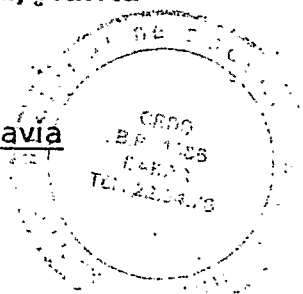


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Second Symposium on Arboviruses in the Mediterranean Countries  
(Including an International Symposium on TBE, Hanta-  
and CCHF Viruses)

24 to 29 September 1989 in Dubrovnik, Yugoslavia



ABSTRACT FORM

Please type your abstract within the space indicated below. Give the title of the paper (in capitals) followed by the authors and their affiliations.

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Abstracts should be sent to: Dr PA Nuttall, NERC Institute of Virology, Mansfield Road, Oxford, OX1 3SR, UK.

**ECOLOGICAL DATA ON THE POTENTIAL VECTORS OF THE CCHF  
VIRUS IN SENEGAMBIA AND MAURITANIA AND  
EPIDEMIOLOGICAL IMPLICATIONS**

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Of the 16 species and subspecies of ticks regarded as potential vectors of the CCHF virus in the afrotropical zoogeographical Region, six have been found naturally infected in Senegal (Amblyomma variegatum, Boophilus decoloratus, Hyalomma impeltatum, H. impressum, H. marginatum rufipes, H. truncatum). A seventh species (Rhipicephalus guilhoni) has just been found infected in this country and so constitutes the 17th potential CCHF virus vector of the afrotropical faunal Region. The host range and population dynamics are being studied for the most epidemiologically significant species in Senegambia and Mauritania which include A. variegatum, H. impeltatum, H. m. rufipes, H. truncatum and R. guilhoni. All these species seem to have only one generation per year. A. variegatum is probably the major virus vector to man because of the great anthropophily of its larvae and nymphs that bite man eagerly. On the other hand, the immature stages of Hyalomma spp. and R. guilhoni parasitize mostly rodents, lagomorphs and birds, while the adults bite commonly ungulates and rarely man. But adults however can occasionally feed on people having close contacts with ruminants (cattle breeders, abattoir employees, veterinary staff) who constitute the fraction of the population most at risk.

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ORSTOM Fonds Documentaire

N° : 35.217 ex 1

Cote : B

22 AVR. 1992

p/6

2nd Symposium on Arthropods in the Mediterranean Countries.

C23

24-29 September 1989, Dubrovnik, Yugoslavia.

AMICAS (J.L.), CORNET (J.P.), GONZALEZ (J.P.), CALVO (M.A.), DUBOUTTE (J.P.) or WILSON (M.L.) - Ecological data on the potential vectors of the CCHF virus in Senegambia and Mauritania and epidemiological implications.

Ladies and gentlemen. I would like to present some results of a collaborative study <sup>on the ecology of potential vectors of the CCHFV in Senegal</sup> performed by scientists from ORSTOM, the Pasteur Institute, and the U.S. Army Medical Research Institute of Infectious Diseases or USAMRIID. Some of our observations <sup>20 yr</sup> go back twenty years or so but most date from the beginning of 1987.

Slide please [SLIDE 1 - Acknowledgement]

About three years ago, we began intensive, prospective observations on tick ecology as part of a large research project on Crimean-Congo Hemorrhagic Fever that was funded by USAMRIID. We gratefully acknowledge their support of this work.

next slide please

next slide please [SLIDE 2 - potential vectors]

At the present time, twenty-nine potential vector species of CCHF virus are recognized and all are hard ticks. Thirteen of them occur in Senegal, of which eight have been found naturally infected in this country

Only *Amblyomma* <sup>ey</sup> *variegatum*, *Hyalomma* <sup>ey</sup> *impeltatum*, *Hyalomma* <sup>ey</sup> *marginatum* <sup>ey</sup> *rufipes*, *Hyalomma* <sup>ey</sup> *truncatum* and *Rhipicephalis* <sup>ay</sup> *guilhoni* may play a significant part in the CCHF virus cycle.

So, we will rapidly paint a picture of our knowledge on the ecology of these five species in Senegal, based on the data of the literature and the results of our observations.

next slide please [SLIDE 3 - Map of Senegal]

We have selected three sites in the northern half of the country where prospective observations continue. Two sites, Dahra and Yonofere, are situated in the sahelian zone where an epizootic of CCHF was observed in 1987. The third site is Bandia, located in the sudanian zone where the CCHF Virus is known

to circulate at a low level. ~~but where we have just observed an amplified circulation~~ ~~the year~~ ~~observed~~ ~~(2 isolates from)~~ ~~next slide please~~ [SLIDE 4 - *Amblyomma variegatum* distribution] (2 isolates from Hyalomma ticks were obtained)

*Amblyomma variegatum* is found throughout Senegambia.

The hosts of adults and nymphs are mainly cattle, those of larvae mainly cattle and goats as well as birds.

Larvae and nymphs bite man eagerly.

next slide please [SLIDE 5 - *Amblyomma variegatum* dynamics]

*A. variegatum* has one generation per year and, in the central part of Senegambia, one can see the adults on their hosts from mid-July, immediately after the first important rains, until the end of the rainy season, in mid-October. We can see the larvae from September until February with an obvious maximum in November, and the nymphs from October until July with a maximum in November-December.

On the epidemiological plane, *A. variegatum* is a species which, because of the strong anthropophily of its immature stages, may be most likely able to transmit the virus to man. Infection by larvae will be rather exceptional because it implies transovarial transmission of the virus which appears to be a rare event. On the other hand, nymphs, infected by the transtadial route from larvae fed on viremic hosts, could surely be an important vector to man. Nymphal

viral activity is maximum in November-December then decreases to a level that persists through July. August and September are the months without nymphs. The adults, emerged from nymphs in the summer on ruminants, may transmit the virus to other ungulates, perpetuating in this way the viral circulation and amplification.

next slide

(SLIDE 6 - *H. impeltatus* distribution)

*H. impeltatus*. This species is found in the northern half of Senegal. The hosts of adults and of the immature stages are rodents and ungulates. Bitten by adults and immature stages of this species, the possibility is rather unusual as we have never

(SLIDE 7 - *H. impeltatus* dynamics)

one generation per year and, in the northern areas, on their hosts all year long but activity is restricted through August when the temperature is still high, followed, one month later, by

biologically, this species probably play a part quite vital in the infection of man but will be able to allow the exchange of the virus between small animals and ungulates.

next slide please [SLIDE 8 - *H. marginatum rufipes* distribution]

*Hyalomma marginatum rufipes* is found all over Senegambia although it is more abundant in the northern third of the country.

The hosts of adults are mainly cattle, those of immature stages are, first and foremost, the ground-feeding birds and secondarily terrestrial monkeys (*Erythrocebus patas*), hedgehogs and hares.

One has mentioned the parasitism of man by the adult of this species but this seems to be a marginal phenomenon as we have never seen it.

next slide please [SLIDE 9 - *H. marginatum rufipes* dynamic]

The population dynamics of this species is not yet well understood. For the meantime, it is impossible to assert whether *H. m. rufipes* has one or two generations per year, or doesn't follow any seasonal cycle.

From an epidemiological point of view, the rarity of parasitism of man by the adults of this species will give it a quite anecdotal part in human infection. Moreover, as birds aren't apparently able to display a viremia, and as the part feeding on mammals is very small, this species will be of little epidemiological importance if transovarial transmission of the virus is not a frequent phenomenon.

next slide please [SLIDE 10- *H. truncatum* distribution]

*Hyalomma truncatum* is found all over Senegambia where it is the most abundant *Hyalomma*.

The hosts of adults are mainly cattle and sheep. Those of larvae are ground feeding birds, rodents, hedgehogs and hares. Those of nymphs are rodents, hares and hedgehogs.

The adult can bite man specially if he has close contacts with ruminants and become impregnated with their odour.

next slide please [SLIDE 11- *H. truncatum* dynamics]

The species has one generation per year. Unlike *A. variegatum*, it is not the adults but the immatures that rule its dynamics. Actually, *H. truncatum* adults withstand rather well the hygrometric conditions of the dry season and we see them on cattle in decreasing numbers until June when the minimum is observed.

next slide please [SLIDE 12- *H. truncatum* immatures]

The larvae are at their maximum number on their rodent hosts in October and the nymphs in December. The larvae and nymphs disappear in May when hygrometric conditions are incompatible with their survival.

Epidemiologically, this species may play a major role because of its abundance, and because a proportion of immatures feed on small mammals which are liable to harbour CCHF virus, for example *Erinaceus albiventris* or *Mastomys* sp. In addition, our personal observations indicate that adults of *H. truncatum* may be important parasites of man. Moreover, we can recall the recent results of LOGAN et al. who have just experimentally demonstrated the vectorial ability of this species.

(6)

next slide please [SLIDE 13- *R. guilhoni* distribution]

*Rhipicephalus guilhoni* is found principally in the northern half of Senegal north of 14° latitude.

The hosts of adults are mainly ruminants. Larvae and nymphs feed on rodents, specially *Arvicanthis niloticus*.

The adults can bite people having close contacts with ruminants as we have observed on at least 3 occasions.

next slide please [SLIDE 14- *R. guilhoni* adult dynamics]

This species has one generation per year. Its population dynamics are similar to that of *H. truncatum* with the difference that the adults appear later on ungulates.

next slide please [SLIDE 15- *R. guilhoni* immatures dynamics]

The dynamics of the preimaginal stages is the same as for *H. truncatum*. Epidemiologically, *R. guilhoni*, the adults of which we found infected with CCHF Virus in 1988, may play a part similar to that of *H. truncatum*.

next slide please [SLIDE 16 - CCHF/Tick CYCLE]

To conclude, we can say that, except for *H. m. rufipes* which needs further observations, each of these species of potentially important vectors of CCHF virus have only one generation per year. The adults appear with the rainy season and the immatures at the end of this season and the beginning of the dry season. The ticks that appear to be the most likely able to transmit the virus to man, in Senegal, are the nymphs of *A. variegatum* and the adults of *H. truncatum*.

(7)

get slide please. SLIDE 17 - Distribution of Human Cases.]

Furthermore, the distribution of the hemorrhagic cases seen in Africa fits the distribution of the *A. pyramus* spp. but not that of *A. variegatus*. This latter species could select non-hemorrhagic viral strains and this might explain why scientists working in Nigeria could have thought that the African strains of HF virus were less virulent than the Eurasian ones.



DISCUSSION

- Q: What allows you to think that *A. variegatum* is able to select mild CCHF strains?
- A: As an answer, I repeat what I wrote in a review on tick arboviruses in tropical areas published in 1980 (*Mem. trop.*, 40: 499): "It seems rather enlightening to compare the results of KIRYA (9th int. Congr. trop. Med. Malaria, Athens, 1975) who finds complement-fixing antibodies against this virus in 55 over 800 human sera (6.9%) while no definite illness due to this infection can be found, to those of VASILENKO (at the same congress) who finds antibodies in 405 over 5,398 cattle-breeders sera (7.5%) in Bulgaria where, between 1968 and 1973, 129 clinical cases of CCHF have been reported (63 mild and 66 serious, i.e. 15.5% of mortality).

Demandes à M.L.W si les données de 1988 sont de 1989

