

The tsetse fly and trypanosomiasis problem in the Lambwe Valley, western Kenya—a brief review and considerations for the future

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A short overview of the trypanosomiasis situation in the Lambwe Valley, western Kenya is given. Possible solutions to the trypanosomiasis problem are considered. The Ruma National Park, located in the Lambwe Valley, is an ecologically important area that should be conserved for the future. For ecological, environmental, and economic reasons insecticidal spraying in attempts to control or eradicate the tsetse flies cannot be justified. Reduction of man-vector contact to achieve an acceptable level of trypanosomiasis transmission should be the aim. To achieve this goal many relatively simple methods can be used. For a more permanent solution trypanosomiasis control, including systematic medical and veterinary surveillance, rapid treatment of infected humans and animals, strict control of livestock numbers, gradual replacement of susceptible livestock with trypanoresistant breeds and/or with domestic fowls and protein-rich crops, should be integrated with the overall rural development. This should include improvement of socioeconomic, medical, veterinary, and agricultural conditions. Strong participation by the local people on their own conditions is necessary for success in such a rural development programme.

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During the earlier part of this century Gambian sleeping sickness, transmitted by *Glossina fuscipes*, was prevalent along lake shores and rivers in western Kenya. In the 1950s Rhodesian sleeping sickness replaced the Gambian form in Kenya and was subsequently detected in the Lambwe Valley, South Nyanza District in 1959 (Baldry 1972). Anti-tsetse measures resulted in the eradication of *G. fuscipes* from South Nyanza in the early 1970s. *Glossina pallidipes*, however, has remained at a high population density in the Lambwe Valley and human and animal trypanosomiasis is presently transmitted chiefly by this species in the valley. The main habitat of *G. pallidipes* is dense thicket in the Ruma National Park, which occupies about 1/3 (120 km²) of the valley. Most of the human cases have, presumably, been contracted near the park. The vectorial importance of *G. fuscipes* in western Kenya is, however, increasing and a few recent human cases in the Lambwe Valley may have been due to transmission by this species.

There was a relatively high sleeping sickness incidence in the Lambwe Valley in the 1960s but the

situation improved in the 1970s. The improvement was, at least partly, due to anti-tsetse measures, fencing of the park, and removal of human settlements from heavily tsetse-infested areas (Baldry 1972). In the late 1970s, however, the man-vector contact had reached a dangerous level due to thicket extension, increasing populations of cattle and wildlife, and more intensive use of tsetse-infested areas near the park. In 1980 the situation became very serious with high mortality in cattle, sheep, goats and dogs and in 1980–1983 nearly 200 cases of human trypanosomiasis, including fatal ones, were detected.

Potential solutions

An attempt in 1981 to eradicate *G. pallidipes* by endosulfan, dieldrin, and bush clearance failed. Although the population was reduced by 99 % in its preferred habitat, density-dependent buffering restored the population to its original level in the thicket within 1 year (Turner 1984). In this area *G. pallidipes* is living close to its bioclimatic optima.

Thus, it may prove exceedingly difficult to eradicate it by insecticides alone—unless drastic, adverse environmental consequences are accepted.

Turner (1983) discussed potential solutions to the trypanosomiasis problem in Lambwe Valley. In the present situation, whether one is aiming at control or eradication of trypanosomiasis, one has to rely chiefly on reduction or complete elimination of contact between infective tsetse on one hand and humans and livestock on the other.

Removal of human settlements from the valley could temporarily reduce the man-vector contact. A high rate of human population increase and lack of alternative land for resettlement may, however, prevent this option. Furthermore, if the tsetse population was left uncontrolled in its present habitat the flies would probably extend their range to new areas.

A completely different solution would be to eliminate the park by drastically changing the habitat, e.g., by agriculture, making the area uninhabitable to tsetse. This may, however, not be a judicious solution. The Ruma National Park is a unique ecosystem, harbouring species of endangered animals, and the only protected area in this part of Kenya. For environmental, economic, scientific, and ethical reasons the park should be conserved for the future. Moreover, elimination of the park does not guarantee that the tsetse would disappear—unless other drastic steps were included.

Eradication—possible or even desirable?

Although the only way to eradicate trypanosomiasis from the Lambwe Valley at present seems to be through eradication of the tsetse vectors, it is possible that bovine trypanosomiasis may remain—due to mechanical transmission by other blood-sucking Diptera. As indicated by the many previous spraying programmes, eradication by insecticides will be very difficult to achieve—unless extensive spraying is combined with other methods, e.g., the release of sterile males or with methods which drastically change the ecology of the area. The adverse environmental and economic consequences of large-scale use of chemical insecticides are well-known. Control of—or attempts to eradicate—tsetse in the valley by insecticidal sprayings cannot be advocated.

Total eradication of *G. pallidipes* (and *G. fuscipes*) may, however, seem to be an attractive solution. The population of *G. pallidipes* appears to be

relatively well isolated from other populations of the same species. Eradication could therefore, theoretically, be achieved by population suppression (traps, insecticide-impregnated screens, bush clearance) followed by release of a sufficient number of competitive, sterile males. This method depends on advanced technology, well-trained staff, efficient and appropriate pre-release suppression methods, e.g., efficient traps, highly productive colonies of *G. pallidipes* (and *G. fuscipes*), and detailed information on the ecology of the area. Through intensive, directed research and application of the results eradication of *G. pallidipes* by this technique could presumably be achieved. It is likely, however, that eradications must be repeated in the future due to reinvasion of flies from other areas. *Glossina fuscipes* often occurs in plantations close to human habitations and may sometimes be an extremely important vector. This species does not seem to occur in well isolated populations in western Kenya and may therefore not be so easily eradicated by the sterile-male technique.

The tsetse flies appear to fulfil important ecological roles by protection of natural ecosystems against human exploitation, preventing overstocking, degradation of vegetation, and soil erosion. Thus, tsetse flies may indirectly contribute to stabilization of ground-water levels and the local climate. Also, as integral components of the food-webs and as vectors of disease of wild animals tsetse flies may contribute to the stability of the ecosystem. Eradication of tsetse flies may, therefore, have undesired effects.

Future considerations

A first step towards an acceptable, low level of trypanosomiasis transmission in the Lambwe Valley could, most likely, be achieved by the combined effects of a number of environmentally acceptable measures which include: the creation of a thicket-free zone around the park, elimination of thickets near human settlements, reduction of thicket vegetation inside the park, placing of traps and/or screens at strategic locations, construction of a few alternative roads around the park and enforcement of laws governing unauthorized human movement in the park, selective reduction of the number of abundant reservoirs of trypanosomes including treatment of livestock, and information to all people concerned about the sleeping sickness situation.

Restoration of the vegetation in the park, in order to decrease the area covered with dense thicket, should have a marked effect against tsetse abundance. Thicket reduction could be done by several methods including the introduction of browsers that were previously abundant in the valley.

To have a lasting impact these measures should be integrated with others in a scheme for general rural development. To speed up this process it will initially depend on international aid. Long-term control of trypanosomiasis as well as malaria and other important diseases would be easier and more efficient if integrated with the overall rural development including socioeconomic, educational, medical, veterinary, and agricultural aspects. In the more developed society, less dependent on the present international economic order, with a lower rate of human population growth, several aspects of disease control would be more easily managed. With particular emphasis on trypanosomiasis control in the Lambwe Valley, these measures include systematic medical and veterinary surveillance (including serologic screening at least once a year), rapid treatment of infected humans and animals, strict control of livestock numbers, gradual replacement of susceptible livestock with trypanoresistant breeds and/or with domestic fowls and protein-rich crops. It should be recognized that a prerequisite for success in such a rural development programme is strong participation by the local people and on their conditions.

References

- Baldry, D. A. T. 1972. A history of Rhodesian sleeping sickness in the Lambwe Valley. – *Bull. WHO* 47: 699–718.
- Turner, D. A. 1983. Ecological factors and the trypanosomiasis situation in the Lambwe Valley, South Nyanza. – *In*: Tukei, P. M. & Njogu, A. R. (eds.). *Diseases of the tropics*, pp. 39–43. Nairobi (Africa Book Services (EA) Ltd).
- Turner, D. A. 1984. A preliminary assessment of some immediate and long-term effects of aerial spraying of endosulfan on *Glossina pallidipes* Austen in the Lambwe Valley, Kenya. – *Insect Sci. Applic.* 5: 425–429.

Sammanfattning

Arbetet ger en kort översikt av sömnsjuka-problemet i Lambwe-dalen, Västra Kenya. Sömnsjuka orsakas av zooflagellater som sprids av tsetseflugor hörande till släktet *Glossina*. Bekämpning av flugorna genom insekticid-besprutning är ej önskvärd, speciellt då det aktuella området innefattar en viktig nationalpark. Istället bör man eftersträva att minimera kontakten mellan flugor och människor. Detta kan uppnås med relativt enkla metoder som reducering av täta buskage, omledning av vägar och förbättrad information till lokalbefolkningen. På lite längre sikt kan en förbättrad medicinsk kontroll med snabb behandling av smittade människor och djur i kombination med ändrad inriktning av jordbruket leda till en mer permanent kontroll av sömnsjukan i området.

På exkursion med Upplands-föreningen

Söndagen den 2 juni 1985 hade Upplands Entomologiska Förening sin försommarexkursion till det vackra herresätet Fånö i Löts socken vid Ekolundsåviken, särskilt bekant som Axel Oxenstiernas födelsehem. Naturen där är bland den fagraste som Mälardalen har att uppvisa. Den är av ursprunglig prägel, men bjuder också på ett främmande och ganska unikt inslag, en bokskogsplantering av betydande storlek. Ur skoglig synpunkt bör denna vara en av de äldsta och förnämligaste så långt upp i landet. Träden är hundraåriga och av aktningssäva dimensioner, har en längd av 20 m eller däröver, kraftiga kronor, raka och kvistre-

na stammar högt upp under lövverket. Läge, fuktighetsförhållanden, temperatur och den bördiga marken tycks passa dem utmärkt. Entomologiskt har bokskogen väl ej så mycket att ge, fast Sten Jonsson där redan konstaterat förekomst av ett par stritar, som lever på bok och på något sätt följt med den hit upp. Den ena, *Fagomyia cruenta* Herrich-Schäffer, har sannolikt bok som enda värdträd och är i Sverige hittills endast känd från SK, BL och VG. Den andra arten, *Alebra albostrisella* Fallén, lever förutom på bok också på ek.

En annan ovanlig sak är en väl bibehållen ca km-lång ekallé, som uppges vara anlagd under