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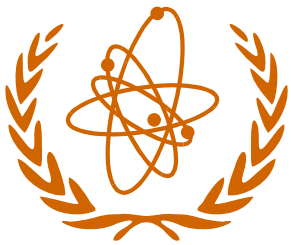

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SECTION A – NEWS

FORTHCOMING MEETING

International conference: Sustainable Crop-Livestock Production for Improved Livelihoods and Natural Resource Management in West Africa

The International Livestock Research Institute (ILRI) and its partners have announced the above conference, to be held in Ibadan, Nigeria, November 19-22, 2001. It is organized to take stock of lessons from more than two decades of research on the contributions of crop-livestock systems to sustainable agricultural intensification, and improved livelihoods in West Africa. The conference will distill lessons from past research, prioritize emerging opportunities (within and outside the region) and identify new mechanisms and livelihoods of crop-livestock producers in West Africa.

Objectives

To review and document the impacts on productivity, livestock, and the environment of the last twenty years of crop-livestock systems research in West Africa;

To assess future trends and identify new opportunities, within and outside the region, for sustainable intensification of crop-livestock systems; and

To identify and develop strategies to implement priority actions and collaborative mechanisms to foster research and development activities that will reduce poverty and improve food security through sustainable crop-livestock farming systems in West Africa.

Programme

An Introduction/Scene Setting Session (with invited papers) will be followed by the main conference having the following themes: Crop-livestock systems research in West Africa: Lessons from the past as a guide to the future; Future trends and emerging opportunities for sustainable intensification of crop-livestock systems; and Strategies for research partnerships and output delivery for poverty alleviation. There will be opportunities for participants to present examples of tools and techniques that have been used in the field or in training courses relevant to the conference themes.

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MEETING REPORT

Workshop: Strategic planning of area-wide tsetse and trypanosomosis control in West Africa

This workshop was held 21-24 May, 2001, at Ouagadougou, Burkina Faso. A total of 28 people attended the workshop, drawn from FAO, Joint FAO/IAEA Division, OAU-IBAR, ILRI, ITC, CIRDES, IRD, Burkina Faso, Mali, Ghana, Togo, Benin, Nigeria, Ethiopia, SIT Forum and international consultants. The Secretary General, Ministry of Animal Resources of Burkina Faso officially opened the workshop; the Director of Veterinary Services attended the opening ceremony. In his address at the workshop opening, Dr. R.C.Matteoli Animal Health Officer, Animal Production and Health Division, FAO, greeted the participants on behalf of the Director, APHD of FAO. The address is summarized below. Dr. Matteoli stated that the work that FAO and IAEA carries out is aimed at incorporating and fusing normative actions with technical assistance. Normative actions aim to define, normalize and standardize guidelines and policy strategies for the implementation of action plans having, as the ultimate goal, food security and a sustainable livestock-agricultural development. In the specific case of this workshop, efforts are devoted to address the livestock-agricultural and socio-economic development of tsetse and trypanosomosis infested areas. At a recent high-level meeting between FAO and IAEA, it was recognized that tsetse-trypanosomosis remains an important issue for rural development and that the removal of this factor would be a major contributor to large-scale poverty reduction in sub-Saharan Africa. Tsetse-trypanosomosis interventions have to be viewed as an integral part of the general development action plan, requiring parallel action in the fields of land use, natural resources, the environment and socio-economic development. When considering the range of options available, one has to be mindful that economies of scale may be counterbalanced by the risk that unwanted negative land use changes could occur, and a sensible option is to consider only land portions where agricultural benefits are expected to be maximal and at the same time tsetse populations are most vulnerable to attack. These complex issues have no easy answer, and cautious planning is called for. Clarification of the principles will be a tangible output of the workshop.

CURRENT RESEARCH

Research Co-ordination Meeting: Genetics Application to Improve the SIT for Tsetse Control/Eradication including Population Genetics

The 3rd Research Co-ordination Meeting "Genetics Application to Improve the SIT for Tsetse Control/Eradication including Population Genetics" was held at FAO HQ, Rome, from 19 to 23 March 2001, and was hosted by the Animal Production and Health Division of FAO. Eleven participants attended this meeting, drawn from USA, Canada, Italy, Kenya, Côte d'Ivoire, Greece, UK, IAEA and FAO. Nine research teams were represented, comprising the total scientific community presently working on the subject of tsetse genetics. The first two days of the meeting were devoted to presentations followed by working group activities to produce a draft text of the report.

The recent declaration by the African Heads of State and Governments on the eradication of tsetse from the African continent has resulted in the development of extensive tsetse intervention programmes incorporating the SIT (sterile insect technique). A key component in the identification of target populations is their degree of isolation from other populations; a very powerful tool to aid in this identification is population genetic analysis. Populations are isolated when there is no gene flow; powerful molecular tools are available to analyse gene flow and these are being further developed.

A second component of target population identification is the use of GIS (geographic information systems) mapping technology. Much of this GIS technology is being developed in FAO and the current meeting was held in Rome in order to facilitate the development of integrated maps incorporating both genetic and geographic information.

The results reported in the meeting confirm previous analyses that there is a surprisingly high level of population structuring in tsetse over even quite small geographic distances. However, adequate sampling has not yet been carried out over a sufficiently wide geographic area and this remains a major constraint to full understanding of tsetse population structure, and hence the rational use of SIT in these areas.

New analytical procedures were presented on the immune response of tsetse related to the study of vectorial capacity. Trypanosomes appear to be able to block the expression of some anti-pathogen genes in the fly and thus to enhance the parasite's chances of infecting the fly. These studies, together with the demonstration of a genetic transformation system in tsetse, could eventually lead to the development of refractory strains.

Polytene chromosome maps are now available for *Glossina austeni*, *G. pallidipes* and *G. morsitans submorsitans.* Banding pattern analysis has revealed the presence of many inversion differences between the species. So far no field populations have been analysed to see if there are floating inversions as there are in mosquitoes and blackflies. A

sex-distorter phenotype in *G. morsitans submorsitans* was shown to be associated with a complex inversion on an X chromosome.

The frequent occurrence of hybrid sterility when tsetse of different taxa are crossed may provide an additional component to SIT. Data from many different crossing schemes illustrated the complexity of the hybrid phenotype but identified several situations in which females could be permanently sterilized following mating with a male from a different taxon. In some crosses, laboratory cage experiments showed no evidence of assortative mating.

A major advantage of holding the meeting at FAO Rome was that participants were able to hear presentations from staff of the Agricultural Department, on how FAO uses an area-wide approach when dealing with plant pests and infectious diseases in animals.

NEW PUBLICATIONS

Training manual: vectors of sleeping sickness

Laveissière C., Grébaut P., Herder S. and Penchenier L., 2000. *Les glossines vectrice de la Trypanosomiase humaine africaine*. [*The tsetse vectors of human African trypanosomiasis*] pp. 246. OCEAC, Yaoundé, Cameroun.

This publication is noticed in Section B of this number of TTIQ, under 11859, but a somewhat expanded description is given here. It is written in French, and takes the form of a paperback book containing more than 150 good quality figures (some in Chapter 12 are not numbered). The contents cover: I. Introduction; II. Morphology; III. Identification of species; IV. Internal anatomy, physiology, genetics; V. Investigative techniques; VI. Life of the insect; VII. Medical importance; VIII. Vector control; IX. Control campaigns in the field; X. Conclusion; XI. Glossary; XII. Construction of traps; XIII. Bibliography; XIV. Index. The Introduction gives the background to the problem posed by the tsetse as the vector of sleeping sickness. While very serious outbreaks have occurred in the past, and the disease must still be regarded as of great importance, our knowledge of its present status is inadequate. Nevertheless, sleeping sickness is known to be active in many areas. The present prevalence of the disease in Africa is indicated. Foci of the two forms of the disease are given, that are caused by *Trypanosoma brucei gambiense* and *T. b. rhodesiense* respectively. The circulation of the pathogenic trypanosomes in nature is explained, and stages of the disease in the human patient, and diagnostic methods, are briefly described.

The chapter on morphology covers the externals of the tsetse fly; details of the head, mouthparts, calypters, chemoreceptors, feet, and genitalia are illustrated with the help of drawings and scanning electron micrographs, selected to give background for later treatment of species identification and physiology. The third chapter deals with the identification of species, tackling in order (i) the East Coast of Africa; (ii) The Sudan, Ethiopia and Somalia; (iii) Uganda, Kenya and Tanzania; (iv) Southern and south-east

Africa; (v) Central and West Africa. A key is given for the identification of the species found in each of these regions. The fourth chapter on physiology, internal organs and genetics covers ingestion of the blood meal, its digestion, general metabolism, the role of the fat body, excretory system and reproductive system. Full details are given of the ovarian cycle, study of which can assist in determining the age of the female fly (as explained later). Mentioning that genetic differences between populations of the same species of insect may have a profound effect on ecology and the insect's capacity to transmit disease, a brief account is given of the number of chromosomes found in various tsetse species; distinguishing between populations on the basis of variation in isoenzymes is briefly dealt with; likewise, DNA microsatellite markers can tell us much about relationships between different populations of the same species. The fifth chapter on investigative techniques briefly describes the many methods by which flies can be captured for counting or for more detailed later study; some of the methods are mainly of historical interest, but many are in current use either as part of control measures or in research programmes; also described are the means of estimating the age of flies using anatomical details of the intestine, of the wings (wing fray) and especially of the ovaries. Dissecting the flies for signs of trypanosome infection in the gut and the salivary glands is followed by a description of how living flies may be marked for later capture. The preservation of various parts of the fly for more detailed study, whether for blood meal identification, or for identifying the tsetse species or trypanosome species, is very briefly outlined. The topic of remote sensing as a means of predicting where a given species of fly might be expected to occur is introduced. Setting up traps, calculating sex ratios of field-captured flies, calculating apparent densities of flies/trap/day, pupal searching, use of a weather station and measuring certain microclimatic variables are included.

The sixth chapter covers the life and ecology of different tsetse species, mentioning a range of classic habitats, both natural and man-made. Mating, growth of the larva, deposition of the mature larva, formation of the pupa, and the timetable of these events are dealt with; accounts of the various causes of pupal mortality, and of the emergence of the adult stage, are followed by the means by which the young fly searches for its blood meal, using the sense of smell to locate potential hosts. Host preferences are outlined. Daily and seasonal activity cycles, resting behaviour, flight, dispersal, longevity of the adults and reproductive rates are described, and population parameters such as sex ratio, nutritional state, age composition, and seasonal fluctuation in density complete this chapter. The next (seventh) chapter deals with the medical importance of the fly, the major vector species, infection rates, and the wild and domestic hosts which act as reservoirs for the human disease. Epidemiological factors covered include how the various principals interact: the human population, the vector and the reservoir host. The risk of transmission is illustrated by an example from Côte d'Ivoire (which requires study of mathematical formulae). The epidemiological status of West and Central Africa is described in some detail, and in less detail for eastern Africa. The eighth chapter discusses some of the issues faced by those who have to decide on intervention: should the main effort be against the parasites in the human population or against the vector? If the latter, should one aim at eradication or reduction? What must be the scope of the control campaign should one be decided upon? How quickly are results needed? What environmental impact can be expected? A variety of possible control methods is described, including non-insecticidal ones such as habitat modification, catching-out the

flies, using natural enemies of the flies, and genetic methods including the sterile male technique. Insecticidal control methods are introduced by a description of the main categories of insecticides, the formulations in use, and the ways in which the insecticides may be used. Traps and screens are selected for detailed treatment; different types of these, and how they may be used in different types of habitat are described. Involvement of the resident human population is also explained. The ninth chapter describes in detail particular control campaigns in (i) Vavoua (Côte d'Ivoire) (ii) Sinfra (Côte d'Ivoire) and (iii) Uganda. There is a useful guide in Chapter XII for the construction of the traps.

This publication is without doubt a valuable addition to the literature available on tsetse control, being more up to date in many areas than some of its predecessors. Any later edition might expand some sections, add further illustrations to others, and perhaps arrange the material typographically or by means of boxes, so that it could more conveniently be used by two somewhat distinct target groups: middle level field operatives and graduate officers, who may benefit from different levels of treatment.

John Pollock

Tsetse and Trypanosomosis Control and the Environment

Bourn D., Reid R., Rogers D., Snow W. and Wint W., 2001. *Environmental Change and the Autonomous Control of Tsetse and Trypanosomosis in Sub-Saharan Africa*. 248 pp. Environmental Research Group Oxford. [see Section B, entry 11853]

This study, commissioned by the UK Department for International Development, Rural Livelihoods Animal Health Programme, is described as a review of the historical record of agricultural expansion and environmental change in Africa, assessing the impact of these factors on trypanosomosis in five countries over the past fifty years. It is mainly concerned with the threat to livestock, and has less to say about the sleeping sickness problem. The Introduction deals with the essentials of trypanosomosis epidemiology, and raises the questions of how environmental changes have affected the disease and its transmission, and what the implications might be for controlling the disease in the future. The five countries that have been given special attention in the study are Ethiopia, The Gambia, Kenya, Nigeria, and Zimbabwe. Each is treated in separate chapters, usually under the following common list of sub-heads: Land, People and Agriculture; Trypanosomosis Control; Environmental Change; and Changing Nature of the Disease Problem. There is some modification of the list to deal with the case of Kenya, in which the second and third sub-heads are replaced by four case studies of places of special interest in that country. Each of the five selected countries has its special features. Ethiopia has its cattle population mainly restricted to the highland areas, and contact with tsetse is at the margins of the grazing zones, especially at the heads of the major valleys. Ethiopia's national herd is the largest in Africa. In complete contrast, The Gambia is a flat, low-lying country deep within the *Glossina morsitans submorsitans* and *G. palpalis gambiensis* belts; cattle are typically trypanotolerant and can survive a higher degree of challenge than most zebu breeds. The Gambia is host country for the International Trypanotolerance Centre. Kenya has never had a formal vector eradication strategy nationally, but local control projects have been carried out in sleeping sickness outbreak areas, as well as against the disease in cattle; trypanosome resistance to drugs applied to

domestic livestock has been a very serious problem. Kenya has an active research effort in the field of tsetse and trypanosomosis control. The four areas selected for special study in Kenya are Nguruman in the southern Rift Valley, Galana Ranch in Coast Province, Olambwe Valley in Western Province, and Busia District adjacent to Uganda. While Nigeria has a long history of deliberate intervention in the control of trypanosomosis, by drug use and by a variety of methods of vector control including bush clearing, knapsack spraying and the sterile male technique, it is stated that large-scale government-sponsored tsetse control schemes are an outdated form of intervention and are most unlikely to be revived. Southward dispersal of pastoralists has been in progress for decades, in concert with the dwindling of the natural savanna woodland. A growing dependence of tsetse on human hosts and domestic stock is seen in many areas. Zimbabwe, on the other hand, has had large-scale tsetse eradication schemes linked to an active and productive research wing, resulting in great improvements in the efficiency with which insecticides have been deployed, by luring the tsetse to insecticide-impregnated cloth screens. However, more recently even Zimbabwe has moved towards reducing the rôle of the Government arm, and contracting private companies to carry out control routines.

A general conclusion is that the original habitats with their natural wildlife have been greatly reduced as a result of settlement and hunting, and that domestic livestock has become more important in the cycle of transmission of the pathogenic trypanosomes. All who have worked in the field will have noticed that areas cleared for crops and settled by villagers, support progressively lower densities of tsetse with the passage of time, at least in respect of the morsitans group flies. This is described as an autonomous change in disease transmission and epizootiology. As transmission has come to depend more on domestic stock, the impact of trypanosomosis on farming has increased, unfortunately at a time when veterinary services have been in general decline, for a variety of reasons. Most governments are, it is said, unable or unwilling to support large-scale tsetse and trypanosomosis control operations; more effort at the individual farmer or community level is presented as the way to combat this major impediment to rural development.

The treatment of these very different countries will help a variety of people to grasp the essentials of a large and complex problem. It should assist the young graduate to see more clearly the overall situation of his own country, and the special features of that country in the continental context. Experienced officers will also gain from the comparison of one country to another, enabling him or her to see old problems in a new light. Administrators and donors will find the overview and summaries of country statistics and the cost-benefits of intervention helpful. The historical perspective adopted throughout is most useful, and the Annotated Bibliography is itself a major contribution. There are fifteen coloured maps illustrating the points made in the text.

Under Chapter 7, Discussion and Conclusions, it is stated that “The simplest and arguably most appropriate and sustainable way of dealing with tsetse and trypanosomosis in Africa is to take no purposive actions whatsoever, and to rely on the autonomous control of the disease, through agricultural expansion and hunting, which has been in effect since time immemorial.” It is right that such ideas should be aired; they help to illuminate the difficulties faced by those who wish to alleviate the impact of human and animal trypanosomosis on the rural poor, and who hope at the same time to preserve much

of the incomparable African wildlife. Perhaps these conflicting aims cannot be resolved. The book "*Environmental Change and the Autonomous Control of Tsetse and Trypanosomosis in Sub-Saharan Africa"*, written by five applied ecologists, takes us to that point, but no further. We are left wondering whether the African fauna is doomed, at least outside the national parks, the effective maintaining of which is in any case of variable quality.

Despite the above, the authors recommend the development of a number of effective ways to disseminate existing knowledge, including such skills as identifying tsetse species, "reading" the environment in terms of possible tsetse habitat, recognizing the signs of trypanosomosis, management strategies for reducing the chance of disease exposure, use of trypanotolerant breeds, trypanocidal drugs, pour-on insecticides, and use of odour-baited traps and insecticide-impregnated screens; also recommended are steps to improve international co-ordination, setting of priorities, technical assistance, monitoring and information dissemination.

We are forced to view the problem of trypanosomosis as one issue within a much larger context, how to relieve rural poverty and raise agricultural productivity without causing irreparable environmental damage. This multi-authored work is scholarly and important, and raises a number of uncomfortable questions that have to be addressed.

John Pollock

SECTION B – ABSTRACTS

1. GENERAL (INCLUDING LAND USE)

11853 **Bourne, D., Reid R., Rogers D., Snow W. and Wint W., 2001.** *Environmental Change and the Autonomous Control of Tsetse and Trypanosomosis in Sub-Saharan Africa.* pp. 248. Environmental Research Group Oxford Limited.

Environmental Research Group Oxford Limited, P.O.Box 346, Oxford, OX1 3Qe, UK. [Bourn: davidmbourn@cs.com]

This is a general and historical account of tsetse/trypanosomosis control activities in five countries, Ethiopia, The Gambia, Kenya, Nigeria and Zimbabwe. Emphasis is placed on the effects of human settlement and the habitat disturbance associated with that, on tsetse. A fuller account of this book is given in Section A.

11854 **Catley, A. and Leyland, T. 2001.** Community participation and the delivery of veterinary services in Africa. *Preventive Veterinary Medicine*, **49** (1-2): 95-113.

Catley: Inter African Bureau for Animal Resources, Organisation of African Unity, CAPE Unit, PARC VAC Project, P.O.Box 30786, Nairobi, Kenya. [catley.pace@OAU-IBAR.org]

Community participation is now widely promoted as an important feature of aid projects in less-developed countries. However, definitions, uses and expectations of community participation vary considerably among professionals (including veterinarians). Lack of common understanding of community participation hinders the comparison of experiences between projects and can lead to false hopes regarding how community participation should be used and what it might deliver. This paper provides an overview of experiences with community participation in animal-health service development and research in Africa. By examining two types of community-based animal-health intervention, the paper also describes how community participation can vary in veterinary projects and relates this variation to project impact and sustainability. Projects that encourage types of community participation such as interactive participation and self-mobilisation are most likely to result in sustained benefits for livestock keepers.

11855 **Department for International Development, 2000.** *DFID-funded tsetse and trypanosome research and development since 1980. Volume 1, Scientific review*. London, UK; DFID. Separately paginated: *Review*, pp. 1-52; *DFID-funded tsetse research in Zimbabwe, 1980-1997: A case study*, pp. 1-50; *DFID-funded tsetse and trypanosomiasis research in Kenya, 1980-1997: A case study*, pp. 1-38; *DFID-funded research on tsetse and trypanosomiasis at the International Trypanotolerance Centre in The Gambia, 1985-1996: A review*, pp. 1-47; *Remote sensing and geographic information systems: work related to tsetse, trypanosomiasis and land use, 1980-1997*, pp. 1-39; *Tsetse-transmitted research in sub-Saharan Africa, 1980-1997: Research in UK laboratories and at ILRI*, pp. 1-109.

11856 **Department for International Development, 1999.** *DFID-funded tsetse and trypanosome research and development since 1980. Volume 2, Economic analysis*. London, UK; DFID. 123 pp.

11857 **Hendrickx G., de La Rocque, S., Reid R. and Wint W., 2001.** Spatial trypanosomosis management: from data-layers to decision making. *Trends in Parasitology*, **17** (1): 35-41.

Hendrickx: The Institute for Tropical Medicine, Nationale Straat 155, 2000, Antwerp, Belgium. [ghendrickx@pandora.be]

The use of geographical information systems (GIS) in the management of African animal trypanosomosis in sub-Saharan Africa offers potential in assisting decisions on allocation of resources, prioritization of control areas, and planning and management of field operations. Approaches now being used to develop reliable data-layers and to incorporate these data into GIS models are reviewed. Techniques should be further refined to produce more-detailed data layers and to include a dynamic element, a problem rarely addressed until now.

11858 **Hursey B.S., 2001.** The programme against African trypanosomiasis: aims, objectives and achievements. *Trends in Parasitology*, **17** (1): 2-3.

Hursey: 1, Siding Terrace, Skewen, Neath, West Glamorgan, SA10 6RE UK. [brian@bhursey.freeserve.co.uk]

This is a brief overview of the papers on trypanosomiasis and its control, presented in an issue of *Trends in Parasitology* largely dedicated to these topics. The conclusion arrived at is that a common approach would attain optimum efficiency of trypanosomiasis management: in line with this approach, PAAT (Programme Against African Trypanosomiasis) has the objective of moving towards adopting a common strategy that will achieve uniformity and harmony in combating trypanosomiasis, the choice of the most appropriate strategic tools and diagnostic techniques, as well as the standardization of treatment methods and follow-up procedures throughout trypanosomiasis-affected areas.

11859 **Laveissière C., Grébaut P., Herder S. and Penchenier L., 2000.** *Les glossines vectrice de la Trypanosomiase humaine africaine.* [*The tsetse vectors of human African trypanosomiasis*] pp. 246. OCEAC, Yaoundé, Cameroun.

Laveissière: Institut de Recherche pour le Developpement, OCEAC, BP 288, Yaoundé, Cameroun. [trypoceac@camnet.cm]

This manual is for the training of those concerned with tsetse and trypanosome control in areas threatened by sleeping sickness. A fuller review is given in Section A.

2. TSETSE BIOLOGY

(a) REARING OF TSETSE FLIES

(b) TAXONOMY, ANATOMY, PHYSIOLOGY, BIOCHEMISTRY

11860 **Luna, C., Bonizzoni, M., Cheng, Q., Robinson, A.S., Aksoy, S. and Zheng, L., 2000.** Microsatellite polymorphism in tsetse flies (Diptera: Glossinidae). *Journal of Medical Entomology*, **38** (3): 376-381.

Luna: School of Medical Epidemiology and Public Health, Yale University, 60 College Street, New Haven, CT 06520 USA.

In sub-Saharan Africa, tsetse flies are the vectors of trypanosomes, the causative agents of sleeping sickness in humans and nagana in animals. Certain wild populations of the palpalis group exhibit intraspecific variation and are suspect of manifest differences in vectorial capacity. The current study reports the identification of 13 polymorphic microsatellite loci from *Glossina palpalis palpalis* Robinean-Desvoidy. The majority of these markers amplify corresponding loci from the related species *G. p. gambiensis* Vanderplank, *G. f. fuscipes* Newstead, and *G. tachinoides* Westwood. Only seven of 13 loci were amplified from *G. austeni* Newstead. Genetic variability was estimated in one field population of *G. p. gambiensis*. These results confirmed that microsatellite markers may be used to examine the subpopulation structure of tsetse flies.

11861 **Maudlin I. And Welburn S.C., 2001.** Genome – which genome? *Trends in Parasitology*, **17** (1): 50-52.

Maudlin: [imaudlin@vet.ed.ac.uk]

The techniques of genome sequencing applied to parasites and their symbionts have raised hopes that parasites affecting human health and welfare may be better targeted by improved or novel drugs, or other interventions arising from such technological advances. A case is made for a new strategy for technological promotion involving scientists, government and industry, with participation from both rich and poor countries. The community of parasitologists is urged to work towards the goal of ensuring that the developing world benefits from these genome initiatives.

(c) DISTRIBUTION, ECOLOGY, BEHAVIOUR, POPULATION STUDIES

11862 **Hargrove J.W., 2001.** The effect of temperature and saturation deficit on mortality in populations of male *Glossina m. morsitans* (Diptera : Glossinidae) in Zimbabwe and Tanzania. *Bulletin of Entomological Research*, **91** (2): 79-86.

Hargrove: Tsetse Control Branch, Box CY52, Causeway, Harare, Zimbabwe.

The methods of Bailey and of Jolly and Seber were used to provide maximum likelihood estimates of population parameters for Jackson's classical mark-recapture experiments on males of the tsetse fly *Glossina m. morsitans* Westwood. These were compared with Jolly-Seber (J-S) estimates for the same fly from more recent work on

Antelope Island, Lake Kariba, Zimbabwe. The Bailey estimates of birth and death rates and total population size had markedly lower variances than Jackson's originals. Both sets of estimates provided moving averages over 6-week periods, whereas the Jolly-Seber analysis provided independent weekly estimates and their variance is consequently higher. Saturation deficit and maximum temperature (T_{max}) accounted for 11 and 16% respectively of the variance in independent 4-week means of the weekly J-S survival probabilities. Analysis of covariance, carried out on a joint data set of smoothed J-S estimates of the survival probability in Tanzania and Zimbabwe, showed a significant effect of T_{max} on survival. When this effect was removed, the survival probability in the Tanzania studies was found to be 8% lower than on Antelope Island. The two effects accounted for 50% of the variance in the joint data. When saturation deficit was substituted for T_{max}, regression only accounted for 35% of the variance. If saturation deficit is important in determining tsetse survival, it must act on stages other than the post-teneral adult. Given the continuous increase in mortality, even at moderate temperatures, it is hard to envisage a direct effect of T_{max}. There may be an indirect effect, however, via the number of hunger-related deaths resulting from the increase in the feeding rate with increasing temperature.

3. TSETSE CONTROL (INCLUDING ENVIRONMENTAL SIDE-EFFECTS)

11863 **Grant I.F., 2001.** Insecticides for tsetse and trypanosomiasis control: is the environmental risk acceptable? *Trends in Parasitology*, **17** (1): 10-14.

Grant: Natural Resources Institute, University of Greenwich, Chatham Marine, Kent. [ian.grant@nri.org]

Tsetse control technology, as well as the science of environmental impact and risk assessment, has come a long way over the past 20 years. The application of science to tsetse control has significantly reduced impacts on the environment, and the costs of environmental monitoring and assessment have reduced dramatically. Enviromental impacts are encountered with all insecticide-based techniques, but they appear to be relatively minor and short-lived. Despite a wealth of ecotoxicological information, conflict between real and imagined risks is hampering decision making. Public confidence in control technologies is being undermined by political viewpoints, fears (often based on misinformation) and poor communication of the environmental issues.

11864 **Allsopp R., 2001.** Options for vector control against trypanosomiasis in Africa. *Trends in Parasitology*, **17** (1): 15-19.

Allsopp: Natural Resources Institute, University of Greenwich, Chatham Maritime, Kent, ME4 4TB. [r.allsopp@gre.ac.uk]

Tsetse control has long been an important option for reducing the impact of African trypanosomiasis but, although many effective methods have been used, the results have seldom proved sustainable. Developments to reduce cost and environmental impact increasingly limit the choices available for control and the scale of operations has declined. Conversely, human trypanosomiasis has reached epidemic proportions in some

countries. It is argued that those tasked with managing trypanosomiasis or committed to poverty alleviation in Africa should consider large-scale, area-wide tsetse control involving all proven methods, including aerial spraying and the sterile insect technique.

11865 **Rowlands, G.J., Leak, S.G.A., Mulatu, W., Nagda, S.M., Wilson, A. and d'Ieteren, G.D.M., 2001.** Use of deltamethrin 'pour-on' insecticide for the control of cattle trypanosomosis in the presence of high tsetse invasion. *Medical and Veterinary Entomology,* **15** (1): 87-96.

Rowlands: P.O.Box 30709, Nairobi, Kenya.

A deltamethrin 'pour-on' insecticide was applied monthly to over 2000 cattle exposed to a high challenge of drug-resistant trypanosomes and high tsetse re-invasion pressure in the Ghibe valley, south-west Ethiopia. Blood samples were taken monthly from an average of 760 cattle for determination of PCV and presence of trypanosomes. The area of the valley is approximately 350 km^2 and the cattle grazed in roughly four locations covering about a quarter to half of the area. Two years before the trial commenced, *Glossina morsitans submorsitans* Newstead (Diptera: Glossinidae) began to invade the valley. Despite the use of the pour-on the mean apparent density of *G. m. submorsitans* continued to rise, and, during the 4 years of tsetse control, was more than three-fold higher than that recorded during the previous 18 months. Over the same period there was little change in the apparent density of *Glossina pallidipes* Austen (Diptera: Glossinidae). By contrast, the mean monthly prevalence of trypanosome infections in cattle over 36 months of age decreased from 38.3 to 29.0%, the incidence of new infections decreased from 26.6 to 16.0% (a reduction of 40%), and packed cell volume in cattle increased from 21.7 to 24.1%. Evidence of a change in apparent parasite transmission rate was demonstrated by regression of infection incidence in cattle on the logarithm of apparent density of *G. m. submorsitans*. Before the trial started the regression coefficient was 45.8 +/- 6.3 and this reduced to 9.2 +/- 2.5% incidence per $\log_e$ (flies/trap/day) during the period of tsetse control. It was concluded that this indicated reductions in tsetse numbers in the immediate vicinities of cattle in a way that was not reflected in overall tsetse catches. Nevertheless, the comparatively high levels of trypanosome prevalence that persisted in the cattle demonstrates that, where invasion prevalence is high, treatment of small pockets of cattle will not eradicate tsetse. To achieve more significant reduction in trypanosome prevalence in cattle, integrated methods of control utilizing target barriers in the major routes of invasion will be needed.

11866 **Aksoy S., Maudlin I., Dale C., Robinson A.S. and O'Neill S.L., 2001.** Prospects for control of African trypanosomiasis by tsetse vector manipulation. *Trends in Parasitology,* **17** (1): 29-35.

Aksoy: Department of Epidemiology and Public Health, Section of Vector Biology, Yale University School of Medicine, 60 College Street, New Haven, CT 06510, USA.

The extensive antigenic variation phenomena that African trypanosomes display in their mammalian host have hampered efforts to develop effective vaccines against

trypanosomiasis. Human disease management aims largely to treat infected hosts by chemotherapy, whereas control of animal diseases relies on reducing tsetse populations as well as on drug therapy. The control strategies for animal diseases are carried out and financed by livestock owners, who have an obvious economic incentive. Sustaining largely insecticide-based control at a local level and relying on drugs for treatment of infected hosts for a disease for which there is no evidence of acquired immunity could prove extremely costly in the long run. It is more likely that a combination of several methods in an integrated phased and area-wide approach would be more effective in controlling these diseases and subsequently improving agricultural output. New approaches that are environmentally acceptable, efficacious and affordable are clearly desirable for control of various medically and agriculturally important insects including tsetse. Here, molecular genetic approaches to modulate tsetse vector competence are discussed.

4. EPIDEMIOLOGY: VECTOR-HOST AND VECTOR-PARASITE INTERACTIONS

11867 **Haynes, D.M., 2000.** Framing tropical disease in London: Patrick Manson, *Filaria perstans*, and the Uganda sleeping sickness epidemic, 1891-1902. *Social History of Medicine,* **13** (3): 467-493.

Haynes: Dept of History, Irvine, University of California Irvine CA 92697, USA. [Dhaynes@uci.edu].

Much of the historical literature on tropical medicine represents the periphery as the chief site for the production of western knowledge about disease in the British empire. This study on the Filaria perstans-sleeping sickness hypothesis revises this perspective by showing how the imperial metropole functioned as a cultural space for the construction of knowledge about the empire. Beginning in 1891, Patrick Manson used the publicity resources of London to generate a rhetorical imperative for the confirmation of his hypothesis without ever leaving Britain. Later, while he was medical adviser to the imperial state, the 1900 sleeping sickness epidemic in Uganda presented Manson with a unique opportunity to determine the validity of his hypothesis. By exaggerating the possible spread of the epidemic privately among Foreign Office personnel and publicly in the medical press, he succeeded in mobilizing the first Royal Society sleeping sickness research expedition to Africa in 1902. While this expedition ultimately disproved Manson's hypothesis, this outcome ironically created the very conditions for the identification of the actual causal agent (*Trypanosoma gambiense*) and its vector (tsetse fly) by Aldo Castellani and David Bruce respectively.

11868 **Torr, S.J,, Wilson, P.J., Schofield, S., Mangwiro, T.N.C., Akber, S. and White, B.N., 2001.** Application of DNA markers to identify the individual-specific hosts of tsetse feeding on cattle. *Medical and Veterinary Entomology,* **15** (1):78-86.

Torr: Natural Resources Institute, University of Greenwich, Chatham ME4 4TB Kent, UK.

Primer sets for five different ungulate loci were used to obtain individual microsatellite DNA profiles for 29 Mashona cattle from a herd in Zimbabwe. There were 3-13 alleles for each locus and, using the entire suite of five loci, each animal within the herd, including closely related individuals, could be unequivocally distinguished. Wild-caught *Glossina pallidipes* Austen (Diptera: Glossinidae) were fed on specific cattle and the bloodmeal was profiled 0.5-72 h after feeding. The individual specific sources of the bloodmeals, including mixed meals produced by allowing tsetse to feed on two different cattle, were reliably identified up to 24 h after feeding. The technique was used in field studies of host selection by *G. pallidipes* and *G. morsitans morsitans* Westwood (Diptera, Glossinidae) attracted to pairs of cattle. When the pair comprised an adult and a calf, 100% of meals were from the adult. For some pairs of adult cattle, tsetse were biased significantly towards feeding on one animal, whereas for other pairs there was no such bias. In general, feeding was greater on the animal known to have a lower rate of host defensive behaviour. Results suggest that relatively slight differences in the inherent defensive behaviour of cattle produce large differences in host-specific feeding rates when the hosts are adjacent. For flies attracted to pairs of cattle, <2% contained blood from both hosts. The DNA profiling technique will be useful in studying the epidemiology of vector-borne diseases of livestock.

5. HUMAN TRYPANOSOMIASIS

(a) SURVEILLANCE

11869 **Garcia, A., Jamonneau, V., Magnus, E., Laveissière, C., Lejon, V., N'Guessan, P., N'Dri, L., Meirvenne, N. van and Buscher, P., 2000.** Follow-up of Card Agglutination Trypanosomiasis Test (CATT) positive but apparently aparasitaemic individuals in Côte d'Ivoire: evidence for a complex and heterogeneous population. *Tropical Medicine & International Health*, **5** (11): 786-793.

Garcia: Institut Pierre Richet, BP 1500, Bouaké 01, Côte d'Ivoire.

The aetiological diagnosis of human African trypanosomiasis (HAT) is based on the detection of the parasite, but currently available parasitological tests have low sensitivity and are hampered by fluctuating parasitaemia. The identification of seropositive individuals on whom to focus parasitological examination is based on antibody detection by means of the CATT/*T. b. gambiense*. A complicating phenomenon is the occurrence of serologically positive but parasitologically unconfirmed results (isolated CATT positivity).

This work presents a two-year longitudinal serological, parasitological and molecular follow-up of CATT-positive individuals including repeated examinations of each individual, to study the evolution over time of seropositivity at both the population and the individual levels. At the population level, the rate of seropositivity decreased during the first months of the survey, and afterwards showed remarkable stability. At the individual level, the results reveal the extreme heterogeneity of this population, with

subjects showing fluctuating results, others with a short transient CATT positivity and subjects that maintain their seropositivity over time. The stability of seropositivity and the pattern of results obtained with both immunological and parasitological examinations support the view that individual factors, such as immune response to infection, might be involved in the isolated CATT positivity phenomenon.

11870 **Jamonneau, V., N'Guessan, P., N'Dri, L., Simarro, P. and Truc, P., 2000.** Exploration of the distribution of *Trypanosoma brucei* ssp. in West Africa, by multilocus enzyme electrophoresis. *Annals of Tropical Medicine and Parasitology*, **94** (6): 643-649.

Truc: Laboratoire de Recherche et de Coordination sur les Trypanosomes, CIRAD/EMVT/IRD, LRCT, Campus International de Baillarguet, F-34398 Montpellier Cedex 5, France. [truc@mpl.ird.fr]

Multilocus enzyme electrophoresis (MLEE) remains very useful for basic epidemiological studies, being more robust and cheaper than newer DNA-based methods. The aim of this study was to use MLEE to identify stocks of *T. brucei* isolated mainly from humans and to analyse the distribution and persistence of zymodemes in space and time. Amongst other results, it was found that zymodeme 3 is widely distributed in West and Central Africa; it is the main cause of the current human African trypanosomiasis epidemic in Côte d'Ivoire since 1991.

11871 **Jamonneau, V., Garcia, A., Frezil, J.L., N'Guessan, P., N'Dri, L. Sanon, R., Laveissiere, C. and Truc, P., 2000.** Clinical and biological evolution of human trypanosomiasis in Côte d'Ivoire. *Annals of Tropical Medicine and Parasitology*, **94** (8): 831-835.

Truc: Laboratoire de Recherche et de Coordination sur les Trypanosomes, CIRAD/EMVT/IRD, LRCT, Campus International de Baillarguet, F-34398 Montpellier Cedex 5, France. [truc@mpl.ird.fr]

Fifteen trypanosome positive human patients who had refused treatment were observed from 1995-6 to March 1999. Eleven remained without overt clinical signs, but three had first stage signs of sleeping sickness and one had second stage (neuro-psychiatric) symptoms by the end of the observation period.

11872 **Jones, J.**, 2000. African sleeping sickness returns to UK after four years. *British Medical Journal*, **321** (7270): 1177.

Two cases of *T. b .rhodesiense* were reported in UK, the patients returning from stays in Tanzania and Zambia, respectively. Suramin was successfully used to treat these cases.

(b) PATHOLOGY AND IMMUNOLOGY

11873 **Bentwich, Z, Maartens, G., Torten, D., Lal, A.A. and Lal, R.B., 2000.** Concurrent infections and HIV pathogenesis. *AIDS*, **14** (14): 2071-2081.

Bentwich: Ruth Ben Ari Institute of Clinical Immunology, Kaplan Medical Centre, Hebrew University Hadassah Medical School, IL-76100 Rehovot, Israel.

This brief review summarises what is known about the interaction between HIV pathogenesis and other concurrent infections. In respect of African human trypanosomiasis the article concludes that the interaction is unclear, needing further study.

11874 **Buguet, A., Bourdon, L., Bouteille, B., Cespuglio, R., Vincendeau, P., Radomski, M.W. and Dumas, M., 2001.** The duality of sleeping sickness: focusing on sleep. *Sleep Medicine Reviews*, **5** (2): 139-153.

Buguet: Institut de Médecine tropicale du service de santé des armées, Le Pharo, B.P.46, 13998 Marseille Armées, France.

Sleeping sickness, once under control, is a re-emergent endemic parasitic disease in intertropical Africa. Its originality resides in its duality. Two trypanosome groups (*Trypanososma brucei gambiense* vs. *rhodesiense*) are transmitted to humans by tsetse flies from two geographical areas (Western and Central Africa humid forest vs. Eastern Africa arboreous savannah), provoking a slowly or a rapidly evolutive disease. The two stage (haemolymphatic vs. neurological invasion) pathogenic evolution leads to the duality of the immune response, depending on the host-parasite interrelation differences in the blood and the brain. In the blood, the immune processes involved are both specific (anti-variant surface glycoprotein (VSG) antibodies) and non-specific (complement-mediated lysis, opsonification-facilitated phagocytosis and antibody dependent cell-mediated cytotoxicity). Although macrophages are activated in the blood and infiltrate the brain, nitric oxide decreases in the blood and increases in the brain, with a breakage in the blood-brain barrier, leading to brain lesions through the production of deleterious molecules. Prophylactic means are affected by the duality of pathogenic processes. This finally leads to a two stage disease (haemolymphatic vs. neurological) with two different therapeutic strategies. The sleep-wake cycle and other biological rhythms are also marked by the disappearance of circadian rhythmicity demasking basic ultradian activities and relationships, such as the interdependence of endocrine profiles and the sleep-wake alternation.

11875 **Mulenga, C., Robertson, B., Mhlanga, J. and Kristensson, K., 2000.** Trypanosomes cross the blood-brain barrier (BBB) during the middle and late stages of a chronic model of African trypanosomiasis without apparent loss of BBB integrity. (Meeting abstract.) *European Journal of Neuroscience*, **12** (Supplement 11): 356.

Mulenga: Karolinska Institute, Department of Neuroscience, Nobels Vag 12A, S-17177 Stockholm, Sweden.

11876 **Mulenga, C., Mhlanga, J.D.M., Kristensson, K. and Robertson, B. 2001.** *Trypanosoma brucei brucei* crosses the blood-brain barrier while tight junction proteins are preserved in a rat chronic disease model. *Neuropathology and Applied Neurobiology*, **27** (1): 77-85.

Robertson: Karolinska Institute, Department of Neuroscience, Nobels Vag 12A, S-17177 Stockholm, Sweden.

11877 **Sanner, B.M., Büchner, N., Kotterba, S. and Zidek, W., 2000.** Polysomnography in acute African trypanosomiasis. (Letter.) *Journal of Neurology*, **247** (11): 878-879.

Sanner: Department of Medicine 1, Ruhr University Bochum, Marienhospital Herne, Hölkeskampring 40, 44625 Herne, Germany. [Bernd.Sanner@ruhr-uni-bochum.de]

11878 **Welburn S.C., Fevre E.M., Coleman P.G., Odiit M. and Maudlin I., 2001.** Sleeping sickness: a tale of two diseases. *Trends in Parasitology*, **17** (1): 19-24.

Welburn: Sir Alexander Robertson Centre for Tropical Veterinary Medicine, Royal (Dick) School of Veterinary Studies, The University of Edinburgh, Roslin, Midlothian, UK EH25 9RG. [sue.welburn@ed.ac.uk]

Sleeping sickness presents clinically as two distinct diseases, reflecting the fact that two very different trypanosomes are responsible. The African Rift separating East and West Africa defines the distribution of the two diseases. The biology and distribution of these two diseases in relation to the evolution of hominids in Africa are discussed.

(c) TREATMENT

11879 **Denise, H. and Barrett., M.P., 2000.** Uptake and mode of action of drugs used against seeping sickness. *Biochemical Pharmacology*, **61** (1): 1-5.

Barrett: University of G;asgow, IBLS, Division of Infection and Immunity, Joseph Black Building, Glasgow G12 8QQ, Lanark, Scotland.

11880 **Dumas, M. and Bouteille B., 2000.** Treatment of human African trypanosomiasis. *Bulletin of the World Health Organisation*, **78** (12): 1474.

Institut d'Epidémiologie Neurologique et de Neurologie Tropicale, Faculté de Médecine, Université de Limoge, 2 rue du Docteur Marchand, 87025 Limoges Cedex, France.

11881 **Keiser. J., Stich, A. and Burri, C., 2001.** New drugs for the treatment of human African trypanosomiasis: research and development. *Trends in Parasitology*, **17** (1): 42-49.

Burri: Swiss Tropical Institute, PO Box, CH-4002 Basel, Switzerland. [Christian.Burri@unibas.ch]

Chemotherapy of human African trypanosomiasis is problematic because of the high frequency of severe adverse events, the long duration and high cost of treatment, and an increasing number of treatment-refractory cases. New cost-efficient, easy-to-use drugs are urgently needed. Whereas basic research on potential drug targets is anchored in academia, the complex, highly regulated and very expensive process of preclinical and clinical drug development is almost exclusively in the hands of pharmaceutical companies. This account reviews, from the angle of industrial drug research and development, the past ten years of research activities at different stages of the development of trypanocidal drugs, and assesses future prospects. The absence of compounds in clinical development Phases I-III indicates no new drugs will become available in the next few years.

6. ANIMAL TRYPANOSOMIASIS

(a) SURVEY AND DISTRIBUTION

11882 **Desquesnes, M., Bengaly, Z., Millogo, L., Meme, Y. and Sakande, H., 2001.** The analysis of the cross-reactions occurring in antibody-ELISA or the detection of trypanosomes can improve identification of the parasite species involved. *Annals of Tropical Medicine and Parasitology*, **95** (2): 141-155.

Desquesnes: CIRAD-EMVT, B.P. 5035, 34032 Montpellier Cedex 1, France. [m.dequesnes@fasonet.bf]

In Africa, the main pathogenic trypanosomes of livestock are *Trypanosoma vivax*, *T. congolense* and *T. brucei*. The geographical distributions and hosts of these three species are very similar. As they differ markedly in pathogenicity and epidemiology, however, a species-specific serological test for infection would be very useful for epidemiological studies. The antibody-ELISA (Ab-ELISA) that have been developed for detecting the *Trypanosoma* spp. most commonly infecting livestock give satisfactory sensitivity and genus specifcity. Unfortunately, they are not species-specific because of strong cross-reactions between the pathogenic *Trypanosoma* spp.

In the present study, carried out in Burkina Faso, the results of standardized Ab-ELISA for *T. vivax*, *T. brucei* or *T. congolense* were compared using 1288 plasma samples

from sheep experimentally infected with *T. vivax*, *T. evansi* and/or *T. congolense*. If the results were interpreted, as usual, only using a positivity threshold (PT), the strong cross-reactions observed led to a mean species-specificity of <30%. However, analysis of the reactions observed in the three types of Ab-ELISA revealed that the homologous reactions were stronger than the heterologous for almost all of the single and mixed infections (98.3% and 99.0%, respectively). In monospecific infections exceeding the PT study of the positivity score produced in each of the three types of Ab-ELISA in creased species-specificity to >96%. It therefore appears that comparison of the strengths of the reactions

seen in Ab-ELISA could greatly improve sero-epidemiological surveys of trypanosome infections in domestic ruminants, although the technique remains to be evaluated in experimentally infected cattle.

11883 **Kalu, A.U., Oboegbulem, S.I. and Uzoukwu, M., 2001.** Trypanosomosis in small ruminants maintained by low riverine tsetse population in central Nigeria. *Small Ruminant Research,* **40** (2): 109-115.

Kalu: Department of Veterinary, Public Health & Preventive Medicine, University of Maiduguri, PMB 1069, Maiduguri, Borno State, Nigeria.

The prevalence of trypanosomosis was investigated over a 12-month period, among small ruminants grazing in known sleeping sickness endemic area of central Nigeria and under light riverine tsetse challenge. Analysis of the data from 304 Yankassa sheep and 239 West African Dwarf x Red Sokoto goats indicated high mean prevalence (27.62%, confidence limits Cl: 0.232, 0.312). Interspecies difference between sheep (38.16%; 0.382, Cl: 0.332, 0.432) and goats (14.23%; 0.142, Cl: 0.102, 0.182) was highly significant ($P < 0.001$). Infections were also significantly higher ($P < 0.05$) with agro-pastoral (extensive) management, during the dry season and in adults compared to intensively managed animals, the wet season and young animals, respectively. *Trypanosoma, vivax* was the predominant parasite encountered and accounted for over 49% of the infections. *T. congolense* and mixed populations were diagnosed at approximately 15% each while *T. brucei* were absent in caprines. The implications of these findings in the epidemiology of the diseases in both man and domestic animals is discussed.

11884 **Machila, N., Sinyangwe, L., Mubanga, J., Hopkins, J.S., Robinson, T. and Eisler, M.C., 2001.** Antibody-ELISA seroprevalence of bovine trypanosomosis in the Eastern Province of Zambia. *Preventive Veterinary Medicine,* **49** (3-4): 249-257.

Machila: Centre for Tropical Veterinary Medicine, Royal (Dick) School of Veterinary Studies, The University of Edinburgh Easter Bush, Roslin EH25 9RG, Midlothian, Scotland, UK. [n.machila-eislen@sms.ed.ac.uk]

A longitudinal study was conducted over a 1-year period in six selected villages in Petauke and Katete districts in the Eastern Province of Zambia. Starting in November 1997, 50 animals were sampled at random at each village every 2 months. The parasitological prevalence of trypanosomosis was determined by the haematocrit centrifugation buffy-coat technique, supplemented with thick and thin Giemsa-stained blood films. Serum samples also were collected for anti-trypanosomal antibody determination by indirect, enzyme-linked immunosorbent assay. Parasitological prevalence was highly variable between villages and between visits (range: 0-28.6%; median: 3.1%). Seroprevalence was also variable between villages (range: 0-80.8%; median: 50%), but was less variable between visits. Average annual parasitological prevalence and average annual seroprevalence for each village were highly correlated [R-2 (adjusted for d.f.) = 0.89, $p < 0.01$]. Seroprevalence measured on any single visit to a

study village was better than parasitological prevalence as a predictor of average annual parasitological prevalence.

11885 **Mattioli, R.C., Faye, J.A. and Jaitner, J., 2001.** Estimation of trypanosomal status by the buffy coat technique and an antibody ELISA for assessment of the impact of trypanosomosis on health and productivity of N'Dama cattle in The Gambia. *Veterinary Parasitology* **95** (1): 25-35.

Mattioli: International Trypanotolerance Centre, PMB 14, Banjul, The Gambia. Present address: FAO, Viale delle Terme di Caracalla, 00100, Rome Italy. [Raffaele.Mattioli@fao.org]

The buffy coat/dark ground phase contrast technique (BCT) and an indirect antibody enzyme immunoassay (ELISA) were employed to assess the trypanosomal status of 32 N'Dama cattle, aged 19-28 months, exposed to natural challenge of *Glossina morsitans submorsitans* and *G. palpalis gambiensis*. Prior to the start of the investigation animals experienced 9-16 months of tsetse challenge in the study area. Blood and corresponding serum samples were examined monthly for a period of 8 months for patent parasitaemia by BCT and presence of *Trypanosoma vivax* and *T. congolense* antibodies by ELISA. In the ELISA, the reactivity of sera to anti-trypanosomal antibodies was expressed in percent positivity (pp). Packed cell volumes (PCV) and body weights were also recorded monthly, and daily weight gain (DWG) computed to assess the impact of trypanosomal status on health and productivity. During the study period, the overall parasitaemic trypanosome prevalence was 3% (6/199), while the serological prevalence was 54.7% (109/199). Both diagnostic tests revealed a predominance of *T. vivax* over *T. congolense* infections in N'Dama cattle. Sensitivity of the immunoassay was 83.3%. In *T. vivax*- parasitaemic cattle, antibodies persisted for 4-6 months after the parasite was detected by BCT. A significantly higher overall mean PCV level was observed in blood samples obtained from cattle found, in any particular month, negative by BCT and ELISA, compared with those blood samples from animals responding serologically positively for anti-trypanosome antibodies. Likewise, mean DWG was significantly higher in cattle found negative for both tests in comparison to animals presenting detectable anti-trypanosome antibodies and those detected positive by both tests. A significant negative relationship was observed between pp values and PCV levels in animals seropositive for *T. vivax* and/or *T. congolense*. Similarly, a negative relationship was observed between DWGs and pp values. PCV levels were significantly positively correlated with DWGs. It was concluded that serological screening could provide useful information complementary to that obtained by the use of BCT not only to assess more accurately the trypanosomal status of cattle populations, but also to evaluate the effects of trypanosome infection on animal health and productivity and estimate the trypanosomosis risk.

(b) PATHOLOGY AND IMMUNOLOGY

11886 **Sharma, D.K., Chauhan, P.P.S., Saxena, V.K. and Agrawal, R.D., 2000.** Haematological changes in experimental trypanosomiasis in Barbari goats. *Small Ruminant Research,* **38** (2): 145-149.

Sharma: Central Institute for Research, Goats, Mathura 281122, UP, India.

Haematological changes due to *Trypanosoma evansi* infection were studied in 12 Barbari male goats of 6-9 months of age. These were divided in two groups, A and B, consisting of eight infected and four control animals, respectively. The animals were kept in strict hygienic conditions and on a zero grazing schedule. Animals of group A were exposed to $1x10^6$ T. evansi subcutaneously. Animals of both the groups were bled weekly and blood samples were examined for different haematological parameters including PCV, Hgb and total RBC count, and erythrocytic indexes of MCV, MCH and MCHC were calculated. Analysis of data revealed significant changes in all these parameters and erythrocytic indexes in infected goats when compared with controls. Observations showed macrocytic anaemia with reticulocytosis in response to early haemolysis.

(c) TRYPANOTOLERANCE

(d) TREATMENT

11887 **Geerts, S., Holmes P.H., Diall O. and Eisler M.C., 2001.** African bovine trypanosomiasis: the problem of drug resistance. *Trends in Parasitology*, **17** (1): 25-28.

Geerts: Institute of Tropical Medicine, Nationalestraat 155, 2000 Antwerpen, Belgium. [sgeerts@itg.be]

The three trypanocides used to control tsetse-transmitted trypanosomiasis in domestic animals in Africa have been in use for over 40 years and, not surprisingly, resistance of trypanosomes to these drugs has emerged. Because of the relatively limited market in Africa and the high costs of developing and licencing new drugs, international pharmaceutical companies have shown little interest in the development of new trypanocides for use in either animals or humans. Therefore, the current challenge is to achieve optimal use of the relatively old existing drugs, and it is in this context that the problem of drug resistance has to be quantified.

7. EXPERIMENTAL TRYPANOSOMIASIS

(a) DIAGNOSTICS

11888 **Shoda, L.K.M., Kegerreis, K.A., Suarez, C.E., Roditi, I., Corral, R.S., Bertot, G.M., Norimine, J. and Brown, W.C. 2001.** DNA from protozoan parasites *Babesia bovis*, *Trypanosoma cruzi*, and *T. brucei* is mitogenic for B lymphocytes and stimulates macrophage expression of interleukin-12, tumor necrosis factor alpha, and nitric oxide. *Infection and Immunity*, **69** (4): 2162-2171.

Brown: Department of Veterinary Microbiology and Pathology, Program for Vector Borne Diseases, Pullman, Washington State University, WA 99164 USA.

(b) PATHOLOGY AND IMMUNOLOGY

11889 **Garin, Y.J.F., Sulahian, A., Menéceur, P., Pratlong, F., Prina, E., Gangneux, J.-P., Dedet, J.-P. and Derouin, F., 2001.** Experimental pathogenicity of a presumed monoxenous trypanosomatid isolated from humans in a murine model. *Journal of Eukaryotic Microbiology*, **48** (2): 170-176.

Garin: 07, UFR Lariboisiere, Hôpital St Louis, Laboratoire de Parasitologie et Mycologie, 15 Rue Ecole Med, Université de Paris, F-75006 Paris, France.

11890 **Mbala, L., Ngita, F., Tsita, J. and Matumueni, P., 2000.** Cerebrospinal trypanosomiasis masquerading as pulmonary infectious disease in a 1-year-old boy. *Annals of Tropical Paediatrics*, **20** (4): 293-295.

Mbala: Hospital IME Kimpese, Department of Paediatrics, POB 113, Kimpese, Bas Congo, Congo.

A 1-year-old boy with cerebrospinal trypanosomiasis presented with severe respiratory symptoms, hepatosplenomegaly and no neurological signs of trypanosomiasis. Agitation and high fever on the 2nd day in hospital prompted a lumbar puncture and trypanosomes were recovered from the cerebrospinal fluid.

11891 **Namangala, B., De Baetselier, P., Noël, W., Brys, L. and Beschin, A., 2001.** Alternative versus classical macrophage activation during experimental African trypanosomosis. *Journal of Leukocyte Biology*, **69** (3): 387-396.

Beschin: Interuniversity Institute for Biotechnology, Free University of Brussels, Paardenstraat 65, B-1640 St Genesius Rode, Belgium

11892 **Sileghem, M., Saya, R., Grab, D.J. and Naessens, J., 2001.** An accessory role for the diacylglycerol moiety of variable surface glycoprotein of African trypanosomes in the stimulation of bovine monocytes. *Veterinary Immunology and immunopathology*, **78** (3-4): 325-339.

Naessens: International Livestock Research Institute, P.O.Box 30709, Nairobi, Kenya. [j.naessens@cgiar.org]

11893 **Tabel, H., Kaushik, R.S. and Uzonna, J.E., 2000.** Susceptibility and resistance to *Trypanosoma congolense* infections. *Microbes and Infection*, **2** (13): 1619-1629.

Tabel: Deparment of Veterinary Microbiology, University of Saskatchewan, Saskatoon, SK S7N 5B4, Canada.

(c) CHEMOTHERAPEUTICS

11894 **Camacho, M.D., Phillipson, J.D., Croft, S.L., Kirby, G.C., Warhurst, D.C. and Solis, P.N., 2001.** Terpenoids from *Guarea rhophalocarpa*. *Phytochemistry*, **56** (2): 203-210.

Camacho: Centre for Pharmacognosy and Phytotherapy, School of Pharmacy, University of London, 29-39 Brunswick Square, London WC1N 1AX, England. [mcamacho@cua.ulsop.ac.uk]

11895 **Kelly, J.M., Quack, G. and Miles, M.M., 2001.** In vitro and in vivo activities of aminoadamantane and aminoalkylcyclohexane derivatives against *Trypanosoma brucei*. *Antimicrobial Agents and Chemotherapy*, **45** (5):1360-1366.

Kelly: Department of Infection and Tropical Medicine, London School of Hygiene and Tropical Medicine, University of London, Keppel St, London WC1E 7HT, England.

11896 **Maser, P., Vogel, D., Schmid, C., Raz, B. and Kaminsky, R., 2001.** Identification and characterization of trypanocides by functional expression of an adenosine transporter from *Trypanosoma brucei* in yeast. *Journal of Molecular Medicine*, **79** (2-3): 121-127.

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8. TRYPANOSOME RESEARCH

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(b) TAXONOMY, CHARACTERISATION OF ISOLATES

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(c) LIFE CYCLE, MORPHOLOGY, BIOCHEMICAL AND MOLECULAR STUDIES

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