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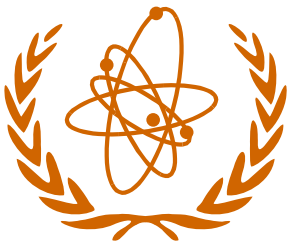

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SECTION B – ABSTRACTS

1. GENERAL (INCLUDING LAND USE)

5553 **Bourn, D., Milligan, K. and Wint, W., 1986.** Tsetse, trypanosomiasis and cattle in a changing environment. *In*: Kaufmann, R. von, Chater, S. and Blench, R. (eds), *Livestock systems research in Nigeria's subhumid zone* (Proceedings of the Second ILCA/NAPRI Symposium, Kaduna, Nigeria, 29 October - 2 November 1984), pp. 85-109. Addis Ababa; ILCA.
Resource Inventory and Management Ltd, Oxford, UK.
The Nigerian environment is undergoing profound and widespread changes induced by human population growth and agricultural expansion. As a result, natural vegetation is being transformed into farmland, and wildlife populations are being hunted out. Consequently, the natural habitats and hosts of tsetse (*Glossina* spp.), the vectors of animal and human trypanosomiases, are tending to disappear. Coincident with the expansion of human settlement and cultivation, and the declining importance of trypanosomiasis, there has been a southward spread in the distribution of cattle.
From authors' abstract

5554 **Brumby, P., 1986.** *ILCA: its approach and work.* Addis Ababa; ILCA. 18 pp.
ILCA, P.O. Box 5689, Addis Ababa, Ethiopia.
This document discusses ILCA's approach to its complex and challenging mandate, reflects on a few of the centre's achievements so far, highlights some of the strategic issues facing ILCA, and offers suggestions for the future development of the institute's work.

5555 **Centre de Recherches sur les Trypanosomoses Animales, 1987.** *Rapport d'Activité 1986.* [Annual Report 1986.] Bobo-Dioulasso; CRTA. 73 pp.
CRTA, B.P. 454, Bobo-Dioulasso, Burkina Faso.
The work of the Tsetse Section in 1986 is described. Research aimed at improving trapping systems by the use of olfactory attractants gave some very promising results, in particular for *Glossina tachinoides* which was shown for the first time to be sensitive to certain products isolated from host urine. Tsetse colonies were maintained satisfactorily by feeding on artificial membranes. In the Sideradougou pastoral area, barriers of traps and screens were regularly reimpregnated with insecticide and effectively prevented reinvasion of the area. An epidemiological survey of cattle and sheep showed that cyclical transmission of trypanosomiasis no longer occurs within the control area although it is common outside.

5556 **Ducloux, M., 1988.** Eugène Jamot (1879-1937): un fils du Limousin. [Eugène Jamot (1879-1937): a native of Limousin.] *Bulletin de la Société de Pathologie exotique et de ses Filiales,* **81** (3 bis): 419-426.
Hôpitaux des Armées, 55 avenue Victor-Hugo, 19000 Tulle, France.
An account is given of the life and work of Eugène Jamot who, in Brazzaville in 1917, created the first programme of mass screening and treatment of sleeping sickness.

5557 **International Laboratory for Research on Animal Diseases, 1988.** *ILRAD 1987* (Annual Report). Nairobi; ILRAD. 92 pp.
ILRAD, P.O. Box 30709, Nairobi, Kenya.
The goal of ILRAD's trypanosomiasis research programme is to achieve a fuller understanding of the entire disease process in order to identify promising avenues for practical immunological, chemical or genetic control. Research on the biology and biochemistry of trypanosomes in 1987 focused on genetic and biochemical changes which occur when a trypanosome passes from one developmental stage to another (differentiation), on various aspects of trypanosome metabolism and on the mechanisms of antigenic variation. Studies on host responses to trypanosome infection covered early events in the skin, parasite-host interaction in the bloodstream, pathogenic effects, and control of infection in trypanotolerant and susceptible cattle. Epidemiological research included studies on trypanosome characterisation (including the development of DNA probes) and livestock production under trypanosomiasis risk (trypanocidal drug detection and testing *in vitro* and *in vivo***,** and evaluation of protection). ILRAD continued to collaborate with ILCA in the African Trypanotolerant Livestock Network: this included research on tsetse challenge and trypanosome infection, evaluation of trypanosomiasis control, indications of heritability of

trypanotolerance, and N'Dama productivity. A new research programme on the epidemiology and socio-economics of animal disease and its control in Africa was initiated in late 1987.

5558 **International Livestock Centre for Africa, 1987.** *ILCA Annual Report 1986/87.* Addis Ababa; ILCA. 82 pp.

5559 **International Livestock Centre for Africa, 1988.** *ILCA Annual Report 1987.* Addis Ababa; ILCA. 105 pp.

ILCA, P.O. Box 5689, Addis Ababa, Ethiopia.

1987 was a year of transition for ILCA and this annual report and the previous one reflect the change from an institute based on disciplinary units and zonal research programmes to one that follows a new thrust-based research concept. Most of ILCA's work on trypanosomiasis is concentrated, in collaboration with ILRAD, on the African Trypanotolerant Livestock Network. In 1987 the network operated in nine countries of sub-Saharan Africa, mainly covering the humid and subhumid zones. The 1986/87 report describes research on tsetse challenge, trypanosome prevalence, species and intensity of trypanosome infection, trypanosome infection and PCV, trypanosome infection and livestock productivity, use of trypanocidal drugs and evaluation of productivity of different breeds. The 1987 report groups studies under four major themes: trypanosomiasis epidemiology, trypanotolerance, genetics of trypanotolerance, and biological and economic evaluation of productivity responses to interventions.

5560 **Jerve, A.M., 1982.** *Livestock trypanosomiasis and the pastoral crisis in semi-arid Africa. An approach to future land-use with example from Southern Somalia.* DERAP Working Paper A 256. Bergen, Norway; DERAP. 88 pp.

Chr. Michelsen Institute, DERAP, Fantoftvegen 38, N-5036 Fantoft, Bergen, Norway.

Part 1 of this report summarises the basic features of tsetse-trypanosomiasis ecology. In Part 2, the case of Southern Somalia is used to demonstrate some relations between land-use and tsetse control. The problems of livestock trypanosomiasis and overgrazing clearly demonstrate the need for an inter-disciplinary approach which can best be understood using systems analysis.

5561 **Murray, M., Trail, J.C.M., Turner, D.A. and Wissocq, Y. (eds), 1983.** *Livestock productivity and trypanotolerance. Network training manual.* Addis Ababa; ILCA. 198 pp.

ILCA, P.O. Box 3689, Addis Ababa, Ethiopia.

The African Trypanotolerant Livestock Network was established to evaluate the productivity of different breeds of domestic ruminants living under different levels of tsetse-typanosomiasis risk, under different management systems, in different ecological zones. Once essential baseline data are established and meaningful productivity indices, based on production, economic, health and tsetse data, are computed, it should then be possible to predict the productive capacity of a particular breed in a given situation and also the cost effectiveness and impact of possible control interventions. This training manual was produced in an attempt to standardise the procedures used for obtaining baseline data throughout Africa so that results from different areas can be critically compared. The manual describes the parameters and techniques used in

the collection of data in the three areas of animal health, tsetse, and animal productivity, and indicates how relevant information is extracted, analysed and interpreted.

5562 **Overseas Development Administration and University of Bristol, 1988.** *Tsetse Research Laboratory Annual Report 1987.* Bristol; ODA and University of Bristol. 44 pp. TRL, Langford House, Langford, Bristol BS18 7DU, UK.

1987 was the 25th anniversary of TRL which was established to determine the feasibility of establishing and maintaining productive laboratory colonies of tsetse flies. This objective was achieved by the mid-1960s and since then TRL has not only provided a reliable supply of tsetse to research workers but greatly expanded its research programme. In 1987 research was undertaken on tsetse nutrition, reproduction (synthetic juvenile hormone) and behaviour (visual responses, host odours, mating behaviour), and on *Glossina* as a vector of trypanosomes (particularly susceptibility or refractoriness to trypanosome infection and role of lectins). Work on the infraspecific characterisation of trypanosomes and on the *in vitro* testing of sensitivity of *Trypanosoma congolens*e to isometamidium chloride continued.

5563 **Shaw, A.P.M. and Hoste, C.H., 1987.** *Trypanotolerant cattle and livestock development in West and Central Africa. Volume I: The international supply and demand for breeding stock. Volume II: Trypanotolerant cattle in the national livestock economies.* FAO Animal Production and Health Papers 67/1 and 67/2 Rome; FAO. 184 + 330 pp. Veterinary Epidemiology and Economics Research Unit, University of Reading, Reading RG6 2AH, UK; B.P. 2540, Ouagadougou, Burkina Faso.

This publication arises from information collected by three consultants in nineteen countries (Senegal, Gambia, Guinea Bissau, Guinea, Sierra Leone, Liberia, Mali, Burkina Faso, Côte d'Ivoire, Ghana, Togo, Benin, Nigeria, Cameroon, Republic of Central Africa, Gabon, Congo, Zaire and Equatorial Guinea) during a total of 24 weeks in 1985. Volume I provides a general summary of the data from the nineteen country studies, focusing on an evaluation of the future supply and demand for trypanotolerant breeding stock. based on the economic background to trypanotolerant cattle production and on past experiences in breeding trypanotolerant breeding stock. Volume II presents nineteen individual country studies, assessing the role of trypanotolerant cattle in their livestock economies and detailing their past experiences and future prospects for trading in trypanotolerant breeding stock.

2. TSETSE BIOLOGY

(a) REARING OF TSETSE FLIES

5564 **Galun, R. and Kabayo, J.P., 1988**. Gorging response of *Glossina palpalis palpalis* to ATP analogues. *Physiological Entomology*, **13** (4): 419-423.

Department of Parasitology, Hadassah Medical School, Hebrew University, Jerusalem, Israel; Entomology Unit, Joint FAO/IAEA Programme, IAEA Laboratories, A-2444 Seibersdorf, Austria.

The potencies of seventeen analogues of ATP as gorging inducers for *G. p. palpalis* were evaluated. The ranking for effective dose that induced half the flies to gorge (ED_{50}) was: A tetra P > ATP = 2'd ATP > ADP = 2'd ADP > AMP-PNP > 3'd ATP > 2'3'dd ATP > AMP-PCP > adenosine 5' triphosphate 2',3'dialdehyde > AMP-CPP >> AMP. Females detect ATP and its analogues better than males. The ED_{50} of ATP was 5×10^{-7} M for teneral females and 1.5×10^{-6} M for males. According to the potency order of the ATP analogues, the *G. p. palpalis* gustatory receptors recognising ATP can be classified as P_{2y} purinoceptors. Authors' abstract

5565 **Kabayo, J.P., Taher, M. and Barnor, H., 1988.** Use of oven-dried blood for *in vitro* feeding of tsetse flies. *Experientia*, **44** (9): 802-803.

Entomology Unit, Joint FAO/IAEA Programme, IAEA Laboratories, A-2444 Seibersdorf, Austria.

Comparison of the survival, fecundity and offspring size of *Glossina palpalis* females fed reconstituted oven-dried blood, fresh, frozen/thawed, or reconstituted freeze-dried blood showed that oven-drying at 45^{o}C does not diminish the nutritional quality of blood. The significance of this finding is discussed with a view to optimising costs and conditions of blood-diet storage and transportation in the context of mass-rearing of tsetse flies. Authors' abstract

5566 **Madubunyi, L.C., 1988**. Performance of the tsetse, *Glossina morsitans morsitans* reared under various feeding regimens in Zambia. *Entomologia experimentalis et applicata*, **48** (1): 3-8.
Department of Veterinary Parasitology and Entomology, Faculty of Veterinary Medicine, University of Nigeria, Nsukka, Nigeria.
Groups of *G. m. morsitans* fed at emergence and thereafter daily or every second or third day, up to the end of their first pregnancy cycle, survived well (73-79%) and produced virtually the same number of puparia/female (0.83-0.85) in the same puparial weight class (23-24 mg). However, adult survival (29%), number of puparia/female (0.30) and puparial weight (19 mg) were much lower in the group fed only every fourth day after the initial meal at emergence. It is proposed that tsetse colonies could be fed on Mondays, Wednesdays and Fridays without jeopardising adult survival, puparial production/female and the size (weight) of puparia produced.
Author's abstract

5567 **Moloo, S.K., Grootenhuis, J.G., Kar, S.K. and Karstad, L., 1988.** Survival and reproductive performance of female *Glossina morsitans morsitans* when maintained on the blood of different species of wild mammals. *Medical and Veterinary Entomology*, **2** (4): 347-350
Moloo, Kar: ILRAD, P.O. Box 30709, Nairobi, Kenya; Grootenhuis, Karstad: Veterinary Research Laboratory, Wildlife Disease Section, Kabete, Kenya.
A study was carried out to determine the effect on the reproductive performance of female *G. m. morsitans* when allowed to feed *in vitro* for 63 days on fresh defibrinated blood of buffalo, bushbuck, cattle, eland, oryx, warthog, waterbuck or wildebeest. There were marginal differences in the survival and reproductive performance between eight different groups of tsetse, 200 per group, when fed on the blood of these mammalian species. When allowed to feed for 14 consecutive days on the blood of buffalo, wildebeest or warthog, the mean number of feeds were 6.2$\pm$0.3, 6.5$\pm$0.3 and 6.3$\pm$0.3, respectively. The mean weight of the bloodmeal taken also did not differ significantly between these three groups. Whereas the protein patterns of the blood plasma of the above eight host animals were different, the protein patterns of the haemolymph from tsetse fed on the blood of these hosts were identical. It is thus concluded that the preference shown by tsetse for some mammalian species investigated here may not be based on any aspect of the nutritional value of their blood.
Authors' abstract

5568 **Tenabe, S.O., 1988.** Effects of feeding regimen and timing of adult emergence collection on productivity of laboratory-bred *Glossina palpalis palpalis*. *Bulletin of Animal Health and Production in Africa*, **36** (1): 69-72.
Department of Zoology, University of Benin, Benin City, Nigeria.
The completion of the mating act as well as the total time spent *in copula* by *Glossina* are important in initiating and regulating ovulation and the subsequent pregnancy cycle in female tsetse. Also, the ability of female *Glossina* to produce `milk' is dependent upon her feeding activity. Therefore the nutrition and effective mating of the females must be co-ordinated to allow for optimum larval development *in vitro*. This paper reports the effects of the timing of adult emergence collection from puparia and feeding regimen on the productivity of female *G. p. palpalis* under laboratory conditions. Results indicated that adult emergence must be collected at intervals not exceeding 24 h and that a colony of *G. p. palpalis* could be offered 4-6 blood meals per week from guinea-pigs on specific days depending on the level of increase desired.
Authors' abstract

(b) TAXONOMY, ANATOMY, PHYSIOLOGY, BIOCHEMISTRY

[See also **12:** no. 5564.]

5569 **Becker, J.-L., Hazan, U., Nugeyre, M.-T., Rey, F., Spire, B., Barré- Sinoussi, F., Georges, A., Teulières, L. and Chermann, J.-C., 1986.** Infection de cellules d'insectes en culture par le virus HIV, agent du SIDA, et mise en évidence d'insectes d'origine africaine

contaminés par ce virus. [Infection of insect cell lines by HIV, agent of AIDS, and evidence for HIV proviral DNA in insects from Central Africa.] *Comptes rendus des Séances de l'Académie des Sciences (III),* **303** (8): 303-306.
Institut Pasteur, 28 rue du Docteur-Roux, 75724 Paris Cedex 15, France; Becker also: Laboratoire de Zoologie, ERA no. 615, Université Paris-VI, 11 quai Saint-Bernard, 75230 Paris Cedex 05, France; Georges: Institut Pasteur, Bangui, Central African Republic; Teulières: Institut National de Recherche Biomédicale, Kinshasa, Zaire.
HIV proviral DNA was found in the genome of tsetse flies from Central Africa, and the possibility of tsetse flies being a natural reservoir for the virus is suggested.
5570 **Galun, R., 1988.** Recognition of very low concentrations of ATP by *Glossina tachinoides* Westwood. *Experientia*, **44** (9): 800.
Entomology Unit, Joint FAO/IAEA Programme, IAEA Laboratories, A-2444 Seibersdorf, Austria.
Like many other blood feeders, *G. tachinoides* is stimulated to gorge by the presence of ATP in its diet. A concentration of 1.3×10^{-8} M ATP induces 50% feeding. The ability of *G. tachinoides* to detect ATP is the highest recorded so far among insects.
Author's abstract

5571 **Gooding, R.H., 1988.** Preliminary analysis of genetics of hybrid sterility in crosses of *Glossina palpalis palpalis* (Robineau-Desvoidy) and *Glossina palpalis gambiensis* Vanderplank. *Canadian Entomologist*, **120** (11): 997-1001.

Department of Entomology, University of Alberta, Edmonton, Alberta, Canada T6G 2E3.

G. p. palpalis and *G. p. gambiensis* hybridised readily in the laboratory but hybridised females produced fewer offspring than did females that mated with their own kind. Most hybrid females were fertile when backcrossed to either *G. p. palpalis* or *G. p. gambiensis* but almost all hybrid males were sterile. About half of the backcross males were able to fertilise *G. p. palpalis* and *G. p. gambiensis.* By using an X chromosome marker gene, *tan*, evidence was obtained that the X chromosome is involved in hybrid male sterility, either through interaction with the Y chromosome or the autosomes of the other subspecies. There was no evidence for maternally inherited sterility factors of a type that confer unidirectional sterility on hybrid or backcross males.

Author's abstract

5572 **Jura, W.G.Z.O., Otieno, L.H. and Chimtawi, M.M.B., 1988.** Ultrastructural evidence for trans-ovum transmission of the DNA virus of tsetse, *Glossina pallidipes* (Diptera: Glossinidae). *Current Microbiology*, **18** (1): 1-4.

ICIPE, P.O. Box 30772, Nairobi, Kenya.

The occurrence of vertical transmission of the DNA virus of tsetse was studied in virus-infected, female *G. pallidipes* with hypertrophied salivary glands. Ultra-structural examination of tissue components of ovaries of these females revealed virus particles within both germ cell cystocyte clusters and in the follicles, sparsely distributed within nurse cells and in the oocyte cytoplasm. The presence of the virus particles within the ooplasm demonstrates the ovum as a vehicle through which the *G. pallidipes* virus is disseminated in nature.

Authors' abstract

5573 **Kokwaro, E.D., Okot-Kotber, B.M., Odhiambo, T.R. and Murithi, J.K., 1987.** Biochemical and immunochemical evidence for the origin of the spermatophore material in *Glossina morsitans morsitans* Westwood. *Experientia*, **43** (4): 448-451.

ICIPE, P.O. Box 30772, Nairobi, Kenya.

Protein patterns in secretions from fully differentiated accessory reproductive glands, spermatophore and testes of males of *G. m. morsitans* were determined by isoelectrofocusing. The patterns of total accessory gland proteins were remarkably similar to those of the spermatophore. At least 27 bands were detected in secretions of these two organs. Of these, 13 were major protein bands and isoelectrofocused in the pI range of 4 and 6.55. Ten of these 13 were found to be acidic. Ouchterlony immunodiffusion and straight line immuno-electrophoresis showed that secretory proteins from the accessory glands and spermatophore shared common immunological characteristics which differed from those of the testes.

Authors' abstract

5574 **Matha, V. and Weiser, J., 1988**. Detection of antigens common to salivary glands and other tissues of tsetse fly, *Glossina palpalis palpalis* (Diptera: Glossinidae). *Folia Parasitologica*, **35** (3): 285-287.

Institute of Entomology, Department of Insect Pathology, Czechoslovak Academy of Sciences, Ceské Budejovice, Czechoslovakia.

The study demonstrates the antigens common to salivary gland, fat body, mesenteron, thorax muscle, native whole body and dried whole body homogenates of tsetse flies, *G. p. palpalis.* The possibilities of their origin and the role in hypersensitivity induction and its propagation are discussed.

Authors' abstract

5575 **Odindo, M.O., 1988**. *Glossina pallidipes* virus: its potential for use in biological control of tsetse. *Insect Science and its Application*, **9** (3): 399-403.

ICIPE, P.O. Box 30, Mbita, Kenya.

Laboratory-reared tsetse, *G. pallidipes*, were inoculated with the tsetse virus by micro-injection into the haemocoel, and feeding through micropipettes. The inoculated tsetse were reared on rabbits for 45 days, and feeding, flight and mating activities recorded. The tsetse

were dissected and the conditions of the salivary glands and gonads noted. In males, tsetse were examined under a compound microscope and the presence of spermatozoa noted. F_1 pupae were allowed to emerge, dissected, and the salivary glands examined for hypertrophy, and the gonads for sterility. There was no reduction in the activity of inoculated tsetse. The infection level was 23.5% in the treated adults. All infected males were sterile while females were fertile. There was no significant difference in the maternal age at larviposition, F_1 pupal weight, or incubation period of F_1 pupae, between treated and untreated tsetse. A high proportion of F_1 adults (65%) were infected, with category 4 hypertrophied salivary glands. All males with enlarged glands were sterile. The evidence obtained shows that the tsetse virus may be used in biological control of *G. pallidipes.*
Author's abstract

5576 **Okolo, C.J., Molyneux, D.H., Wallbanks, K.R. and Maudlin, I., 1988**. Fluorescein conjugated lectins identify different carbohydrate residues on *Glossina* peritrophic membranes. *Tropical Medicine and Parasitology*, **39** (3): 208-210.
Department of Biological Sciences, University of Salford, Salford, M5 4WT, UK; ibid.; ibid.; TRL, ODA/University of Bristol, Langford, Bristol BS18 7DU, UK.
Fluorescein-lectin conjugates were used as markers to determine the presence of surface carbohydrates on the peritrophic membranes of six *Glossina* species. Inter- and intra-specific variation in exposed carbohydrate residues was observed. Peritrophic membranes from non-teneral flies appeared to have less exposed surface carbohydrates than those of tenerals. Teneral *G. m. morsitans* susceptible to trypanosome infection had exposed carbohydrate residues recognised by APA lectin, but these residues were absent in a line of this species refractory to trypanosome infection. It is suggested that at least some of the surface carbohydrates of the peritrophic membrane bind endogenous gut lectin and parasite-surface carbohydrates may influence trypanosome development in *Glossina* spp.
Authors' abstract

5577 **Otter, C.J. den, Tchicaya, T. and Berg, M.J. van den, 1988**. Olfactory sensitivity of five species of tsetse (*Glossina* spp.) to 1-octen-3-ol, 4-heptanone, 3-nonanone and acetone. *Insect Science and its Application*, **9** (2): 213-218.
Otter, Berg: Sensory Physiology Group, Department of Animal Physiology, Univeristy of Groningen, P.O. Box 14, 9750 AA Haren, Netherlands; Tchicaya: IEMVT, 10 rue Pierre Curie, 94704 Maisons-Alfort Cedex, France.
A comparison was made of the EAG responses of replete males and females of *Glossina palpalis gambiensis, G. tachinoides, G. fuscipes fuscipes, G. morsitans morsitans* and *G. austeni* to the odour of various concentrations of acetone, 4-heptanone, 3-nonanone and 1-octen-3-ol. The stimulatory effectiveness of these substances increased in the order: acetone < 4-heptanone < 3-nonanone < 1-octen-3-ol. Amounts of acetone 10^3-10^4 times greater and of 4-heptanone and 3-nonanone 10-100 times greater than those of 1-octen-3-ol were required to obtain similar EAG responses. These results are discussed in relation to the behavioual effects of the odours of these substances on tsetse in wind tunnel experiments in the laboratory and catching experiments in the field. In *G. m. morsitans* and *G. tachinoides*, the EAG responses of males were somewhat higher than those of females. In *G. austeni*, *G. f. fuscipes* and *G. palpalis gambiensis*, however, the reverse occurred. All species were equally tuned to the four odour substances, which indicates that these odours do not determine host specificity.
Authors' abstract

5578 **Stiles, J.K., Molyneux, D.H. and Wallbanks, K.R., 1988.** Viruslike particles in *Glossina palpalis gambiensis* (Diptera: Glossinidae). *Annales de la Société belge de Médecine tropicale*, **68** (2): 161-163.
Department of Biological Sciences, University of Salford, Salford M5 4WT,UK.
Virus-like particles (VLPs) were found, by transmission electron microscopy, in the nuclei of mature midgut epithelial cells of all *G. p. gambiensis* examined, particularly in the middle and posterior regions, from day 1 to day 20 post-emergence. They were also found within the cytoplasm in two flies. There was no evidence for pathogenicity to the cells. No VLPs were found in 50 *G. p. palpalis* examined. The presence of VLPs in *G. p. gambiensis* which is susceptible to *Trypanosoma brucei gambiense* and their absence from the refractory *G. p. palpalis* suggests a possible link.

(c) DISTRIBUTION, ECOLOGY, BEHAVIOUR, POPULATION STUDIES

5579 **Green, C.H., 1988.** The effect of colour on trap- and screen-orientated responses in *Glossina palpalis palpalis* (Robineau-Desvoidy) (Diptera: Glossinidae). *Bulletin of Entomological Research*, **78** (4): 591-604.
TRL, University of Bristol, School of Veterinary Science, Langford, Bristol BS18 7DU, UK.
The importance of colour in the attraction of *G. p. palpalis* to trapping devices was investigated in Côte d'Ivoire. Biconical traps were tested with the normally royal blue lower

cone replaced with one of 25 differently coloured cloths. Royal blues were consistently the best colours for traps; yellow and orange were the worst, catching less than 1% as many as the best royal blue. Modelling trap data from the spectral reflectivities of the colours used showed that blue wavelengths contributed positively, and ultraviolet and green-yellow-red negatively, to trap performance. The responses to screens were studied using electric nets, deployed to catch flies both circling around and landing on the screen. The overall catch (of circling and landing flies) was greatest for royal blue screens, intermediate for yellow and green ones, and lowest for screens highly reflective of ultraviolet light; the total range of variation between colours was much smaller than was the case with traps. The relationship of catch to spectral reflectivity was similar to that described for trap score. An achromatic series of screens (black, white and greys) all attracted significantly fewer females than did royal blue screens, implying that attraction to blue depends on colour discrimination and not on intensity contrasts alone. For most colours, the majority of flies circled the screen without landing; with materials strongly reflecting ultraviolet, however, a high proportion of flies (especially females) landed.
Author's abstract

5580 **Madubunyi, L.C., 1988.** The collapse of *Glossina tachinoides* (Diptera: Glossinidae) populations in two peridomestic agroecosystems in the Nsukka area of Anambra State, Nigeria. *Insect Science and its Application*, **9** (3): 361-366.
Department of Veterinary Parasitology and Entomology, Faculty of Veterinary Medicine, University of Nigeria, Nsukka, Nigeria.
The collapse of *G. tachinoides* populations, within a 27-month period of weekly sampling by means of unbaited biconical traps, in two peridomestic agroecosystems is described. Consistent removal of parous flies through trapping, and low recruitment of young flies into the population, were largely responsible for unabated decline in the apparent density of both *G. tachinoides* populations. Reduction in the size of the resident pig population to below five pigs/week/agroecosystem triggered the collapse of both tsetse populations. Some ecological implications of these findings and their possible application in tsetse control are discussed.
Author's abstract

5581 **Takken, W., 1988.** Ecological factors limiting the distribution of *Glossina morsitans morsitans* and of *Glossina pallidipes* (Diptera: Glossinidae) in Inhambane Province of Mozambique. *Insect Science and its Application*, **9** (2): 237-242.
UNDP/FAO Project MOZ/75/008, P.O. Box 4595, Maputo, Mozambique.
After the rinderpest panzootic of the late last century, southern Mozambique appeared to have become free of *G. morsitans* and *G. pallidipes*. However, since the 1940s a gradual advance of tsetse into southern Mozambique has been observed. Anti-tsetse measures were taken during the 1950s and 1960s along the southern front of the tsetse belt to stop the advance of the fly into tsetse-free cattle grazing areas. To reassess the extent of the fly front in Inhambane Province, a tsetse survey using bait oxen was made in the Muabsa area during 1981 and 1982. *G. m. morsitans*, *G. pallidipes* and *G. austeni* were found, although not always sympatrically. It appeared that the *G. morsitans* and *G. pallidipes* front in the study area had been stable since 1969. The front is situated along a line of marked changes in soil and vegetation types and it is concluded that this may be the reason why these tsetse did not advance further south. *G. austeni* was found throughout the study area in a less well defined belt. The populations of *G. m. morsitans* and of *G. pallidipes* in the study area form the most southerly distributed populations of these species known in Africa today.
Author's abstract

5582 **Torr, S.J., 1988.** The flight and landing of tsetse (*Glossina*) in response to components of host odour in the field. *Physiological Entomology*, **13** (4): 453-465.
ODNRI, Central Avenue, Chatham Maritime, Chatham, Kent, ME4 4TB, UK.
Studies were conducted in Zimbabwe of the responses of *Glossina morsitans morsitans* and *G. pallidipes* to various host odours using either arrangements of electrocuting nets or visual observations. Tsetse flying upwind in a plume of carbon dioxide, acetone and octenol turned downwind upon flying into a plume of acetone or octenol, but did not turn upon flying into a plume of carbon dioxide. They also turned in response to a transient decline in odour concentration. Tsetse landed on the ground in the vicinity of a source of natural odour or

artificial odour containing carbon dioxide but not at sources of acetone or octenol only. The proportion of female *G. pallidipes* caught at a source of natural odour (37%) was significantly different from that caught at a source of synthetic odour (17%). Resting tsetse stimulated by natural odour took off sooner than non-stimulated flies and had a strong upwind bias in the direction of take-off. Tsetse stimulated with artificial odour did not take off sooner than non-stimulated flies. It is suggested thath there is an unidentified component(s) of ox odour that activates resting tsetse.
Author's abstract

5583 **Torr, S.J., 1988.** Behaviour of tsetse flies (*Glossina*) in host odour plumes in the field. *Physiological Entomology*, **13** (4): 467-478.
ODNRI, Central Avenue, Chatham Maritime, Chatham, Kent, ME4 4TB, UK.
In Zimbabwe, studies were made of the responses of *Glossina pallidipes* and *G. morsitans morsitans* to artificial host odour using an incomplete ring of electrocuting nets. In a plume of synthetic host odour tsetse flew generally upwind, with 50-60% flying within 35^{o} of due upwind. More than 80% of tsetse flew at <50 cm above ground level. Upon losing contact with odour they executed a reverse turn within about 2 m, and upon regaining contact they turned upwind. There were no clear differences in the responses of *G. m. morsitans* and *G. pallidipes.* Using electrocuting nets lying horizontally on the ground, it was found that tsetse landed in the vicinity of the odour source, the propensity to land being greater for *G. pallidipes* than for *G. m. morsitans*, greater for immature than mature flies, and greater for males than females.
Author's abstract

5584 **Wall, R., 1988**. Tsetse mating behaviour: effects of age and hunger in *Glossina morsitans morsitans* and *G. pallidipes*. *Physiological Entomology*, **13** (4): 479-486.
TRL, University of Bristol, Langford House, Langford, Bristol BS18 7DU, UK.
The effects of age and hunger on the responses of male *G. m. morsitans* and *G. pallidipes* to freeze-killed female decoys were examined in the laboratory. In both species, activity, estimated as the total number of interactions between males and decoys, increased with both age and hunger. Interactions were divided into short-stay (<60 s) and long-stay, full copulatory responses. In both species, young, unfed males were significantly less likely to attempt to copulate with a decoy after encounter than were fed males. Among fed males the proportion of interactions that proceeded to full copulatory attempts did not change with increasing age, but decreased consistently with increasing hunger. At all ages and hunger levels, *G. pallidipes* were more active than *G. m. morsitans.* However, after encountering a decoy, *G. pallidipes* were less likely to attempt to copulate than *G. m. morsitans.* In both species the duration of copulatory attempts did not change with age, but declined with increasing hunger. Copulatory attempts by *G. pallidipes* were significantly shorter than those of *G. m. morsitans.* The results are discussed in relation to the behaviour of tsetse in response to control devices such as traps and targets.
Author's abstract

3. TSETSE CONTROL (INCLUDING ENVIRONMENTAL SIDE EFFECTS)

[See also **12**: nos. 5572, 5575, 5579, 5584.]

5585 **Bossche, P. van den, 1988**. Preliminary observations of tsetse flies fed on a pig dipped in deltamethrin. *Annales de la Société belge de Médecine tropicale*, **68** (2): 159-160.
Institute of Tropical Medicine, Animal Health Service, Nationalestraat 155, B-2000 Antwerp, Belgium.
A pig was immersed for 6-10 s in a 0.00375% deltamethrin suspension and afterwards kept indoors. Teneral male *Glossina tachinoides* were exposed to the back of the pig for 15 min on various days after dipping. Tsetse mortality remained high for at least 14 days after dipping, and on day 22 there was still a 100% knock-down for at least 6 h.

5586 **Bossche, P. van den and Geerts, S., 1988.** The effects on longevity and fecundity of *Glossina tachinoides* after feeding on pigs treated with ivermectin. *Annales de la Société belge de Médecine tropicale*, **68** (2): 133-139.
Institute of Tropical Medicine, Veterinary Department, Nationalestraat 155, B-2000 Antwerp, Belgium.

Teneral male and mature female *G. tachinoides* were allowed to feed on piglets treated subcutaneously with a single injection of 1 or 3 mg ivermectin per kilogram, from day 1, 8, 15 or 22 after treatment. The effects of a single bloodmeal were limited, especially for the flies fed on the pig treated with 1 mg/kg ivermectin. One hundred percent mortality could be observed, however, in male teneral flies fed once on the pigs treated with 3 mg/kg ivermectin, until 8 days after the injection of the product. Effects on fecundity were present until 22 days after treatment. Mortality in male teneral flies fed permanently on the pigs treated with 1 or 3 mg/kg ivermectin, and receiving their first meal between 1 and 15 days after injection, varied from 79.2 to 100% and dropped to zero from day 22 onwards. Mortality in female flies, however, was much lower but fecundity was seriously affected. No viable offspring were produced by the flies fed on the pigs treated with both doses of ivermectin from day 1 or 8 post-treatment onwards. Fifteen days after the injection of ivermectin the fecundity of the female flies fed on the pigs treated with 1 or 3 mg/kg of the product was respectively 75.7% and 33.3%. From day 22 onwards reproduction became normal again.
Authors' abstract

5587 **Laveissière, C., Couret, D. and Grébaut, P., 1987.** Recherche sur les écrans pour la lutte contre les glossines en région forestière de Côte d'Ivoire. Mise au point d'un nouvel écran. [Research on screens for the control of tsetse flies in the forested area of Côte d'Ivoire. Development of a new screen.] *Cahiers ORSTOM, série Entomologie médicale et Parasitologie*, **25** (3-4): 145-164.
IPR/OCCGE, B.P. 1500, Bouaké, Côte d'Ivoire.
The successful outcome of human trypanosomiasis control in forested areas depends on the improvement of trapping, the only vector control technique that appears practicable at the present time. Such an improvement, particularly to screens, requires not only the study of tsetse behaviour towards targets but also the consideration of economic constraints. The authors used electric grids based on the model used in Zimbabwe. It was apparent that the electric-blue fabric (cotton + polyester) commonly used is not the best: although its attractivity is good, its efficiency (number of flies landing on it) is lower than that of other shades of blue and of other fabrics with high reflectivity for ultra-violet (100% polyester, polyamide or viscose). However, the colours of these fabrics are not very stable, making them a poor choice. Association of blue with another colour increases the catches on the screen: a white fabric incites a higher percentage of flies to land than a black fabric, but the white colour is not stable. Most of the attracted tsetse flies try to avoid the screen, but this disadvantage is reduced by using two black stripes on either side of the attractive surface, making them as `transparent' (invisible or almost invisible to tsetse) as possible: 75% of the flies then land on these stripes. The efficiency of a screen varies with the relative disposition and the proportion of the blue and black stripes; the best efficiency is provided by a blue screen fringed with two black stripes with a blue/black ratio between 1 and 2, for an 83 cm width. The authors have built a new screen taking into account the two factors strength and stability, as well as the sizes of available local materials. It measures 83 x 107 cm, consists of one stripe of electric-blue cotton/polyester fabric 50 cm wide and two of black polyamide tulle 17.5 cm wide. The screen hangs on an iron support 150 x 85 cm. Its cost is about 957 CFA francs (3 US dollars) and its efficiency is about twice that of the simple blue screen.
Authors' abstract

5588 **Laveissière, C., Couret, D. and Manno, A., 1987.** Importance de la nature des tissus dans la lutte par piégeage contre les glossines. [Importance of the nature of materials used in traps for tsetse control.] *Cahiers ORSTOM, série Entomologie médicale et Parasitologie*, **25** (3-4): 133-143.
IPR/OCCGE, B.P. 1500, Bouaké, Côte d'Ivoire; ibid.; Laboratoire d'Ecologie de la GTZ, B.P. 42, Korhogo, Côte d'Ivoire.
The authors have tested two insecticides, deltamethrin (200 mg/m^2) and alphacypermethrin (380 mg/m^2), on various fabrics used in the control of tsetse flies by trapping. This study shows that the chemical characteristics of the fabrics are as important as their dyes. The efficiency of a screen made with a cotton/polyester fabric is high but depends on the weave: a closely-woven fabric (with thin thread) allows a good fixation of insecticide but prevents tsetse from taking a lethal dose. Synthetic or artificial staples (polyester, acrylic and

especially polyamide) give the best results: fly mortality remains at a high level even after 4 months. Deltamethrin and alphacypermethrin on polyester or polyamide fibres (mosquito net) are generally equivalent: some combinations give a mortality exceeding 80% after an exposure of 6 months. The results of bioassays change also according to the dyes of the fabrics: both the dye itself and its mode of fixation on the staple have an important effect on insecticide persistence. Moreover, owing to the instability of some dyes after an exposure to sun and rain above 2 months, the greatest care must be taken in the choice of synthetic fabrics: screens made with some blue fabrics can lose their attractivity and become completely inefficient even if they have a high degree of toxicity to tsetse.
Authors' abstract

5589 **Nitcheman, S., Challier, A., Carle, P.-R. and Clair, M., 1988.** Effets des doses sublétales de deltaméthrine sur le couple *Glossina morsitans morsitans-Trypanosoma* (*Nannomonas*) *congolense*. [Effects of sublethal doses of deltamethrin on the pair *G. m. morsitans-T.* (*N.*) *congolense*.] *Comptes rendus des Séances de l'Academie des Sciences (III),* **307** (7): 423-426.
Nitcheman, Clair: IEMVT, 10 rue Pierre-Curie, 94704 Maisons-Alfort Cedex, France; Challier: 113-119 rue Lecourbe, 75015 Paris, France; Carle: PROCIDA/ROUSSEL UCLAF, CRBA, B.P.1, Saint-Marcel, 13367 Marseille Cedex 11, France.
The presence of *Trypanosoma* in *G. m. morsitans* induced a decrease in physiological activity which was expressed in particular by a statistically higher mortality rate of infected flies. A similar effect was caused by sublethal doses of deltamethrin in either infected or non-infected insects. The effect was cumulative in flies which were both infected and treated. Sublethal doses of the pyrethroid compound also caused a delay in feeding, abortions and larval clampings. Moreover, deltamethrin demonstrated an intravectorial effect against *Trypanosoma* which can reduce the transmission ability of the flies.
Authors' abstract

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

[See also **12**: nos. 5567, 5574, 5576, 5578, 5582, 5583, 5589.]

5590 **Gouteux, J.P., Noireau, F., Malonga, J.R. and Frezil, J.L., 1988**. `Effet de case' et `contamination familiale' dans la maladie du sommeil: essai d'interprétation du phénomène. Exemple de trois foyers congolais. [`House effect' and `family contamination' in sleeping sickness: epidemiological interpretation, with a study of three Congolese foci.] *Annales de Parasitologie humaine et comparée,* **63** (5): 315-333.
Laboratoire d'Entomologie Médicale et de Parasitologie, Centre ORSTOM, B.P. 181, Brazzaville, Congo.
A review is given of the different hypotheses concerning the concentration of trypanosomiasis cases at the house or family level: 1. Mechanical transmission by haematophagous insects. 2. Interrupted feeding of a tsetse fly with cyclic infection on different people. 3. Family biological factor. These hypotheses are used as a introduction to an epidemiological field study in three Congolese foci. Whereas their distribution among village districts is random, patients are significantly aggregated at the house and/or family level. This distribution may be partly explained by the common activity of members of the same family group (travel, work in the fields, bathing), associated with an amplifying factor, the most probable being interruped feeding of a tsetse fly with cyclic infection. In some foci other possibilities can be considered, such as mechanical transmission by *Aedes* or hereditary population factors. This spatial and/or familial concentration of cases is an important epidemiological property of sleeping sickness and makes strict surveillance of a patient's family group particularly important.
Authors' abstract

5591 **Moloo, S.K. and Kutuza, S.B., 1988.** Comparative study on the susceptibility of different *Glossina* species to *Trypanosoma brucei brucei* infection. *Tropical Medicine and Parasitology*, **39** (3): 211-213.
ILRAD, P.O. Box 30709, Nairobi, Kenya.
Teneral *Glossina morsitans centralis, G. austeni, G. palpalis palpalis, G. p. gambiensis, G. fuscipes fuscipes, G. tachinoides* and *G. brevipalpis*, from laboratory-bred colonies, were

allowed to feed simultaneously for 34 days on the flanks of ten goats infected with *T. b. brucei* isolated in Tanzania or in Nigeria, and then the tsetse were dissected. The seven tsetse species and subspecies showed salivary gland infections over the range of 0% to 40.4%. Survival of the Tanzanian and Nigerian *T. b. brucei* was best in *G. m. centralis* and very poor in the other tsetse species. It is suggested that there are differences in the gut of different laboratory-bred *Glossina* species and subspecies allowing *T. b. brucei* parasites to survive better and undergo the complete developmental cycle more readily in some species than in others.
Authors' abstract

5592 **Okoth, J.O. and Kapaata, R., 1988.** The hosts of *Glossina fuscipes fuscipes* (Newstead) in Busoga, Uganda, and epidemiological implications for trypanosomiasis. *Annals of Tropical Medicine and Parasitology*, **82** (5): 517-518.
UTRO, P.O. Box 96, Tororo, Uganda.
This study investigated the host preference of *G. f. fuscipes* in a peridomestic situation at Wakatanga where sleeping sickness is epidemic and in a classical lacustrine habitat at Kityerera on Lake Victoria where the disease is endemic. The main hosts of *G. f. fuscipes* in Busoga were found to be monitor lizards, man, bush pig and bush buck. Bush pig and man formed significant percentages of tsetse feeds in Kityerera compared to Wakatanga. A significantly higher percentage of bovid meals were recorded for Wakatanga where, although a large number of them were likely to have come from domestic animals, over half came from the bush buck which therefore probably plays a major role as a reservoir of sleeping sickness. Unidentified primates, probably monkeys, provided up to 10% of the tsetse feeds and should therefore be considered as possible reservoirs.

5593 **Owaga, M.L.A., Hassanali, A. and McDowell, P.G., 1988.** The role of 4-cresol and 3-n-propylphenol in the attraction of tsetse flies to buffalo urine. *Insect Science and its Application*, **9** (1): 95-100.
ICIPE, P.O. Box 30772, Nairobi, Kenya.
Seven phenolic compounds (phenol, 3- and 4-cresols, 3- and 4-ethylphenols, and 3- and 4-n-propylphenols) previously shown to be components of a fraction of an extract of buffalo urine which was active as a tsetse attractant, were evaluated in field experiments, individually at different concentrations, and in blends. The results indicate that 4-cresol and 3-n-propylphenol are the most important components for the attractancy of the phenolic mixture.
Authors' abstract

5. HUMAN TRYPANOSOMIASIS

(a) SURVEILLANCE

[See also **12**: nos. 5590, 5599.]

5594 **Avode, G., Bouteille, B., Pestre-Alexandre, M., Dumas, M., Gbaguidi, C., Lawson, G. and Darde, M.L., 1988.** La trypanosomiase humaine africaine dans le nord du Bénin. Enquête sérologique préliminaire. [African human trypanosomiasis in northern Benin. Preliminary serological investigation.] *Bulletin de la Société de Pathologie exotique et de ses Filiales*, **81** (3 bis): 513-521.
Avode, Bouteille, Pestre-Alexandre, Dumas, Darde: Institut de Neurologie Tropicale, Faculté de Médecine de Limoges, 87025 Limoges Cedex, France; Bouteille, Pestre-Alexandre, Darde: also Service de Parasitologie-Mycologie, CHU Dupuytren, 87042 Limoges Cedex, France; Gbaguidi, Lawson: Direction Provinciale de la Santé de l'Atacora, Natitingou, Benin.
A serological survey for trypanosomiasis was undertaken, by indirect immunofluorescence and ELISA, in four localities in northern Benin: N'Dahonta (Tanguiéta District) and Porga Forêt, Porga Village and Dassari (Matéri District). There was a good degree of correlation between the two techniques. The 92 subjects selected for study could be grouped into three categories: (i) immunological suspects who were both IgG and IgM positive and sometimes also had a raised serum IgM level; (ii) possible suspects who were IgG positive; (iii) subjects who were negative. Between 39.1 and 43.5% of the subjects examined fell into groups (i) or (ii) and should be examined for trypanosomes in the ganglia, the blood and finally the CSF, for certain diagnosis. In the absence of parasitological diagnosis, all suspects in group (i)

should be considered infected and treated. By this method, about 1% of the population studied could be regarded as infected.

5595 **Lemesre, J.L., Noireau, F., Makoundou, M.L., Louembet, M.T. and Frezil, J.L., 1988.** Apport des techniques sérologiques dans l'analyse du liquide céphalo-rachidien de patients congolais atteints de la maladie du sommeil. [Contribution of serological tests to the immunological analysis of the cerebrospinal fluid of Congolese patients suffering from sleeping sickness.] *Bulletin de la Société de Pathologie exotique et de ses Filiales,* **81** (3 bis): 506-510.

Laboratoire d'Entomologie Médicale et de Parasitologie, ORSTOM, B.P. 181, Brazzaville, Congo; ibid.; ibid.; ibid.; Centre ORSTOM de Montpellier, 2041 avenue du Val-Montferrand, B.P. 5045, 34032 Montpellier Cedex, France.

Three serological tests, the card agglutination test (Testryp CATT), the indirect immunofluorescence antibody test (IFAT) and the Cellognost indirect haemagglutination technique (CIHA), were used to analyse the CSF of 41 patients infected with *Trypanosoma brucei gambiense* and of 30 other patients without sleeping sickness but showing CSF abnormalities due to other diseases (meningitis, infectious encephalitis, AIDS). CATT showed a lower specificity (80%) than the other two tests (100%) and also a lower sensitivity (31.7%) than either IFAT (73.2%) or CIHA (90%). This immunological analysis suggests that invasion of the CNS by trypanosomes occurs earlier than might be supposed from the cytochemical abnormalities observed in the CSF. The technique may thus prove useful in determining the precise stage of the disease and hence the appropriate treatment.

Based on authors' abstract

5596 **Nantulya, V.M., 1988**. Immunodiagnosis of *rhodesiense* sleeping sickness: detection of circulating trypanosomal antigens in sera and cerebrospinal fluid by enzyme immunoassay using a monoclonal antibody. (Abstract only.) *Bulletin de la Société de Pathologie exotique et de ses Filiales,* **81** (3 bis): 511-512.

ILRAD, P.O. Box 30709, Nairobi, Kenya.

Recently we reported the derivation of monoclonal antibodies against common surface plasma membrane antigens of *Trypanosoma brucei rhodesiense* procyclics. The antibodies reacted with *T. b. rhodesiense* isolates from various countries. By sandwich ELISA, the monoclonal antibody has been used to detect circulating antigens in sera from *rhodesiense* sleeping sickness patients. Out of 108 cases tested so far, 101 (93.5%) had detectable circulating, soluble antigens in their sera. The antigen titres varied from 1/10 to 1/160. Normal blood donor sera (187) and sera from patients with leishmaniasis (10), schistosomiasis (17) and malaria (23) were all negative when tested at a dilution of 1/10. The trypanosomal antigen recognised by the monoclonal antibody was also detected in cerebrospinal fluid.

From author's abstract

5597 **Stanghellini, A., 1988**. La trypanosomiase à *T. b. gambiense*: méthodes de lutte. [*Trypanosoma brucei gambiense* trypanosomiasis: methods of control.] *Bulletin de la Société de Pathologie exotique et de ses Filiales,* **81** (3 bis): 637-644.

Service National de Lutte contre la Trypanosomiase, Hôpital N'Kembo, B.P. 998, Libreville, Gabon.

This paper reviews the different ways currently available for detecting sleeping sickness. These ways are then integrated and discussed by the author in proposing different strategic and methodologic solutions after emphasising the role of each of the technical stages. Altogether, there is not one standard solution but adaptations around a main plan, according to context and having regard to efficiency and profitability. In any event, success depends on political will, community participation and the motivation and good training of the personnel.

Author's abstract

(b) PATHOLOGY AND IMMUNOLOGY

5598 **Boa, Y.F., Traore, M.A., Doua, F., Kouassi-Traore, M.T., Kouassi, B.E. and Giordano, C., 1988.** Les différents tableaux cliniques actuels de la trypanosomiase humaine africaine à *T. b. gambiense*: analyse de 300 dossiers du foyer de Daloa, Côte-d'Ivoire. [Present clinical aspects of African human trypanosomiasis due to *Trypanosoma brucei*

gambiense: analysis of 300 cases in the Daloa focus, Côte d'Ivoire.] *Bulletin de la Société de Pathologie exotique et de ses Filiales*, **81** (3 bis): 427-444.
Département de Neurologie (Boa, Traore, Giordano) and Département de Parasitologie (Kouassi-Traore), Faculté de Médecine d'Abidjan, B.P. V166, Abidjan, Côte d'Ivoire; Doua: Projet de Recherches Cliniques sur la Trypanosomiase, B.P. 1425, Daloa, Côte d'Ivoire.
Over a period of 22 months, 300 patients with sleeping sickness were admitted to the trypanosomiasis clinic at Daloa, 52% having been discovered by active surveillance. The sex ratio of the patients was 1.5 males to 1 female; the mean age was 25.5 years. The most frequent signs and symptoms observed by clinical examination were: fever (30%), adenopathy (86.3%), prurigo (43.3%), splenomegaly (15.3%), hepatomegaly (1%), headache (72.6%), vigilance and sleeping disturbances (68.7%), peri-oral reflexes (67.6%), cheiro-oral reflexes (64.3%), movement disorders consisting of tremor, choreo-athetosis, buccal dyskinesia or seizures (35%), motor palsy and gait disorders (15%), tonus disturbances (12.3%), sensitivity abnormalities (17%), endocrine disorders (16.3%), psychiatric symptoms (6.3%). According to CSF status, 261 patients (87%) were classified as second period (P2). This group, although biologically well defined, was in fact a miscellaneous group of clinical signs and symptoms ranging from apparently normal patients to sleeping, comatose and cachectic patients. 93% of the patients in this group had peripheral signs associated with neurological symptoms. Statistical analysis showed these to be as frequent in the first period as in the second, suggesting that the CNS is affected early in the course of the disease. The classification of patients in groups of increasing neurological impairments was in accordance with this hypothesis: 89% of the patients in the second period had only slight neurological signs. This explains the dilemma of the physician who finds himself obliged to use melarsoprol in the treatment of all patients classified as second period.
Authors' abstract

5599 **Dechef, G., Kazyumba, G., Antoine, P., Kibuila, K. and Nkanga, N., 1988.** La trypanosomiase au Centre Neuropsychopathologique de l'Université de Kinshasa. [Trypanosomiasis in the Neuropsycho-pathology Centre of Kinshasa University, Zaire.] *Bulletin de la Société de Pathologie exotique et de ses Filiales*, **81** (3 bis): 445-448.
CNPP UNIKIN, B.P. 825, Kinshasa XI, Zaire.
The recent building of a Neuropsychopathology Centre at Kinshasa University is facilitating clinical, electroencephalographic and soon neuropsychopathologic studies on human African trypanosomiasis due to *Trypanosoma brucei gambiense*. One investigation concerned patients referred to CNPP with various neurological and psychic disturbances: half came from the city of Kinshasa and its surrounding districts, showing how doctors are less likely to think of trypanosomiasis as a possibility in large towns in spite of the mobile population.
Based on authors' abstract

5600 **Giordano, C., Boa, F.Y., Kouassi, B., Piquemal, M., Akani, F., Yapi, P. and Sonan, T., 1988.** EEG et traitement par l'Arsobal dans la trypanosomiase humaine africaine. [EEG and Arsobal treatment in African human trypanosomiasis.] *Bulletin de la Société de Pathologie exotique et de ses Filiales*, **81** (3 bis): 482-483.
Faculté de Médecine, B.P. V166, Abidjan, Côte d'Ivoire.
The EEG in patients suffering from *Trypanosoma brucei gambiense* typanosomiasis at the meningo-encephalitic stage displays features characteristic of this stage of the disease, while in patients diagnosed and treated at an early stage the EEGs are mostly normal or show only mild abnormalities. Where abnormalities occur, they are characterised by a depressed background activity on which are superimposed bursts of synchronous and generalised polymorphic delta waves at 1-2 c/s, and there is often a strict correlation between the severity of the clinical symptoms and the degree of EEG abnormality. Melarsoprol has a dramatic effect, often causing these EEG abnormalities to disappear after the first period of treatment, resulting in a return to alpha waves of a normal amplitude. Studying the EEG thus seems a useful way of monitoring the patient's recovery.
Authors' abstract

5601 **Hublart, M., Lagouche, L., Racadot, A., Boersma, A., Degand, P., Noireau, F., Lemesre, J.L. and Toudic, A., 1988.** Fonction endocrine et trypanosomiase africaine. Bilan de 79 cas. [Endocrine function and African trypanosomiasis. Results from 79 cases.] *Bulletin de la Société de Pathologie exotique et de ses Filiales*, **81** (3 bis): 468-476.

Unité INSERM no. 16, Place de Verdun, 59045 Lille Cedex, France; ibid.; ibid.; ibid.; ibid.; ORSTOM, B.P. 181, Brazzaville, Congo; ibid.; ibid.
Although a high frequency of hypogonadism is found during sleeping sickness, the physiological properties of the gonads have been poorly studied. We report here an investigation of the gonadotropic axis in 79 patients infected by *Trypanosoma brucei gambiense*. A diminution in the levels of oestradiol in 50% of the woman and testosterone in 50% of the men was noted, whereas no decrease in pituitary gonadotropins (FSH and LH) was found. The results of gonad-adenohypophysial tests suggested that the dysfunction may be of central origin. Studies of the thyrotropic axis were also undertaken: there was a decrease in T_3 and FT_3 (free fraction) even though T_4 was normal. The specific relationship between hypogonadism and trypanosomal infection is discussed.
Authors' abstract

5602 **Nkanga, N.G., Kazadi, K., Kazyumba, G.L. and Dechef, G., 1988**. Signes cliniques neurologiques de la trypanosomiase humaine africaine au stade méningo encéphalitique. (A propos de 23 cas.) [Clinical neurological signs of African human trypanosomiasis in the meningo-encephalitic stage. (Concerning 23 cases.)] *Bulletin de la Société de Pathologie exotique et de ses Filiales*, **81** (3 bis): 449-458.

Nkanga, Kazadi Dechef: Service de Neurologie, CNPP, Mont Amba, Université de Kinshasa, B.P. 825, Kinshasa XI, Zaire; Kazyumba: Laboratoire de Parasitologie, IMT, Faculté de Médecine, Université de Kinshasa, B.P. 825, Kinshasa XI, Zaire.
Twenty-three patients with trypanosomiasis, admitted at the meningo-encephalitic stage, underwent a systematic neurological examination which allowed a broad picture to be built up of clinical signs suggestive of the disease. Frontal syndrome predominated and was often expressed as a cheiro-chin reflex, the most frequent objective neurological sign. Extrapyramidal disorders and neuroendocrine dysfunction were frequent. Vestibular, cerebellar, pyramidal and meningeal disorders were also seen. Changes in the cerebrospinal fluid were not constant.
Authors' abstract

5603 **Noireau, F., Apembet, J.D. and Frezil, J.L., 1988**. Revue clinique des troubles endocriniens observés chez l'adulte trypanosomé. [Clinical review of endocrine dysfunction in adult sleeping sickness patients.] *Bulletin de la Société de Pathologie exotique et de ses Filiales*, **81** (3 bis): 464-467.

ORSTOM, B.P. 181, Brazzaville, Congo; ibid.; ORSTOM, B.P. 5045, 34032 Montpellier Cedex, France.
Clinical manifestations associated with endocrinological disorders were investigated in 21 Congolese patients suffering from *gambiense* trypanosomiasis. 90.5% of them showed cytological abnormality in the cerebrospinal fluid. Signs and symptoms of endocrine dysfunction occur during the course of the parasitic

disease. Gonadic deficiency is the most frequent and probably the most specific disorder. Reversibility of the endocrine dysfunction after treatment is likely but needs further investigation.
Authors' abstract

5604 **Nozais, J.P., 1988**. Mais ou est donc passée la `clé' de Kérandel? [Where on earth has Kerandel's key gone?] *Bulletin de la Société de Pathologie exotique et de ses Filiales,* **81** (3 bis): 477-479.
Département de Parasitologie, Médecine Tropicale, Groupe Hospitalier Pitié-Salpêtrière, 75013 Paris, France.
A review of the literature suggests that the term Kerandel's key has resulted from confusion of two distinct symptoms of African human trypanosomiasis. The deep hyperaesthesia which occurs in the early stage of the disease is properly called the Kerandel sign, having been described by Kerandel in 1908. The `sign of the key' - a pain in the bones or muscles when the sleeping sickness patient turns a key in a lock - was described by Heckenroth and Ouzilleau in 1907.

5605 **Sonan, T., Giordano, C., Boa, F. and Dumas, M., 1988.** Formes hémiplégiques de la trypanosomiase humaine africaine. [Hemiplegic forms of human African trypanosomiasis.] *Bulletin de la Société de Pathologie exotique et de ses Filiales,* **81** (3 bis): 459-463.
Sonan, Dumas: Institut de Neurologie Tropicale, Faculté de Médecine de Limoges, 87025 Limoges Cedex, France; Giordano, Boa: Service de Neurologie, CHU de Cocody, B.P. V166, Abidjan, Côte d'Ivoire.
A review of the literature showed that hemiplegic forms were rare in human African trypanosomiasis, 14 cases having been reported between 1963 and 1987. These forms pose problems in differential diagnosis particularly in relation to other subacute or chronic forms of meningo-encephalitis (tuberculosis and syphilis) and in relation to intracranial tumours, where hemiplegia is associated with intracranial hypertension, angiographic and focal EEG anomalies. Computerised tomography suggests the association of massive demyelination of the centrum ovale with cerebral oedema.
Authors' abstract

5606 **Tsala Mbala, P., Blackett, K., Mbonifor, C.L., Leke, R. and Etoundi, J., 1988.** Atteintes fonctionnelles et immunologiques au cours de la trypanosomiase humaine africaine à *Trypanosoma gambiense*. [Functional and immunological disturbances in *T. gambiense* human African trypanosomiasis.] *Bulletin de la Société de Pathologie exotique et de ses Filiales,* **81** (3 bis): 490-501.
Centre Universitaire des Sciences de la Santé, Yaoundé, Cameroon; Tsala Mbala: Institut de Recherches Médicales et d'Etudes des Plantes Médicinales, Cameroon.
Our study was carried out in two phases. In the first phase, a group of 58 patients were investigated: electromyographic abnormalities were recorded in 52%, electrocardiographic abnormalities in 48%, electroencephalographic abnormalities in 47%, spirographic abnormalities in 31%. Impairments of the central nervous system occur classically in *T. b. gambiense* infection, while cardiac damage is more frequent in *T. b. rhodesiense* infection. Noted lesions are due to an immunological mechanism. In the second phase, 25 patients and controls from the same area were investigated. We tried to confirm the existence and pathogenesis of cardiac impairments in *T. b. gambiense* infection: incidence, symptoms, clinical and electrocardiographic signs, disturbances of cardiac rhythm. There were ST segment, T wave and PR interval changes. Chest X ray showed cardiomegaly. Echocardiography revealed right ventricular dilatation. There were pericardial effusion and thickening. Immunological tests showed significantly higher IgM and immunoconglutinin levels in the patient group together with the presence of anti-heart antibodies of the IgM and IgG classes. Our results suggest that cardiac impairments may be due to immune complexes.
Authors' abstract

(c) TREATMENT
[See also **12**: no. 5600.]

5607 **Doua, F., Boa, F.Y., Schechter, P.J., Miezan, T.W., Diai, D., Sanon, F.R., Raadt, P. de, Haegele, K.D., Sjoerdsma, A. and Konian, K., 1988.** L'alpha-

difluorométhylornithine (eflornithine) dans le traitement de la trypanosomiase humaine africaine à *T. gambiense* au stade tardif: efficacité et tolérance (à propos de 14 cas). [Alpha-difluoromethylornithine (eflornithine) in the treatment of late-stage African human *T. gambiense* trypanosomiasis: efficacy and tolerance (concerning 14 cases).] (Abstract only.) *Bulletin de la Société de Pathologie exotique et de ses Filiales*, **81** (3 bis): 589-590.
Doua, Miezan, Sanon: Projet de Recherches Cliniques sur la Trypanosomiase, B.P. 1425, Daloa, Côte d'Ivoire; Boa: Département de Neurologie, Faculté de Médecine, B.P. V166, Abidjan, Côte d'Ivoire; Schechter, Haegele, Sjoerdsma: Merrell Dow Research Institute, Strasbourg, France, and Cincinnati, Ohio, USA; Diai: Secteur de Santé Rurale de Daloa, Côte d'Ivoire; Raadt: Parasitic Diseases Programme, WHO, 1211 Geneva 27, Switzerland; Konian: Direction de la Santé Publique pour le Département du Sud, Abidjan, Côte d'Ivoire.
Alpha-difluoromethylornithine (DFMO, eflornithine), an inhibitor of polyamine biosynthesis, was used to treat 14 patients with late-stage *gambiense* sleeping sickness, 12 cases having been previously treated with and considered refractory to melarsoprol. Alpha-difluoromethylornithine was administered intravenously at a dose of 400 mg/kg/day for 14 days followed by oral treatment, 300 mg/kg/day, for 21-28 days In all patients treatment was associated with rapid disappearance of trypanosomes from body fluids, in several cases within 24 h, and decreased CSF white blood cell counts. In all but one patient, who died of a pulmonary infection during treatment, alpha-difluoromethylornithine produced a dramatic reversal of clinical signs and symptoms of the disease. Determination of drug concentrations in serum and cerebrospinal fluid of 5 patients demonstrated that alpha-difluoromethylornithine diffuses into the central nervous system with cerebrospinal fluid levels representing up to 51% of corresponding serum concentrations. Diarrhoea, abdominal pain and anaemia were the most frequent side-effects associated with therapy, but were reversible and did not necessitate discontinuation of treatment. Four patients have been followed for more than 2 years post-treatment without evidence of relapse. Thus, alpha-difluoromethylornithine appears to be a remarkably effective and well tolerated new treatment for late-stage T. b. gambiense trypanosomiasis, including cases refractory to organic arsenical therapy, and is likely to be curative in this disease.
Authors' abstract

5608 **Kazyumba, G.L., Ruppol, J.F., Tshefu, A.K. and Nkanga, N., 1988**. Arsénoresistance et difluorométhylornithine dans le traitement de la trypanosomiase humaine africaine. [Arsenical resistance and difluoromethylornithine in human African trypanosomiasis treatment.] *Bulletin de la Société de Pathologie exotique et de ses Filiales*, **81** (3 bis): 591-594.
Kazyumba, Tshefu, Nkanga: Laboratoire de Parasitologie, Campus de Kinshasa, B.P. 852, Kinshasa XI, Zaire; Ruppol: Bureau Central de la Trypanosomiase, B.P. 7782, Kinshasa I, Zaire.
Human African trypanosomiasis is a major medical problem in Zaire, particularly in endemic areas where the population at risk amounts to about 10 million of the inhabitants, almost a third of the entire population of Zaire. Melarsoprol, which has been the main trypanocide in use for the past 40 years, has been accompanied during the last ten years by an ever-increasing failure rate (10%). Since May 1984, 86 patients, of whom 51 were refractory to melarsoprol, have been treated with difluoromethylornithine (DFMO). The results obtained seem encouraging because, after 2 years of set-back, desperate cases are now considered cured. The side-effects (disorders of intestinal function, anaemia, long period of drug administration) may be considered minor.
Authors' abstract

5609 **Maes, L., Doua, F. and Hamers, R., 1988.** ELISA assay for melarsoprol. *Bulletin de la Société de Pathologie exotique et de ses Filiales*, **81** (3 bis): 557-560.
Maes, Hamers: Instituut voor Moleculaire Biologie, Vrije Universiteit Brussel, Sint-Genesius Rode, Belgium; Doua: Projet de Recherches Cliniques sur la Trypanosomiase, B.P. 1425, Daloa, Côte d'Ivoire.
A sensitive ELISA method has been developed for measuring the trypanocidal drug melarsoprol. The test allows for the detection of the drug in human sera and in cerebrospinal fluid at the ng/ml level. Preliminary analyses on patient sera and CSF confirm the feasibility of the method. Further application of the test will enable the necessary pharmacokinetic and

metabolic studies to be conducted; the drug monitoring should hopefully result in improved treatment schedules minimising the undesired side effects, e.g. lethal encephalopathies.
Authors' abstract

5610 **Nieuwenhove, S. van, 1988.** Oral eflornithine (DFMO) therapy in late-stage arsenical-refractory *gambiense* sleeping sickness. (Abstract only.) *Bulletin de la Société de Pathologie exotique et de ses Filiales*, **81** (3 bis): 608.
Sleeping Sickness Control, Li Rangu, Western Equatoria, Sudan.
Oral eflornithine monotherapy was administered to 65 late-stage arsenical-refractory patients in the Sudan at a rate of 400 mg/kg bodyweight/day in four divided doses for 4-6 weeks. It was found to be capable of producing a cure, as evidenced by 8 cases with a follow-up of close to or more than 24 months. Results in patients under the age of 14 were disappointing. Because of the high relapse rate, oral monotherapy cannot be recommended in this age group. Although relapses were also observed in adults, oral monotherapy with eflornithine was found to provide a useful novel approach in treatment of late-stage arsenical-refractory *gambiense* sleeping sickness.
Author's abstract

5611 **Nieuwenhove, S. van, 1988**. Nifurtimox in late-stage arsenical-refractory *gambiense* sleeping sickness. (Abstract only.) *Bulletin de la Société de Pathologie exotique et de ses Filiales*, **81** (3 bis): 650.
Sleeping Sickness Control, Li Rangu, Western Equatoria, Sudan.
Nifurtimox was used in Sudan in a series of 13 late-stage arsenical-refractory patients. After 6 years follow-up, 11 (85%) are considered cured, one relapsed and one probably relapsed. In this series, Nifurtimox 15-20 mg/kg/day was administered during 4-6 weeks. Nifurtimox treatment was preceded by one injection of suramin or Berenil. Monotherapy with Nifurtimox administered in another series of 64 late-stage arsenical-refractory patients showed similar results. Nifurtimox is at present routinely used as an alternative treatment in arsenical-refractory cases in Sudan.
Author's abstract

5612 **Pialoux, G., Kernbaum, S. and Vachon, F., 1988.** Encéphalopathie arsenicale au cours du traitement de la trypanosomiase africaine. A propos d'un cas d'évolution favorable. [Arsenical encephalopathy during treatment of African trypanosomiasis. Concerning a case with a favourable outcome.] (Abstract only.) *Bulletin de la Société de Pathologie exotique et de ses Filiales*, **81** (3 bis): 555-556.
Clinique de Réanimation des Maladies Infectieuses, Hôpital Claude-Bernard, 10 avenue de la Porte-d'Aubervilliers, 75944 Paris Cedex 19, France.
A 37-year-old white man with typical *gambiense* sleeping sickness developed convulsions, coma and hemiplegia after 3 days' treatment with melarsoprol but recovered after 48 h of intensive care. This reactive encephalopathy seems not to be related to the dose of melarsoprol but rather to individual susceptibility which cannot be foreseen.

5613 **Taelman, H., Marcelis, L., Sonnet, J., Kazyumba, G., Enden, E. van den**, **Wery, M. and Schechter, P.J., 1988**. Traitement de la trypanosomiase humaine à *Trypanosoma brucei gambiense* par l'alpha-difluorométhylornithine. Résultats chez 7 patients. [Treatment of human *T. b. gambiense* infection by alpha-difluoromethylornithine. Results in 7 patients.] *Bulletin de la Société de Pathologie exotique et de ses Filiales*, **81** (3 bis): 578-588.
Taelman, Wery: Institut de Médecine Tropicale, Nationalestraat 155, B-2000 Antwerp, Belgium; Marcelis: Hôpital Universitaire Saint-Pierre, Brussels, Belgium; Sonnet: Cliniques Universitaires Saint-Luc, Brussels, Belgium; Kazyumba: Bureau de Contrôle de la Trypanosomiase, Kinshasa, Zaire; Enden: Hôpital Middelheim, Antwerp, Belgium; Schechter: Institut de Recherches Merrell Dow, Strasbourg, France.
Alpha-difluoromethylornithine (DFMO, eflornithine) is a specific irreversible inhibitor of ornithine decarboxylase, shown to be curative in various *Trypanosoma* species infections of animals. In the present open study, the efficiency of DFMO was assessed in 7 patients (4 Africans, 3 Europeans) with *T. b. gambiense* (Tbg) infection, 4 in the advanced stage and 3 in the early phase of the disease. Treatment with DFMO at initial dosages ranging from 300 to 500 mg/kg/day administered IV (except 1 case) for 10-15 days, followed by 200-300 mg/kg/day *per os* for 28-69 days, was associated with clearing of trypanosomes from blood

within 1-4 days, a trend towards normalisation or full normalisation of all altered biological values characterising the disease and disappearance of clinical symptoms. Side effects of DFMO, including loose stools (5 cases), anaemia (3 cases) and decreased hearing (1 case), were mild and transient, requiring no treatment or interruption of the drug, except in one case. Pharmacokinetic studies, carried out in 4 patients, demonstrate penetration of the drug into the CNS. In 6 cases, no evidence of relapse was found at 24 months post-treatment follow-up, indicating that DFMO can be curative in early and late-stage Tbg sleeping sickness. In 1 case, no relapse could be detected after a follow-up of 6 months. Further studies are needed to confirm our encouraging results and to determine the optimal regimens of DFMO for the cure of early and late-stage sleeping sickness.
Authors' abstract

6. ANIMAL TRYPANOSOMIASIS

(a) SURVEY AND DISTRIBUTION

5614 **Nawathe, D.R., Sinha, P.K. and Abechi, A.S., 1988**. Acute bovine trypanosomiasis in a tsetse-free zone of Nigeria. *Tropical Animal Health and Production*, **20** (3): 141-142.
University of Maiduguri, Faculty of Veterinary Medicine, P.M.B. 1069, Maiduguri, Nigeria; ibid.; National Veterinary Research Institute, Maiduguri, Nigeria.
During October and November 1986, 10 Wadara x Friesian calves at Dalori Dairy Farm, Maiduguri, died from acute trypanosomiasis. Ante- and post-mortem examination showed low PCV and heavy parasitaemia due to *Trypanosoma vivax*. In another sedentary herd 50 km north of Maiduguri, four debilitated Wadara cows were also found to be infected, as were two examined at the Maiduguri slaughter house. It thus appears that *T. vivax* may be common in the area around Maiduguri where it causes chronic infection in adult cattle but acute disease in calves. All affected animals were from sedentary herds with no contact with nomadic cattle. Heavy populations of biting flies, brought about by unusually high rainfall, may have been responsible for the spread of trypanosomiasis outside the tsetse zone.

(b) PATHOLOGY AND IMMUNOLOGY

5615 **Joshua, R.A., 1987**. The nature of immunodepression in *Trypanosoma brucei*-infected domestic chickens. *Bulletin of Animal Health and Production in Africa*, **35** (4): 280-284.
Department of Veterinary Medicine, University of Ibadan, Ibadan, Nigeria.
Immunodepression in *T. brucei*-infected chickens (*Gallus domesticus*) was demonstrated by evaluating the immune response of infected cockerels to a heterologous antigen, human serum albumin (HSA). Infected chickens showed no clinical signs, but experienced persistent low-level parasitaemias. Total serum anti-HSA antibody levels were decreased in infected birds in comparison to uninfected controls. Percentage localisation of intravenously injected fluorescein-labelled HSA in splenic germinal centres was also significantly reduced ($P<0.001$) in infected chickens. It is suggested that the reduced serum antibody response to HSA observed in *T. brucei*-infected chickens is due at least in part to failure of splenic germinal centres to trap sufficient amounts of this antigen.
Author's abstract

5616 **Mutayoba, B.M., O'hara-Ireri, H.B. and Gombe, S., 1988.** Trypanosome-induced depression of plasma thyroxine levels in prepubertal and adult female goats. *Acta Endocrinologica*, **119** (1): 21-26.
Sokoine University of Agriculture, Faculty of Veterinary Medicine, P.O. Box 3017, Morogoro, Tanzania; Reproductive Biology Unit, NCRR, University of Nairobi, P.O. Box 30197, Nairobi, Kenya; ibid.
Changes in plasma T_4 levels were investigated in prepubertal and adult female goats during the course of an experimental *Trypanosoma congolense* infection. A significant decline in the T_4 levels was observed within 1 week of trypanosome challenge. The levels remained low up to the end of the 7th week when prepubertal goats received a trypanocidal treatment, whereafter the values started to rise to normal pre-infection values. The post-infection plasma T_4 values in the untreated adult goats did not return to normal except in one resistant goat which recovered naturally after 16 weeks of the infection. The thyroid glands of chronically infected and untreated adult goats revealed marked atrophy, fibrosis and

colloidopathy. It is concluded that trypanosomiasis rapidly impairs thyroid gland function in susceptible animals, but these changes can be reversed by early trypanocidal treatment before marked degenerative changes become evident or following self-cure in resistant animals. Authors' abstract

5617 **Ocholi, R.A., Ezeugwu, R.U. and Nawathe, D.R., 1988.** Mixed outbreak of trypanosomiasis and babesiosis in pigs in Nigeria. *Tropical Animal Health and Production,* **20** (3): 140.

National Veterinary Research Institute, Vom, Nigeria.

An outbreak of disease caused by mixed *Trypanosoma simiae* and *Babesia trautmanni* infections occurred in a commercial pig farm in September/October 1985 at Mopa near Ilorin. The signs seen were high fever, lethargy, lateral recumbency, paralysis of hind legs and bleeding from natural orifices. All pregnant sows aborted and death occurred in 2-4 days. Examination of blood

smears identified the causative organisms. Treatment with acaricide spray, diminazene aceturate, tetracycline and vitamin B complex brought the disease under control but only after 65.6% of a unit of 131 pigs had died.

5618 **Olubayo, R.O. and Mugera, G.M., 1987.** The pathogenesis of haemorrhages in *Trypanosoma vivax* infection. II. Patho-morpho-logical changes. *Bulletin of Animal Health and Production in Africa*, **35** (4): 286-292.

Veterinary Research Laboratory, P.O. Kabete, Kenya; Department of Veterinary Pathology and Microbiology, University of Nairobi, P.O. Box 29053, Kabete, Kenya.

An investigation was carried out to establish the patho-morphological changes associated with the haemorrhagic syndrome observed in *T. vivax* infection in cattle. Among the significant changes observed were focal necrotising myocarditis, multifocal glomerulonephritis, centralobular hepatic coagulative necrosis and focal non-suppurative encephalitis. Bacteriological examination revealed *Staphylococcus aureus*, *Streptococcus epidermiditis* and *Pasteurella haemolytica* to have been partially responsible for the pathological changes observed. It was concluded that, besides the disseminated intravascular coagulation previously reported, this strain of *T. vivax* causes severe damage in various tissues and organs which may be due to extravascular localisation of the trypanosomes. Authors' abstract

5619 **Vos, G.J., Moloo, S.K., Nelson, R.T. and Gardiner, P.R., 1988**. Attempts to protect goats against challenge with *Trypanosoma vivax* by initiation of primary infections with large numbers of metacyclic trypanosomes. *Parasitology*, **97** (3): 383-392.

ILRAD, P.O. Box 30709, Nairobi, Kenya.

Attempts were made to immunise goats by infection with large numbers of metacyclic trypanosomes of a clone of *T. vivax*, followed by chemotherapy. Five groups of 6 goats each were infected intradermally with 5 different doses of cultured metacyclics of *T. vivax*, ranging from 10^2 to 10^6 trypanosomes/goat. Four weeks after infection, the goats were treated with 10 mg/kg diminazene aceturate (Berenil). Three weeks after treatment, 3 goats in each group were challenged intradermally with 10^4 homologous metacyclics derived from culture. The remaining 3 goats in each group were challenged by 20 tsetse infected with the homologous clone. Five out of 30 goats were resistant to homologous challenge: 4 of the goats that had been challenged with cultured parasites, and 1 that had been challenged by tsetse. In each group 1 goat was protected. Protection was therefore not apparently influenced by the number of trypanosomes used to establish the primary infection. In another experiment, 6 goats were each infected by feeding 100 tsetse on the goats for 15 consecutive days. Three weeks after infection the goats were treated with Berenil and 3 weeks later challenged by 20 tsetse infected with the homologous clone. Three out of the 6 goats resisted challenge. The susceptible goats in both experiments, however, showed a reduction in the peak of parasitaemia following challenge compared with both challenge controls and the initial infections. Lytic antibodies to cultured metacyclics of *T. vivax* were detected in goats that resisted challenge after a primary infection with cultured metacyclics, and in resistant and susceptible goats after a primary infection by tsetse. All infected goats produced lytic antibodies to live bloodstream forms, as well as antibodies to bloodstream form lysates (demonstrated by ELISA). It is suggested that the immunity that had been induced in some of the experimental animals is due to antibody responses to both metacyclic and bloodstream variable antigen types (VATs) expressed during infection. Authors' abstract

(c) TRYPANOTOLERANCE

[See also **12**: nos. 5561, 5563.]

5620 **Mutayoba, B.M., Gombe, S., Kaaya, G.P. and Waindi, E.N., 1988**. Trypanosome-induced ovarian dysfunction. Evidence of higher residual fertility in trypanotolerant small East African goats. *Acta Tropica*, **45** (3): 225-237.

Mutayoba: Sokoine University of Agriculture, Faculty of Veterinary Medicine, P.O. Box 3017, Morogoro, Tanzania; Gombe, Waindi: Reproductive Biology Unit, NCRR, University of Nairobi, Kenya; P.O. Box 30197, Nairobi, Kenya; Kaaya: ICIPE, P.O. Box 30772, Nairobi, Kenya.

Changes in the length of oestrous cycles, plasma progesterone and oestradiol-17ß levels were monitored for 6 months in *Trypanosoma congolense*-infected normocyclic small East

African goats obtained from three tsetse-endemic areas and one tsetse-free area of East Africa. Irregular oestrous cycles were observed in all infected goats, before cessation at the second cycle post-infection in the more susceptible and fourth cycle in the more resistant goat groups. A significant decline in the progesterone and oestradiol-17ß parameters was observed. The decline in hormonal values was, however, less in the more resistant than in the susceptible goat groups, at least in the first 2 months post-infection. Resumption of the ovarian cycle was observed in a few resistant goats after 5 months of the infection. It is concluded that clinical tolerance is correlated with residual fertility, i.e. the greater the tolerance the higher the retention of fertility.
Authors' abstract

(d) TREATMENT

5621 **Mbwambo, H.A., Mella, P.N.P. and Lekaki, K.A., 1988**. Berenil (diminazene aceturate)-resistant *Trypanosoma congolense* in cattle under natural tsetse challenge at Kibaha, Tanzania. *Acta Tropica*, **45** (3): 239-244.
Tanzania Livestock Research Organization, Animal Diseases Research Institute, P.O. Box 9254, Dar es Salaam, Tanzania.
Twenty-nine cattle, naturally infected with *T. congolense* Kibaha, were subjected to chemotherapy with diminazene aceturate (Berenil) at 3.5 to 14.0 mg/kg. Fourteen animals recovered while six were refractory to treatment at 7.0 to 14.0 mg/kg. Further treatment of the Berenil-resistant isolates with isometamidium chloride (Samorin) at 1.0 mg/kg effected cure. Corresponding chemotherapeutic trials in mice showed that the isolates were resistant to diminazene aceturate at 56.0 mg/kg and sensitive to Samorin at 20.0 mg/kg. It is noted that *T. congolense* infections that do not respond to treatment with Berenil at 7.0 mg/kg may indicate development of resistance; the use of Samorin at 1.0 mg/kg or Homidium may be the alternative. The paper calls for judicious use of Berenil and Samorin, as they are the only sanative pairs available for the chemotherapy of bovine trypanosomiasis.
Authors' abstract

7. EXPERIMENTAL TRYPANOSOMIASIS

(a) DIAGNOSTICS

5622 **Bajyana Songa, E. and Hamers, R., 1988**. A card agglutination test (CATT) for veterinary use based on an early VAT RoTat 1/2 of *Trypanosoma evansi*. *Annales de la Société belge de Médecine tropicale*, **68** (3): 233-240.
Vrije Universiteit Brussel, Instituut voor Moleculaire Biologie, Paardenstraat 65, B-1640 St-Genesius-Rode, Belgium.

(b) PATHOLOGY AND IMMUNOLOGY

5623 **Ahmed, J.S., Lendner, K., Steuber, S., Reinwald, E. and Hörchner, F., 1988**. *In vitro* stimulation of pony peripheral blood lymphocytes by a soluble fraction of *Trypanosoma evansi*. *Journal of Veterinary Medicine (B)*, **35** (6): 462-466.
Ahmed, Lendner, Steuber, Hörchner: Institut für Parasitologie und Tropenveterinärmedizin, Freie Universität Berlin, Königsweg 65, D-1000 Berlin 37, Federal Republic of Germany; Reinwald: Institut für Veterinär-Biochimie, Freie Universität Berlin, Koserstrasse 20, D-1000 Berlin 33, Federal Republic of Germany.

5624 **Bouteille, B., Darde, M.L., Monteil, J. and Pestre-Alexandre, M., 1988.** Le complément: témoin d'infestation par *Trypanosoma brucei brucei* chez le mouton, modèle expérimental; son évolution après traitement. [Complement: a sign of *T. b. brucei* infection in the sheep, an experimental model; its evolution after treatment.] *Bulletin de la Société de Pathologie exotique et de ses Filiales*, **81** (3 bis): 522-529.
Service de Parasitologie-Mycologie, CHU Dupuytren, 80742 Limoges Cedex, France, and Institut de Neurologie Tropicale, Faculté de Médecine de Limoges, 87025 Limoges Cedex, France.

5625 **Chirimwami, B., Marck, E.A.E. van, Brucher, J.M., Mulumba, P., Wéry, M. and Gigase, P.L.J., 1988**. Light microscopic neuropathology of long-term experimental *Trypanosoma brucei gambiense* infection in the rat. *Annales de la Société belge de Médecine tropicale*, **68** (3): 195-203.
Chirimwami: B.P. 966, Kinshasa 1, Zaire; Laboratory of Histopathology (Marck, Gigase) and Laboratory of Protozoology (Mulumba, Wéry), Institute of Tropical Medicine, Nationalestraat 155, B-2000 Antwerp, Belgium; Brucher: Laboratory of Neuropathology and General Pathology, Catholic University of Louvain, Avenue E. Mounier 52, B-2000 Brussels, Belgium.

5626 **Chirimwami, B., Marck, E.A.E. van, Brucher, J.M., Wéry, M. and Gigase, P.L.J., 1988**. Progression of central nervous system lesions in the rat infected with *Trypanosoma brucei gambiense*: a light microscopic study. *Annales de la Société belge de Médecine tropicale*, **68** (3): 205-218.

Chirimwami: B.P. 966, Kinshasa 1, Zaire; Laboratory of Histopathology (Marck, Gigase) and Laboratory of Protozoology (Wéry), Institute of Tropical Medicine, Nationalestraat 155, B-2000 Antwerp, Belgium; Brucher: Laboratory of Neuropathology and General Pathology, Catholic University of Louvain, Avenue E. Mounier 52, B-2000 Brussels, Belgium.

5627 **Christensen, N.O., Furu, P., Kurtzhals, J. and Odaibo, A., 1988**. Heterologous synergistic interactions in concurrent experimental infection in the mouse with *Schistosoma mansoni, Echinostoma revolutum, Plasmodium yoelii, Babesia microti,* and *Trypanosoma brucei. Parasitology Research,* **74** (6): 544-551.

Danish Bilharziasis Laboratory, Jaegersborg Alle 1D, DK-2920 Charlottenlund, Denmark.

5628 **Joshua, R.A., 1988**. Infectivity and virulence in a serodeme of *Trypanosoma vivax*. [Sheep, mice.] *Comparative Immunology, Microbiology and Infectious Diseases*, **11** (2): 99-104.

Department of Veterinary Medicine, University of Ibadan, Ibadan, Nigeria.

5629 **Makumyaviri, A.M., Sileghem, M., Le Ray, D., Hamers, R. and Baetselier, P. de, 1988.** Système lymphocytaire et résistance relative de la souris consanguine à *Trypanosoma brucei brucei*. [Lymphocyte system and relative resistance of inbred mice to *T. b. brucei.*] *Annales de l'Institut Pasteur: Immunologie,* **139** (5): 545-556.

Makumyaviri, Le Ray: Laboratoire de Protozoologie, Institut de Médecine Tropicale, 155 Nationalestraat, B-2000 Antwerp, Belgium; Makumyaviri also: Faculté de Médecine Vétérinaire, Université de Lubumbashi, B.P. 1825, Lubumbashi, Zaire; Sileghem, Hamers, Baetselier: Instituut voor Moleculaire Biologie, Vrije Universiteit Brussel, 65 Paardenstraat, B-1640 Suit-Genesius-Rode, Belgium.

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KETRI, P.O. Box 362, Kikuyu, Kenya; Zoology Department, University of Nairobi, P.O. Box 30197, Nairobi, Kenya; ICIPE, P.O. Box 30772, Nairobi, Kenya.

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