female: 104-111. |

*SUMMARY OF COLLECTION DATA*

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 325 |
| Goats | 122 | 2 |
| (b) *Wild Animals* | | |
| Buffalo | 72 | 9 |
| Bushbuck | 29 | 1 |
| Lechwe | 13 | 1 |
| Warthog | 39 | 4 |
| Waterbuck | 7 | 1 |
| Wildebeest | 20 | 3 |
| Zebra | 45 | 8 |

*DISTRIBUTIONS* (Map 25) :

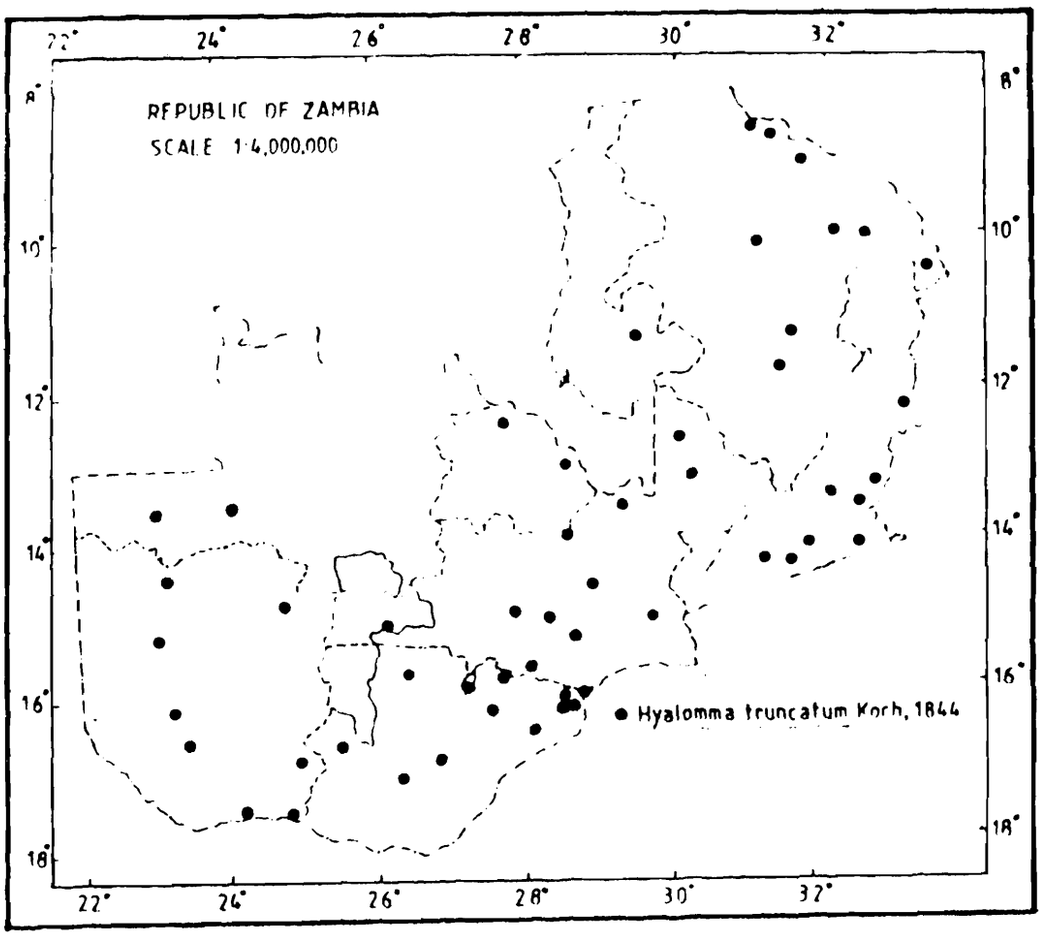
*H. truncatum* is probably ubiquitous in Zambia. There are certain areas in the country in which it has been relatively uncommon, but better collection techniques would probably reveal its presence almost everywhere in good numbers. Throughout its range in Zambia this tick is frequently associated with *H. rufipes* especially in areas ranging from 700m to 1400m in altitude with annual rainfall between 800mm to 900mm.

*Central Province* : The species is common throughout the greater part of this province; it occured in collections from the south, central, north and north-eastern regions of the province. There are few records of its occurrence in the western part. In Kafue National Park, this tick was found on buffalo and wild herbivores.

*Copperbelt Province* : In collections, the author has come across a few examples of this tick, so far-from Chingola only. It had been recorded earlier from Ndola by Theiler (1962).

*Eastern Province* : Generally speaking, this tick is present throughout the province except the northern part where probably thorough collection will reveal its presence. *H. truncatum* was found to infest cattle from low to moderate intensity in areas surrounding Chipata, Chadiza, Chiparamba, Katete, Petauke, Lundazi and Sinha where it has been collected from many farms. It is usually found in association with *H. rufipes* and other

tick species especially *A.variegatum* and *R. appendiculatus*. It has also been collected from buffalo, waterbuck and warthog in Luangwa valley.




Map 25. The distribution of *Hyalomma truncatum* in Zambia

*Lusaka Province* : In this province, the collections have been obtained from Chimbwete, Chiota, Chilanga, Rufunsa and adjoining areas in fairly good numbers which reflects the abundance of the species in the broken hill country.

*Luapula Province* : Only a few examples of this tick have been found mainly in Samfya. This probably represents an introduction on trade stock.

*Northern Province* : *H. truncatum* is absent in the western part of the province but is fairly uniformly distributed in the central, northern and eastern part of the province and has been collected from various farms in Mpika, Shiwa Ng'andu, Kasama, Mbesuma, Isoka, Thendele, Nsokolo, Mbala and Mpulungu. The infestation by this species is generally low in comparison to other tick species.

*North-Western Province* This species is to be found,to a very limited extent in parts of Kabompo and Zambezi districts in the Province. All specimens are off cattle.

*Southern Province* : This species is very thickly distributed in the province especially in the northern and northeastern region. There are few records of its occurrence in the western, southern and south eastern regions. The infestation, is generally from low to moderate. The author has examined collections of this tick from areas adjoining Mazabuka, Nanduba, Shamboko, Chirundu, Lusitu, Shadunka, Chibelele, Choma, Kalomo, Simamba and Namwala. It has also been found to infest wild herbivores in Kafue flats especially Lochinvar National Park.

*Western Province* : In this province, collections have been obtained from Mwandi in the deep south, and almost throughout the Zambezi upto Lukulu in the north. It has also been found at Mulobezi and Kaoma. The infestation on cattle is generally from low to moderate.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : *H. truncatum* has been collected frequently between 900m to 1200m in altitude in low to moderate infestation. It has also been found at Mbala highlands and Mafinga mountains in the north eastern plateau region of the country where the altitude is over 1500m. The foci of infestation of this tick is mainly from the Kalahari region in the west to Kafue flats, central plateau, broken hill country and lesser eastern plateau of the country.

Vegetation : *H. truncatum* has been found in various collections from riverine grasslands, savannahs, woodlands and their subtypes, Most records are from woodlands dominated by *Brachystegia* and *Julbernardia* species extending into *Isoberlinia* and *Combretum* woodlands; from grasslands and savannahs dominated by *Loudetia* species and amongst *Afrormosia* species.

Rainfall : This ranges from 800mm to 1400mm rainfall zone.The maximum infestation was in areas receiving 800mm to 1000mm rainfall annually.

Soil : This species tends to prefer barotse sand, sandveldts, leached sandveldts and red-brown loams with extensions to kafue clays, red-clays, kafue basin alluvium, and valley soils, to rock and rubble.

*DISEASE RELATIONSHIP* : *H. truncatum* is known to transmit the virus of sweating sickness, a disease that affects cattle, sheep, goats and pigs (Neitz, 1959; syn. *H. transiens*). According to Barnett and Bailey (1955) it is known to transmit the causative agents of East Coast Fever of cattle under laboratory conditions. It is also known to cause tick paralysis in man (Erasmus, 1952; Swanepoel, 1959).

*HOST* : *H. truncatum* chiefly parasitises domestic cattle and goats, but other large game and domestic animals may be infested. Small mammals, wild carnivores and tortoises are rarely attacked by this species. Hoogstraal (1956a), and Theiler (1962) have given a detailed host-list of this species in Africa.

*REMARKS* This tick is endemic to the Ethiopian region and has been recorded almost everywhere in Africa except in forests of western Africa.

## Genus 7. **Ixodes**

### 26. *Ixodes alluaudi* Neumann, 1913

*DESCRIPTIONS*

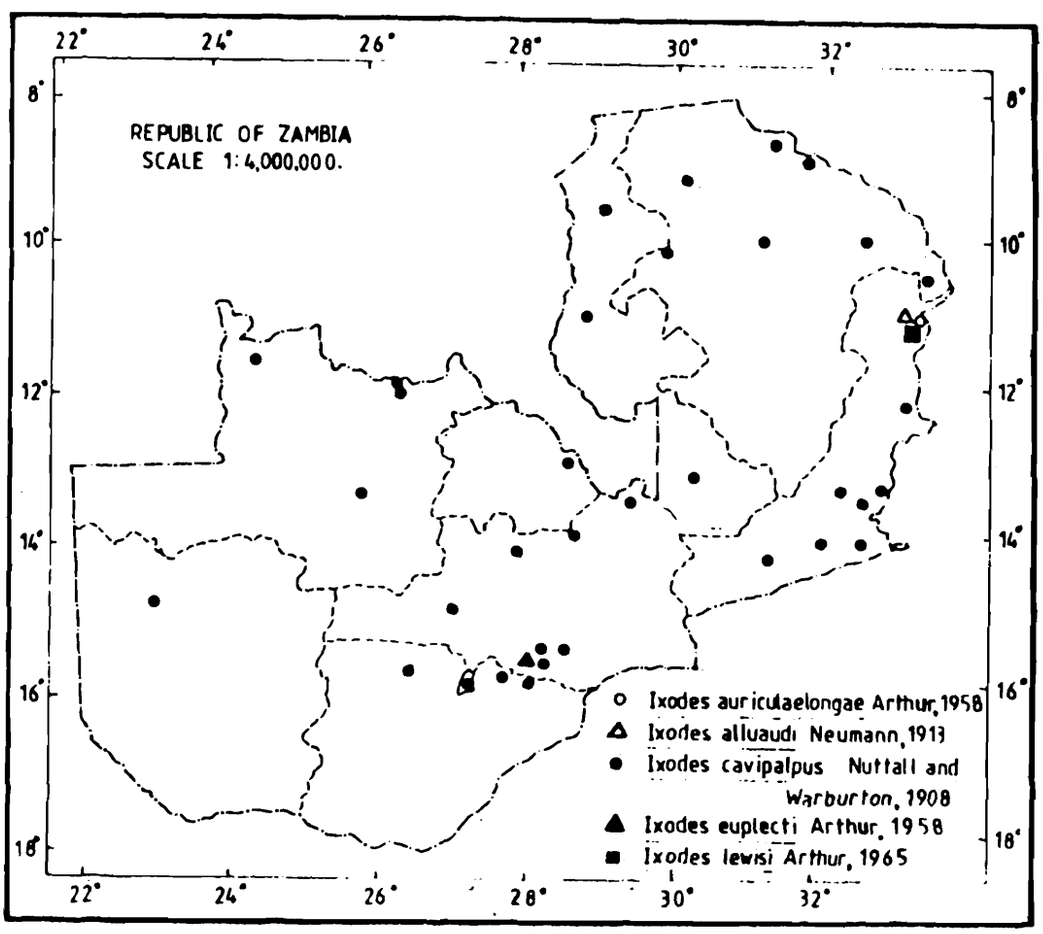
Arthur (1965). Ticks of the genus *Ixodes* in Africa : 286-293; Figs. Male, Female, N. and L.

Elbl and Anastos (1966b). Ixodid Ticks of Central Africa (Acarina : Ixodidae). Vol.II: 5-9, Fig. Female.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| *Praomys delectorum* | 14 | 3 |

*DISTRIBUTION* (Map 26) :




Map 26. The distribution of *Ixodes auriculaelongae, I. alluaudi, I. cavipalpus, I. euplecti* and *I. lewisi* in Zambia

In our collections we have only one female and three larvae which have been collected in Zambia, in *Eastern Province* from Nyika Plateau.

*PHYSIOGRAPHY, VEGETATION* Etc.

Physiography : The station lies on the Nyika plateau on the Luangwa- Malwai watershed in north eastern montane areas. The altitude is between 1500m to 2,200m.

Vegetation : Miombo woodland dominated by *Brachystegia* and *Julbernardia* species; and extensive montane grasslands.

Rainfall : The area lies within 1200mm to 1300mm annual rainfall zone.

Soil The locality is characterised by rock and rubble.

*DISEASE RELATIONSHIP* Unknown

*HOST* : Arthur (1965) concluded from Theiler's (1941) study of South African data that the red-shrew, *Crocidura flavescens* could be the true host and the infestation of other insectivores, rodents and lagomorph was incidental. Theiler (1962) summarised the host-list of this species.

*REMARKS* : In Africa outside Zambia this tick is distributed in South Africa, Tanzania, Sudan and Congo (Arthur, 1965).Yeoman and Walker (1967) have not found this tick in Tanzania. Clifford and Walker (1966) recorded a single male in Kenya from Mt Kenya.

### 27. *Ixodes auriculaelongae* Arthur, 1958

*DESCRIPTIONS*

| | |
|---|---|
| Arthur (1958). | *Parasitology*, 48(1-2) : 41-43; Fig. Female. |
| Arthur (1965). | Ticks of the genus Ixodes in Africa : 117-120; Fig. Female. |
| Elbl and Anastos (1966b). | Ixodid Ticks of Central Africa (Acarina : Ixodidae), Vol.II: 18-21; Fig. Female. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| *Praomys delectorum* | 14 | 1 |
| *Praomya natalensis* | 1 | 1 |
| *Crocidura occidentalis* | 1 | 1 |

*DISTRIBUTION* (Map 26) :

These specimens came from Nyika Plateau in the north eastern montane area adjoining Malawi border.

Vegetation : Miombo woodland and extensive montane grasslands.

Rainfall : Between 1200mm to 1300mm per annum.

Soil : Plateau soil, charcterised by rock and rubble

*DISEASE RELATIONSHIP* : These have not been studied.

*HOST* : The available records in Africa suggest that this tick parasitises both insectivores and rodents.

*REMARKS* : *I. auriculaelongae* occurs not only in Zambia but also in Zaire and Tanzania. This tick in Zaire prefers savannah and forested savannah habitat (Elbl and Anastos, 1966d). As the host species are fairly well distributed in Africa, it suggests

that probably this tick is more extensive and uniform in distribution than the present few records indicate.

### 28. ***Ixodes calcarhebes*** Arthur & Zulu, 1980

*DESCRIPTION*

Arthur and Zulu (1980). *Sys. Parasitology*, 1 (3/4) : 241-244. Fig. Female.

*REMARKS* : No specimen of this species were found in the present study from within Zambia so far. Arthur and Zulu (1980) has recorded this tick in Zambia off *Praomys natalensis*. No record of its precise occurrence within Zambia was given in their paper.

### 29. ***Ixodes cavipalpus*** Nuttal and Warburton, 1908

*DESCRIPTION* :

Arthur (1965). Ticks of the genus *Ixodes* in Africa : 122-128; Figs. Male, Female and L.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No of collections recorded* | *No. of Collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 77 |
| Cats | 2 | 1 |
| Dogs | 100 | 4 |
| Goats | 122 | 2 |
| (b) *Wild Animals* | | |
| Eland | 22 | 3 |
| Hartebeest | 16 | 1 |
| Lion | 16 | 1 |

*DISTRIBUTION* (Map 26) :

*Ixodes cavipalpus* has been collected frequently from many parts of Zambia. In *Central Province* it has been collected at Mumbwa, Chipepo, Kapiri-Mposhi, Mkushi and Serenje. *Eastern Province* records came from Chipata, Chadiza, Chiparamba, Katete, Lundazi and Petauke areas. In *Lusaka Province* it was found at Chilanga and Chalimbana areas. In *Luapula Province* it occurs at Kawambwa and Mansa. Records in *Northern Province* came from Kasama, Luwingu, Mbala, Mporokoso, Nsokolo and Thendele. It was also recorded from Kasempa, Solwezi and Mwinilunga in *North-Western Province*. In *Southern Province* this tick was found at Mazabuka, Nanduba, Namwala and Lochinvar National Park.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : *I. cavipalpus* has been found at Mbala highlands, Mafinga mountains and on central plateau region in *Northern, Central* and *Luapula Provinces;* on broken hill country in *Lusaka Province*. In *Southern Province* it occurs on the Kafue flats; it has also been collected on the broken hill country of eastern plateau in *Eastern Province*. The altitude range is from 900m to 1500m.

Vegetation : The major habitat of this tick appears to be miombo woodland dominated by *Brachystegia* and *Julbernardia* species. It has also been found in savannahs and munga woodlands amongst the vegetation of *Afrormosia, Combretum* and associated *Acacia* and tall grasses. There are some scattered locations in the grasslands dominated by *Hyparrhenia* species.

Rainfall : The majority of our collections are from the belt receiving 800mm to 1200mm rainfall per annum; with few locations in the 1400mm zone.

Soil : The stations are characterised by sandveldt, redbrown loams, red-clays, kafue clays, flood plain soils and amongst rock and rubble in valley soils.

*DISEASE RELATIONSHIP* : These have not been studied.

*HOST* : The hosts reported for *I. cavipalpus* include a variety of domestic and wild animals. Theiler (1962) summarized the host-list of this species in Africa. In Zambia this tick was mainly collected from domestic cattle, goats, dogs and cats. Amongst game animals it was found on eland and hartebeest.

*REMARKS* *Ixodes cavipalpus* is well distributed in Africa. Its range in southern Africa is from south Africa to Zimbabwe, Malawi and Zambia in the north to Angola, Zaire, as well as the Cameroons in central Africa; to Tanzania, Kenya and Uganda in east Africa. The northern limit of its distribution extends up to Sudan.

### 30. *Ixodes dawesi* Arthur, 1956

*DESCRIPTION* :

Arthur (1956). *Rev. Zool. Bot. afr.*, 54 (3-4): 301-3; Fig. Female

*REMARKS* : Colbo (1973) recorded this tick from Zambia. In a subsequent paper (Colbo and MacLeod, 1976) treated *I. dawesi* Arthur, a nymph as *Ixodes* sp. this nymph is now not available in our collections. Its exact identity cannot, therefore, be established. In view of the above, Gangarajah's (1976) record of *I. dawesi* from Zambia is rather doubtful and cannot be confirmed.

### 31. *Ixodes euplecti* Arthur 1958

*DESCRIPTIONS*

Arthur (1958). Parasitology, 48 (1-2) : 67-69; Fig. Female.

Arthur (1965). Ticks of the genus *Ixodes* in Africa : 203-204; Fig. Female.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No of collections recorded* | *No. of Collections containing this species* |
|---|---|---|
| Bush-shrike (Tchagra sp) | 1 | 1 |

*DISTRIBUTION* (Map 26) :

Only one female has been reported in Zambia so far, from Chilanga (Mt. Makulu).

*PHYSIOGRAPHY, VEGETATION* Etc.

Physiography : The station is situated on broken hill country at an altitude of about 1,220m.

Vegetation : The area is in the agricultural zone where both cropping and grazing are extensively practised. A few patches of remnant savannah forests are left.

Rainfall : The annual precipitation is between 900mm to 1,000mm.

Soil : The soil is typical red-clay sand.

*DISEASE RELATIONSHIP* : Unstudied

*HOST* : The type specimen of *I. euplecti* was collected from male *Euplectes macroura* (Family ploceidae: Passeriformes). In Zambia this tick was found to infest *Tchagra* species.

*REMARKS* : In Africa outside Zambia this tick is known by its type locality "Moyen Congo, Djambala, French Equatorial Africa, 2,400 feet alt".

### 32. *Ixodes lewisi* Arthur, 1965

*DESCRIPTION* :

Arthur (1965). Ticks of the genus *Ixodes* in Africa : 279-286; Fig. Male.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No of collections recorded* | *No. of Collections containing this species* |
|---|---|---|
| *Wild Animals* | | |
| Yellow spotted 'Dassie' | 1 | 1 |

*DISTRIBUTION* (Map 26) :

This species is known only from one male and one female collected in *Eastern Province* at Nyika plateau off *Dendrohyrax brucei* subsp.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : The locality is on the Nyika plateau on the Luangwa-Malawi watershed in the north-eastern montane area of Zambia. The area does not rise above 2290m.

Vegetation : The area lies in miombo woodland, as well as montane forest and grassland.

Rainfall : The annual rainfall is between 1200mm to 1300mm.

Soil : The soil is of rock and rubble type.

*DISEASE RELATIONSHIP* : These have not been studied.

*HOST* : This tick is primarily a parasite of both domestic and wild ruminants, especially the larger species (Walker, 1974).

*REMARKS* : *I. lewisi* is well distributed in Kenya and most records are from the highland regions (Walker, supracit). The extension of this species into montane regions of Zambia is of significance. the author has so far not found this tick infesting larger domestic animals in Zambia, especially in eastern province which is the known range for its distribution.

### 33. *Ixodes nchisiensis* Arthur 1958

*DESCRIPTIONS* :

| | |
|---|---|
| Arthur (1958). | *Parasitology;* 48 (1-2): 43-47; Figs. Male and Female. |
| Arthur (1965). | Ticks of the genus *Ixodes* in Africa : 205-209, Figs. Male and Female. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No of collections recorded* | *No. of Collections containing this species* |
|---|---|---|
| 'Elephant shrew' | 3 | 2 |

*DISTRIBUTION* (Map 27) :

*I. nchisiensis* has been collected so far only from Kafue National Park in Zambia.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography The station is situated on a high inland plateau at an altitude of about 1200m.

Vegetation Miombo woodland and adjoining grasslands.

Rainfall : Ranges from 900mm to 1000mm.

Soil The area is characterised by sandveldt.

*DISEASE RELATIONSHIP* : Unknown

*HOST* This tick is mainly found on insectivores and rodents.

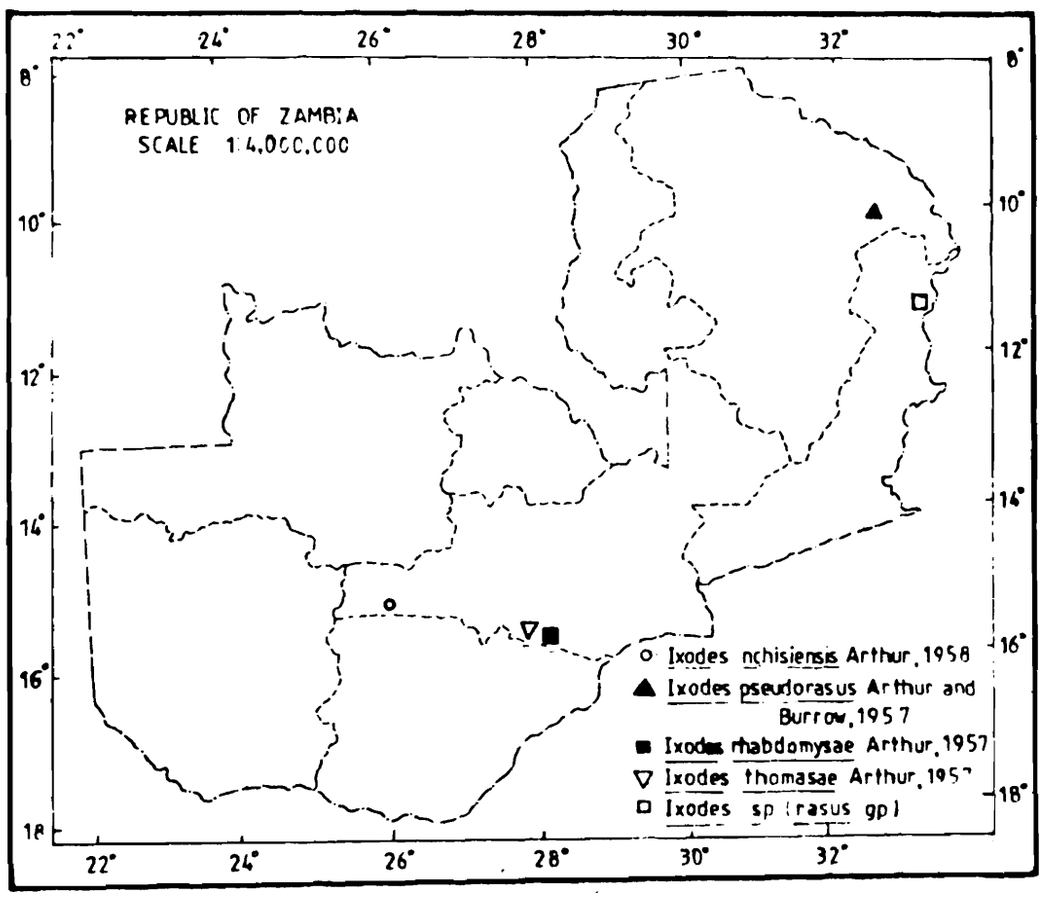
*REMARKS* : Besides Zambia, the tick is recorded from Malawi and Zaire.

### 34. *Ixodes pilosus* Koch, 1844

*DESCRIPTION* :

| | |
|---|---|
| Arthur (1965). | Ticks of the genus *Ixodes* in Africa : 151-157; Figs. Male and Female. |

*REMARKS* : Colbo (1973) recorded this tick from Zambia without mentioning any locality or host. Gangrajah (1976) also listed this tick in his check-list without referring to locality and host. According to Theiler (1962) the records outside South Africa need to be reassessed as the material which she has rexamined does not refer to *Ixodes pilosus.*




Map 27. The distribution of *Ixodes nchisiensis, I. pseudorasus, I. rhabdomysae, I. thomasae* and *I. sp. (rasus group)* in Zambia

35. ***Ixodes pseudorasus*** Arthur and Burrow, 1957

*DESCRIPTION* :

Arthur (1965). Ticks of the genus *Ixodes* in Africa : 151-161; Figs. Male and Female.

*SUMMARY OF THE COLLECTION DATA* :

| *Host* | *No of collections recorded* | *No. of Collections containing this species* |
|---|---|---|

| | | |
|---|---|---|
| Giant Rat | 1 | 1 |

*DISTRIBUTION* (Map 27) :

This record come from *Northern Province*, Isoka District on Mafinga Mountains. To date, it is the only record of this species from Zambia. As the known host *Cricetomys gambianus* is well distributed in *Northern, Southern* and *North-Western Province* (Ansel, 1960); and Ansell &Ansell (1973), there is little doubt that this tick is more widely distributed than this single record indicates.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : The station is located on Mafinga Mountains over the Luangwa valley at an altitude of about 1500m.

Vegetation : The area lies in miombo woodland amongst montane grassland with heaths and proteas.

Rainfall : The annual rainfall is between 1000mm to 1100mm.

Soil : Leached sandveldt.

*DISEASE RELATIONSHIP* : These have not been studied

*HOST* : The reported host-list of this tick includes carnivores, hyracoids, artiodactyla and rodents. Arthur (1965) has provided a detailed host-list of this species. In Zambia the writer has not come across this tick from cattle and goat so far.

*REMARKS* : In Africa *I. pseudorasus* is widely distributed extending from Senegal in the west across Sierra Leone, Ivory Coast, Ghana; Congo, Zaire, Rwanda, and Burundi in Central Africa; to Zimbabwe, Zambia and Malawi in the south; and Kenya, Uganda and Tanzania in the east (Elbl and Anastos, 1966d).

### 36. *Ixodes rhabdomysae* Arthur, 1959

*DESCRIPTIONS* :

| | |
|---|---|
| Arthur (1959). | *Rev. zool. Bot. afr.*, 59(1-2) : 151-153. |
| Arthur (1965). | Ticks of the genus *Ixodes* in Africa : 224-227; Fig. Female. |

*SUMMARY OF THE COLLECTION DATA* :

| *Host* | *No of collections recorded* | *No. of Collections containing this species* |
|---|---|---|
| *Aethomys walambae* | 10 | 2 |
| *Praomys natalensis* | 11 | 2 |

*DISTRIBUTION* (Map 27) :

The specimens were collected in *Lusaka Province*, Chilanga near the Mt. Makulu area.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography The station lies on broken hill country at an altitute of about

1,220m.

Vegetation : This is an area which is much altered by cultivation and grazing. With a few patches of remnant savannah forests amongst *Combretum* and *Afrormosia* trees.

Rainfall : About 900mm to 1000mm per annum.

Soil The soil of the area is characterised by redy-clays.

*DISEASE RELATIONSHIP* Unknown.

*HOST* : The type specimen of this species was collected from *Rhabdomys pumilio*. In Zambia this tick has been collected from *Aethomys walambae, Petrodromus tetradactylus, Pelomys fallax, Praomys natalensis* and *Saccostomys campestris*, (Colbo and MacLeod, 1976).

*REMARKS* : Besides Zambia this tick is known by its type locality; South Africa, Howiesons' Poort, *Eastern Province.*

37. ***Ixodes thomasae*** Arthur, 1957

*DESCRIPTIONS* :

| | |
|---|---|
| Arthur (1957a). | In Arthur and Burrow. *Bull. Mus. comp. zool. Harv.*, 116 : 532-534. |
| Athur (1965). | Ticks of the genus Ixodes in Africa : 176-179; Fig. Female. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No of collections recorded* | *No. of Collections containing this species* |
|---|---|---|
| *Pelomys fallax* | 1 | 1 |

*DISTRIBUTION* (Map 27) :

The species was collected in *Lusaka Province*, Chilanga near Mt. Makulu area.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : The locality is on broken hill country, on plateau at an altitude of about 1,220m.

Vegetation : The general vegetational pattern has changed much due to extensive cultivation and grazing. Localized remnants of savannah forests are still found towards the south.

Rainfall : Between 900mm to 1000mm per annum.

Soil Red-clays.

*DISEASE RELATIONSHIP* : Unknown

*HOST* : The type specimen of this species was collected in Kenya from *Arvicanthis abyssinicus nubilans*. This tick infests four-toed hedgehog, nile rat, angoni swamp rat, tropical swamp-rat = "Mouse" small antelope and black headed bush-shrike (Clifford and Walker, 1966; Walker, 1974). Colbo and MacLeod (1976) collected this

tick in Zambia from *Pelomys fallax* and *Praomys natalensis.*

*REMARKS* : Colbo (1973) recorded this tick for the first time in Zambia. GanagaRajah (1976) included this tick in his check-list on the basis of Colbo's work. In a subsequent paper Colbo and MacLeod (1976) treated their specimens as *Ixodes* species near *thomasae.* In the absence of Colbo's specimens it is not possible to fix the exact identity of *Ixodes thomasae* in Zambia. This species appears to be very rare in Zambia (Chilanga) as no specimen of this tick was found on series of *P natalensis* examined during 1978 and 1979.

### 38. *Ixodes sp.* (*rasus* gp.)

*REMARKS* : Colbo and MacLeod (1976) recorded two females off *Rhynchocyon cirnei* from the north eastern montane area of Zambia. As the above specimens are not present in N.C.S.R. collections, it is not possible to fix the exact identity. GanagaRajah (1976) recorded *Ixodes rasus* from Zambia in his check-list. The writer has not been able to trace the specimens on which he based his record. In the absence of any authentic record of *I. rasus;* this record may be treated as provisional only.

## Genus 8. **Rhipicentor**

### 39. ***Rhipicentor bicornis*** Nuttal and Warburton, 1908

*DESCRIPTIONS* :

| | |
|---|---|
| Theiler (1961). | *Rev. Zool. Bot. Afr.* LXVI, 3-4 : 297-308; Fig. Male and Female. |
| Elbl and Anastos (1966d). | Ixodid ticks of Central Africa, Vol. IV: 113-118; Fig. Male and Female. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No of collections recorded* | *No. of Collections containing this species* |
|---|---|---|
| *Domestic Animals* | | |
| Dog | 100 | 1 |

*DISTRIBUTION* (Map 20) :

I have examined in collections *R. bicornis* from Isoka District in *Northern Province.* Previously recorded in the province from Chinsali and Mbala regions. There are also records of its occurrence in Kansanshi in *North-Western Province.*

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography All collecting localities are from highland zones, over 1200m in altitute. Two of the stations lie on the elevated part of main plateau region; one on the Mbala highland region; one on the northern plateau region bordering Zaire and another one on the southern plateau region.

Vegetation : Variable woodlands, generally of medium growth and with a rather limited undergrowth, but becoming very short and mixed in upland areas. It has also

been found in grasslands dominated by *Hyprrhenia* in southern plateau region.

Rainfall : These areas fall in 800mm to 1400mm rainfall zone per annum.

Soil : The localities are characterised by leached sandveldt, seasonally water logged soils and leached red-brown loams.

*DISEASE RELATIONSHIP* : Unstudied.

*HOST* : *R. bicornis* has been recorded in literature from both domestic (goats, horses, dogs and cattle) and wild animals specially carnivores, Theiler (1962) has provided a detailed host list of this species.

*REMARKS* : Outside Zambia this tick is distributed in Congo, Ruanda, Burundi, Zaire, Angola, Malawi, Zimbabwe, Namibia and Union of South Africa.

## Genus 9. **Rhipicephalus**

### 40. ***Rhipicephalus appendiculatus*** Neumann, 1901

*DESCRIPTIONS* :

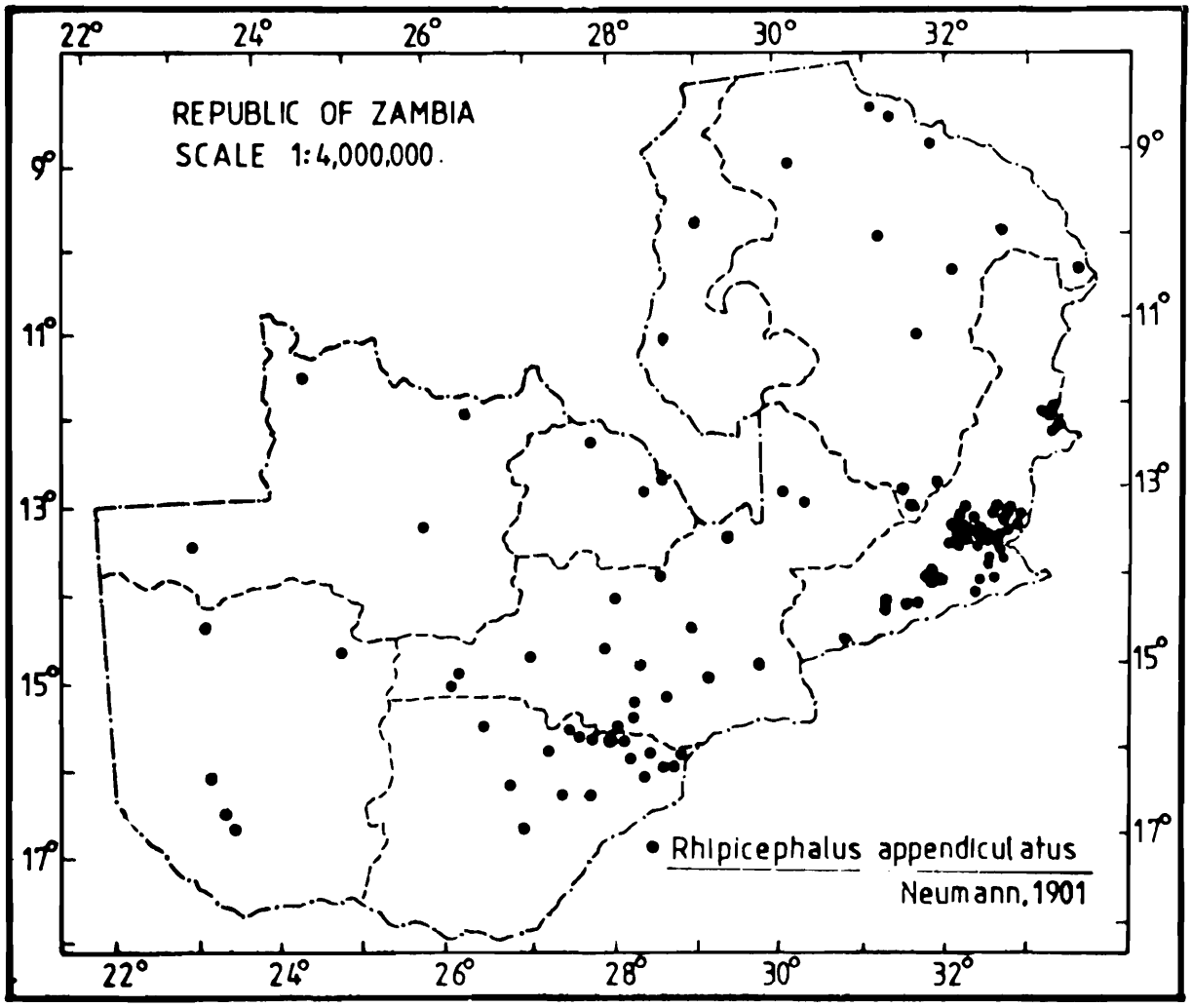
| | |
|---|---|
| Hoogstraal (1956a). | African Ixodoidea. 1. Ticks of the Sudan, 559, 599-615; Figs. Male and Female. |
| Elbl and Anastos (1966c). | Ixodid Ticks of Central Africa. III. Genus *Rhipicephalus* : 10-19; Figs. Male and Female. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No of collections recorded* | *No. of Collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 274 |
| Goats | 122 | 2 |
| Sheep | 91 | 6 |
| (b) *Wild Animals* | | |
| Buffalo | 72 | 4 |
| Hare | 10 | 1 |
| Impala | 24 | 1 |
| Kudu | 33 | 6 |
| Lechwe | 13 | 2 |
| Lion | 16 | 2 |
| Rhino | 5 | 1 |
| Wild pig | 16 | 2 |
| Zebra | 45 | 4 |

*DISTRIBUTION* (Map 28) :

*Rhipicephalus appendiculatus* is the most important species of ticks in Zambia as it is chiefly responsible for the transmission of *Theileria parva* the agent of East Coast Fever in cattle. Generally, it is found in almost all the provinces in the country in low to very heavy infestations during rainy season. In order to provide the range of variation in the infestation rates the entire collection from all over the country has been carefully studied, listed and plotted on the map. According to Yeoman and Walker (1967) there is a real risk to stock even when the rates are as low as one tick per three beasts.




Map 28. The distribution of *Rhipicephalus appendiculatus* in Zambia

*Central Province* : *R. appendiculatus* is common more or less in all the districts of the province. Infestation rate is generally low to moderate throughout the province in all collections made in areas around Chipepo, Chisamba, Kapiri Mposhi, Keembe, Lupiya, Mkushi and Serenje. In Kafue National Park it was found to infest buffalo and there is a distinct possibility of its occurrence on other mammalian hosts.

*Copperbelt Province* : The tick occurred in collections received from areas adjoining Chingola, Luanshya and Ndola in low to moderate infestations. The maximum number of ticks were found in the month of January. In view of limited

cattle distribution it is difficult to draw a clear picture of distribution of this species within the province.

*Eastern Province* : The distribution of *R. appendiculatus* in the province is of special interest as the epizooticity and enzooticity of ECF is of basic importance to the economic development of region. This species is very prevalent throughout the province except in the elevated areas in Chama district. The tick is generally found on cattle in varying degree of infestation almost throughout the Chipata and Chadiza districts, and somewhat patchy in Katete, Petauke and Lundazi districts. In South Luangwa National Park this tick was taken from kudu, buffalo, lion and wild pig.

*Luapula Province* : In this province, where the cattle population is sparse and fragmented, the tick was found in small numbers at Katotoma and Kawambwa off cattle. A single collection recorded the occurrence of this tick in the province on bush-pig.

*Lusaka Province* : In this province *R. appendiculatus* occurs uniformly throughout in low to moderate infestation. It is common around Lusaka, Chilanga, Kafue in the south and Chalimbana, Chiota and Rufunsa towards east; further collecting would undoubtedly show it to be much more widely distributed.

*Northern Province* : Examination of the material points out that this tick is uniformly distributed in the province from 1300m to over 1500m in the Mbala highlands in moderate to heavy and very heavy intensities. In Mpika district it is very rare. It is widespread around Chinsali. Further, in the northeast, in Isoka district this tick is well established and has been recorded at Isoka, Mutonda and Thendele. It is common around Kasama and a large number of specimens were collected in the district during the month of January. In the north, in Mbala district, this species is very common around Mbala, Nsokolo, and Mpulungu. It is also found around Mporokoso Luwingu districts.

*North-Western Province* : *R. appendiculatus* is very rare in collections in this province. In collections the writer found a single male off cattle from Kasempa; two females off cattle from Mwinilunga and a solitary male off cattle from Zambezi. Further collections are needed in the province to determine whether the tick is established or the records merely represent chance introduction.

*Southern Province* : This tick is fairly well distributed in the province and occurs usually in low to moderate infestations. In Mazabuka district it is common around Causeway, Chaya, Central Research Station, Kabanje and Mwangula. It is widespread in Gwembe district, in Lusitu, Siadombozia, Simamba and Chirundu. There are also few records of its occurrence in Monze, Choma and Namwala districts. It has also been collected off buffalo, kudu, lion, impala and zebra from game animals in the province.

*Western Province* : The distribution of this tick in this province is patchy and usually occurs in low numbers. In Seshcke District it was found at Mulobezi and Mwandi. It has also been collected around Kaoma and Lukulu districts.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : *R. appendiculatus* occurs in altitudes ranging from 300m in the faulted valleys of Luangwa and Zambezi to 1820m in Mafinga mountains and Mbala highlands. It has also been found uniformly throughout the main plateau region on either side of the main Congo-Zambezi watershed from Kabwe to Isoka which ranges in

altitude from 1,230m to 1535m; and on southern plateau around Choma and Kalomo in the *Southern Province* at about 1,200m; and the eastern plateau at about 1,075m. There is also a foci of infestation in the upper valley region ranging in altitude from 900m to 1200m. On Barotse plains and northern plateau region of *North-Western Province*, the occurrence of this tick is very irregular.

Vegetation *R. appendiculatus* has been found in various collections mainly from areas dominated by *Bracystegia* and *Julbernardia* woodland/grass complex and montane grasslands. It occurs in smaller numbers in river valley woodlands dominated by *Isoberlinia, Combretum* and *Afrormosia* trees with grasses. In the evergreen forest and grasslands it is found in very small numbers either marginally or in localised areas.

Rainfall : *R. appendiculatus* is found between 800mm to 1300mm rainfall zone. Most parts of Zambia where it is particularly common receives 900mm to 1100mm rain per annum. In Zambia, rainfall plays a dominant role in the infestatin rate of this tick as it is found mainly during wet months.

Soil : This tick prefers red-brown loams and soils of Luangwa and Zambezi valleys (rock and rubble). It is also found in sandveldts and leached sandveldts. The occurrence on barotse sands and kafue clays and kafue basin alluvium is irregular and rare.

*DISEASE RELATIONSIIIP* : *R. appendiculatus* is the chief field vector of the protozoan parasite *Theileria parva*, causative agent of East Coast Fever. Lounsbury (1904) was the first to prove the role of this tick in the transmission of this important and fatal disease of cattle. Besides, it is also capable of transmitting Red-water *(Babesia begimina)*, Pseudo East Coast Fever *(Theileria mutans)*, Boutonneuse Fever *(Rickettsia conorii)*, and Louping ill (Virus) experimentally. The severe bites of this tick is also known to cause tick toxicosis and frequently cause bleeding leaving deep wounds open to secondary bacterial infections.

*HOST* : *R. appendiculatus* chiefly parasitises domestic cattle while other frequent hosts are goats, sheep, buffaloes, antelopes and zebra. It has also been recorded from wild carnivores and domestic dogs. Hoogstraal (1956a), and Theiler (1962) have summarised in detail the host-list of this species. In Zambia in all areas of collection, cattle serve as the primary host. Other mammalian hosts were buffalo, bush pig, goat, hare, hartebeest, impala, kudu, lechwe, rhino, sheep, waterbuck and zebra.

*REAMARKS* : In the Ethiopian region this tick is mainly a Central and East African species. According to Hoogstraal (1956a) its northern limit is in southern Sudan and somewhere in Ethiopia. From this level it extends to South Africa, where, south of Pretoria, it occurs only on the coastal strip. Within this range, it is absent in deserts and in areas without shrub cover. Elbl and Anastos (1966c) have found this tick fairly widely distributed in Zaire, Rwanda and Burundi and is absent or almost entirely absent in West Africa.

## 41. *Rhipicephalus capensis* Koch, 1844

*DESCRIPTION* :

Elbl and Anastos (1966c). Ixodid Ticks of Central Africa. III. Genus: *Rhipicephalus* : 25-32; Figs.

Male and Female.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No of collections recorded* | *No. of Collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 3 |
| (b) *Wild Animals* | | |
| Hartebeest | 16 | 2 |

*DISTRIBUTION* (Map 29) :

The few records of *R. capensis* in the country are widely scattered. It has been collected in *Lusaka Province* from Chalimbana; in *Luapula Province* from Mansa; in *Northern Province* it was found at Kasama. It occurred at Namwala in *Southern Province.*

*PHYSIOGRAPHY, VEGETATION* Etc.

Physiography : This tick has been found at Chalimbana near Lusaka in the broken hill country; on the main plateau it occurred near Kasama; and it has been found on the narrow hilly margins of the *Luapula Province* near mansa; on Kafue flats near Namwala. It has been recorded at altitudes ranging from 600m to 1200m.

Vegetation : The records of this tick mostly come from the miombo woodland dominated by *Brachystegia* and *Julbernardia* species. There is, however, one record from *Bussea* thickets near grasslands and swamp forest on Kafue flats.

Rainfall : These stations are in the 800-1200mm rainfall zone.

Soil : The Stations are characterised by red-brown loams, sandveldt, kafue clays and rock and rubble.

*DISEASE RELATIONSHIP* : *Rhipicephalus capensis* has been proved to transmit the protozoan parasite *Theileria parva,* causative agent of East Coast Fever of cattle.

*HOST* *R. capensis* is most frequently found on herbivores, antelopes, cattle, goats, as well as pigs and dogs. The chief host appears to be cattle in most of the collections reported. Theiler (1962) has summarised the available host-list. In Zambia this tick was collected from cattle and hartebeest.

*REMARKS* : The range of *R. capensis* in Africa extends from South Africa to Namibia, Botswana, Malawi, Mozambique, Zimbabwe, Angola, Zaire, Ruanda and Burundi.

### 42. ***Rhipicephalus carnivoralis*** Walker, 1966

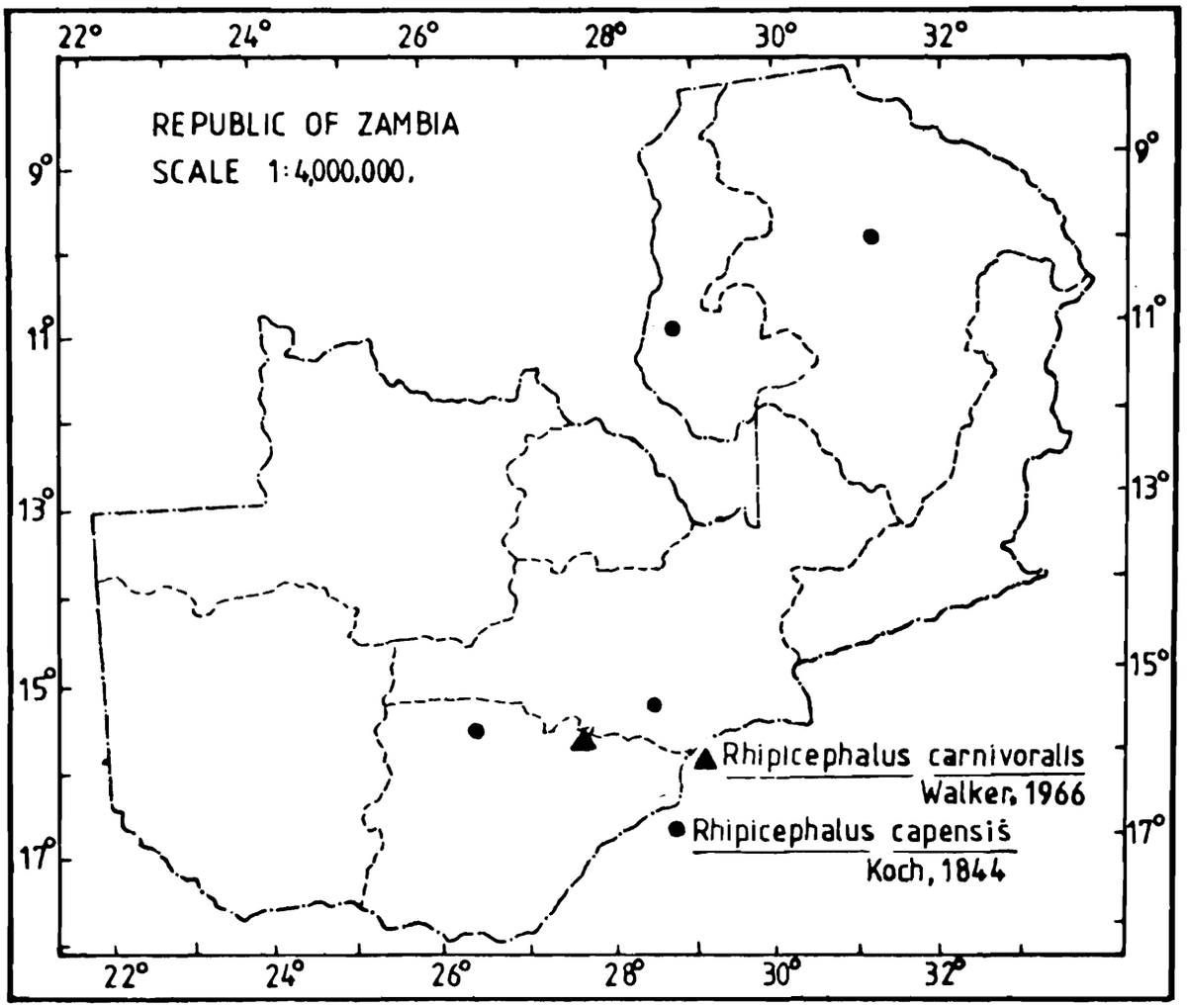
*DESCRIPTION* :

Walker (1966). *Parasitology*, 56: 1-7; Figs. Male and Female, Nand L.

*SUMMARY OF THE COLLECTION DATA* :

| *Host* | *No of collections recorded* | *No. of Collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Dog | 100 | 1 |
| (b) *Wild Animals* | | |
| 'Geneta' | 1 | 1 |

*DISTRIBUTION* (Map 29) :




Map 29. The distribution of *Rhipicephalus capensis* and *R. carnivoralis* in Zambia

The known records of this tick are from Luangwa valley in *Eastern Province*, and Mazabuka in *Southern Province*. In view of the wide distribution of its host it is quite likely that the tick may occur in other areas also.

*PHYSIOGRAPHY, VEGETATION* Etc.

Physiography : Lower valley of the Luangwa river and southern plateau at an altitude of about 300m-600m.

Vegetation : Mopane woodland dominated by *Colophospermum mopane* in Luangwa valley and in dry savannahs on southern plateau region.

Rainfall : The areas fall within 800mm-900mm annual rainfall zone.

Soil : The areas are characterised by valley soil and rock and rubble.

*DISEASE RELATIONSHIP* : Brocklesby, Bailey and Vidler (1966) demonstrated that *R. carnivoralis* would transmit *Theileria parva* which causes East Coast Fever of cattle, under laboratory conditions.

*HOST* : This tick mainly attacks carnivores and the reported host-list includes hyaena, leopard, lion, large rock hyrax and small rock hyrax and dog. The nymph and possibly larvae of this tick feed on hyraxes and adults on their predators, the leopard and other large carnivores (Walker, 1974).

*REMARKS* : Walker (1966) described *R. carnivoralis* from Kenya. It also occurs in Tanzania and Zambia.

### 43. ***Rhipicephalus compositus*** Neumann, 1897

*DESCRIPTIONS* :

| | |
|---|---|
| Theiler, Walker and Wiley (1956). | *Onderstepoort J. vet. Res.* 27: 83-89; Figs. Male, Female, N L as *R. ayrei.* |
| Elbl and Anastos (1966c). | Ixodid ticks of Central Africa. III. Genus *Rhipicephalus* : 39-47; Figs. Male and Female. |

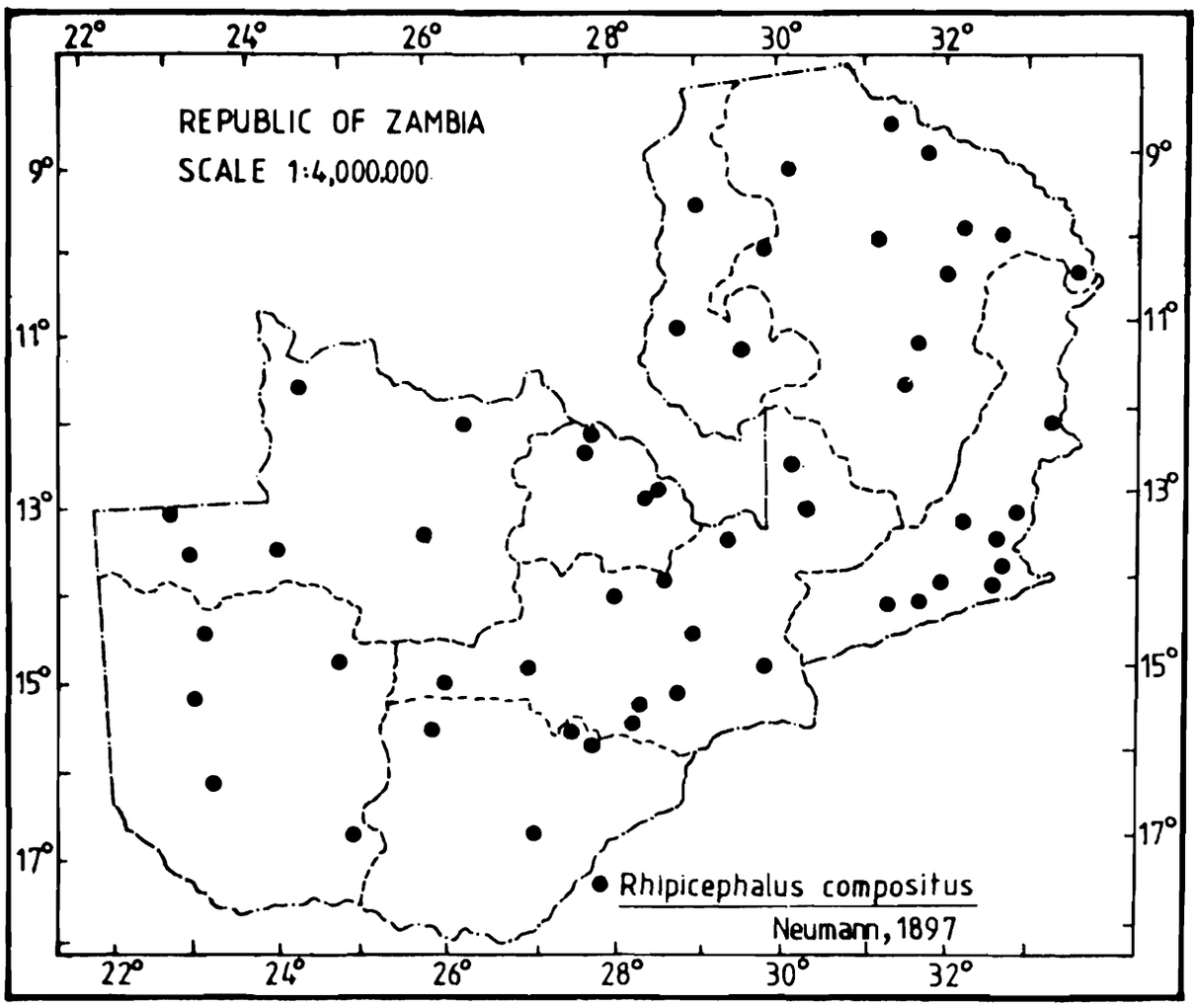
*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 248 |
| Dogs | 100 | 2 |
| (b) *Wild Animals* | | |
| Buffalo | 72 | 5 |
| Bush pig | 16 | 4 |
| Roan Antelope | 6 | 1 |
| Sitatunga | 1 | 1 |

*DISTRIBUTION* (Map 30) :

*R. compositus* is very widely distributed in the country and it may well be present in many areas from which it has not yet been recorded.

In *Central* and *Lusaka Provinces* it has been collected in every district. This tick as yet has been collected from Chililabombwe, Chingola, Luanshya and Ndola in the northern part of the *Copperbelt Province*. In *Eastern Province* it occurs in areas adjoining Chipata, Chadiza, Katete, Lundazi and Petauke districts. There are as yet few records of *R. compositus* from the *Luapula Province*. In Kawamba district it has only been collected at Chief Kazembe's areas; Katotomwa farm; Lubulafita farm, Lupenshya village and Musambeshi village; and in Mansa district from Chisuka crush and Shingano village. It has been found in very low numers in Samfya district.




Map 30. The distribution of *Rhipicephalus compositus* in Zambia

It occurs throughout the *Northern Province* from Mpika district in the south to Mbala district in the extreme north and from Luwingu district in the west to Isoka in the east. There is, however, no record as yet of its occurrence in Kaputa district. In *North-Western Province* it has been collected in Kabompo, Kasempa, Mwinilunga, Solwezi and Zambezi districts. This tick seems to be very rare in *Southern Province* and only a few specimens of this tick have been collected in Mazabuka district. In *Western Province* it is present in Sesheke district around Machile; in Senanga district at Senanga

itself; in Mongu district at Mongu itself; in Lukulu district at Lukulu and Kaoma around Kaoma. No collection has been made in Kalabo district.

*PHYSIOGRAPHY VEGETATION* etc.

Physiography : There are records of *R. compositus* throughout the whole range of Zambia's physiography from flat plateau at about 600m in altitue to elevated belts of upland country, intensely dissected escarpment zones to highlands over 1800m in altitude. It is very rare in southern plateau region and absent in our collections from Choma-Kalomo plateau region.

Vegetation : *R. compositus* occurs in numerous collections mainly from areas dominated by *Brachystegia* and *Julbernardia* woodland/grass complex and montane grasslands. It has been found in small numbers in dry savannahs dominated by *Combretum* and *Afrormosia* trees with grasses; in riverine grasslands amongst *Loudetia* species and in dry-evergreen forests.

Rainfall : It is found predominantly in the 800mm to 1200mm annual rainfall zone, extending marginally into the higher rainfall zones associated with highlands.

Soil : This tick is mainly found in sandveldt, leached sandveldt, barotse sand and floor plain soils. There are few records from red-clays, red-brown loams and in rock and rubble of Luangwa and Zambezi valleys.

*DISEASE RELATIONSHIP* : *R. compositus (syn. R. ayrei)* is known to transmit East Coast Fever experimentally (Wilson, 1953).

*HOSTS* : The present study confirms the observations of Matthyse (1954) that *R. compositus* mainly infests cattle in Zambia. The buffalo is considered as the most preferred host in East African plateau regions. Beside domestic mammals it has been found on unstriped grass mouse, rhinoceros, bushpig, wart-hog, giraffe, sitatunga, buffalo and roan antelope. Walker (1974) recorded this tick beside domestic cattle from nile rat, greater creek rat "creek rat", Jacksons soft furred mouse, lion, cheetah, black rhinoceros, wart-hog, bushpig, eland and buffalo. Hoogstraal (1956a), and Theiler (1962) have given a detailed host-list of this species.

*REMARKS* : According to Theiler, Walker and Wiley (1956) this species is common in East African highland with scattered populations in the highlands of Central Africa. Recent studies conducted by Elbl and Anastos (1966c) have proved that this tick is fairly common in Congo, Ruanda and Burundi and is present in Zimbabwe, Zambia, Malawi, Mozambique and Angola in the south; Nigeria in the west and the Sudan in the north.

### 44. ***Rhipicephalus evertsi evertsi*** Neumann, 1899

*DESCRIPTIONS* :

| | |
|---|---|
| Hoogstraal (1956a). | African Ixodoidea. 1. Ticks of the Sudan.: 641 (Figs. Male and Female 653). |
| Elbl and Anastos (1966c). | Ixodid Ticks of Central Africa III. Genus *Rhipicephalus* : 64-70; Figs. Male and Female. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 447 |
| Goats | 122 | 2 |
| (b) *Wild Animals* | | |
| Buffalo | 72 | 5 |
| Bush-buck | 29 | 2 |
| Duicker | 2 | 1 |
| Eland | 22 | 2 |
| Hartebeest | 16 | 3 |
| Impala | 24 | 1 |
| Lechwe | 13 | 4 |
| Puku | 7 | 1 |
| Roan Antelope | 6 | 1 |
| Sable Antelope | 13 | 1 |
| Waterbuck | 7 | 1 |
| Wildebeest | 20 | 5 |
| Zebra | 45 | 20 |

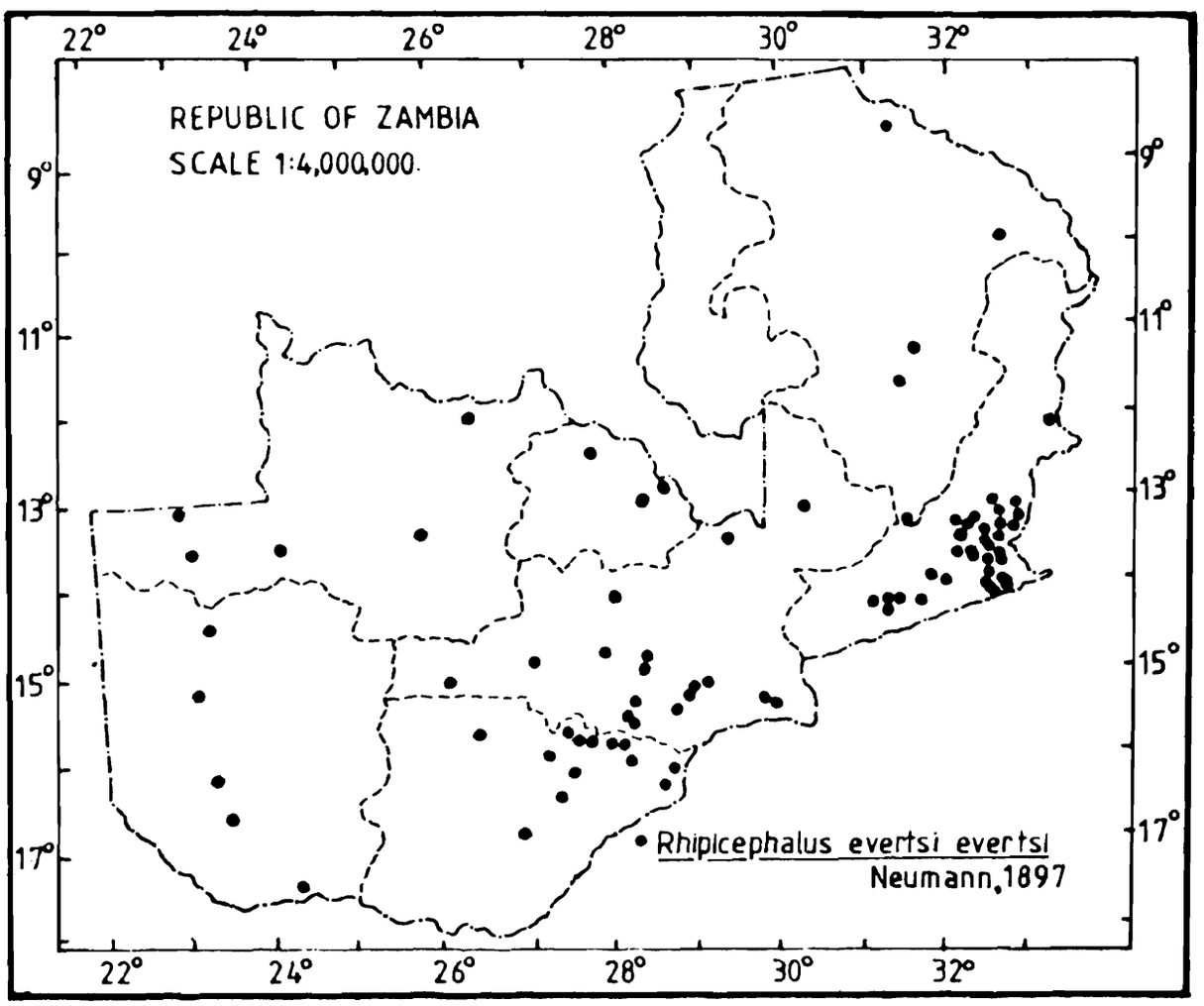
*DISTRIBUTION* (Map 31) :

*R. evertsi evertsi* is present almost throughout the country although not equally distributed in all the provinces. This tick seems to be able to withstand varying conditions and may well found in many other areas fromwhere it has not yet been reported.

In *Central Province, R. e. evertsi* is found in almost all the districts. In Kabwe rural it has been collected at areas adjoining Chipepo in the north, Keembe in the central and Chisamba in the south, in Mumbwa district around Mumbwa itself; in Mkushi around Mkushi itself in Serenje district at Serenje itself. In Kafue National Park it was collected around Chunga safari camp. In *Copperbelt Province* there are as yet few records around Chingola, Luanshya and Ndola districts.

In *Eastern Province* it has been found in every district except Chama where no survey was conducted. Further collections from the province would almost certainly extend its distribution to the north. In Chadiza district it is very common on dipped and undipped cattle and has been found in Chikoloka, Dambwale, Jere, Kalolo, Kamseche, Kazimule, Khulika, Khumadzi and Mlolo. In Chipata district it occurs almost throughout at Changa, Chimtiko, Chimwala, Deli, Devine, Faisako, Jungujani, Kaluni, Kapinde, Kapatamoyo, Makwe, Mathombo, Mgamphula, Mgaya, Mlonyoni, Mphanga, Mphangueni, Msekera and areas around Chiparamba. In Katete district it is very common at Chimpuna, Chinzule, Kafumbwe, Kalapula, Mangula, Michembo,

Mijelle, Msakanya, Mshoke, Mtandazi, Mtelemuka, Mtoloka, Mndondo, Nsolo and Sinda. In Lundazi district at Lundazi itself and Manyoni. In Petauke district there are only five records at Petauke itself, Chatemwa, Chandema, Chimphundu, and Mumbi.




Map 31. The distribution of *Rhipicephalus evertsi evertsi* in Zambia

In *Lusaka Province R. evertsi evertsi* is common throughout. In Lusaka rural it was collected at Chalimbana, Chiota, Chilanga, Kafue, and Palabana. In Luangwa district it has been collected off wild animals in lower Zambezi area.

In *Northern Province* this tick is very rare. In Isoka district it has been collected only once at Isoka itself. In Chinsali district at Shiwa Ng'andu; in Mbala district at Mbala itself and once at Mpika in Mpika district itself. The present study confirms the observations of Theiler as quoted by Yeoman and Walker (1967).

In *North-Western Province* it has been found in Chavuma, at Chisamba, in Zambezi. In Kabompo district at Manyika, Kamao's Sekesekha, Chizumos, Katupia and Luputa. In Kasempa at Kasempa itself. In Solwezi district at Mwala's.

In *Southern Province R. e. evertsi* is very common in the northern part. It is abundant in Mazabuka district and has been collected at Chaya, Kabanje, Nwangula,

Nanduba and Shamboko. In Gwembe district it was found at areas around Lusitu and Chirundu. In Monze district at Monze itself and Lochinvar National Park. In Choma district at Choma itself and in Namwala district at Namwala itself. Further collections from the province would almost certainly extend its known distribution to the remaining parts of the province.

In *Western Province* it has been collected in every district except Kalabo where no collection has been made. In Kaoma our records come from Chingelesa's, Lushubani, Shanguvula's, Sakaboyi and Kaoma itself. In Lukulu district it occurs at Kamanga, Njuungu, Shakapanga and around Lukulu itself. In Senanga district around Kanja at Mwanambao and Sioma. In Mongu district at Mulinde, Sikalume and Mongu itself. This tick is abundant in the southeastern part of Sesheke district and has been collected in the southern tip at Sesheke itself and around Mwandi and Mulobezi.

*PHYSIOGRAPHY VEGETATION* etc.

Physiography : In Zambia, *R. e. evertsi* has been found widely in eastern, central, southern plateau systems and western barotse plains with some extensions into river valleys and northern highlands. Most collections are in altitudes between 300m to 1300m; with a few records at 1500m in the Mbala highlands.

Vegetation : *R. e. evertsi* has been found predominantly in various types of woodlands, savannahs and grasslands; more rarely in dry evergreen forests around Chavuma and Zambezi; and in thickets around Namwala area.

Rainfall : The great majority of records are from about 800mm to 1100mm rainfall per annum. However, there are few records in higher rainfall zones. The general pattern of distribution suggests that this tick avoids the higher rainfall zones. In Tanzania, this tick is also found in low rainfall zones (Yeoman and Walker, 1967).

Soil : This tick is found in almost all the major soils of the country except leached red clays and seasonally waterlogged soils.

*DISEASE RELATIONSHIP* : *R. e. evertsi* has been proved to transmit *Theileria parva*, the agent of East Coast Fever, *Theileria mutans*, agent of Pseudo-East Coast Fever, and *Babesia bigemmina*, red water of cattle (Lounsbury, 1906; Theiler 1911). Besides these, it is also capable of transmitting the causative agents of biliary fever of horses *(Babesia equi* and *Babesia caballi)*; and of both bovine and equine spirochaetosis *(Borrelia theileri)*. In man, it is known to transmit the agent of Boutonneuse Fever *(Rickettsia conorii)*. Clark (1938) reported cases of paralysis in lambs apparently caused by *R. evertsi evertsi*.

*HOST* : According to Hoogstraal (1956a) *R. evertsi evertsi* is usually found on domestic cattle, equines, goats, sheep, wild antelopes, zebras and a few other large game animals. Matthysee (1954) recorded this tick in Zambia besides domestic animals on sable antelope, eland, wildebeest and hartebeest. This tick is fairly common on lechwe, wildebeest and zebras in Lochinvar National Park in Zambia. Elbl and Anastos (1966c) have given a detailed host list of this tick.

*REMARKS* *R. e. evertsi* is very widely distributed throughout most of the Ethiopian faunal region including the mountains of Yemen (Hoogstraal, 1956a). It ranges from Ghana in the west to Somalia in the east and from South Africa in the south to the Sudan in the north. There are no records of its occurrence so far from Mauritania, Gambia, Guinea, Sierra Leone, Liberia, Ivory Cost and Dahomey (Elbl and Anastos, 1966c).

## 45. ***Rhipicephalus hurti*** Wilson, 1954

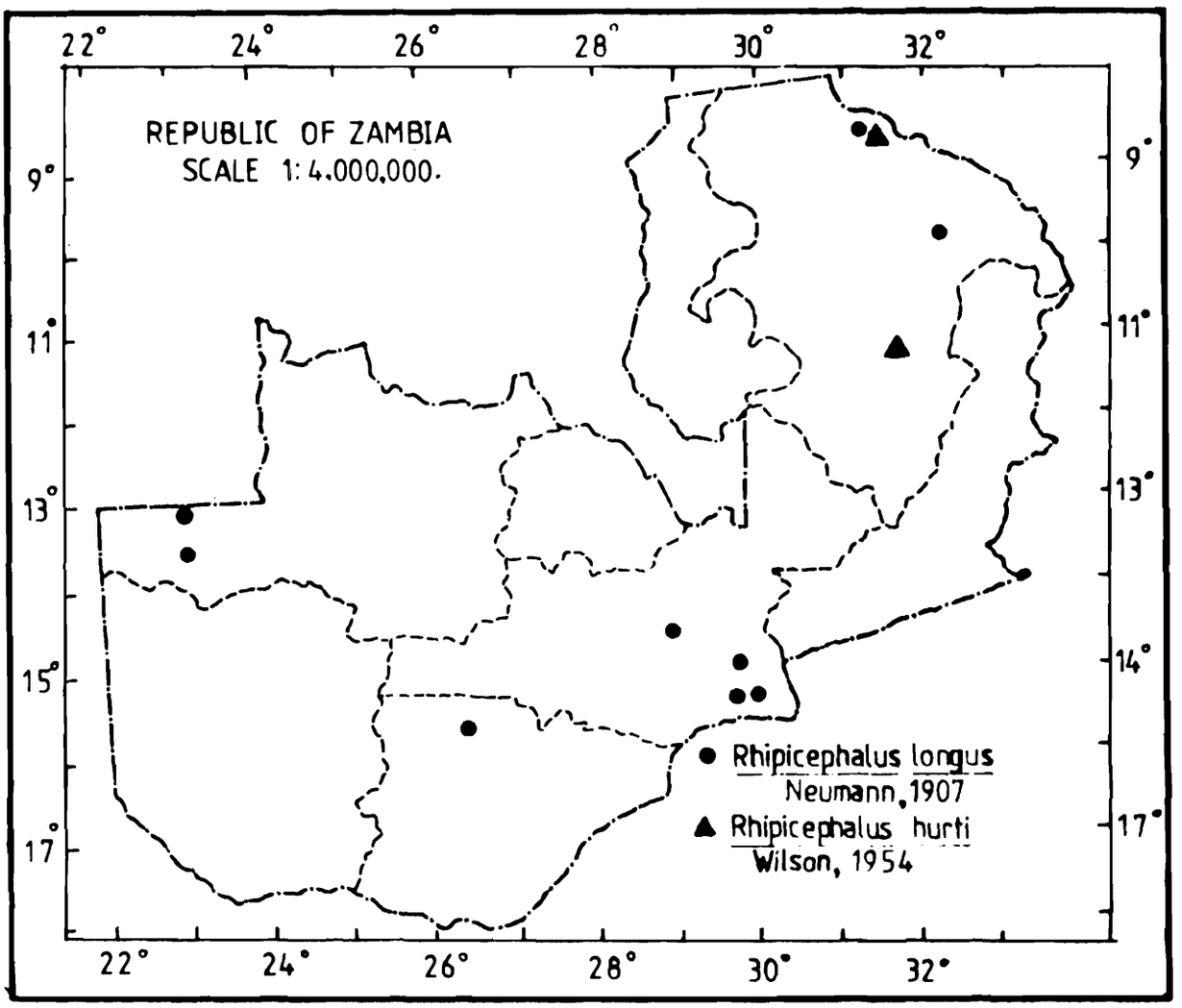
*DESCRIPTION* :

Wilson (1954). *Parasitology*, 44: 227-283; Figs. Male and Female.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| *Domestic Animals* | | |
| Cattle | 1,645 | 2 |

*DISTRIBUTION* (Map 32) :




Map 32. The distribution of *Rhipicephalus longus* and *R. hurti* in Zambia

The few specimens of *R. hurti* were collected in Northern Province at Shiwa Ng'andu farm in Chinsali district and at Mambwe traditional farming area in Mbala district, so far.

*PHYSIOGRAPHY, VEGETATION* etc.

Physiography : Both stations are in the northern plateau region ranging in altitude from 1200m to 1500m.

Vegetation : These locations fall in the miombo woodland dominated by *Brachystegia* and *Julbernardia* species.

Rainfall : These stations are in the 1000mm to 1200mm rainfall zone.

Soil : The areas are characterised by leached sandveldt and seasonally waterlogged soils.

*DISEASE RELATIONSHIP* : This has not been studied.

*HOST* : The reported host range of this species consists of both domestic and wild animals. Recently, Walker (1974) recorded this tick infesting a large variety of wild animals besides domestic cattle and dog in Kenya.

*REMARKS* : The distribution range of *R. hurti* extends from east African highlands in Kenya, Tanzania and Uganda to Central Africa in Zaire, Congo, Ruanda and Burundi; in the south into Zambia.

### 46. ***Rhipicephalus longus*** Neumann, 1907

*DESCRIPTIONS* :

| | |
|---|---|
| Neumann (1907). | Ann. trop. Med. Parasit. 1: 117-118. |
| Cliford and Anastos (1962). | Ticks Explor. Parc natn. Upemba Miss. G.F. de Witte 1946-1949 fasc. 66 : 17 24, plates 1 -3. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 6 |
| (b) *Wild Animals* | | |
| Buffalo | 72 | 3 |
| Warthog | 39 | 1 |

*DISTRIBUTION* (Map 32) :

The few records of *R. longus* in Zambia are scattered; the occurrence of this species is rare. In *Lusaka Province* it was recorded in Lusaka rural at Chimbwete. It was also collected at Rufunsa and in lower Zambezi near Chongwe river. It was found at Mbala and Mbesuma in *Northern Province*. In *North-Western Province* it was collected at Chavuma and Zambezi and in *Southern Province* at Bu-unga area in Namwala district.

*PHYSIOGRAPHY VEGETATION* etc.

Physiography : *R. longus* extends from the central plateau at about 600m to Mbala highlands in the north of the country upto 1500m in altitude.

Vegetation : The localised pockets of this species discovered so far lie in the woodlands, grasslands, dry savannaha and dry evergreen forests.

Rainfall : These areas are in the 800mm - 1200 mm rainfall zones.

Soil : The records of *R. longus* come from barotse sands, kafue clays, leached sandveldt and amongst rock and rubble of Luangwa and Zambezi valleys.

*DISEASE RELATIONSHIP* : This has not been studied.

*HOST* : The reported host list of *R. longus* includes a large variety of wild and domestic animals. Further information on hosts was given by Theiler (1962). Cliford and Anastos (1962) found a single male of this tick from a bird *Himantopus h. himantopus* which appears to be the first published record from a bird.

*REMARKS* : The distribution of *R. longus* appears to be fairly ubiquitous in Africa south of the Sahara. It is common in Western and Central Africa. In the west, the distribution range of this species reaches into Liberia, across Ivory Coast, Ghana, Togo and Cameroon into Gabon, Congo and the Central African Republc. In the south, it ranges from Angola across Zambia to Mozambique and Malawi; in the north, into the Sudan; and in east, into Kenya, Uganda and Tanzania (Elbl and Anastos, 1966c). According to Hoogstrael (1956a), and Theiler (1962), many of these records need confirmation.

### 47. ***Rhipicephalus maculatus*** Neumann, 1901

*DESCRIPTION* :

Theiler and Robinson (1953). *Onderstepoort j. vet. Res.* 26: 105-111; Figs. Male, Female, N and L.

*SUMMARY OF THE COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| *Wild Animals* | | |
| Buffalo | 72 | 4 |
| Warthog | 39 | 1 |

*DISTRIBUTION* (Map 33) :

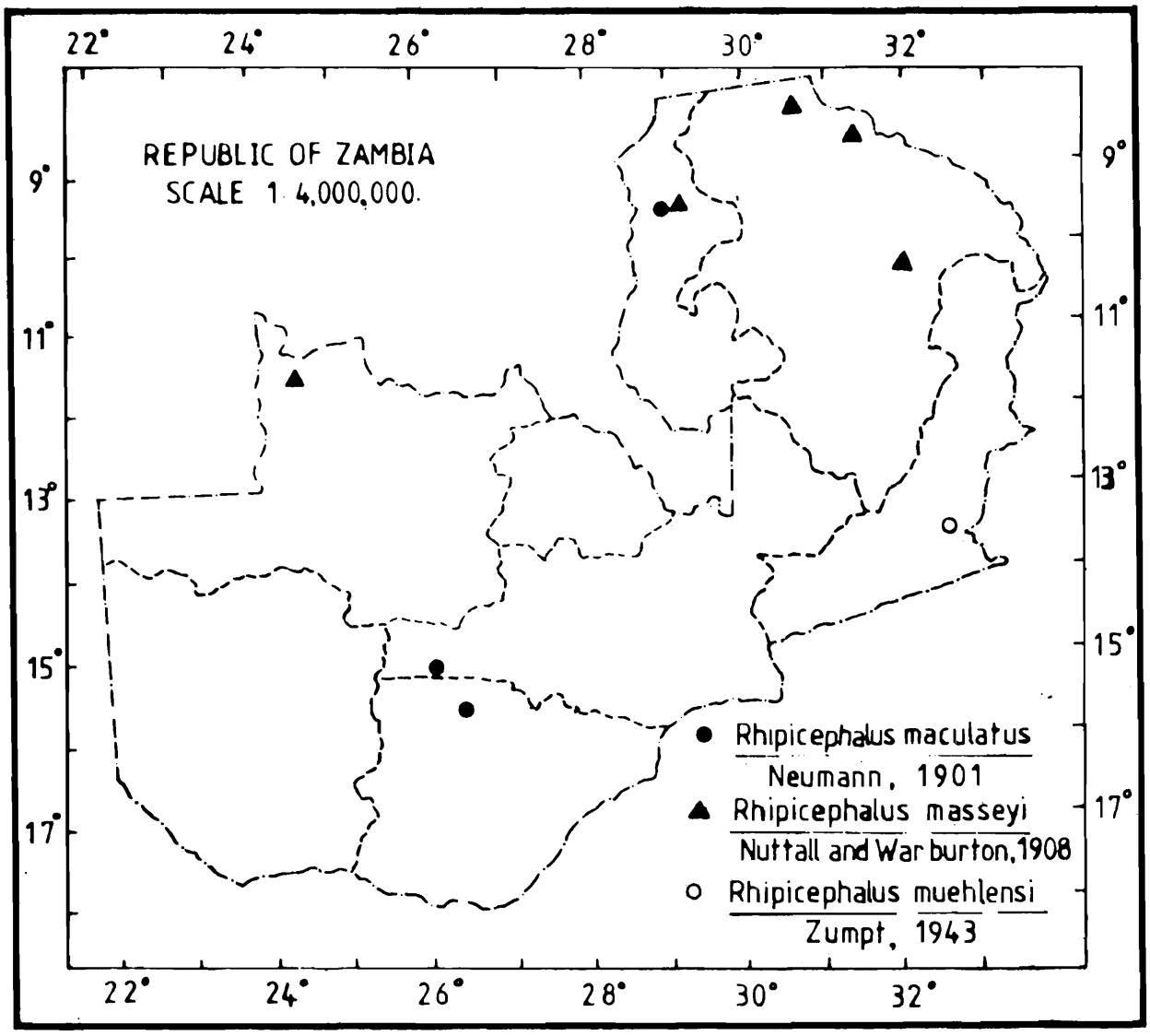
Two collections of specimens were obtained from Kafue National Park in *Central Province*. In *Luapula Province* we have one record from Kawambwa district. The remaining three collections came from Kafue flats in *Southern Province* at Namwala district.

*PHYSIOGRAPHY VEGETATION* etc.

Physiography These stations range from 900m to 1200m in altitude.

Vegetation : *R. maculatus* occurs in miombo woodlands and bussea thickets.

Rainfall : 900mm to 1200mm per annum.




Map 33. The distribution of *Rhipicephalus maculatus*, *R. masseyi* and *R. muehlensi* in Zambia

Soil : These stations are characterised by kafue clay, sandveldt and rock and rubble.

*DISEASE RELATIONSHIP* : This has not been studied.

*HOST* : The reported host range comprises mostly mammals. Adults are also found on reptiles, mainly squamata. Amongst domestic animals it infests cattle, sheep and goat. The wild animals frequently attacked are elephant, black rhinoceros, warthog, wild pig, eland and buffalo.

*REMARKS* : *R. maculatus* is fairly well distributed in southern and eastern Africa. It ranges from South Africa to Zimbabwe, Zambia, Malawi to Mozambique and in East Africa in Uganda to Kenya and Somalia. Theiler (1962) has given a detailed summary of its distribution in Africa.

48. ***Rhipicephalus masseyi*** Nuttal And Warburton, 1908

*DESCRIPTIONS* :

| | |
|---|---|
| Nuttal and Warburton (1908). | *Proc.Camb. Phil.Soc.* 14 (4) : 404-407 : Figs.Male and Female. |
| Elbl and Anastos (1966c). | Ixodid Ticks of Central Africa,III. Genus *Rhipicephalus* Koch, 1844: 98-102; Figs. Male and Female. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 1 |
| (b) *Wild Animals* | | |
| Bush pig | 16 | 1 |
| Warthog | 39 | 1 |

*DISTRIBUTION* (Map 33) :

*R. masseyi* is rare in collections but has been collected in the northern region of the country. In *Luapula Province* it has been recorded from Kawambwa district at Mushumbashi and at Kawambwa district centre.In *Northern Province* it has been collected off bush-pig at Kasaba Bay in Mbala district and off lions at Mbala itself. From Chinsali district, it has been collected in the northern part at Mbesuma off bush-pig and lion. In *North-Western Province* it occurs in Mwinilunga district at Chishika and Kahila, off cattle.

*PHYSIOGRAPHY, VEGETATION* Etc.

Physiography : *R. masseyi* occurs at Kasaba Bay on the shores of Lake Tanganyika in the north of the country; on the main plateau it has been found in the Mbesuma gap between Kasama and Isoka and at Mbala in the northern highlands; also on the hilly margin of *Luapula Province* at Kawambwa; on northern plateau region at Mwinilunga in the area of Congo-Zambezi water-shed.It has been recorded at altitudes upto 1500m.

Vegetation : This tick has been found mainly in miombo woodland/grass complex, with some extensions into grasslands.

Rainfall : All stations falls in the higher rainfall zones receiving 1100mm to 1300mm rainfall per annum.

Soil : The stations are characterised by leached sandveldt, flood plain soils and rock and rubble of river valleys.

*DISEASE RELATIONSIIIP* This has not been studied.

*HOST* : According to Elbl and Anastos (1966c) the primary host is wild pig. It has also been recorded off buffalo water mongoose, lion and domestic cattle. The type series was collected off buffalo.

*REMARKS* : *R. masseyi* ranges in southern Africa from Mozambique through Zambia and into Angola; and in the east it reaches upto Tanzania. It is mainly found on buffaloes and antelopes.

### 49. *Rhipicephalus muehlensi* Zumpt, 1943

*DESCRIPTION* :

Salisbury (1959). Onderstepoort J. vet. Res. 28 : 125-130; Figs. Male, Female, N. and L.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| Cattle | 1,645 | 1 |

*DISTRIBUTION* (Map 33) :

This single record is from *Eastern Province*, Chipata District. The occurrence of this tick seems to be accidental as we have not come across this tick in repeated collections from the area.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : The present record comes from the eastern plateau in Chipata at an altitude of about 1200m. The topography is hilly with ranges of higher hills along the border.

Vegetation : This tick has been found in miombo woodland/grass complex.

Rainfall : The record is from the 1000mm rainfall zone.

Soil : The area is characterised by red-clays.

*DISEASE RELATIONSHIP* : This has not been studied.

*HOST* : This tick is known to parasitise large bovines namely cattle, antelope, etc. However, the total reported host range is quite wide and includes also carnivores, equines and elephants (Elbl and Anastos, 1966c). Yeoman and walker (1967) found this tick on cattle, sheep and goats. Besides these domestic animals they also found it infesting lesser mongoose, bush pig, bushbuck, greater kudu and buffalo. Walker (1974) recorded this tick on domestic animals and black rhinoceros, giraffe, lesser kudu, eland, gerenuk, grants gazelle.

*REMARKS* : *R. muehlensi* is an uncommon tick that has a spotty distribution in central and east Africa reaching south to Zambia, Mozambique and Zululand and north to the Sudan.

### 50. *Rhipicephalus neavei* Warburton, 1912

*DESCRIPTION* :

Warburton (1912). *Parasitology* 5: 7-9; Figs. Male and Female.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 60 |
| Goats | 122 | 3 |
| (b) *Wild Animals* | | |
| Buffalo | 72 | 1 |
| Bush-buck | 29 | 1 |
| Duiker | 2 | 1 |
| Elephant | 16 | 1 |
| Hare | 10 | 1 |
| Impala | 24 | 2 |
| Kudu | 33 | 2 |
| Warthog | 39 | 3 |
| Zebra | 45 | 2 |

*DISTRIBUTION* (Map 34) :

The few records of *R. neavei* in Zambia are scattered. In *Central Province* it has been recorded in Kabwe rural at Chisamba and Kapiri Mposhi; from Mumbwa district at Mumbwa itself; in Mkushi district at Mkushi. In *Copperbelt Province* it was found at Chingola in Chingola district. In *Lusaka Province* it occurs in Luangwa district in the lower Zambezi river basin. In *Eastern Province* it was reported in Chadiza district at Banda; in Chipata district at Chaanje, Kaluni, Mbawa, Msekera, Chiparamba and at Chipata itself; in Katete district at Katete itself. In Luangwa National Park near Mfuwe lodge. In *Northern Province* it was recorded at Isoka in Isoka district: in Chinsali district at Mbesuma and shiwa Ng'andu. In *North-Western Province* there is only one report from Mwinilunga district at Mwinilunga itself. In *Southern Province* it occurs in Gwembe Valley at Lusitu and Changa; in Mazabuka district at Mwangula farm area.

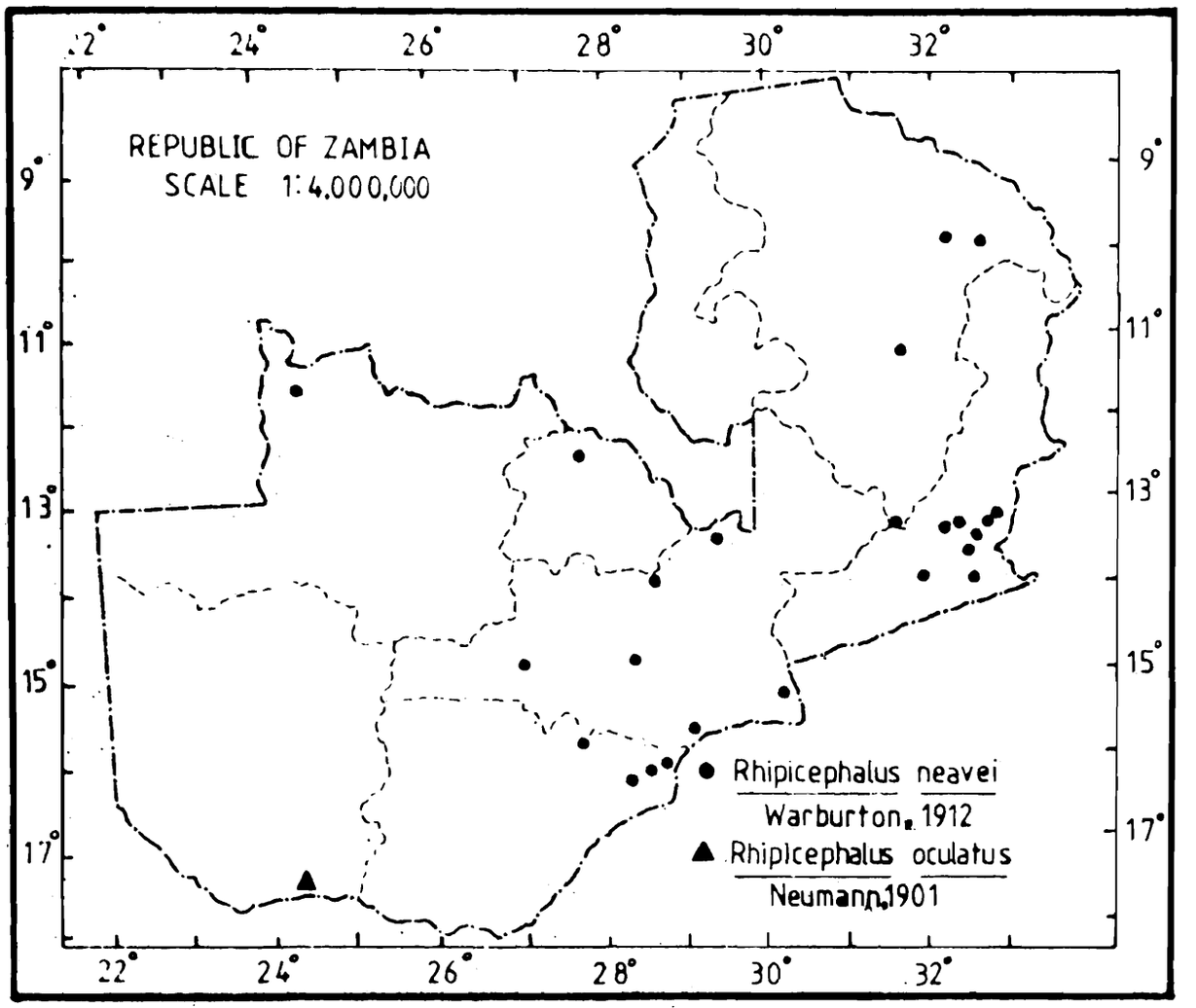
*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : *R.neavei* has been collected between 900m to 1200m in altitude in low infestation. It has also been found in lower Zambezi river and Luangwa river valleys at altitudes below 600m. There are few isolated records from altitudes upto 1500m in North-Western Region of country.

The foci of infestation of this tick appears to be in the central and eastern plateau regions of the country.

Vegetation : *R. neavei* is mainly an inhabitant of the woodland grass complex and their subtypes. Most records are from woodlands dominated by *Brachystegia* and *Julbernardia* species extending into *Isoberlinia* and *Combretum* woodlands. There are few records from dry savannah and only an isolated record from grasslands.

**Rainfall** : The great majority of records come from zones receiving from about 800mm to 1100mm rainfall per annum. However, there are few records upto 1300mm rainfall zone.




Map 34. The distribution of *Rhipicephalus neavei* and *R. oculatus* in Zambia

**Soil** : This tick is usually found in sandveldts, leached sandveldts, red-brown loams, red clays and soils of Laungwa and lower Zambezi valleys.

*DISEASE RELATIONSHIP* : *R. neavei* is capable of transmitting *Theileria parva*, an agent of East Coast Fever under Loboratory conditions Lewis, Piercy and Wiley (1946).

*HOST* : Adults of this tick parasitises both domestic and wild animals. Amongst domestic animals, it has been recorded off cattle, sheep and goats. It is frequently taken off elephant shrew, Ukamba Hare, Lion, rhinoceros, warthog, giraffe, Kudu, sable antelope, dikdik, impala, zebra, buffalo and duicker.

*REMARKS* *R. neavei* was sunk as a synonym of *R. pravus* by Walker (1956). In a subsequent study based on Tanzanian material Yeoman and Walker (1967) treated *R.*

*neavei* as a valid species. Walker (1974) in her study on Kenyan ticks treated specimens of *R. neavei* as synonym of *R. kochi* based on Matthysse and Colbo's unpublished work. As Matthysse and Colbo's unpublished work is not available for refrence, I prefer to treat *R. neavei* as a valid species till their work is published and critically evaluated.

### 51. ***Rhipicephalus oculatus*** Neumann, 1901

*DESCRIPTION* :

Theiler and Robinson (1953). *Onderstepoort J. vet. Res.* 26: 119-125: Figs. Male, Female, N. and L.

*DISTRIBUTION* (Map 34) :

The single record of this tick within the country is from *Western Province*, Sesheke District at Sitalika (Theiler, 1962).

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : The station lies southwards on the Barotse plain towards the border of kalahari sands at an altitude of about 610m.

Vegetation : In general, this is an area of grasslands on black clays with trees of *Burkea* fringed by *Syzygium* trees.

Rainfall : About 800mm rainfall per annum.

Soil : The area is characterised by barotse sand.

*DISEASE RELATIONSHIP* : According to Theiler (in litt ) it has been shown that *R. oculatus* is able to transmit East Coast Fever *(Theileria parva)* and gall sickness *(Anaplasma marginale )* (Zumpt, 1958).

*REMARKS* : Outside Zambia *R. oculatus* is distributed in most of the drier parts of the Union of South Africa, Botswana, Namibia, Angola and Zimbabwe. No specimen of this tick were found in the present study from within Zambia.

### 52. ***Rhipicephalus punctatus*** Warburton, 1912

*DESCRIPTION* :

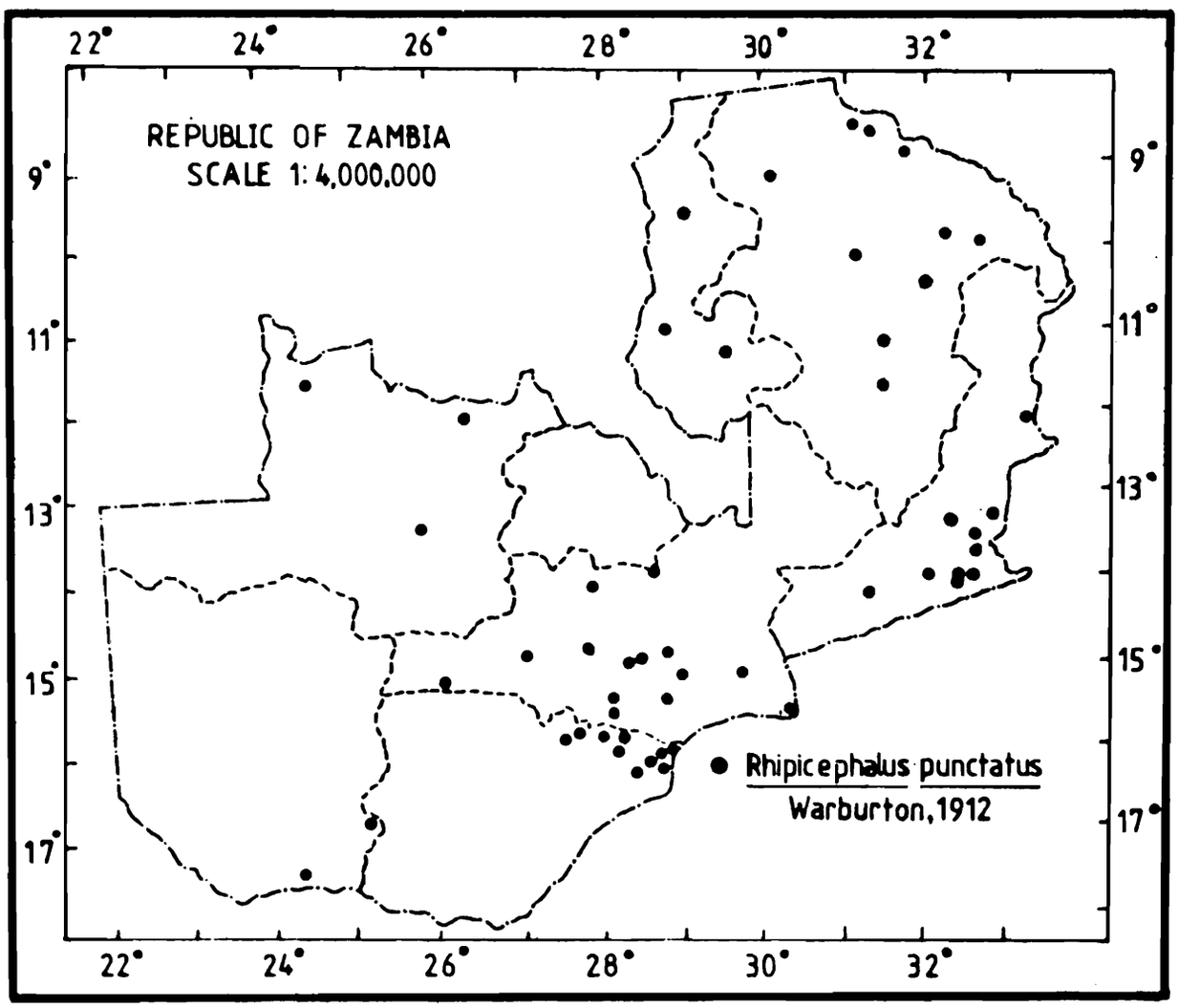
Warburton (1912). *Parasitology* 5:10-11: Figs. Male and Female. (as *R. neavei punctatus*)

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 247 |
| Dogs | 100 | 1 |
| Sheep | 91 | 1 |

| | | |
|---|---|---|
| (b) *Wild Animals* | | |
| Buffalo | 72 | 2 |
| Bushbuck | 29 | 3 |
| Eland | 22 | 3 |
| Kudu | 33 | 1 |
| Roan Antelope | 6 | 1 |

*DISTRIBUTION* (Map 35) :




Map 35. The distribution of *Rhipicephalus punctatus* in Zambia

*R. punctatus* is widely distributed in the country. Certainly there are some areas in which it has not yet been recorded, but thorough collecting would show the presence of this tick. The identity of species in the past remain confused.

In *Central Province* it is reported in Kabwe district at Chipepo and Kapiri Mposhi in the north, Kcembe and Chisamba in south central and from the north eastern end of

Mkushi district at Mkushi itself. In Mumbwa district the presence of *R.punctatus* has only been confirmed at Mumbwa and at Chunga safari camp in Kafue National Park but there s a distinct possibility of its occurrence in other parts also. In *Lusaka Province* this species has been found at Chiota, Lupiya, Rufunsa and Chimbwete in the eastern region and at Lusaka, Lilayi and Chilanga in the southern region; and in Luangwa district at Feira.

In *Eastern Province*, Chipata district *R. punctatus* is recorded at Chaanje, Chiparamba, Msekera and at Chipata itself. Its presence has been confirmed at Dambwale, Kazimule, Khumadzi and Kalolo in Chandiza district. Towards southern region this tick has been collected in Katete and Petauke districts. In the northern district of Lundazi there are relatively few records. In *Northern Province R. punctatus* has been fairly well distributed. It has been found in Mpika district; at Shiwa Ng'andu, Chinsali and Mbesuma in Chinsali district . In Isoka district it occurs at Isoka itself and in the eastern end of the district around Thendele. In Mbala district *R. punctatus* has been collected at several places at Mbala, Mpulungu and Nsokolo. In Luwingu district at Chilesha and Chisumba and in Mporokoso district. In *Luapula Province* there are relatively few records. In Kawambwa district it has been found at Bendele, Matere, Musele, Musambashi and at Kawambwa itself and at Samfya in Samfya district.

In *North Western Province R. punctatus* has only been reported in Kasempa district at Kasempa, in Solwezi district at Solwezi and in Mwinilunga district at Mwinilunga. In*Western Province* there are two records from Sesheke district at Sesheke and Mulobezi.

*PHYSIOGRAPHY,VEGETATION* Etc.

Physiography : Our records shows that *R. punctatus* is confined primarily on main plateau region on either side of Congo Zambezi watershed; on eastern plateau in *Eastern Province* and faulted valleys of lower Zambezi ranging in altitude from 300m to 1800m. It is very rare in Barotse Plain and have been collected so far towards the border of Kalahari sands in Sesheke plains at an altitude of about 600m. It has also been found in lake basin areas of lake Tanganyika.

Vegetation : Its major habitat appears to be miombo woodland dominated by *Brachystegia* and *Julbernardia*/grass complex. There are few records from grasslands (swamps and papyrus sudd) and woodlands (*Brachystegia* with *Boehmii* and *Colophospermum mopane* merging into woodland).

Rainfall : Its rainfall zone extends from about 800mm to 1300mm per annum.

Soil : This tick is mainly found in leached sandveldt, sandveldt, red-clays and red-brown loams. There are also records from kafue basin alluvium, leached redbrown loams, seasonally water logged soils, grey and sandy clays, barotse sand and soils of Luangwa and Zambezi river valleys.

*DISEASE RELATIONSHIP* : Unstudied.

*HOST* : Beside domestic cattle, this tick has been found to infest large variety of wild animals (Walker, 1956).

*REMARKS* : *R. neavei* Warburton, 1912 and *R. neavei punctatus* Warburton, 1912, were sunk as a synonym of *R. pravus* Dönitz, 1910 by Walker (1956). Yeoman and Walker (1967) on the basis of thier study based on collections from Tanzania came to conclusion that *R. pravus, R. neavei and R. neavei punctatus* (now called *R punctatus*) are three separate and distinct species.Beside Zambia this tick in Africa is

distributed in Angola, Malawi, Mozambique, Nigeria, Cameroons, Ethiopia, Somalia and Sudan.

### 53. *Rhipicephalus reichenowi* Zumpt, 1943

*DESCRIPTIONS* :

| | |
|---|---|
| Zumpt(1943a). | *Z. Parasitenk.* 13: 18-19 |
| Walker(1966b). | *Parasitology* 56: 457-469; Figs. Male, Female, N.and L. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 4 |
| (b) *Wild Aniamals* | | |
| Buffalo | 72 | 1 |
| Bush pig | 16 | 3 |

*DISTRIBUTION* (Map 36) :

The few records of *R. reichenowi* in Zambia are from widely separated localities.

In *Central Province* it has been recorded in Mumbwa district around Chunga Safari Camp. In *Lusaka Province* at Chalimbana in Lusaka Rural; in *Southern Province*, Gwembe valley district at Chirundu and Lusitu. In *Northern Province* in Chinsali district at shiwa Ng'andu and Mbesuma; in Mbala district at Mbala itself and in Luangwa valley. In *Luapula Province* at Kawambwa in Kawambwa district itself.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : Our records of *R. reichenowi* are from the main plateau region ranging in altitude from 900m to 1500m. It is also found in localised areas associated with Luangwa valley. Southwards it is associated with the Zambezi escarpment in Gwembe valley between altitudes of 300m to 900m.

Vegetation The localised pocket of this species discovered so far lies in the miombo and mopane woodland/grass complex. There is, however, one record from grasslands near the margin of miombo woodlands.

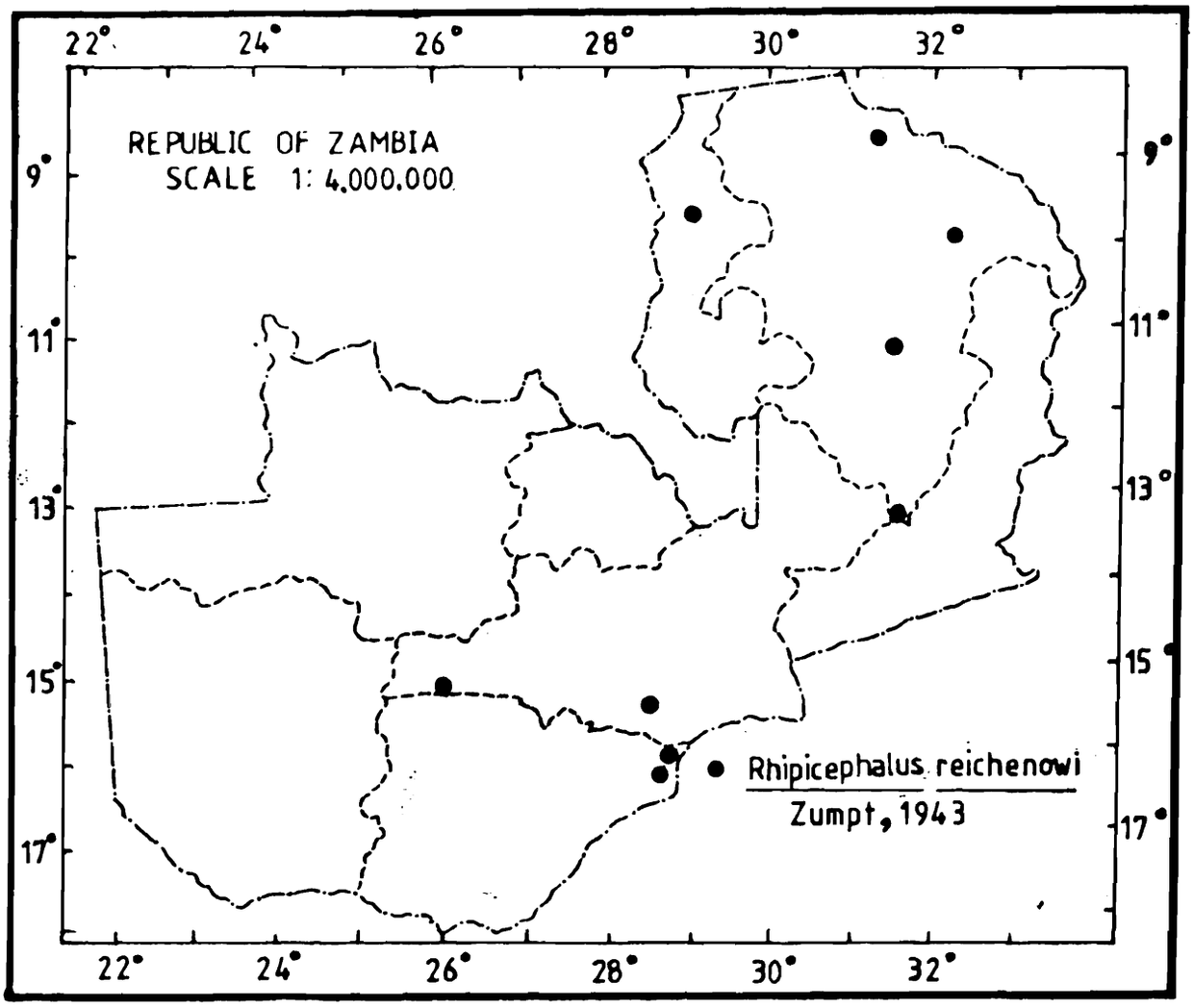
Rainfall : These stations are in the 800mm to 1200mm rainfall zone.

Soil These areas are characterised by leached sandveldt, sandveldt, red-brown loams, valley soils, rock and rubble of Luangwa and lower Zambezi valleys.

*DISEASE RELATIONSHIP* This has not been studied.

*HOST* *R. reichenowi* was described by Zumpt in 1943 from 13 males collected at Mikesse, Tanganyika, off porcupine. Besides porcupine it has been reported off man, buffalo, bush pig, oribi, water buck, duiker, zebra, lion, steenbock, konzi, nyala and domestic cattle.

*REMARKS* : *R. reichenowi* is a very poorly known species in Africa. Besides Zambia it occurs in Central (Zaire), Eastern (Kenya, Tanzania) and Southern Africa (Mozambique and Malawi).




Map 36. The distribution of *Rhipicephalus reichenowi* in Zambia

54. ***Rhipicephalus sanguineus*** (Latreille, 1806)

*DESCRIPTIONS* :

| | |
|---|---|
| Cunliffe (1914). | *Parasitology*, 6: 372-373; Figs. Male, Female, N and L. |
| Hoogstraal (1956a). | African Ixodoidea. 1. Ticks of the Sudan, : 648-685 (Figs. Male and Female): 722-724. |
| Morel and Vassiliades (1962). | *Reveue Elev. Med. vet. Pays. trop.* 15: 350-351; Figs. Male, Female, N. and L. |

*SUMMARY OF THE COLLECTION DATA :*

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 115 |
| Dogs | 100 | 60 |
| Cat | 2 | 1 |
| Sheep | 91 | 1 |
| (b) *Wild Animals* | | |
| Buffalo | 72 | 1 |
| Hare | 10 | 3 |
| Hartebeest | 16 | 1 |
| Lechwe | 13 | 2 |
| Mongoose | 3 | 1 |
| Zebra | 47 | 5 |

*DISTRIBUTION* (Map 37) :

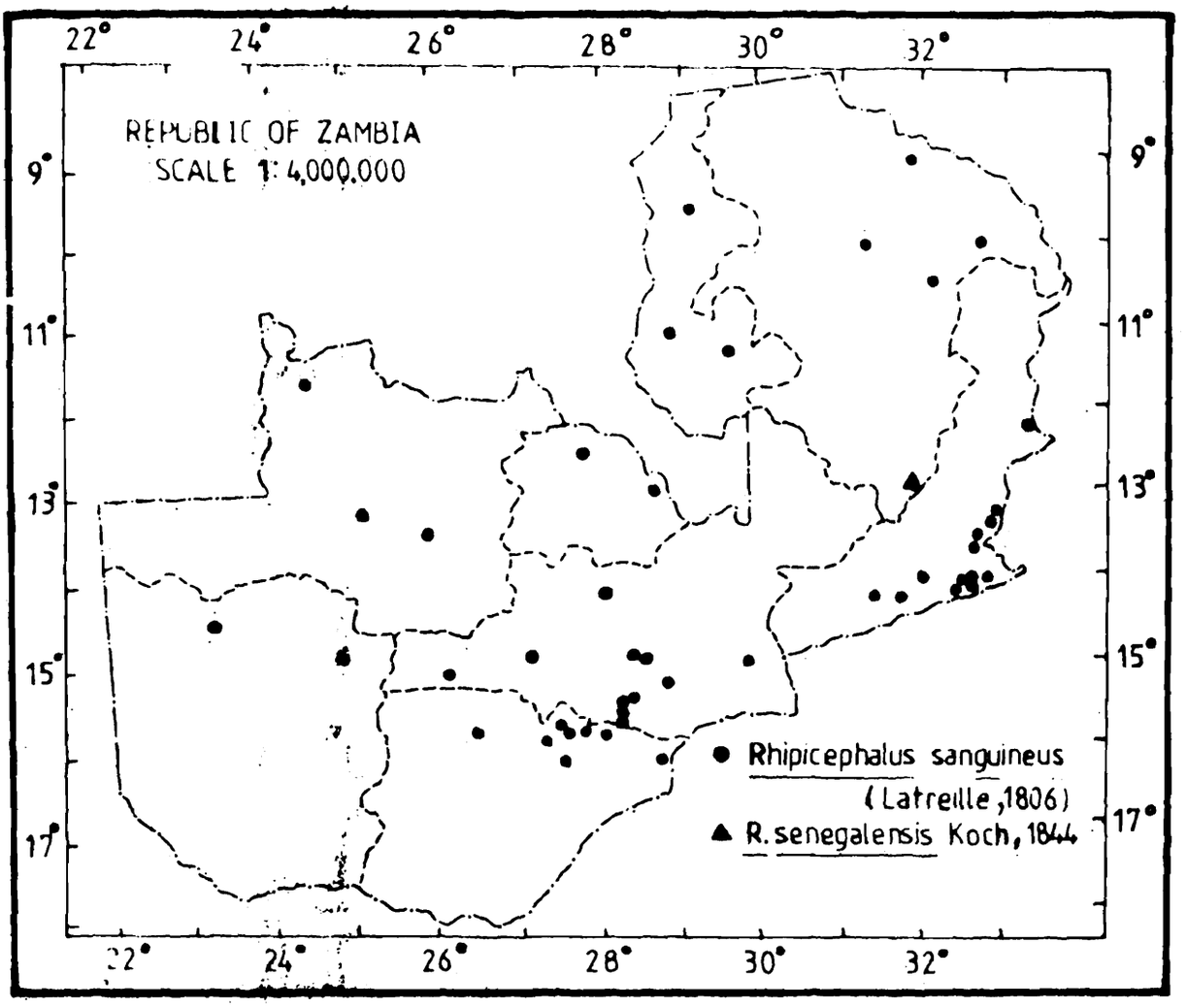
*R. sanguineus* is fairly well distributed in the country. Further collections would prove it to be present in many areas of the country from which it has not yet been recorded.

In *Central Province* it has been collected at Chipembi, Chisamba and Chipepo in the Kafue district; in Mumbwa district around game management areas and in Kafue National Park around Chunga Safari Camp. Records from *Copperbelt Province* are sparse. In Chingola district it has been reported at Chingola and in Ndola district around Ndola itself.

In *Eastern Province* it is common in the Chipata district and has been collected at Chipata, Chaanje, Msekera and Prison Camp; in Chandiza district from Dambwale, Banda, Kamseche, Kalolo, Khulika Makwenda and Mulolo. It has also been found at Katete and Sinda in Katete district and around Petauke in Petauke district; in the north, it has been found around Lundazi in Lundazi district. In *Luapula Province* we have one record from Kawambwa district at Kawambwa itself; two collections at Mansa in Mansa district; and one collection at Samfya in Samfya district. In Lusaka urban and in Lusaka rural at Lilayi and Chilanga in the south and Chiota and Rufunsa towards the east.

In *Northern Province* the specimens were obtained at Isoka (Siwila, Mutanda) and Thendele in Isoka district, in Kasama district at Kasama and Nsokolo in Mbala district. There is as yet few records of *R. sanguineus* in *North Western Province*, in Kasempa district at Chizera and Kasempa itself and a single record in Mwinilunga at Mwinilunga district. In *Southern Province* it has been recorded frequently. In Kafue flats it has been found at Namwala in Namwala district and in the Lochinvar National Park in Monze district; in Mazabuka district at Chaya, Kabanje, Mwangula and Nanduba; in Gwembe district at Chirundu and Lusitu. In *Western Province* this tick has been collected at

Lukulu and at Kaoma, both being district centres; further collecting will undoubtedly show it to be much more widely distributed in the province.




Map 37. The distribution of *Rhipicephalus sanguineus* and *R. senegalensis* in Zambia

*PHYSIOGRAPHY, VEGETATION* Etc.

Physiography : *R. sanguineus* has been found in most of the physiographic zones from the faulted river valleys to highlands in the northeastern plateau region. It ranges in altitude from about 300m to 1800m. It seems to be more common between altitudes 900m to 1200m. It appeared very rarely in collections from Barotse plains.

Vegetation : *R. sanguineus* occurs mainly in miombo woodland/grass complex with extensions into mopane woodland/grass complex. It has also been found in savannahs dominated by *Pterocarpus* sp., *Combretum* and *Afrormosia* trees amongst grasses. There are also a few records of its occurrence in grasslands dominated by *Hyparrhenia* sp., *Loudetia* sp., and in swamps and papyrus sudd.

Rainfall : It is commonest in areas receiving 800mm to 1000mm annual rainfall a year. There are few records of its occurrence in higher rainfall zones up to 1300mm rainfall per annum.

Soil : The stations are characterised by sandveldt; leached sandveldt, red-clay, red-brown loams, kafue clays, flood plain soils, seasonally water-looged soils, kafue basin alluvium and soils of Luangwa and Zambezi valleys.

*DISEASE RELATIONSNSIIIP* : *R. sanguineus* is a cosmopolitan species and serves as a principal vector of *Boutonneuse* Fever, "Indian Tick Typhus" caused by *Rickettsia conori*. It is also a vector of Rocky Mountain spotted fever *(Rickettsia reckettsii)* in the warmer parts of America. It may transmit the virus causing "Congolese red fever" (Virus) to Man. The bite of this tick can cause tick paralysis.

It is known to transmit *Babesia canis*, the causative agent of malignant jaundice and *Rickettsia canis*, agent of canine piroplasmosis. Hoogstraal (1956a) has provided an excellent summary of the diseases transmitted by this tick. Neitz (1956) gave information on the role played by this species in the transmission of other pathogens.

*IIOST* : *R. sanguineus* is known to parasitise a large variety of wild birds and mammals, as well as dogs and various other farm and domestic animals throughout its natural zone of distribution (Hoogstraal, 1956a; Theiler, 1962).

*REMARKS* According to Hoogstraal (1956a) "this species is present almost everywhere in Africa except possibly in the most extreme situations of the great deserts of northern and south-western Africa and perhaps in a few of the most isolated Oases." Theiler (1962) gives a summary of its distribution upto 1962). Elbl and Anastos (1966c) traced its distribution in detail in Zaire, Ruanda and Burundi in Central Africa. Yeoman and Walker (1967) and Walker (1974) studied the zoogeography, distribution and host relationship in Tanzania and Kenya in East Africa. The above studies and records are of *R. sanguineus* sensulata. According to Morel and Vassiliades (1962) *R. sanguineus* is distributed on the periphery of the Sahara and near Eastern deserts.

### 55. ***Rhipicephalus sculptus*** Warburton, 1912

*DESCRIPTIONS* :

| | |
|---|---|
| Warburton (1912). | *Parasitology* 5: 13; Figs. Male and Female. |
| Theiler (1947). | *Onderstepoort J. vet. Res.*, 21(2): 284; Figs. Male and Female. |

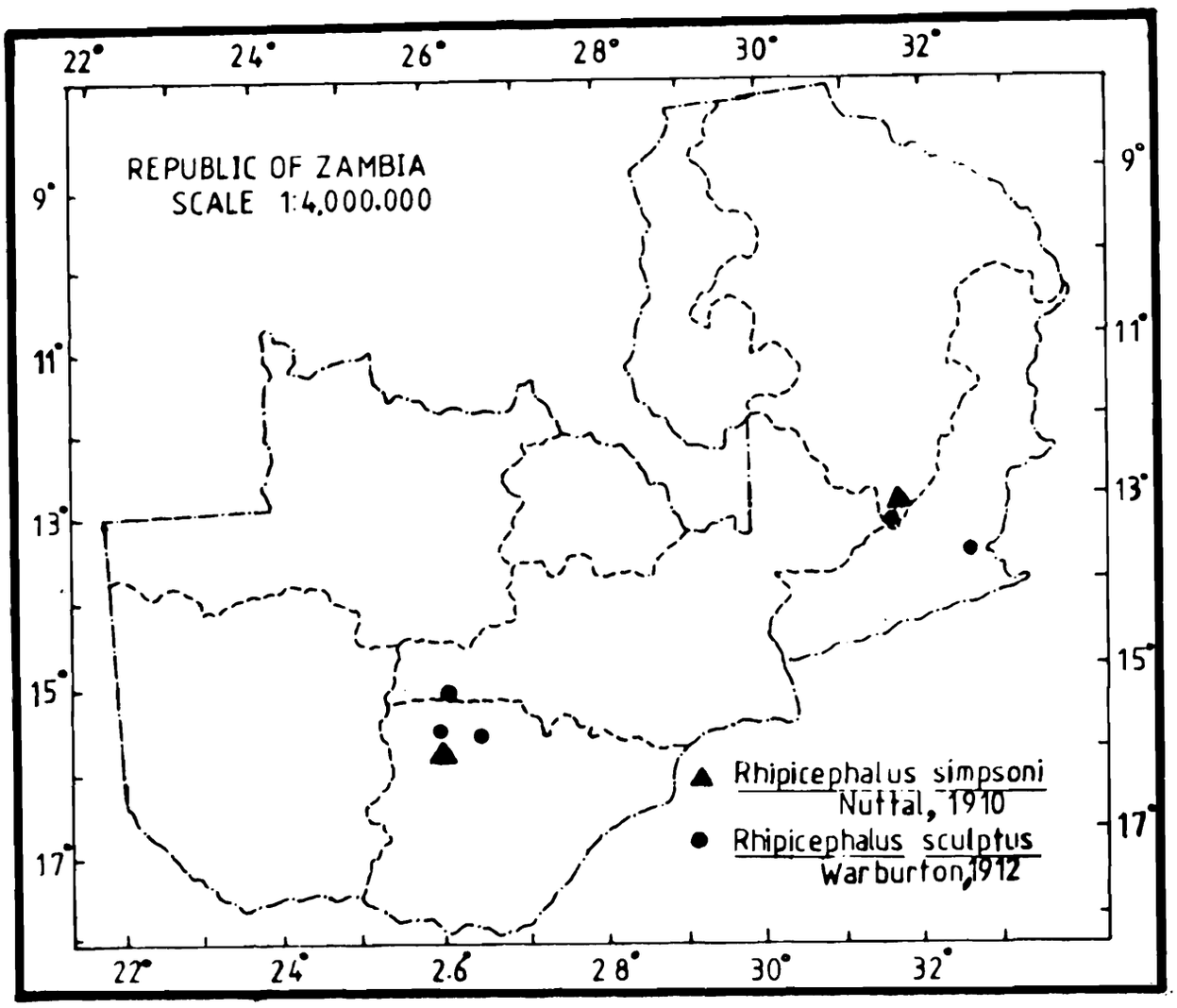
*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 1 |
| (b) *Wild Animals* | | |
| Buffalo | 72 | 4 |

*DISTRIBUTION* (Map 38) :

The few records of *R. sculptus* in Zambia are from a rather restricted area but there is

a distinct possibility of its occurrence in other parts as its hosts are fairly well distributed.




Map 38. The distribution of *Rhipicephalus simpsoni* and *R. sculptus* in Zambia

In *Central Province* it has been collected at Chunga Safari Camp (Kafue National Park) in Mumbwa district. In *Southern Province* it has been found at Namwala and Nkala camp (Kafue National Park) in Namwala district. In *Eastern Province* it occurs at Msekera in Chipata district and at Mfuwe in South Luangwa National Park.

*PHYSIOGRAPHY, VEGETATION* Etc.

Physiography : *R. sculptus* has been found on the high central plateau region in *Central Province;* on Kafue flats in *Southern Province;* in faulted valleys of Luangwa in *Northern Province* and on the Broken Hill country of north-eastern plateau. The above stations range in altitude from 600m to 1200m.

Vegetation : The stations fall in the miombo mopane woodland/grass complex, with minor extensions into river valley type of grasslands in which fierce fires occur annually.

**Rainfall** : The area lies in the 800mm to 1100mm rainfall belt.

**Soil** : The stations are characterised by sandveldt, barotse sand, kafue clays and valley soils.

*DISEASE RELATIONSHIP* : Unstudied.

*HOST* : The species is known to parasitise buffalo, kudu, roan antelope, sable antelope and zebras.

*REMARKS* : *R. sculptus* is an uncommon tick. It was described by Warburton (1912) from Nyasaland (now Malawi) off roan antelope. Yeoman and Walker (1967) have recorded this tick in Tanzania off sable antelope.

### 56. *Rhipicephalus senegalensis* Koch, 1844

*DESCRIPTIONS* :

| | |
|---|---|
| Hoogstraal (1956a). | African Ixodoidea. 1. Ticks of the Sudan: 754-759; Figs. Male and Female. |
| Elbl and Anastos (1966c). | Ixodid ticks of Central Africa. III. Genus *Rhipicephalus* Koch, 1844: 134-140; Figs. Male and Female. |

*SUMMARY OF THE COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| *Wild Animals* | | |
| Buffalo | 1 | 1 |

*DISTRIBUTION* (Map 37) :

7 specimens were collected at Mfuwe in South-Luangwa National Park.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : The station lies in the faulted valley of the Luangwa river and is bordered by Muchinga escarpment at an altitude below 900m.

Vegetation : The area lies in mopane woodlands.

Railfall : About 900mm per annum.

Soil : The area is characterised by valley soils.

*DISEASE RELATIONSHIP* : Hoogstraal (1956a) and Elbl and Anastos (1966c) have reported that specimens of *R. senegalensis* have been found in Guinea Bissau infected with Q. fever (*Coxiela burneti*).

*HOST* : *R. senegalensis* is known to infest a widerange of game and domestic animals. Detailed information on the hosts have been given by Elbl and Anastos (1966c) and Hoogstraal (1956a).

*REMARKS* : It is fairly well distributed in Africa (south of Sahara) and ranges from Malwi, Zimbabwe in the south to Sudan in the north and from Guinea Bissau in the West to Tanzania on the east. In Central Africa, it is found in Zaire, Chad and Cameroons. The present record is the first from within Zambia.

## 57. *Rhipicephalus simpsoni* Nuttal, 1910

*DESCRIPTIONS* :

| | |
|---|---|
| Theiler (1947) | *Onderstepoort. J. vet. sci. Anim. Ind.*, 21: 284-286; Figs. Male and Female. |
| Hoogstraal (1956a). | African Ixodoidea. 1. Ticks of the Sudan.: 725-728, Figs. Male and Female. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No. of collections containing this species* |
|---|---|---|
| *Wild Animals* | | |
| Cane rat | 1 | 1 |

*DISTRIBUTION* (Map 38) :

The specimens were collected at Luangwa valley in Mpika district, *Northern Province* and 4 specimens at Ngoma lodge in Kafue National Park, Namwala district, *Southern Province*.

*PHYSIOGRAPHY, VEGETATION* Etc.

Physiography : These stations are in the Luangwa valley and on southern plateau in upper valley region ranging from 600m to 1000m.

Vegetation : Our records come from miombo and mopane woodlands/grass complex.

Rainfall : It occurs in the 800m to 900m annual rainfall belt.

Soil : The stations are characterised by barotse sands and valley soils.

*DISEASE RELATIONSHIP* : These have not been studied.

*HOST* : The primary hoosts of *R. simpsoni* are cane rats and the giant forest rats. Walker (1974) has found this tick infesting sykes' monkey in Kenya.

*REMARKS*. *R. simpsoni* is widely distributed in the Ethiopian region. It ranges from West Afrcia in the west to Kenya and Tanzania in the east and from South Africa in the south to Sudan in the north. Theiler (1962) has given an excellent summary of its distribution in Africa.

## 58. *Rhipicephalus simus* Koch, 1844

*DESCRIPTIONS* :

| | |
|---|---|
| Hogstraal (1956a). | African Ixodoidea. 1. Ticks of the Sudan : 729-752; Figs., Male and Female. |
| Elbl and Anastos (1966c). | Ixodid ticks of Central Africa. III. Genus *Rhipicephalus* Koch, 1844: 147-155; Figs. Male and Female. |

***SUMMARY OF THE COLLECTION DATA :***

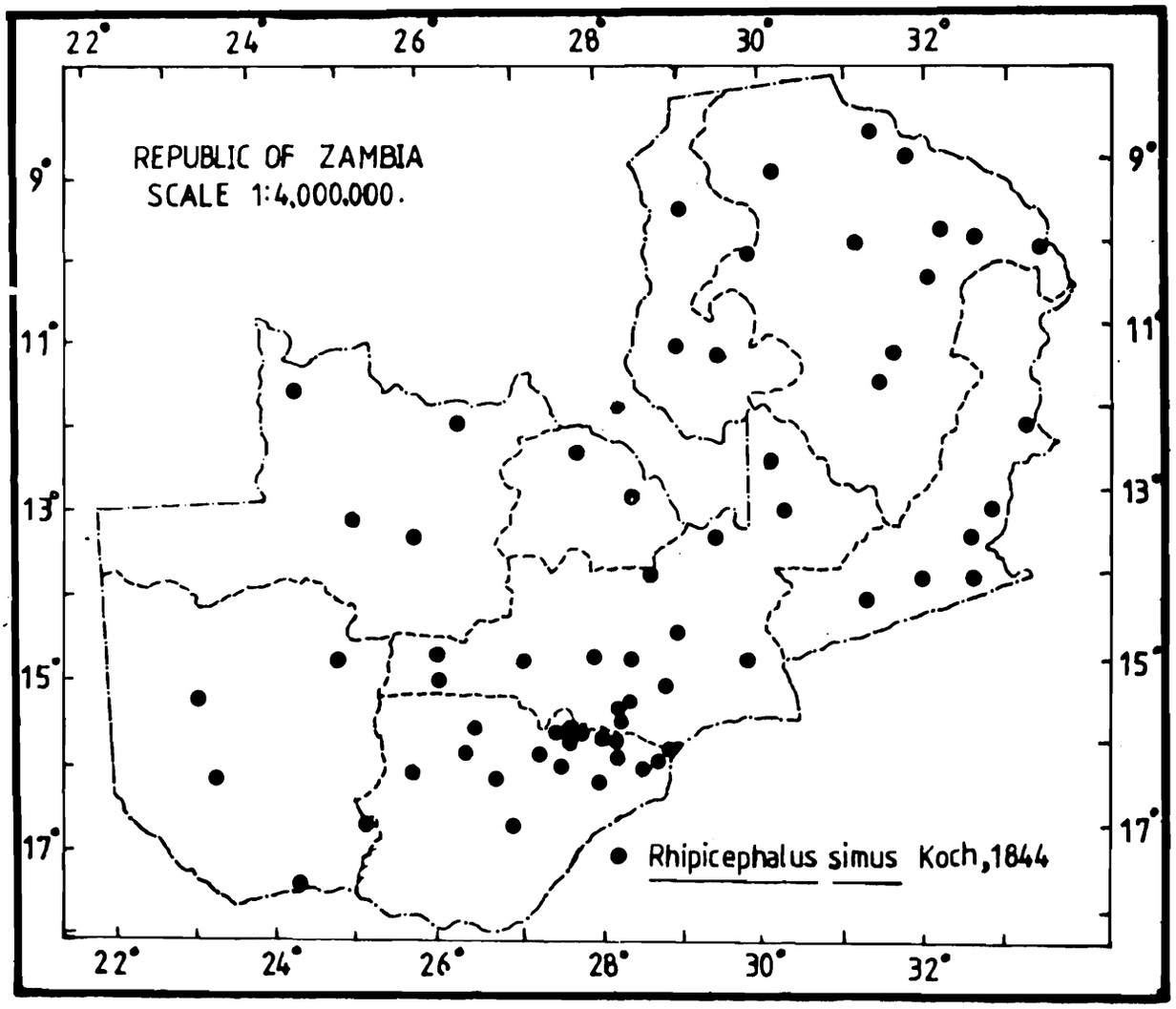
| *Host* | *No. of collections recorded* | *No. of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 319 |
| Dogs | 100 | 20 |
| Goats | 122 | 10 |
| Sheep | 91 | 9 |
| (b) *Wild Animals* | | |
| Buffalo | 72 | 4 |
| Bushbuck | 29 | 1 |
| Bush pig | 16 | 10 |
| Eland | 22 | 1 |
| Hartebeest | 16 | 3 |
| Sable Antelope | 13 | 2 |
| Kudu | 33 | 1 |
| Mongoose | 3 | 1 |
| Lion | 16 | 3 |
| Rhino | 5 | 1 |
| Jackal | 6 | 2 |
| Porcupine | 1 | 1 |
| Warthog | 39 | 1 |
| Zebra | 47 | 6 |

*DISTRIBUTION* (Map 39) :

*R. simus simus* is almost ubiquitous in Zambia and has been recorded from most parts of the country. There is every possibility of its occurrence in areas where it has not yet been recorded. A survey of such areas will reveal its presence almost everywhere.

In *Central Province* it has been collected at Chisamba, Keembe and Kapiri Mposhi in Kabwe rural; Mkushi district; around Serenje District centre and Mumbwa district centre; at Chunga and Lower Nkalabay in the northern part of Kafue National Park. In the *Copperbelt Province* it is not common and has been collected only once at Luanshya. Theiler and Robinson (1954) reported this tick from Chingola. In *Eastern Province*, *R. simus* has been found in Chipata district at Chiparamba, Changa, Chembe, Chimtiko, Chirunda, Devine, Jungujanu, Kaluni, Kamanina, Kapatamoyo, Kasambala, Khawango, Maduma, Mfowe, Mphangweni, Mbawa, Msekera, Nyane,

Rosemary and Tembo's farms; in Chandiza district at Banda's village, Chikoloka, Dwambale, Kalolo, Kambalami, Kazimuli, Khulika, Khumadzi and Phiri's village. It is also well distributed further south in Katete district at Kasonde, Kafumbwe, Makwenda, Michimbo; in Petauke district at Chandema, Chatemwa, Chimpundu, Kapilipili, Mumbi, Mtandazi and Sinda. In the North it has been collected around Lundazi district centre.




Map 39. The distribution of *Rhipicephalus simus* in Zambia

In *Luapula Province* it has been found in Kawambwa district at Bubeshi, Kafite, Kapako, Mushambashi and Sololo stream; in Mansa district at Mansa itself; and in Samfya district at Samfya itself. In *Lusaka Province* it has been reported in Lusaka Rural at Chilanga, Chiota, Lilayi, Lupiya, Njovu, Palabana, Rufunsa and Chimbwete. This tick is fairly common on grasses around Chilanga.

In *Northern Province, R. simus* has been found at Chanda farm, Shiwa Ng'andu and Mbesuma in Chinsali district; in Mpika district at Mpika itself; in Isoka district at Thendele; in Mbala district at Mbala itself and Nsokolo; in Kasama district at Kasama; in Mporokoso district at Mporokoso itself; and in Luwingu district at Chisama and Chileshe. In *North-Western Province* it occurs at Chizera and Kasempa in Kasempa district; in Mwinilunga distrtict at Mwinilunga; in Solwezi district at Kawama, Matukutuku and at Solwezi itself.

In *Southern Province* it has been collected in Mazabuka district at Mazabuka itself and at several other points; in Gwembe district, at Chirundu, Kariba hill, Lusitu (several places); in Monze district at Monze itself, Kayuni, Muyobe, Mapanza and Lochinvar National Park; in Namwala district at Namwala and around Ngoma lodge in the southern part of Kafue National Park; and in Choma district around Choma. In *Western Province* it has been collected in Sesheke district at Sesheke itself, Mulobezi and Machile; in Senanga district at Senanga itself; in Mongu district around Mongu and at Koama in Kaoma district.

*PHYSIOGRAPHY, VEGETATION* Etc.

Physiography : *R. simus* is distributed throughout the whole range of Zambia's physiography, from faulted valley of Zambezi and of Luangwa river, a tributary of Zambezi - Zaire Divide; Luangwa - Lake malawi Divide, Bangweulu depression, Mbala highlands and Barotse plains. These areas range in altitude from 310m to 1820m.

Vegetation : *R. simus* has been recorded in a wide range of vegetation types: Woodlands and their sub-types, savannahs (mainly in *Combretum* and *Afrormosia* zones and marginally in *pterocarpus* savannah and amongst Burkea trees in Barotse plains), grasslands and slopes of highlands and escarpments.

Rainfall : *R. simus* has probably a wide rainfall tolerance as it has been found in areas receiving 800mm to 1300mm rainfall per annum.

Soil : The species occurs in all the main types of soil and their subtypes.

*DISEASE RELATIONSHIP* : *R. simus* has been proved to transmit East Coast Fever of cattle caused by *Theileria parva* (Lounsbury, 1906); gall sickness (*Anaplasma marginale* (Theiler, 1911); Boutonneuse Fever, *Rickettsia conori* (Heisch, Mephee and Rickmann, 1957) to man; and to cause tick paralysis.

*HOST* : This species is known to infest a wide range of mammals both domestic and wild animals. Zumpt (1958) recorded a single female from a bird which he considers as incidental. According to Hoogstraal (1956a), the buffalo and pigs are also favourite hosts, whereas antelopes are usually second choice hosts. Humans are frequently attacked by this tick and is known to cause paralysis in man (Zumpt and Glajchen, 1950).

*REMARKS* : This tick is widely distributed throughout the Ethiopian region.

### 59. ***Rhipicephalus sulcatus*** Neumann, 1908

*DESCRIPTIONS* :

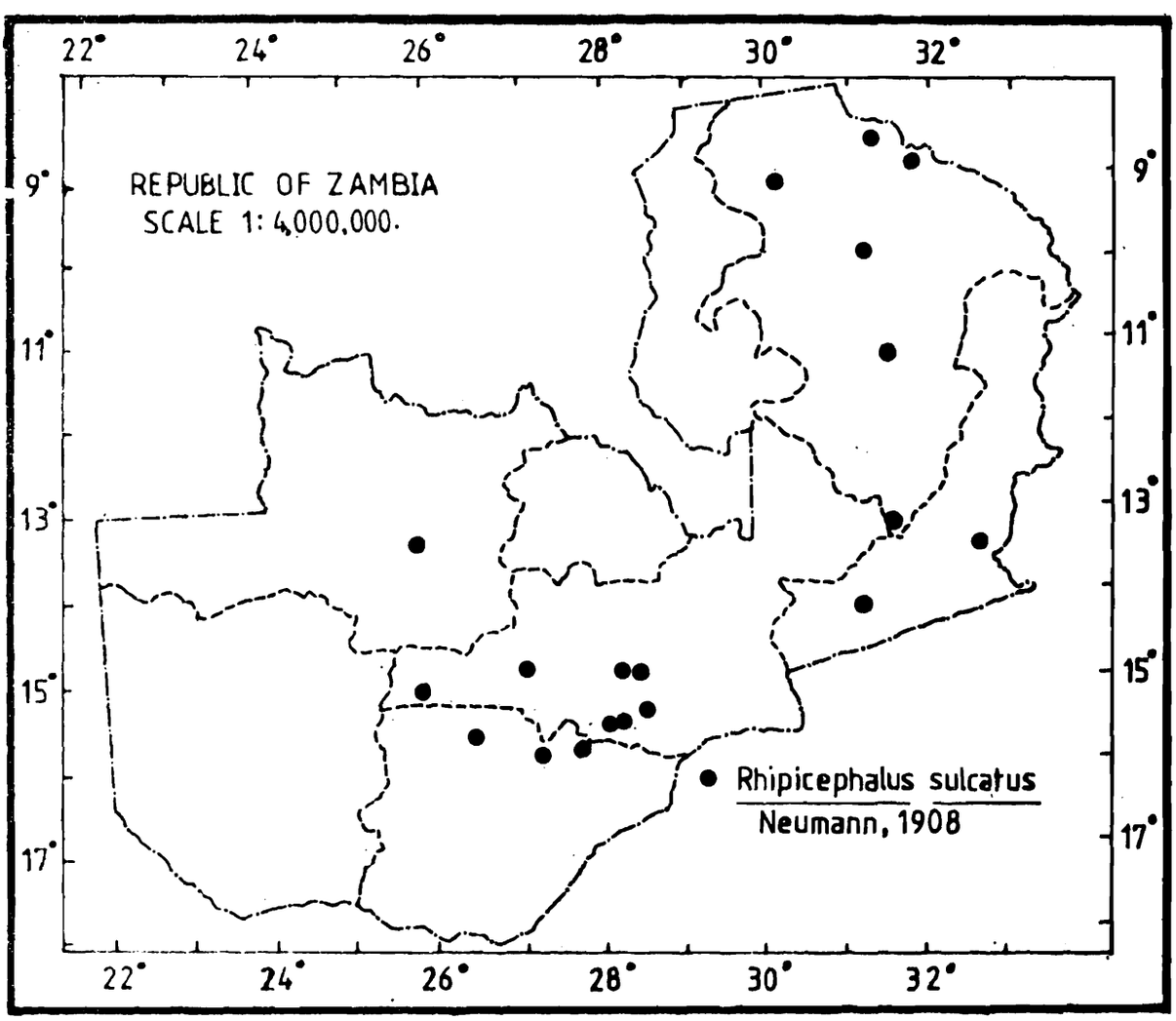
| | |
|---|---|
| Hoogstraal (1956a). | African Ixodoidea. 1. Ticks of the Sudan: 760-766; Figs. Male and Female. |
| Morel and Vassiliades (1962). | *Revue Elev. Med. vet. Pays. trop.* 15: 361-363, 380-38, Figs. Male, Female, N. and L. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 12 |

| | | |
|---|---|---|
| Cat | 2 | 1 |
| Dogs | 100 | 3 |
| Goats | 122 | 1 |
| (b) *Wild Animals* | | |
| Hare | 10 | 1 |
| Impala | 24 | 2 |
| Jackal | 6 | 1 |

*DISTRIBUTION* (Map 40) :




Map 40. The distribution of *Rhipicephalus sulcatus* in Zambia

*R. sulcatus* has been collected in a few localities in Zambia.

In *Central Province* we have found this tick from three localities: Chipembi and Chisamba in Kabwe Rural and at Mumbwa in Mumbwa district. The record in *Eastern*

***Province*** comes from Msekera and Ndinda in Chipta district; in Petauke district at Petauke itself. In *Lusaka Province* it has been collected at Chalimbana, Chilanga, Lilayi and Shikabeta in Lusaka Rural.

In *Northern Province* it has been obtained in Kasama district at Kasama; in Chinsali district at Shiwa Ng'andu; in Mbala district at Nsokolo and in Mporokoso District at Mporokoso itself. The only record in *North-Western Province* comes from Kasempa district at Kasempa itself. In parts of *Southern Province R. sulcatus* has also been recorded occasionally. In Mazabuka district it has been collected around Mazabuka; in Namwala district at Namwala itself and in Monze district at Lochinvar National Park.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : *R. sulcatus* occurs in the main plateau region with extensions into northern highlands. There are also records of its occurrence in Kafue flats, Broken hill country and lesser plateau system. These areas range in altitude from 900m to over 1500m.

Vegetation : Our records mostly come from miombo woodland/grass complex and from dry savannahs dominated by trees of *Combretum* and *Afrormosia*. There are, however, few records from the areas characterised by swamp and papyrus sudd.

Rainfall : These areas have a rainfall of 800mm to 1200mm per annum.

Soil : These stations are characterised by red-clays, red-brown loams, leached sandveldt, kafue clays, kafue basin alluvium and amongst rock and rubble in valley soils.

*DISEASE RELATIONSHIP* : These have not been studied.

*HOST* : The adults are found on domestic cattle, dog, cat, pig and wild animals. There are records of its occurrence on birds also. The reported host range includes domestic and wild ungulates and carnivores within the distribution range of the species. Theiler (1962) has given detailed host-list of this species.

*REMARKS* : *R. sulcatus* range from South Africa in the south to Sudan in the north, and in the west from Senegal to Tanzania, and Ethiopia in the east (Elbl and Anastos, 1966c).

60. ***Rhipicephalus supertritus*** Neumann, 1906

*DESCRIPTIONS* :

| | |
|---|---|
| Theiler (1947). | *Onderstepoort J. vet. Sci. Anim. Ind.* 21: 286-289; Figs. Male and Female. |
| Elbl and Anastos (1966c). | Ixodid ticks of Central Africa. III. Genus *Rhipicephalus* : 164-170; Figs. Male and Female. |

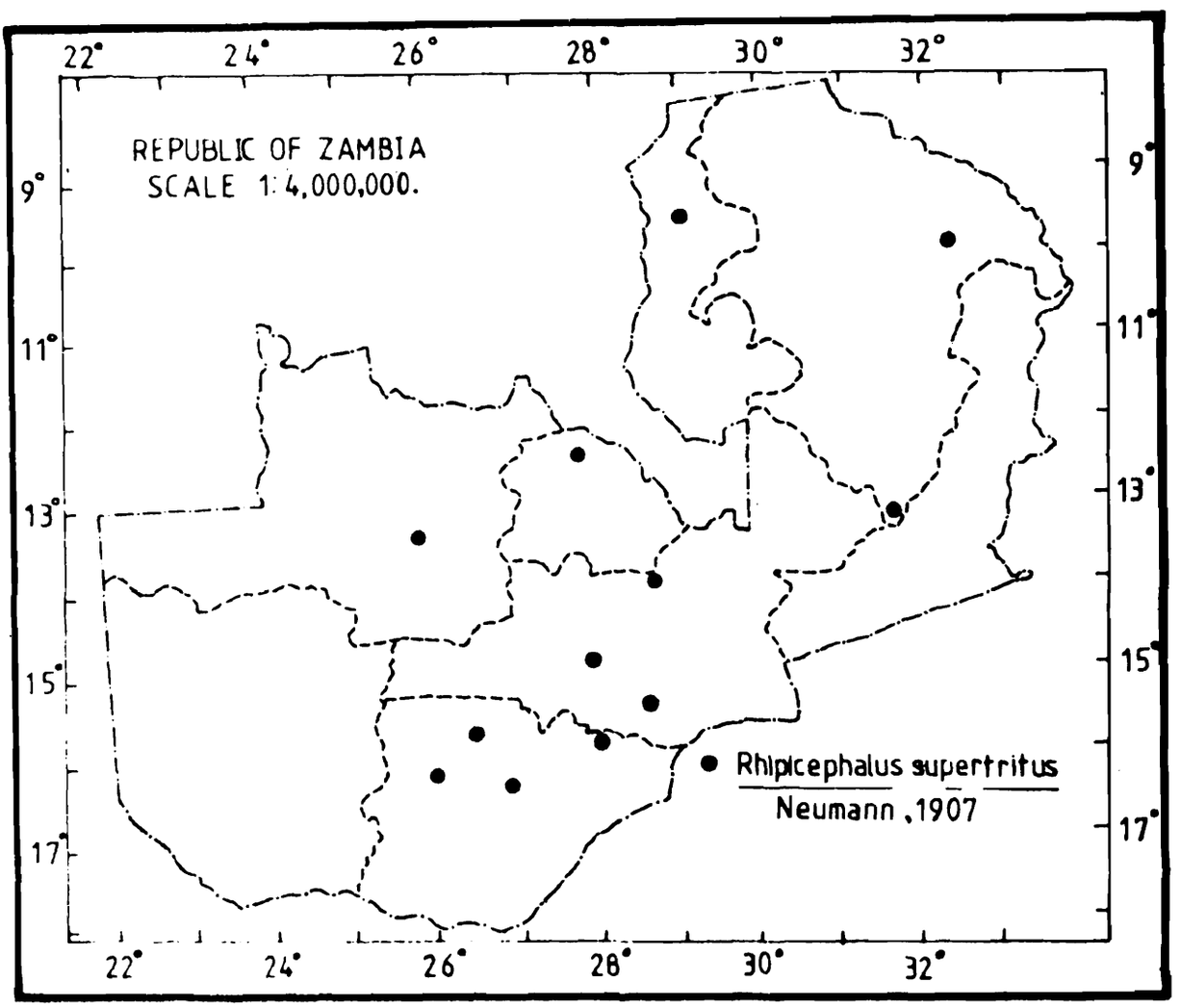
*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 15 |

(b) *Wild Animals*

Eland 22 2

*DISTRIBUTION* (Map 41):




Map 41. The distribution of *Rhipicephalus supertritus* in Zambia

*R. supertritus* was found at several places in Zambia. In *Central Province* it has been collected at Keembe and Kapiri Mposhi in Kabwe Rural. In *Copperbelt Province* this tick was found in Chingola district at Chingola itself. In *Luapula Province* it occurred around Kawambwa district centre. In *Lusaka Province* it was found at Lupiya, Chiota; and Rufunsa in Lusaka Rural.

In *Northern Province*, there is an isolated record of this tick in Chinsali district at Mbesuma. In *North-Western Province* it occurred at Kasempa in Kasempa district. In *Southern Province* it was collected at Nanduba in Mazabuka district; at Namwala in Namwala district and at Mapanza in Choma district.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : From the little data available this tick seems to be mainly confined to 900m to 1200m altitude on Central, Southern and Northern plateau region. However, one collection was made in Luangwa valley at about 600m.

Vegetation : *R. supertritus* is mainly found in woodlands grass complex and dry savannahs. Occasional records are however, found in neighbouring zones of grasslands.

Rainfall : It is found predominantly in 800mm to 900mm rainfall zone; occasionally occurring in the higher rainfall zone of upto 1200mm.

Soil : The stations are characterised by red-brown loams, sandveldt, leached sandveldt, kafue clays, flood plain soils, valley soils and rock and rubble.

*DISEASE RELATIONSHIP* : These have not been studied.

*HOST* : *R. supertritus* chiefly parasitises large wild mammals including carnivores, perisodactyls and artiodactyls. In Zambia this tick was mainly collected off domestic cattle. An excellent summary of its hosts has been given by Hoogstraal (1956a) and Theiler (1962).

*REMARKS* : *R. supertritus* is relatively an uncommon tick that has a patchy distribution in Africa. It ranges from Zimbabwe in the south to Sudan in the north and from Cameroons in the West to Kenya and Tanzania in the east.

61. ***Rhipicephalus tricuspis*** Dönitz, 1906

*DESCRIPTIONS* :

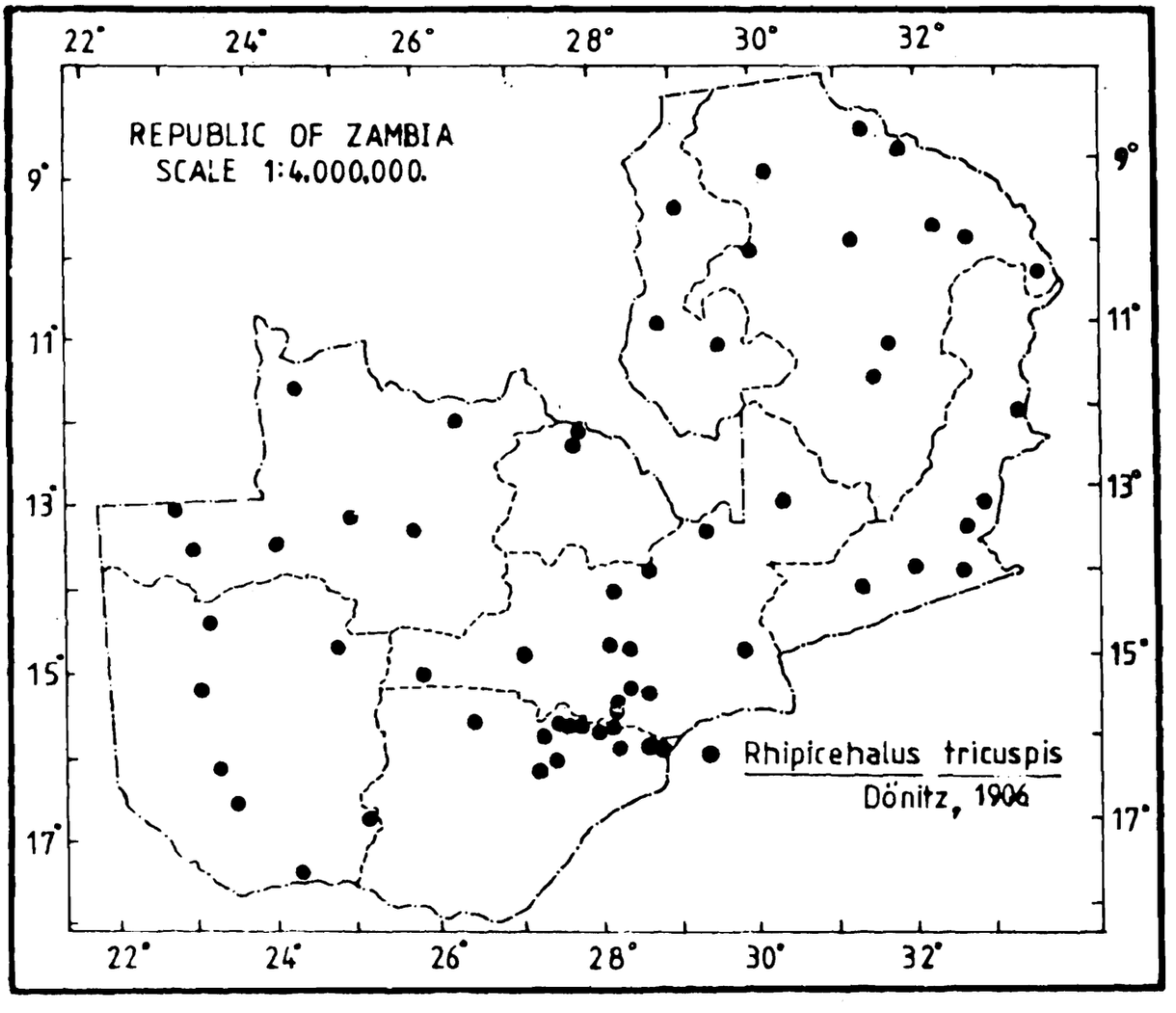
| | |
|---|---|
| Theiler (1947). | *Onderstepoort J. vet. Sci. Ani. Ind.* 21: 292-297; Figs. Male and Female, N and L. |
| Elbl and Anastos (1966c). | Ixodid ticks of Central Africa. III. Genus *Rhipicephalus* Koch, 1844: 171-178. |

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 267 |
| Dogs | 100 | 12 |
| Goats | 122 | 15 |
| Pigs | 2 | 2 |
| Sheep | 91 | 15 |
| (b) *Wild Animals* | | |
| Buffalo | 72 | 1 |
| Bushpig | 16 | 9 |

| | | |
|---|---|---|
| Bushbuck | 29 | 2 |
| Eland | 22 | 5 |
| Hartebeest | 16 | 2 |
| Jackal | 6 | 1 |
| Kudu | 33 | 2 |
| Lion | 16 | 2 |
| Sable Antelope | 13 | 2 |
| Warthog | 39 | 4 |
| Hare | 10 | 1 |
| Wild Dog | 4 | 1 |
| Zebra | 47 | 1 |

*DISTRIBUTION* (Map 42) :




Map 42. The distribution of *Rhipicephalus tricuspis* in Zambia

*R. tricuspis* is almost ubiquitous in Zambia. In *Central Province* it has been recorded at Chisamba, Chipepo, Keembe and Kapiri Mposhi in Kabwe Rural; in Mkushi district at Mkushi itself; around Serenje in Serenje district and at Mumbwa in Mumbwa district. In Kafue National Park around Chunga Safari camp. In *Copperbelt Province* it has been collected in the northern end of the Province bordering Zaire at Chililabombwe and Chingola. In *Eastern Province, R. tricuspis* was collected in Chipata district at Chaanje Changa, Chikumba, Chiparamba, Chimbe, Chimtiko, Chimwala, Chipata, Davine, Jungunjanu, Kaluni, Kamanina, Kamwesa, Kapatamoyo, Kapende, Kasampala, Kokwe, Mbawa, Mgampula, Mishoko, Mpagweni, Mphanga, Msekera, Msolo, Mtengueni, Nyozi, Prison and Rosemarry Farm. It is also widely distributed in the south-east in Chadiza district at Banda, Chikoloko, Dwambale, Jeere, Kalolo, Kambalami, Kamseche, Kazimule, Khulika and Khumadzi. It has also been recorded further south in and around Katete and Petauke districts; in the north it has been found around Lundazi district.

In *Luapula Province* there are records of its occurrence in Kawambwa district at Kawambwa, Musambashi, in Mansa district at Mansa itself and at Samfya in Samfya district. In *Lusaka Province*, it has been frequently collected around Chalimbana, Rufunsa in east and Lilayi and Chilanga towards south in Lusaka rural and is very common on grasses. In *Northern Province* this tick is widely distributed throughout the province. In Mpika district, in Chinsali district at Chanda farm, Shiwa Ng'andu and Mbesuma; in Isoka district at Thendele, Minchifungwe, Sichilongo; in Mbala district at Kawimbe, Landula and Nsokolo; at Kasama and Lukupa in Kasama district; in Mporokoso district at Mporokoso and Ntungumuka; in Luwingu district at Luwingu, Chileshe and Chishimba. In *North-Western Province* it is recorded at Chizera, Kasempa, Chungu, Tominke in Kasempa district; in Kabompo district at Kaoma and Kabompo; in Zambezi district at Chavuma, Chiputa, Lulupa and Samunyau; in Mwinilunga district at Mwinilunga; Chanachanyinda and Kabila; in Solwezi district centre, Ajell farm and Mwala farm.

In *Southern Province R. tricuspis* has been found in Mazabuka District at Mazabuka, Changa, Chaya, Kabanje, Mwangula, Nanduba and Shamboko. In Gwembe Valley District at Demetra (Lusitu) and Kariba Hill; in Monze District at Monze Ching'ang'auka and Lochinvar National Park; in Namwala District at Namwala, Janda, Nakabula and Sikabia.

In *Western Province* it has been recorded in Sesheke District at Machile, Mulobezi (Inambos and Malako) Mwandi and Sesheke; in Senanga District at Senanga, Kanja, Mwanambao and Sioma; in Mongu District at Mongu itself; in Lukulu District at Kaoma, Chingelezu, Lushubani and Shanguvula.

*PHYSIOGRAPHY VEGETATION* Etc.

Physiography : *R. tricuspis* has been found throughout the main Physiographical zones of the country from faulted valleys of Zambezi to Mbala highlands and Nyika plateau ranging in altitude from 600m to 1820m.

Vegetation *R. tricuspis* predominantly occurs in miombo woodland, dominated by *Brachystegia* and *Julbernardia*/grass complex with isolated records from mopane and *Boehmii* subtypes. It is also common in dry savannahs dominated by trees of *Combretum* and *Afrormosia* amongst grasses. There are fewer records from grasslands, evergreen forests, pterocarpus savannahs and amongst *Burkea* and *Africana* trees.

Rainfall : This species has a wide rainfall tolerance and has been found in areas receiving 600mm to 1400mm rainfall per annum.

Soil : It is found in almost all the main types of soils and their subtypes.

*DISEASE RELATIONSHIP* : *R. tricuspis* has been proved to transmit *Coxiella burneti* (Q fever) and harbours *Babesia trautmanni* (Babesiosis); is also known to cause paralysis in sheep and lambs during summer months in the Gatooma area of Zimbabwe (Theiler, 1962).

*HOST* : *R. tricuspis* infests a wide variety of domestic and larger wild animals. Detailed information on the hosts have been given by Hoogstraal (1956a), Theiler (1962). It has also been frequently found on vegetation. In Tanzania, Yeoman and Walker (1967) have found this tick mainly on cattle and to a lesser extent on dogs in rather localised areas.

*REMARKS* : *R. tricuspis* is distributed throughout Africa south of the Sahara. It ranges from South Africa in the south to the Sudan in the north and from Guinea Bissau in the west to the Somali Republic in the east.

### 62. ***Rhipicephalus turanicus*** Pomerantsev Matikashvily, 1940

*DESCRIPTION* :

Morel and Vassiliades (1962). *Revue Elev. Med. vet. Pays trop.*; 15: 365-367, 383-385; Figs. Male and Female, N and L.

*SUMMARY OF COLLECTION DATA* :

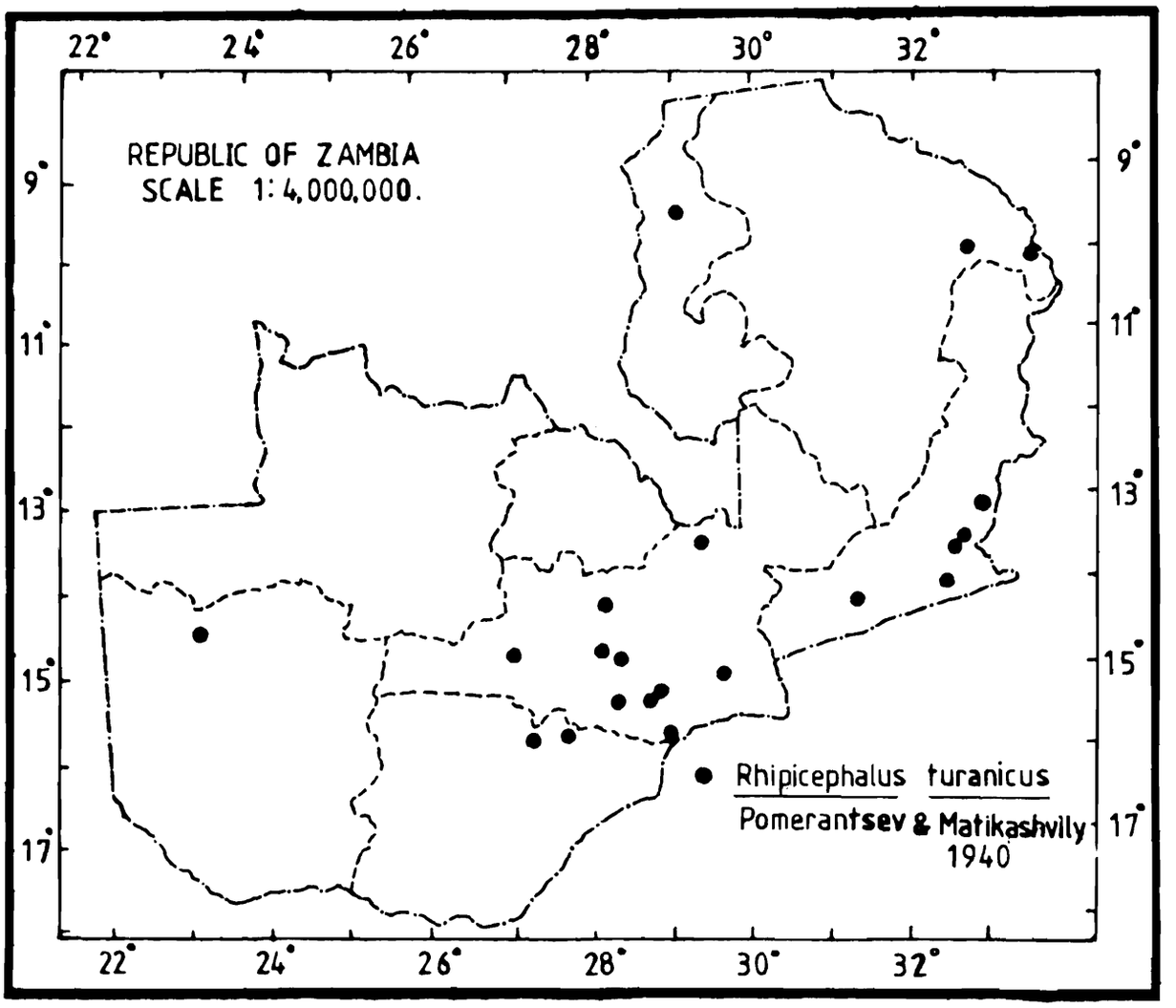
| *Host* | *No. of collections recorded* | *No.of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 28 |
| Dogs | 100 | 1 |
| Sheep | 91 | 2 |
| (b) *Wild Animals* | | |
| Hare | 10 | 3 |

*DISTRIBUTION* (Map 43) :

*R. turanicus* is widely scattered in the country and is usually found in very low numbers.

In *Central Province* it occurs at Chisamba, Keembe, and Chipepo in Kabwe Rural; in Mkushi District at Mkushi itself and at Mumbwa in Mumbwa District. Records from *Eastern Province* are from Chaanje, Hara Farm and Msekera in Chipata District; in Chadiza District at Kazimule and Khumadzi; further south in Petauke District at Petauke itself and at Mfuwe in south Luangwa National Park. In *Northern Province* it has been

collected at Isoka (Siame) and Thendele (Sichilongo) in Isoka District. In *Luapula Province*, there is only one record of its occurrence in Kawambwa District at Kawambwa. In *Lusaka Province* it has been collected at areas around Chalimbana and Rufunsa towards the east, and Chilanga and Lilayi towards the south in Lusaka urban. In *Southern Province* it has been found at Chirundu and Lusitu in Gwembe Valley District; in Monze District at Chingang'auka and Lochinvar National Park; in Mazabuka District at Changa and areas adjoining the Central Veterinary Research Station. In *Western Province* it has been reported so far from Lukulu District at Lukulu itself.




Map 43. The distribution of *Rhipicephalus turanicus* in Zambia

Vegetation : The localized pockets of this species discovered so far lie in the woodlands and their subtypes, grasslands and dry savannahs.

Rainfall : These areas are predominantly in the 800mm to 1000mm rainfall zone with minor extensions upto 1300mm zone.

Soil : The stations are characterised by red-clays, red-brown loam, sandveldt, leached sandveldt, kafue clays, kafue basin alluvium, valley soils and rock and rubble.

*DISEASE RELATIONSHIP* : Unstudied in Africa.

*HOST* : The adults are known to infest herbivores and carnivores; immatures engorge on Myomorph rodents.

*REMARKS* : The species is distributed around the Mediterranean basin and in China.

### 63. *Rhipicephalus zambeziensis* Walker, Norval and Corwin, 1981

*DESCRIPTION*

Walker, Norval and Corwin, 1981. *Onderstepoort J. vet. Res.* 48: 87-104; Figs. Male, Female, N. and L.

*SUMMARY OF COLLECTION DATA* :

| *Host* | *No. of collections recorded* | *No. of collections containing this species* |
|---|---|---|
| (a) *Domestic Animals* | | |
| Cattle | 1,645 | 13 |
| (b) *Wild Animals* | | |
| Buffalo | 72 | 2 |
| Lion | 20 | 1 |

*DISTRIBUTION* (Map 44) :

Examination of collection reveals the presence of this species in some parts of Luangwa valley, on the escarpement slopes of lower and middle Zambezi valley especially Gwembe; on flood plains in the southern parts of *Western Province* and in Kafue National Park.

*PHYSIOGRAPHY, VEGETATION* Etc.

Physiography : In parts of Luangwa National Park the localities fall within the faulted valley of Luangwa river while in *Southrn Province* in the Gwembe trough of the lower Zambezi. In *Western Province*, this tick is confined to the southern part of flood plains along the Zambezi river and, in Kafue National Park areas ranging in altitude from 600m to 900m. The foci of infestation of this tick appears to be in the lower Zambezi valley.

Vegetation : The species occurs in mopane woodland/grass complex and its margin with miombo woodland.

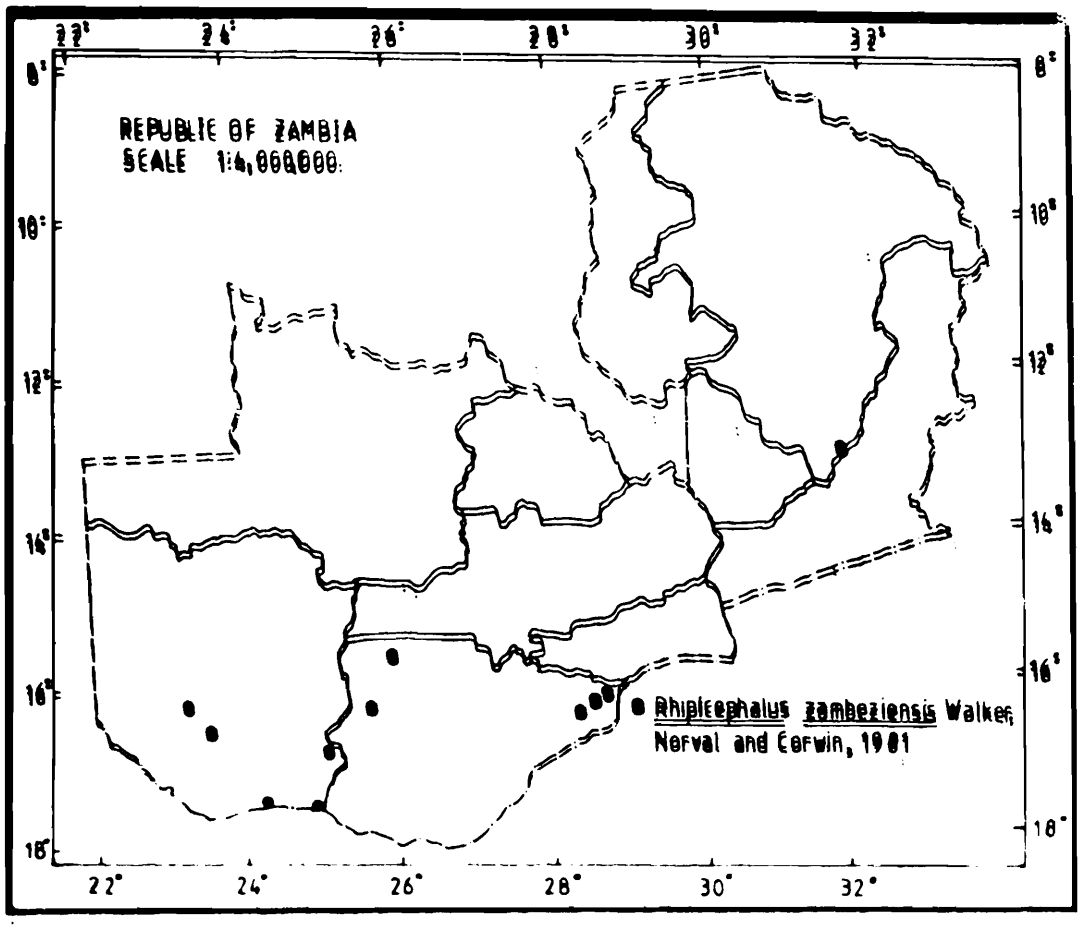
Rainfall : The 800mm to 900mm rainfall zone.

Soil : These areas are characterised by valley soils, rock and rubble of Luangwa and lower Zambezi valleys, sandveldt and barotse sand.

*DISEASE RELATIONSHIP* : These have not been studied.

*HOST* : *R. zambeziensis* was described by Walker et al in 1981 from laboratory bred series from a strain originally collected from cattle in Zimbabwe. Yeoman and

Walker (1967) have found this species parasitising cattle, buffalo, greater kudu and warthog in Tanzania. In Zambia, it has been collected off domestic cattle and buffalo.




Map 44. The distribution of *Rhipicephalus zambeziensis* in Zambia

*REMARKS* : The range of *R. zambeziensis* in Africa extends from South Africa to Namibia, Botswana, Zimbabwe and Zambia.

# GEOGRAPHICAL DISTRIBUTION OF IXODID TICKS IN ZAMBIA

## CENTRAL PROVINCE

### KABWE DISTRICT

*Amblyomma variegatum; Boophilus decoloratus; Ixodes cavipalpus; Haemaphysalis (Rhipistoma) leachii; Hyalomma rufipes; Hyalomma truncatum; Rhipicephalus appendiculatus; Rhipicephalus compositus; Rhipicephalus evertsi, Rhipicephalus longus; Rhipicephalus neavei; Rhipicephalus punctatus, Rhipicephalus sanguineus, Rhipicephalus tricuspis, Rhipicephalus turanicus.*

### MUMBWA DISTRICT

*Amblyomma pomposum, Amblyomma variegatum, Boophilus decoloratus; Hyalomma truncatum; Ixodes cavipalpus, Ixodes nchisiensis, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus maculatus, Rhipicephalus neavei, Rhipicephalus punctatus, Rhipicephalus reichenowi, Rhipicephalus sanguineus, Rhipicephalus sculptus, Rhipicephalus simpsoni, Rhipicephalus simus, Rhipicephalus sulcatus, Rhipicephalus tricuspis, Rhipicephalus turanicus.*

### MKUSHI DISTRICT

*Amblyomma hebraeum, Amblyomma variegatum, Boophilus decoloratus, Haemaphysalis (Rhipistoma) moreli, Hyalomma truncatum, Ixodes cavipalpus, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus neavei, Rhipicephalus punctatus, Rhipicephalus simus, Rhipicephalus tricuspis, Rhipicephalus turanicus.*

### SERENJE DISTRICT

*Amblyomma variegatum, Boophilus decoloratus, Haemaphysalis (Rhipistoma) leachii, Hyalomma truncatum, Ixodes cavipalpus, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus simus, Rhipicephalus tricuspis.*

## COPPERBELT PROVINCE

### CHILILABOMBWE DISTRICT

*Amblyomma variegatum, Rhipicephalus compositus, Rhipicephalus tricuspis.*

### CHINGOLA DISTRICT

*Amblyomma variegatum, Boophilus decoloratus, Haemaphysalis (Rhipistoma) leachii, Hyalomma rufipes, Hyalomma truncatum, Rhipicephalus appendiculatus, Rhipicephalus evertsi evertsi, Rhipicephalus neavei, Rhipicephalus sanguineus, Rhipicephalus supertritus, Rhipicephalus tricuspis.*

LUANSHYA DISTRICT

*Amblyomma variegatum, Boophilus decoloratus, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus evertsi evertsi; Rhipicephalus simus.*

NDOLA DISTRICT

*Amblyomma hebraeum, Amblyomma variegatum, Boophilus decoloratus, Haemaphysalis (Rhipistoma) leachii, Hyalomma truncatum, Ixodes cavipalpus, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus sanguineus.*

## EASTERN PROVINCE

CHADIZA DISTRICT

*Amblyomma variegatum; Boophilus microplus; Haemaphysalis (Rhipistoma) leachii; Hyalomma rufipes; Hyalomma truncatum; Rhipicephalus appendiculatus; Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus neavei, Rhipicephalus punctatus, Rhipicephalus sanguineus, Rhipicephalus simus, Rhipicephalus tricuspis, Rhipicephalus turanicus.*

CHAMA DISTRICT

*Ixodes alluaudi; Ixodes auriculaelongae, Ixodes lewisi.*

CHIPATA DISTRICT

*Amblyomma variegatum, Aponoma exornatum; Boophilus microplus, Haemaphysalis (Rhipistoma) leachii, Haemaphysalis (Rhipistoma) zumpti, Hyalomma rufipes, Hyalomma truncatum, Ixodes cavipalpus, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus muehlensi, Rhipicephalus neavei, Rhipicephalus punctatus, Rhipicephalus sanguineus, Rhipicephalus sculptus, Rhipicephalus simus, Rhipicephalus tricuspis, Rhipicephalus turanicus.*

KATETE DISTRICT

*Amblyomma variegatum, Boophilus microplus, Haemaphysalis (Rhipistoma) leachii, Hyalomma rufipes, Hyalomma truncatum, Ixodes cavipalpus, Rhipicephalus, appendiculatus, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus neavei, Rhipicephalus punctatus, Rhipicephalus sanguineus, Rhipicephalus simus, Rhipicephalus tricuspis.*

LUNDAZI DISTRICT

*Amblyomma eburneum, Amblyomma variegatum, Aponoma exornatum, Boophilus microplus, Hyalomma truncatum, Ixodes cavipalpus, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus punctatus, Rhipicephalus sanguineus, Rhipicephalus simus, Rhipicephalus tricuspis.*

PETAUKE DISTRICT

*Amblyomma variegatum, Boophilus microplus, Hyalomma rufipes, Hyalomma*

*truncatum, Ixodes cavipalpus, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus punctatus, Rhipicephalus sanguineus, Rhipicephalus simus, Rhipicephalus tricuspis, Rhipicephalus turanicus.*

## LUAPULA PROVINCE

### KAWAMBWA DISTRICT

*Amblyomma pomposum, Amblyomma variegatum, Boophilus microplus, Ixodes cavipalpus, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus maculatus, Rhipicephalus masseyi, Rhipicephalus punctatus, Rhipicephalus reichenowi, Rhipicephalus sanguineus, Rhipicephalus simus, Rhipicephalus supertritus, Rhipicephalus tricuspis, Rhipicephalus turanicus.*

### MANSA DISTRICT

*Amblyomma variegatum, Boophilus microplus, Ixodes cavipalpus, Rhipicephalus capensis, Rhipicephalus compositus, Rhipicephalus punctatus, Rhipicephalus sanguineus, Rhipicephalus tricuspis.*

### SAMFYA DISTRICT

*Amblyomma variegatum, Boophilus microplus, Hyalomma truncatum, Rhipicephalus punctatus, Rhipicephalus sanguineus, Rhipicephalus simus, Rhipicephalus tricuspis.*

## LUSAKA PROVINCE

### LUSAKA RURAL

*Amblyomma hebraeum, Amblyomma pomposum, Amblyomma rhinocerotis, Amblyomma tholloni, Amblyomma sparsum, Amblyomma variegatum, Aponoma latum, Aponoma transversale; Boophilus decoloratus, Haemaphysalis (Rhipistoma) leachii, Haemaphysalis (Rhipistoma) moreli, Haemaphysalis spinulosa, Hyalomma rufipes, Hyalomma truncatum, Ixodes auriculaelongae, Ixodes euplecti, Ixodes rhabdomysae, Ixodes thomasae, Ixodes cavipalpus, Rhipicephalus appendiculatus Rhipicephalus capensis, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus longus, Rhipicephalus punctatus, Rhipicephalus reichenowi, Rhipicephalus sanguineus, Rhipicephalus simus, Rhipicephalus sulcatus, Rhipicephalus supertritus, Rhipicephalus tricuspis, Rhipicephalus turanicus.*

### LUANGWA DISTRICT

*Amblyomma rhinocerotis, Amblyomma tholloni, Boophilus decoloratus, Hyalomma truncatum, Rhipicephalus evertsi evertsi, Rhipicephalus longus, Rhipicephalus neavei, Rhipicephalus punctatus.*

## NORTHERN PROVINCE

### CHINSALI DISTRICT

*Amblyomma variegatum, Boophilus decoloratus, Boophilus microplus,*

*Haemaphysalis aciculifer, Haemaphysalis (Rhipistoma) leachii, Hyalomma truncatum, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus longus, Rhipicephalus hurti, Rhipicephalus neavei, Rhipicephalus punctatus, Rhipicephalus reichenowi, Rhipicephalus sanguineus, Rhipicephalus simus, Rhipicephalus sulcatus, Rhipicephalus tricuspis.*

ISOKA DISTRICT

*Amblyomma variegatum, Boophilus microplus, Haemaphysalis hoodi, Haemaphysalis (Rhipistoma) leachii, Haemaphysalis orientalis, Hyalomma truncatum, Ixodes cavipalpus, Ixodes pseudorasus, Rhipicentor bicornis.*

KASAMA DISTRICT

*Amblyomma variegatum, Boophilus decoloratus, Boophilus microplus, Haemaphysalis (Rhipistoma) leachii, Hyalomma truncatum,Ixodes cavipalpus, Rhipicephalus appendiculatus, Rhipicephalus capensis, Rhipicephalus compositus, Rhipicephalus punctatus, Rhipicephalus simus, Rhipicephalus sulcatus, Rhipicephalus tricuspis.*

LUWINGU DISTRICT

*Amblyomma variegatum, Boophilus microplus, Ixodes cavipalpus, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus punctatus, Rhipicephalus simus, Rhipicephalus tricuspis.*

MBALA DISTRICT

*Amblyomma tholloni, Amblyomma variegatum, Boophilus microplus, Hyalomma rufipes, Hyalomma truncatum, Ixodes cavipalpus, Rhipicephalus appendiculatus, Rhipicephalus evertsi evertsi, Rhipicephalus longus, Rhipicephalus hurti, Rhipicephalus punctatus, Rhipicephalus reichenowi, Rhipicephalus sanguineus, Rhipicephalus simus, Rhipicephalus sulcatus, Rhipicephalus tricuspis.*

MPIKA DISTRICT

*Amblyomma rhinocerotis, Amblyomma sparsum, Amblyomma variegatum, Boophilus decoloratus, Boophilus microplus; Dermacentor (Amblyocentor) rhinocerinus, Haemaphysalis spinulosa, Hyalomma rufipes, Hyalomma truncatum, Rhipicephalus evertsi evertsi, Rhipicephalus punctatus, Rhipicephalus zambeziensis.*

MPOROKOSO DISTRICT

*Amblyomma variegatum, Boophilus microplus, Ixodes cavipalpus, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus punctatus, Rhipicephalus simus, Rhipicephalus sulcatus, Rhipicephalus tricuspis.*

NORTH-WESTERN PROVINCE

KABOMPO DISTRICT

*Amblyomma variegatum, Boophilus decoloratus, Hyalomma rufipes, Hyalomma truncatum, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus tricuspis.*

KASEMPA DISTRICT

*Amblyomma variegatum, Boophilus decoloratus, Haemaphysalis (Rhipistoma) leachii, Hyalomma rufipes, Ixodes cavipalpus, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus punctatus, Rhipicephalus sanguineus, Rhipicephalus simus, Rhipicephalus sulcatus, Rhipicephalus tricuspis.*

MWINILUNGA DISTRICT

*Amblyomma variegatum, Boophilus decoloratus, Haemaphysalis (Rhipistoma) leachii, Hyalomma rufipes, Ixodes cavipalpus, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus masseyi, Rhipicephalus neavei, Rhipicephalus punctatus, Rhipicephalus sanguineus, Rhipicephalus simus, Rhipicephalus tricuspis.*

SOLWEZI DISTRICT

*Amblyomma pomposum, Amblyomma variegatum, Boophilus decoloratus, Haemaphysalis aciculifer, Hyalomma rufipes, Ixodes cavipalpus, Rhipicentor bicornis, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus punctatus Rhipicephalus simus, Rhipicephalus tricuspis.*

ZAMBEZI DISTRICT

*Amblyomma variegatum, Boophilus decoloratus, Hyalomma rufipes, Hyalomma truncatum, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus longus, Rhipicephalus tricuspis.*

## SOUTHERN PROVINCE

CHOMA DISTRICT

*Amblyomma nuttali, Amblyomma variegatum, Boophilus decoloratus, Haemaphysalis (Rhipistoma) leachii, Hyalomma truncatum, Rhipicephalus appendiculatus, Rhipicephalus evertsi evertsi, Rhipicephalus simus, Rhipicephalus supertritus.*

GWEMBE DISTRICT

*Amblyomma lepidum, Amblyomma tholloni, Amblyomma variegatum, Aponoma exornatum, Aponoma latum, Boophilus decoloratus, Hyalomma rufipes, Hyalomma truncatum, Rhipicephalus appendiculatus, Rhipicephalus evertsi evertsi, Rhipicephalus neavei, Rhipicephalus punctatus, Rhipicephalus reichenowi, Rhipicephalus sanguineus, Rhipicephalus simus, Rhipicephalus tricuspis, Rhipicephalus turanicus, Rhipicephalus zambeziensis.*

KALOMO DISTRICT

*Amblyomma variegatum*

MAZABUKA DISTRICT

*Amblyomma hebraeum, Amblyomma variegatum, Aponoma latum, Boophilus*

*decoloratus, Haemaphysalis (Rhipistoma) leachii, Hyalomma rufipes, Hyalomma truncatum, Ixodes cavipalpus, Rhipicephalus appendiculatus, Rhipicephalus carnivoralis, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus neavei, Rhipicephalus punctatus, Rhipicephalus sanguineus, Rhipicephalus simus, Rhipicephalus sulcatus, Rhipicephalus supertritus, Rhipicephalus tricuspis, Rhipicephalus turanicus.*

MONZE DISTRICT

*Amblyomma nuttali, Amblyomma variegatum, Aponoma exornatum, Aponoma latum, Boophilus decoloratus, Haemaphysalis (Rhipistoma) leachii, Hyalomma rufipes, Hyalomma truncatum, Ixodes cavipalpus, Rhipicephalus appendiculatus, Rhipicephalus evertsi evertsi, Rhipicephalus sanguineus, Rhipicephalus simus, Rhipicephalus sulcatus, Rhipicephalus tricuspis, Rhipicephalus turanicus.*

NAMWALA DISTRICT

*Amblyomma pomposum, Amblyomma sparsum, Amblyomma variegatum, Boophilus decoloratus, Haemaphysalis (Rhipistoma) leachii, Hyalomma rufipes, Hyalomma truncatum, Ixodes cavipalpus, Rhipicephalus appendiculatus, Rhipicephalus capensis, Rhipicephalus evertsi evertsi, Rhipicephalus longus, Rhipicephalus maculatus, Rhipicephalus sanguineus, Rhipicephalus sculptus, Rhipicephalus simpsoni, Rhipicephalus simus, Rhipicephalus supertritus, Rhipicephalus tricuspis, Rhipicephalus zambeziensis.*

## WESTERN PROVINCE

KAOMA DISTRICT

*Amblyomma variegatum, Boophilus decoloratus, Hyalomma rufipes, Hyalomma truncatum, Ixodes cavipalpus, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus sanguineus, Rhipicephalus simus, Rhipicephalus tricuspis.*

LUKULU DISTRICT

*Amblyomma variegatum, Boophilus decoloratus, Hyalomma rufipes, Hyalomma truncatum, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus sanguineus, Rhipicephalus tricuspis.*

MONGU DISTRICT

*Amblyomma variegatum, Boophilus decoloratus, Hyalomma rufipes, Hyalomma truncatum, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus simus, Rhipicephalus tricuspis.*

SENANGA DISTRICT

*Amblyomma hebraeum, Amblyomma variegatum, Boophilus decoloratus, Hyalomma rufipes, Hyalomma truncatum, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus simus, Rhipicephalus tricuspis, Rhipicephalus zambeziensis.*

SESHEKE DISTRICT

*Amblyomma variegatum, Boophilus decoloratus, Hyalomma rufipes, Hyalomma truncatum, Rhipicephalus appendiculatus, Rhipicephalus compositus, Rhipicephalus evertsi evertsi, Rhipicephalus oculatus, Rhipicephalus punctatus, Rhipicephalus simus, Rhipicephalus tricuspis, Rhipicephalus zambeziensis.*

## HOST-PARASITE LIST

The records listed in this list chiefly constitute those of adults unless otherwise indicated. The abbreviation NN is used for nymphae; N for nymph; LL for larvae, and L. for larva.

The scientific name of each host is on the left hand side of the page and its common name on the right with a figure in bracket indicating the number of individuals known to have been re-examined. The tick species followed by a figure in bracket reflects the number of collections from which each has been found, under the scientific names of the host. These figures are given to show the frequency of infestation.

The names given in the list for mammalian hosts are those given in Ansell (1978). Further information on mammals was obtained from Meester (ED) (1966-1969), Astley Maberly (1960), Swynnerton and Hayman (1950) and Williams (1967). For birds the nomenclature adopted by White (1962, 1963, 1965); and for reptiles those in Loveridge (1957) and Fitzsimons (1967) have been used. The common host-records such as hare, mouse and mongoose etc. could not be determined in some cases. Records of species marked with asterisk are those from material not examined during the course of the present study.

## PART I : DOMESTIC ANIMALS

### CATTLE

***Bos indicus*** Linnaeus, 1758

African short-horned Zebu (Angoni)

African Long-horned Sanga (Barotse)

Short-horned Sanga (Tonga)

*(For details about the breeds and distribution of cattle in Zambia, see pp. 29).*

Number of collections recorded : 1,645

Number of animals examined : 20,296

| *Tick Species* | *No. of collections* |
|---|---|
| *Amblyomma eburneum* | 1 |
| *Amblyomma hebraeum* | 4 |
| *Amblyomma lepidum* | 1 |
| *Amblyomma variegatum* | 542 |
| *Boophilus decoloratus* | 255 |

*Boophilus microplus*.....294
*Haemaphysalis aciculifer*.....2
*Haemaphysalis (Rhipistoma) leachii*.....6
*Hyatomma rufipes*.....124
*Hyalomma truncatum*.....325
*Ixodes cavipalpus*.....77
*Rhipicephalus appendiculatus*.....274
*Rhipicephalus capensis*.....3
*Rhipicephalus compositus*.....248
*Rhipicephalus evertsi evertsi*.....447
*Rhipicephalus longus*.....6
*Rhipicephalus hurti*.....2
*Rhipicephalus masseyi*.....1
*Rhipicephalus muehlensi*.....1
*Rhipicephalus neavei*.....60
*Rhipicephalus punctatus*.....247
*Rhipicephalus reichenowi*.....4
*Rhipicephalus sanguineus*.....115
*Rhipicephalus sculptus*.....1
*Rhipicephalus simus*.....319
*Rhipicephalus sulcatus*.....12
*Rhipicephalus supertritus*.....15
*Rhipicephalus tricuspis*.....267
*Rhipicephalus turanicus*.....28
*Rhipicephalus zambeziensis*.....13

## GOAT

### ***Capra hircus*** Linnaeus, 1758

*Common Goat*

Number of collections recorded : 122
Number of animals examined : 1,435

| *Tick Species* | *No. of collections* |
|---|---|
| *Amblyomma variegatum* | 9 |
| *Boophilus decoloratus* | 9 |
| *Boophilus microplus* | 2 |

*Hyalomma rufipes* .....1
*Hyalomma truncatum*.....2
*Ixodes cavipalpus*.....2
*Rhipicephalus appendiculatus*.....2
*Rhipicephalus evertsi evertsi*.....2
*Rhipicephalus neavei*.....3
*Rhipicephalus simus*.....10
*Rhipicephalus sulcatus* .....1
*Rhipicephalus tricuspis*.....12

DOG

*Canis familiaris* Linnaeus, 1758

Domestic Dog

Number of collections recorded : 100
Number of animals examined : 659

| *Tick Species* | *No. of collections* |
|---|---|
| *Amblyomma variegatum* | 4 |
| *Boophilus microplus* | 1 |
| *Haemaphysalis (Rhipistoma) leachii* | 19 |
| *Haemaphysalis (Rhipistoma) moreli* | 14 |
| *Haemaphysalis spinulosa* | 1 |
| *Ixodes cavipalpus* | 4 |
| *Rhipicentor bicornis* | 1 |
| *Rhipicentor carnivoralis* | 1 |
| *Rhipicephalus compositus* | 2 |
| *Rhipicephalus punctatus* | 1 |
| *Rhipicephalus sanguineus* | 60 |
| *Rhipicephalus simus* | 20 |
| *Rhipicephalus sulcatus* | 3 |
| *Rhipicephalus tricuspis* | 12 |
| *Rhipicephalus turanicus* | 1 |

SHEEP

***Ovis aries*** Linnaeus, 1758

*Domestic Sheep*

Number of collections recorded : 91
Number of animals examined : 989

| *Tick Species* | *No. of collections* |
|---|---|
| *Amblyomma variegatum* | 4 |
| *Amblyomma hebraeum* | 1 |
| *Boophilus decoloratus* | 7 |
| *Boophilus microplus* | 1 |
| *Haemaphysalis(Rhipistoma) moreli* | 1 |
| *Hyalomma rufipes* | 6 |
| *Hyalomma truncatum* | 6 |
| *Rhipicephalus appendiculatus* | 6 |
| *Rhipicephalus evertsi evertsi* | 12 |
| *Rhipicephalus punctatus* | 1 |
| *Rhipicephalus sanguineus* | 1 |
| *Rhipicephalus simus* | 9 |
| *Rhipicephalus tricuspis* | 15 |
| *Rhipicephalus turanicus* | 2 |

## CAT

### *Felis catus* Linnaeus, 1758

*Domestic Cat*

Number of collections recorded : 2

Number of animals examined : 2

| *Tick Species* | *No. of collections* |
|---|---|
| *Ixodes cavipalpus* | 1 |
| *Rhipicephalus sanguineus* | 1 |

## PIG

### *Sus scrofa* Linnaeus, 1758

*Domestic Pig*

Number of collections recorded : 2

Number of animals examined : 13

| *Tick Species* | *No. of collections* |
|---|---|
| *Haemaphysalis (Rhipistoma) leachii* | 1 |
| *Rhipicephalus tricuspis* | 2 |

HORSE

*Equus (Equus) caballus* Linnaeus, 1758

*Domestic Horse*

Number of collection recorded : 1

Number of animals examined : 1

| *Tick Species* | *No. of collections* |
|---|---|
| *Boophilus decoloratus* | 1 |
| *Rhipicephalus appendiculatus* | 1 |
| *Rhipicephalus evertsi evertsi* | 1 |

## PART II : WILD MAMMALS

Class MAMMALIA

Order MACROSCELIDEA

Family MACROSCELIDIDAE

Genus ***Petrodromus*** Peters, 1846 — Four toed Elepahant Shrew (3)

*Petrodromus tetradactylus* Peters, 1846

*Ixodes nchisiensis* (3)

Order LIPOTYPHLA

Family SORICIDAE

Genus ***Crocidura*** Wagler, 1832

*Crocidura hirta* peters, 1852 — Shrew (33)

*Ixodes auriculaelongae* (2)

*Crocidura occidentalis* Pucheran — Giant Shrew (6)

*Ixodes auriculaelongae* (13)

Order PHOLIDOTA

Family MANIDAE

Genus ***Manis*** Linnaeus, 1758

*Manis temmincki* (Smuts, 1852) — Pangolin (Scaly Anteater) (3)

*Rhipicephalus simus* (5)

Order CARNIVORA

Family CANIDAE

Genus ***Lycaon*** Brookes, 1827

*Lycaon pictus* (Temminck, 1820) — Wild Dog (7)

*Haemaphysalis (Rhipistoma) leachii* (21)
*Rhipicephalus appendiculatus* (1)
*Rhipicephalus sanguineus* (10)
*Rhipecephalus tricuspis* (1)

Genus ***Canis*** Linnaeus, 1758
*Canis adustus* Sundevall, 1846 — Side-stripped Jackal (8)
*Amblyomma variegatum*
*Haemaphysalis (Rhipistoma) leachii* (8)
*Haemaphysalis spinulosa*
*Rhipicephalus sanguineus* (2)
*Rhipicephalus simus* (8)
*Rhipicephalus sulcatus* (7)
*Rhipicephalus tricuspis* (21)

Family VIVERRIDAE
Genus ***Civettictis*** Pocock, 1915
*Civettictis civetta* (Schreber, 1778) — African Civet (2)
*Amblyomma variegatum* (2)
*Haemaphysalis (Rhipistoma) leachii* (1)
*Haemaphysalis spinulosa* *
*Rhipicephalus simus* *

Genus ***Genetta*** Oken, 1816
*Genetta* sp. — Genet (2)
*Haemaphysalis spinulosa* *
*Rhipicephalus appendiculatus* *
*Rhipicephalus carnivoralis* *
*Rhipicephalus sanguineus* *
*Genetta tigrina rubiginosa* — Genet (1)
*Haemaphysalis (Rhipistoma) zumpti* (9) *

Genus ***Herpestes*** Illiger, 1811
*Herpestes* sp. — Mongoose (3)
*Haemaphysalis spinulosa* *
*Herpestes sanguineus* Rüpell, 1836 — Yellow Mongoose (1)
*Haemaphysalis (Rhipistoma) zumpti* (2) *

Genus ***Galerella*** Gray, 1865

*Galerella sanguineus* Rüppel, 1836 — Slender Mongoose (3)

*Haemaphysalis spinulosa* (2)

Genus ***Ichneumia*** I. Geoffroy, 1835

*Ichneumia albicauda* (G. Cuivier, 1839) — White-tailed Mongoose (1)

*Rhipicephalus sanguineus* *

Genus ***Mungos*** E. Geoffroy and G. Cuvier, 1795

*Mungos mungo* (Gmelin, 1788) — Banded Mongoose (1)

*Rhipicephalus simus* (1)

Genus ***Helogale*** Gray, 1862

*Helogale parvula* (Sundevall, 1846) — Dwarf Mongoose (1)

*Haemaphysalis (Rhipistoma)leachii* (1)

Faimly FELIDAE (Cats)

Genus ***Panthera*** Oken, 1816

*Panthera leo* (Linnaeus, 1758) — Lion (28)

*Amblyomma sparsum* (4)

*Amblyomma variegatum* *

*Haemaphysalis (Rhipistoma) leachii* (22)

*Haemaphysalis spinulosa* (22)

*Hyalomma rufipes* *

*Hyalomma truncatum* (3)

*Ixodes cavipalpus* *

*Rhipicentor bicornis* *

*Rhipicephalus appendiculatus* (17)

*Rhipicephalus carnivoralis* *

*Rhipicephalus compositus* (1)

*Rhipicephalus evertsi evertsi* (2)

*Rhipicephalus masseyi* *

*Rhipicephalus reichenowi* (1)

*Rhipicephalus sanguineus* (33)

*Rhipicephalus simus* (161)

*Rhipicephalus sulcatus* *

*Rhipicephalus tricuspis* (11)

*Rhipicephalus turanicus* (2)
*Panthera pardus* (Linnaeus, 1758) Leopard (4)
*Amblyomma variegatum* (1)
*Boophilus decoloratus* (1)
*Haemaphysalis (Rhipistoma) leachii* (7)
*Ixodes cavipalpus* *
*Rhipicentor bicornis* *
*Rhipicephalus evertsi evertsi* (4)
*Rhpicephalus compositus* *
*Rhipicephalus neavei* *
*Rhipicephalus sanguineus* *
*Rhipicephalus simus* *
*Rhipicephalus sulcatus* *
*Rhipicephalus zambeziensis*

Genus ***Felis*** Linnaeus, 1758
*Felis libyca* (Forster, 1780) African Wild Cat (1)
*Haemaphysalis spinulosa* *
*Felis serval* Schreber, 1776 Serval *
*Haemaphysalis (Rhipistoma)* *leachii*
*Rhipicentor bicornis* *

Order TUBULIDENTATA
Family ORYCTEROPODIDAE
Genus ***Orycteropus*** G. Cuvier, 1798
*Orycteropus afer* (Pallas, 1766) Ant Bear*
*Rhipicephalus simus* *

Order PROBOSCIDEA
Family ELEPHANTIDAE
Genus ***Loxodonta*** F. Cuvier, 1827
*Loxodonta africana* (Blumenbach, 1797) African Elepahant (4)
*Amblyomma tholloni* (19)
*Hyalomma truncatum* *

Order HYRACOIDEA
Family PROCAVIDAE

Genus ***Dendrohyrax*** Gray, 1868

*Dendrohyrax brucei* (Gray, 1868) Rock Dassie; Yellow spotted Dassie (1)

*Haemaphysalis orientalis* *

*Ixodes lewisi* (2)

Order PERISSODACTYLA

Family RHINOCEROTIDAE

Genus ***Diceros*** Gray, 1821

*Diceros bicornis* (Linnaeus, 1758) Black Rhinoceros (6)

*Amblyomma rhinocerotis* (6)

*Amblyomma sparsum* (9)

*Amblyomma variegatum* (33)

*Rhipicephalus appendiculatus* (18)

*Rhipicephalus simus* (1)

Family EQUIDAE

Genus ***Equus*** Linnaeus, 1758

*Equus burchelli* (Gray, 1824) Burchell's Zebra (63)

*Amblyomma variegatum* (47)

*Boophilus decoloratus* (36)

*Hyalomma rufipes* (1)

*Hyalomma truncatum* (59)

*Rhipicephalus appendiculatus* (18)

*Rhipicephalus compositus* *

*Rhipicephalus evertsi evertsi* (528)

*Rhipicephalus masseyi* *

*Rhipicephalus neavei* (3)

*Rhipicephalus sanguineus* (29)

*Rhipicephalus sculptus* *

*Rhipicephalus simus* (1)

*Rhipicephalus supertritus* *

*Rhipicephalus tricuspis* (4)

*Rhipicephalus turanicus* (2)

Family SUIDAE

Genus ***Potamochoerus*** Gray, 1843

*Potamochoerus porcus* (Linnaeus, 1758) Bush pig (32)

*Amblyomma pomposum* *

*Hyalomma truncatum* *
*Rhipicephalus appendiculatus* (26)
*Rhipicephalus compositus* (7)
*Rhipicephalus longus* (8)
*Rhipicephalus masseyi* (2)
*Rhipicephalus neavei* *
*Rhipicephalus reichenowi* (6)
*Rhipicephalus sanguineus* *
*Rhipicephalus simus* (158)
*Rhipicephalus tricuspis* (21)
*Rhipicephalus turanicus* (1)

Genus ***Phacochoerus*** F. Cuvier, 1826

*Phacochoerus aethiopicus* (Pallas, 1766) Warthog (45)
*Amblyomma pomposum* (7)
*Amblyomma sparsum* (4)
*Amblyomma variegatum* *
*Hyalomma truncaturm* (25)
*Rhipicephalus appendiculatus* *
*Rhipicephalus compositus* (9)
*Rhipicephalus longus* (29)
*Rhipicephalus masseyi* (16)
*Rhipicephalus neavei* (2)
*Rhipicephalus punctatus* (1)
*Rhipicephalus reichenowi* *
*Rhipicephalus sanguineus* *
*Rhipicephalus simus* (123)
*Rhipicephalus tricuspis* (14)

Family HIPPOPOTOMIDAE

Genus ***Hippopotamus*** Linnaeus, 1758

*Hippopotamus amphibius* Linnaeus, 1758 Hippopotamus (10)
*Amblyomma rhinocerotis* *
*Amblyomma sparsum** 
*Amblyomma variegatum* *
*Hyalomma truncatum* *

Family GIRAFFIDAE

Genus ***Giraffa*** Brisson, 1752

*Giraffa camelopardalis* (Linnaeus, 1758) Giraffe (3)

*Hylomma truncatum* *

Family BOVIDAE

Genus ***Syncerus*** Hodgson, 1847

*Syncerus caffer* (Sparrman, 1779) Buffallo (148)

*Amblyomma lepidum* *

*Amblyomma pomposum* (35)

*Amblyomma sparsum* (40)

*Amblyomma variegatum* (332)

*Hyalomma rufipes* (63)

*Hyalomma truncatum* (157)

*Rhipicephalus appendiculatus* (117)

*Rhipicephalus compositus* (26)

*Rhipicephalus evertsi evertsi* (200)

*Rhipicephalus longus* (14)

*Rhipicephalus maculatus* (9)

*Rhipicephalus neavei* (5)

*Rhipicephalus punctatus* (22)

*Rhipicephalus reichenowi* (2)

*Rhipicephalus sanguines* (1)

*Rhipicephalus sculptus* (228)

*Rhipicephalus senegalensis* (7)

*Rhipicephalus simus* (96)

*Rhipicephalus tricuspis* (31)

*Rhipicephalus zambeziensis* (2)

Gensus ***Tragelaphus*** Blainville 1815

*Tragelaphus scriptus* (Pallas, 1766) Bush-buck (28)

*Amblyomma pomposum* (2)

*Amblyomma variegatum* (8)

*Boophilus decoloratus* (2)

*Haemaphysalis (Rhipistoma) leachii* (1)

*Hyalomma rufipes* (1)

*Hyalomma truncatum* (8)

*Ixodes cavipalpus* *

*Rhipicephalus appendiculatus* *

*Rhipicephalus evertsi evertsi* (3)
*Rhipicephalus masseyi*
*Rhipicephalus neavei* *
*Rhipicephalus puncatatus* (7)
*Rhipicephalus sanguineus* *
*Rhipicephalus simus* (1)
*Rhipicephalus tricuspis* (2)
*Tragelaphus strepsiceros* (Pallas, 1766) **Kudu (20)**
*Amblyomma pomposum* (4)
*Amblyomma sparsum* (2)
*Amblyomma tholloni* (9)
*Amblyomma variegatum* (1)
*Boophilus decoloratus* (4)
*Hyalomma rufipes* *
*Hyalomma truncatum* (4)
*Rhipicephalus appendiculatus* (3)
*Rhipicephalus evertsi evertsi* *
*Rhipicephalus longus* (2)
*Rhipicephalus neavei* (2)
*Rhpicephalus punctatus* (8)
*Rhpicephalus simus* (2)
*Rhipicephalus supertritus* *
*Rhipicephalus tricuspis* (3)
*Tragelaphus oryx* (Pallas, 1766) **Eland (29)**
*Amblyomma pomposum* (4)
*Amblyomma variegatum* (5)
*Boophilus decoloratus* (4)
*Hyalomma truncatum* (30)
*Rhipicephalus appendiculatus* *
*Rhipicephalus masseyi* *
*Rhipicephalus neavei* *
*Rhipicephalus punctatus* (13)
*Rhipicephalus sanguineus*
*Rhipicephalus tricuspis* (2)

Genus ***Cephalophus*** H. Smith, 1827

*Cephalophus monticola* (Thunberg, 1789) — Blue Duiker

*Ixodes lewisi* *

Genus ***Sylvicapra*** Ogilby, 1837 — Common Duiker

*Sylvicapra grimmia* (Linnaeus, 1758)

*Rhipicephalus evertsi evertsi*

*Rhipicephalus punctatus* *

*Rhipicephalus tricuspis* *

Genus ***Redunca*** H. Smith, 1827

*Redunca arundinum* (Boddaert) — Reed Buck

*Amblyomma variegatum* (70)

*Rhipicephalus appendiculatus* (1)

*Rhipicephalus evertsi evertsi*

*Rhipicephalus punctatus* *

*Rhipicephalus tricuspis* *

Genus ***Kobus*** A. Smith. 1840

*Kobus ellipsiprymnus* (Ogilby, 1833) — Waterbuck (16)

*Amblyomma sparsum* *

*Amblyomma variegatum* (6)

*Hyalomma truncatum* (1)

*Haemaphysalis (Rhipistoma) leachii* *

*Haemaphysalis spinulosa* *

*Rhipicephalus evertsi evertsi* (3)

*Rhipicephalus neavei* *

*Rhipicephalus sanguineus* *

*Rhipicephalus sculptus* *

*Rhipicephalus simus* *

*Rhipicephalus sulcatus* *

*Kobus leche* Gray, 1850 — Lechwe (13)

*Amblyomma variegatum* (4)

*Hyalomma truncatum* (2)

*Rhipicephalus appendiculatus* (5)

*Rhipicephalus evertsi evertsi* (1)

*Rhipicephalus sanguineus* (2)

*Kobus vardoni* (Livingstone, 1857) **Puku**
*Amblyomma variegatum* (1)
*Ixodes cavipalpus* *
*Rhipicephalus evertsi evertsi* (3)

Genus ***Hippotragus*** Sundevall, 1846
*Hippotragus equinus* (Desmarest, 1804) Roan Antelope (10)
*Amblyomma pomposum* (13)
*Boophilus decoloratus* *
*Hyalomma truncatum* (8)
*Ixodes cavipalpus* *
*Rhipicephalus compositus* (1)
*Rhipicephalus evertsi evertsi* (2)
*Rhpicephalus longus* (1)
*Rhipicephalus neavei* *
*Rhipicephalus punctatus* (1)
*Rhipicephalus simus* (8)
*Rhipicephalus tricuspis* *
*Hippotragus niger* (Harris, 1838) Sable Antelope (16)
*Amblyomma pomposum* (12)
*Amblyomma sparsum* (1)
*Amblyomma variegatum* *
*Boophilus decoloratus* (1)
*Hyalomma truncatum* (11)
*Rhipicephalus appendiculatus* *
*Rhipicephalus evertsi evertsi* (71)
*Rhipicephalus longus* (35)
*Rhipicephalus neavei* *
*Rhipicephalus punctatus* (16)
*Rhipicephalus sculptus* *
*Rhipicephalus sanguineus* (2)
*Rhipicephalus simus* (47)
*Rhipicephalus tricuspis* (17)

Genus ***Connochaetes*** Lichtenstein, 1812
*Connochaetes taurinus* (Burchell, 1823) Wildebeest
*Amblyomma variegatum* (2)
*Boophilus decoloratus* (14)
*Hyalomma truncatum* (13)

*Rhipicephalus evertsi evertsi* (117)
*Rhipicephalus tricuspis* (3)

Genus ***Alcelaphus*** Blainville, 1816
*Alcelaphus lichtensteini* (Peters, 1849) Hartebeest
*Amblyomma pomposum* *
*Boophilus decoloratus* (8)
*Hyalomma truncatum* (3)
*Rhipicephalus capensis* (2)
*Rhipicephalus compositus* (1)
*Rhipicephalus evertsi evertsi* (1)
*Rhipicephalus punctatus* *
*Rhipicephalus sanguineus* (2)
*Rhipicephalus simus* (8)
*Rhipicephalus sulcatus* *
*Rhipicephalus tricuspis* (2)

Genus ***Damaliscus*** Scalater and Thomas, 1894
*Damaliscus lunatus* (Burchell, 1823) Tsessebe
*Hyalomma truncatum* *

Genus ***Aepyceros*** Sundevall, 1847
*Aepyceros melampus* (Lichtenstein, 1812) Impala
*Amblyomma sparsum* (1)
*Amblyomma variegatum* (1)
*Boophilus decoloratus* (23)
*Ixodes cavipalpus* *
*Rhipicephalus appendiculatus* (45)
*Rhipicephalus evertsi evertsi* (5)
*Rhipicephalus neavei* (3)
*Rhipicephalus punctatus* (1)
*Rhipicephalus sulcatus* (13)

Genus ***Ourebia*** Laurillard, 1841
*Ourebia ourebi* (Zimmermann, 1783) Oribi
*Rhipicephalus appendiculatus* *

Genus ***Raphicerus*** H. Smith, 1827
*Raphicerus sharpei* (Thomas, 1897) Sharpes Grysbok

*Rhipicephalus evertsi evertsi* *
*Rhipicephalus punctatus* *

Order LAGOMORPHA
Family LEPORIDAE
Genus ***Lepus*** Linnaeus, 1758
*Lepus* sp (Species not recorded) — Hare (10)
*Hyalomma truncatum* *
*Boophilus decoloratus*
*Rhipicephalus appendiculatus* (3)
*Rhipicephalus neavei* (4)
*Rhipicephalus punctatus* (3)
*Rhipicephalus sanguineus* (6)
*Rhipicephalus sulcatus* (1)
*Rhipicephalus tricuspis* (1)
*Rhipicephalus turanicus* (3)

Order RODENTIA (Rodents)
Family HYSTRICIDAE (Porcupines)
Genus ***Hystrix*** Linnaeus, 1758
*Hystrix africaeaustralis* (Peters, 1852) — Porcupine (1)
*Rhipicephalus sanguineus* *
*Rhipicephalu simus* (1)

Family THRYONOMYIDAE (Cane Rats)
Genus ***Thryonomys*** Fitzinger, 1867
*Thryonomys swinderianus* (Temminck, 1827) — Cane Rat (1)
*Rhipicephalus simpsoni* (1)

Family PEDETIDAE (Spring-Hare)
Genus ***Pedetes*** Illiger, 1811
*Pedetes capensis* (Forster, 1778) — Spring Hare (1)
*Rhipicephalus tricuspis* *

Family CRICETIDAE
Genus ***Cricetomys*** Waterhouse, 1840
*Cricetomys gambianus* Waterhouse, 1840 — Giant Rat (1)
*Haemaphysalis spinulosa* (2)

Genus ***Saccostomus*** Peters, 1846
*Saccostomus campestris* Peters, 1846 — Pouched Mouse (27)

*Haemaphysalis* (N 6)*
*Haemaphysalis* (L15)*
*Ixodes rhabdomysae* (1)
*Rhipicephalus* (N 1)*

Genus ***Tatera*** Lataste, 1882
*Tatera leucogaster* (Peters, 1852) Gerbil (6)
*Haemphasalis* (N 6)*
*Tatera valida* (Bocage, 1890) Gerbil (5)
*Haemphysalis* (N 1)*

Family MURIDAE (Rats and Mice)
Genus ***Praomys*** Thomas, 1915
*Praomys natalensis* (A. Smith 1834) Multimammate Rat (296)
*Haemaphysalis leachii* (11)
*Haemaphysalis spinulosa* (2)
*Ixodes rhabdomysae* (12)
*Rhipicephalus* (L&N)*

Genus ***Aethomys*** Thomas, 1915
*Aethomys namaquensis* (A. Smith 1834) (2)
*Haemaphysalis* (N)*
*Rhipicephalus* (N)*
*Aethomys chrysophilus* (de-Winton, 1897) (23)
*Haemaphysalis* ( N & L)*
*Rhipicephalus* (L)*

Genus ***Pelomys*** Peters, 1853
*Pelomys fallax* (Peters, 1852) Creek Rat (30)
*Haemaphysalis* (N)*
*Ixodes rhabdomysae* (6)
*Rhipicephalus* (L * N)

PART III : BIRDS

Class AVES
Order FALCONIFORMES
Family SAGITTARIIDAE

Genus ***Sagittarius*** Hermann, 1783
*Sagittarius serpentarius* (Miller, 1779) Secretary Bird (1)
*Hyalomma* sp. (L)*

Order GALLIFORMES
Family PHASIANIDAE
Genus ***Numida*** Linnaeus, 1766
*Numida meleagris mitrata* (Pallas, 1767) Helmeted Guinea-Fowl (4)
*Amblyomma variegatum* (N and L only)
*Haemaphysalis leachii* (4)

Order CHARADRIIFORMES
Family · BURHINIDAE
Genus ***Burhinus***
*Burhinus capensis* (Lichtenstein, 1823) Spotted Dikkop
*Hyalomma* sp. * (N. only)

Order CUCULIFORMES
Family CUCULIDAE
Genus ***Centropus***
*Centropus senegalensis* (Linnaeus, 1766) Senegal Coucal
*Haemaphysalis leachii* (N. and L. Only)

Order STRIGIFORMES
Family STRIGIDAE
Genus ***Bubo***
*Bubo africanus* (Temminck, 1821) Spooted Eagle Owl (3)
*Rhipicephalus sanguineus* (1)
*Hyalomma* sp. (L)
*Ciccaba woodfordii* (A. Smith, 1834) Wood Owl
*Amblyomma variegatum* (N)
*Hyalomma* sp. (N)

Order PASSERIFORMES
Family ALAUDIDAE
Genus ***Mrafra africana*** A. Smith, 1836 Rufousnaped Lark (1)
*Haemphaysalis hoodi* (1)

Family TURDIDAE
Genus ***Cossypha***
*Cossypha heuglini* (Hartlaub, 1866) Heuglin's Robin
*Ixodes* sp. (N)

Family LANIDAE
Genus ***Tchagra***
*Tchagra* sp. Bush Shrikes (1)
*Ixodes euplecti* (1)

## PART IV : REPTILES

Class REPTILIA
Order CHELONIA
Family TESTUDINIDAE
Genus ***Testudo*** Linnaeus, 1758
*Testudo* sp. Tortoises (7)
*Amblyomma marmoreum* (6)
*Amblyomma nuttali* (2)
*Amblyomma sparsum* (48)

Order SQUAMATA
Family VARANIDAE
Genus ***Varanus***
*Varanus niloticus niloticus* (Linnaeus, 1758) Monitor Lizard (3)
*Aponoma exornatum* (47)

Family BOIDAE
Genus ***Python*** Daudin,1803
*Python sebae* (Gmelin, 1789). Python (3)
*Aponoma latum* (10)
*Aponoma transversale* (1)

Family COLUBRIDAE
Genus ***Pseudaspis***
*Pseudaspis cana* Linnaeus, Molesnake
*Aponoma latum* *

Genus ***Mehelya***
*Mehelya* sp.
*Aponoma latum* *

Family VIPERIDAE
Genus ***Causus*** Wagler, 1830
*Causus rhombeatus* Lichtenstein Night Adder (1)
*Aponoma latum* (2)

Genus ***Bitis*** Gray, 1842

*Bitis arietans* (Merrem 1820) Puff Adder (13)

*Aponoma latum* (29)

Family ELAPIDAE

Genus ***Naja*** Laurenti, 1768

*Naja hajae hajae* Linnaeus, 1758 Egyptian Cobra

*Aponoma latum* (2)

*Naja nigricoollis pallida* Boulenger, 1896 Pink or Red spitting Cobra (6)

*Aponoma latum* *

## GAZETTEER

This gazetteer lists the names and co-ordinates of places and areas from where the ticks were collected. In compiling this list the biggest problem encountered was the duplication of place names, with and sometimes without variation of spelling. This duplication of names is very common in Zambia. In cases where place names are not located, they are listed and the name of the district in which they fall is given with district co-ordinates.

In the following list I have given the co-ordinates as in the official *Gazetteer of geographical names in the Republic of Zambia*, cited as Gazetteer (1967) Some of these slightly differ from those given in *Zambia* : Official Standard Names Gazetteer, as approved by the United States Board on geographical names (1972).

Gazetteer for the countries immediately following Zambia will be found in Hill and Carter 1941 (Angola), Swynnerton and Hayman 1951 (Tanzania), Chapin 1954 (Zaire), Smithers 1971 (Botswana), and Skead 1973 (Southern Africa).

| | | | | |
|---|---|---|---|---|
| AMUSAA VILLAGE (Mongu District) | 15° | 30'S | 23° | 30'E |
| ANCHOR RANCH (Mazabuka District) | 16° | 00'S | 28° | 00'E |
| ATCKIN FARM (Monze District) | 16° | 00'S | 27° | 15'E |
| BECKETT FARM (Choma District) | 16° | 49'S | 26° | 59'E |
| BIBURY FARM (Mazabuka District) | 16° | 00'S | 28° | 00'E |
| BIKRON FARM (Katete District) | 14° | 06'S | 32° | 05'E |

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|---|---|---|---|---|
| BUBESHI | 10° | 48'S | 30° | 45'E |
| BULAMUSHI (Namwala District) | 16° | 00'S | 26° | 00'E |
| BUNGA (Namwala District) | 16° | 00'S | 26° | 00'E |
| CAUSEWAY FARM (Mazabuka District) | 16° | 00'S | 28° | 00'E |
| CENTRAL VETERINARY RESEARCH STATION | | | | |
| MAZABUKA (Mazabuka District) | 16° | 00'S | 28° | 00'E |
| CHAANGA VILLAGE | 16° | 17'S | 28° | 24'E |
| CHAANJE VILLAGE | 13° | 25'S | 32° | 52'E |
| (Chama District) | 11° | 15'S | 32° | 50'E |
| CHALIMBANA | 15° | 23'S | 28° | 29'E |
| CHANACHANYINDI CRUSH (Mwinilunga District) | 12° | 00'S | 24° | 30'E |
| CHANDA VILLAGE | 11° | 21'S | 32° | 07'E |
| CHANDEMA VILLAGE | 14° | 14'S | 31° | 23'E |
| CHANGA VILLAGE | 14° | 18'S | 31° | 15'E |
| (Chipata District) | 14° | 00'S | 32° | 30'E |
| CHANGA VILLAGE | 16° | 17'S | 28° | 24'E |
| (Mazabuka District) | 16° | 00'S | 28° | 00'E |
| CHAPEPWA VILLAGE | 10° | 02'S | 32° | 39'E |
| CHAYA VILLAGE (Mazabuka District) | 16° | 00'S | 28° | 00'E |
| CHEELO VILLAGE | 16° | 12'S | 27° | 46'E |
| CHENGO VILLAGE | 10° | 52'S | 28° | 51'E |

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|---|---|---|---|---|
| CHIBELELE | 17° | 21'S | 26° | 26'E |
| CHIKALA VILLAGE | 15° | 39'S | 27° | 40'E |
| CHIKANDA VILLAGE | 14° | 45'S | 27° | 48'E |
| CHIKOLA VILLAGE | 14° | 37'S | 29° | 20'E |
| CHIKOLO VILLAGE | 11° | 55'S | 27° | 11'E |
| CHIKOLOKA CRUSH (Chadiza District) | 14° | 00'S | 32° | 45'E |
| CHILANGA FARM (Samfya District) | 11° | 30'S | 30° | 00'E |
| CHILANGA | 15° | 33'S | 28° | 17'E |
| CHILESHY VILLAGE | 09° | 52'S | 31° | 00'E |
| CHILENGA VILLAGE | 14° | 31'S | 28° | 07'E |
| CHILENGA FARM (Luanshya District) | 13° | 08'S | 28° | 25'E |
| CHILINDE VILLAGE | 09° | 17'S | 31° | 41'E |
| CHILUBA (Mporokoso District) | 09° | 00'S | 29° | 00'E |
| CHILUFYA VILLAGE (Mansa District) | 12° | 00'S | 29° | 00'E |
| CHIMTIKO CRUSH (Chipata District) | 14° | 00'S | 32° | 30'E |
| CHIMWALA VILLAGE | 13° | 21'S | 32° | 42'E |
| CHING' ANGIAUKA VILLAGE (Mazabuka District) | 16° | 00'S | 28° | 00'E |
| CHINGELESI FARM (Kaoma District) | 15° | 00'S | 24° | 30'E |
| (Chinsali District) | 10° | 33'S | 32° | 04'E |
| CHINUNDA VILLAGE | 13° | 11'S | 32° | 39'E |
| CHINZOMA VILLAGE (Mumbwa District) | 15° | 00'S | 27° | 00'E |

| | | | | |
|---|---|---|---|---|
| CHINZULE VILLAGE | 14° | 18'S | 31° | 56'E |
| CHIOTA VILLAGE | 15° | 23'S | 28° | 29'E |
| CHIPARAMBA | 13° | 34'S | 32° | 29'E |
| CHIPAPA | 15° | 40'S | 28° | 20'E |
| CHIPEPO | 14° | 12'S | 28° | 13'E |
| CHIPEMBI | 14° | 56'S | 28° | 36'E |
| CHIPUNDU VILLAGE | 14° | 19'S | 31° | 36'E |
| CHIPUTA VILLAGE | 14° | 17'S | 23° | 03'E |
| CHIRUNDU | 16° | 03'S | 28° | 50'E |
| CHIRWA FARM (Chipata District) | 14° | 00'S | 32° | 30'E |
| CHISAMBA VILLAGE | 13° | 05'S | 22° | 45'E |
| (Chavuma) | 13° | 05'S | 22° | 41'E |
| CHISAMBA | 14° | 59'S | 28° | 23'E |
| (Kabwe District) | 14° | 30'S | 27° | 30'E |
| CHESENGA VILLAGE (Chililabombwe District) | 12° | 20'S | 27° | 50'E |
| CHISHIMBA FARM (Luwingu District) | 10° | 15'S | 29° | 55'E |
| CHISUNKA VILLAGE | 10° | 45'S | 28° | 50'E |
| CHIWALA | 12° | 59'S | 28° | 44'E |
| CHIZOMA VILLAGE (Gwembe District) | 16° | 30'S | 28° | 00'E |
| CHIZYIMO VILLAGE (Kabompo District) | 13° | 30'S | 24° | 00'E |
| CHIZYUKA VILLAGE (Monze District) | 16° | 00'S | 27° | 15'E |
| CHONGWE | 15° | 17'S | 28° | 47'E |
| CHUNGA DAMBO | 11° | 07'S | 29° | 37'E |

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|---|---|---|---|---|
| CHUNGA CAMP | 15° | 03'S | 25° | 59'E |
| CHUNGU FARM (Kasempa District) | 14° | 00'S | 26° | 00'E |
| DELI FARM (Chipata District) | 14° | 00'S | 32° | 30'E |
| DEMETRA FARM (Gwembe District) | 16° | 30'S | 28° | 00'E |
| DIAMOND DALE FARM (Mumbwa District) | 15° | 00'S | 27° | 00'E |
| DIVIA FARM | 13° | 05'S | 32° | 55'E |
| DWAMBALE CRUSH | 13° | 56'S | 32° | 29'E |
| FAISAKO (Chipata District) | 14° | 00'S | 32° | 30'E |
| FENI CRUSH | 13° | 47'S | 32° | 45'E |
| FOREST DEPARTMENT (Samfya District) | 11° | 30'S | 30° | 00'E |
| FWAMBO VILLAGE | 08° | 52'S | 31° | 32'E |
| GALAUNIA FARM (Chisamba Area) | 12° | 32'S | 30° | 00'E |
| HARA FARM (Chipata District) | 14° | 00'S | 32° | 30'E |
| HAEZEL FARM (Solwezi District) | 12° | 03'S | 26° | 30'E |
| HENRY LUPESHA (Kawambwa District) | 10° | 00'S | 29° | 00'E |
| HYGATE FARM (Chingola District) | 12° | 38'S | 27° | 45'E |
| ILUYA VILLAGE | 15° | 30'S | 25° | 00'E |
| INAMBAO'S VILLAGE (Mulobezi) | 16° | 47'S | 25° | 10'E |
| JACK FLYOYD FARM (Chipata District) | 14° | 00'S | 32° | 30'E |

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|---|---|---|---|---|
| JALI JALI VILLAGE | 12° | 07'S | 33° | 09'E |
| JAMES THAWE FARM | 13° | 45'S | 32° | 35'E |
| JAPHETI CRUSH (Lundazi District) | 12° | 00'S | 33° | 00'E |
| KABANJA VILLAGE | 15° | 47'S | 27° | 48'E |
| KABUNDI EAST | 12° | 56'S | 27° | 20'E |
| KACHEMBE CRUSH (Chipata District) | 14° | 00'S | 32° | 30'E |
| KACHINKA VILLAGE (Kaoma District) | 15° | 00'S | 24° | 30'E |
| KAFITE STREAM | 09° | 37'S | 29° | 06'E |
| KAFUE | 15° | 46'S | 28° | 11'E |
| KAFUMBWE CRUSH | 14° | 21'S | 33° | 14'E |
| KAFUE GORGE | 15° | 51'S | 28° | 30'E |
| KAFWIMBI VILLAGE | 10° | 09'S | 32° | 34'E |
| KAHILA VILLAGE (Mwinilunga District) | 12° | 00'S | 24° | 35'E |
| KALALUKA CRUSH (Lundazi District) | 12° | 00'S | 33° | 00'E |
| KALEYA | 15° | 54'S | 27° | 41'E |
| KALIMWANGO FARM (Mansa District) | 12° | 00'S | 29° | 00'E |
| KALOLO CRUSH | 14° | 11'S | 31° | 47'E |
| KALULU VILLAGE | 13° | 45'S | 32° | 18'E |
| (Kalulushi District) | 12° | 50'S | 28° | 00'E |
| KAMANYA VILLAGE | 14° | 22'S | 24° | 41'E |
| KAMBALIMBALI VILLAGE | 14° | 24'S | 31° | 37'E |
| KAMBANI VILLAGE | 13° | 22'S | 32° | 43'E |

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|---|---|---|---|---|
| KAMBWE VILLAGE | 09° | 27'S | 32° | 52'E |
| KAMSECHE VILLAGE (Chadiza District) | 14° | 05'S | 32° | 45'E |
| KAMWEJSA VILLAGE | 13° | 27'S | 32° | 47'E |
| KAMZOWELE | 12° | 04'S | 33° | 19'E |
| KANANGELELO VILLAGE (Senenga District) | 16° | 00'S | 23° | 00'E |
| KANDOSI VILLAGE (Mulobezi) | 16° | 47'S | 25° | 10'E |
| KANJA VILLAGE | 13° | 48'S | 31° | 33'E |
| KANYUNYA VILLAGE | 12° | 20'S | 33° | 21'E |
| KAPATAMOYO VILLAGE | 13° | 33'S | 32° | 41'E |
| KAPIJIMPANGA VILLAGE | 12° | 16'S | 26° | 31'E |
| KAPINDE VILLAGE | 12° | 11'S | 33° | 04'E |
| KAPIRI-MPOSHI | 13° | 58'S | 28° | 40'E |
| KAPITOLO FARM (Chililabombwe District) | 12° | 20'S | 27° | 50'E |
| KAPOLOPOLO VILLAGE (Kasama District) | 10° | 00'S | 31° | 30'E |
| (Kaputa District) | 08° | 45'S | 29° | 50'E |
| KASAMBALA VILLAGE (Chipata District) | 14° | 00'S | 32° | 30'E |
| KASERA VILLAGE | 12° | 03'S | 32° | 41'E |
| KASOMPE | 12° | 35'S | 27° | 54'E |
| KASONDE VILLAGE | 14° | 28'S | 31° | 16'E |
| KATAMBALA VILLAGE | 11° | 10'S | 32° | 18'E |
| KATANDULA VILLAGE (Ndola District) | 13° | 30'S | 28° | 00'E |
| KATENDA VILLAGE (Kasempa District) | 14° | 00'S | 26° | 00'E |

| | | | | |
|---|---|---|---|---|
| KATOBO | 15° | 30'S | 25° | 17'E |
| KATOTOMWA (Kawambwa District) | 10° | 00'S | 29° | 00'E |
| KATUKULA VILLAGE | 15° | 22'S | 22° | 42'E |
| KATUPISYA (Kabompo District) | 13° | 30'S | 24° | 00'E |
| KALUMBE VILLAGE | 13° | 29'S | 32° | 48'E |
| KAUMA VILLAGE (Chavuma) | 13° | 05'S | 22° | 41'E |
| KAWA FARM (Chipata District) | 14° | 00'S | 32° | 30'E |
| KAWAMA GRAZER SCHEME | 11° | 52'S | 27° | 16'E |
| KAWANA FARM (Kabompo District) | 13° | 30'S | 24° | 00'E |
| KAWANGO VILLAGE | 13° | 28'S | 32° | 48'E |
| KAWIMBE VILLAGE | 08° | 50'S | 31° | 32'E |
| KAZEMBE | 09° | 49'S | 28° | 45'E |
| KAZIMULE CRUSH | 13° | 54'S | 32° | 24'E |
| KEEMBE | 15° | 07'S | 27° | 50'E |
| KHULIKA CRUSH (Chandiza District) | 14° | 05'S | 32° | 45'E |
| KHUMADZI VILLAGE (Chadiza District) | 14° | 05'S | 32° | 45'E |
| KHUNDA CRUSH | 12° | 18'S | 32° | 25'E |
| KINKI VILLAGE (Kasempa District) | 14° | 00'S | 26° | 00'E |
| (Kitwe District) | 12° | 50'S | 28° | 15'E |
| KOKWE VILLAGE | 13° | 25'S | 32° | 49'E |
| LAMBALA OLD CAMP (Kawambwa District) | 10° | 00'S | 29° | 00'E |

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|---|---|---|---|---|
| LAMEKA VILLAGE | 12° | 45'S | 32° | 47'E |
| LENGWE | 09° | 27'S | 31° | 42'E |
| LILAYI | 15° | 31'S | 28° | 18'E |
| LILUPA FARM (Zambezi District) | 13° | 30'S | 23° | 07'E |
| LIMULUNGA VILLAGE | 15° | 09'S | 23° | 10'E |
| LINYANDELA VILLAGE (Mongu District) | 15° | 30'S | 23° | 30'E |
| LIUWA PLAIN NATIONAL PARK | 14° | 30'S | 22° | 30'E |
| (Kalabo District) | 14° | 58'S | 22° | 41'E |
| (Livingstone District) | 17° | 40'S | 26° | 00'E |
| LOCHINVAR NATIONAL PARK | 16° | 03'S | 27° | 17'E |
| (Luangwa District) | 15° | 25'S | 30° | 05'E |
| LUANGWA NATIONAL PARK (NORTH) | 11° | 55'S | 32° | 10'E |
| LUANGWA NATIONAL PARK (SOUTH) | 13° | 20'S | 31° | 20'E |
| LUBULAFITA VILLAGE | 10° | 00'S | 29° | 10'E |
| LUBUNGO VILLAGE (Samfya District) | 11° | 30'S | 30° | 00'E |
| LUKUPA | 10° | 08'S | 30° | 59'E |
| LUKWANDA FARM (Lundazi District) | 12° | 00'S | 33° | 00'E |
| LUNDULA VILLAGE | 08° | 46'S | 31° | 33'E |
| LUNZUWA BRIDGE | 09° | 00'S | 31° | 23'E |
| LUPIYA VILLAGE | 13° | 47'S | 29° | 43'E |
| LUPUTA VILLAGE | 13° | 32'S | 24° | 14'E |
| LUSAKA URBAN | 15° | 25'S | 28° | 17'E |

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|---|---|---|---|---|
| LUSAKA RURAL | 15° | 23'S | 28° | 29'E |
| LUSITU | 16° | 15'S | 28° | 30'E |
| LUSHUBANI FARM (Kaoma District) | 15° | 00'S | 24° | 30'E |
| LUSUNTA SPRAY RACE | 12° | 18'S | 33° | 17'E |
| LWAAMBWA SPRAY RACE (Lundazi District) | 12° | 00'S | 33° | 00'E |
| LWEEKO (Kawambwa District) | 10° | 00'S | 29° | 00'E |
| MACHILE | 17° | 21'S | 25° | 00'E |
| MADUMA VILLAGE | 13° | 34'S | 32° | 30'E |
| MAKENI | 15° | 25'S | 28° | 16'E |
| MAKUNGU VILLAGE | 08° | 52'S | 31° | 34'E |
| MAKWE | 14° | 24'S | 31° | 56'E |
| MAKWENDA CRUSH | 13° | 43'S | 31° | 37'E |
| MALAKI VILLAGE | 17° | 18'S | 24° | 48'E |
| MALAMBWA VILLAGE | 10° | 51'S | 31° | 51'E |
| MALANGO VILLAGE | 10° | 07'S | 32° | 40'E |
| MANYINGA FARM | 13° | 17'S | 24° | 13'E |
| MANYONI FARM (Lundazi District) | 12° | 00'S | 33° | 00' |
| MAPANDE VILLAGE | 16° | 45'S | 27° | 25'E |
| MAPANGAZYA (Mazabuka District) | 16° | 00'S | 28° | 00'E |
| MAPANZA | 16° | 15'S | 26° | 57'E |
| (Mpika District) | 11° | 51'S | 31° | 27'E |
| MARSHLAND FARM (Chingola District) | 12° | 30'S | 27° | 45'E |

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|---|---|---|---|---|
| MASAITI | 13° | 16'S | 28° | 25'E |
| MASHITESHI | 15° | 46'S | 26° | 02'E |
| (Senanga District) | 16° | 00'S | 23° | 10'E |
| MATAMBWE VILLAGE (Mulobezi) | 16° | 47' | 25° | 10'E |
| MATAMBWE VILLAGE (Mulobezi) | 16° | 47'S | 25° | 10'E |
| MATETE STREAM | 10° | 39'S | 29° | 09'E |
| MATHAMBO CRUSH | 13° | 45'S | 31° | 33'E |
| MAZHIBA VILLAGE | 15° | 56'S | 26° | 42'E |
| MBAWA FARM (Chipata District) | 14° | 00'S | 32° | 30'E |
| MBEKESHI STREAM | 11° | 20'S | 29° | 17'E |
| MBOTWA VILLAGE (Mporokoso District) | 09° | 00'S | 30° | 00'E |
| MBUZI VILLAGE | 12° | 23'S | 32° | 26'E |
| MGAMPULA CRUSH | 13° | 28'S | 32° | 50'E |
| MGAWA CRUSH | 13° | 23'S | 32° | 39'E |
| MICHEMBO VILLAGE | 14° | 12's | 31° | 50'E |
| MIPA STREAM | 10° | 49'S | 29° | 11'E |
| MITUKUTUKU VILLAGE | 11° | 45'S | 25° | 20'E |
| MKANDA VILLAGE (Chipata District) | 14° | 00'S | 32° | 30'E |
| MKUMPA VILLAGE | 13° | 53'S | 32° | 13'E |
| (Mkushi District) | 14° | 00'S | 29° | 00'E |
| MLONYEZI | 13° | 28'S | 32° | 48'E |
| MOUNT MUKULU | 15° | 33'S | 28° | 14'E |
| MPANSHYA | 15° | 07'S | 29° | 43'E |

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|---|---|---|---|---|
| MPELEMBE VILLAGE (Mansa District) | 12° | 00'S | 29° | 00'E |
| MPHANGULA VILLAGE | 13° | 53'S | 31° | 36'E |
| MPUNDU FARM (Kasempa District) | 14° | 00'S | 26° | 00'E |
| MSEKERA STATION | 13° | 38'S | 32° | 27'E |
| MSOSOKA (Katete District) | 14° | 06'S | 32° | 05'E |
| MTENGOWALILA CRUSH | 13° | 24'S | 32° | 44'E |
| MTOWE | 14° | 05'S | 31° | 21'E |
| (Mufulira District) | 12° | 40'S | 28° | 15'E |
| MUKAMBA (Choma District) | 16° | 30'S | 27° | 00'E |
| MUKANGA CRUSH | 10° | 16'S | 29° | 10'E |
| MUKANWA VILLAGE (Seshcke District) | 17° | 00'S | 24° | 00'E |
| MULINDI VILLAGE | 15° | 37'S | 23° | 23'E |
| MULONGA | 16° | 49'S | 24° | 44'E |
| MULOLO VILLAGE | 12° | 54'S | 31° | 58'E |
| MULWALE (Kasempa District) | 14° | 00'S | 26° | 00'E |
| MUMBI CRUSH | 14° | 29'S | 31° | 19'E |
| MUNDAWANGA | 15° | 33'S | 28° | 18'E |
| MUNONOKO VILLAGE (Senanga District) | 16° | 00'S | 23° | 00'E |
| MUSAMBESHI (Kawambwa District) | 10° | 00'S | 29° | 00'E |
| MUSHAWA | 13° | 28'S | 32° | 46'E |
| MUSICHILI VILLAGE (Ndola district) | 13° | 30'S | 28° | 00'E |

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|---|---|---|---|---|
| MUSIMBI (Namwala District) | 10° | 00'S | 26° | 00'E |
| MUSTADI TEMBO FARM (Chipata District) | 14° | 00'S | 32° | 30'E |
| MUSUMALI VILLAGE (Chavuma) | 13° | 05'S | 22° | 41'E |
| MUTA'TU VILLAGE | 15° | 00'S | 23° | 24'E |
| MUTONDA VILLAGE | 10° | 02'S | 33° | 39'E |
| MWAALA VILLAGE (Solwezi District) | 12° | 30'S | 26° | 30'E |
| MWABACHITONGO (Luwingu District) | 10° | 30'S | 30° | 00'E |
| MWANAMBAO VILLAGE (Senanga District) | 16° | 00'S | 23° | 00'E |
| MWANDI | 17° | 31'S | 24° | 50'E |
| MWANDILA FARM (Lundazi District) | 12° | 00'S | 33° | 00'E |
| MWANGULA FARM | 15° | 48'S | 27° | 59'E |
| MWASE FARM | 12° | 27'S | 33° | 19'E |
| MWEEMBA FARM (Chingola District) | 12° | 30'S | 27° | 45'E |
| (Mwense District) | 10° | 25'S | 29° | 00'E |
| MWINICHIFUNGWE (Isoka District) | 09° | 45'S | 32° | 45'E |
| NAKABULA | 16° | 50'S | 26° | 28'E |
| NAMATALA VILLAGE (Senanaga District) | 16° | 00'S | 23° | 00'E |
| NANDUWE VILLAGE | 16° | 50'S | 26° | 05'E |
| NANG'OMBE VILLAGE | 16° | 54'S | 23° | 52'E |
| NANIWE VILLAGE | 14° | 09'S | 31° | 28'E |

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|---|---|---|---|---|
| (Nchelenge District) | 09° | 00'S | 29° | 00'E |
| NELLO FARM (Kalomo District) | 17° | 00'S | 26° | 00'E |
| NGOMA | 15° | 56'S | 25° | 55'E |
| NGOZI VILLAGE | 13° | 46'S | 31° | 42'E |
| NJUNGU VILLAGE | 14° | 33'S | 23° | 34'E |
| NJUNGUNJANI VILLAGE (Chipata District) | 14° | 00'S | 32° | 30'E |
| NSOKOLO VILLAGE | 09° | 11'S | 31° | 51'E |
| NTUNGUMUKA VILLAGE (Mporokoso District) | 09° | 00'S | 30° | 00'E |
| NYANI VILLAGE | 12° | 57'S | 32° | 21'E |
| NYATI FARM | 15° | 13'S | 28° | 25'E |
| NYIKA PLATEAU | 10° | 38'S | 33° | 15'E |
| NYUMBANO VILLAGE (Mulobezi) | 16° | 47'S | 25° | 10'E |
| PALABANA | 15° | 28'S | 28° | 34'E |
| PHANGWENI CRUSH (Chipata District) | 14° | 00'S | 32° | 30'E |
| PHILIPO BANDA VILLAGE (Ndola Rural District) | 13° | 30'S | 28° | 00'E |
| PINELAND RANCH (Chingola District) | 12° | 30'S | 27° | 45'E |
| PRISON CRUSH (Chipata District) | 14° | 00'S | 32° | 30'E |
| ROSEMARY BANDA FARM (Chipata District) | 14° | 00'S | 32° | 30'E |
| RUFUNSA | 15° | 05'S | 29° | 38'E |
| SAMUNYAU FARM (Zambezi district) | 13° | 30'S | 23° | 00'E |

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|---|---|---|---|---|
| SANKANGA VILLAGE | 14° | 40's | 23° | 17'E |
| SANYAMBE VILLAGE | 16° | 29'S | 23° | 25'E |
| SEJENI VILLAGE | 11° | 03'S | 24° | 03'E |
| SEKESEKE (Kabompo District) | 12° | 30'S | 24° | 00'E |
| (Serenje District) | 16° | 15'S | 23° | 15'E |
| SHADOMBOZIA VILLAGE (Gwembe District) | 16° | 30'S | 28° | 00'E |
| SHAKAPANGA VILLAGE (Lukulu District) | 14° | 15'S | 23° | 10'E |
| SHAMBOKO VILLAGE (Mazabuka District) | 16° | 00'S | 28° | 00'E |
| SHANDUKA VILLAGE (Gwembe District) | 16° | 30'S | 28° | 00'E |
| SHANGUVULA FARM (Kaoma District) | 15° | 00'S | 24° | 30'E |
| SHINDE FARM | 13° | 24'S | 23° | 05'E |
| SHINGANO VILLAGE (Mansa District) | 12° | 00'S | 29° | 00'E |
| SHINONDO VILLAGE | 09° | 48'S | 30° | 41'E |
| SHIWA ESTATES (Chisamba) | 12° | 32'S | 30° | 00'E |
| SHIWA NG'ANDU | 11° | 12'S | 31° | 45'E |
| SHODOLA | 15° | 04'S | 25° | 11'E |
| SHONE FARM (Kasama District) | 10° | 00'S | 31° | 30'E |
| SIAWENGA VILLAGE | 16° | 39'S | 27° | 55'E |
| SIBALABALA VILLAGE | 15° | 39'S | 24° | 47'E |
| SICHILONGO VILLAGE | 10° | 10'S | 33° | 24'E |
| SIKALONA VILLAGE | 17° | 23'S | 27° | 12'E |

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| SIKAMBIA (Namwala District) | 16° | 00'S | 28° | 00'E |
| SILILO VILLAGE | 17° | 28'S | 24° | 25'E |
| SIMAMBA VILLAGE | 16° | 25'S | 28° | 42'E |
| SIMFUKWE VILLAGE (Mbala District) | 09° | 00'S | 31° | 00'E |
| SIMUKOKO VILLAGE (Isoka district) | 09° | 45'S | 32° | 45'E |
| SIMULIMBE (Namwala District) | 16° | 00'S | 28° | 00'E |
| SINDA | 14° | 12'S | 31° | 45'E |
| SIWILA CRUSH (Isoka District) | 09° | 45'S | 32° | 45'E |
| SOLOLO STREAM (Kawambwa District) | 10° | 00'S | 29° | 00'E |
| SUNKANI VILLAGE (Mansa District) | 12° | 00'S | 29° | 00'E |
| SYAMATABA VILLAGE (Mulobezi) | 16° | 47'S | 25° | 10'E |
| TAFUNA VILLAGE (Mbala District) | 09° | 00'S | 31° | 00'E |
| THAYO CRUSH (Chipata District) | 14° | 00'S | 32° | 30'E |
| TENDELE FARM | 10° | 14'S | 33° | 24'E |
| YAKOBE VILLAGE | 12° | 56'S | 30° | 27'E |
| YONGA VILLAGE (Zambezi District) | 13° | 30'S | 23° | 00'E |
| ZIMBA | 17° | 19'S | 26° | 17'E |
| ZOMBE (Chief) | 08° | 53'S | 30° | 46'E |
| ZULU'S FARM (Chipata District) | 14° | 00'S | 32° | 30'E |

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