

Ticks

Tick identification

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TICKS OF VETERINARY IMPORTANCE / DIFFERENTIAL DIAGNOSIS

Photos, distribution maps, importance and hosts of all ticks described below and of other ticks of veterinary and human importance can be found online at:

http://www.itg.be/photodatabase/African_ticks_files/index.html or offline in the Tick database.

A holistic approach should be followed in the identification of ticks. Thus besides the morphological features that we make use of to identify ticks to species level, we also make use of their ecological requirements to assist with an accurate diagnosis. Consequently the geographic locality at which they were collected, the hosts from which they were collected, the body site on the host from which they were collected, and the season of the year during which they were collected are all important aids. Ideally anyone who sends in ticks for identification should supply all this information. Perhaps most important of all is that male ticks must be included in any collection sent for identification as they have more distinct taxonomic features that can be recognized than the females. Even more importantly a label containing all the important collection data and written in pencil should be included with the ticks inside the vial or tube or bottle in which the ticks have been placed. If an outside label is pasted onto the container it must be written in pencil, ball point writing dissolves the moment the alcohol used for tick preservation spills onto it.

Besides the ticks whose common names are derived from their colour, farmers and researchers have also named ticks according to the geographic locality in which they are present, or the season during which they occur, or the condition they may cause, or the host on which they may feed or where they attach. Thus we have the Karoo paralysis tick, the winter horse tick, the kennel tick, the brown ear tick, the fowl tampan and the sand tampan. As you can gather from the foregoing these names are very descriptive and immediately give you a clue as to which tick you are dealing with.

The Ixodidae

***Amblyomma* spp.**

***Amblyomma hebraeum* – the South African bont tick**

Amblyomma hebraeum is a medium-sized to large tick with long mouth-parts and banded legs, its eyes are flat, the conscutum of the male is ornate with two discrete lateral patches of colour, and with the exception of the first festoon on either side the festoons are uniformly yellow in colour. It closely resembles *A. gemma*, an East African tick, but has the two discrete lateral patches of colour

on the conscutum which are joined to the main colour pattern in *A. gemma*, and the festoons of *A. gemma* are variably dark-brown and yellow. Its distribution does not overlap with that of *A. gemma* (see [Tick database](#) for pictures and more information).

Amblyomma variegatum

Amblyomma hebraeum

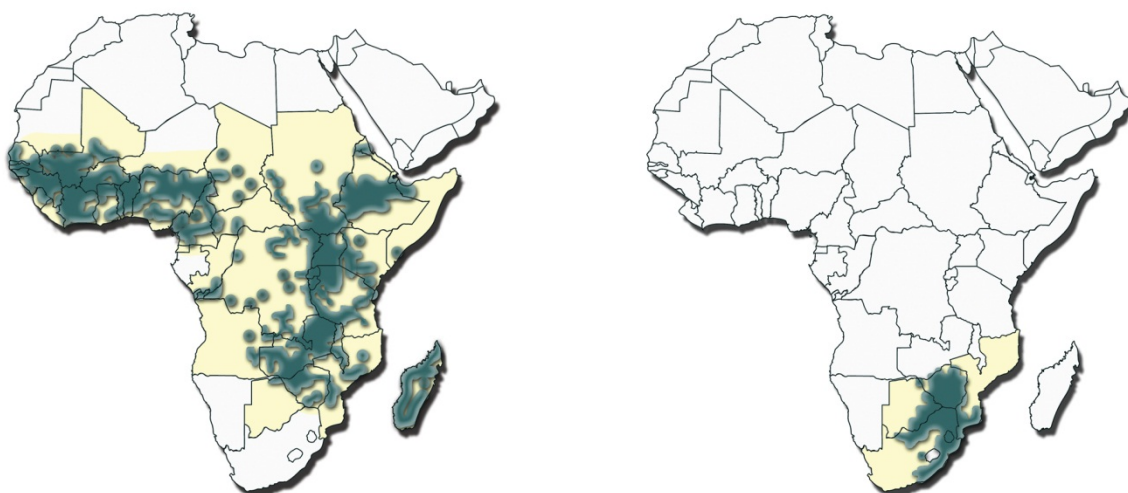
Male



Female



Distribution



Adults feed on cattle, sheep, goats and large wild ruminants, particularly giraffes (*Giraffa camelopardalis*), African buffalo (*Syncerus caffer*) and eland (*Taurotragus oryx*), also on warthogs (*Phacochoerus africanus*) and black (*Diceros bicornis*) and white (*Ceratotherium simum*) rhinoceroses. Immatures infest the same hosts as the adults but also small antelopes, scrub hares (*Lepus saxatilis*), helmeted guineafowls (*Numida meleagris*), and tortoises (e.g. *Chersina angulata*, *Geochelone pardalis*). The immature stages of this tick do not infest rodents (rats, mice, squirrels or gerbils), if they do they seem unable to engorge and usually die. The adults prefer the hairless areas under the tail, in the lower perineal region, on the udder and testes, around the prepuce and in the axilla of cattle, as well as around the feet of sheep and goats. The larvae are found on the feet, legs and on the muzzle, the nymphs attach on the feet, legs, groin, sternum and neck.

Amblyomma hebraeum is a three-host tick, like all other species of this genus. The adults and nymphs are “hunters”, scuttling along the ground when a suitable host is in the vicinity. After detaching the engorged female will lay up to 20 000 eggs. These eggs hatch after two to three weeks depending on the temperature and the larvae wait for hosts on the vegetation, from which very large numbers can be collected by drag-sampling the vegetation with flannel cloths. Once attached the larvae engorge in 7 to 14 days, detach and moult. The nymphs engorge in 7 to 14 days, detach and moult. The adult males attach and start engorging. Only when sexually mature males (i.e. males that have been attached for \pm 6 days) are present will the females attach. The pheromones secreted by the mature male ticks also attract more male and female ticks as well as nymphs which all attach to the host, usually in the vicinity of the mature males. The males and females mate and the females engorge in 7 to 9 days and detach. The males may remain on the host animal for 2 to 4 months. The life cycle usually takes 1 year to complete, but may extend for longer.

This tick requires moisture and warmth, brush and bush and does not survive in open grassland. In South Africa it is found along the coastal belt from Port Elizabeth in the Eastern Cape Province, through KwaZulu-Natal and thence across Mpumalanga, Gauteng, Limpopo and North-West Provinces, north of a line running approximately through Pretoria to the Botswana border. It is also present in eastern Swaziland, southern Mozambique, eastern Botswana and in southern and eastern Zimbabwe.

Amblyomma hebraeum transmits *Ehrlichia ruminantium* (heartwater) to domestic and wild ruminants, and *Theileria mutans* (benign bovine theilerioses) to cattle and *Rickettsia africana*, the cause of African tick-bite fever in humans. The larvae of *A. hebraeum* are probably more responsible than any other tick for tick bites in humans.

***Amblyomma variegatum* – the tropical bont tick**

Adults of *A. variegatum* have long mouthparts and banded legs like *A. hebraeum*, but have different colour patterns on the conscutum and scutum, the colour pattern on the male conscutum is dark-orange. Their eyes are beady, and the males have uniformly dark festoons.

It is widely distributed through West, Central, North-East and East Africa and in southern Africa extends into Zambia, north-eastern Botswana, the Caprivi Strip of Namibia, north-western Zimbabwe

and central and northern Mozambique. Its spread southwards appears to be limited by interspecific competition with *A. hebraeum* with which it shares similar habitats, hosts and sites of attachment and by the drier conditions in the south. It has also been imported onto the Caribbean islands where attempts to eradicate it have cost millions of dollars without success, mainly because of the variety of hosts it infests, particularly the immature stages, and its re-introduction by birds infested with the immature stages flying from one island to the next.

Amblyomma variegatum transmits heartwater (*E. ruminantium*), benign bovine theilerioses (*Theileria mutans*, *T. velifera*), bovine ehrlichiosis (*E. bovis*), the virus of Nairobi sheep disease and is associated with acute bovine dermatophilosis (*Dermatophilus congolensis*).

***Hyalomma* spp.**

***Hyalomma dromedarii* – the camel tick**

Adult *H. dromedarii* are large yellow-brown to nearly black ticks with long mouthparts. The legs are paler than the scutum and may be ringed by paler bands. The lateral grooves are short and deep and limited to the posterior third of the conscutum, the postero-median groove is deep and narrow, extending from a distinct parma to midlength of the conscutum. This groove is bounded on either side by converging ridges and lateral to these ridges are the deep and wide postero-lateral grooves. The sub-anal plates on the male are distinctly laterally placed in relation to the adanal plates and may extend beyond the posterior margin of the body in engorged specimens. The genital aperture of the female is narrowly elongate and triangular.

The preferred hosts are camels (*Camelus dromedarius*), but cattle, sheep, goats and horses may also be infested. The larvae and the nymphs feed on small burrowing animals and on hares, but the nymphs may also infest camels, cattle and horses. Adults attach on the inner thighs, udder and scrotum and in the outer nostrils of camels.

Hyalomma dromedarii has a two or a three-host life cycle. The larvae may feed and moult to nymphs on small mammals or hares and the adults feed on large domestic herbivores. Alternatively the larvae may feed on small mammal hosts, drop off and moult to nymphs, which can then either attach to other small mammal hosts or feed on the same large animals as the adults. The life cycle appears to be continuous throughout the year.

It is present in the arid regions of north Africa from Mauritania in the west to Egypt in the east; it is also present in Sudan, Ethiopia, Somalia and Kenya in North East Africa. It was introduced into Namibia on camels and continues to exist there on these animals in arid regions.

It transmits *Theileria annulata* the cause of tropical theileriosis, is also a mechanical vector of camel pox and has been incriminated in a case of tick paralysis in children in Egypt.

Hyalomma dromedarii

Hyalomma rufipes

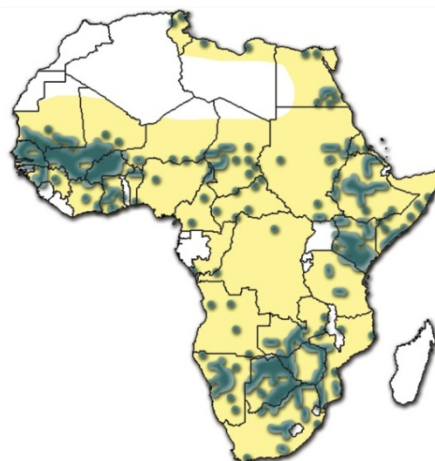
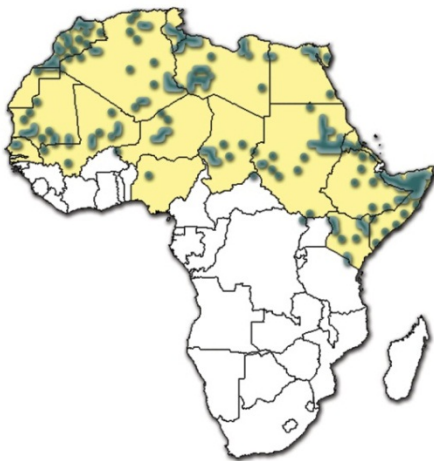
Male



Female



Distribution



Hyalomma rufipes – large, coarse bont-legged tick

Until recently this tick was known as *Hyalomma marginatum rufipes*, a subspecies of *Hyalomma marginatum*, but it has now been established as a valid species and given full specific status as *Hyalomma rufipes*.

Dark-brown to nearly black conscutum of male is broadly oval and the entire surface is covered with medium-sized, coarse punctations. The brown legs are brightly-banded with ivory-coloured rings. The adanal plates have square ends, and the sub-anal plates are distinct but small and aligned with the adanal plates. The genital apron of the female is convex, the genital aperture is very broadly v-shaped, and there are numerous setae in the circumspiracular area.

With the exception of Lesotho, the eastern Free State, the coastal areas of KwaZulu-Natal and the coastal areas and adjoining inland regions of the Western Cape Province, *H. rufipes* is present throughout South Africa. It is widespread in Botswana, Zimbabwe and northern Namibia as well as in Kenya, Ethiopia and Somalia and the southern countries of West Africa.

Hyalomma rufipes adults feed on cattle, sheep, goats, horses, and large wild herbivores including rhinoceroses. The immature stages feed on scrub hares and ground-frequenting birds (e.g. guinea fowl). Adults attach in the hairless area of cattle around the anus and on the genitalia and are also found around the hooves of sheep. The immature stages are found on the necks of scrub hares and on the heads and necks of birds.

Hyalomma rufipes is a two-host tick. The adults are “hunters”. The females feed for 7 to 14 days and then detach and lay 2 000 to 10 000 eggs and die. The larvae hatch in 30 to 60 days and infest hares or birds on which they engorge and moult to nymphs. The engorged nymphs detach, drop to the ground and moult to adults. The life cycle takes 1 year to complete. The adults are active mainly during the summer months from October to March. The immature stages feed on hares and birds from autumn to spring.

The long mouthparts cause tissue damage in cattle and sheep and secondary bacterial infections may lead to abscess formation. The tick also causes lameness in lambs. Injuries caused by the long mouthparts are attractive to the blowfly *Chrysomya bezziana*. It can transmit *Anaplasma marginale* to cattle causing bovine anaplasmosis or gallsickness and also *Babesia occultans* causing benign babesiosis in cattle; it can also transmit *R. conori* to humans. Ticks of the genus *Hyalomma* can transmit Congo Haemorrhagic fever virus to humans: *H. rufipes* would appear to be the most efficient vector of the virus.

Hyalomma glabrum – pale-legged bont-legged tick

Until recently this tick was classified as a subspecies of *Hyalomma marginatum* and was known as *H. marginatum turanicum*. It has subsequently been reinstated as an old taxon bearing the specific name *Hyalomma glabrum*. It is fairly similar in appearance to *H. rufipes*, but the dorsal aspects of its banded legs are ivory-coloured. Its hosts are the same as those of *H. rufipes*.

***Hyalomma truncatum* – small smooth bont-legged tick**

Dark-brown conscutum of male is fairly narrow, glossy with few punctations anteriorly, with a semi-circular indentation posteriorly that is covered with coarse punctations. The brown legs are brightly-banded with ivory-coloured rings. The adanal plates have square ends, and the sub-anal plates are distinct but small and aligned with the adanal plates. The genital apron of the female is concave, the genital aperture nearly semicircular in shape, and the circumspiracular area is nude.

With the exception of Lesotho, the eastern Cape Province, the eastern half of the Free State, south-eastern Gauteng and south-eastern Mpumalanga and southern KwaZulu-Natal, *H. truncatum* is present throughout South Africa. It is present throughout Zimbabwe and much of Mozambique. It occurs in south-eastern and north-western Botswana, central and northern Namibia, and southern Angola. In Tanzania and in Kenya it is present mainly in the south-west, and with the exception of the eastern and western regions it occurs throughout Ethiopia and from there to the West African coast.


Hyalomma truncatum adults feed on cattle, sheep, goats, horses, large wild herbivores and particularly on giraffes and eland and occasionally on dogs. The immature stages feed on scrub hares and on various species of small rodents (e.g. bushveld gerbils (*Gerbilliscus leucogaster*), and four-striped mice (*Rhabdomys pumilio*)). On cattle the adults of *H. truncatum* attach in the tail switch, around the anus, on the lower perineum and on the legs. They are also found around the hooves of sheep. The immature stages attach on the necks of scrub hares. *Hyalomma truncatum* is a two-host tick. The adults are “hunters”. The females feed for 7 to 14 days and then detach and lay 2 000 to 10 000 eggs and die. The larvae hatch in 30 to 60 days and infest hares or rodents, on which they engorge and moult to nymphs. The engorged nymphs detach, drop to the ground and moult to adults. The life cycle takes 1 year to complete.

The adults are active mainly during the summer months from October to March. The immature stages are active and feed on hares and rodents from autumn to spring.


Certain strains of *H. truncatum* contain a toxin in their saliva that causes sweating sickness, an acute dermatitis in cattle, particularly calves. When the ticks infest dogs they tend to cluster at one site and can cause severe skin necrosis. The long mouthparts cause tissue damage in cattle and sheep and secondary bacterial infections may lead to abscess formation. The tick also causes lameness in lambs. Injuries caused by the long mouthparts are attractive to the blowfly *Chrysomya bezziana*. Ticks of the genus *Hyalomma* can transmit Congo Haemorrhagic fever virus to humans, and *H. truncatum* can transmit *R. conori* to humans.

Hyalomma truncatum

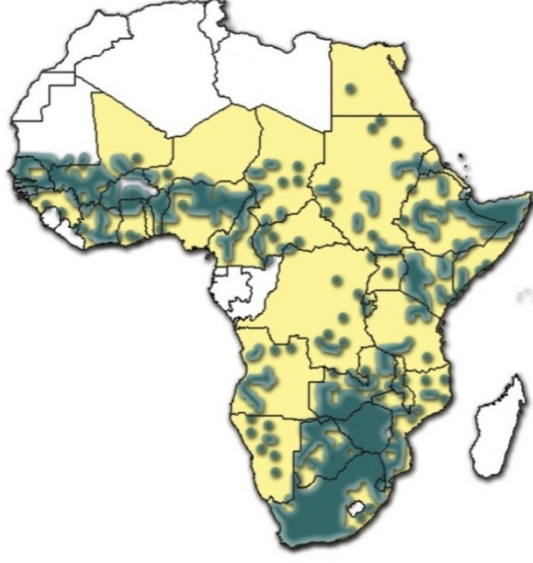
Male



Female



Distribution



The image displays the morphology and distribution of the Hyalomma truncatum tick. It includes dorsal and ventral views of both male and female specimens. The male ticks are shown with their characteristic dark, shield-like body and lighter legs. The female ticks are shown with their larger, more rounded bodies and darker coloration. The distribution map of Africa highlights the tick's range across the continent, primarily in the southern and central regions.

Hyalomma albiparmatum

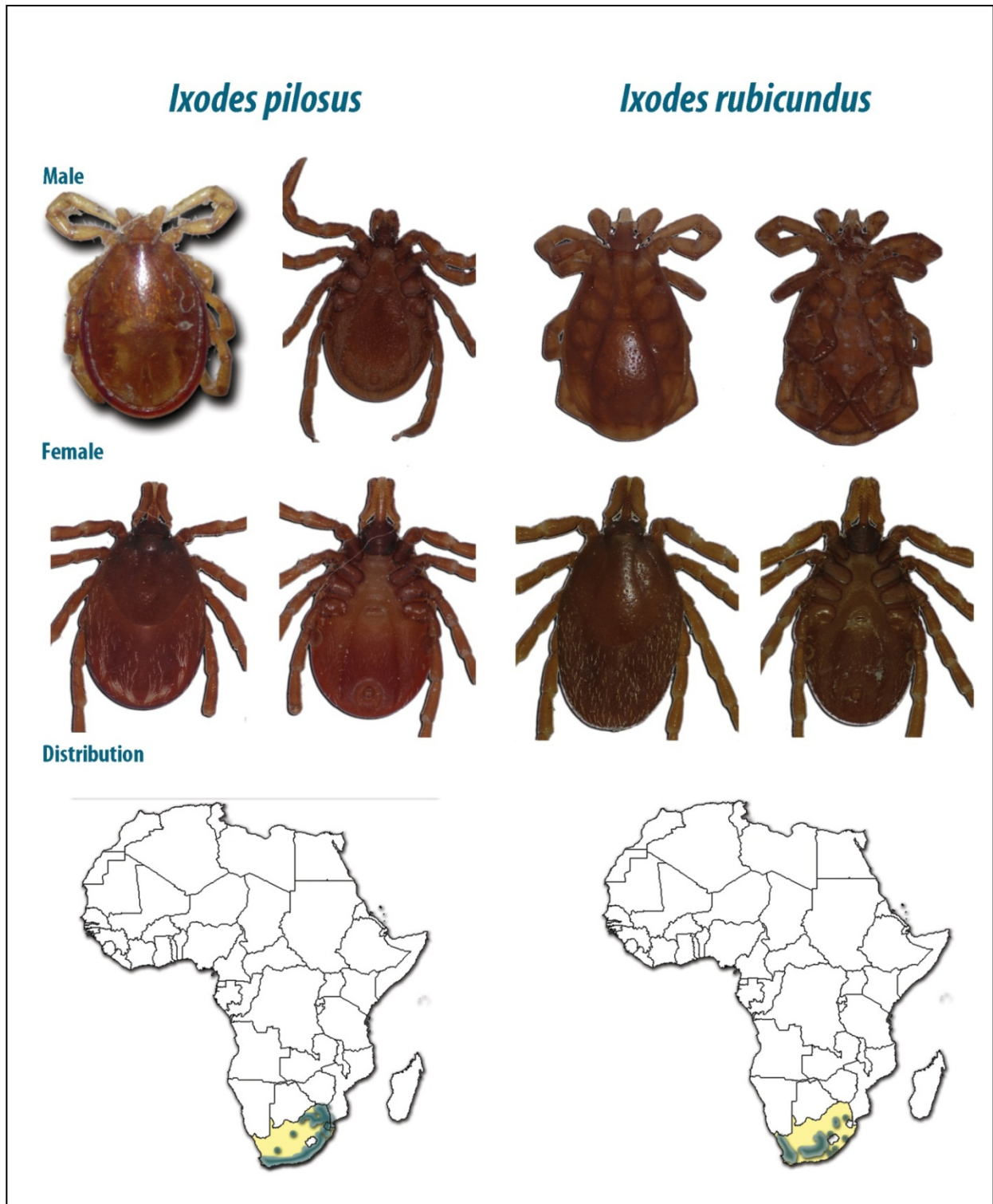
All stages of this East African tick are identical in appearance to *H. truncatum* with the exception of an ivory-coloured central festoon in the male of *H. albiparmatum*.

***Ixodes pilosus* (group) - Sourveld tick**

There are probably three different tick species within this grouping of which only one has been described. The female is similar in appearance to *Ixodes rubicundus*, but the auriculae protrude laterally on the ventral aspect of the basis capituli, and there are spurs medio-posteriorly on the first pair of coxae. The alloscutum bears four longitudinal rows of long, stout setae dorsally. The posterior alignment of the anal groove is short and converging. In the male the genital aperture is present in an inverted U-shaped area formed by the ventral shields.

All stages of development of *I. pilosus* infest cattle, sheep, dogs, grey rhebok (*Palea capreolus*), bushbuck (*Tragelaphus scriptus*), caracal (*Caracal caracal*) and scrub hares. It attaches around the the head.

This tick is present in the southeastern sourveld coastal regions of the Western and Eastern Cape Provinces, and there are foci around Nelspruit and in the Northern Province near Polokwane. It is a three-host tick, with adults present in summer, larvae in autumn and nymphs in spring. This species is not known to transmit diseases.



***Ixodes rubicundus* - Karoo paralysis tick**

Ixodes rubicundus is a reddish-brown colour and the mouthparts are long relative to the size of the tick. The palps are club-shaped and denticles are visible on the lateral aspects of the hypostome. Eyes are absent. The legs are long and slender and appear to be grouped anteriorly. A prominent lateral groove is evident on the conscutum of the male and festoons are absent. The anal groove surrounds the anus anteriorly in both sexes. The ventral surface of the male is covered with a number of shields and its genital aperture is present in an inverted V-shaped area formed by these shields. There are no adanal plates. The auriculae of the female do not protrude prominently laterally on the ventral aspect of the basis capituli, and the medio-posterior aspect of the first pair of coxae is rounded and has no spur.

Adults feed on sheep, goats, dogs, caracals (*Caracal caracal*), and mountain reedbeek (*Redunca fulvorufula*). Immatures are found on rock elephant shrews (*Elephantulus myurus*), red rock rabbits (*Pronolagus rupestris*) and caracals. Females are present in the wool-line on the limbs and belly of sheep. Males rarely attach to host animals, but are frequently found attached to females. *Ixodes rubicundus* is a strictly South African tick. It is present in the Karoo, southern Free State and small foci near the towns of Bronkhorstspuit, Belfast and Heidelberg in Gauteng and Mpumalanga Provinces. The presence of hilly or mountainous veld and of the wild olive tree (*Olea africana*), the shrub "besembos" (*Rhus erosa*), and the gras "suurpol" (*Merxmeullera disticha*) all support the existence of the tick as does the presence of rock elephant shrews (eastern rock sengis) and red rock rabbits. The ticks also prefer the southern slopes of the hills that are cooler than the northern slopes.

This is a three-host tick. The females remain on the host for about 7 days, they then detach and lay 2 000 to 4 000 eggs and die. The eggs "over-summer" and only hatch the following autumn. The larvae feed on red rock rabbits and rock elephant shrews during autumn and winter and the nymphs during winter and spring. The engorged nymphs, which drop from these small mammals, "over-summer" and moult to the adult stage the following autumn. The females remain on the host for about 7 days. The life cycle takes 2 years to complete. Suurpol, besembos and wild olives afford protection for the hares and shrews and the mat of leaves that forms under this vegetation supplies shelter to the ticks and their eggs. This mat also ensures that the relative humidity is high, which is essential for the hatching of the eggs. Adult ticks quest on the grass at a height of about 40 cm within 2 metres of "besembos" or "wild olives". They react to vibrations, shadows and odours. The questing height of the adults corresponds to the belly height of their preferred hosts, mountain reedbeek and sheep.

Adults are most abundant on sheep and on antelopes during autumn to spring of one year, during the following year larvae are most abundant on rock elephant shrews and on red rock rabbits during late summer to winter and nymphs during winter to spring. Adult ticks appear on the vegetation and on host animals earlier in the year in the south of South Africa than in the north.

The female ticks produce a toxin that causes paralysis, particularly in sheep and goats, but young calves and antelopes may also be affected. Peak numbers of adult ticks are present within 4 weeks of activity having commenced, and the number of female ticks per kg of host mass is important in the

causation of paralysis. Initially a paralysis of the legs is noted and this may progress until paralysis of the respiratory system and death supervenes. A few cases of paralysis may be seen in February or March, reaching a peak in April or May, and are associated with a drop in environmental temperature and with moist conditions. If the ticks are removed timeously the clinical signs are reversed within a few hours.

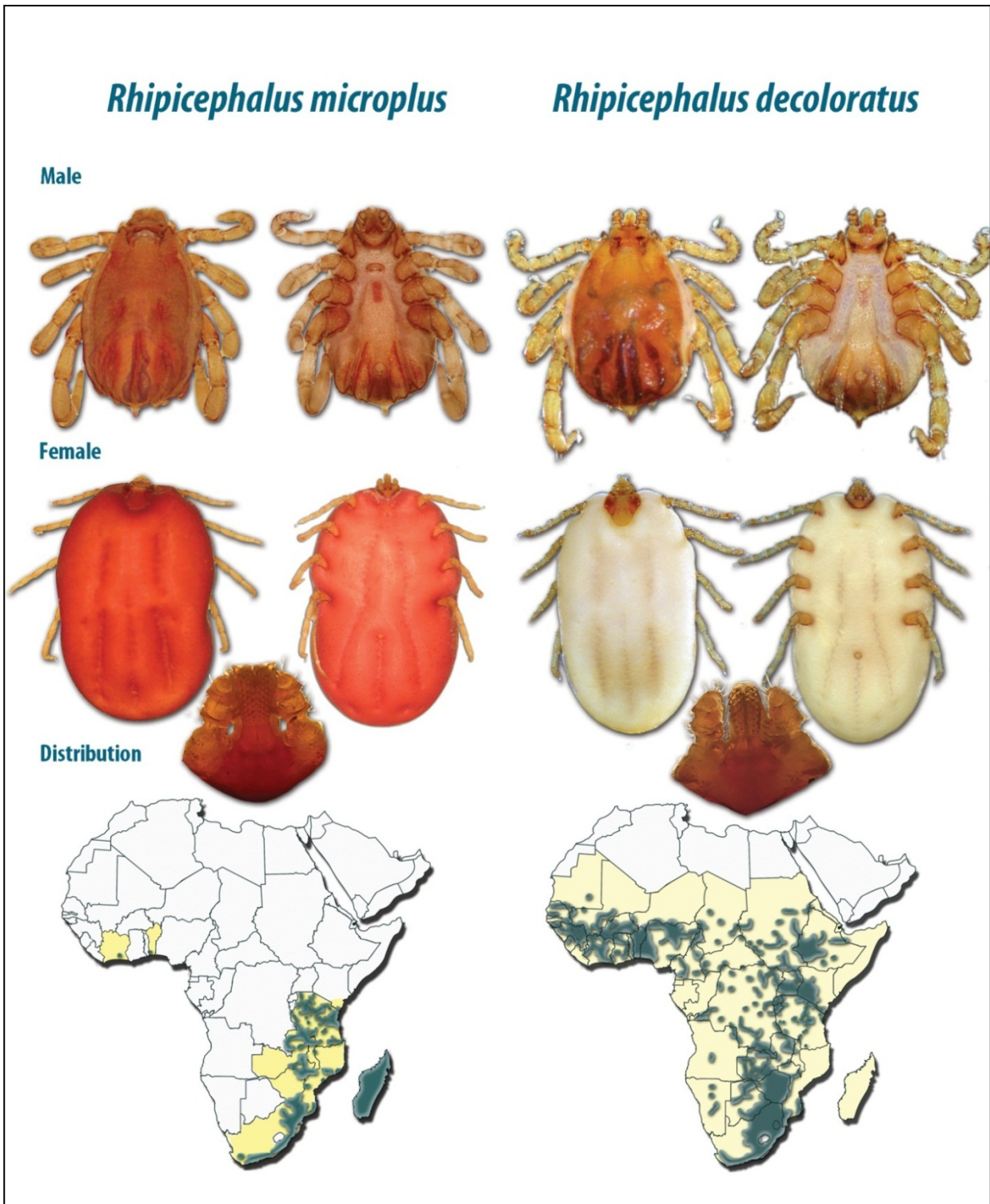
***Rhipicephalus* spp.**

The first two tick species we have to do with in this genus are arguably the best-known tick in the world (*Rhipicephalus microplus*), and in southern Africa (*Rhipicephalus decoloratus*). These ticks were previously known as *Boophilus microplus* and *Boophilus decoloratus*. Their names were changed to *Rhipicephalus (Boophilus) microplus* and to *Rhipicephalus (Boophilus) decoloratus* in 2003 and in a list of valid tick names that was published in 2010 they are now simply known as *Rhipicephalus microplus* and *Rhipicephalus decoloratus*. These name changes have caused a lot of controversy, but as they have been well motivated by respected acarologists *R. microplus* and *R. decoloratus* are likely to become the accepted scientific names.

***Rhipicephalus (Boophilus) decoloratus* – African blue tick**

The mouthparts are short and the dentition on the hypostome is arranged in two columns, each consisting of numerous rows each of which consists of three denticles (3/3 dentition). The internal margin of the first segment of each palp has a bristle-bearing protuberance. The basis capituli is hexagonal in shape. The conscutum of the male is yellowish in colour and often so poorly sclerotized that the outlines of the gut can be seen through it. There are numerous fine hairs on the conscutum of males and the scutum of females. The eyes are difficult to see, and in the female two distinct grooves divide the scutum into a central yellow area and two lateral areas that are reddish-brown. There are no festoons. A small caudal process is present on the males and the adanal plates have a long, narrow posteriorly directed internal spur and a shorter external spur. The tips of the adanal and accessory adanal plates can be seen from above where they protrude beyond the posterior margin of the conscutum. The engorged female is blue in colour, frequently with a constriction in its middle and a rather soft-looking integument. The segments of the pale yellow, slender legs are beady in appearance.

Cattle, impalas (*Aepyceros melampus*), eland, nyalas (*Tragelaphus angasii*) bushbuck (*Tragelaphus scriptus*), greater kudu (*Tragelaphus strepsiceros*) and also horses and zebras are hosts of *R. decoloratus*. The sides of the body, shoulders, neck and dewlap are preferred sites of attachment. The immature stages may be found on the tips and upper edges of the ears and on the legs.



Rhipicephalus decoloratus requires moisture and warmth. In South Africa it is found in the coastal regions of the Western and Eastern Cape Provinces, throughout KwaZulu-Natal, Mpumalanga, Gauteng, Limpopo and North West Provinces and the eastern half of the Free State. It is distributed through most of the wetter regions of South Africa, except for those localities at which it has been replaced by *R. microplus*. However, it also occurs in cold mountainous areas such as the

Drakensberg range and parts of Lesotho. It is absent from the drier parts of South Africa, which receive an average annual rainfall of less than 380 mm, including the western Free State, the central Karoo, Bushmanland and little Namaqualand. In the generally arid territory of Namibia it is present only in localized areas in the north, and in Botswana it is restricted to the higher rainfall eastern border areas and a few scattered localities in the north. It is also present in the eastern half of Zimbabwe, Angola, much of Zambia, Malawi, southwestern and northern Tanzania, Burundi, Uganda, western Kenya and in the wetter highlands and sub-highlands of Ethiopia. It is also found in most countries of sub-Saharan West-Africa.

Rhipicephalus decoloratus is a one-host tick. The engorged females lay 1 000 to 2 500 eggs about 1 week after detaching from the host. These eggs hatch in 3 to 6 weeks and the larvae climb up the vegetation and wait there for a host. They attach, engorge and moult to the nymphal stage on the host after a week, the nymphs attach, engorge and moult to adults on the host after a week, the adults attach, partially engorge, mate and the females fully engorge and drop off after a week. They therefore spend about 3 weeks on the host animal and the life cycle, including the non-parasitic phase, can be completed in approximately 2 months. More than one life cycle can be completed annually.

The ticks are active throughout the year where the climate is warm enough, with a peak in abundance during spring and another during late summer and autumn. Large numbers of synchronously hatching larvae are present on the vegetation and on hosts in spring. In cooler regions there may be little activity in the winter months.

Rhipicephalus decoloratus transmits *Babesia bigemina* to cattle. This infection is transmitted only by the nymphal and adult stages after it has passed transovarially from one generation to the next. The incubation period in cattle is 12 to 14 days. Once established in the tick host *B. bigemina* can be transmitted by many successive generations of ticks without their acquiring new infection.

Rhipicephalus decoloratus also transmits *Anaplasma marginale* to cattle, and *Borrelia theileri*, the cause of spirochaetosis, to cattle, sheep, goats and horses.

***Rhipicephalus microplus* - Asian blue tick**

Adults of *R. microplus* are slightly larger than those of *R. decoloratus*, and the scutum is slightly redder in colour, but they are otherwise very similar in general appearance. The dentition on the hypostome is arranged in two columns each consisting of numerous rows and each row consists of four denticles (4/4 dentition). The inner margin of the first segment of the palps is concave and bears no bristle. A small caudal process is present on the males and the internal spur on the adanal plates is approximately as long as the external spur and is not as prominent as that of *R. decoloratus*.

Domestic cattle are probably the only really effective hosts of this tick, but domestic goats sharing pastures with infested cattle have now also been found to be infested and as female ticks successfully engorge on the goats it is possible that the life cycle of *R. microplus* can be completed in the absence of cattle. More and more records of *R. microplus* on wildlife are being reported and ticks have been found on grey rhebok and eland in the Western Cape Province and on deer in South America.

It has been postulated that *R. microplus* was introduced into East and South Africa from Madagascar, where it had originally arrived with cattle from southern Asia. In South Africa it is now established in ever increasing areas along the southern and eastern coasts of the Western and Eastern Cape Provinces and of KwaZulu-Natal. It is also present in the coastal regions of Mozambique, Tanzania and Kenya. In the interior it is found in scattered localities in Mpumalanga and Limpopo Provinces, South Africa, in parts of the eastern and central provinces of Zambia, throughout Malawi and to the east and north of Lake Malawi in Tanzania. There is evidence that where favourable moist and warm climatic conditions exist it competes with and is able to replace the indigenous *R. decoloratus*. *R. microplus* spread into Zimbabwe in the 1970s, when dipping was disrupted during the pre-independence war, and replaced *R. decoloratus* in several areas. By 1988 it had disappeared, possibly because of drought and the reintroduction of dipping. In Zambia, though, its westward spread appears to be continuing. In Mozambique it has completely displaced *R. decoloratus* at least as far north as Tete Province, while it has also recently been introduced into West Africa where it is apparently flourishing. It would seem that *R. microplus* has adapted to most conditions in Africa: the constant warm and moist regions of West Africa with its lush vegetation, the coastal areas of South Africa with their adjoining drier regions, the inland regions of the north-eastern regions of the Eastern Cape Province, where snow may fall in winter, and the extremely hot and dry regions of Tete Province, Mozambique, where there is scarcely a blade of grass to be found during winter and spring.

Rhipicephalus microplus has a one-host life cycle of which the parasitic portion takes approximately 21 days to complete on the host. Its total life cycle (including the off host period during which the detached female lays eggs, the larvae hatch from the eggs and the larvae quest for hosts from the vegetation) is approximately 1 week shorter than that of *R. decoloratus*. Females lay approximately 500 eggs more than do *R. decoloratus* females, and like *R. decoloratus* it is able to complete several generations in one year.

Rhipicephalus microplus may be present in variable numbers throughout the year. The largest numbers of larvae are usually present on pastures and on hosts in spring, and successive lesser waves of questing larvae then occur through the summer and into the cooler autumn and early winter months. Theoretically, only larvae of this one-host tick should quest for hosts from the vegetation, but male ticks have also been collected from the vegetation, implying that they must have detached shortly before or after moulting and were now questing from the vegetation for a second host.

The tick transmits bovine babesiosis (*Babesia bovis* and *B. bigemina*). *Babesia bovis* infection is acquired by the adults of one generation of ticks and transmitted transovarially by the larvae of the next generation and all infestation is then lost by them. It also transmits bovine anaplasmosis (*Anaplasma marginale*) and spirochaetosis (*Borrelia theileri*).

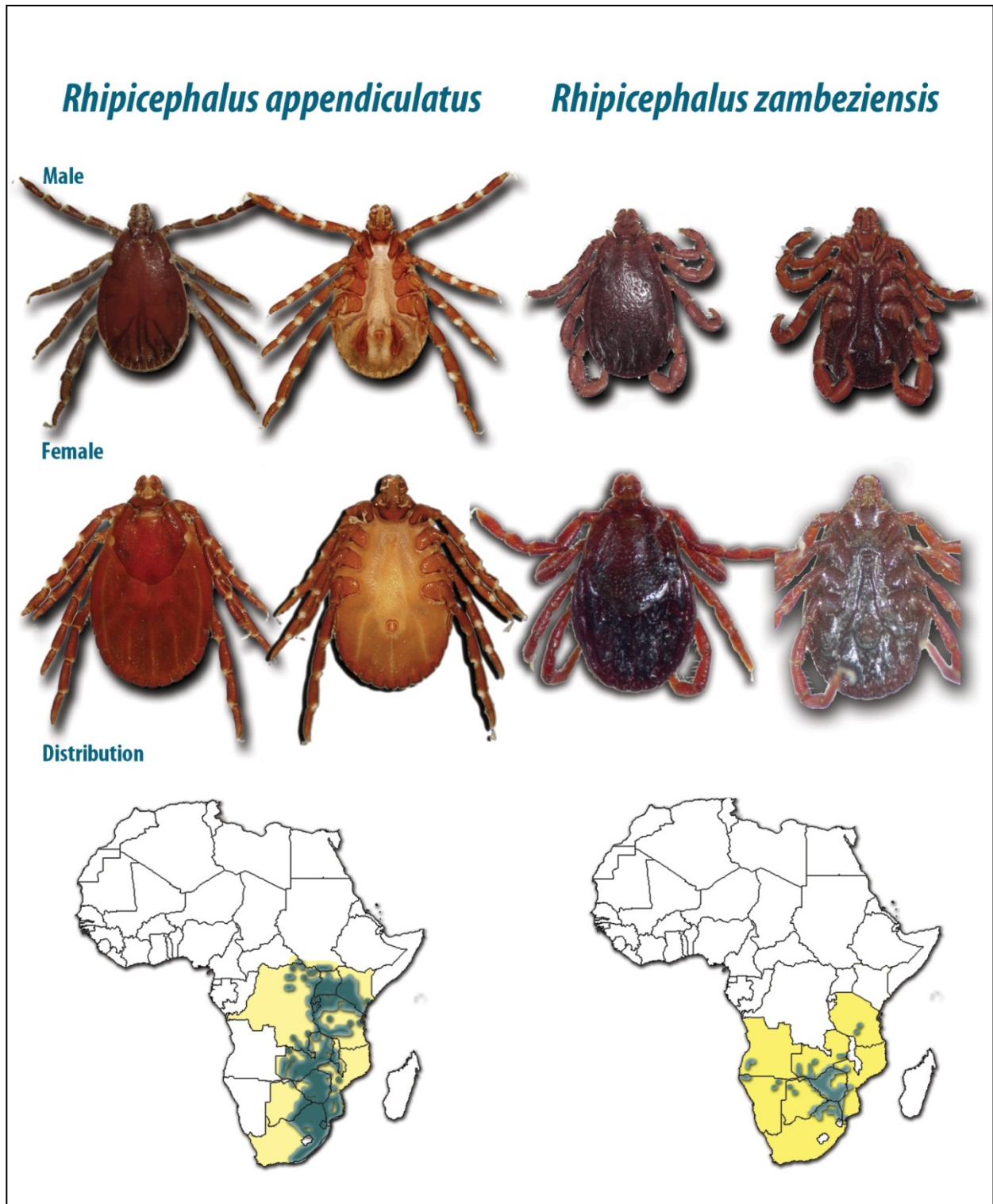
***Rhipicephalus appendiculatus* - Brown ear tick**

The tick is a uniform brown colour. The mouthparts are short and the basis capituli, particularly of the female, is hexagonal in shape. The anterior process of coxa I is visible from the dorsal surface. The cervical fields are the shape of scalpel-shaped depressions. The eyes are flat. There is a mixture of medium-sized and fine punctations present in the middle of the conscutum and the scutum. The postero-median groove and the postero-lateral grooves on the male conscutum are fairly long and narrow. The adanal plates are fairly long and in engorged males a caudal appendage is present. In males the legs increase in size from I to IV.

Large numbers of both adult and immature ticks can be found on cattle, goats, African buffalo, eland, male nyala, greater kudu and sable antelope (*Hyppotragus niger*). Some adults and large numbers of immatures can occur on smaller antelopes such as impalas and only immatures on scrub hares.

The adults are found particularly on the inner and outer surfaces of the ears but do not go into the ear canals. In heavy infestations they are also found on the eyelids, around the horns, on the upper surfaces of the neck, in the tailbrush and around the anus. On cattle the immature stages attach mainly on the neck and dewlap, the cheeks, eyelids, muzzle and ears.

This tick is an eastern, central and southern African species. Its distribution extends from southern Sudan, Uganda, south-western Kenya, eastern Democratic Republic of the Congo, Rwanda and Burundi, to northern, north-eastern, central and south-western Tanzania. In southern Africa it is confined to the moister regions, which include the highlands of Malawi, Zambia, Mozambique (Angonia and Chimoio Districts), and Zimbabwe. It is also present in eastern Botswana and in Swaziland. The extent of its distribution in the coastal regions of Mozambique is unknown. In South Africa it is present in Limpopo, North-West, Gauteng and Mpumalanga Provinces, along the east coast of KwaZulu-Natal and the coastal regions of the Eastern Cape Province to Grahamstown in the west of the latter province. There are also foci in the Ermelo and Carolina districts in Mpumalanga and Vredefort in the Free State.



Rhipicephalus appendiculatus survives best in woodland and woodland savanna regions with good vegetation cover. It tends to die out if overgrazing occurs and it does not survive on open plains. It was introduced into the south-eastern lowveld of Zimbabwe during the commencement of a wet cycle in 1973, and by 1982 it was estimated that more than 1 million ha of the lowveld were infested.

It started to disappear from this region towards the end of a dry cycle in 1983 and by 1985 it could no longer be found.

This is a three-host tick. It feeds rapidly in all stages of development requiring only 4 to 7 days to engorge. The engorged female lays 3 000 to 5 000 eggs after detaching from the host. These eggs hatch in 20 to 90 days. The entire life cycle can be completed in 3 months but in the southern regions of the tick's distribution it probably takes a year to complete.

Rhipicephalus appendiculatus has a strictly seasonal, single annual life cycle in southern Africa. Adults occur during the rainy period (December to March), larvae in the cooler late summer to winter period after the rains (March to July) and nymphs in the winter and early spring (July to October). The pattern of seasonal occurrence is regulated by the unfed adults, which enter diapause and do not engage in host seeking until the rains start. In regions close to the equator more than one life cycle can be completed annually and no clear pattern of seasonal abundance may be evident.

This tick is the main vector of *Theileria parva*, the causative organism of East Coast fever in cattle. Transmission takes place from stage to stage. Benign bovine theileriosis caused by *Theileria taurotragi*, bovine ehrlichiosis (*E. bovis*) and the virus of Nairobi sheep disease are also transmitted by this tick species. It is also responsible for the transmission of *Rickettsia conori* to humans. It is hypothesized that the saliva of *R. appendiculatus* contains a toxin and if large numbers of ticks infest an animal this toxin can interfere with the immune processes of the host resulting in a loss of condition and outbreaks of babesiosis, anaplasmosis and heartwater in animals that were previously immune to these diseases. Severe infestations can lead to crumpling of the ear and infestations of the ear with the larvae of *Chrysomya bezziana* may occur.

***Rhipicephalus zambeziensis* - Lowveld brown ear tick**

Rhipicephalus zambeziensis is closely related to *R. appendiculatus*, and the two are morphologically very similar. The major difference between the adults of the two species is that *R. zambeziensis* has more conspicuous punctations on the scutum. In the females the genital aperture of *R. appendiculatus* is shaped like a deep bowl with sloping sides, whereas that of *R. zambeziensis* is shaped like a pot with nearly upright sides. The immature stages are more easily differentiated than the adults.

The tick has the same hosts as those used by *R. appendiculatus* during its adult and immature stages. Adults are found on the head and ears and on the muzzles, and immatures on the feet and legs.

Rhipicephalus zambeziensis replaces *R. appendiculatus* in the hot, dry river valley systems of south-eastern Africa (Luangwa, Kafue, Zambezi, Sabi and Limpopo Valleys) that separate the major highland areas. It is present in the dry environments of northern Namibia and in the lowland areas of the Mozambique interior. The distributions of *R. zambeziensis* and *R. appendiculatus* overlap where there are gradual transitions between wet and dry areas. This occurs in parts of the eastern and southern provinces of Zambia bordering the Zambezi Valley, eastern Botswana and in North-West, Limpopo and Mpumalanga Provinces, South Africa. Some interspecific hybridization may occur. *R. zambeziensis* is absent from semi-desert and desert areas.

Ticks: Tick identification

This is a three-host tick. Adults are most numerous in the late summer, larvae during autumn and winter and nymphs during winter and spring.

Rhipicephalus zambeziensis is the vector of Corridor disease (*T. parva*), benign bovine theileriosis (*T. taurotragi*) and ehrlichiosis (*E. bovis*).

Rhipicephalus evertsi evertsi - the red-legged tick.

Conscutum and scutum are densely punctate and very dark brown contrasting with the reddish-orange body wall. The eyes are convex and orbited and the legs are reddish-orange. The adanal plates are triangular in shape and large, and the circum-spiracular integument is covered with dense prominent setae.

Adults prefer horses, zebras, elands, cattle and sheep. Larvae and nymphs utilise the same hosts as the adults and also scrub hares and various antelopes. The adults are found on the hairless area around the anus as well as the inguinal region of equids and sheep. The immature stages attach deep in the ear canals. Several hundred of these may be recovered from the ear canals of zebras.

Of the 60 or more *Rhipicephalus* spp. that occur in Africa *R. evertsi evertsi* is the most widespread, with the majority of sub-Saharan countries reporting its presence. It is most common in the eastern part of the continent, from Eritrea and Sudan in the north to South Africa in the south. With the exception of the Northern Cape Province, where its distribution is somewhat limited, it occurs virtually throughout South Africa. It tolerates a wide range of climatic conditions and in southern Africa the main factor limiting its distribution in the west is increasing aridity, with the critical rainfall level being about 250 to 280 mm per annum.

This is a two-host tick. After dropping from the host the engorged females lay 5 000 to 7 000 eggs and then die. The eggs hatch and the larvae climb on to the vegetation and then on to the first hosts and attach deep in the ear canals where they moult to the nymphal stage after about 1 week. The nymphs engorge in about 1 week and then detach and drop off the host to moult to the adults. The adults attach to the second and final host on which they remain for about 6 to 12 days.

These ticks are active mainly during the summer but are present throughout the year in warm regions. In KwaZulu-Natal, South Africa, the immature stages are active from November to June and the adults from January to May. In Limpopo Province the immature stages are most abundant from April to September and the adults from September to March. More than one life cycle can be completed in a year.

Rhipicephalus evertsi evertsi may play a role in the transmission of *T. parva* to cattle, but if it does it is not an important vector. It transmits *Theileria equi* and *Babesia caballi* to horses stage to stage only. *T. equi* and *B. caballi* are also transmitted intra-uterinely in horses. It has been demonstrated experimentally that it can transmit *B. bigemina* transovarially to cattle. Stage to stage transmission of *Theileria separata* to sheep also occurs. Transmission of *B. theileri*, the cause of spirochaetosis in cattle, horses, sheep and goats has also been reported. The saliva of engorging female ticks contains a toxin that causes paralysis, particularly in lambs, but it may also affect calves and adult sheep. This toxicosis is known as spring lamb paralysis because of its seasonal occurrence. In the









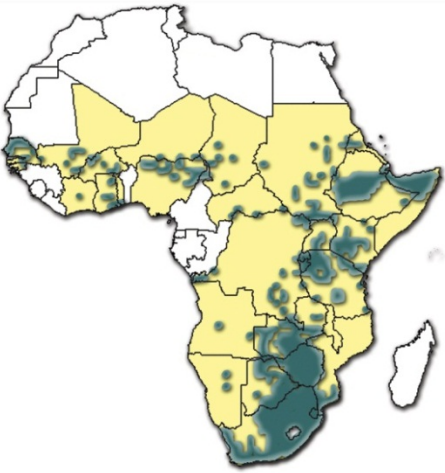

Ticks: Tick identification

eastern highveld regions of the Mpumalanga and Free State Provinces, South Africa the synchronous moulting of free-living over-wintered nymphs gives rise to large numbers of adults on spring-born lambs. Several females are necessary to produce paralysis and they must have fed for about 5 days and weigh between 15 and 21 mg each. The clinical signs can be reversed by removal of the ticks. Large infestations of immature ticks may damage the ear canal of its host.

A very similar tick, *Rhipicephalus evertsi mimeticus*, known as the Namibian red-legged tick, looks like *R. evertsi evertsi*, but has red and ivory-coloured banded legs similar to those of certain *Hyalomma* spp. However, the structure of its capitulum and its shorter mouthparts readily distinguish it from the *Hyalomma* spp.

Rhipicephalus evertsi mimeticus would seem to have the same host preferences, predilection attachment sites and life cycle as *R. evertsi evertsi*. The adults are most numerous from November to May and the immature stages in February and March and from May to September. This tick occurs in western Botswana, central and northern Namibia and southern and western Angola.

R. evertsi mimeticus transmits *Theileria equi*, the cause of equine piroplasmiasis, and *Theileria separata*, the cause of ovine theileriosis.

| <i>Rhipicephalus evertsi evertsi</i> | | <i>Rhipicephalus pravus</i> | |
|---|--|--|--|
| Male | | Female | |
|  |  |  |  |
|  |  |  |  |
| Distribution | | Distribution | |
|  | |  | |

Rhipicephalus pravus

Its conscutum and scutum narrow and punctate, eyes convex and prominent and cervical fields narrow and nearly parallel with each other. Large triangular adanal plates present on males and engorged males have a narrow fairly long caudal process.

All stages of development infest hares, adults on cattle, sheep and goats and wild ruminants. Immature stages are found on elephant shrews. Adults attach on the head and ears, and also on the lower neck, abdomen, udder, perineum, groin and heels of their larger hosts.

Rhipicephalus pravus is present in eastern Ethiopia, Somalia, Kenya, and north-eastern Tanzania.

It is a three-host tick. A long dry season seems important in the life cycle of this tick. Adults are most numerous during the rainy season in Ethiopia. The immature stages are present on hares during the dry season in Kenya.

***Rhipicephalus simus* - Glossy brown tick**

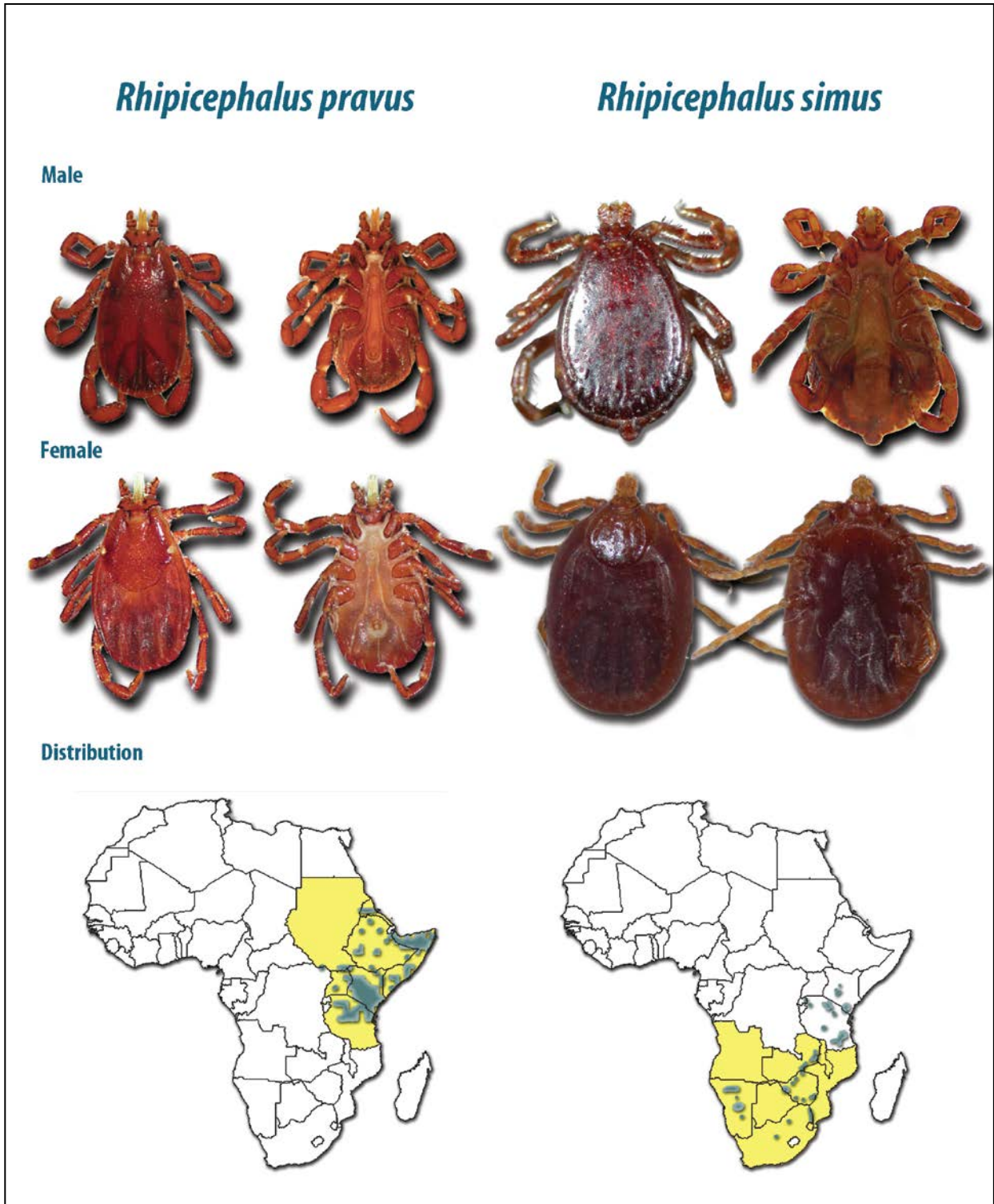
(In East Africa *R. simus* is replaced by *Rhipicephalus praetextatus*, which morphologically is nearly identical to *R. simus*)

The conscutum and scutum are shiny and dark or reddish-brown. There are four definite longitudinal rows of large punctations referred to as the “simus” pattern on the conscutum of the male, on which there are also numerous small to minute punctations. Posterior grooves are absent or very indistinct. The caudal process is bluntly rounded in engorged males, and the adanal plates are large and almost kidney-shaped. The posterior margin of the female scutum is usually smoothly rounded and the external margin of the broad cervical fields is clearly demarcated by irregular rows of punctuations. The shape of the female genital aperture is a truncated U-shape, diverging anteriorly.

Adult ticks infest cattle, sheep goats, horses and dogs, large carnivores, zebras, warthogs, rhinoceroses. The larvae and nymphs infest rodents. The adults are found in the tail switch of cattle and zebras and on the head and shoulders of dogs and warthogs, as well as around the feet of sheep and cattle.

Rhipicephalus simus is widespread in the moister eastern regions of southern Africa, but is never very numerous. It is a three-host tick of which the adults are present in summer, larvae autumn to winter on their rodent hosts, and the nymphs winter to spring on rodents.

Rhipicephalus simus can transmit *Anaplasma marginale*, the cause of anaplasmosis or gallsickness in cattle, stage to stage and intrastadially.



The Argasidae

Subfamily: Argasinae

Argas walkerae and *Argas persicus* - The fowl tick or fowl tampan

The ticks are flat and their outline egg-shaped (ovate). The capitulum of the adults and nymphs is present on the antero-ventral surface of the body and not visible from above. The integument of the body is leathery and on both the dorsal and ventral surfaces there are numerous symmetrically arranged discs. The margin of the body is sharp, clearly defined and differentiated morphologically from the rest of the integument by a row of quadrangular cells on both the dorsal and ventral surfaces. Eyes are absent.

It infests domestic fowls, ducks, geese and turkeys. The female tampan lays a batch of 20 to 100 eggs after each blood meal. The eggs hatch in approximately 3 weeks. The six-legged larvae will attach and feed on a host for five to 10 days, usually under the wings. They drop off to moult in cracks and crevices in the poultry house. The nymphs will feed for 5 minutes to a few hours and then moult. There can be 4 nymph stages each requiring a blood meal before moulting to the next stage. Moulting to the adult can occur from the 2nd stage onwards. The final nymph stage moults to the adult which also feeds for a short while and like the nymphs usually only at night when the birds are roosting. The adults feed about once a month and the females produce a batch of eggs after each blood meal, they may produce some six or seven batches during their lifetime. The larvae can survive for 2 months or more, the nymphs for 1 year and the adults for up to 3 years without a blood meal. Very large populations of ticks can build up rapidly in untreated poultry houses.

Larvae and the first nymphal stage in early summer; nymphal stages 2 to 4 are present in midsummer; adults late summer and winter. The ticks over-winter as adults or eggs.

The two *Argas* spp. can transmit a number of diseases to poultry (e.g. avian spirochaetosis and piroplasmosis). The larval ticks excrete a toxin causing paralysis in chickens and in ducks.

Subfamily: Ornithodorinae

Otobius megnini - spinose ear tick

Adult ticks are dark-grey in colour and violin-shaped. Numerous small pits are present on the integument. The lateral margin of the body is thick without a definite suture line. The mouthparts are rudimentary and the capitulum is situated on the antero-ventral surface of the body. The adults do not feed. The tick is eyeless.

The larvae have six fairly long legs and the capitulum is situated anteriorly. As the larvae engorge they become pear-shaped. They are white or pink in colour. There are a number of nymph stages. The earlier ones are diamond-shaped and the later ones assume a violin-shape, similar to that of the adults. The capitulum is situated antero-ventrally under the body. The nymphs are covered with short, rigid spines from which the tick derives its common name.

Ticks: Tick identification

Otobius megnini infests cattle, sheep, goats, horses, donkeys, mules and cats and occasionally humans.

This tick was introduced from South America in about 1898 after the rinderpest. It is found in the drier areas of the country such as the Karoo, Kalahari and Free State but is still spreading and has been found in the Pretoria district.

The female tick lays 300 to 1500 eggs in batches over a period of months. These eggs are laid in cracks and crevices in kraals, stables and catteries. The eggs hatch in about three weeks giving rise to a six-legged larva, which, after locating a host, attaches in the ear canal. The larval stage lasts 1 to 2 weeks and the larva then moults in the ear and gives rise to the first nymph stage, which is eight-legged and also attaches in the ear. The number of nymph stages is unknown but moulting and attachment of each stage occurs in the ear. The nymphs remain in the ear for 3 to 6 months and the final nymph stage engorges, detaches and drops out in the kraal. These nymphs moult and the resulting adults mate; 18 months may pass before mating takes place. The adults are non-parasitic and remain in cracks and crevices in the kraal. The life cycle may extend for a period of 2 years.

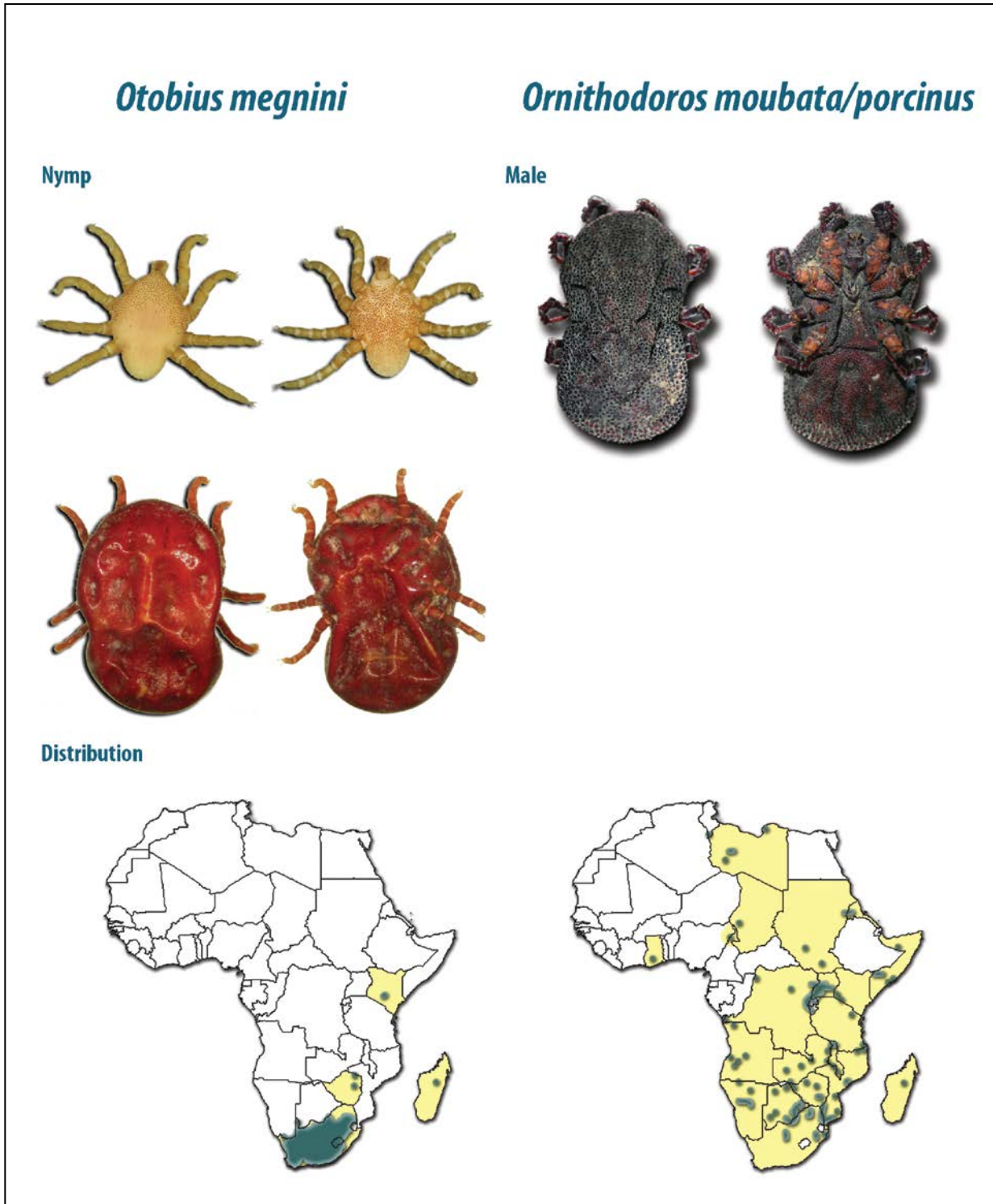
Otobius megnini is essentially a kraal infestation and the ticks are carried to new localities in the ears of infested animals. The ticks feeding in the ear canal and the spines on their bodies result in considerable irritation and infested animals do not feed well.

***Ornithodoros moubata/porcinus* - eyeless or hut tampan, warthog tampan**

The adults are grey-brown in colour with a leathery mammilated integument, the margins of the body are rounded and a supracoxal fold is present. They are similar in appearance to *Ornithodoros savignyi* but have no eyes.

Hosts are humans, poultry, domestic pigs and warthogs.

The distribution of ticks of the *O. moubata* complex that parasitize warthog follows that of their warthog hosts, which still occur in large areas of southern Africa. However, as the density of human habitation increases, these areas are decreasing in size and in number and wildlife reserves are becoming the foci of warthog distribution. Locally the ticks are spread via their nymphal stages, which are commonly found on warthog foraging outside their burrows. These tampan are widespread in the more arid western and northern regions of North West, Limpopo and Mpumalanga Provinces, South Africa. They are also present in Botswana, Namibia, Zimbabwe, Tanzania, Kenya, Uganda, Ethiopia, Somalia and Sudan, and in Central and few records are from West Africa.



After a blood meal and mating the female produces a batch of approximately 300 eggs, which are well hidden. Six-legged larvae hatch from these eggs, but do not feed and then moult to the first nymph stage after 1 to 2 days. The nymphs seek a host and take a blood meal and then moult to the next nymph stage. This process is repeated for each of the four or five nymph stages. Each of these nymph stages may survive for as long as 2 years without a blood meal. The adults seek a host and

Ticks: Tick identification

take a blood meal that may take 20 to 30 minutes. While they are feeding they void large volumes of coxal fluid through the coxal openings between coxae I and II. Feeding in all stages usually takes place at night. After each blood meal the females lay a batch of eggs. The adults can survive for 4 to 5 years without food. All stages of the hut tampan hide in cracks and crevices in the hut walls during the day. Those of the warthog tampan hide in crevices in the warthog's burrow during the day. Large numbers of nymphs may be present on free-ranging warthogs out of their burrows during the day and infestation is probably spread in this way.

The warthog species, *O. porcinus* plays a role in the transmission of the virus causing African swine fever. Transovarial and trans-stadial transmission of the virus occur and it may also pass from male to female ticks during mating via the spermatophore. Adult warthogs serve as carriers of African swine fever virus but the viraemia in these animals is usually very low and transmission of the virus from warthogs to domestic pigs is effected by *O. porcinus*. Infection of warthogs usually occurs in the first 4 – 6 weeks of life via infected ticks in the burrows. *Ornithodoros moubata* transmits *Borrelia duttoni*, the causative organism of African relapsing fever in humans. This infection is transmitted to humans by means of the coxal fluid that is produced while the tampan is feeding and thus contaminates the feeding wound. Furthermore the *O. moubata* complex of ticks transmits *Borrelia anserina* the causative organism of fowl spirochaetosis and *Aegyptianella pullorum* to chickens.

Ticks of dogs

This section is devoted to the ticks that are commonly encountered on dogs.

***Haemaphysalis elliptica* – southern African yellow dog tick**



For many years this tick was referred to as *Haemaphysalis leachi*, with which it had been lumped. We now know that it is a valid species in its own right and that all previous records of *H. leachi* in South Africa actually refer to *H. elliptica*.

Ticks: Tick identification

The hypostome and palps are short. The second segment of the palps is extended laterally giving the capitulum a triangular appearance. The basis capituli has well-developed posterior processes (cornua). The scutum is yellow in colour and is covered with numerous small punctations and festoons are present. Eyes are absent. There are no adanal plates in the males.

Adults are found on dogs, cats and larger wild carnivores, particularly the large wild felids. Larvae and nymphs infest rodents. Adults attach to the head, neck and shoulders, but in severe infestations they are present over the entire body.

Haemaphysalis elliptica is present in the eastern part of the country from East London through KwaZulu-Natal to the Zimbabwean border, as well as the Provinces of Gauteng, North West Province, Mpumalanga, Limpopo and north-eastern Free State in South Africa. It is also present in numerous large foci in the Eastern and Western Cape Provinces. The ticks prefer high rainfall, but may occur wherever the rodent hosts for the immature stages are present. Because the hosts of the immature stages are rodents, this tick generally infests dogs in large domestic plots, small-holdings and farms.

Haemaphysalis elliptica is a three-host tick. The female feeds for 1 to 2 weeks, expands slowly initially but engorges rapidly on the last day. Female ticks lay about 5000 eggs within 14 days of detaching from the host. The eggs hatch in 1 to 4 months. The larvae and nymphs usually infest common murid rodents but may also be found on dogs.

Adults are present throughout the year with peak numbers from winter, spring to late summer.

Haemaphysalis elliptica is the vector of *Babesia rossi*, the cause of canine babesiosis.

Rhipicephalus gertrudae

The conscutum and scutum are dark or reddish-brown and very heavily punctate. Posterior grooves are absent or very indistinct. The caudal process is bluntly rounded in engorged males, and the adanal plates are large and almost kidney-shaped. The posterior margin of the female scutum is usually smoothly rounded and the external margin of the broad cervical fields is clearly demarcated by irregular rows of punctations.



Adults occur on dogs, cats, sheep and antelopes (e.g. eland). Immature stages are found on rodents. The adults attach to the head and shoulders of dogs. Because the hosts of the immature stages are rodents, this tick generally infests dogs kept on large domestic plots, small-holdings and farms. It is a three-host tick and the adults are present from late winter to early summer.

It replaces *R. simus* in the Western and Northern Cape Provinces, western Free State.

***Rhipicephalus sanguineus* – the kennel tick**

The conscutum and scutum are yellowish to reddish-brown and, apart from a variable number of punctations, often appears smooth. The eyes are distinct and slightly convex. The marginal grooves in the male are sharply defined. The posterior grooves on the conscutum of the male may be well-defined or inconspicuous. The bodywall of the male has a salmon-pink colour and when engorged extends beyond the conscutum. The basis capituli of the female has broad lateral angles, and the cervical fields are slightly depressed and scalpel-shaped.

Dogs are the preferred, if not the only hosts, for all stages of development. Larvae are found particularly on the stomach and sides, nymphs on the ears and shoulders, and adults on the ears, neck and shoulders of dogs. Adults and nymphs may also be present between the toes.

Its distribution is world-wide between 50°N and 35°S. In South Africa it is found particularly in the warm and moist areas, it also occurs in dry areas but not in the desert-like conditions in the west of the country. The immediate distribution of its free-living stages is confined to kennels, domestic dwellings and other human-made structures. This tick is well-adapted to living in kennels and houses. Except when it is present on dogs it does not occur outside of these structures.

Rhipicephalus sanguineus is a three-host tick. The engorged female detaches and lays 3000 to 5000 eggs within 1 to 8 weeks. These eggs hatch in 3 to 8 weeks. The larvae engorge in 3 to 8 days and moult in 3 to 4 weeks. The nymphs engorge in 4 to 10 days and moult in 3 to 26 weeks. The adults may engorge in 7 days but the female can stay on the dog for 3 weeks and the male for considerably longer. The life cycle can be completed in 10 weeks under ideal conditions. In warm temperate and summer rainfall areas all stages are found on dogs from October to May. Infestation over-winters as the pre-moulted nymph stage and possibly as engorged females. More than one life cycle per year is possible. The females may lay their eggs under the dogs' bedding or in cracks and crevices or they may climb up the walls and lay eggs in cracks and crevices in the walls. The larvae and nymphs usually moult in the same sites as the females lay their eggs. Dogs that are tied up or caged may become heavily infested. In artificially heated houses the life cycle may continue during winter.

Rhipicephalus sanguineus is the vector of *Ehrlichia canis*, the cause of canine ehrlichiosis or tropical pancytopenia in dogs.

***Rhipicephalus simus* - Glossy brown tick**

The conscutum and scutum are shiny and dark or reddish-brown. There are four definite longitudinal rows of large punctations referred to as the "simus" pattern on the conscutum of the male, on which there are also numerous small to minute punctations. Posterior grooves are absent or very indistinct. The caudal process is bluntly rounded in engorged males, and the adanal plates are large and almost kidney-shaped. The posterior margin of the female scutum is usually smoothly rounded and the external margin of the broad cervical fields is clearly demarcated by irregular rows of punctations. The shape of the female genital aperture is a truncated U-shape, diverging anteriorly.

Adult ticks infest dogs, cats, cattle, sheep, goats, horses, large carnivores (e.g. lions), zebras, warhogs, and rhinoceroses. Because the hosts of the immature stages are rodents, this tick generally infests dogs kept on large domestic plots, small-holdings and farms. The adults are found on the head and shoulders of dogs.

Rhipicephalus simus is widespread in the moister eastern regions of southern Africa, but is never very numerous. It is a three-host tick of which the adults are present in summer, larvae in autumn to winter on their rodent hosts, and the nymphs from winter to spring on rodents.

Ticks of reptiles

***Amblyomma marmoreum* – South African tortoise tick**

It is a very large tick with long, robust mouthparts. The conscutum and scutum are dull yellow to beige with dark-brown markings and numerous prominent, deep punctations.

All stages of development, especially the adults, feed on tortoises, and more particularly leopard tortoises, *Geochelone pardalis*. Adults very rarely parasitize domestic livestock, but the immature stages, especially larvae, are frequently encountered on these animals, as well as on wild carnivores

and antelopes and also on scrub hares and on helmeted guineafowls and other ground-frequenting birds. On tortoises the ticks attach to the soft parts around the base of the legs and tail.

Amblyomma marmoreum is widespread in South Africa and Zimbabwe and is probably more prevalent in Mozambique, Botswana and Namibia than current records seem to indicate.

It is a three-host tick. On tortoises all stages remain attached for 2 to 7 weeks, or longer. The adults are most abundant during summer, the larvae from autumn to spring and nymphs from spring to summer. The life cycle may take longer than 1 year to complete.

Amblyomma sylvaticum

It is a small species of *Amblyomma*. The conscutum of the males is dark brown to nearly black with ivory colouring on its lateral edges. The female scutum is also dark-brown with ivory-coloured ornamentation particularly in the lateral fields and the eyes are surrounded by dark patches. Angulate tortoises (*Chersina angulata*) are the preferred hosts of *Amblyomma sylvaticum*, although other tortoise species may also be infested.

Amblyomma (previously Aponomma)

Amblyomma exornatum

It is a very small ornate tick. Mouthparts are long in relation to the small size of its body. It is an eyeless tick. The conscutum of males is oval to nearly circular in some specimens. Ornamentation on the male conscutum is in the form of nine iridescent green coppery to yellow markings on a dark-brown background. The female scutum is dark-brown with three patches of ornamentation, two laterally and one on the posterior field of the scutum. *Amblyomma exornatum* is a tick of varanid lizards and male ticks frequently cluster in the nostrils of these reptiles.

Amblyomma latum

It is a very small tick with long mouthparts. The tick is eyeless. The conscutum of the male is virtually circular in shape and uniformly brown. The female scutum is brown. *Amblyomma latum* is a tick that attaches under the scales of snakes.

Amblyomma transversale

It is a very small tick with long mouthparts. It is an eyeless tick. The conscutum of males are laterally oval and light-brown, seeming to cover only the first 4/5ths of the dorsal surface. *A. transversale* is a tick of pythons.

Ornithodoros compactus

It is a small soft tick or tampan infesting particularly Namaqualand speckled padloper tortoises, *Homopus signatus signatus*, in South Africa. Unlike the nymphs and adults of other *Ornithodoros* spp. many *O. compactus* may be present on their tortoise hosts.

Some beautiful or unusual ixodid ticks

***Rhipicephalus pulchellus* – the zebra tick**

This is a medium-sized large *Rhipicephalus* spp. with a striking dark-brown and ivory-coloured pattern on the conscutum, while the whole scutum of the female is ivory-coloured except for brown patches around the eyes. The other morphological features of this tick are similar to those of *R. appendiculatus*.



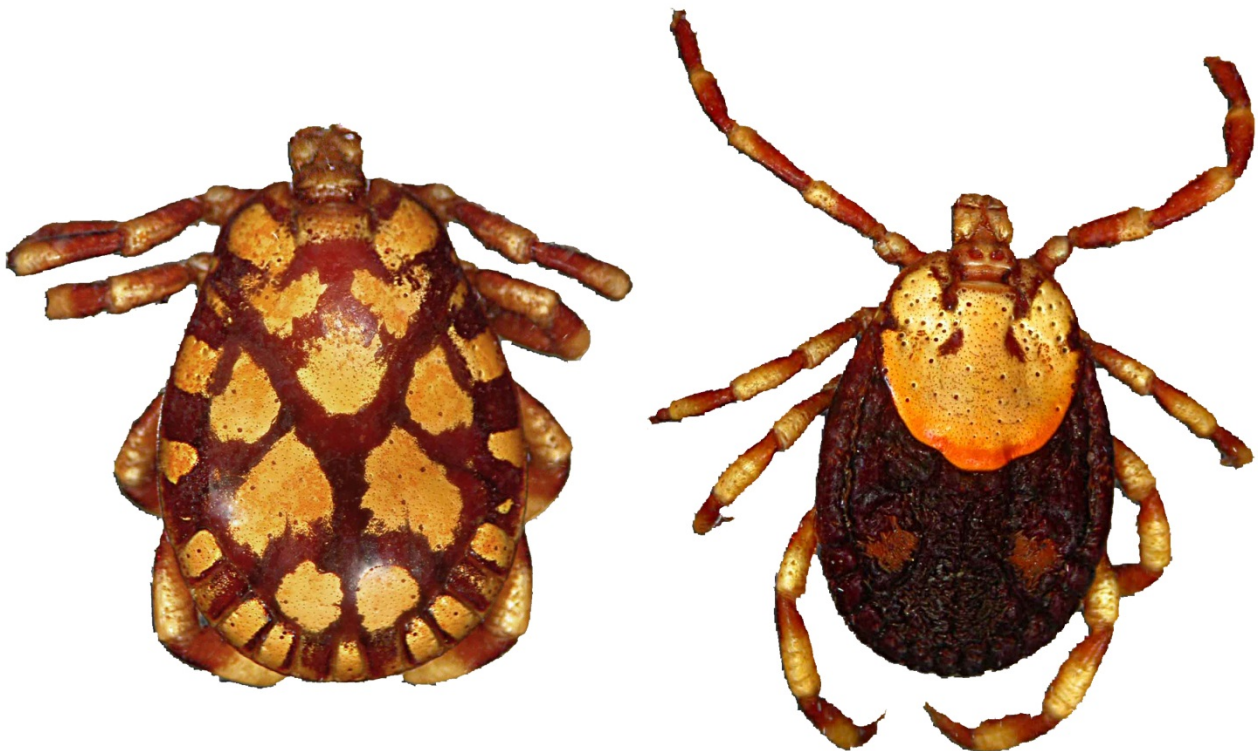
All stages of development infest cattle, sheep, goats, camels, zebras, African buffaloes and elands. The immature stages may also occur on hares. On cattle and sheep and other hosts the adults attach to the ears and the underside of the body.

It is present in the Horn of Africa and east of the Rift Valley from Eritrea in the north to north-eastern Tanzania in the south. It is a three-host tick. The adults appear to be most abundant during the rainy season.

In Somalia *Rhipicephalus pulchellus* was found to be a vector of Nairobi sheep disease virus.

***Dermacentor rhinoceros* - the rhinoceros tick**

It is a large tick a rectangular basis capituli with medium-length, robust palps. The conscutum of male is chocolate-brown with orange patches of ornamentation, much like a gaint ladybird. Festoons are present but there are no adanal plates on the male. The coxae are large and the legs are banded. The female scutum is entirely ivory-coloured with a tinge of orange, except for a patch of brown around the eyes. Two prominent patches of white setae are present on the alloscutum of female ticks.



Dermacentor rhinocerus infests black and white rhinoceroses (*Diceros bicornis* and *Ceratotherium simus*). The hosts of the immature stages are rodents. It is present within the distribution ranges of rhinoceroses in Africa. It is a three-host tick. The adults quest for their rhinoceros hosts from the stems of thick grass at height of 1 to 2 metres.

***Margaropus winthemi* - winter horse tick**

The male is small and eyes are present, but difficult to see. Festoons are absent. There are tufts of hair along the posterior margin of the body of the male, the caudal process is large and the adanal plates are sharply pointed posteriorly and fused anterior to the anus. The segments of especially the fourth pair of legs of the male are markedly expanded. The mouthparts of both males and females are short and their light coloured legs have brown bands.

This tick infests particularly horses, zebras, eland and also cattle. It prefers to attach to the sides of the host animal.

Margaropus winthemi is absent in the coastal belt of South Africa and occurs in foci in Lesotho, southern, central, eastern and western parts of the Free State, the higher regions of the Western and Eastern Cape and KwaZulu-Natal Provinces with isolated foci in the North West Province of South Africa.

This is a one-host tick. Very large numbers of ticks are present on its preferred hosts in mid and late winter, with mountain zebras near Cradock in the Eastern Cape Province harbouring 40 000 ticks or more in mid-winter. None to hardly any ticks are present in summer.

This tick does not transmit any diseases, but large infestations during winter can lead to a loss of condition and to the death of zebra foals. During winter starlings will make opportunistic use of the abundant food supply supplied by this tick on infested hosts.

Rhipicentor nuttalli

This is a brown tick superficially resembling *Rhipicephalus* spp. Eyes and festoons are present. There are no adanal plates on the males. Coxae I with two long, pointed, posteriorly directed spurs. All coxae are large; particularly coxae IV on the males, coxae IV each have two long, sharp, posteriorly directed spurs arising from their posterior margins.

Adult ticks infest hedgehogs and carnivores, the immature stages infest elephant shrews. The tick is probably more widely distributed in South Africa than present distribution records show. It has been recorded in isolated localities in the Western, Northern and Eastern Cape Provinces, Free State, Gauteng, North West and Limpopo Provinces and in Zimbabwe and Namibia.

It is a three-host tick of which the adults can cause paralysis in dogs.