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■ The tick vectors of cowdriosis in Angola

GOMES (A.F.). Les vecteurs de la cowdriose en Angola. *Revue Élev. Méd. vét. Pays trop.*, 1993, 46 (1-2) : 237-243

Parmi les espèces d'*Amblyomma* qui sont des vecteurs prouvés de *Cowdria ruminantium*, six ont été trouvées en Angola. *A. pomposum* est l'espèce la plus importante et la plus répandue. *A. variegatum*, prédominante dans les provinces de Cabinda et de Moxico, et *A. astrion*, qui se trouve dans la zone littorale et la zone de transition et sur le plateau de Camabatela, ont une importance moindre. *A. sparsum* et *A. tholloni*, parasites spécifiques d'hôtes sauvages, sont considérés comme des vecteurs accessoires. *A. hebraeum* a été introduit récemment dans le territoire mais sa distribution actuelle est inconnue. Les hôtes, la répartition, l'écologie et l'abondance saisonnière de ces espèces sont passés en revue.

Mots clés : Cowdriose - *Cowdria ruminantium* - Vecteur - Tique - *Amblyomma* - Hôte - Distribution naturelle - Variation saisonnière.

INTRODUCTION

Cowdriosis (heartwater) is a major tickborne disease of ruminants, caused by the rickettsial organism, *Cowdria ruminantium*, and is transmitted by 3-host ticks belonging to the genus *Amblyomma*. Transmission is transstadial although one case of transovarial transmission has been reported by BEZUIDENHOUT and JACOBSZ (4). ANDREW and NORVAL (2) investigated the role of males in the transmission of this rickettsia and demonstrated the transstadial (nymph to adult) and intrastadial transmission.

In Angola cowdriosis is a major disease problem for cattle and small ruminants originating from disease-free areas and sometimes a serious problem for local populations of small ruminants as well. Amongst the proven experimental vectors there exists *Amblyomma astrion*, *A. pomposum*, *A. sparsum*, *A. tholloni* and *A. variegatum*. *A. hebraeum* has been introduced recently in Camabatela plateau. *A. variegatum* has been proved to be an efficient vector of cowdriosis by DAUBNEY in 1930 (6) ; *A. tholloni* by MACKENZIE and NORVAL (16) ; *A. sparsum* by NORVAL and MACKENZIE (21) ; *A. pomposum* by NEITZ in

1947 (18) and afterwards by SERRANO (27) in Angola; *A. astrion* by UILENBERG and NIEWOLD (33) and *A. hebraeum* by LOUNSBURY (15). Besides these species, *A. splendidum*, *A. nuttalli* and *A. compressum* have also been recorded in Angola. *Amblyomma* ticks existing in this country have been reviewed previously by SERRANO (26).

METHODS

The present review is based on the material collected and identified by SOUSA DIAS (1949-1957) (28), SERRANO (1961-1974) (26, 27) and by the author (since 1975). The results of some of the detailed surveys accomplished by the author on the livestock areas are presented in table I. Ticks were identified according to descriptions by ROBINSON (25), SOUSA DIAS (28), HOOGSTRAAL (13), WALKER (34) and WALKER and OLWAGE (36).

Ecological zones were classified according to DINIZ and AGUIAR (12), faunal districts according to TAYLOR (30) and vegetation according to BARBOSA (3). Concerning the climate the Thornthwaite's classification presented by DINIZ (11) was followed.

TABLE I Records of *Amblyomma* species on bovines in some of the livestock areas surveyed.

Area	No. of collections recorded	No. of collections containing			
		<i>A. astrion</i>	<i>A. hebraeum</i>	<i>A. pomposum</i>	<i>A. variegatum</i>
Camabatela plateau	30	3	1	11	1
Cela	64	—	—	24	—
Dombe Grande	40	22	—	—	—
Huambo province	80	—	—	44	—
Huila province	202	—	—	146	—

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RESULTS

Amblyomma astrion Dönitz, 1909

Hosts

In Angola *A. astrion* is primarily a parasite of the African buffalo (*Syncerus caffer*) but it also parasitizes frequently domestic ruminants especially in the regions where both exist. It was also recorded from the wart hog (*Phacochoerus aethiopicus*). Immatures are found predominantly on buffalo although they have also been seen on domestic ruminants.

Distribution and ecology (map 1)

A. astrion was recorded in Zaire, Bengo, Cuanza Norte, Cuanza Sul, Malanje, Benguela and Namibe provinces (north-west of the country, especially in the littoral and transition strips, both warm and dry). Its Southern limit in Angola and probably in the continent is formed by the Curoca river (Namibe province). The existence of this tick in areas with a rainfall less than 250 mm p.a. (e.g. Dombe Grande, Benguela province, Curoca, Namibe province) would be explained by the microclimate existing there.



Map 1 : Localities at which *Amblyomma astrion* has been collected.

Altitude : 0 - 1,000 m.

Ecological zones : II, III, IV, V, VII, XII.

Faunal districts : this tick was collected mainly in the southwest arid district.

Vegetation : forest - savanna mosaic ; thicket - savanna mosaic, tree and shrub savanna ; tree and shrub steppes.

Climate : *A. astrion* predominates in the semi-arid zone, but it exists from arid to humid climates. Rainfall : 100-1,400 mm p.a..

Seasonal occurrence

In Dombe Grande adults were collected all along the year but the largest collections were recorded from October to March.

Comments

PETNEY et al. (23) considered *A. astrion* as a vector of secondary importance on cowdriosis epidemiology. Nevertheless, its role would be more important because this tick can survive in areas where its main host, the buffalo, is disappearing and being replaced by domestic ruminants (e.g. Dombe Grande, Benguela province). In São Tomé and Príncipe islands, *A. astrion* is a major parasite of domestic ruminants (32). Also, African buffaloes are also known to remain carriers of *C. ruminantium* for long periods (1).

Amblyomma pomposum Dönitz, 1909

DIAS (7, 8, 10) asserted that the tick classified as *A. pomposum* in Angola is in fact *A. superbum* and considers *A. pomposum* as a species apparently restricted to East Africa. Until this nomenclatural problem would be solved, we continue to denominate this tick as *A. pomposum*, as have done SOUSA DIAS (28) and SERRANO (26).

Hosts

In Angola cattle are the dominant domestic host, but *A. pomposum* has also been found on sheep, goats, horses, donkeys, pigs and dogs. Nymphae are commonly seen on bovines and small ruminants. Adults infests also a wide range of wild hosts but are found predominantly on ungulates. They have been recorded on the following hosts : buffalo (*Syncerus caffer*), eland (*Taurotragus oryx*), kudu (*Tragelaphus strepsiceros*), roan antelope (*Hippotragus equinus*), zebra (*Equus burchelli*), red lechwe (*Kobus lechwe*) banded mongoose (*Mungos mungo*), wart hog (*Phacochoerus aethiopicus*) and pangolin (*Manis tricuspis*). SERRANO (26) indicates that immatures prefer small rodents. BORGHT-ELBL (5) reveals that these forms parasitize birds and reptiles as well as

carnivores and ungulates. DIAS (9) identifies nymphs from a lion (*Panthera leo*).

Distribution and ecology (map 2)

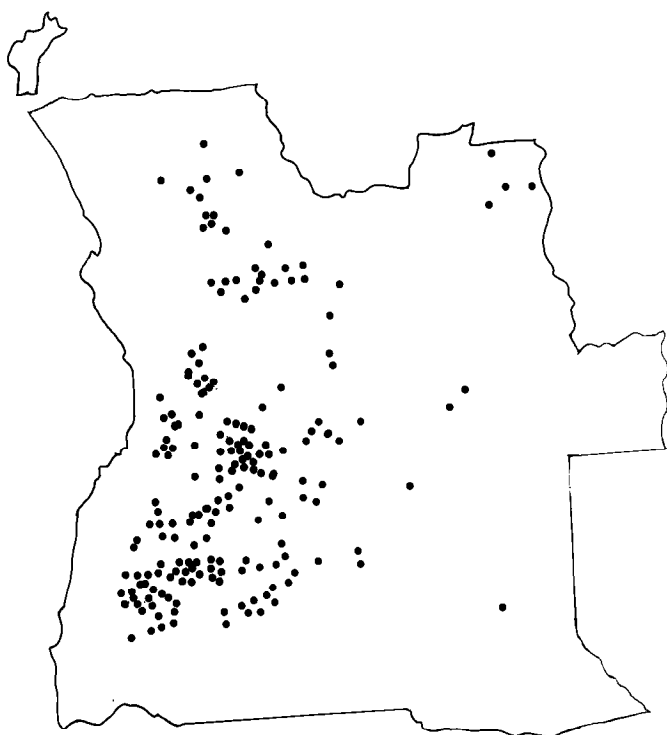
A. pomposum constitutes the most widely distributed *Amblyomma* species in Angola. It predominates in the highlands, where the climate and vegetation are more favourable. It has been collected in the following provinces : Uige, Malanje, Lunda Norte, Cuanza Norte, Cuanza Sul, Bie, Huambo, Benguela, Moxico, Cuando Cubango, Huila, Namibie and Cunene.

Altitude : it occurs above 500 m, but the regions of maximum abundance are located beyond 1,000 m.

Ecological zones : *A. pomposum* prevails in the zones VIII and IX, but it exists also in the zones V, X, XII, XIII. In the zones V and XVI it is scarce.

Faunal districts : it predominates in the Rhodesian highland district. Vegetation : it is especially a tick of woodlands.

Climate : *A. pomposum* prefers a humid climate. It is absent from arid areas and from almost all semi-arid areas. It prevails in areas where annual rainfall is higher than 1,000 mm but it was also recorded from areas receiving 800 mm p.a.



Map 2 : Localities at which *Amblyomma pomposum* has been collected.

Seasonal occurrence

Adults occur throughout the year, but heavier loads are present on cattle during the rainy season, from October-April. Substantial variation in the maximum abundance and in the timing of peak occurrence exists between regions with different climatic characteristics.

Comments

Economically *A. pomposum* is the most important *Amblyomma* species in Angola. It is the major vector of cowdriosis and its distribution has influenced the distribution of this disease which is more prevalent in the areas where *A. pomposum* exists. The tick itself causes abscess formation, lameness, anaemia, weight loss and is also associated with dermatophilosis.

A. pomposum becomes scarce in eastern Angola where it is substituted by *A. variegatum*. This rarefaction is probably due to the association between ticks, climate and particular vegetation types.

Amblyomma sparsum Neumann, 1899

Hosts

In Angola *A. sparsum* has never been recorded on domestic mammals, although YEOMAN and WALKER (37) reported the adult stage on cattle in Tanzania and NORVAL (19) stated that small numbers of nymphae may occur on cattle, sheep and goats in Zimbabwe. In Angola adults were collected from rhinoceros (*Diceros bicornis*), buffalo (*Syncerus caffer*), tortoises, large snakes and man, and nymphae from python (*Python sebae*) and tortoises. MOREL (17) noted that adults are parasites of both reptiles and mammals and asserted that *A. sparsum* has its place between *A. nuttalli* and ruminant *Amblyomma* (*A. variegatum* and *A. hebraeum* groups) in the series of the gradual adaptation of reptile ticks to mammals.

Distribution and ecology (map 3)

A. sparsum was recorded in south-west and south-east Angola (Benguela, Namibe, Huila and Cuando Cubango provinces).

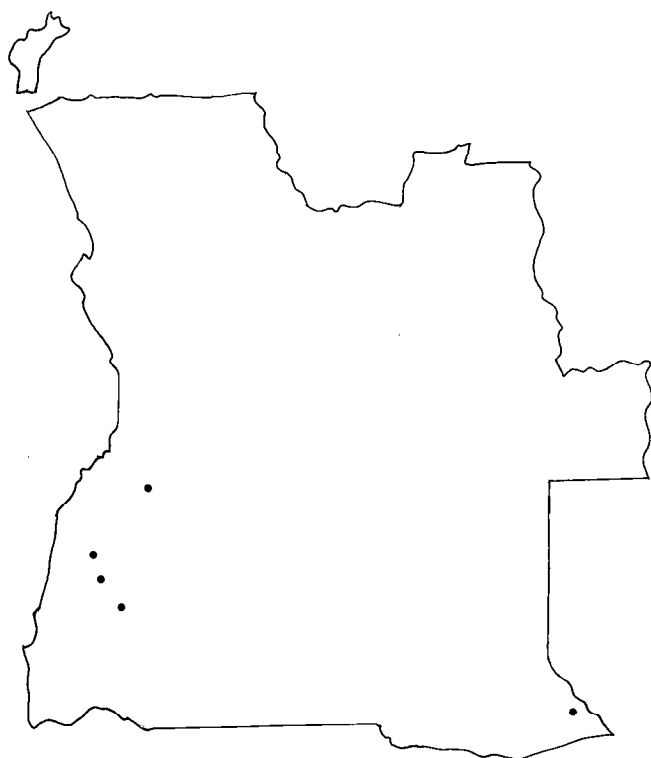
Altitude : 200-1,500 m.

Ecological zones : IV, V, XVI.

Faunal districts : although this tick has been collected predominantly in the south-west arid district, it exists also in the Rhodesian highland district.

Vegetation : woodlands; tree and shrub savanna.

Climate : *A. sparsum* exists in semi-arid and sub-humid areas with an average annual rainfall ranging from 200 to



Map 3 : Localities at which *Amblyomma sparsum* has been collected.

1,000 mm. BORGHT-ELBL (5) affirms that in areas where rainfall is less than 500 mm p.a. this tick probably survives in very humid microhabitats such as marshland and inundated areas along streams and rivers and lake shores.

Seasonal occurrence

Insufficient data are available.

Comments

A. sparsum cannot be regarded as an important vector of cowdriosis because it is essentially restricted to wildlife. Nevertheless, in addition to than buffaloes, one of its reptile hosts, a tortoise, is known to be an experimental carrier of *C. ruminantium*. According to PETNEY *et al.* (23) it is an accidental vector.

***Amblyomma tholloni* Neumann, 1899**

Hosts

In Angola adults of *A. tholloni* were collected only from elephants. We do not have any collection containing immature stages, but in Zimbabwe larvae and nymphae

have been recorded from cattle, sheep and goats (16, 19). It is extremely unlikely that adults will attach on ungulates under field conditions (20).

Distribution and ecology (map 4)

A. tholloni was collected in the north-west (Zaire and Bengo provinces). It occurs in association with the African elephant and undoubtedly its distribution is more extensive than that mapped in map 4.

Altitude : 100-1,000 m.

Ecological zones : II, V.

Faunal districts : southern Congo savanna district and southwest arid district.

Vegetation : forest-savanna mosaic; tree and shrub savanna.

Climate : *A. tholloni* was found in semi-arid and sub-humid zones. The rainfall ranges from 500 to 1,400 mm.

Seasonal occurrence

Few data are available to estimate its seasonal abundance.



Map 4 : Localities at which *Amblyomma tholloni* has been collected.

Comments

Adults of *A. tholloni* are found mainly on the African elephant (13, 19, 31, 35, 37). The immature stages are less host-specific and parasitize domestic ruminants and probably also wild ungulates making it possible that cowdriosis could be transmitted from wild to domestic hosts (16, 20). The knowledge that *A. tholloni* transmits *C. ruminantium* may be of value in understanding the origin of the disease in areas adjoining game reserves (16, 20). PETNEY *et al.* (23) classified this tick as an accidental vector of cowdriosis.

Amblyomma variegatum (Fabricius, 1794)

Hosts

In Angola *A. variegatum* occurs mainly on domestic ruminants, especially cattle, though sheep and goats are important hosts also.

Adults were also collected from horses, pigs, donkeys, buffalo (*Syncerus caffer*), kudu (*Tragelaphus strepsiceros*) and wart hog (*Phacochoerus aethiopicus*). Immatures predominate on domestic ruminants and dogs, but are also very common on birds, particularly ground-feeding ones (Galliformes, Gruiformes).

Distribution and ecology (map 5)

A. variegatum is the most common *Amblyomma* of intertropical Africa on domestic and wild mammals. In Angola it predominates in the East (Moxico province), but it is also present in Cabinda and Camabatela plateau. On this plateau it was recorded only in one collection (table I).

Altitude : 0-1,500 m.

Ecological zones : I, VII, XIII, XIV, XV.

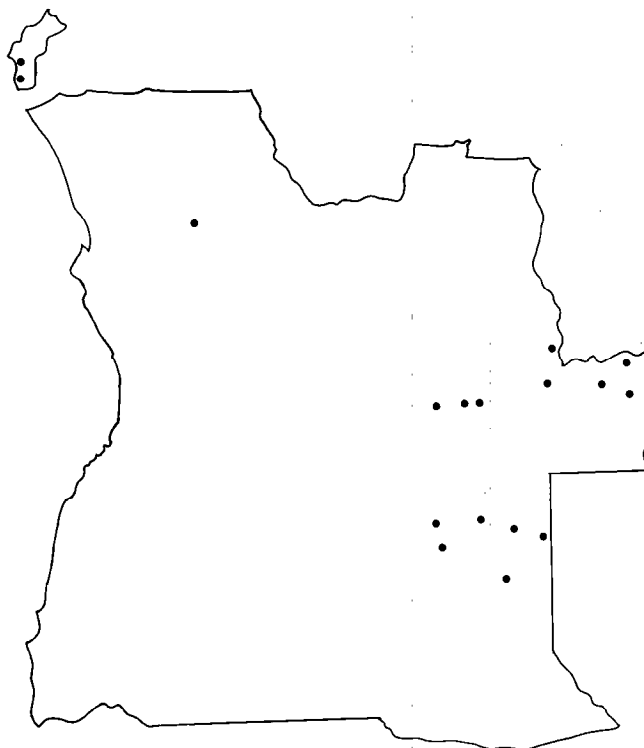
Faunal districts : southern Congo savanna district and Rhodesian highland district.

Vegetation : forest-savanna mosaic ; woodlands; tree and shrub savanna. On Camabatela plateau it inhabits thick-ket-savanna mosaic with a high grass cover. MOREL (17) indicates that egg-laying and resting places are at ground level, at the foot of graminaceous tufts or in thickets sometimes slightly in the ground.

Climate : sub-humid and humid. Rainfall : 800-1,600 mm p.a.

Seasonal occurrence

Adults occur mainly during the rainy season. PEGRAM *et al.* (22) indicate that in southern Africa nymphae



Map 5 : Localities at which *Amblyomma variegatum* has been collected.

occur from May to September and larvae from March to May. The tick undergoes only one generation per year.

Comments

A. variegatum is considered by PETNEY *et al.* (23) a major vector of cowdriosis. However, in Angola this species does not assume a great importance because it exists basically in regions with low densities of livestock. As predicted with the CLIMEX computer-based system (29) almost all the country constitutes a potential region for the distribution of *A. variegatum*. Nevertheless, this tick is confined to the east and in Cabinda Province. In the center and south-west, where almost all the Angolan livestock is concentrated, this species is replaced by *A. pomposum*. The exclusion of *A. variegatum* from these areas may be due to the interspecific competition between the 2 species. RECHAV *et al.* (24) demonstrated that this phenomenon occurs between *A. hebraeum* and *A. variegatum*, so it is possible that the same could happen between *A. variegatum* and *A. pomposum*, for example on the Camabatela plateau, where *A. pomposum* dominates and *A. variegatum* is very scarce.

***Amblyomma hebraeum* Koch, 1844**

Amblyomma hebraeum is the major vector of cowdriosis in the southern part of the African continent, i.e. in South Africa, eastern Botswana, southern Zimbabwe and southern Mozambique (36). One isolated collection was made from cattle during the survey accomplished in 1982 on the Camabatela plateau, north-west Angola.

The most effective way of introducing a new species is the transportation of ticks on their hosts. *A. hebraeum* was probably introduced with cattle imported from Botswana in the course of the year 1981. This tick has long survival times and longevity of *A. hebraeum* male ticks while attached to the host is shown to be within the range 149-244 days (mean 177 days) (14). In 1984 the Camabatela plateau had around 18,000 bovines but afterwards these animals have been decimated during the civil war. We do not know if this tick is established itself in the region and if so, what its distribution is at present.

REFERENCES

- ANDREW (H.R.), NORVAL (R.A.I.). The carrier status of sheep, cattle and African buffalo recovered from heartwater. *Vet. Parasitol.*, 1989, **34** : 261-266.
- ANDREW (H.R.), NORVAL (R.A.I.). The role of males of the bont tick (*Amblyomma hebraeum*) in the transmission of *Cowdria ruminantium* (heartwater). *Vet. Parasitol.*, 1989, **34** : 15-23.
- BARBOSA (L.A.G.). Carta fitogeográfica de Angola. Luanda, Instituto de Investigação Científica de Angola, 1970. 323 p.
- BEZUIDENHOUT (J.D.), JACOBSZ (C.J.). Proof of transovarial transmission of *Cowdria ruminantium* by *Amblyomma hebraeum*. *Onderstepoort J. vet. Res.*, 1986, **53** : 31-34.
- BORGHT-ELBL (A.). Ixodid ticks (Acari : Ixodidae) of Central Africa. V. The larval and nymphal stages of the more important species of the genus *Amblyomma* Koch, 1844. *Ann. Musée R. Afr. C., Sci. zool.*, 1977, **222** : XI + 158 p.
- DAUBNEY (R.). Natural transmission of heartwater of sheep *Amblyomma variegatum* (Fabricius, 1794). *Parasitology*, 1930, **22** : 260-267.
- DIAS (J.A.T.S.). Sobre a posição sistemática de algumas espécies africanas do género *Amblyomma* C.L. Koch (Acarina-Ixodoidea) "Grupo *variegatum*". *Nov. Doc. Moçambique*, 1953, **73** : 119-139.
- DIAS (J.A.T.S.). Estudo do "holótipo" do *Amblyomma pomposum* Dönitz, 1909 a algumas considerações acerca das espécies que integram o "grupo *variegatum*". T. Dias, 1953. *Revue Cienc. Vet.*, 1969, II (A) : 209-232.
- DIAS (J.A.T.S.). Subsídios para o conhecimento da fauna ixodológica de Angola. Garcia de Orta, *Sér. Zool.*, 1984, **11** : 57-68.
- DIAS (J.A.T.S.). Acerca da posição taxonómica das espécies africanas de *Amblyomma* do "grupo *variegatum*". T. Dias (Acarina-Ixodoidea). Garcia de Orta, *Sér. Zool.*, 1989, **13** : 89-96.
- DINIZ (A.C.). Angola o meio físico e potencialidades agrárias. Lisboa, Instituto para a Cooperação Económica, 1991. 189 p.
- DINIZ (A.C.), AGUIAR (F.Q.B.). Regiões naturais de Angola. Huambo, Instituto de Investigação Agronómica de Angola, 1969. 5 p.
- HOOGSTRAAL (H.). African Ixodoidea. I. Ticks of the Sudan (with special reference to Equatoria Province and with preliminary reviews of the genera *Boophilus*, *Margaropus* and *Hyalomma*). Washington DC, Department of the Navy, Bureau of Medicine and Surgery, 1956. (Research Report N°005.050.29.07)
- JORDAAN (J.O.), BAKER (J.A.F.). Survival rate on the host and mating capacity of *Amblyomma hebraeum* (Koch) male ticks. In : WHITEHEAD (G.B.), GIBSON (J.D.), Eds. *Tick Biology and control*. Grahamstown, Rhodes University, 1981. P. 115-117.
- LOUNSBURY (C.P.). Tick-heartwater experiment. *Agric. J. Cape Good Hope*. 1900, **16** : 682-687.
- MACKENZIE (P.K.I.), NORVAL (R.A.I.). The transmission of *Cowdria ruminantium* by *Amblyomma tholloni*. *Vet. Parasitol.*, 1980 : 265-268.
- MOREL (P.C.). Study on Ethiopian ticks (Acarina, Ixodidae). Maisons-Alfort, IFMV, 1980. 332 p.
- NEITZ (W.O.). Die oordraging van Heartwater deur *Amblyomma pomposum* Dönitz, 1909. *S. Afr. Sci.*, 1947, **1** : 83.
- NORVAL (R.A.I.). The ticks of Zimbabwe. VII. The genus *Amblyomma*. *Zimbabwe Vet. J.*, 1983, **14** : 3-18.
- NORVAL (R.A.I.), COLBORNE (J.), TANNOCK (J.), MACKENZIE (P.K.I.). The life cycle of *Amblyomma tholloni*, 1899 (Acarina : Ixodidae) under laboratory conditions. *Vet. Parasitol.*, 1980, **7** : 255-263.
- NORVAL (R.A.I.), MACKENZIE (P.K.I.). The transmission of *Cowdria ruminantium* by *Amblyomma sparsum*. *Vet. Parasitol.*, 1981, **8** : 189-191.
- PEGRAM (R.G.), PERRY (B.D.), MUSISI (F.L.), MWANAUMO (B.). Ecology and phenology of ticks in Zambia : seasonal dynamics in cattle. *Expl. Appl. Acarol.*, 1986, **2** : 25-45.
- PETNEY (T.N.), HORAK (I.G.), RECHAV (Y.). The ecology of the African vectors of heartwater, with particular reference to *Amblyomma hebraeum* and *Amblyomma variegatum*. *Onderstepoort J. vet. Res.*, 1987, **54** : 381-395.
- RECHAV (Y.), NORVAL (R.A.I.), OLIVIER (J.H.). Interspecific mating of *Amblyomma hebraeum* and *Amblyomma variegatum* (Acari : Ixodidae). *J. med. Entomol.*, 1982, **19** : 139-142.
- ROBINSON (L.E.). Part IV. The genus *Amblyomma*. In : NUTALL (G.H.F.), WARBURTON (C.), COOPER (W.F.), ROBINSON (L.E.), Eds. *Ticks. A monograph of the Ixodoidea*. London, Cambridge University Press, 1926. Xii + 302 p. plates I-VII.
- SERRANO (F.M.H.). Considerações sobre a morfologia, ecologia e biologia dos ixodídeos dos géneros *Amblyomma* e *Dermacentor* assinalados em Angola. *Rev. Cienc. Vet.*, 1963, **58** : 181-204.
- SERRANO (F.M.H.). Transmissão experimental da *Rickettsia ruminantium* "estirpe de Mara" a carneiros merinos, pelo *Amblyomma pomposum* Dönitz 1901, vector da heartwater em Angola. *Pecuária*, 1964, **22** : 25-31.
- SOUSA DIAS (V.). Subsídios para o estudo dos ixodídeos de Angola. *Pecuária*, 1950, **2** : 127-280.
- SUTHERST (R.W.), MAYWALD (G.F.). A computerised system for matching climates in ecology. *Agriculture, Ecosystems and Environment*, 1985, **13** : 281-299.
- TAYLOR (M.). Check-list of Angola birds. Lisboa, Companhia de Diamantes de Angola, 1963. 250 p.
- THEILER, GERTRUD. The Ixodoidea parasites of vertebrates in Africa South of the Sahara (Ethiopian region). Onderstepoort, Veterinary services, 1962. 255 p. (project S.9958)

32. UILENBERG (G.), CORTEN (J.J.F.M.), DWINGER (R.H.). Heartwater (*Cowdria ruminantium* infection) on São Tomé. *Vet. Q./q.*, 1982, **4** : 106-107.

33. UILENBERG (G.), NIEWOLD (T.A.). *Amblyomma astrion* Dönitz, 1909 (Ixodidae), nouveau vecteur expérimental de la cowdriose. *Revue Élev. Méd. vét. Pays trop.*, 1981, **34** : 267-270.

34. WALKER (J.B.). Notes on the common tick species of East Africa. 3rd Ed. Nairobi, Coopers Kenya Ltd. , 1970. 24 p.

35. WALKER (J.B.). The ixodid ticks of Kenya. London, Commonwealth Institute of Entomology, 1974. XI + 220 p.

36. WALKER (J.B.), OLWAGE (A.). The tick vectors of *Cowdria ruminantium* (Ixodoidea, Ixodidae, genus *Amblyomma*) and their distribution. *Onderstepoort J. vet. Res.*, 1987, **54** : 353-379.

37. YEOMAN (G.H.), WALKER (J.B.). The ixodid ticks of Tanzania. London, Commonwealth Institute of Entomology, 1967. XII + 215 p.

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Amongst the *Amblyomma* species presently known to be capable of transmitting *Cowdria ruminantium* six have been recorded in Angola. *A. pomposum* is the most important and widely distributed. Of secondary importance are *A. variegatum*, which prevails in Cabinda and Moxico provinces, and *A. astrion* which occurs in the littoral and transition strips and on Camabatela plateau. *A. sparsum* and *A. tholloni* which are specific parasites of wild hosts are considered accidental vectors. *A. hebraeum* was introduced recently in the territory but its distribution is unknown at present. For each of these species the hosts, distribution, ecology and seasonal abundance are listed.

Key words : Heartwater - *Cowdria ruminantium* - Vector - Tick - *Amblyomma* - Host - Natural distribution - Seasonal variation - Angola.

GOMES (A.F.). Las garrapatas que actúan como vectores de la cowdriosis en Angola. *Revue Élev. Méd. vét. Pays trop.*, 1993, **46** (1-2) : 237-243

De todas las especies de *Amblyomma*, reconocidas como vectores de *Cowdria ruminantium*, seis han sido identificadas en Angola. La de mayor distribución es *A. pomposum*. En segundo lugar se encuentra *A. variegatum*, presente en las provincias de Cabinda y Moxico y *A. astrion*, la cual se encuentra en las zonas litorales y adyacentes, así como en la meseta de Camabatela. *A. sparsum* y *A. tholloni*, parásitos específicos de los animales silvestres, se consideran como vectores accidentales. Recientemente se introdujo en el territorio *A. hebraeum*, aunque se desconoce la amplitud de su distribución. Se da una lista de los huéspedes, de la distribución, la ecología y la abundancia estacional de cada especie.

Palabras claves : Cowdriosis - *Cowdria ruminantium* - Vector - Garrapata - *Amblyomma* - Huesped - Distribución natural - Variación estacional - Angola.