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AU-IBAR / UA-BIRA

BAMAKO, MALI

ISCTRC / CSIRLT

Sixty two years of AU/ISCTRC 1949

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2011 Soixante-deux Années de l'UA/CSIRLT

Bamako, Mali
12 - 16 september 2011

INTERNATIONAL SCIENTIFIC COUNCIL FOR TRYPANOSOMIASIS RESEARCH AND CONTROL ISCTRC

31st Meeting

Programme

African Union
Interafrican Bureau for Animal Resources

Internatiomnal Scientific Council for Trypanosomiasis Research and Control
(ISCTRC)

31st Meeting

PROVISIONAL PROGRAMME

ABOUT THE CONFERENCE

Theme of the conference

Refocusing Research and Control of tsetse and trypanosomiasis: a development agenda

Members of the Scientific Committee

The members of the 31st ISCTRC Scientific Committee that were appointed by the Director of AU-IBAR were drawn from various institutions working on Tsetse and Trypanosomiasis. The committee received and considered over 130 abstracts addressing the various themes of the conference.

Prof. Ahmed Elsawalhy, Director of AU-IBAR, Chairperson
Dr. James Wabacha, ISCTRC Secretary, Member
Dr. Baba Soumare, Member
Dr. Pamela Olet, Member
Dr. Rajinder Saini, Member
Dr. Raffaelle Matioli, Member
Dr. Pere Simaro, Member
Dr. Hippolyte Djosse Affognon, Member

Repporteur and Moderators

Raportteur general	Baba Soumare
Deputy Raporteur General	Charles Mahama

Moderators and raporteurs for the various themetic sessions are as per the programme

Presentation guidelines

Allocated time for presentations:
Key note address will take 30 minutes. The Invited papers that will set the scene for the various sessions will be 20 minutes each comprising of 15 minutes of presentation with 5 minutes of discussions immediately after the presentation.

The other presentations will comprise of 15 minutes of presentation. The discussions will be held at the end of each session.

Viewing of posters
There will be continous viewing of the posters during coffee/tea breaks. Tea and coffee will be served at the poster stands. The presenters for the posters will be at the stands during the coffee/tea breaks. There will be general discussion on the posters in the plenary on Friday, 16th September at 09.35-10.30.

Uploading of presentations in the conference computer
For presenters making their presentation during the first day you are requested to upload your presentation during registration on Sunday. The rest of the presentations will be uploaded in the conference computer on the eve of the presentation. The Rappotteurs will support you on this activity. The presenters for each session will take front seats in preparation for presentation and discussions.

Presentation by international organizations
Representatives of the international organizations will make their presentations on the first day of the conference during the first Session

Certificate awards for the best posters
There will be awards of Certificates for the best five (5) posters presented at the conference. You are therefore requested to vote for **one poster indicating your name and poster number.**

A table showing the the presentations that will be made during the conferece

Thematic area	Oral	Poster	Total
PATTEC	3	-	3
Country reports	6	-	6
Human African Trypanosomiasis	26	24	50
Animal African trypanosomiasis	16	19	35
Glossina Biology, Control and Eradication	20	13	33
Land use, environment and Socio-economics	4	2	6
Total	**75**	**58**	**133**

The national organizing Committee

The members of the National Organising Committee in Mali:

President

Dr Mamadou KANE General Secretary, Ministry of Livestock and Fisheries (MLF)

Members:

Dr Alphonse TEME, Technical Advisor, MLF
M. Bakary Bouare, Director of Finance, Ministry of Finances, MLF
Ms Samaké Hama Goueta, Finance officer, MLF
MS TRAORE Hawa FOFANA, Communication Officer, MLF
Dr Abdel Kader DIARRA, CVO, Directorate of Veterinary Services, MLF
Dr Issa TOURE, Deputy CVO, Directorate of Veterinary Services, MLF
Dr Ouayara KONE, Vet. Officer, Directorate of Veterinary Services, MLF
Dr Mahamadou SYLLA, Coordinator PATTEC-Mali, Directorate of Veterinary Services, MLF
Dr Bogoba DIARRA, Director, Ministry of Health
M. Moussa KONE, M&E PATTEC-Mali, Directorate of Veterinary Services, MLF
Dr Ibrahim Ayouba MAIGA, Vet. Officer, Directorate of Animal Production and Industries, MLF
Dr Ahmadou HAIDARA, Coordinator, Tse-Tse flies Control Programme
M. Amadou Kouyaté, Transport Officer, Ministry of Transport
Pr. Mamadou Moussa DIARRA, Researcher, National Agricultural Research System
IGP. Namakoro DIARRA, Technical Advisor, Ministry of Security and Civilian Protection
Dr Zakaria BOCOUM, Vet. Officer, Central Veterinary Laboratory
SOW Hawa SOUCKO, Fishery Officer, Directorate of Fishery, MLF
CAMARA Adama SANOGO, Finance Officer, Directorate of General Budget, Ministry of Finances
M. Mamadou DOUMBIA, Civilian Officer, District Mayor Office
Abdoulaye TRAORE, Civilian Officer, District Governor Office

Mahamane Yéya MAIGA, Tourism Officer, Ministry of Tourism and Handcraft
M. Matiné Coulibaly, Protocol Officer, Ministry of foreign affairs
Dr Sadou MAIGA, Resource Person
Dr Issa DEGOGA, Resource Person
Dr Aligui DJITEYE, Resource Person
Dr Sékouba BENGALY, Resource Person
Dr Mahamoud DIALL, Resource Person
M. Adama KONATE, Resource Person

Ad hoc committee

President
Dr Sadou MAIGA, Resource Person

Members:
Ms Samaké Hama Goueta, Finance Officer, MLF
Ms TRAORE Hawa FOFANA, Communication Officer, MLF
Ms SOW Hawa SOUCKO, Fishery Officer, Directorate of Fishery, MLF
M. Moussa KONE, M&E PATTEC-Mali, Directorate of Veterinary Services, MLF
Dr Issa DEGOGA, Resource Person
Dr Ouayara KONE, Veterinary Officer, Directorate of Veterinary Services, MLF

31ST INTERNATIONAL SCIENTIFIC COUNCIL FOR TRYPANOSOMIASIS RESEARCH AND CONTROL (ISCTRC) GENERAL CONFERENCE
REFOCUSING RESEARCH AND CONTROL OF TSETSE AND TRYPANOSOMIASIS: A DEVELOPMENT AGENDA
CENTRE INTERNATIONAL DE CONFÉRENCE DE BAMAKO (CICB)
SEPTEMBER 12-16, 2011, BAMAKO, MALI

PROVISIONAL PROGRAMME

		Presenter
Sunday 11th September 2011		
0.8.15-18.00hrs	Registration, Distribution of documents and display of posters	
Monday 12th September 2011		
SESSION 1		
09.00hrs	**OPENING CEREMONY**	

	Keynote Paper: Refocusing Research and Control of tsetse and trypanosomiasis: a development agenda	AUC Commissioner of Rural Economy and Agriculture, Rhoda Peace Tumusiime
11.00hrs	**Tea/Coffee Break and Viewing of Posters**	
SESSION 2		
	Moderator: Dr. Baba Soumare *Rapporteur: Pere Simarro*	
11.00-13.00hrs	Presentations by International Organisations	
13.00- 14.00hrs	**Lunch break**	
SESSION 3:.(2hrs)		
Theme 1 : PATTEC		
	Moderator: Issa Sidibe *Rapporteur: C. Mahama*	
14.00-14.20	Ten years of coordinated efforts towards eradication of Tsetse and trypanosomiasis	Hassane Mahamat
14.20-14.35	Presentation on the advocacy and awareness campaign project on African Trypanosomiasis (1.01) *Solomon Haile Mariam*	Solomon Haile Mariam

14.35-14.50	Creation of Sustainable tsetse free areas in the north-west and north-east geopolitical zones of Nigeria through the Pan African Tsetse and trypanosomiasis Eradication Campaign (PATTEC) initiative (1.02) *Peter M. Dede and Mohammed Mamman*	Peter M. Dede
14.50-15.05	Implementation and achievements of PATTEC advocacy activities in Tanzania, January- December, 2010 1.03) *Mwalimu, C, D, Kibona Stafford, Sindato Calvin , Daffa, J & Mwambembe, E*	Mwalimu, C, D,
15.05-16.00	Discussion	
SESSION 4 1hr 30min)		
Theme 1: *PATTEC Continued*		
16.30-1800hrs	Discussions on the implementation of PATTEC	PATTEC National Coordinators
Tuesday 13th September 2011		
SESSION 5: (2hrs 15min)		
Theme 2: Country Reports		

	Moderator: Nicholus Kauta *Rapporteur: Issa Degoga*	
08.15-08.30	Tsetse and trypanosomiasis control activities in Tanzania 2009-2011 (2.01) *Daffa J. W .S*	Daffa J. W .S
08.30-08.45	Report on HAT, 2009-2010 (2.02) *Peka Mallaye*	Peka Mallaye
08.45-09.00	Country report on situation analysis of tsetse and trypanosomiasis (2.03) *Erneo B. Ochi and Taban Tereka*	Erneo B
09.00-09.15	Spatial dynamic of tsetse flies in Burkina Faso (1949-2009): Impact of global change (2.04) *Fabrice Courtin, Jean-Baptiste Rayaissé, Issa Tamboura, Oumar Serdébéogo, Zowindé Koudougou, Philippe Solano, Issa Sidibé*	Fabrice Courtin
09.15-09.30	Strategies towards the eradication of tsetse in Zimbabwe: 2009-2011 (2.05) *W. Shereni*	W. Shereni
09.30-09.45	A summary report of the Southern Tsetse Eradication project (STEP) (2.06) *Thomas Chertenet Asfaw*	Thomas Chertenet Asfaw
09.45-10.00	Country report for Mali (2.07)	

10.00-10.30	Discussion	
10.30-11.00	**Tea/Coffee Break and Viewing of Posters**	
SESSION 6 : (2hrs)		
Theme 3: Human African Trypanosomiais		
	Moderator: T. Josenado *Rapporteur:E.nock Matovu*	
	Epidemiology	
11.00-11.20	Towards elimination of Human African trypanosomiasis: Essential policies, technical options, resource mobilization and current practices	Perez Simarro, WHO
11.20-11.35	Health care seeking behaviour and diagnostic delays for human African trypanosomiasis in the Democratic republic of the Congo (3.01) *Hasker E, Lumbala C, Mbo F, Mpanya A, Kande V, Lutumba P, Boelaert M*	Hasker E
11.35-11.50	T.B. Gambiense human African trypanosomiasis programs: Different contexts, epidemiology, ways of thinking and many challenges ahead before elimination (3.02) *Laurence Flevaud, M. Angeles Lima, Gemma Ortiz Genovese, Pedro Pablo Palma*	Laurence Flevaud

11.50-12.05	Challenges of controlling T. b. gambiense human African trypanosomiasis in a remote and unstable area of the Democratic Republic of Congo (3.03) *Josué Amici Heradi, Catherine de Patoul, Michel Quere, Claude Mahoudeau, Jacqui Tong, François Chappuis*	Josué Amici Heradi
12.05-12.20	The contribution of Health Centres, rural and urban-rural general hospitals and national hat control programme referral centres to the diagnosis of hat in the democratic republic of Congo : the case of the Bandundu province. (3.04) *Florent Mbo, Victor Kande, Claude Sese, Pascal Lutumba*	Florent Mbo
12.20-12.35	Establishing posts for reactive surveillance of sleeping sickness (3.05) *Diarra A., Franco J.R., Sinatoko A., Badziklou K., Simarro P.*	Diarra A.,
12.35-13.00	Discussion	
13.00-14.00	**Lunch break**	
SESSION 7 :(2hrs)		
14.00-14.15	Up-to-date, evidence-based estimates of sleeping sickness risk: a methodology based on geographic information systems (3.06) *Giuliano Cecchi, Massimo Paone, José R. Franco, Abdoulaye Diarra, José A. Ruiz Postigo, Raffaele C. Mattioli, Pere P. Simarro*	Giuliano Cecchi

14.15-14.30	The atlas of human african trypanosomiasis: progress status and prospects (3.07) *José R. Franco, Massimo Paone, Giuliano Cecchi, Abdoulaye Diarra, José A. Ruiz Postigo, Raffaele C. Mattioli, Pere P. Simarro*	José R. Franco,
14.30-14.45	Population genetics structure of trypanosoma brucei in uganda: it's implication on the epidemiology of sleeping sickness (3.08) *Richard Echodu, Jon S. Beadell, Loyce M. Okedi, Chineme Enyioha, John C. K Enyaru , Wendy Gibson, Serap Aksoy, Adalgisa Caccone*	Richard Echodu
14.45-15.00	Epidemiologic care and transfusional security face to HAT in RDC (3.09) *Basha M, Kande V, Sese C, Yuma S, Ngandu C, Mbo A, Mwandeke N, Van der Veken W*	Basha M
15.00-15.15	New evidences for the existence of human trypanotolerance: perspective for a better understanding of the host-parasite interaction and for improved control strategies (3.10) *Bruno BUCHETON, Mamadou CAMARA, Hamidou ILBOUDO, Oumou CAMARA, Jacques KABORE, Thierry De MEEUS, Annette MACLEOD and Vincent JAMONNEAU*	Bruno BUCHETON

15.15-15-30	Vaccine protection abolished by human african trypanosomiasis? (3.11) *V. Lejon, D. Mumba Ngoyi, L. Kestens, L. Boel, J. Jacobs, V. Kande, J. Van Griensven, P. Büscher*	V. Lejon
15.30-16.00	Discussion	
16.00.16.30	**Tea/Coffee Break and Viewing of Posters**	
SESSION 8: (1hr 30min)		
THEME 3 HAT Contd.		
16.30-16.45	Immunological determinant underlying the control of infection in humans infected by trypanosoma brucei gambiense (3.12) *Hamidou ILBOUDO, Rachel BRAS-GONÇALVES, Mamadou CAMARA, Jacques KABORE, Jean Loup Lemesre, Oumou CAMARA, Vincent JAMONNEAU and Bruno BUCHETON*	Hamidou ILBOUDO
16.45-17.00	Analysis of factors leading to relapses in a cohort study conducted in Angola from 2008 to 2011 (3.13) *Bisser S, Vatunga G, Courtioux B, Preux PM , Ndungu J, Josenando T*	Bisser S,
17.00-17.15	Trypanosoma brucei "biophotonica (3.14) *Van Reet Nick, Pyana P., Büscher P.*	Van Reet Nick

17.15-17.30	Identification of peptides that mimic variant surface glycoprotein epitopes for diagnosis of trypanosoma brucei gambiense HAT (3.15) *Liesbeth Van Nieuwenhove, Stijn Rogé, Fatima Balharbi, Tessa Dieltjens, Yves Guisez, Philippe Büscher and Veerle Lejon*	Liesbeth Van Nieuwenhove
17.30-18.00	Discussion	
Wednesday 14th September 2011		
SESSION 9 (2hrs 15min)		
Theme 3: HAT Contd.		
	Diagnosis	
08.15-08.30	Recombinant expression of litat 1.3 vsg in pichia pastoris for serodiagnosis of gambiense sleeping sickness (3.16) *Rogé S., Heykers A., Brouwer de Koning A., Guisez Y. and Büscher P.*	Rogé S.

08.30-08.45	Evaluation of the immune trypanolysis test performed on blood collected on filter paper (3.17) *Vincent Jamonneau, Hamidou Ilboudo, Jacques Kaboré, Oumou Camara, Sakande Hassane, Mamadou Léno, Mamadou Camara, Rudy Baelmans, Philippe Büscher & Bruno Bucheton*	Vincent Jamonneau
08.45-09.00	How reliable is PCR for diagnosis, staging and follow-up of gambiense sleeping sickness (3.18) *Stijn Deborggraeve, Veerle Lejon, Rosine Ali Ekangu, Dieudonné Mumba Ngoyi, Patient Pati Pyana, Médard Ilunga, Jean Pierre Mulunda, Philippe Büscher*	Stijn Deborggraeve
09.00-09.15	Improved parasitological and molecular techniques for the diagnosis and surveillance of sleeping sickness (3.19) *Philippe Büscher, Dieudonné Mumba Ngoyi , Fatima Balharbi, Victor Kande Betu, Wim Van der Veken, Claude Sese, Veerle Lejon*	Philippe Büscher,
09.15-09.30	Sleeping sickness diagnosis: use of buffy coats improves the sensitivity of the mini anion exchange centrifugation test (3.20) *Camara Oumou, Camara Mamadou, Ilboudo Hamidou, Sakande Hassan, Kaboré Jacques, Jamonneau Vincent and Bucheton Bruno*	Camara Oumou

09.30-09.45	Neopterin for the staging and follow-up of sleeping sickness patients: evidence from a multi-centric cohort (3.21) *Natalia Tiberti, Alexandre Hainard, Veerle Lejon, Bertrand Courtioux, Enock Matovu, John Charles Enyaru, Xavier Robin, Natacha Turck, Krister Kristensson, et.al.*	Natalia Tiberti
09.45-10.00	Feasibility of nect administration in rural health structures: results from implementation in a multicentre clinical trial in the DRC (3.22) *Caecilia Schmid, Victor Kande, Crispin Lumbala, Florent Mbo, Claude Nkongolo, Petra Baeumelt, Andrea Kuemmerle, Olaf Valverde and Christian Burri*	Caecilia Schmid
10.00-10.30	Discussion	
SESSION 10 (1hr 30min)		
Theme 3: HAT Contd		
	Chemotherapy	
11.00-11.15	NECT field phase IIIB trial. Primary efficacy and in-hospital safety results (3.23) *Olaf Valverde Caecilia Schmid, Johannes Blum, Victor Kande, Wilfried Mutombo, Médard Ilunga, Ismael Lumpungu, Sylvain Mutanda, Digas Tete, Pathou Nganzobo, Nono Mubwa, Séverine Blesson*	Olaf Valverde Caecilia Schmid

11.15-11.30	Pharmacovigilance system in the use of the nifurtimox - eflornithine combination treatment in the second stage of gambiense human african trypanosomiasis (3.24) *Franco JR , Simarro PP, Diarra A, Ruiz-Postigo JA, and Samo M.*	Franco JR
11.30-11.45	Fexinidazole a new oral treatment for sleeping sickness – update of development (3.25) *Antoine Tarral, Nathalie Strub Wourgaft, Séverine Blesson, Olaf Valverde Mordt*	Antoine Tarral
11.45-12.00	Discovery and optimization of a novel drug candidate for treatment of late-stage human african trypanosomsiasis (3.26) *Robert Don, Bakela Nare, Steve Wring, Cy Bacchi, Reto Brun, Jacob Plattner, Beth Beaudet, Tana Bowling, Daitao Chen, Yvonne Freund, Eric Gaukel, Matthew Jenks, Marcel Kaiser, Luke Mercer, et.al*	Robert Don
12.00-12.20	Discussion	
SESSION 11 (30min)		
Theme 4: Animal African Trypanosomiasis (AAT)		
	Moderator: Raffaele Matioli *Rapporteur: O.Diall*	

12.20-12.40	Towards elimination of Animal African trypanosomiasis: Essential policies, technical options, resource mobilization and current practices	Gilbert Akoda
	Chemotherapy and Drug resistance	
12.40.12.55	Assessment of anti-trypanosomal drug resistance in cattle of the Ladduga grazing reserve, Kachia, Nigeria (4.01) *T. Randolph, O. Diall, P-H. Clausen, B. Diarra, M. Mamman, J.O. Kalejaiye, S.S. Shaida, A.O. Fajinmi, S.K. Samdi, B. Wayo, E. Okoh, B. Ramatu, A.U. Malala, Z. Bengalyf and H. Vitouley*	T. Randolph
13.00- 14.00	**Lunch break**	
SESSION 12 : (2hrs)		
Theme 4: AAT Continued		
14.00-14.15	Assessment of trypanocidal drug resistance on the Adamaoua plateau in Cameroon using a field test and a standardised test in mice (4.02) *Mamoudou, A., Zoli, A., Tanenbe, C, Andrikaye, J. P., Bourdanne, Marcotty, T. , Delespaux, V., Clausen, P.-H , Geerts, S.*	Mamoudou, A

14.15-14.30	Binding of the trypanocidal drugs diminazene aceturate, homidium chloride and isometamidium chloride to bovine erythrocytes (4.03) *W. M .Karanja, G. A., Murilla and R. E. Mdachi*	W. M .Karanja,
14.30-14.45	Improved PCR-RFLP for the detection of diminazene resistance in trypanosoma congolense under field conditions using filter papers for sample storage (4.04) *Hervé Sèna Vitouley, Erick Ouma Mungube, Emmanuel Allegye-Cudjoe, Oumar Diall, Zakaria Bocoum, Boucader Diarra, Thomas F. Randolph, Burkhard Bauer, Peter-Henning Clausen, et al.*	Hervé Sèna Vitouley
14.45-15.00	Sensitivity and virulence of trypanosoma evansi isolates from camels in Marsabit County, Kenya (4.05) *Mdachi, R.E., Murilla, G.A., Bateta, R., and Munga, L. K.*	Mdachi, R.E
15.00-15.15	Situation of trypanocides in Mauritania (4.06) *Dia, M.L., Barry Yahya et Ould Babah, B*	Dia, M.L.
15.15-15.30	An update of the situation of trypnocidal drug resistance in livestock in subsaharan africa (4.07) *Talaki E., Diall O., Sidibé I., Belem A.M.G., Pangui L.J.*	Talaki E.
15.30-16.00	Discussion	
16.00-16.30	**Coffee/tea Break and viewing of posters**	

SESSION 13 :(1hr 30min)		
Theme 4: AAT Continued		
16.30-16.45	Validation of site-specific spraying of cattle for trypanosomosis control in Glossina fuscipes fuscipes infested areas in Uganda (4.08) *J.W. Magona, J. Walubengo, F. Kabi, J.T. Odimim, M. Ocaido*	J.W. Magona
	Epidemiology	
16.45-17.00	Comparative prevalence of animal trypanosomosis in tsetse infested and tsetse free parts of Ethiopia (4.09) *Fikru, R., Aster T., Moti, Y. , Merga, B. , B. M. Goddeeris, and Philippe Büscher*	Fikru, R
17.00-17.15	Genetic characterization of Trypanosoma brucei circulating in domestic animals of the Fontem sleeping sickness focus of Cameroon (4.10) *Gustave Simo, Guy Roger Njitchouang, Flobert Njiokou, Gerard Cuny, Tazoacha Asonganyi*	Gustave Simo
17.15-17.30	Impact of Drought and Degradation of Protected Areas on the Distribution of Bovine Trypanosomoses and their Vectors in the Oti Catchment Basin of Northern Togo (4.11) *B. Dao, G. Hendrickx, I. Sidibé, A.M.G. Belem, S. De La Rocque*	B. Dao

17.30-18.00	Discussion	
Thursday 15th September 2011		
SESSION 14 (1hr 30min)		
THEME 4: AAT Contd		
08.15-08.30	Evaluation of trypanosomosis control strategies used by camel keeping communities in Marsabit and Isiolo Counties (4.12) *Mdachi, R.E., Wanjala, K. Munga, L. K., Changasi, R.E., Maichomo, M. and Murilla, G.A*	Mdachi, R.E
08.30-08.45	Molecular epidemiology of re-emerging trypanosomosis in Choma-Kalomo block of the southernprovince of Zambia (4.13) *Bukowa K.M., Simukoko H., Sinyangwe L., and Namangala B.*	Bukowa K.M
08.45-09.00	Seasonal studies of tsetse and trypanosomiasis situation at ngorongoro concervation area and the surrounding villages (4.14) *F. Mramba, G. Mbata, O. Managwa, A. Nyaki, A. Msangi and J. Muumba*	F. Mramba

09.00-09.15	Status of tsetse-transmitted trypanosomiases in livestock and man in the Manafwa-river-crescent districts in south-eastern Uganda (4.15) *Okedi, L. M.., Magona, J., Alioni, V. S., Azabo, R., Mugyenyi, A., Echodu, R., and Aksoy S.*	Okedi, L. M
09.15-09.30	Evaluation of antibody response against glossina saliva in cattle: a supplementary / alternative approach to assess exposure of tsetse bites (4.16) *Martin Bienvenu SOMDA, Zakaria BENGALY, Anne POINSIGNON, Sylvie CORNELIE, Françoise MATHIEU-DAUDE, Emilie Thérèse DAMA, Edith DEMETTRE-VERCEIL, Franck REMOUE, et. al*	Martin Bienvenu SOMDA
09.30-09.55	Discussion	
SESSION 15 (30min)		
THEME: 5 Glossina Biology, Control and Eradication		
	BIOLOGY	
	Moderator: Kalinga Chilongo *Rapporteur: Joyce Daffa*	
09.55- 10.15	Generating knowledge to enhance control of glossina	Issa Sidibe

10.15-10.30	Mass marking of Glossina austeni during emergence with fluorescent powders: its effects and identification (in the framework of sterile insect releases) (5.01) *Aligui Djiteye, Detlef Luger and Henry Banor*	Aligui Djiteye
10.30-11.00	**Coffee/tea Break and viewing of posters**	
SESSION 15 (2hrs)		
Theme: 5 Glossina Biology, Control and Eradication Continued		
	Biology	
11.00-11.15	Vectorial capacity of the Glossina species, effects of the feeding state during the first infected blood meal and / or the gamma rays irradiation doses (5.02) *Aligui Djiteye and Burkhard Bauer*	Aligui Djiteye
11.15-11.30	Development of strategies to manage the salivary gland hypertrophy virusfor improved mass-rearing of Glossina pallidipes (5.03) *Adly M.M. Abd-Alla, Andrew G. Parker, Marc J.B. Vreysen and Max Bergoin*	Adly M.M. Abd-Alla

11.30-11.45	Genetic population structure of glossina palpalis palpalis from central African sleeping sickness foci (5.04) *Tito Trésor Melachio Tanekou, Gustave Simo, Sophie Ravel, Thierry de Meeûs, Sandrine Causse, Philippe Solano, Pascal Lutumba, Tazoacha Asonganyi, Flobert Njiokou*	Tito Trésor Melachio Tanekou
11.45-12.00	Interactive trapping responses of the tsetse flies glossina brevipalpis newst and g.pallidipes austen in Kenya (5.05) *Japhet Kiragu Paul Thande, Robert Njue, Peter Gitonga*	Japhet Kiragu Paul Thande
12.00-12.15	Population genetic structure and reproductive strategies of African trypanosomes (5.06) *Thierry De Meeûs, Mathurin Koffi, Vincent Jamonneau, Bruno Bucheton, Gustave Simo, Flobert Njiokou, Bashir Salim and Philippe Solano.*	Thierry De Meeûs
12.15-12.30	Responses of G. Pallidipes and G. morsitans morsitans to mobile baits (5.07) *D. Tsikire, A. Chamisa, S Torr and W Shereni.*	D. Tsikire, A
12.30-13.00	Discussion	
13.00-14.00	**Lunch break**	
SESSION 16 (2 hrs)		

Theme 6 Glossina Biology, Control and eradication Continued		
14.00-14.15	Geometric morphometrics as a tool to help decision for tsetse control strategy (5.08) *D. Kaba, P. Solano, G. Acapovi-Yao, K. Allou, A. Diarrassouba, M.T.Seck, J. Bouyer, S. Ravel, K.E. N'Goran et J-P. Dujardin.*	D. Kaba
	Control	
14.15-14.30	Developing continental maps of Glossina species (5.09) *Giuliano Cecchi, Massimo Paone, Udo Feldmann, Marc J. B. Vreysen, Raffaele C. Mattioli*	Giuliano Cecchi
14.30-14.45	Assays to evaluate effects as well as durability of deltamethrin-treated nets (itn) for the control of various insect vectors (5.10) *P.-H. Clausen, K. Frenzel, N. Geerike, M. Körber, B. Manti, R. Mathis, W. Mauer, D. Mehlitz, K.-J. Peters, B. Rössler, K.M.A. Rohrmann, O. Skrock, A. Westerkamp and B. Bauer*	P.-H. Clausen
14.45-15.00	Eradication of tsetse from the loos islands, guinea: where we are? (5.11) *Moise S. Kagbadouno, Mamadou Camara, Jérémy Bouyer, Fabrice Courtin, Mory F. Onikoyamou, Chris J. Schofield, Philippe Solano*	Moise S. Kagbadouno

15.00-15.15	An operation to eliminate tsetse flies from 10,000 km2 covering parts of Angola and Zambia with use of the sequential aerosol technique (sat) (5.12) *Kalinga Chilongo, Patrick M. Kgori*	
15.15-15.30	Parasitological prevalence of bovine trypanosomiasis prior to field trial of tsetse repellent project in Kwale District of costal Kenya (5.13) *Norbert, M.*	Norbert, M.
15.3-16.00	Discussion	
16.00-18.30	**Coffee/tea Break and viewing of poster**	
SESSION 17 (1hr 30min)		
Theme 6 Glossina Biology, Control and eradication Continued		
16.30-16.45	Eradication of tsetse fly, Glossina pallidipes newst from Lambwe valley, Kenya, using insecticide impregnated odour baited targets through public-private sector partnership (5.14) *Francis P. Oloo*	Francis P. Oloo
16.45-17.00	Control of tsetse using footbaths in Chad (5.15) *Noel Ndeledje, Zakaria Bengaly, Patrice Grimaud, Frédéric Stachurski, Adrien Belem, Jérémy Bouyer*	Noel Ndeledje

17.00-17.15	The environmental impact of deltamethrin aerial ulv spray against tsetse-fly on non-target invertebrates in Sesheke and Shangombo districts of western Zambia (5.16) *Kaposhi, Crispin K. M., Mudenda, Macarthy, Chupa Anthony, Masuku Amos and Chintu Oliver*	Kaposhi, Crispin K. M.
17.15-17.30	Towards an optimal design of target for tsetse control: comparisons of novel targets for the control of palpalis group tsetse in west africa (5.17) *J - B. Rayaisse, J. Esterhuizen, I. Tirados, D. Kaba, E. Salou, A Diarrassouba, G.A. Vale, M.J. Lehane, S.J. Torr3, & P. Solano*	J - B. Rayaisse
17.30 -17.45	Development of site specific animal health package to improve livestock productivity in Kenya by controlling various insect vectors (5.18)*Saini, R. K., Affognon, H.D., Wafula E., Ng'iela, J., Musa, P. and Mattioli R.*	Saini, R. K
17.45- 18.00	Discussion	
Friday 16th September 2011		
SESSION 18 (1hr 20min)		
Theme 6: Land use, environment and socioeconomics		
	Moderator : A. Hippolyte *Rapporteur: Gecchi Giuliano*	

08.15- 08.35	Advocacy hat project in Uganda (2008-2011) (6.01) *Florence Muhumuza*	Florence Muhumuza
08.35-8. 50	Difference in knowledge of animal trypanosomosis and its control between two main ethnic groups in northern Benin: case of Fulani and Batonou (6.02) *Affognon Hippolyte , Kiki Celestin and Codjia Victorin*	Affognon Hippolyte
08.50-09.05	Socio-economic impact of bovine trypanosomosis on cattle productivity in the Sudan (6.03) *Wisal Elnour, M. M. Mohamed-Ahmed , Fayga Hussein Balal, A.H.A/Rahman*	Wisal Elnour
09.20- 09.35	Discussion	
SESSION 19 (55 min)		
	Moderator: Lamine M. Dia *Rapporteur: Henri Kabore*	
09.35-10.30	Plenary discussion on posters	
10.30-11.00	**Coffee/tea Break and viewing of posters**	
SESSION 20 (2hrs)		
	Moderator: Prof. Ahmed Elsawalhy *Rapporteur: Baba Soumare*	
11.00-12.00	Recommendations	
12.00-13.00	**Closing Ceremony**	

2.05 STRATEGIES TOWARDS THE ERADICATION OF TSETSE IN ZIMBABWE: 2009-2011
W. Shereni

2.06 A SUMMARY REPORT OF THE SOUTHERN TSETSE ERADICATION PROJECT (STEP)
Thomas Chertenet Asfaw

2.07 SUMMARY REPORT ON TSETSE AND TRYPANOSOMIASIS RESEARCH AND CONTROL IN MALI

III HUMAN AFRICAN TRYPANOSOMIASIS (HAT)

ORAL

EPIDEMIOLOGY

3.01 HEALTH CARE SEEKING BEHAVIOUR AND DIAGNOSTIC DELAYS FOR HUMAN AFRICAN TRYPANOSOMIASIS IN THE DEMOCRATIC REPUBLIC OF THE CONGO
Hasker E, Lumbala C, Mbo F, Mpanya A, Kande V, Lutumba P, Boelaert M

3.02 *T. B. GAMBIENSE* HUMAN AFRICAN TRYPANOSOMIASIS PROGRAMS: DIFFERENT CONTEXTS, EPIDEMIOLOGY, WAYS OF THINKING AND MANY CHALLENGES AHEAD BEFORE ELIMINATION
Laurence Flevaud, M. Angeles Lima, Gemma Ortiz Genovese, Pedro Pablo Palma

3.03 CHALLENGES OF CONTROLLING *T. B. GAMBIENSE* HUMAN AFRICAN TRYPANOSOMIASIS IN A REMOTE AND UNSTABLE AREA OF THE DEMOCRATIC REPUBLIC OF CONGO
Josué Amici Heradi, Catherine de Patoul, Michel Quere, Claude Mahoudeau, Jacqui Tong, François Chappuis

3.04 THE CONTRIBUTION OF HEALTH CENTRES, RURAL AND URBAN-RURAL GENERAL HOSPITALS AND NATIONAL HAT CONTROL PROGRAMME REFERRAL CENTRES TO THE DIAGNOSIS OF HAT IN THE DEMOCRATIC REPUBLIC OF CONGO : THE CASE OF THE BANDUNDU PROVINCE.
Florent MBO, Victor KANDE, Claude SESE, Pascal LUTUMBA

3.05 ESTABLISHING POSTS FOR REACTIVE SURVEILLANCE OF SLEEPING SICKNESS
Diarra A., Franco J.R., Sinatoko A., Badziklou K., Simarro P.

3.06 UP-TO-DATE, EVIDENCE-BASED ESTIMATES OF SLEEPING SICKNESS RISK: A METHODOLOGY BASED ON GEOGRAPHIC INFORMATION SYSTEMS
Giuliano Cecchi, Massimo Paone, José R. Franco, Abdoulaye Diarra, José A. Ruiz Postigo, Raffaele C. Mattioli, Pere P. Simarro

3.07 THE ATLAS OF HUMAN AFRICAN TRYPANOSOMIASIS: PROGRESS STATUS AND PROSPECTS
José R. Franco, Massimo Paone, Giuliano Cecchi, Abdoulaye Diarra, José A. Ruiz Postigo, Raffaele C. Mattioli, Pere P. Simarro

3.08 POPULATION GENETICS STRUCTURE OF *TRYPANOSOMA BRUCEI* IN UGANDA*:* IT'S IMPLICATION ON THE EPIDEMIOLOGY OF SLEEPING SICKNESS
Richard Echodu, Jon S. Beadell, Loyce M. Okedi, Chineme Enyioha, John C. K Enyaru , Wendy Gibson, Serap Aksoy, Adalgisa Caccone

3.09 EPIDEMIOLOGIC CARE AND TRANSFUSIONAL SECURITY FACE TO HAT IN RDC
Basha M, Kande V, Sese C, Yuma S, Ngandu C, Mbo A, Mwandeke N, Van der Veken W

3.10 NEW EVIDENCES FOR THE EXISTENCE OF HUMAN TRYPANOTOLERANCE: PERSPECTIVE FOR A BETTER

Rogé S., Heykers A., Brouwer de Koning A., Guisez Y. and Büscher P.

3.17 EVALUATION OF THE IMMUNE TRYPANOLYSIS TEST PERFORMED ON BLOOD COLLECTED ON FILTER PAPER
Vincent Jamonneau, Hamidou Ilboudo, Jacques Kaboré, Oumou Camara, Sakande Hassane, Mamadou Léno, Mamadou Camara, Rudy Baelmans, Philippe Büscher & Bruno Bucheton

3.18 HOW RELIABLE IS PCR FOR DIAGNOSIS, STAGING AND FOLLOW-UP OF *GAMBIENSE* SLEEPING SICKNESS?
Stijn Deborggraeve, Veerle Lejon, Rosine Ali Ekangu, Dieudonné Mumba Ngoyi, Patient Pati Pyana, Médard Ilunga, Jean Pierre Mulunda, Philippe Büscher

3.19 IMPROVED PARASITOLOGICAL AND MOLECULAR TECHNIQUES FOR THE DIAGNOSIS AND SURVEILLANCE OF SLEEPING SICKNESS.
Philippe Büscher, Dieudonné Mumba Ngoyi , Fatima Balharbi, Victor Kande Betu, Wim Van der Veken, Claude Sese, Veerle Lejon

3.20 SLEEPING SICKNESS DIAGNOSIS: USE OF BUFFY COATS IMPROVES THE SENSITIVITY OF THE MINI ANION EXCHANGE CENTRIFUGATION TEST
Camara Oumou**,** Camara Mamadou, Ilboudo Hamidou, Sakande Hassan, Kaboré Jacques, Jamonneau Vincent and Bucheton Bruno

3.21 NEOPTERIN FOR THE STAGING AND FOLLOW-UP OF SLEEPING SICKNESS PATIENTS: EVIDENCE FROM A MULTI-CENTRIC COHORT
Natalia Tiberti, Alexandre Hainard, Veerle Lejon, Bertrand Courtioux, Enock Matovu, John Charles Enyaru, Xavier Robin, Natacha Turck, Krister Kristensson, Dieudonné Mumba Ngoyi, Gedeão M. L. Vatunga, Sanjeev Krishna, Philippe Büscher, Sylvie Bisser, Joseph Mathu Ndung'u, Jean-Charles Sanchez

CHEMOTHERAPY

3.22 FEASIBILITY OF NECT ADMINISTRATION IN RURAL HEALTH STRUCTURES: RESULTS FROM IMPLEMENTATION IN A MULTICENTRE CLINICAL TRIAL IN THE DRC
Caecilia Schmid, Victor Kande, Crispin Lumbala, Florent Mbo, Claude Nkongolo, Petra Baeumelt, Andrea Kuemmerle, Olaf Valverde and Christian Burri

3.23 NECT FIELD PHASE IIIB TRIAL. PRIMARY EFFICACY AND IN-HOSPITAL SAFETY RESULTS
Olaf Valverde Caecilia Schmid, Johannes Blum, Victor Kande, Wilfried Mutombo, Médard Ilunga, Ismael Lumpungu, Sylvain Mutanda, Digas Tete, Pathou Nganzobo, Nono Mubwa, Séverine Blesson

3.24 PHARMACOVIGILANCE SYSTEM IN THE USE OF THE NIFURTIMOX - EFLORNITHINE COMBINATION TREATMENT IN THE SECOND STAGE OF GAMBIENSE HUMAN AFRICAN TRYPANOSOMIASIS.
Franco JR , Simarro PP, Diarra A, Ruiz-Postigo JA, and Samo M.

3.25 FEXINIDAZOLE A NEW ORAL TREATMENT FOR SLEEPING SICKNESS – UPDATE OF DEVELOPMENT
Antoine Tarral, Nathalie Strub Wourgaft, Séverine Blesson, Olaf Valverde Mordt

3.26 DISCOVERY AND OPTIMIZATION OF A NOVEL DRUG CANDIDATE FOR TREATMENT OF LATE-STAGE HUMAN AFRICAN TRYPANOSOMSIASIS
Robert Don, Bakela Nare**,** Steve Wring, Cy Bacchi, Reto Brun, Jacob Plattner, Beth Beaudet, Tana Bowling, Daitao Chen, Yvonne Freund, Eric Gaukel, Matthew Jenks, Marcel Kaiser, Luke Mercer, Andy Noe, Matt Orr, Robin Parham, Ryan Randolph, Cindy Rewerts, Jessica Sligar, Nigel Yarlett , Robert Jacobs.

POSTER

3.27 GEOGRAPHICAL RISK FACTORS OF SLEEPING SICKNESS TRANSMISSION IN THE FOCUS OF BOFFA (GUINEA)
Rouamba J, Bruneau JC, Traoré I, Kagbadouno M, Coulibaly B, Camara M, Courtin F

3.28 COMPARISON OF FUCHS ROSENTHAL AND URIGLASS CELL COUNTING CHAMBERS AND OF DOUBLE AND MODIFIED SIMPLE CENTRIFUGATION FOR EXAMINATION OF CEREBROSPINAL FLUID IN SLEEPING SICKNESS.
D. Mumba Ngoyi , V. Lejon, P. Pyana, P. Büscher

3.29 DETERMINANTS OF EFFECTIVE CONTROL OF HUMAN AFRICAN TRYPANOSOMIASIS. THE CASE OF KASAÏ, DEMOCRATIC REPUBLIC OF CONGO, 1997 - 2005.
Lumbala C, Mpanya A, Mitashi P, Hasker E Hendrickx D, Lefevre P, Kande V, Lutumba P, Boelaert M

3.30 DND*i* R&D PROGRESS TO TACKLE SLEEPING SICKNESS
Nathalie Strub Wourgaft, Rob Don, Antoine Tarral, Olaf Valverde Mordt

3.31 REGIONAL CAPACITY BUILDING PLATFORM FOR CLINICAL TRIALS IN HAT: FIVE YEARS OF CONTRIBUTION TO RESEARCH
Augustin Kadima Ebeja , Dr Richard Laku

3.32 IMPROVING MICROSATELLITE LOCI AMPLIFICATION OF *TRYPANOSOMA BRUCEI GAMBIENSE* FROM BODY FLUID
Jacques Kaboré, Hamidou Ilboudo, Annette MacLeod, Paul Capewell, Mamady Camara, Adrien Marie Gaston Belem, Bruno Bucheton, Thierry De Meeûs, Vincent Jamonneau

3.33 INTRODUCTION OF VECTOR CONTROL AND ADVOCACY STRENGTHENING FOR BETTER CONTROL OF HAT IN THE EPICENTRE OF DUBREKA FOCUS

Camara. M, Kagbadouno .S.M, Bucheton. B; Courtin. F, Jamonneau. V, Solano. P

3.34 ARE MOLECULAR AMPLIFICATION TESTS FOR THE DIAGNOSIS OF HUMAN AFRICAN TRYPANOSOMIASIS ACCURATE? A SYSTEMATIC REVIEW.
Emily R Adams, Claire Mugasa, Kimberly R Boer, Henk Schallig, Mariska MG Leeflang

3.35 HISTORY OF AN EPIDEMIOLOGICAL LINK BETWEEN BURKINA FASO AND IVORY COAST: THE CASE OF KOUDOUGOU FOCI
Diane Kiendrebeogo, Vincent Jamonneau, Philippe Solano, Alfred Nana, Lingué Kouakou, Roger Kambiré, Fabrice Courtin

3.36 ISOLATION AND DRUG-SENSITIVITY PROFILING OF *TRYPANOSOMA BRUCEI GAMBIENSE* FROM CURED AND RELAPSED SLEEPING SICKNESS PATIENTS
Pyana P., Van Reet Nick, Mumba D., Kaiser, M., Büscher P.

3.37 NETWORK FOR MAPPING AFRICAN TRYPANOSOMIASIS IN TANZANIA (NETMATT): PRELIMINARY RESULTS
Joyce Daffa, Stafford Kibona, Calvin Sindato, Anna Mushi, Tunu Mndeme, Paul Bessell, Joseph Ndung'u

3.38 PROBLEMS OF RELAPSE OR THERAPEUTIC FAILURE IN HAT, THE NEED FOR A SYNDROMIC APPROACH.
Mukendi Mulumba deby, Munona Beya Joelle

3.39 EPIDEMIOLOGY OF HAT IN DUBRÉKA FOCUS, GUINEA
Camara M ; Camara.O ; Kagbadouno S.M ; Jamonneau. V; Bucheton B; Solano. P

3.40 MONITORING OF BLOOD DONORS SEROPOSITIVE FOR HAT IN KINSHASA
Basha M, Yuma S, Kande V, Sese C, Vagheni E, Mayanu M.R, Van der Veken W

3.41 TOWARDS ELIMINATING HUMAN AFRICAN TRYPANOSOMIASIS IN NIGERIA
Ifeoma N. Anagbogu , Peter Dede

3.42 SUSTAINABLE STRATEGIES FOR SLEEPING SICKNESS CONTROL
Aksoy Serap

3.43 HUMAN MOBILITY IN THE DUBREKA FOCUS: AN OBSTACLE FOR HAT ELIMINATION?
Courtin F, Camara M, Bucheton B, Kagbadouno M, Laveissière C, Solano P, Jamonneau V

3.44 IMMUNE TRYPANOLYSIS ON NON-HUMAN INFECTIVE TRYPANOSOMES FOR DIAGNOSIS OF *GAMBIENSE* SLEEPING SICKNESS
Rogé S., Van Reet N., Wand N., Guisez Y., Rudenko G. and Büscher P.

3.45 CHARACTERIZATION OF EX-VIVO CELLULAR RESPONSE IN INDIVIDUALS INFECTED BY TRYPANOSOMA BRUCEI GAMBIENSE
Hamidou Ilboudo, Vincent Jamonneau, Philippe Holzmuller, Gérard Cuny, André Garcia, Bruno Bucheton, David Courtin

3.46 HUMAN INFECTIONS WITH TRYPANOSOMES OF ANIMAL ORIGIN
Touratier Louis

3.47 SHOULD I GET SCREENED FOR SLEEPING SICKNESS? A QUALITATIVE STUDY IN KASAI PROVINCE, DEMOCRATIC REPUBLIC OF CONGO
Mpanya A, Hendrickx D, Mitashi P, Lumbala C, Vuna M , Kande V, Boelaert M, Lefèvre P, Lutumba P.

3.48 ACRIDINE ORANGE FLUORESCENCE ENHANCED WHITE BLOOD CELL COUNTING IN CEREBROSPINAL FLUID
Veerle Lejon, Dieudonné Mumba Ngoyi, Victor Kande, Wim Van der Veken, Philippe Büscher

3.49 INTERNATIONAL COOPERATION IN THE FIGHT AGAINST AGAINST HUMAN AFRICAN TRYPANOSOMIASIS: A NEW APPROACH OF MÉDECINS SANS FRONTIÈRES WITH A MOBILE TEAM Lindner AK, Rooney BB, Braker K.

3.50 SLEEPING SICKNESS IN THE COASTAL AREA OF GABON: EPIDEMIOLOGICAL AND ENTOMOLOGICAL CHARACTERISTICS
KOHAGNE TONGUE L., GOUNOUE KAMKUMO R., MENGUE M'EYI P., LOUIS F.J.

IV ANIMAL AFRICAN TRYPANOSOMIASIS (AAT)

ORAL

CHEMOTHERAPY AND DRUG RESISTANCE

4.01 ASSESSMENT OF ANTI-TRYPANOSOMAL DRUG RESISTANCE IN CATTLE OF THE LADDUGA GRAZING RESERVE, KACHIA, NIGERIA
T. Randolph, O. Diall, P-H. Clausen, B. Diarra, M. Mamman, J.O. Kalejaiye, S.S. Shaida, A.O. Fajinmi, S.K. Samdi, B. Wayo, E. Okoh, B. Ramatu, A.U. Malala, Z. Bengaly[f] and H. Vitouley

4.02 ASSESSMENT OF TRYPANOCIDAL DRUG RESISTANCE ON THE ADAMAOUA PLATEAU IN CAMEROON USING A FIELD TEST AND A STANDARDISED TEST IN MICE.
Mamoudou, A., Zoli, A., Tanenbe, C, Andrikaye, J. P., Bourdanne, *Marcotty, T.,* Delespaux, V., Clausen, P.-H , Geerts, S.

4.03 BINDING OF THE TRYPANOCIDAL DRUGS DIMINAZENE ACETURATE, HOMIDIUM CHLORIDE AND ISOMETAMIDIUM CHLORIDE TO BOVINE ERYTHROCYTES
W. M .Karanja, G. A., Murilla and R. E. Mdachi

4.04 IMPROVED PCR-RFLP FOR THE DETECTION OF DIMINAZENE RESISTANCE IN *TRYPANOSOMA CONGOLENSE* UNDER FIELD CONDITIONS USING FILTER PAPERS FOR SAMPLE STORAGE
Hervé Sèna Vitouley, Erick Ouma Mungube, Emmanuel Allegye-Cudjoe, Oumar Diall, Zakaria Bocoum, Boucader Diarra, Thomas F. Randolph, Burkhard Bauer, Peter-Henning Clausen, Dirk Geysen, Issa Sidibe, Zakaria Bengaly, Peter Van den Bossche and Vincent Delespaux

4.05 SENSITIVITY AND VIRULENCE OF *TRYPANOSOMA EVANSI* ISOLATES FROM CAMELS IN MARSABIT COUNTY, KENYA
Mdachi, R.E., Murilla, G.A., Bateta, R. and Munga, L. K.

4.06 SITUATION OF TRYPANOCIDES IN MAURITANIA
Dia, M.L., Barry Yahya et Ould Babah, B

4.07 AN UPDATE OF THE SITUATION OF TRYPNOCIDAL DRUG RESISTANCE IN LIVESTOCK IN SUBSAHARAN AFRICA
Talaki E., Diall O., Sidibé I., Belem A.M.G., Pangui L.J.

4.08 VALIDATION OF SITE-SPECIFIC SPRAYING OF CATTLE FOR TRYPANOSOMOSIS CONTROL IN *GLOSSINA FUSCIPES FUSCIPES* INFESTED AREAS IN UGANDA
J.W. Magona, J. Walubengo, F. Kabi, J.T. Odimim, M. Ocaido

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4.09 COMPARATIVE PREVALENCE OF ANIMAL TRYPANOSOMOSIS IN TSETSE INFESTED AND TSETSE FREE PARTS OF ETHIOPIA.
Fikru, R., Aster T., Moti, Y. , Merga, B. , B. M. Goddeeris, and Philippe Büscher

4.10 GENETIC CHARACTERIZATION OF *TRYPANOSOMA BRUCEI* CIRCULATING IN DOMESTIC ANIMALS OF THE FONTEM SLEEPING SICKNESS FOCUS OF CAMEROON
Gustave Simo, Guy Roger Njitchouang, Flobert Njiokou, Gerard Cuny, Tazoacha Asonganyi

4.11 IMPACT OF DROUGHT AND DEGRADATION OF PROTECTED AREAS ON THE DISTRIBUTION OF BOVINE TRYPANOSOMOSES AND THEIR VECTORS IN THE OTI CATCHMENT BASIN OF NORTHERN TOGO
B. Dao, G. Hendrickx, I. Sidibé, A.M.G. Belem, S. De La Rocque

4.12 EVALUATION OF TRYPANOSOMOSIS CONTROL STRATEGIES USED BY CAMEL KEEPING COMMUNITIES IN MARSABIT AND ISIOLO COUNTIES
Mdachi, R.E., Wanjala, K. Munga, L. K., Changasi, R.E., Maichomo, M. and Murilla, G.A

4.13 MOLECULAR EPIDEMIOLOGY OF RE-EMERGING TRYPANOSOMOSIS IN CHOMA-KALOMO BLOCK OF THE SOUTHERNPROVINCE OF ZAMBIA
Bukowa K.M., Simukoko H., Sinyangwe L., and Namangala B.

4.14 SEASONAL STUDIES OF TSETSE AND TRYPANOSOMIASIS SITUATION AT NGORONGORO CONCERVATION AREA AND THE SURROUNDING VILLAGES
F. Mramba, G. Mbata, O. Managwa, A. Nyaki, A. Msangi and J. Muumba

4.15 STATUS OF TSETSE-TRANSMITTED TRYPANOSOMIASES IN LIVESTOCK AND MAN IN THE MANAFWA-RIVER-CRESCENT DISTRICTS IN SOUTH-EASTERN UGANDA
Okedi, L. M.., Magona, J., Alioni, V. S., Azabo, R., Mugyenyi, A., Echodu, R., and Aksoy S.

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4.16 EVALUATION OF ANTIBODY RESPONSE AGAINST *GLOSSINA* SALIVA IN CATTLE: A SUPPLEMENTARY / ALTERNATIVE APPROACH TO ASSESS EXPOSURE OF TSETSE BITES
Martin Bienvenu SOMDA, Zakaria BENGALY, Anne POINSIGNON, Sylvie CORNELIE, Françoise MATHIEU-DAUDE, Emilie Thérèse DAMA, Edith DEMETTRE-VERCEIL, Franck REMOUE, Antoine SANON and Bruno BUCHETON

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4.17 ASSESSMENT OF TRYPANOCIDAL DRUG RESISTANT *TRYPANOSOMA CONGOLENSE* ISOLATES IN SELECTED SITES OF WESTERN AMHARA REGIONAL STATE, ETHIOPIA
Hassen, K., Hagos, A., and Ephrem, E.

4.18 BASELINE SURVEY OF ANIMAL TRYPANOSOMOSIS IN THE REGION OF THE BOUCLE DU MOUHOUN, BURKINA FASO
A. Sow, R. Ganaba, P. Koné, Z. Bengaly, L. Percoma, M. Ouédraogo, V. Delespaux, G. J. Sawadogo, I. Sidibé

4.19 BOVINE TRYPANOSOMOSIS IN THE UPPER WEST REGION OF GHANA: ENTOMOLOGICAL, PARASITOLOGICAL AND SEROLOGICAL CROSS-SECTIONAL SURVEYS
Y. Adam, T. Marcotty, G. Cecchi, C.I. Mahama, P. Solano, Z. Bengaly, P. Van den Bossche

4.20 EPIDEMIOLOGY OF TRYPANOSOMOSES AROUND AN ISOLATED TSETSE POCKET IN SENEGAL AND POTENTIAL IMPACT OF THEIR ERADICATION.

J. Bouyer, M.T. Seck, Y. Ndiaye, B. Sall, Z. Bengaly, M. Vreysen

4.21 HALF A CENTURY OF TSETSE AND TRYPANOSOMOSIS CONTROL ON THE ADAMAOUA PLATEAU IN CAMEROON
Mamoudou, A.[1], Zoli, A.[1], Van den Bossche, P. [2], Delespaux, V.[2],Cuisance, D.[3], Geerts, S. [2]

4.22 IMPROVING CATTLE INDUSTRY THROUGH SURVEILLANCE AND CONTROL OF TRYPANOSOMIASIS IN KAURU AREA, KADUNA STATE, NIGERIA.
F.N.C. Enwezor, B. Bello , A. Kalgo and L.T. Zaria

4.23 PREVALENCE OF TRYPANOSOMA EVANSI AND CO INFECTIONS IN CAMELS IN MARSABIT AND ISIOLO COUNTIES OF KENYA
Munga, L.K., Mdachi, R.E., Changasi, R.E., Maichomo, M., Wanjala, K., and Murilla, GA

4.24 LOCATION-SPECIFIC TREATMENT REGIMENS FOR AFRICAN ANIMAL TRYPANOSOMOSIS
Pierre-Marie Borne*, Hamadi Karembe and Réza Bentaleb

4.25 PATHO - PHYSIOLOGICAL EFFECTS OF EXPERIMENTAL *TRYPANOSOMA CONGOLENSE* AND *TRYPANOSOMA VIVAX* INFECTIONS IN THE GRASSCUTTER (*THRYONOMYS SWINDERIANUS,* TEMMINCK)
Opara, M.N. and Fagbemi, B.O.

4.26 EVALUATION OF THE SEROPREVALENCE OF BOVINE TRYPANOSOMOSIS IN GUINEA
A. M. Barry, F. Roger, M. B. Diallo, S. Geers

4.27 SURVEY OF CATTLE TRYPANOSOMIASIS AT CERTAIN COMMUNITIES UNDER PASTORAL RESOLVE AREA, KADUNA STATE, NIGERIA.
F.N.C. Enwezor, and K. David.

4.28 SURVEY OF CHEMORESISTANCE OF TRYPANOSOMES IN N'DAMA CATTLE IN THE COTTON ZONE OF UPPER GUINEA (MANDIANA PREFECTURE IN GUINEA, CONAKRY)
A. M. Barry, S. Keita.

4.29 THE ROLE OF TSETSE FLY NATURAL INFECTIONS IN THE EPIDEMIOLOGY OF ANIMAL AFRICAN TRYPANOSOMOSIS (AAT) IN THE NEWLY FARMING AREAS OF SOUTHERN TANZANIA
Malele, I., H. Magwisha, H. Nyingilili, K. Mamiro, E. Rukambile, J. Daffa, H. Msami, E. Lyaruu, N. Lwitiko & E. Kiimbita

4.30 NO TITLE
Girma Zeleki

4.31 UPDATING OF CURRENT SITUATION OF CAMEL TRYPANOSOMIASIS IN SUDAN USING ADVANCED DIAGNOSTIC TECHNIQUES
Mubarak M. Abdelrahman and Intisar E. Elrayah

4.32 TSETSE/TRYPANOSOMOSIS CHALLENGES AND RURAL POVERTY IN AFRICA: IMPLICATIONS FOOD SECURITY AND MDG1
Oluwafemi, R.A

4.33 TRYPANOSOMIASIS CHALLENGE IN CATTLE ON PASTORAL TRANSHUMANCE DUE TO DROUGHT IN NORTH COAST, KENYA.
Mutyambai D.M., Akhusama E.E., Dzila H.B., Karuga J.M. and Kabochi S.K.

4.34 ASSESSMENT OF THE TRYPANOSOME SPECIES DIVERSITY IN CATTLE AND TSETSE POPULATION DENSITY IN PATE ISLAND OF LAMU DISTRICT
Gamba[1] D. O., Olet, P. A., Limo, S., Cheruyoit , M. K.,

4.35 A NOTE ON TSETSE DISTRIBUTION IN FOUR STATES OF SOUTH SUDAN

Ochi, E. B. , Hassan,M. A., Lukaw ,Y. S., Mohammed, I. A and Rahman .A.H

V GLOSSINA Biology, CONTROL AND ERADICATION

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PAN AFRICAN TSETSE AND TRYPANOSOMIASIS ERADICATION CAMPAIGN (PATTEC)

1.01

PRESENTATION ON THE ADVOCACY AND AWARENESS CAMPAIGN PROJECT ON AFRICAN TRYPANOSOMIASIS

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A special project for strengthening the awareness and sensitization campaign and increasing advocacy for the PATTEC Initiative was launched in January 2008 in cooperation with The Foundation for the Innovation of New Diagnostics (FIND). Under this special project 11 African Union member States including Angola, Central African Republic (CAR), Cote d'Ivoire, Guinea, Gabon, Kenya, Malawi, Nigeria, Tanzania and Uganda had signed Memorandum of Understanding (MOU) with AU_PATTEC to implement a 4-year Strategic Plan for the implementation of the advocacy activity on African Trypanosomiasis. In the course of the last 3 years these countries in general terms achieve various mile stones including policy review of on African Trypanosomiasis. The possibility of mobilizing more resources for the programme and building capacities in the area of improved diagnostics and surveillance of AT were widely addressed under the project. A Dynamic data base was also established to strengthen networking among the participating countries.

The paper will examine the achievements and the various challenges faced in the implementing countries.

1.02

CREATION OF SUSTAINABLE TSETSE FREE AREAS IN THE NORTH-WEST AND NORTH-EAST GEOPOLITICAL ZONES OF NIGERIA THROUGH THE PAN AFRICAN TSETSE AND TRYPANOSOMIASIS ERADICATION CAMPAIGN (PATTEC) INITIATIVE.

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Tsetse and trypanosomiasis problems in Nigeria are still widely distributed in all the states of the federation and the Federal Capital Territory (FCT). The disease has had protracted effects on humans and livestock production systems, with an overall negative impact on the Nigerian economy, thus, making control imperative. Several control efforts by the Nigerian Government over the past 5 decades to combat both the vector and disease had limited success. Notably, an area of 1,500km^2 reclaimed through the Biological Control of Tsetse (BICOT) in the Lafia Agricultural Development Project (LADP) in Central Nigeria using integrated methods with a component of the Sterile Insect Technique (SIT) has since been re-infested. These limitations in tsetse control efforts by individual affected countries led to a rethink of a more pragmatic control strategy to be adopted and thus the establishment of the Pan African Tsetse Trypanosomiasis Eradication Campaign (PATTEC) initiative in 2001. In Nigeria, PATTEC activities began in 2003 with the identification of the lead Ministry, focal person and major stakeholders. The PATTEC-Nigeria Management Committees (3No) were constituted and inaugurated. Meetings of these Committees have been regular to review progress being made. The establishment and furnishing of a Project Coordination and Management Unit (PCMU) and secondment of complement staff were further achievements of the PATTEC-Nigeria project. Its activities are being carried out on the basis of the 6 geo-political zones in a North-south carpet roll-up fashion, starting in two projects in the North-west and North-east zones. The project plan of action and proposals for the two projects have

been produced. Delineation of the two project areas and baseline data generation has commenced. Stock colonies of *Glossina tachinoides, G. palpalis palpalis* and *G. morsitans submorsitans* are being established through field collection and importation of seed materials. The performance of these colonies is rated as average, despite the intermittent electricity failures resulting into wide rage fluctuations in climatic conditions (temperature and relative humidity) and their attendant effects on survival and reproductive performance of the flies. Until the eruption of post election crises in Kaduna in April, 2011, mortalities in the 3 colonies were maintain below the 2% level, while fecundity ranges from 0.5 to 0.6. Colony sizes as at 25th may, 2011 stand at 2624, 874 and 521 for *G. m. submorsitans, G. tachinoides* and *G. p. palpalis*, respectively. Results of recent work sponsored by WHO/NITR/FMOH/PATTEC-Nigeria in Delta State in 2010 revealed an overall HAT prevalence rate of 0.3% in the 10 communities screened, while vector survey showed presence of *G.p.palpalis* with apparent densities of 3.01, 2.81, 5.01 and 2.55 flies/trap/day at Ejiopor, Umuebu, Ugbebe and Akpan human settlements respectively. Similarly, survey carried out in Jigawa state, an area far remote from tsetse distribution, revealed a prevalence of 1.83 due to *T. vivax* and *T. congolense*. PATTEC-Nigeria has embarked on aggressive fund sourcing from Government agencies and parastatals to support the implementation of various aspects of PATTEC in Nigeria. PATTEC-Nigeria played key role in the development of proposals for the North-west and North-east of Nigeria regional projects which have since been submitted to the AU-PATTEC for consideration and co-funding by the African Development Bank. The Federal Ministry of Science and Technology on behalf of PATTEC-Nigeria, signed a Memorandum of Understanding (MOU) with African Union PATTEC and FIND on Advocacy for African Trypanosomiasis in Nigeria.

1.03

IMPLEMENTATION AND ACHIEVEMENTS OF PATTEC ADVOCACY ACTIVITIES IN TANZANIA, JANUARY- DECEMBER, 2010

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Tanzania is a member country of Pan African Tsetse and Trypanosomiasis Eradication Campaign (PATTEC) under the African Heads of States decision. AGH/Dec.156 (XXXIV). In 2009 eleven countries in Africa including Tanzania joined to implement PATTEC- Strategic Plan for Advocacy with support from Foundation for Innovative New Diagnostic (FIND). In Tanzania, advocacy campaign implementation started 2010 with the broad aim to addressing the issue of sustainability and ownership of tsetse and trypanosomiasis control programmes. During the implementation period, Tanzania conducted awareness campaigns on Human African Trypanosomiasis (HAT) through medical personnel and community training, stakeholder workshop and mass media.

This paper presents the achievement in the advocacy campaigns that include increased number of individuals in HAT endemic areas seeking medical attention, increased community awareness and participation in HAT control activities, as well as decreased HAT cases from 55 cases in 2008 to 3 cases in 2010, as a result of deployment of insecticides impregnated targets to reduce man-fly contacts. The impact of HAT perceived at all levels of health systems resulted into inclusion of HAT control in the Comprehensive Council Health Plans (CCHP) in endemic districts, integration of HAT in the malaria, HIV/AIDS and TB surveillance systems. Furthermore, linkage has been established for key stakeholders including research institutions and a plan to include HAT in health training curricula for sustainable capacity building is underway. The gained achievement is crucial for HAT elimination campaign

and need to be sustained to support PATTEC initiatives towards a continent free of trypanosomiasis.

COUNTRY REPORTS

2.01

TSETSE AND TRYPANOSOMOSIS CONTROL ACTIVITIES IN TANZANIA 2009 - 2011

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Livestock industry in Tanzania is being facing many problems among them being the presence of vector-borne diseases. Tsetse transmitted Trypanosomosis remain one among the major constraints to Sustainable Agriculture and Rural Development. About 4 million people and 7million cattle are under the threat of infection. Currently surveys have indicated that all the seven species recorded earlier; exist in Tanzania, being unevenly distributed due to markedly different ecological and physical features.

Human African Trypanosomosis (HAT) is endemic in 7 regions. From 2009 to 2011, only 4 districts reported 6 HAT cases. Animal African Trypanosomosis (AAT) reported cases does not give the actual magnitude of the problem due to variable district numbers reporting each year from 21 tsetse infested regions. There were 49,565 cattle at risk in 11 regions with 15 districts reporting 489 cases and 25 deaths from 28 foci in 2009**.** In 2010 reporting districts were 13 from 8 regions with 511 cases and 37 deaths from 26 foci; whereas, 1 districts from 1 region reported 2 cases and 12deaths from 1 focus in 2009**.** The Network for mapping of African Trypanosomiasis Tanzania (NetMATT) established in 2009 in year one work plan has gathered HAT records from 7 regions, carried inventory on capacity of treatment and diagnostic of 15 centres in 6 regions and tsetse distribution mapping in 3 regions. Other activities include capacity building for medical personnel and agro-pastoral communities in HAT AND AAT affected areas.

During the period of 2009 to 2011 ongoing research focused on the bio-ecology and population dynamics of various *Glossina spp in* the Game-livestock- human settlement interface areas; trypanosomosis prevalence, mass

rearing of *G. swynnertoni* and feasibility of using the Sterile Insect Technique (SIT) for eradication.

2.02

REPORT ON HAT, 2009-2010

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Human African trypanosomiasis (HAT), commonly called sleeping sickness, has been known in Chad since 1900. It is endemic in four known historical foci, namely: Mandoul (Bodo and Beboto), Moissala, Gore, and Tapol, with a population of 150,000 at risk. In terms of health zoning, these foci are covered by three (3) health offices: Eastern Logone, Mandoul and Western Logone.

The control of this disease often experiences interruptions for periods which are more or less long, due to lack of financial, material and human resources. Considering these difficulties, PNLTHA (National HAT Control Programme) activities are focussed on the following:

- Advocacy for strengthening the program operational capacity
- Passive and active screening of cases
- Management of cases
- Control of old cases of trypanosomosis (*AT*)
- Supervision of activities

So, the years 2009 - 2010 were characterised by significant interventions supported by the Ministry of Public Health and partners (WHO, OCEAC and MSF-F), who enabled examination of 60,798 people within 2 years, among whom 427 new cases were detected and treated in the active foci of Mandoul and Moissala.

This report presents the results obtained by PNLTHA in 2009 - 2010 in HAT control in Chad.

2.03

COUNTRY REPORT ON SITUATION ANALYSIS OF TSETSE AND TRYPANOSOMIASIS

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Tsetse field surveys in Western, Eastern and Central Equatoria States revealed *Glossina fuscipes fuscipes* in Yambio and Kajokeji Counties. *G.morsitans submorsitans* identified in Magwi County of EES. Mean population density of tsetse flies/trap/day estimated at 13 .Bovine trypanosomiasis poses a menace to sustainable development of livestock in all ten States of South Sudan. Moreover, the prevalence of HAT in WES is usually elevated. Community mobilization and sensitization advocated and capacity building strengthened skills of the vulnerable communities as platform for control strategy.

Situation of Tsetse and Trypanosomiasis in South Sudan needs immediate interventions. All stakeholders and partners are urged to support such initiatives.

2.04

SPATIAL DYNAMIC OF TSETSE FLIES IN BURKINA FASO (1949-2009): IMPACT OF GLOBAL CHANGE

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Abstract The northern distribution limit of tsetse flies was updated in Burkina Faso and compared to previous limits to revise the existing map of these vectors of African trypanosomiases dating from several decades ago. From 1949 to 2009, a 25- to 150-km shift has appeared toward the south. Tsetse are now discontinuously distributed in Burkina Faso with a western and an eastern tsetse belt. This range shift can be explained by a combination of decreased rainfall and increased human density. Within a context of international control, this study provides a better understanding of the factors influencing the distribution of tsetse flies.

Keywords: Tsetse, distribution, population growth, climate change, Burkina Faso

2.05

STRATEGIES TOWARDS THE ERADICATION OF TSETSE IN ZIMBABWE: 2009-2011

W. Shereni

Tsetse control in Zimbabwe during the period 2009-2011 were focused on preventing tsetse reinvasion and extensive entomological surveys to determine the distribution limits of tsetse. The tsetse holding line or barrier of targets consisting of 32000 targets was maintained while tsetse surveys supported by IAEA were initiated in north western Zimbabwe. Cattle within and to the adjacent to the tsetse belt were kept on curative drugs as a temporary measure prior to the implementation of tsetse control intervention. Togather with regional neighbours, a strategy has been formulated to implement cross border joint tsetse operations towards total eradication from the 350,000 km^2 area of the common tsetse belt.

Through support from the IAEA, Zimbabwe initiated entomological baseline data collection in the Matusadona National Park and its surrounding areas. The strategy in this area is to use an integrated approach involving tsetse suppression using targets and final eradication using sterile insect technique. Tsetse baseline data surveys were commenced in September 2010 in Matusadona Project Area at a trap density of one trap per 4 km^2. A total of 1,490 trap sites were marked for deployment in the entire project area. Data collection was by means of odour-baited epsilon traps deployed in the marked sites. By end of April 2011, a total of 1,150 (77%) trap sites were used for the collection of baseline data. Results to date indicate a total area of approximately 6,500 km^2 infested with both G. morsitans morsitans and G. pallidipes austeni. The mean relative densities for G. pallidipes austeni at the edge of the tsetse belt and within the Parks Area were 0.85 and 2.9 (catch/trap/day) while low levels of G. morsitans morsitans were recorded (0.12) towards the Parks.

2.06

A SUMMARY REPORT OF THE SOUTHERN TSETSE ERADICATION PROJECT (STEP)

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Introduction

Tsetse flies have infested about 240,000km2 (21.7%) of the landmass of Ethiopia located in the southwest, west and north western part of the country. Five species of tsetse flies: *G.pallidpes, G.Ascipes, G.morsitans submorsitans, G.tachinoides* and *G.Longipennis,* occur in Ethiopia. The infested part of the country is fertile and suitable for livestock and crop production but was not properly utilised because of tsetse and trypanosomosis problem. Only animal trypanosomosis exist in Ethiopia and about 14.8 million cattle, 6.1 million sheep and goats, 1 million camels, 1.2 million equines are at risk. The disease seriously affects oxen which could be used for draught power to cultivate land for crop production and contribute to the growing concern for food security in Ethiopia. It is a major constraint to livestock and agricultural Development and consequently human health due to malnutrition. It causes about 720 million ETB annual economic losses. The most important species of tsetse transmitted trypanosomes affecting livestock in Ethiopia are *Trypanosoma vivax, T. brucei, T. congolense.* The Southern Tsetse Eradication Project (STEP) was established and implemented since 1997/98 to eradicate tsetse flies and create sustainable tsetse free areas in 25000km^2 area of the Southern Rift Valley of Ethiopia, which is about 10.4% of the infested areas of the country. So far, the project has made remarkable efforts to achieve its objectives.

The project Area

The total project area is estimated to 25,000 **km**^{2} located in the Southern Rift Valley of Ethiopia. The area lies between latitudes 4° 45' and 7° 15" N and longitudes 36° 40'and 1

2.07

SUMMARY REPORT ON TSETSE AND TRYPANOSOMIASIS RESEARCH AND CONTROL IN MALI

Mali covers an area of 1,240,000 sq.km, with a human population of 14,517,176 inhabitants.

Animal farming is the main source of income for 30% of this population, and contributes about 10% to the GDP of Mali. It is practised by at least 80% of the rural world.

Animal species raised in Mali are mainly: cattle: 9,160,000; sheep: 11,865,000; goats: 16,500,000; horses: 487,000; donkeys: 880,000; camels: 922,000; pigs: 75;000; and poultry: 37,000,000. (Source: National Animal Productions and Industries, 2010).

One major constraint to livestock development is the presence of tsetse flies that infest an area of about **240,000 sq.km**. Sikasso, Kayes, Koulikoro and Segou areas are infested at 100%, 76%, 60%, and 44% respectively.

Species of trypanosomes found in cattle in glossina-infested areas in Mali are: *Trypanosoma congolense*, *T. vivax* and *T. brucei brucei*. *T. evansi* species is found in camels.

In Mali, some 2.7 million cattle and 2.5 million people are at risk.

To fight animal trypanosomiasis, the strategy used is integrated control, combining the use of non polluting insecticide-impregnated traps, and releases of sterile males. Other actions include the detection and treatment of sick animals.

The various actions undertaken to date are: the laying of traps and screens, treatment of sick animals, and testing in humans.

The sale of trypanocidal drugs accounts for over 50% of the turnover of veterinary pharmacies in Mali.

The status of *T. brucei gambiense* human trypanosomiasis is not well known, because no systematic investigations are conducted due to lack of funding.

One project in the control of tsetse flies and trypanosomiasis, developed under PATTEC Initiative, ***Creating Sustainable Tsetse and Trypanosomiasis Free Areas in Eastern and West Africa***, is being implemented with financial support from the African Development Fund (ADF), and covers 37,000 sq.km.

As part of this project implementation, tsetse populations were reduced by 97, 03% in an area covering 18,000 sq.km in the northern basin of the Niger River, following the setting up of deltamethrin-impregnated single conical Vavoua traps, and the active participation of beneficiary communities. Trypanosomiasis prevalence has also declined drastically in cattle in this area.

Given the extent of the damage caused by the tsetse fly and animal trypanosomosis, the National Tsetse and Animal Trypanosomosis Control Project was set up in Mali, with the responsibility of planning, coordinating and monitoring all tsetse and trypanosomiasis control activities throughout the territory.

Control activities are supported by research programmes at the Central Laboratory of Bamako.

HUMAN AFRICAN TRYPANOSOMIASIS (HAT)

ORAL PRESENTATIONS

EPIDEMIOLOGY

3.01

HEALTH CARE SEEKING BEHAVIOUR AND DIAGNOSTIC DELAYS FOR HUMAN AFRICAN TRYPANOSOMIASIS IN THE DEMOCRATIC REPUBLIC OF THE CONGO.

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About half of the Human African Trypanosomiasis (HAT) patients reported in the Democratic Republic of the Congo (DRC) are currently detected by fixed health facilities and not by mobile teams. Given the recent policy to integrate HAT control into general health services, we studied health seeking behaviour in these spontaneously presenting patients.

We took a random sample from all patients diagnosed with a first-time HAT episode through passive case finding between October 1st 2008 and September 30th, 2009 in the two most endemic provinces of the DRC. Patients were approached at their homes for a structured interview. We documented patient delay (i.e. time between onset of symptoms and contacting a health centre) and health system delay (i.e. time between first contact and correct diagnosis of HAT)

Median patient delay observed was 4 months (IQR 1-10 months, *n=66*); median health system delay was 3 months (IQR 0.5-11 months). Those first presenting to public health centers had a median systems delay of 7 months

(IQR 2-14 months, *n=23*). The median patient was diagnosed upon the 4th visit to a health facility (IQR 3rd -7th visit).

Substantial patient as well as health system delays are incurred in HAT cases detected passively. Public health centers are performing poorly in the diagnostic work-up for HAT, mainly because HAT is a relatively rare disease with few and aspecific early symptoms. Integration of HAT diagnosis and treatment into general health services requires strong technical support and well organized supervision and referral mechanisms.

3.02

T. B. GAMBIENSE HUMAN AFRICAN TRYPANOSOMIASIS PROGRAMS: DIFFERENT CONTEXTS, EPIDEMIOLOGY, WAYS OF THINKING AND MANY CHALLENGES AHEAD BEFORE ELIMINATION

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MSF is currently diagnosing and treating patients in CAR, Uganda and South Sudan. Each of these countries presents particular and common challenges, which this abstract will underline so as to challenge current elimination optimism.

CAR, unstable context with difficult access to the HAT patients. In 2010 outreach activities allowed to identify new focus with prevalence over 3%. Globally 71% of the patients detected over the years in MSF program are coming from outreach activities, so when security restricts movement it does not allow patients to reach diagnostic, treatment and control.
The development of innovative strategies of intervention for unstable contexts, simplification of diagnostic tools and treatment regimen remain a major challenge.

Uganda, West Nile region, stable context with low HAT prevalence. National HAT program faces weakness to maintain sustainable surveillance system, implementation of diagnostic, best treatment options, experienced human resources and supply chain.

South Sudan, Western Equatorian province. The Prevalence drastically reduced over the past decade. However, population movement from high HAT prevalence areas to low prevalence areas in South Sudan could rapidly change

the trend. Sustainable funding mechanisms and strengthening the surveillance system are crucial to maintain the disease under control.

Conclusion: We continue to be concerned that history can repeat itself. As the numbers currently reported by the countries reduces, it is of real importance that the funding of programs as well as research activities for new diagnostic and treatments do not follow the same trend.

3.03

CHALLENGES OF CONTROLLING *T. B. GAMBIENSE* HUMAN AFRICAN TRYPANOSOMIASIS IN A REMOTE AND UNSTABLE AREA OF THE DEMOCRATIC REPUBLIC OF CONGO

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Globally, the number of reported cases of *T. b. gambiense* human African trypanosomiasis has sharply decreased during the last 10 years, thanks to increased disease control efforts. This undeniable success should not hide the remaining difficulties to detect and treat patients, and to control the disease in some remote and unstable areas. A retrospective analysis covering 4 years activities of a HAT control program run by MSF in the Haut- and Bas-Uélé regions of DRC is presented. Between July 2007 and December 2010, more than 81'000 people were screened and 2340 HAT patients treated, including 58% in first stage illness. HAT prevalence was above 3% in many « aires de santé ». The introduction of NECT for treatment of second stage HAT in December 2009 allowed for simplification of patients' management and the drug combination was found to be safe and efficacious. Control activities, in particular mobile teams, were severely disturbed by the rampant insecurity, forcing the MSF team to be evacuated twice. The majority of « aires de santé » have been covered only once by screening activities and numerous villages are yet to be visited by the mobile team. In addition, the complexity of HAT diagnosis and treatment and the precarity of health structures prevent any attempt to reintegrate HAT activities in this region.

3.04

THE CONTRIBUTION OF HEALTH CENTERS, RURAL AND URBAN-RURAL GENERAL HOSPITALS AND NATIONAL HAT CONTROL PROGRAMME (PNLTHA) REFERRAL CENTRES TO THE DIAGNOSIS OF HUMAN AFRICAN TRYPANOSOMIASIS IN THE DEMOCRATIC REPUBLIC OF CONGO: THE CASE OF BANDUNDU PROVINCE.

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Human African trypanosomiasis or sleeping sickness remains a major public health issue in the Democratic Republic of Congo in general and in Bandundu Province in particular.

Bandundu province is the most affected by human African trypanosomiasis in the Democratic Republic of Congo. In 2009, 7181 new cases were identified in DRC, with 4457 or 62% reported by Bandundu Province alone. Among the 4457 cases identified, more than 50% are found in health centers, rural general hospitals and PNLTHA referral centres.

Our presentation aims to show the contribution of passive case detection, carried out by health centers and general hospitals in health zones (or health districts) and by PNLTHA referral centers, to the diagnosis of HAT from 2006-2010, with emphasis on efforts to integrate activities undertaken by PNLTHA in the control of human African trypanosomiasis, after strengthening the capacity of health providers in these facilities for various reasons, such as active case detection by mobile teams which does not cover all endemic villages in the province. This integration of activities is consistent with the new national policy of the Ministry of Health of DRC, which focusses on strengthening the health system. Emphasis will be on the

problems and difficulties encountered in identifying prospects for the coming years in order to sustain activities in these health facilities. These also contribute to the goal of eliminating sleeping sickness, advocated by the World Health Organisation.

3.05

ESTABLISHING POSTS FOR REACTIVE SURVEILLANCE OF SLEEPING SICKNESS

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Over the past ten years, considerable progress has been made in the control of human African trypanosomiasis. However, the level of sleeping sickness endemicity in endemic countries is not uniform. In a number of countries, no case has been noted for the past ten years, while other countries have reported an annual number of cases below 100, and others have indicated the presence of foci of higher activity, reporting a number of new cases over 500 and for some over 1000.

In highly endemic countries, the best control approach is unquestionably the systematic screening of populations at risk by mobile teams. However, when the number of patients decreases significantly, it seems clear that maintaining a large number of specialized staff and heavy logistics is no longer appropriate. However, giving up the surveillance of the disease would inevitably lead, as in the past, to new outbreaks. Therefore, it seems necessary now **to establish a simple and integrated system** within health services to ensure sustainable effective surveillance and maintenance of an adequate response capacity**.**

The proposed approach is to establish a **warning system** by way of **surveillance posts** based in referral hospitals in areas historically known as transmission areas, to help identify cases of sleeping sickness through **clinical suspicion** and **serological testing**.

While sentinel posts establish serological suspicion, this will be certified or not by deeper serological methods and by molecular biology, conducted at a **WHO collaborating centre**. If such suspicion is certified, the country health system, with support from WHO, will be responsible for **parasitological confirmation**. Once this confirmation is made, the patient will be treated, and a **reactive screening** will be performed in his home village in order to **stop the transmission** of the disease in the area. If the suspicion is not confirmed, the suspect will be **monitored clinically** and through serology.

3.06

UP-TO-DATE, EVIDENCE-BASED ESTIMATES OF SLEEPING SICKNESS RISK: A METHODOLOGY BASED ON GEOGRAPHIC INFORMATION SYSTEMS

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Estimates of people at risk of human African trypanosomiasis (HAT) at the continental level were last provided by an Expert Committee of the World Health Organization (WHO) held in 1995. At that time, quantitative information on the geographic distribution of HAT was scanty and lacking in detail, so much so that risk estimates were largely based on educated guess. Comprehensive, recent and spatially-explicit information on the reported occurrence of sleeping sickness is now being assembled in the framework of a WHO-led initiative: the Atlas of HAT. Geospatial analysis techniques based on Geographic Information Systems (GIS) now enable the Atlas' epidemiological data to be combined with human population layers to estimate population at risk, and to map its distribution. As a proof of concept, six countries endemic for *Trypanosoma brucei gambiense* were studied (i.e. Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea and Gabon). The distributions of HAT cases and human population for the period 2000-2009 were used to construct a kernel-smoothed relative risk function. Six risk categories were defined and mapped, ranging from 'very high' (> 1 case per 10^2 people per annum) to 'marginal' (< 1 case per 10^6 people per annum). Excluding the category 'marginal', approximately 3.4 million people in the study area are estimated to be at some level of HAT risk. Although adaptations for *T. b. rhodesiense* may be necessary, the nature of the input data makes the methodology suitable for application at the continental level.

3.07

THE ATLAS OF HUMAN AFRICAN TRYPANOSOMIASIS: PROGRESS STATUS AND PROSPECTS

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The Atlas of human African trypanosomiasis (HAT) was launched in 2008 by the World Health Organization (WHO), and it is jointly implemented with the Food and Agriculture Organization of the United Nations (FAO) in the framework of the Programme Against African Trypanosomosis (PAAT). The primary goal of the initiative is to develop a tool based on Geographic Information Systems (GIS) to assist efforts for disease control and elimination in endemic countries. To this end, all HAT cases and active screening activities reported from sub-Saharan Africa since 2000 are being geo-referenced at the village-level. Input data are provided by the full range of stakeholders involved in HAT control and research. Data processing has been completed for 23 out of the 25 countries having reported on the sleeping sickness status in the period 2000-2009. For the Democratic Republic of the Congo (DRC), data processing is still ongoing, but preliminary maps already include over three quarters of the cases reported in the study period (i.e. over 77,000 cases). Present efforts are focused on finalizing the maps for DRC and Angola, so as to complete the continental picture. At the same time, an increasingly high priority is being attached to the transfer of technology to National Sleeping Sickness Control Programmes (NSSCPs). Empowerment of NSSCPs will be pursued through training and the provision of hardware and software, thus enabling an optimal utilization of the tool whilst ensuring future refinements and updates of the Atlas.

3.08

POPULATION GENETICS STRUCTURE OF *TRYPANOSOMA BRUCEI* IN UGANDA*:* IT'S IMPLICATION ON THE EPIDEMIOLOGY OF SLEEPING SICKNESS

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Human African Trypanosomiasis has remained a major public health problem in Uganda characterized by recurrence sporadic outbreaks and continued spread to new unaffected areas. In order to gain insight into the dynamics of sleeping sickness epidemics and the role of reservoir hosts; we evaluated changes in gene frequencies at 6 microsatellite loci of *Trypanosoma brucei rhodesiense* isolates collected between 1990 to 2009. A total of 98 *T. b. rhodesiense* isolates were compared, 42 from old foci areas and 56 from new foci areas. We also compared the structure of 32 *T. b. brucei* isolates collected from cattle and pigs. Bayesian clustering analysis of *T. b. rhodesiense* using microsatellite markers indicate three distinct populations that are stable over time. *T. b. rhodesiense* were found in cattle confirming cattle as reservoir of sleeping sickness. The population genetic structure of *T. b. brucei* in cattle and pigs are distinct from the human infective *T. b. rhodesiense* and structured into two with pigs having one unique population that is different from cattle. Nevertheless, additional studies are required to better estimate the extend of diversity of the parasites isolates in pigs and cattle plus the long-term stability of these clones.

3.09

EPIDEMIOLOGIC CARE AND TRANSFUSIONAL SECURITY FACE TO HAT IN RDC

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In 2007, a commun reseach has been done in the Eastern Kasai province (a highly endemic human trypanosomiasis area of the time) by the PNLTHA and the CNTS who worked in collaboration with CTB. The work came to the conclusion that HAT were present in the population of blood givers. Therefore, the Card Agglutination Test for Trypanosomiasis (CATT) had been recommended and accepted to decide on the biological qualification of blood transfusion in endemic areas concerned with HAT.

During 2010, nine cases of HAT with probable way of transmission the blood transfusion have been pictured in urbain areas especially in Kinshasa 6, Bandundu town 2 and Kananga 1. It has been established that a familial giver in Kinshasa exchanged blood with two of his children besides a child of his neigbour before being caught by PNLTHA as a trypanosomiasis victim.The CATT for the receivers gave a positive result and certainly, HAT was confirmed for each. Then, PNLTHA took charge of tratment for the four new cases of HAT. Because migration movement among people, the CATT should be generalised in RDC.

PNLTHA*, CNTS**, CTB***

***Key words**: CATT, sécurité transfusionnelle, Trypanosomiase humaine africaine (THA)*

Abréviations:
CATT: Card Agglutination Test for Trypanosomiasis; PNLTHA : Programme national de lutte contre la Trypanosomiase Humaine Africaine ; CNTS: Centre national de transfusion sanguine ; CTB: Coopération technique belge ; RDC: République démocratique du Congo

3.10

NEW EVIDENCES FOR THE EXISTENCE OF HUMAN TRYPANOTOLERANCE: PERSPECTIVE FOR A BETTER UNDERSTANDING OF THE HOST-PARASITE INTERACTION AND FOR IMPROVED CONTROL STRATEGIES.

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Since first identified, human African trypanosomiasis (HAT) or sleeping sickness has long been described as invariably fatal. Increasing data however argue that infection by *Trypanosoma brucei gambiense* (*Tbg*), the causative agent of HAT, results in a wide range of outcomes in its human host and importantly that a number of subjects in endemic areas are apparently able to control infection to low levels, undetectable by most sensitive parasitological tests used in the field. We report here on results obtained during the long term follow-up of cohorts of parasitologically unconfirmed seropositive subjects from Côte d'Ivoire and Guinea. Main findings were that individuals positive to the highly specific Trypanolysis test for *Tbg* are able to maintain high antibody responses over some time very long period (>10 years) without developing the disease and that parasite DNA found in such subjects harbor the same microsatellite genotypes as those found in patients. This thus provide further evidences that trypanotolerance exists in humans as has already been described in cattle or in the rodent experimental models of infection. The consequences/impacts on HAT epidemiology will also be discussed in the regard of implementing sustainable HAT control strategies.

3.11

VACCINE PROTECTION ABOLISHED BY HUMAN AFRICAN TRYPANOSOMIASIS?

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Most of our understanding of the immunopathology of trypanosomiasis stems from studies on mouse models. It has been described that in mice, infection with *Trypanosoma brucei* results in loss of memory B-cells in the spleen (Radwanska et al. 2008). As a consequence, mice permanently lose their protection against certain pathogens, built up by vaccination prior to trypanosome infection. If this phenomenon also occurs in patients suffering from human African trypanosomiasis (HAT), this might have an impact on vaccination programs since revaccination of HAT patients after anti-trypanosomal therapy would be required. We examined the effect of HAT on memory B-cells, memory T-cells and acquired immunity. The number of memory B cells and memory T-cells circulating in peripheral blood was quantified in 117 HAT patients before treatment and in paired controls. As a model for acquired immunity and vaccine induced protection, antibody levels against measles were determined. Our data suggest a significantly higher total number of memory B-cells in the blood of HAT patients compared to controls. Total numbers of memory T-cells do not differ. Although measles antibody levels are lower in HAT patients than in controls, concentrations are still sufficient to protect against infection. In conclusion, our data do not seem to support abolishment of vaccine protection in HAT, as observed in experimental infections in mice.

3.12

IMMUNOLOGICAL DETERMINANT UNDERLYING THE CONTROL OF INFECTION IN HUMANS INFECTED BY *TRYPANOSOMA BRUCEI GAMBIENSE*

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In West Africa HAT is caused by *Trypanosoma brucei gambiense*. As for many infectious diseases it is now clear that a wide range of outcome may result from the infection by trypanosomes. The disease is characterised by an early haemolymphatic phase (stage 1) followed by a meningoencephalitic phase (stage 2) leading to neurological disorders and death if left untreated. However, in *T.b. gambiense* endemic area a high proportion of individuals displaying CATT positive serological results are negative to direct parasitological investigations. Increasing evidence now indicate that at least part of these subjects are infected but harbour parasitaemia levels that are below the detection limit of the parasitological tests, suggesting that they are able to control infection. The nature of the immune response in these individuals has yet received poor attention. In this communication we report on the quantification of the cytokine levels (IL-12, IL-2, IL-4, IL-5, TNF-α, INF-γ, IL-8, IL-1, IL-6, IL-10) measured in healthy endemic controls, stage 1 and stage 2 patients and on a cohort of seropositive subjects that were followed up in time to assess the evolution of their parasitological status. Whereas HAT patients were characterized by elevated levels of IL-1 and IL-10, seropositive

subjects exhibited high levels of IL-6, IL-8 and TNF-□ and low levels of IL-1b, IL-12 and IL-10. Interestingly high levels of IL-10 and low level of INF-γ in seropositive subjects were associated with an increased risk of developing HAT. This study thus provides the first immunological basis underlying trypanotolerance in humans.

3.13

ANALYSIS OF FACTORS LEADING TO RELAPSES IN A COHORT STUDY CONDUCTED IN ANGOLA FROM 2008 TO 2011.

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Mechanisms of relapses in human African trypanosomiasis (HAT) are not well characterized, but seem to be linked to many different factors. We have followed a cohort of HAT patients from 2008 to 2011, some of whom were included in a study on diagnostic markers (FIND/CD19). Only patients with confirmed presence of trypanosomes in blood, lymph or cerebrospinal fluid (CSF), and who gave signed informed consent were included. They were followed passively and actively for a period of 2 years at 6, 12, 18 and 24 month post-treatment. At each follow-up, clinical and neurological investigations were carried out, together with microscopic examination for trypanosomes, total white cell count and presence of B cells (CD19 positive cells) in CSF.

A total of 255 patients were included and up to 70 % of them followed up. Follow-up will be completed in 2012 for the patients included latest. The cohort includes 138 stage 2 patients (cell count $\geq 20/mm^3$ of CSF), 73 stage 1 patients (cell count $\leq 5/mm^3$ of CSF) and 44 intermediate stage patients (cell count between $6 – 19/mm^3$ of CSF). Twelve relapses were observed (5 in stage 2 patients; 4 in intermediate stage patients; 3 in stage 1 patients). The proportion of intermediate stage patients who relapsed is considered to be significantly high. We have carried out a preliminary analysis of the data, and propose a number of factors that could be associated with relapses and/or false increase of CSF cells, such as age, co-infections, clinical state at inclusion, and inflammatory state of CSF.

3.14

TRYPANOSOMA BRUCEI "BIOPHOTONICA"

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Biophotonic imaging (BI) of experimental African trypanosomiasis (EAT), is based on the detection of light, throughout the whole body of an infected mouse, which is emitted by trypanosomes that are genetically manipulated to express luminescent and/or fluorescent proteins. Pleomorphic bloodstream form *Trypanosoma brucei (T.b.) brucei* cells were transfected with 4 red, far-red or near-infrared fluorescent genes and 2 red luminescent genes. The highest expressing populations were selected and tested for fluorescent and/or luminescent activity *in vitro* and *ex vivo*. The human codon optimised, thermo stable, red luciferase PpyRE9 was identified as the most promising luciferase gene to transfect also *T.b. gambiense, T.b. rhodesiense and T. evansi*. The fluorescent expression is still under investigation. Further evaluation of these populations *in vivo* should demonstrate their applicability for use in drug efficacy testing with BI. In conclusion, we obtained promising results to expand the collection of *Trypanosoma brucei* "biophotonica" into the far-red spectrum of light emission.

DIAGNOSIS

3.15

IDENTIFICATION OF PEPTIDES THAT MIMIC VARIANT SURFACE GLYCOPROTEIN EPITOPES FOR DIAGNOSIS OF *TRYPANOSOMA BRUCEI GAMBIENSE* HAT.

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We aimed at identifying peptides that mimic epitopes (mimotopes) specific to *Trypanosoma brucei (T.b.) gambiense* variant surface glycoproteins (VSGs) and that may replace the native proteins in diagnostic antibody detection tests. A Ph.D.-12 peptide phage display library was screened with polyclonal antibodies from patient's sera, previously affinity purified on VSG LiTat 1.3 or LiTat 1.5. The peptide sequences were derived from the DNA sequence of the selected phages and synthesised as biotinylated peptides. We evaluated the diagnostic performance of the synthetic peptides in indirect ELISA with sera from HAT patients and endemic negative controls. Respectively eighteen and twenty different mimotopes were identified for VSG LiTat 1.3 and LiTat 1.5, of which six and five were retained for assessment of their diagnostic performance. Based on alignment of the peptide sequences on the original protein sequence of VSG LiTat 1.3 and 1.5, two additional peptides were synthesised. All mimotopes had areas under the curve (AUCs) of ≥ 0.85, indicating their diagnostic potential. The peptide corresponding to the VSG LiTat 1.3 protein sequence also had an AUC of ≥ 0.85, while the peptide based on the sequence of VSG LiTat 1.5 had an AUC of only 0.79. We therefore delivered the proof of principle that mimotopes for *T.b. gambiense* VSGs, with diagnostic potential, can be selected by phage display with polyclonal human antibodies.

3.16

RECOMBINANT EXPRESSION OF LITAT 1.3 VSG IN *PICHIA PASTORIS* FOR SERODIAGNOSIS OF *GAMBIENSE* SLEEPING SICKNESS

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The variable surface glycoprotein (VSG) LiTat 1.3, expressed in *Trypanosoma brucei gambiense*, is produced recombinantly in the yeast *Pichia pastoris* to avoid the use of laboratory rodents in the production of a diagnostic test for *gambiense* sleeping sickness. A previous study expressing the *T. evansi* VSG RoTat 1.2, showed that *Pichia pastoris* is very suitable for heterologous expression of trypanosome proteins.

LiTat 1.3 (AA 1 → 349) is amplified from *T.b. gambiense* genomic DNA. A C-terminal Strep tag II is added for affinity purification. This fragment is cloned into the pP-αhSUMO vector. Thus, the following construct is created: α-mating factor signal sequence (for secretion of the recombinant protein) – N-terminal His tag – human SUMO3(small ubiquitin-like modifier protein, enhances expression, solubility and correct folding of its fusion partner) – LiTat 1.3 VSG (AA 1 → 349) – C-terminal Strep tag II. This construct is transfected into the *Pichia pastoris* M5-strain (limits N-glycosylation to $Man_5GlcNac_2$). The secreted protein is affinity purified and tested in ELISA against a panel of 137 human sera (58 positive, 74 endemic negative and 5 non-endemic negative sera). The results show a significant difference between negative and positive sera. Moreover, after comparison with native LiTat 1.3, we observe a strong correlation between the reactions with the recombinant fusion protein and its native counterpart. We suggest that this recombinant protein can be used as antigen for the diagnosis of *gambiense* sleeping sickness.

3.17

EVALUATION OF THE IMMUNE TRYPANOLYSIS TEST PERFORMED ON BLOOD COLLECTED ON FILTER PAPER

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The very specific immune trypanolysis test (TL) was recently shown to be a relevant marker for contact with *T. b. gambiense.* Partners involved in HAT control in West Africa welcomed the performance of TL to optimise epidemiological surveillance in the context of HAT elimination. Unfortunately, for practical reasons, the implementation of TL in National Control Programs is hampered by its technological requirements (cryobiology and laboratory animal facilities, availability of VAT-specific control sera, etc.). Therefore samples have to be send to CIRDES (Burkina-Faso) where TL is now available. Furthermore, TL is currently performed on plasma or serum that has to be kept frozen until use. To facilitate specimen storage and shipment from the field to the laboratory, adaptation of TL for testing blood collected on filter paper (FP) is thus a desirable goal. The objective of this study was to evaluate the performance of this new procedure as compared to TL performed on plasma or serum. The study was carried out on samples collected in the foci of Dubreka and Boffa (Guinea) from HAT patients before treatment, HAT patients one year after treatment and on CATT-positive subjects non-parasitologically confirmed (SERO). Preliminary results showed that all HAT cases were TL-positive when preformed on plasma and FP.

However, when TL on FP is performed on cured HAT cases and on SERO, it is less sensitive than TL preformed on plasma. These results will be discussed in view of the specifications of a surveillance tool in the context of HAT elimination.

Keywords: *Human African trypanosomiasis; diagnosis; control; West Africa; immune trypanolysis test; antibody.*

3.18

HOW RELIABLE IS PCR FOR DIAGNOSIS, STAGING AND FOLLOW-UP OF *GAMBIENSE* SLEEPING SICKNESS?

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The polymerase chain reaction (PCR) has been proposed for diagnosis, staging and post-treatment follow-up of sleeping sickness but no appropriate evaluations of its diagnostic accuracy have taken place in clinical practice. We report on the sensitivity and specificity of a PCR for diagnosis, disease staging and detection of treatment failure in 360 *T.b. gambiense* sleeping sickness patients and 129 endemic controls from the D.R. Congo.

The infection status of the patients was monitored during 2-years post-treatment. Reference standard tests were trypanosome detection for diagnosis and trypanosome detection and/or increased white blood cell concentration in the cerebrospinal fluid (CSF) for staging and detection of treatment failure.

When performed on blood, the PCR that targets the 18S ribosomal RNA gene, showed a sensitivity of 88.4% and a specificity of 99.2% for diagnosis. For disease staging, PCR on CSF had a sensitivity and specificity of 88.4% and 82.9%. During follow-up, PCR on blood had low sensitivity (12.5-50%) to detect treatment failure. In the CSF, PCR positivity weaned slowly and remained positive until the end of the 2 year follow-up in around 20% of successfully treated patients.

For *T.b. gambiense* sleeping sickness diagnosis and staging, this PCR performed as well as the most sensitive parasite detection techniques. PCR is

however not appropriate for post-treatment follow-up. Continued PCR positivity in one out of five cured patients points to persistence of living or dead parasites or their DNA after successful treatment and may necessitate the revision of some paradigms about the pathophysiology of sleeping sickness.

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3.19

IMPROVED PARASITOLOGICAL AND MOLECULAR TECHNIQUES FOR THE DIAGNOSIS AND SURVEILLANCE OF SLEEPING SICKNESS.

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Over the last few years, improved diagnostic tests and platforms have been developed and are proposed for implementation in HAT control and surveillance. Examples include new versions of the mini-Anion Exchange Centrifugation Technique (mAECT and mAECT on buffy coat) and PCR and other DNA amplification techniques. Although promising, the performance of these tests and platforms in real life remains unknown and, especially for PCR, may be critically influenced by the nature and the processing of the biological specimen prior to examination.

We present preliminary data on the diagnostic performance of lymph node aspirate examination, the capillary tube centrifugation technique, the mAECT and mAECT on buffy coat. The sensitivity and repeatability of m18S PCR performed 1° on whole blood stored in guanidine EDTA stabilisation buffer and; 2° on 30 µl of blood dried on filter paper were assessed as well.

The data were obtained in 120 persons with serological (CATT positive on blood diluted 1/4) or clinical suspicion of sleeping sickness. Parasite detection and specimen collection were performed in the field (Bandundu Province, D.R. Congo), DNA extraction and PCR were performed in duplicate at ITM in Antwerp.

3.20

SLEEPING SICKNESS DIAGNOSIS: USE OF BUFFY COATS IMPROVES THE SENSITIVITY OF THE MINI ANION EXCHANGE CENTRIFUGATION TEST

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The objective of this study was to evaluate a modification of the mini anion exchange centrifugation test (mAECT) for the diagnosis of *Trypanosoma brucei gambiense* human African trypanosomiasis (HAT) in which 350 µl of buffy coat withdrawn from five ml of blood are used instead of blood in order to increase the sensitivity of the test. The new protocol was first tested experimentally on serial dilution of trypanosomes and was then further evaluated in the field condition on 57 HAT patients diagnosed during a medical survey carried out in Guinea. Experimentally, the use of buffy coats improved mAECT sensitivity by at least five fold, and enabled to consistently detect parasites in blood at a concentration of 10 trypanosomes/ml. During the field evaluation, more patients were found positive with mAECT-bc (96.5%) than with mAECT-blood (78.9%, Chi2=6.93, p=0.008) and lymph juice examination (77.2%, Chi2=7.67, p=0.005). Furthermore the number of parasites per collectors was significantly higher (7.2 vs 2.6, p=0.001) when buffy coats were used instead of blood. The use of the mAECT-bc protocol thus enables a significant improvement of HAT parasitological diagnosis in Guinea, without any additional costs and would deserve to be tested in other *T.b. gambiense* endemic areas.

Key words: *Human African trypanosomiasis, diagnosis, buffy coat, mAECT*

3.21

NEOPTERIN FOR THE STAGING AND FOLLOW-UP OF SLEEPING SICKNESS PATIENTS: EVIDENCE FROM A MULTI-CENTRIC COHORT

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Background Sleeping sickness (human African trypanosomiasis-HAT) is a parasitic disease affecting rural communities in sub-Saharan Africa. Determination of the stage of disease and post-treatment follow-up represent key issues in patients' management.

Methods The concentration of IgM, CXCL10, CXCL13, ICAM-1, VCAM-1, MMP-9, B2MG, and neopterin was determined on the cerebrospinal fluid (CSF) of 243 stage 1 and 357 stage 2 patients originating from Angola, Chad, the Democratic Republic of the Congo, Malawi, and Uganda. Included

patients suffered from *Trypanosoma brucei gambiense* or *T.b. rhodesiense* HAT. Classification as stage 2 was based on the number of white blood cells (>5/μL) or presence of parasites in CSF. The same biomarkers were quantified in 98 *T.b. gambiense* patients followed for two years after treatment. Sensitivity and specificity of the biomarkers in identifying patients' stage and predicting relapses were determined.

Findings In *T.b. gambiense* patients, neopterin (Sp 98·2%, Se 86·6%) and IgM (Sp 94·3%, Se 90·5%) were powerful markers for staging. Neopterin was also the most efficient in confirming cure and detecting relapses as early as six months after treatment. MMP-9 alone (Sp 92·9%, Se 80·3%) or in combination with CXCL13 and CXCL10 (Sp 100%, Se 87·3%), was the best in staging *T.b. rhodesiense* patients.

Interpretation This study demonstrates the possibility of using neopterin to stage *T. b. gambiense* patients and to evaluate treatment outcome. New markers to stage *T.b. rhodesiense* disease are also proposed.

Funding This work received financial support from the Foundation for Innovative New Diagnostics (FIND).

CHEMOTHERAPY

3.22

FEASIBILITY OF NECT ADMINISTRATION IN RURAL HEALTH STRUCTURES: RESULTS FROM IMPLEMENTATION IN A MULTICENTRE CLINICAL TRIAL IN THE DRC

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Objectives: The NECT FIELD study started in 2009 to assess the clinical tolerability, feasibility and effectiveness of NECT co-administration in HAT stage 2 patients in real-life conditions. Correct implementation of NECT requires its application in the limited conditions of the rural health structures.

Methods and Materials: We assessed the NECT administration by the health personnel in five out of the six study centres, by direct observation and key informant interviews. Provincial coordinators were also interviewed. Logisticians at various levels were interrogated on the NECT supply chain management. The national directorate and central distribution point of the PNLTHA (National Trypanosomiasis Control Programme) in Kinshasa was also visited.

Results: NECT was well accepted and implemented by the health staff and administered according to best practices. The treatment bears many advantages, compared to the previous existing 2nd stage HAT treatments (melarsoprol, too toxic and eflornithine alone, of more complex administration). However, the health staff interviewed had been trained before the use of NECT. It was seen that the catheter insertion and infusion techniques and the management of adverse events deserve special attention.

The logistics to get the NECT treatment kits through the national to the provincial and local level is demanding and costly, as the kits of 4 treatments have a volume of 190 dm^3. Storage capacity is limited at all levels.

Discussion and Conclusions: NECT is simpler, better treatment than the previous ones. Its reduced duration and smaller volume facilitate its implementation in rural structures. Thorough training and careful follow up of adverse events is necessary.

3.23

NECT FIELD PHASE IIIB TRIAL: PRIMARY EFFICACY AND IN-HOSPITAL SAFETY RESULTS

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Objectives NECT-Field trial assess clinical response of NECT (Nifurtimox-Eflornithine co-administration) under field conditions: adverse events (AEs), feasibility of the implementation in the health centres; and effectiveness at 24 months after treatment.

Material and methods: Multicentre, open label; co-administration of oral nifurtimox (10 days at 15mg/kg/day t.i.d) plus injectable eflornithine (7 days at 400 mg/kg/day b.i.d). All patients that could take oral medication were admitted, follow up visits were planned each 6 months until 24 months after end of treatment.

Results: Results during hospitalization are presented here. 630 patients were included between May 2009 and May 2010, 100 of them were children <12, 13 pregnant and 34 breastfeeding women. Ongoing follow up 48% at 18 month . . The primary efficacy response based on patients discharged alive shows 98.4% efficacy (619/629). In-hospital safety results brought 10 deaths (8 possibly related); 39 serious adverse events (SAE), mainly of neurological (9) and infectious origin (10). Children and pregnant women were included for the first time and had less adverse effects than other adults. 92% of patients showed at least one adverse event, similar to other studies.

Discussion and conclusions NECT for second stage gambiense sleeping sickness was introduced in 2009 and is first line treatment in nine affected countries. NECT treatment administered under field conditions provides similar in-hospital safety and efficacy than in controlled study conditions. No new signal was detected in this wider population nor after administering it to children. NECT therefore appears as safe in children as in adults.

3.24

PHARMACOVIGILANCE SYSTEM IN THE USE OF THE NIFURTIMOX - EFLORNITHINE COMBINATION TREATMENT IN THE SECOND STAGE OF GAMBIENSE HUMAN AFRICAN TRYPANOSOMIASIS.

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The nifurtimox and eflornithine combination treatment (NECT) showed in clinical trials a non-inferior level of safety and efficacy than previous elective treatment of eflornithine monotherapy for the treatment of second stage of Gambiense human African trypanosomiasis (HAT). In April 2009, the NECT was included in the 16th WHO Essential Medicines List (WHO EML).
Following the inclusion in the WHO EML, the NECT has been adopted as first line treatment of second stage of Gambiense HAT by 10 endemic countries (Cameroon, Central African Republic, Chad, Cote d'Ivoire, Democratic Republic of Congo, Equatorial Guinea, Gabon, Guinea, Sudan and Uganda). These 10 countries currently report the 95% of cases of Gambiense HAT.

The WHO Essential Medicines Expert Committee strongly recommended reinforcing the pharmacovigilance of this new therapy when it will be used by National Sleeping Sickness Programmes (NSSCP), usually in health facilities located in rural remote areas.

Nifurtimox and eflornithine are donated to WHO through a Public-Private-Partnership by the pharmaceutical companies, sanofi-aventis and Bayer. They are supplied free of charge to disease-endemic countries by WHO in form of treatment kits, which include all additional material required for its use. Therefore WHO took the responsibility to set up a pharmacovigilance system s in collaboration with NSSCP and non-governmental organizations.

One year after the implementation, this pharmacovigilance system adapted to this specific situation is showing to be an effective tool to get useful information on the safety and efficacy of the new implemented treatment.

3.25

FEXINIDAZOLE A NEW ORAL TREATMENT FOR SLEEPING SICKNESS – UPDATE OF DEVELOPMENT

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Fexinidazole is a 2-substituted 5-nitroimidazole, oral compound which exhibits *in vitro* and *in vivo* activity against *Trypanosoma brucei rhodesiense* and *T.b. gambiense* parasites, the causative agents of human African trypanosomiasis (HAT). In Preclinical studies oral fexinidazole cured mouse models of acute and chronic HAT infection. Preclinical absorption distribution metabolism and elimination (ADME) studies show that fexinidazole is well absorbed, distributed throughout the body, including the brain., rapidly metabolized in at least 2 active metabolites (fexinidazole sulfoxide and sulfone) which account for most of the pharmacological activity.

Toxicology studies including safety pharmacology and 4-week repeated-dose in the rat and dog have shown that fexinidazole is well tolerated up to 800 mg/kg/day, with no particular safety issues identified.

While fexinidazole, like many nitroimidazoles, is mutagenic in the Ames test, it is not genotoxic and not expected to pose a genotoxic risk for humans.
Up to now 96 healthy volunteers of sub-Saharan origin were randomized to receive either single or repeated oral fasting dosing up to 3600mg/day for 14 days. The same metabolisation occurred resulting high plasma concentration of fexinidazole sulfone. (M2) with a half-life of 24 hours leading to a single dosing per day. In man the free fraction of this M2 is about 43% which let augur an easy crossing of the Blood Brain Barrier, as was already demonstrated in animal studies.

In volunteers, fexinidazole demonstrated a good tolerability and safety profile, with only one subject presenting an increase in liver function test.
Food interaction single dose studies have shown an interesting increase in blood concentration which will be used in healthy subjects to determine the

best and most compliant oral dosing regimen combined with food to be studied in the next clinical pivotal study in patients.

3.26

DISCOVERY AND OPTIMIZATION OF A NOVEL DRUG CANDIDATE FOR TREATMENT OF LATE-STAGE HUMAN AFRICAN TRYPANOSOMSIASIS

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Objectives: Human African trypanosomiasis (HAT) is a significant public health problem in sub-Saharan Africa affecting many thousands of individuals. An urgent need exists for the discovery and development of new, safe, and effective drugs to treat HAT, as existing therapies have poor safety profiles, difficult treatment regimens, limited effectiveness, and a high cost of goods.

Materials and Methods: In a collaborative program with Drugs for Neglected Diseases *initiative*, Scynexis, Anacor Pharmaceuticals, Pace University and STPH we have developed a new class of drug candidates for treatment of stage1 and 2 HAT. The structure of these compounds is based on novel organoboron chemistry licensed from Anacor Pharmaceuticals and optimized at Scynexis and Pace University.

Results: One molecule from this series, SCYX-7158 has been identified as a clinical candidate for trials in patients with stage 2 HAT. SCYX-7158 is active *in vitro* against relevant strains of *Trypanosoma brucei*, including *T. b. rhodesiense* and *T. b. gambiense*. It has a good safety profile in rodent and

non-rodent species and is effective against all disease stages in mouse models when given orally.

Discussions and Conclusions: It is planned to initiate human clinical research in 2011 with SCYX-7158 as an oral drug candidate for treatment of HAT.

POSTERS

3.27

GEOGRAPHICAL RISK FACTORS OF SLEEPING SICKNESS TRANSMISSION IN THE FOCUS OF BOFFA (GUINEA)

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Guinea is the country more touched by the sleeping sickness in West Africa, particularly on the littoral where the principal focuses are located. It is the case with the mouth of Rio Pongo (prefecture of Boffa) where patients are detected each year. In 2009, a geographical census and investigations were carried out in order to characterize the human geography of the focus of Boffa. Approximately 14.700 people were listed (name, first name, ethnos group, sex, age) and the activities of the families were characterized (fishing, agriculture, rice growing, extraction of salt, etc). Following these investigations, a medical prospection carried out in this zone permitted to detect 29 patients out of 9.626 examined people (14 patients on the continent and 15 on the islands, in 19 villages and 27 family houses). These patients are composed to 61% men and 39% women and belong to the ethnicities Soussou (93%) and Baga (7%), respectively accounting for 77% and 11% of the listed population which counts to 49% men and 51% women. Important differences in the methods in water provision were also highlighted. The detailed cartography of the distribution of sleeping sickness permit to identify the spaces of transmission risk while the census and the investigations make it

possible to characterize the populations at risk, for a better orientation of the medical fight.

***Key words**: Dynamics of settlement, landscape, sleepy sickness, Boffa, maritime Guinea*

3.28

COMPARISON OF FUCHS ROSENTHAL AND URIGLASS CELL COUNTING CHAMBERS AND OF DOUBLE AND MODIFIED SIMPLE CENTRIFUGATION FOR EXAMINATION OF CEREBROSPINAL FLUID IN SLEEPING SICKNESS.

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Gambiense sleeping sickness is a chronic infection, evolving from the hemo-lymphatic stage into the meningo-encephalitic disease stage. Both stage determination and follow-up after treatment are based on examination of cerebrospinal fluid (CSF) for the presence of trypanosomes and the number of white blood cells (WBC). In order to improve these procedures, which are crucial for patient management, we compared the performance of the classical re-usable Fuchs Rosenthal counting chamber with that of a disposable counting chamber (Uriglass). In addition, sensitivity of the modified simple centrifugation to detect trypanosomes in CSF was compared with sensitivity of the double centrifugation.

Modified simple centrifugation and double centrifugation were performed on CSF of 94 trypanosomiasis patients. Sensitivity of modified simple centrifugation (85/94) was significantly higher than of double centrifugation (46/94) [$p < 0.0001$]

For comparison of the Fuchs Rosenthal and Uriglass counting chamber, 188 CSF samples from patients with low WBC numbers ($\leq$ 30 WBC/µl) were examined. For each CSF, WBCs were counted twice with Fuchs Rosenthal and twice with Uriglass. Bland-Altman analysis showed high repeatability for both methods and good agreement between both methods.

We conclude that modified simple centrifugation is more sensitive than double centrifugation and that Fuchs Rosenthal and Uriglass counting chambers can be used interchangeably.

3.29

DETERMINANTS OF EFFECTIVE CONTROL OF HUMAN AFRICAN TRYPANOSOMIASIS. THE CASE OF KASAÏ, DEMOCRATIC REPUBLIC OF CONGO, 1997 - 2005.

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After an epidemic peak in 1997-1998, human African trypanosomiasis (HAT) control in Congo has seen a decrease in reported cases, parallel to an increase in populations tested. These good results were noted in some regions, notably Equateur du Nord, while in others, like the two Kasai, the results were not as good.

To study the factors explaining the difference in results between regions, we compared the implementation of the control by the National HAT Control Programme (PNLTHA) provincial coordination agencies in Equateur Nord and Kasai, between 1997 and 2005. The indicators proposed by *Bouchet B et al. Robays J et al.* and by PNLTHA, namely evaluation of the control operational effectiveness and interview of experts, formed the basis for comparison.

Coverage in screening activities by number of mobile units, the rate of participation of the population in active case detection, and treatment adherence were the main determinants. The participation rate in Kasai was lower mainly because of the high rates of failure of melarsoprol treatment, false beliefs, lack of interest among certain risk groups such as diamond miners.

Some recommendations are made to put HAT control on a different course where the number of reported cases has stagnated: increase the coverage of

activities, replace melarsoprol-eflornithine combination with nifurtimox, involve authorities, combat false beliefs, involve the public in raising awareness.

3.30

DND*i* R&D PROGRESS TO TACKLE SLEEPING SICKNESS

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Drugs for Neglected Diseases initiative (DNDi)

Objectives: Currently available treatments for HAT are toxic and complex regimens with a loss of efficacy in several regions. Treatment is also stage-specific, with more toxic and more difficult to administer drugs for stage 2 disease. The objective is to improve current treatment options, particularly for patients with the stage 2 disease. Ideally, treatment should be orally administered and effective for both stages of the disease.

Material and Methods: DNDi established a short-term strategy to develop a combination therapy of existing drugs and a medium-term strategy to identify existing chemical compounds with potential against *T. brucei* parasite. To further build a pipeline for HAT drug R&D, DNDi also set up the HAT Lead Optimization Consortium.

Results: In 2009, DNDi and its partners launched the first new treatment for sleeping sickness in 25 years: nifurtimox and eflornithine combination therapy (NECT). In 2007, DNDi rediscovered fexinidazole, an existing chemical compounds with potential against *T. b. Gambiense and T.b. Rhodesiense.* DNDi has since completed all necessary pre-clinical testing and has begun clinical studies in healthy volunteers before moving into a large clinical study assessing the efficacy and safety of fexinidazole for HAT to treat stage 2 of the disease. With the HAT Lead Optimization Consortium, DNDi identified oxaborole as a promising lead series against the *T. brucei* parasite. SCYX-7158 oxaborole should enter in clinical development in 2011.

Discussions and Conclusions: Efforts made by DNDi and its partners have brought a more adapted treatment with NECT. Fexinidazole and SCYX7158 oxaborole are promising new candidates as potential oral treatments for both stages of the disease.

3.31

REGIONAL CAPACITY BUILDING PLATFORM FOR CLINICAL TRIALS IN HAT: FIVE YEARS OF CONTRIBUTION TO RESEARCH

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Objectives: For a long time, human African trypanosomiasis (HAT) diagnosis and treatment has not progressed due to lack of scientific research in this disease which offers no lucrative market. In 2005, people in charge of HAT control programs and leading research institutions involved in the investigation of this disease in the five most endemic countries (Angola, Congo, Democratic Republic of Congo, Uganda and Sudan), in collaboration with DNDi Foundation and other partners, have formed a functional network whose objective is to strengthen clinical trials capacities.

Methodology: The functioning of the HAT platform is based on a win-win partnership between research institutions in the South and North involved in HAT as well as coordination with other networks such as EANETT. Their collaboration is through training activities, scientific meetings, and regular communications between members, including the circulation of a bi-annual newsletter.

Results: The platform supported the development of a combination therapy - Nifurtimox-Eflornithine (NECT) - and contributed to the validation of a fluorescence microscope (iLED). Training in Ethics, Good Clinical Practices, Pharmacovigilance for capacity building in clinical trials were held.

Conclusion: The HAT platform, which currently includes seven African countries (Central African Republic and Chad joined in 2009), has created enthusiasm and synergy among member countries and its partners towards achieving the objectives of controlling and eradicating this disease.

3.32

IMPROVING MICROSATELLITE LOCI AMPLIFICATION OF *TRYPANOSOMA BRUCEI GAMBIENSE* FROM BODY FLUID

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Human African trypanosomiasis is a parasitic disease whose pathogenic agent, *Trypanosoma brucei* can be found in different patient's biological fluids (blood, lymph of cervical lymph node, cerebrospinal fluid). Previous studies have shown that microsatellite markers are polymorphic enough to be amplified directly from *T. brucei* present in biological fluids without using heavy and expensive *in vitro* or *in vivo* isolation protocols. However, it has been observed that genotyping *T. brucei* directly from body fluids is confronted with amplification failures as null alleles and/or allelic dropouts. In this study, we attempted to check whether the numerous homozygous profiles met are true homozygous or due to allele dropout and we also investigated how to improve genotyping technics for *T. brucei gambiense* from body fluids. To do this, we tested three protocols of varying DNA concentration, in four kinds of patient's fluids (blood, buffy-coat, lymph from cervical node and cerebrospinal fluid) on three microsatellite markers (Micbg5, Micbg6 and

Misatg4). Our study showed that most homozygous profiles are due to allelic dropouts. The importance of allelic dropouts avoidance is related to the kind of body fluid and to the DNA concentration but also to the replication of experiments. The best body fluids were lymph and blood and the best DNA concentration the two highest ones. Following our results we would recommend using the lymph of cervical lymph nodes for Guinean *T. brucei gambiense* and protocol replication.

Key words: *Trypanosoma brucei gambiense; Improving; Microsatellite loci; Body fluids.*

3.33

INTRODUCTION OF VECTOR CONTROL AND ADVOCACY STRENGTHENING FOR BETTER CONTROL OF HAT IN THE EPICENTRE OF THE FOCUS OF DUBRÉKA

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Human African trypanosomiasis is endemic throughout maritime Guinea (mangrove areas).

Since 1997, despite efforts by PNLTHA and its partners to control HAT in households on the Guinean coast (Dubréka, Boffa, Forécariah), the disease remains prevalent in some villages, making this area the most affected in the country.

In spite of numerous medical surveys conducted in these households, the disease remains a public health problem. The objective of this work is to highlight the geographic, human and entomological factors that may explain this epidemiological prevalence and to propose solutions for better control of this disease. Medical data from nine surveys conducted in 1997-2009, with the monitoring of confirmed cases and serological suspects from May 2008, were analyzed. Entomological surveys conducted and the results of the campaign on Loos Islands are encouraging.

With these results, a complementary approach to medical surveys in order to optimize control efforts on the Guinean coast was undertaken by PNLTHA, based on the sensitisation and monitoring of pattients and seropositive people and the introduction of progressive vector control on the coast.

To achieve these objectives, different strategies have been put in place:

- Vector control: four strategies were developed. The use of insecticide-impregnated screens and traps, fumigation, "pour on" on animals and impregnated nets.
- Advocacy focused on sensitisation of the different layers of the target population through the various channels available.

Proper implementation of these strategies will enable better control of the disease through a substantial reduction of the density of tsetse and of Man / Tsetse contact and better engagement of the population in control activities.

3.34

ARE MOLECULAR AMPLIFICATION TESTS FOR THE DIAGNOSIS OF HUMAN AFRICAN TRYPANOSOMIASIS ACCURATE? A SYSTEMATIC REVIEW

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Here we investigated the diagnostic accuracy and variations of accuracy of molecular amplification tests for Human African Trypanosomiasis (HAT) for both diagnosis and staging of HAT (stage I or II) compared to microscopy. We searched the main electronic databases for studies assessing the accuracy of molecular tests for HAT. Methodological quality was assessed using the QUADAS tool and selected studies were analysed using the bivariate random effects model for a pooled estimate of sensitivity and specificity. Sixteen articles evaluating molecular amplification tests were included: PCR (n=12), NASBA (n=2), LAMP (n=1) and a study comparing PCR and NASBA (n=1). Fourteen articles, including 19 different studies were included in the meta-analysis. Only the PCR studies for diagnosis of HAT provided sufficient data for meta-analysis; PCR analysis performed on blood compared to microscopy had a sensitivity of 99% (95% CI:93-100%) and a specificity of 98% (95% CI:93-99%). Variations in accuracy may be due to different targets of the PCRs, differences in infecting agent (*T.b. rhodesiense* or *T.b. gambiense*), target population and study design. Three studies evaluated the accuracy of HAT staging using PCR in CSF with sensitivity from 88% to 100%, and specificity from 56% to 83%; pooling results was not possible.
High accuracy and narrow confidence intervals indicate that PCR of blood samples may be adopted for routine stage I HAT diagnosis as an alternative to microscopy. To assess the accuracy of PCR in cerebrospinal fluid for staging of HAT longitudinal studies are needed.

3.35

HISTORY OF AN EPIDEMIOLOGICAL LINK BETWEEN BURKINA FASO AND IVORY COAST: THE CASE OF KOUDOUGOU FOCI

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The massive movements of populations having occurred between Burkina Faso and Ivory Coast in the first half of the XXth century have participated in the spread of HAT from the epidemic Burkina Faso towards endemic Ivory Coast. Today, the disease is no more locally transmitted in Burkina Faso (although tsetse flies still ocurr) but still occurs in the Ivory Coast forest area. Hence every year, because of the intense migratory link which still exists between these two countries, HAT cases are found in Burkina Faso, coming from Ivory Coast. These people have been infected in Ivory Coast and are passively detected in Burkina Faso. This work, by the analysis of historic epidemiological data (reports) as well as by interviews made with the patients detected passively since 2000 in the region of Koudougou in Burkina Faso, allows to present the story of the epidemiological link between this region and the Ivory Coast forest area, where are found villages called Koudougou which are linked with Koudougou Burkina Faso. This work underlines the importance of a good knowledge of human mobility between two countries from a health point of view and shows the importance of a good communication between health programs of bordering countries.

Keywords: *Mobility, Sleeping sickness, Burkina Faso, Côte d'Ivoire, spread*

3.36

ISOLATION AND DRUG-SENSITIVITY PROFILING OF *TRYPANOSOMA BRUCEI GAMBIENSE* FROM CURED AND RELAPSED SLEEPING SICKNESS PATIENTS

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High relapse rates among patients treated with melarsoprol in the HAT focus of Mbuji-Mayi in D.R. Congo still remain unexplained. To test the hypothesis of drug resistance, *T.b. gambiense* parasites were isolated via inoculation of *Grammomys surdaster* and subsequent adaptation to *Mus musculus*. A unique collection of 85 *T.b. gambiense* strains of which 24 were obtained from the same 12 patients before and after treatment (paired) and 13 from cured patients (BT), is now available. Forty one strains are fully adapted to *Mus musculus* and 15 have been screened *ex-vivo* for sensitivity against melarsoprol, pentamidine, nifurtimox and DB75 without evidence of reduced drug sensitivity. *In vivo* drug sensitivity testing in an acute model of HAT in mice is ongoing. Currently, 21 strains of which 7 paired strains and 7 from cured patients are tested with 0 and 10mg/kg body weight melarsoprol, with a follow-up of 90 days after treatment. Preliminary results show no reduced sensitivity to melarsoprol at 10mg/kg in 4 strains from cured patients, neither in 4 paired strains from relapsed patients.

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3.37

NETWORK FOR MAPPING AFRICAN TRYPANOSOMIASIS IN TANZANIA (NETMATT): PRELIMINARY RESULTS

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During the 1960's and 1970's, Tanzania, like most other African countries, maintained a dedicated department responsible for tsetse and trypanosomiasis surveys and control. By the early 1980's, activities at the department had decreased but human African trypanosomiasis (HAT) persisted in four regions, and African animal trypanosomiasis (AAT) was widely spread in all regions. Furthermore, due to low prioritisation, the impact of both diseases was undermined by out-dated information and under reporting. Although data from recent years suggest that incidences of HAT are declining and the disease may be close to elimination, one of the problems remaining is of inadequate data to support decision making when developing strategies to sustain elimination. The Network for mapping of African Trypanosomiasis in Tanzania (NetMATT) was formed in 2010, and has been utilizing local expertise to undertake an inventory of existing information, and mapping AT in relation to tsetse distribution, capacity and location of HAT diagnosis and treatment centres, HAT cases and population at risk. This paper highlights the results gathered in year one on HAT records from 6 regions, capacity for diagnosis and treatment of 15 centres in 5 regions and tsetse distribution in 10 regions. By mapping all aspects of the disease, gaps in control, treatment and surveillance capacity have been identified. This information can now be used to guide the targeting of resources and advocacy for HAT and AAT, and help to develop strategies and monitor elimination of the disease.

3.38

PROBLEMS OF RELAPSE OR TREATMENT FAILURE IN HAT CONTROL: THE NEED FOR A SYNDROMIC APPROACH

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Human trypanosomiasis is rife in DRC. The results of studies conducted in Bandundu and Kasai show a disparity in epidemiological data on the stages of the disease. Clinical and paraclinical data on patients monitored by the Neuro-Psycho-Pathological Centre was availed. Between January and April 2011, eight people, including four men and four women, were monitored for HAT meningo-encephalitis after a failed initial treatment for the same condition. Clinical, paraclinical and therapeutic data was evaluated on admission, after 2 days and on the 14th day of treatment. The main neurological syndromes on admission, the cyto-biochemical and parasitological profile before treatment and on day 2 of the treatment, the neurological picture at the end of the treatment with NECT were described. During this episode, some improvement was noted for the biological profile on day 2 of the treatment and for the clinical picture at the end of the treatment. Parallel rapid improvement and management in a specialized unit suggests the importance of a syndromic approach, in addition to biology, in the clinical stage classification, which will have implications for improved management of HAT patients.

3.39

EPIDEMIOLOGY OF HAT IN THE FOCUS OF DUBRÉKA, GUINEA

Camara M ; Camara.O; Kagbadouno S.M ; Jamonneau. V; Bucheton B; Solano. P

The Prefecture of Dubréka alone accounts for almost half of HAT cases in Guinea. These patients are mostly people who operate in the mangroves: farming, fishing, wood harvesting, salt extraction, oyster gathering, and trade. In order to clarify the particular epidemiology of HAT in this mangrove focus, three complementary approaches were simultaneously used: one based on screening and treatment, the second on entomo-epidemiological data, and finally a geographical approach to HAT. The peculiarity of HAT in the mangrove area is shown, namely a very high proportion of ill people at a neurological stage, and a majority of cases with cervical adenopathies, this being a very good sign for the diagnosis of HAT. We propose innovation in diagnostic parasitology: the implementation of minicolumns from the buffy-coat, which increase sensitivity and are particularly relevant in those areas where parasitemia levels are very low. In spite of increased medical surveys, the infection rate has not decreased in the focus of Dubréka: it is imperative to adapt the strategy to the behavior of human populations in the mangroves, with greater mobility of medical teams, better monitoring of untreated seropositive people and treated patients, and the addition of the control of vectors. This will not aim to eradicate, but to decrease the density of tse tse flies in order to break the transmission cycle. This is made possible by another innovation proposed, the use of floating traps in a mangrove environment. This integrated approach should be extended to other coastal foci to achieve HAT eradication in the mangrove area in Guinea.

3.40

MONITORING OF BLOOD DONORS SEROPOSITIVE FOR HAT IN KINSHASA

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The study of Mulumba A and al (1999) and the joint investigation of PNTS / PNLTHA in partnership with CTB (2007) have confirmed the presence of HAT in the population of blood donors. Accordingly, the CATT was recommended and accepted in the biological qualification of blood transfused in the DRC. During the year 2010, on 74,617 blood units collected in PNTS, 10,067 or 13.27% were tested in CATT. 632 of them have proved CATT positive, a seroprevalence of 6.27%. This compared to that seen in PNLTHA during the same year is very high. It could be explained by a careful reading of the PNTS' s staff that, for the slightest doubt has probably qualified CATT positive. Also, the CATT was performed on plasma extracted from blood collected in EDTA. Finally, cross-reactions with other markers of infection were recorded. Certainly, parasitological tests to confirm the THA are considered.

3.41

TOWARDS ELIMINATING HUMAN AFRICAN TRYPANOSOMIASIS IN NIGERIA

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The report describes on going effort towards eliminating Human African Trypanosomiasis (HAT) in Nigeria. HAT is re-emerging in Nigeria.

From 2009 HAT issues have been on the front burner in Nigeria since the implementation of activities drawn from the HAT Advocacy Strategic Plan (HAT-ASP). Factors that have contributed to this are governmental support and collaboration, advocacy by Programme Managers, technical and financial assistance by PATTEC, Foundation for Innovative New Diagnostics, World Health Organization, and several other partners.

The HAT-ASP aims to achieve the implementation of sustained and effective advocacy and social mobilization activities for improved HAT surveillance and case management, their integration into national disease control programmes with improved and sustained financial and practical support for African Trypanosomiasis (AT) eradication and improved partnership and collaboration.

Sentinel sites exist in the country. Other activities carried out are stakeholders' meetings, training and sensitization activities, social and resource mobilization activities, nationwide and targeted publicity activities. Guidelines for the national Integrated Disease Surveillance and Response (IDSR) system was revised to include HAT as one of Nigeria's priority diseases. Several States established AT teams. Activities are carried out at various levels in the country. These activities are monitored and reported regularly.

Nigeria has reported less than a hundred cases annually from 2006, but the actual endemicity status is unknown. Cases are identified during screening exercises. Efforts are to institute effective and sustainable HAT surveillance and response system with an aim to eliminate the disease in Nigeria by 2015.

Keywords: *Nigeria, sentinel sites, advocacy, surveillance*

3.42

SUSTAINABLE STRATEGIES FOR SLEEPING SICKNESS CONTROL

Aksoy Serap

Sleeping sickness, also known as human African trypanosomiasis (HAT), is one of the neglected tropical diseases of sub-Saharan Africa that has plagued human health and agricultural development. According to WHO reports, the number of new cases diagnosed with HAT has dropped below 10,000 for the first time in 50 years, signaling a possible end to the latest epidemic cycle as a major public health problem. While the news of reaching a probable elimination phase for Sleeping Sickness is most welcoming, sustainable management of disease control now poses a formidable challenge to endemic countries and health ministries that have to juggle a multitude of diseases when faced with shortages of funds. If the decline in the reported HAT cases are taken at face value, it could signal African governments to abandon their local control efforts and for funding agencies to relax their disease research priorities. Should this happen, it is most certain that epidemics will likely flare up in the near future as it has happened in the past.

Given that HAT epidemiology varies significantly for *rhodesiense* and *gambiense* disease, the measures adopted will have to vary in different epidemiological settings. Nevertheless since the distribution of sleeping sickness is limited to ancient and in many cases well-recognized foci, vigilant monitoring through surveillance at these foci should be continued for both forms of the disease. Despite intensive research into the biology of the trypanosomes and tsetse, to date the toolbox for diagnostics and treatment of sleeping sickness has remained extremely small and plagued with difficulties. However, the basic knowledge accumulated on parasite and tsetse biology and the unprecedented technological advancements we are witnessing in science at this time provide the impetus for continued future research where the prospects for translational science are excellent. It is most likely that innovative and interdisciplinary research will lead the way for improved and effective tools to monitor and prevent the next epidemic. One effective means of preventing disease transmission is to remove tsetse flies, either at a local

level (e.g., a group of villages) or regionally (covering large parts of a country or region). However, a major problem has been the cost and logistical difficulty of implementing such control programmes. This presentation will focus on the HAT control opportunities that are likely to emergence based on control of the tsetse vector.

3.43

HUMAN MOBILITY IN THE DUBREKA FOCUS: AN OBSTACLE FOR HAT ELIMINATION?

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In Guinea, country the most affected by sleeping sickness in West Africa, foci are found mainly in the littoral, like in Dubreka. The analysis of data from nine medical surveys done from 1997 to 2009 in Dubreka showed that the disease is still present despite important control activities. We implemented field activities in order to characterise the human settlement, to exhaustively census the whole population and to define its mobility. The knowledge of human geography, especially the human mobility between mainland and islands, has enabled to identify problems for a good epidemiological coverage. For example, 20% of the continental population leave on islands (for at least 2 months time) because of agricultural activities (salt extraction and rice cultivation). According to these results, a complementary adapted approach targeted to this mangrove area is proposed regarding medical aspects, in order to optimise control strategies.

***Keywords**: Sleeping sickness, geography, mobility, Guinea, control*

3.44

IMMUNE TRYPANOLYSIS ON NON-HUMAN INFECTIVE TRYPANOSOMES FOR DIAGNOSIS OF *GAMBIENSE* SLEEPING SICKNESS

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Immune trypanolysis is the most sensitive and specific serodiagnostic test for *gambiense* sleeping sickness but it bears an inherent infection risk. Aiming to replace in immune trypanolysis the highly infective *Trypanosoma brucei gambiense* by a non-infective *Trypanosoma brucei brucei*, the *gambiense*-specific VSGs LiTat 1.3 and LiTat 1.5 were cloned in an expression vector that enables the introduction of any VSG in a non-human infective *T.b. brucei* model.

Each construct was transfected into bloodstream form trypomastigotes and recombinant clones were selected by neomycin and puromycin resistance. Immunofluorescence assays with specific rabbit antibodies proved that the introduced VSG was presented at the cell surface together with the original VSG221. Immune trypanolysis experiments with the transfected clones confirm their recognition by specific antisera.

Currently, we are focusing on the knockout of VSG221 from the double expressors to create *T.b .brucei* clones expressing only the *T.b. gambiense* specific VSGs LiTat 1.3 or LiTat 1.5. Thus, we will develop a human- and animal-friendly immune trypanolysis test for antibody detection in diagnosis of *gambiense* sleeping sickness.

3.45

CHARACTERIZATION OF *EX-VIVO* CELLULAR RESPONSE IN INDIVIDUALS INFECTED BY *TRYPANOSOMA BRUCEI GAMBIENSE*

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Our objective was to compare to the levels of cytokines secreted by the immune cells from former sleeping sickness patients, asymptomatic, seropositive and healthy individuals. The study was carried out in Ivory Coast in the focus of Sinfra and Bonon. We stimulated the whole blood samples with trypanosomes and determined by ELISA the levels of circulating IL-6, IL-10, TNF-α and IFN-γ in blood samples from the different categories of individuals: (1) healthy (n=23); (2) former sleeping sickness cases (phase 1 (n=18); phase 2 (n=21)); (3) seropositive (n=10) and (4) asymptomatic (n=8). Circulating IFN-γ level was significantly higher in blood samples from asymptomatic individuals than those coming from the other groups (p=0.0001, Kruskall-Wallis). It is also important to note that the production of IFN-γ was also higher in blood samples from seropositive individuals, after stimulation with trypanosomes, than the samples from the reference group (p=0.0093; Kruskall-Wallis). These results confirm that THA involves a strong stimulation of the immune system with important secretions of cytokines. They also state that IFN-γ could play an important role in the control of the disease and the phenomenon of seropositivity without parasitologic confirmation. They thus suggest the implication of immunity in this particular aspect of the epidemiology of the THA. Genotyping of Single Nucleotide Polymorphisms (SNPs) in genes coding the cytokines of interest is in progress, the results of the impact of these SNPs on the cytokine production will be also presented during the conference.

3.46

HUMAN INFECTIONS WITH TRYPANOSOMES OF ANIMAL ORIGIN

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So far a few documented cases on human infection with pathogenic trypanosomes of animal origin.were published - There is **in Asia** that one can find rare publications in infants with *T. lewisi* (KAUR et al., in India,2007 ; SARATAPHAN et al., in Thailand , 2007) then **in Africa** in a new borne infant in Senegal / Gambia (HOWIE et al., 2007). However, the trypanosome identification of *T. evansi* in India in a patient and the detailed follow-up (2004 -2006) of the induced human infection allowed to explain the essential role of the apolipoprotein (Apo L1)in the human trypanolytic factor (PAYS E , 2006 ; VANHOLLEBEKE B. et al., 2006) and to understand the mechanism of the infection ..

At the end of the round table on NTTAT , held in Addis Ababa in October 2005 during the 28th ISCTRC Conference , it was suggested - taking into account the provided information of the Indian case (infection of a cowman in charge of the sanitary care of *T. evansi* infected animals) to look for the presence or serological signs of this trypanosome in the occasional blood samplings of people (herds-and flock men, camel drivers,) frequently in contact with infected animals (cattle/buffaloes , dromedaries , goats).

In Africa , serological and parasitological surveys (blood smears) were carried out **in Sudan** in **dromedary** herds of several hundred animals (A/H RAHMAN , INTISAR ELRAYAH : annual meetings , May 2008 & May 2009) , with the CATT/*T. evansi* , PCR and even ITL in some cases. Various degrees of *T. evansi* infection were determined in these animals .In camel drivers responsible for these herds , numerous positive reactions of their sera were established with the same diagnostic tests but never a trypanosome was

detected . This result can be explained by the repeated bites of insects vectors inoculating *T. evansi* quickly destroyed by the human trypanolytic factor of the bitten recipient .

In Egypt , a parasitological and serological survey (HARIDI FH et al. 2011) carried out on several hundred of **dromedaries** and their camel drivers (blood smears and ELISA) showed various results depending on the infection rate of the dromedary herds and allowed to detect *T. evansi* in the blood of one of the 30 sampled camel drivers .

In Asia (West Bengal) a similar serological survey carried out in **dairy goats** - very numerous in this State , with the CATT/ *T. evansi* gave numerous positive reactions in goats and people in charge of their care but no parasite in the blood of these people (DAS S., NTTAT meeting May 2007; SARKAR D. et al. , 2008).

3.47

SHOULD I GET SCREENED FOR SLEEPING SICKNESS? A QUALITATIVE STUDY IN KASAI PROVINCE, DEMOCRATIC REPUBLIC OF CONGO

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**contribute equally as a first authors*

Background
Control of human African trypanosomiasis (sleeping sickness) in the Democratic Republic of Congo is based on mass population active screening by mobile teams. Although generally considered a successful strategy, the community participation rates in these screening activities and ensuing treatment remain low in the Kasai-Oriental province. A better understanding of the reasons behind this observation is necessary to improve regional control activities.

Methods
Thirteen focus group discussions were held in five health zones of the Kasai-Oriental province to gain insights in the regional perceptions regarding sleeping sickness and related active screening activities.

Results
Sleeping sickness is well known amongst the population and is considered a serious and life-threatening disease. The disease is acknowledged to have severe implications for the individual (e.g. persistence of manic periods and trembling hands, even after treatment), at family level (e.g. income loss, conflicts, separations) and communities (disruption of activities). Several important barriers to screening and treatment were identified. Fear of drug toxicity, lack of confidentiality during screening procedures, financial barriers and a lack of communication between the mobile teams and local communities were described. Additionally, the existence of a number of regionally accepted prohibitions related to sleeping sickness treatment was found to be a strong impediment to disease screening and treatment. These prohibitions,

which do not seem to have a rational basis, have far-reaching socio-economic repercussions and severely restrict the participation in day-to-day life.

Conclusion

A mobile screening calendar more adapted to the local conditions with more respect for privacy, the use of less toxic drugs, and a better understanding of the origin as well as better communication about the prohibitions related to treatment would have a positive effect on the participation of the Kasai-Oriental population in sleeping sickness screening and treatment activities.

3.48

ACRIDINE ORANGE FLUORESCENCE ENHANCED WHITE BLOOD CELL COUNTING IN CEREBROSPINAL FLUID

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Correct white blood cell counting in cerebrospinal fluid is critical for diagnosis of neurological diseases, including for disease stage and post-treatment follow-up of human African trypanosomiasis. Presence of contaminating artefacts and red blood cells can result in inaccurate cell counts and thus inappropriate treatment. We describe a simple and fast procedure for total white blood cell counting in the cerebrospinal fluid. A final acridine orange concentration of 0.5-1 µg/ml is added to cerebrospinal fluid. The sample is applied in a counting chamber and examined with a LED microscope in epifluorescence mode, providing low intensity bright light from below to see the counting grid. The recognition of white blood cells is enhanced by their fluorescent nucleus, while red blood cells do not fluoresce. Trypanosomes are instantly killed, rendering them poorly visible. In conclusion, addition of low concentrations of acridine orange to the cerebrospinal fluid provides a simple method for determination of the cytorachia for stage determination and post-treatment follow-up in human African trypanosomiasis.

3.49

INTERNATIONAL COOPERATION IN THE FIGHT AGAINST AGAINST HUMAN AFRICAN TRYPANOSOMIASIS: A NEW APPROACH OF MÉDECINS SANS FRONTIÈRES WITH A MOBILE TEAM

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Despite great advances in human African trypanosomiasis (HAT) control in the last decade, continued efforts and innovative approaches are essential for the goal of eliminating HAT as a public health problem. The ongoing experience in MSF field projects questions whether the true burden of the disease is not much higher than the number of new cases reported to WHO in 2009. MSF has recently set up a new mobile team operating internationally in endemic countries. Working in collaboration with national control programs and other partners, the international mobile HAT team (IHT) wants to facilitate diagnosis and treatment for neglected populations that are difficult to access. The IHT will work with national control programs and will offer support where needed. Active village based screening will be the main activity and treatment facilities will be provided when new foci are found. The IHT will have a flexible response capacity which will adapt to regional conditions and work closely with local players to insure best practice across regions and without borders. The IHT further wants to develop and improve operational HAT models through integration of new approaches and upcoming technologies in collaboration with national and international research institutions.

In the presentation the IHT will describe the strategy in more detail. It is anticipated that the ISCTRC platform will facilitate stimulating discussion leading to further development of the IHT approach.

3.50

SLEEPING SICKNESS IN THE COASTAL AREA OF GABON: EPIDEMIOLOGICAL AND ENTOMOLOGICAL CHARACTERISTICS

KOHAGNE TONGUE L., GOUNOUE KAMKUMO R., MENGUE M'EYI P., LOUIS F.J.

Gabon is a meso-endemic country for human African trypanosomiasis, with less than 50 new cases reported per year. Patients are from Estuaire and Ogooue-Maritime Provinces, bordering the Atlantic Ocean. To clarify the epidemiological and entomological characteristics of HAT transmission in this country, a retrospective survey and trapping were conducted in two endemic foci located in the coastal area, with varied biogeographic features, consisting of secondary forests, flooded forests and mangroves. After analysing blood meals and tse tse infected organs by ELISA and PCR respectively, we noted that the landing structures built in the flooded forest or in the mangroves were the main sites of disease transmission. Fishermen are four times more at risk of contracting sleeping sickness, which affects more men than women. There are four taxonomic groups of flies, but *G. palpalis palpalis*, which is found everywhere, is the most abundant. The fly seems to feed more on animals than on humans, and species of human trypanosome (*T. brucei gambiense* group I) and animals (*T. vivax, T. brucei sl and T. congolense*) were identified. The results confirm that the Gabonese coastline has an area at risk of trypanosomiasis. It seems necessary to establish an integrated strategy to prevent the spread of the disease to suburban areas of the two major cities: Libreville and Port Gentil.

ANIMAL AFRICAN TRYPANOSOMIASIS (AAT)

ORAL

CHEMOTHERAPY AND DRUG RESISTANCE

4.01

ASSESSMENT OF ANTI-TRYPANOSOMAL DRUG RESISTANCE IN CATTLE OF THE LADDUGA GRAZING RESERVE, KACHIA, NIGERIA

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A survey was conducted to determine the occurrence and magnitude of anti-trypanosomal drug resistance in cattle of the Ladduga Grazing Reserve. The 310 cattle used in the study were randomly selected from each of the 6 blocks of the reserve. Blood samples obtained by venipuncture from the cattle were examined for trypanosomes by the Buffy Coat Technique and a PCR-based assay technique. Naturally occurring trypanosomal infections, diagnosed microscopically, in the cattle (No. detected parasitaemic/No. examined) were 11/71 (block I), 14/60 (block II), 39/54 (block III), 42/50 (block IV), 21/43 (block V) and 29/29 (block VI). In this study, we applied a protocol for rapid detection of anti-trypanosomal drug resistance hotspots which involved the monitoring of all the 156 cattle detected parasitaemic that were divided into two equal groups of 78 subjects each and treated on day 0 with diminazene aceturate (7.0 mg/kg, i.m.) or isometamidium chloride (0.5 mg/kg, i.m.). All treated cattle subsequently detected parasitaemic when re-examined on day 14 received treatment with the other "*sanative pair*" drug (i.e. diminazene in those previously treated with isometamidium, and vice versa). All the cattle

treated on day 14 and subsequently detected parasitaemic on day 28 were treated with the other *"sanative pair"* drug. The infections included single infections with *Trypanosoma brucei* (8.9%), *T. congolense* (46.2%) and *T. vivax* (3.8%), and mixed infections of *T. brucei /T. congolense* (28.9%), *T. congolense /T. vivax* (7.1%), *T. brucei /T. vivax* (0.6%), and *T. brucei /T. congolense /T. vivax* (5.1%). Regardless of the *Trypanosoma spp* found and nature (single/multiple) of the infection, the overall treatment failure rate determined on day 14 was 20.3% for isometamidium and 10.7% for diminazene. Data determined on day 28 indicated overall failure rates of 40.5% for treatment with isometamidium and 7.3% for that with the *"sanative pair"*. Based on response to questionnaire surveys, the herdsmen indicated that they readily purchased and self-administered diminazene or isometamidium to their cattle although only 20% of the respondents appeared to use the correct dosages of the two drugs. Data from the study would contribute to the mapping and control of animal trypanosomiasis in Nigeria and the West African cotton belt.

4.02

ASSESSMENT OF TRYPANOCIDAL DRUG RESISTANCE ON THE ADAMAOUA PLATEAU IN CAMEROON USING A FIELD TEST AND A STANDARDISED TEST IN MICE.

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Based on a survey in a few villages of the department of Faro and Déo the village of Kontcha where the highest trypanosomosis prevalence (32.5%) was observed has been selected to evaluate the resistance of trypanosomes to diminazene and isometamidium. Two groups of 40 cattle each were treated on day 0 either with diminazene or with isometamidium. The animals were monitored using the buffy coat technique with an interval of two weeks during a period of two months. The trypanosomosis incidence in the groups treated with diminazene and isometamidium was 32.5 and 27.5%, respectively. Survival analysis and the mean hazard ratio (1.38) suggested a certain resistance to isometamidium and a reduced protective activity of this drug. An important number of animals which was treated with diminazene at 7 mg/kg were found positive two weeks after treatment indicating a strong suspicion of resistance to this trypanocidal compound. These field results were corroborated by the results of the standard mouse test using 6 isolates of *T. congolense*. Sensitivity tests using 1 mg/kg isometamidium chloride or 20 mg/kg diminazene aceturate showed that 4 isolates were resistant to both products whereas the 2 other isolates were resistant against one of these drugs. This study is the first report of trypanocidal drug resistance in Cameroon.

4.03

BINDING OF THE TRYPANOCIDAL DRUGS DIMINAZENE ACETURATE, HOMIDIUM CHLORIDE AND ISOMETAMIDIUM CHLORIDE TO BOVINE ERYTHROCYTES

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Pharmacokinetic parameters are usually determined by analysis of drug concentration in plasma rather than whole blood. However, certain drugs have high blood-to- plasma concentration ratio (Kb/p) an indication of drug binding to erythrocytes. Knowledge of the partitioning of therapeutic compounds into red blood cells (RBCs) is important in interpreting and understanding their pharmacokinetic profile. We report the Kb/p and percent binding to red blood cells of three important trypanocidal drugs. Three groups of three steers each were treated intra muscularly with ^{14}C labeled, diminazene aceturate, isometamidium chloride and homidium chloride at dose rates of 3.5mg/kg, 1mg/kg and 1mg/kg bw respectively. Drug levels were determined by measuring radioactivity in whole blood and plasma samples collected at 15 min, 30 min, 1 hrs, 4 hrs, 8 hrs and daily for 14 days. The Kp/b ratio of the three drugs was determined by dividing the drug concentrations in blood by the concentration in plasma. Erythrocyte fraction was determined by packed cell volume (PCV). The fraction bound, expressed in percentage was based on the ratio of the drug concentration in the erythrocytes to that in whole blood. The overall mean (±SE) percentage binding decreased in the order, homidium chloride (32.87±0.97) > isometamidium chloride (12.75±1.35) > diminazene aceturate (1.09±0.73) while Kb/p was 0.99±0.1 for homidium, 0.77±0.06 for isometamidium and 0.71±0.09 for diminazene. Based on these results it can be concluded that RBCs uptake of homidium but not of diminazene and isometamidium may influence pharmacokinetic parameters calculated from plasma drug levels.

4.04

IMPROVED PCR-RFLP FOR THE DETECTION OF DIMINAZENE RESISTANCE IN *TRYPANOSOMA CONGOLENSE* UNDER FIELD CONDITIONS USING FILTER PAPERS FOR SAMPLE STORAGE

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Despite the break-through due to the development of a BclI-PCR-RFLP for the diagnosis of diminazene aceturate (DA) resistance in *Trypanosoma congolense (Tc)*, the test's ability to amplify low concentrations of parasite DNA needs to be enhanced and its specificity improved by preventing incomplete digestion of the amplicon. To evaluate the performance of the improved PCR-RFLP using the DpnII enzyme, use was made of 449 whole blood spots on filter papers collected from parasitologically positive cattle originating from the cotton zone of Southern Mali. A total of 68% of all blood spots was found positive for the presence of trypanosomes using the 18S pan-PCR developed by Geysen et al. (2003). Of these, 74% (225) were diagnosed as a single or mixed *Tc* infection. Out of these *Tc* positive samples, 26% (59) amplified using the DpnII-PCR-RFLP. By adding a step of whole genome amplification, an extra 42 samples became positive, reaching a total of 44.9% (101). The DA resistance profiles of the 101 amplified *Tc* samples were

distributed as follows: 93% were resistant, 2% sensitive and 5% presented a mixed profile. In view of the above, the test's ability to amplify low concentrations of DNA was enhanced by adding a step of whole genome amplification using the QIAGEN REPLI-g® UltraFast Mini Kit. Its specificity was improved by replacing the BclI (T ^ GATCA) enzyme by DpnII (^ GATC). Finally, sample collection, storage and transfer could be facilitated by collecting blood spots or buffy coats on filter paper (Whatman N°4, Whatman®).

Key words: *Trypanosoma, congolense, resistance, diminazene, diagnosis, PCR, RFLP*

4.05

SENSITIVITY AND VIRULENCE OF *TRYPANOSOMA EVANSI* ISOLATES FROM CAMELS IN MARSABIT COUNTY, KENYA

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Trypanosomosis has been identified as the most important disease of camels in Kenya. *Trypanosoma evansi* transmitted by biting flies is the most important and widely distributed trypanosomes that cause the disease in camels. Forty two t*rypanosoma evansi* isolates were prepared from blood of infected camels from Marsabit County in North eastern Kenya and stored in liquid nitrogen. The viability of the stabilates in mice was determined by inoculating 0.2 ml of the blood into two immunosuppressed mice. The drug sensitivity of the isolates were determined using the single dose mouse sensitivity test. Experimental mice were monitored for 60 days post treatment.

Out of 30 stabilates inoculated into mice 46.6% established an infection. The pre-patent period for isolates varied from 2 to 6 days with a mean of 3 days. The survival period of mice infected with the isolates varied from a minimum average of 8.6 ±0.5 days to a maximum average of 40.6±11.9 days. Approximately 43% of the 14 isolates tested were sensitive to isometamidium at 1mg/kg and 71% were sensitive to diminazene aceturate at 20mg/kg). All isolates were resistant to homidium at 1mg/kg and 93% of the isolates were resistant to quinapyramine sulphate (Triquin®) at 1mg/kg. Isometamidium, diminazene and quinapyramine treatment significantly ($p<0.05$) increased the survival period of mice infected with the isolates. The variation in virulence and sensitivity of the *T. evansi* isolated from Marsabit has implication in strategic use of trypanocidal drugs for control of *T. evansi* in camels.

4.06

SITUATION OF TRYPANOCIDES IN MAURITANIA

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With a surface of 1 030 000 km ^{2} of which 77 % of the territory receive a rain ranging between 0 and 100 mm, Mauritania is an excellence country for camels breeding whose is estimated around 1,4 million head. Indeed, the dromedaries are intimate dregs to the ecological, climatic and sociocultural conditions of the country.

The consequences of the repeated dryness which caused 15 to 30 % of mortality of small ruminants, 20 to 50 % of cattle and 5 % only of dromedaries made that the dromedary occupies from now on an increasingly significant place of the Mauritanian economy by their provisioning of red meat and with the very significant development of its fresh or pasteurized milk die. They are entrusted to extremely by mobile shepherds to search of better pastures and water points on the level of pastoral space of Mauritanian and in the countries borders. This mode of breeding exposes these animals to various diseases among which, the camel trypanosomis, considered as one of pathologies responsible for considerable economic losses.

Thanks to the purchasing power of the stockbreeders of dromedaries combined to their knowledge and the impact of the camel trypanosomosis, Mauritania is a potential market of the trypanocides.

The authors, after investigation near veterinary pharmacies and deposits, drew up the list following of the trypanocides at those which answered their questionnaires. It is about: Trypamidium®, Sécuridium®, Quinaject ®, Trypadim®, Babenic®, Véribenⓡ, Veridium®, Diminazen®, Trypan®, Tryplas-N®, Bibaject®, Bitachim®, Diminazène 2,36+B12, Asipyr®, Cymelarsan®, Trypadim®, Sangavet, etc.

Would the passion of the camel drivers for these trypanocides whose access is easy on the ground in Mauritania justify by their effectiveness or the fact that the stockbreeders are prisoners of the publicity of the manufacturers? In the absence of systematic control of effectiveness of these trypanocides in Mauritania, the results of this investigation are discussed compared to their diversity, their source, their effectiveness against to *T evansi* the doses annually ordered compared to the manpower of the dromedaries, their condition of conservation and use by the stockbreeders, etc. The information collected in addition to those obtained from the Livestock office, led the authors to propose condition of uses of the trypanocides and their rational use according to the epidemiologic situation of the disease according to the zones visited in the country or the frontier countries.

Key words: *Mauritania, Dromedaries, Trypanosomosis, T. evansi Trypanocides*

4.07

AN UPDATE OF THE SITUATION OF TRYPNOCIDAL DRUG RESISTANCE IN LIVESTOCK IN SUBSAHARAN AFRICA

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African animal trypanosomosis remains one of the major constraints for livestock development in subsaharan Africa. For the control of this disease, chemotherapy is the most used strategy. However, this chemotherapy relies on a few number of old molecules of which the repeated and often incorrect use, led to the emergence of resistant trypanosome strains in some regions. The resistance of trypanosomes has been reported in more than fifteen countries in subsaharan Africa. These reports are based on the use of different protocols. If in the practice, the suspicion of the resistance is often raised by the apparent lack effectiveness of a treatment, its confirmation relies on the use of different methods including field methods calling for statistical analyses (Khi^2, Reduction of the Relative Risk, "Ratio of Eisler ") with different follow up durations (28 and 56 days) and laboratory methods. In the present work, the authors have compiled and analyzed different results related to trypanosome resistance in subsaharan Africa.

Keywords*: Trypanosomes, chemoresistance, trypanocide, subsaharan Africa.*

4.08

VALIDATION OF SITE-SPECIFIC SPRAYING OF CATTLE FOR TRYPANOSOMOSIS CONTROL IN *GLOSSINA FUSCIPES FUSCIPES* INFESTED AREAS IN UGANDA

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In a bid to enhance bovine trypanosomosis control in tsetse-infested rural areas in Uganda by livestock keepers, restricted application of deltamethrin to legs and ventral abdomen of cattle was assessed for its effectiveness in reducing the prevalence of trypanosomosis and tsetse apparent density in areas infested with *Glossina fuscipes fuscipes* over a 10-months period. The study was conducted in 9 villages in Amuria, Dokolo and Kaberamaido districts from December 2008 to September 2009. A total of 600 cattle were sprayed and tested for trypanosomosis every 4 weeks in 6 experimental villages, 2 per district. In addition, 300 cattle were tested for trypanosomosis every 4 weeks in 3 control villages, 1 per district. At the same time, tsetse-trapping was conducted to assess reduction in tsetse apparent density. A decline in the prevalence of trypanosomosis from 10% to 0%, 12% to 1% and 11% to 0% was achieved in Amuria, Dokolo and Kaberamaido, respectively, between December 2008 and July 2009. Correspondingly, a decline in the tsetse apparent density from 3.0 to 0.0, 2.7 to 0.0 and 1.5 to 0.0 was achieved in Amuria, Dokolo and Kaberamaido, respectively, between December 2008 to July 2009. This study shows that a 100% decline in prevalence of trypanosomosis and tsetse apparent density was achieved within a period of 8 and 7 months, respectively. Cattle in experimental villages had a significantly higher ($P < 0.05$) mean PCV than those in control villages. The low-cost property of this method, its simplicity of application and quick effect on the improvement of livestock health and productivity and its ability to simultaneously control trypanosomosis and tick-borne diseases instantly attracted farmers' participation.

EPIDEMIOLOGY

4.09
COMPARATIVE PREVALENCE OF ANIMAL TRYPANOSOMOSIS IN TSETSE INFESTED AND TSETSE FREE PARTS OF ETHIOPIA.

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An epidemiological study on animal trypanosomosis was conducted on 796 cattle. In southwest Ethiopia, 411 animals were examined in two tsetse infested areas, Jimma and Gurage, In the central-western highlands a tsetse free zone, 385 animals were examined in Horro-Guduru. Parasite and molecular diagnosis was performed respectively with Woo test and with ITS-1 PCR. In Woo, overall trypanosomosis prevalence was 7.3% with 4.1% and 1.6% mono infections of *T. vivax* and *T. congolense* respectively. In ITS-1 PCR, overall prevalence was 26.9%, with mono infections of respectively 16.9%, 3.3%, 1.3% and 1.1 % for *T. vivax*, *T. congolense*, *T. theileri* and *Trypanozoon*. With this PCR, the following mixed infections were recorded: *T. vivax* + *T. congolense* (1.8%), *T. vivax* + *T. theileri* (1.8%), *T. vivax* + *Trypanozoon* (0.4%), *T. congolense* +*T. theileri* (0.3%), *T. congolense* + *Trypanozoon* (0.3%). There was significant difference ($p<0.05$) in prevalence of trypanosomosis in tsetse infested (32.4%) and tsetse free areas (21.1%). Based on the ITS-1 PCR results, *T. congolense*, with a prevalence of 3.3% in tsetse infested area was the only trypanosome species that was not found in the tsetse free area. ,The other taxa, *T.*

vivax, *T. theileri*, *Trypanozoon*, were observed in both tsetse infested and tsetse free study sites with similar prevalence.

4.10

GENETIC CHARACTERIZATION OF *TRYPANOSOMA BRUCEI* CIRCULATING IN DOMESTIC ANIMALS OF THE FONTEM SLEEPING SICKNESS FOCUS OF CAMEROON

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To identify *Trypanosoma brucei* genotypes circulating in mammals of the Fontem sleeping sickness focus of Cameroon, 397 domestic animals including 225 pigs, 87 goats, 65 sheep and 20 dogs were sampled. The CATT 1.3 test and the parasitological examinations were positive for 63.98% and 21.9% of the 397 animals, respectively. *T. brucei* specific primers revealed 147 (37.02%) animals infected by this trypanosome species. Of these 147 *T. brucei* positive samples, *Trypanosoma brucei gambiense* represented 9.8% (39/397); confirming the circulation of the trypanosome pathogenic for man in the Fontem focus. The genetic characterization of 147 *T. brucei* positive samples with seven microsatellite markers revealed 89 different alleles: 82 in pigs, 72 in goat, 60 in sheep and 48 in dog. The sensitivity of the microsatellite markers varies significantly ($\chi 2$ = 120,32; P <0,0001) between them. The MICBG1 and MICBG6 appear as the most polymorphic markers. A high level (80.95%) of mixed infections of different *T. brucei* genotypes were identified in domestic animals of the Fontem HAT focus; indicating that several genotypes can be transmitted to tsetse during a single blood meal. These results open new avenues to undertake investigations on the development of multiple infections in tsetse flies. Such investigations may allow to understand how the multiple infections evolve from the tsetse flies mid-guts to the

salivary glands and also to understand the consequence of these evolutions on the dynamic of trypanosomes transmission.

4.11

IMPACT OF DROUGHT AND DEGRADATION OF PROTECTED AREAS ON THE DISTRIBUTION OF BOVINE TRYPANOSOMOSES AND THEIR VECTORS IN THE OTI CATCHMENT BASIN OF NORTHERN TOGO

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Located at the transition of the semiarid area in the North and the humid area in the South, the Oti catchment basin (OCB) has been subjected to high anthropic and climatic pressures from the 1970s to the 1990s. Drought, advancing desertification and economic activities, which rely mainly on crops and animal husbandry, contributed to the deterioration of the basin. In addition, because of its location, OCB is visited by transhumant cattle from Burkina Faso and Niger every year during the dry season. This seasonal movement of transhumant cattle engenders transmission and upholding of transboundary animal diseases, in particular bovine trypanosomoses. Bibliographical and field data, collected at the end of the dry season in April and May 2006, and processed by a GIS, allowed to assess the impact of anthropic and climatic factors on the epidemiology of animal trypanosomoses in OCB. Results of the survey showed that OCB was badly degraded; large wild mammals and Glossina species have become almost extinct in the wildlife reserve of the Lion's Den. Glossina tachinoides was the only species captured north of 10° latitude N. Trypanosoma vivax was listed as the main parasite responsible for bovine trypanosomosis. It was concluded that land encroachment by man and climate change contributed to the southward retreat of the distribution area of Glossina species.

Keywords: *Cattle – Glossina – Trypanosomosis – Drought – Deforestation – Geographical information system – Togo.*

4.12

EVALUATION OF TRYPANOSOMOSIS CONTROL STRATEGIES USED BY CAMEL KEEPING COMMUNITIES IN MARSABIT AND ISIOLO COUNTIES

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Kenya has the fifth largest camel herd in the world kept by different communities mainly in Isiolo and Marsabit counties. Camel trypanosomosis is endemic in these counties and adversely affects camel productivity. A study was carried out to evaluate the strategies used by five camel keeping communities to control trypanosomosis in camel in Marsabit and Isiolo counties. Structured questionnaires were administered to 184 respondents in four areas in Marsabit county and 3 areas in Isiolo County. A majority (55%) of respondents in all sites, except Isiolo Central division, controlled tsetse flies and/or other biting flies by spraying the camels, with 64% of them using acaricides (Triatix®). Majority (71.4%) of camel herders from Isiolo Central division did not use anything to control biting flies. However, they migrate from or avoid the infested areas. There was a significant ($p < 0.05$) variation in the products used to treat trypanosomosis between the camel-keeping communities. This varied from use of Oxytetracyline® (Rendilles), Samorin® and Novidium® (Somalis), Triquin and Novidium (Boranas) and ethno medicine (Turkanas). Between 5.3% - 25.7% of respondents mixed drugs particularly Terramycin® with Novidium®, while between 2.9% - 34.3% reported treatment failure. It would appear there is inappropriate use of the trypanosomosis control strategies by camel keepers in the two counties which has led to infective control of the disease in camels. This needs to be addressed through appropriate training of the camel keepers.

4.13

MOLECULAR EPIDEMIOLOGY OF RE-EMERGING TRYPANOSOMOSIS IN CHOMA-KALOMO BLOCK OF THE SOUTHERN PROVINCE OF ZAMBIA

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The aim of the study was to investigate the prevalence and risk factors of re-emerging bovine trypanosomosis in the Choma-Kalomo block of Southern Province of Zambia using a molecular technique –Loop-mediated isothermal amplification (LAMP). The study area was aerial sprayed in 1987. A total of 460 blood samples collected were analysed using the buffy coat examination and buffy coat spots on Whiteman filter paper (for DNA extraction). A LAMP reaction was performed using the extracted DNA as template for detection of trypanosomes using Loopamp DNA amplification kit. Results obtained from the study indicate a prevalence of 12.8% using LAMP while parasitological method was 4.8%. Furthermore, more cows were infected with trypanosomes than any other age category. There is re-surgence of bovine trypanosomosis in Choma-Kalomo block. The use of parasitological methods in the diagnosis of trypanosomosis underestimates the actual prevalence of the disease due to low sensitive of the technique. Therefore, in order to prevent the spread of the disease, more specific and sensitivity techniques such as LAMP must be used in the diagnosis of trypanoaomosis. LAMP technique does not require sophificated instrument as compared to polymerase chain reaction hence suitable for most resource poor African countries.

4.14

SEASONAL STUDIES OF TSETSE AND TRYPANOSOMIASIS SITUATION AT NGORONGORO CONCERVATION AREA AND THE SURROUNDING VILLAGES

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Ngorongoro conservation area is one of the important areas in northern Tanzania whereby pastoralism, conservation activities and tourism co-exist.

From 2009-2010, seasonal studies were conducted (dry and wet) to identify the tsetse species and their density distribution in and the surrounding villages. Trapping of the tsetse flies were performed using different convectional traps which were deployed with standard odor attractants and the blood samples were collected from the randomly selected cattle, for parasitological assays.

The results showed that the 13 villages surveyed in and outside Ngorongoro conservation areas were infested with three tsetse species (*Glossina. swynnertoni G. pallidipes, a*nd *G. m. centralis*) and *G. swynnertoni* was found dominant. Out of 182 local cattle sampled in the dry season, 10 (5.45%) animals were infected while in the rain season, 3 (1.39%) out of the 251 cattle sampled were also positive and all were infected with either *T. congolense* or *T.brucei*. Results from dissections indicated that all the three trypanosomes (*T. congolense, T.brucei* and *T vivax)* were found in the flies.

The results from this study indicated that Ngorongoro is highly infested with tsetse flies and the problem of trypanosomiasis to both animals and possibly to human was noted. Therefore a deliberate efforts need to be made for sustainable control interventions in order to break the transmission cycle.

Keywords: *Glossina, African Animal Trypanosomiasis, tsetse, traps*

4.15

STATUS OF TSETSE-TRANSMITTED TRYPANOSOMIASES IN LIVESTOCK AND MAN IN THE MANAFWA-RIVER-CRESCENT DISTRICTS IN SOUTH-EASTERN UGANDA

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A situation analysis of the tsetse-transmitted Trypanosomiasis problem in Uganda will update the GIS-based decision-support tool for reducing the impact of Tsetse-transmitted Trypanosomiases in livestock and man across agro-pastoral farming communities in Uganda. Mapped relationships derived from primary data (tsetse fly vector species and incidence of Trypanosomiases (nagana and sleeping sickness) in Manafwa-Malaba river system in SE Uganda known to be affected by floods and landslides since 2007 shows that bovine Trypanosomiasis in all affected districts varies little between extended wet and dry seasons in September 2010 and January 2011.

Nagana situation in September 2010 was overall for Manafwa at 16% (with Bugobero – 1%; Butiru – 25%; Bushiende – 7%; and Busiu – 38%); Mbale at 38%; Iganga at overall 4% (Ibulanku – 2%; Namungalwe – 3%; Nawandala – 0%; Nawaikoke – 2%) and Namutumba – 10% (Bulange – 5%-12%; Magada - 12%) . Nagana data for the above regions in 2011 showed the problem is still heavy in the Manafwa (16%); slightly low in Mbale - 33%; Butalejja at Bunghazi -31% and Himutu – 8%). The survey was extended to Kumi – Mukongoro/Agaria area were we saw 10% infection with 8/14 being T. vivax 2010 survey found only biting flies in the area; Ngora – Kobuin/Atoot had 4% Iganga-Ibulinaku had 3.8 % while Namutumba – Bulange had 10%.

This data showed no reduced prevalence of nagana in districts bodering Manafwa river namely Manafwa, Busiu, Butalejja and Namutumba. Besides there is now an outbreak of sleeping sickness in Bukedea country where tsetsefly presence is now confirmed in previously un-infested communal

grazing valleys in the heart of the district. Fly data and environmental data is being mapped to create risk maps for decision support. This data will be related to the tsetse genetic mtDNA haplotype mapping and will be geo-processed. Reports will provide for a rational evidence-based protocol for managing Tsetse-transmitted Trypanosomiases (human and animal) in mid South-Eastern Uganda.

IMMUNOLOGY

4.16

EVALUATION OF ANTIBODY RESPONSE AGAINST *GLOSSINA* SALIVA IN CATTLE: A SUPPLEMENTARY / ALTERNATIVE APPROACH TO ASSESS EXPOSURE OF TSETSE BITES

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Our study proposes a new strategy, at low cost, that is alternative and/or complementary to the entomological methods based on trapping tsetse flies, to target and evaluate tsetse flies control programs in animal african trypanosomosis. It aims to develop a sero-epidemiological tool to assess cattle exposure to tsetse bites. IgG responses against *Glossina* saliva was assessed by ELISA on (i) 101 bovine sera from Burkina Faso of which, 48 were sedentary cattle from a tsetse free area and 53 were from a tsetse infested area; and (ii) bovine that were experimentally exposed to tsetse flies and other bloodsucking arthropods. High anti-saliva antibody (Ab) responses were detected in cows from the tsetse infested area and showed a significantly higher response during the dry season. Furthermore, a positive association was found between the anti-saliva response and the risk of being infected by

trypanosomes. When cross-reactions between Glossina saliva and other hematophagous vectors were tested, only the saliva of *Tabanidae spp* was found to be positive. In any case, Ab response to *Glossina spp* saliva is transient and decreases within 4 weeks after the stop of experimental exposure. This character is a major advantage to design a biomarker of exposure based on the Ab response to tsetse saliva. Immunoproteomic screening followed by mass spectrometry is currently underway. In perspectives, synthetic peptides will be designed in order to develop an easy and reproducible test with higher specificity for the evaluation of *Glossina* exposure.

Key words: *Animal African Trypanosomosis, Glossina saliva, biomarker of exposure, specific salivary antigens*

POSTERS

4.17

ASSESSMENT OF TRYPANOCIDAL DRUG RESISTANT *TRYPANOSOMA CONGOLENSE* ISOLATES IN SELECTED SITES OF WESTERN AMHARA REGIONAL STATE, ETHIOPIA

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A study was conducted from December 2009 to July 2010 in trypanosomosis endemic areas of Western Amhara Regional State, Ethiopia with the objective of assessing trypanocidal drug resistant *Trypanosoma congolense* isolates. Experimental trypanocidal drug sensitivity test was performed in experimentally infected mice using combined and separately pooled trypanosomal isolates obtained from different districts. Point prevalence of trypanosomosis obtained from cattle screened for isolation was found to be 12.4 % in Debreelias, 20 % in Dembecha and 27.2 % for Jabitahnan. *Trypanosoma congolense* accounted for 72.9 % the overall trypanosomosis cases. The drugs tested failed to permanently clear the parasite, being relapsing at 5.8±0.96 days with 70 mg/kg Diminazene aceturate; 14.2±1.99 days with 10 mg/kg Isometamidium chloride and 4.6±3.75 days with 10 mg/kg Homidium bromide. The difference in the relapse duration was found to be statistically significant ($p<0.001$) among drugs, longer with Isometamidium chloride than others. The drugs were also unable to permanently clear trypanosomes from the combined pool when given in combination at intervals, as there was a 40 % relapse with 70 mg/kg Diminazene aceturate initial treatment followed by Isometamidium chloride 5 mg/kg at 17±3.92 days. However sanative pairs appeared to be relatively effective than single drug alone, as relapse duration was significantly longer ($P<0.001$) in the former than the latter. Separate pools from each district was also used to compare the relative contribution of drug resistance phenotype in

combined pool and similar results were observed (relapses at 7.8±1.57 days; 7.0±1.24 days and 5.8±0.96 days with 70 mg/kg Diminazene aceturate; 17.50±1.88 days; 18.20±2.66 days and 11.00±2.15 days with 10 mg/kg Isometamidium chloride in pools from Debreelias, Dembecha and Jabitahnan, respectively). The present study revealed the presence of multi drug resistance that could most probably be attributed to the drug-use practices exercised in the livestock production system. Wise use of currently available trypanocides with other alternative control strategies should be adopted as timely solution for the current problem of trypanosomosis in the region.

Keywords: *Bovine, Relapse duration, T. congolense, Trypanocidal drugs, Western Amhara, Ethiopia.*

4.18

BASELINE SURVEY OF ANIMAL TRYPANOSOMOSIS IN THE REGION OF THE BOUCLE DU MOUHOUN, BURKINA FASO

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In order to have a baseline situation on the prevalence of the animal trypanosomosis, the Pan African Tsetse and Trypanosomiasis Eradication Campaign (PATTEC) financed a cross sectional survey in the Region of the Boucle du Mouhoun, priority zone of tsetse and trypanosomosis intervention of the project. This cross sectional study was carried out in 53 villages located in the 6 provinces of the region. Overall, 2002 bovines, 1466 small ruminants and 481 donkeys were sampled. This survey showed that almost half of the cattle were subjected to a trypanocide treatment whereas less than 6% and 1% of the small ruminants and donkeys were treated against the trypanosomose respectively. Because of the systematic treatments in the zones at trypanosomosis risk, the parasitological prevalence for the different species remained weak, 1.3%, 0.8%, and 0.5% in bovines, donkeys and sheep respectively. The parasitological prevalence was null in goats. The infections were due mainly to *Trypanosoma vivax* with few cases of *T. congolense*. However, ELISA analyses revealed serological prevalence of 37.4%, 20%, 9.4%, and 9.1% in bovines, sheep, goats and donkeys respectively. In general, the prevalence of the trypanosomosis was high in the villages located along the Mouhoun River and its principal tributaries. Moreover in all the villages where trypanosomosis cases were detected in the other species, cases in bovines were also found there. The study has showed that the risk of infection with trypanosomes was strongly associated to some descriptive variables of the sampled animals.

***Key words**: PATTEC, Trypanosomosis, Small ruminants, Donkeys, Boucle du Mouhoun, Burkina Faso*

4.19

BOVINE TRYPANOSOMOSIS IN THE UPPER WEST REGION OF GHANA: ENTOMOLOGICAL, PARASITOLOGICAL AND SEROLOGICAL CROSS-SECTIONAL SURVEYS

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Baseline surveys were conducted in the Upper West Region of Ghana to assess the distribution and densities of tsetse species, as well as the prevalence of bovine trypanosomosis. The study was carried out in the framework of the Pan African Tsetse and Trypanosomosis Eradication initiative (PATTEC) and the objective of the surveys was to collect accurate and recent data for project implementation, monitoring and evaluation. The choice of the intervention area was guided by economic (i.e. potential for high economic return), entomological, and geographic considerations. In particular, the concerted multinational approach advocated by PATTEC aims at the creation of tsetse free areas between Ghana, Burkina-Faso and Mali. The entomological survey focused on suitable tsetse habitats along the three main rivers in the study area (i.e. BlackVolta, Kulpawn and Sissili). The parasitological and serological surveys were conducted on a multistage sampling of 1800 cattle randomly selected over 36 grid-cells across the study area. Results indicated the presence of *Glossina tachinoides* in all three river basins, whilst *Glossina palpalis gambiensis* was only found at the southern limit of the study area. The average parasitological prevalence, based on Buffy coat technique, was estimated at 2.5% (95% CI: 1.06–5.77) while serological prevalence from ELISA test was 19% (95% CI: 14.03–25.35). The wide disparity between parasitological and serological prevalence is largely attributed to the use of

trypanocidal drugs. The findings of the present study enabled an integrated tsetse elimination strategy to be developed, which combines aerial spraying (Sequential Aerosol Technique), ground spraying, insecticide treated targets and cattle pour-on.

4.20

EPIDEMIOLOGY OF TRYPANOSOMOSES AROUND AN ISOLATED TSETSE POCKET IN SENEGAL AND POTENTIAL IMPACT OF THEIR ERADICATION.

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The government of Senegal launched a tsetse eradication campaign in 2007. The feasibility study revealed that an isolated tsetse pocket of about 1000km^2 keeps transmitting African Trypanosomoses (AAT) in the study area. In order to anticipate the potential impact of their eradication, the prevalence and incidence of AAT (sentinel herds) were studied in and around the infested area. The results show that cyclic transmission is still preponderant and that mechanical transmission is almost absent. Actually, a negative correlation between AAT prevalence and the distance to the closest tsetse captured was observed, together with a positive correlation between AAT incidence and tsetse apparent densities. The incidence of AAT in the absence of tsetse was null. The eradication of tsetse will thus probably lead to the simultaneous eradication of AAT. Moreover, this impact will probably extend outside the control area.

4.21

HALF A CENTURY OF TSETSE AND TRYPANOSOMOSIS CONTROL ON THE ADAMAOUA PLATEAU IN CAMEROON

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The invasion of tsetse flies into the Adamaoua plateau occurred in the 1950s and resulted in high mortality in cattle due to trypanosomosis. Three species of tsetse flies have been recorded: *Glossina morsitans submorsitans*, *G. fuscipes fuscipes* and *G. tachinoides*. Between 1960 and 1975 the Cameroonian Government organized large-scale trypanocidal treatment campaigns of cattle. Later on, tsetse control activities were initiated. Between 1976 and 1994 several aerial spraying campaigns were carried out which resulted in the clearance of 3,200,000 ha of pastures. Unfortunately, reinvasion of tsetse flies in several cleared areas could not be avoided. To prevent reinvasion of tsetse flies from the Plain of Koutine (north of the Adamaoua plateau) a barrier consisting of targets and traps was put in place. However, bush fires destroyed most of the targets and traps soon after deployment in 1994. Thereafter, the barrier was replaced by a program of insecticide-treatments of cattle. Cross-sectional and longitudinal parasitological and entomological surveys in 2004-05 showed that the barrier of insecticide-treated cattle had succeeded in keeping the plateau relatively free of tsetse flies. The incidence of trypanosomosis in cattle on the plateau was reported to vary between 0 and 2.1%.

4.22

IMPROVING CATTLE INDUSTRY THROUGH SURVEILLANCE AND CONTROL OF TRYPANOSOMIASIS IN KAURU AREA, KADUNA STATE, NIGERIA

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Running title: Surveillance and control of trypanosomiasis in cattle in a village community in northern Nigeria.

Following claims of severe trypanosomiasis which disrupted farming activities, devastated communal cattle industry and flight of 32 cattle herders with over 70 heads and families in Kauru area, Nigeria, we investigated tsetse and trypanosomiasis distribution aimed at instituting control measures. The study was conducted between late February to early March and October, 2008 and blood samples collected at random from 964 cattle from nine sampling sites were examined for the presence of trypanosomes using the Buffy coat technique and Giemsa thin blood films. Anaemia was assessed by packed cell volume measurement (PCV). Traps were set for tsetse catch in selected sites along the streams. The knowledge, attitude, perception and treatment seeking behaviours (KAPTSB) were assessed using questionnaires on targeted audience. Results showed dry and wet season's trypanosome prevalence of 23.6 % and 20.1 %, respectively, with 210 cattle found infected giving overall prevalence of 22 %. *Trypanosoma vivax* (203) and *T. congolense* (7) were seen. Mean total PCV values were 22.19 ± 4.82% and 25.14 ± 4.55% for Trypanosome-positive and negative cattle, respectively. *Glossina palpalis* and *G. tachinoides* were trapped including Tabanidae but none of the tsetse was infected with trypanosomes. The qualitative data showed inappropriate health care seeking behaviors and lack of veterinary clinics in the study districts. This study provided linkage between the community and local government and also

data which the government used in planning and treatment of cattle in all the districts. Recommended strategies for sustainable control to enhance livestock productivity in the area are discussed.

Key words: *anemia, cattle industry, control, Kauru, prevalence, tsetse, trypanosomiasis, surveillance*

4.23

PREVALENCE OF TRYPANOSOMA EVANSI AND CO INFECTIONS IN CAMELS IN MARSABIT AND ISIOLO COUNTIES OF KENYA

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Trypanosomosis in camels occurs concurrently with other dieases/ conditions which may adversely affect the course and control of surra. A study was carried out to evaluate the prevalence *T. evansi* and co-infections in camels in Marsabit and Isiolo counties of Kenya. A total of 828 camels were randomly sampled in 5 sites in Isiolo and 4 sites in Marsabit County. Blood samples were collected from the ear vein for packed cell volume (PCV) and parasitological determinations. Faecal samples were collected in polythene bags and Fecal egg count determined In both counties. Trypanosoma evansi infections were observed in only 4 out of the nine sites where camels were sampled, with prevalence of 1%, 6%, 26.7% and 19.4% being observed in Maikona, Dahley, Loglogo and Laisamis respectively. Infected camels had significantly low PCVThe prevalence of anaemia (PCV <25%) varied 4.5% at Daaba to 47.2% at Laisamis. Presence of helminths was observed in all sites in the two counties. The prevalence of helminth infection varied from 26.4% in Laisamis to 84.6% in Daaba. However, helminths co-infections had no significant effect ($p>0.05$) on packed cell volumes of trypanosome positive camels. Other disease conditions observed were mange (20%), dermatophytosis (10%) and abscess in three camels. It is concluded that co infections and other conditions may play an important role in the health and productivity in camel. It is imperative that for effective control of trypanosomosis in camels strategic control of other co infections should be considered

4.24

LOCATION-SPECIFIC TREATMENT REGIMENS FOR AFRICAN ANIMAL TRYPANOSOMOSIS

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During the past half century there have been major advances in our understanding of African animal trypanosomosis (AAT) and vector control. Africa's livestock keepers, however, still remain dependent on a few trypanocidal drugs, notably diminazene aceturate and isometamidium chloride. Most trypanocidal drugs are administered by livestock keepers or paravets: inaccurate diagnosis based only on clinical signs, under-dosing and use of suboptimal drug regimens are often the norm. Many livestock keepers report that local availability of quality animal health products and services is a real issue. To address this situation Ceva is developing a simple 4-step system to help local animal health service providers to design more rational regimens, based on curative and preventative trypanocidal drugs and application of insecticide, to facilitate better and more cost-effective management of AAT tailored to specific local circumstances. The 4 steps are: 1) description of the local situation, such as seasonality of AAT based on rainfall pattern, farming system, and forest and pasture coverage; 2) estimation of the AAT risk by recording local prevalence (proportion of local herds/animals affected per year); 3) identification of the most appropriate and cost-effective control regimen for different types of cattle; use of weighbands to improve estimation of bodyweight and administration of correct doses of drugs and insecticide; 4) monitoring the effect of the treatments and using this information to fine-tune the regimen through a continuous improvement method. The system will be refined based on feedback received during the 31st ISCTRC meeting and then made available by Ceva.

4.25

PATHO - PHYSIOLOGICAL EFFECTS OF EXPERIMENTAL *TRYPANOSOMA CONGOLENSE* AND *TRYPANOSOMA VIVAX* INFECTIONS IN THE GRASSCUTTER (*THRYONOMYS SWINDERIANUS,* TEMMINCK)

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Trypanosome infection might affect grasscutter's productivity while in domestication. The PCV, MCHC, total WBC and Lymphocytes of the grasscutters experimentally infected with *T. congolense* and *T. vivax* decreased ($p<0.05$), while MCV increased ($p<0.05$) 21dpi. Plasma glucose and cholesterol were decreased ($p<0.05$). Body temperature fluctuated between 37.4^0C and 39.2^0C with a peak on day 12 (39.2^0C) in *T. congolense* and 37.5^0C to 40.1^0C which peaked on day 8 (40.1^0C) in *T. vivax*. The livers and kidneys showed vacuolar and tubular epithelial degeneration respectively, with thrombosis in alveolar blood vessels. It was concluded that the grasscutter may serve and might have been playing the role of reservoirs hosts for this economically important disease. Infected grasscutters though did not show clinical signs of this disease, but clearly manifested haematological and tissue changes which could lead to death.

Key words: *Patho-physiology, Trypanosoma congolense, Trypanosoma vivax, Infections, Grasscutter*

4.26

EVALUATION OF THE SEROPREVALENCE OF BOVINE TRYPANOSOMOSIS IN GUINEA

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A study of the prevalence of trypanosomosis was conducted in Guinea on serum samples from the laboratory serum bank. 928 serum samples from N'dama cattle were randomly selected and anlysed by an antibody test for T*rypanosoma spp* and antigens. The results of the first test showed the presence of *Trypanosoma spp* antibodies in 67% of the cattle. The infection rate reached 72% in Upper Guinea, 68% in Lower Guinea, 63% in Forest Guinea, 62% in Middle Guinea. Ranked by sex, 69% of the females are infected or have been in contact with the infectous agent compared to 62% of the males. Animals get infected at any age. The proportions of infections are 71%, 43%, 61%, 63%, 59%, 74% in cattle of less than 1 year, 1 to 2 years, 2 to 3 years, 3 to 4 years, 4 to 5 years, and over 5 years respectively. The second test shows the presence of *T. brucei* antigen in 16% of the serum samples; 11% for *T. congolense*; 2% for *T. vivax*. The distribution and combination of results show that 2% of animals are seropositive for 1, 2, or 3 antigens with no mark of antibodies; 17% of animals are seropositive for antigens and antibodies; half of the animals (50%) have antibodies alone.

***Key words**: Antigens – Antibodies – Trypanosome – Seroprevalence – Bovine – Guinea*

4.27

SURVEY OF CATTLE TRYPANOSOMIASIS AT CERTAIN COMMUNITIES UNDER PASTORAL RESOLVE AREA, KADUNA STATE, NIGERIA

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Animal diseases, especially trypanosomiasis, constitute a major obstacle to livestock production and hamper economic development of much of sub-Saharan Africa. Based on request by Pastoral Resolve (PARE), a Non Governmental Organization, devoted to supporting pastoral development in Nigeria, we undertook a study to clarify the status of cattle trypanosomiasis at certain communities under its domain in November 2007. Blood samples collected at random from 410 cattle were screened for the presence of trypanosomes using the Buffy coat technique and Giemsa thin blood smears. Anaemia assessed by packed cell volume (PCV) was estimated using the Microhaematocrit method and a PCV reader. Out of 410 cattle sampled, 60 were found positive with trypanosomes with overall prevalence of 14.6%. The prevalence in the four communities studied ranged from 7.8 -18.8 % and were quite high. *Trypanosoma vivax* (85 %) produced the most dominant infections; *T. brucei* (11.7 %) and *T. congolense* (3.3 %) infections. The infections markedly reduced the mean PCV of the affected animals 22.3 ± 3.2 % compared to 27.5 ± 2.8 % of trypanosome-negative cattle. The findings showed a high trypanosome infection rates in the areas studied suggesting the need to design control strategies aimed at reducing trypanosomiasis problems towards improved livestock production. Recommended strategies are the use of vector and chemotherapeutic approaches and targeted educational training of pastoralists by Pastoral Resolve Centre for Documentation, Training and Research (PCDTR) staff on the need to embrace best animal practices for effective livestock development and management.

4.28

SURVEY OF CHEMORESISTANCE OF TRYPANOSOMES IN N'DAMA CATTLE IN THE COTTON ZONE OF UPPER GUINEA (MANDIANA PREFECTURE IN GUINEA, CONAKRY)

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Trypanosomosis is a limiting factor for the development of animal production in Africa in general, and in Mandiana in particular. Agricultural production depends on draught oxen; animal traction is commonly used. Trypanocides are increasingly applied against the disease by the farmers, without discernment, thus favouring the appearance of chemoresistant trypanosomes.

The primary aim of this study was to assess the importance and distribution of chemoresistance in Mandiana. To do this, a block treatment with isometamidium chloride at 1 mg/kg was effected in 3 villages (Saladou, Kanifra, Dialakoro) on 150 animals, 50 in each village. The percentage presenting a parasitaemia when examined by BCT, carried out at J0 on 300 cattle, 100 in each village, was 1% in Saladou (*T. vivax* infection), 3% in Kanifra (2 single infections by *T. congolense* and one double infection by *T. congolense* et *T. brucei*.

The second aim was to know the extension of trypanocide treatment failure around villages where failure appeared to be high (Saladou) and not high (Dialakoro). To this purpose, a block treatment with ISMM (1 mg/kg) was carried out for an additional study. 600 animals, 40 in each of 15 villages, 10 around Saladou, 5 around Dialakoro, were treated. Three cases of trypanosomes infections was observed in 3 differents villages near Saladou

The third aim was to study the nature of the infections seen in the field after ISMM treatment. Three isolates (2 of *T. brucei*, 1 of *T. congolense*), multiplied in mice, were submitted to an *in vivo* test to detect resistance in N'dama calves kept in the stable under mosquito netting. The test was carried out in 13 calves: 9 (3 per isolate) were infected and treated with

isometamidium chloride at the dose of 0, 5 mg/kg; three calves were also infected (1 per isolate) and served as positive controls; one calf was used as a negative control. The calves were monitored during 100 days after their first peak of parasitaemia. None of the animals relapsed after treatment with 0, 5 mg/kg.

***Key words**: Trypanosoma congolense; Trypanosoma brucei; cattle; isometamidium; chemoresistance; Guinea.*

4.29

THE ROLE OF TSETSE FLY NATURAL INFECTIONS IN THE EPIDEMIOLOGY OF ANIMAL AFRICAN TRYPANOSOMOSIS (AAT) IN THE NEWLY FARMING AREAS OF SOUTHERN TANZANIA

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Tsetse flies and trypanosomosis are among several factors that constrain livestock development in Tanzania. Over the years Rufiji District was excluded from livestock production owing to tsetse fly infestation, however few years ago there was an influx of livestock following the eviction from Usangu wetlands aimed at conserving the wetlands. A study was conducted to determine tsetse fly species infesting the area, their infection rates, *trypanosoma* species circulating in the area and efficiency of available traps for catching tsetse flies. During baseline data survey the proportion of total tsetse catches per trap were in the following decreasing order S3 (33%), H-Trap (27%), Pyramidal (19%), mobile trap (11%) and biconical trap (10%). Of the 1200 trapped flies, 75.6% were identified as *Glossina pallidipes,* 11.7% *as G. brevipalpis,* 9.6% as *G. austeni* and 3.1% *G. m. morsitans. G. pallidipes* was the most abundant followed by *G. brevipalpis* and the least abundant was *G. m. morsitans*. Dissections revealed the overall infection rate of 6.6% (13/197*).* Whole DNA was extracted from 82 tsetse flies and the prevalence of trypanosomes circulating in the area in descending order was 87.80% (72/82) for *T. simiae*; 70.73% (58/82) for *T. brucei* types; 48.78% (40/82) for the *vivax* types and 32.93% (27/82) for the *congolense* types as determined by polymerase chain reaction (PCR). All trypanosome types were found in all tsetse species analysed except for the *congolense* types which were absent in *G. m. morsitans*. None of the *T. brucei* positive samples contained human

infective trypanosomes by SRA – PCR test. These results demonstrate that all tsetse species are biologically important in the transmission of animal trypanosomosis and plans for control should consider all species.

4.30

Girma Zeleki

This survey was conducted between July and August 2007 at grazing fields and villages in and around the Nech Sar national park, with the intention of forwarding baseline information on the extent of the problem and possible control strategies. Tsetse flies survey was conducted by deploying a total of 16 geo referenced NGU traps on the grazing fields of cattle. Trypanosomosis survey and PCV (Packed Cell Volume) measurement were done on randomly selected 202 cattle. *Glossina pallidipes* with mean apparent density of 11.46 ftd (flies per trap per day) were found to be the only prevailing tsetses fly species in the study area. The mean apparent density of biting flies was found to be 4.54 ftd. Trypanosomosis with population mean estimated 17.33±5.30 were seen to be a serious problem of cattle in the area. *Trypanosoma congolense* and *T. vivax* were the two dominant species encountered in the area. However statistically significant proportion of the cattle ($P<0.005$) were found infected with *T. congolense*. The overall mean PCV was 17.65±5.30%. The mean PCV of the aparsitemic and parasitemic animals were found to be statistically significantly different ($P< 0.05$). On the contrary, the number of cattle aparsitemic but anemic was also significant. These could be possibly due to infection by other recurrent parasites (such as haemonchosis, babesiosis and anaplasmosis), and nutritional deficiencies. The study disclosed *G. pallidipes* as the principal vector of the area. Thus, urgent control intervention should be instituted to cure livestock dependent livelihood of the community and the nation

4.31

UPDATING OF CURRENT SITUATION OF CAMEL TRYPANOSOMIASIS IN SUDAN USING ADVANCED DIAGNOSTIC TECHNIQUES

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Camel trypanosomiasis, locally known as (Guffar), is the most important disease of parasitic diseases that affects camels in Sudan, and causes considerable economic losese of animals, milk and meat. *Trypanosoma evansi* is the main causative agent of camel trypanosomiasis in Sudan.

This study was designed to update the prevalence of camel Trypanosomiasis situation in Sudan using different diagnostic techniques.

Four different surveys of the disease were carried out during the period (2007 - 2009) in four different Sudanese States (Gadarif, Gezira, North Kordofan and Kassala). A total of (1186) blood samples were collected from jugular vein of different camels age groups. Sera were separated from blood, and DNA extracted from spotted blood onto FTA® cards using methanol fixation method. Parasitological diagnosis using (wet, thin and thick) smears. Serological diagnosis using (CATT\ *T. evansi*) test and molecular diagnosis using (PCR) assays were performed.

Results showed that the prevalence of the disease using blood smears was (1.94%). Sero-prevalence using CATT\ *T. evansi* was (37.65%). The molecular prevalence using (TBR and M18S) (PCR) was (19.05%) and (8.68%), respectively.

Applying parasitological diagnosis alone estimating low sensitivity, while applying serological diagnosis over-estimate the prevalence of the disease.

Combination of parasitological, serological and molecular diagnosis methods can give an optimum satisfied result to estimate prevalence of trypanosomiasis. This will help in proper designing of control policies of the disease in endemic areas.

4.32

TSETSE/TRYPANOSOMOSIS CHALLENGES AND RURAL POVERTY IN AFRICA: IMPLICATIONS FOOD SECURITY AND MDG1

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Tsetse-borne trypanosomosis occurs only in Africa south of the Sahara where there are tsetse flies. Animals become sick with trypanosomosis after they are bitten by infected tsetse flies. The disease directly constrains the productivity of cattle, sheep and goats by reducing birth rates, increasing abortion and mortality rates among others. The negative effects of this situation on the productivity, economic growth, food security, poverty reduction and the attainment of the first Millennium Development Goal of eradicating extreme poverty and hunger by 2015 were reviewed. Quite a number of international aid institutions have made significant contributions towards Africa' development, yet Africa is still far from achieving food and nutrition security. The success of food security and poverty alleviation programmes in sub-Saharan Africa has often been hindered by problems of wrong policy implementations and other avoidable constrains. This paper discusses past and present approaches towards tsetse flies and animal trypanosomosis control. Suggestions were made concerning some of the weaknesses of these control measures so as to make them more effective and sustainable. The author commended the effort of PATTEC which among other things considered trypanosomosis as a continental problem, and concluded that, if poverty reduction, food security and the attainment of the first Millennium Development Goal is to become a reality, tsetse fly and trypanosomosis control policies in Africa must be matched with appropriate actions. This no doubt is a joint task by African Government and Donors.

4.33

TRYPANOSOMIASIS CHALLENGE IN CATTLE ON PASTORAL TRANSHUMANCE DUE TO DROUGHT IN NORTH COAST, KENYA.

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The effects of global climate change resulting to unpreceded prolonged droughts, has been forcing Kenya's pastoralists of North Eastern parts to embark on pastoral transhumance traversing different ecological zones and habitats to the Tana delta wetlands in Coast province in search of water and pasture. This study assessed tsetse populations and trypanosomiasis prevalence in cattle in the original grazing lands and after movement to the delta wetlands. Two trapping sites were identified and 200 cattle were screened and samples analyzed using the Buffy coat technique and Giemsa thin films for parasite detection and identification. Packed cell volume (PCV) was also determined. Results from tsetse survey in original grazing lands, Kotile, indicated a mean FTD (fly per trap per day) of 1.06 with most traps having 0 catch while in the preferred destination of delta wetlands, a mean FTD of 31.64 was obtained. Two fly species *Glossinna pallidipes* and *G. brevilpapis* were identified in Kotile while *G. pallidipes*, *G.Brevipalpis* and *G. austeni* were identified in Witu. The apparent fly densities in both sites were significantly different ($P<0.001$) with a higher fly density in delta area.

Parasitological prevalence in the two sites was significantly different with 8% in Kotile and 23% in Witu with *Trypanosoma congolense* (63.89%), *T. vivax* (21.455%) and mixed infections (14.655%). In both sites a highly significant association was observed between PCV values and occurrence of parasitaemia ($P<0.05$).This study found out that cattle moving from arid areas of N.Eastern Kenya to Tana delta wetlands are exposed to high densities of tsetse flies along the migratory routes and at delta area hence high incidences of

trypanosomiasis in the migratory cattle. The study therefore advocates for use of an effective vector control measures on these migratory cattle.

Key words: *Trypanosomiasis, pastoral transhumance, drought, Tana delta wetlands, Kenya.*

4.34

ASSESSMENT OF THE TRYPANOSOME SPECIES DIVERSITY IN CATTLE AND TSETSE POPULATION DENSITY IN PATE ISLAND OF LAMU DISTRICT

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A cross sectional survey was done in Pate island Lamu district to determine the trypanosome species diversity in cattle and *Glossina Austeni* population density.

H trap and biconical traps were used in the 92km^2 island to assess the apparent density of the tsetse flies for 96hrs .in the smaller islets of pate, siyu and faza .Trypanosome species were obtained from the blood drawn from the ear vein of cattle processed by HCT and BCT analyzed by microscopically.

The result indicate that there were higher proportion of the non-teneral *G.Austeni* female flies in the island than males . The mean FTD in mtangawanda was 1.0 followed by Pate at 0.375 Miabogi at 0.037 and rasini at 0.225, very low densities of the Trypanosomes were found in 6 out of 27 dissected flies pooled from the islands making about 22.2% infection rate.

The population of cattle in Faza is 8,150.Out of these 396 were sampled and 5 (0.75%) were found to be infected Infections were higher in Tundwa followed by Siyu and Pate at respectively. The main trypanosome species prevalent in the island was *_T.congolense*

In conclusion the trypanosome species in the island is prevalently *T.congolense* in cattle whereas there were no parasites found in dissected tsetse flies. Usage of trypanocides is evident on the island which is indicative of the endemicity of trypanosomiasis in the island .

4.35

A NOTE ON TSETSE DISTRIBUTION IN FOUR STATES OF SOUTH SUDAN

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Preliminary tsetse field surveys were conducted in 4 States of South Sudan; Western, Eastern and Central Equatoria States as well as Unity State. Four localities in Yambio County, Western Equatoria State were surveyed for tsetse using biconical traps. The localities included: Maingba Angaru stream near Saura village, Wuzee stream, Ndavura stream at Nambia village and Yabongo stream at the fringe of Yambio town. The only *Glossina* species found was *Glossina fuscipes fuscipes* whose apparent density was 1.5, 1.8, 2.5, 2.5 fly /trap/day in the four localities, respectively. Similar work conducted in Lorini stream, Sanga River and Tendari River in Kajokeji County, Central Equatoria State revealed apparent density of *G. f. fuscipes* to be 5.2, 3.3 and 3.8 fly /trap/day, respectively. In Khor Ingleeze stream, Torit County, Eastern Equatoria ,*G. f. fuscipes* revealed light infestations while in the most of Magwi County up to the borders with Uganda *G. morsitans* was revealed. Entomological Surveys conducted in Unity State revealed no tsetse flies indicating that the State is tsetse free. However, Tabanids particularly *Atylotus* species and *Tabanus taeniola* were abundantly found. Random examination of cattle in different localities of Unity State revealed that the prevalence of trypanosomosis varied between 1-10% and the only trypanosome species found was *T. vivax*.

GLOSSINA CONTROL BIOLOGY, CONTROL AND ERADICATION

ORAL

GLOSINA BIOLOGY

5.01

MASS MARKING OF *GLOSSINA AUSTENI* DURING EMERGENCE WITH FLUORESCENT POWDERS: ITS EFFECTS AND IDENTIFICATION (IN THE FRAMEWORK OF STERILE INSECT RELEASES)

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Glossina austeni is one of the seven species of tsetse fly successfully raised in the FAO/IAEA Entomology Unit in the Seibersdorf Laboratory. Tens of thousands of pupae have been regularly sent to Tanzania in the framework of the tsetse eradication Project in Zanzibar through the releasing of sterile males. From this, a technique of automatically marking adult with fluorescent powder was envisioned. Investigations were made in order to estimate the persistence of marks, to determine the effects of the marks on sexual behavior of the flies and to compare the sensitivity of different apparatus used for the detection of the marks.
The results obtained revealed that the marking technique using Day-glo fluorescent powder is a simple, cheap, efficient and discrete method. It has no deleterious effect on the sexual behavior of flies or on the fertility of marked individuals. Additionally, all males of *Glossina austeni* marked with 1%, 0.5% or 0.25% Day-glo (Pink, Orange) powder are identifiable at day_{30} and day_{37} post-emergence.

Male flies marked with 0.5% Day-glo are more competitive than the mature controls of the same age (day_8 or day_{15} post-emergence).

Females marked with 0.5% Pink Day-glo fluorescent powder (copulated by marked males at the same dose) have produced more pupae than the non-treated controls.

It is recommended to use a mixture of fine sand and Day-glo powder in the proportion of 1 volume of mixture to cover 2 volumes of pupae of *Glossina austeni*, for the automatic marking of adult flies during emergence. The proposed doses for the two tested colors (rose Aurora and orange blaze) are 0.5% for identifications using stereo microscope or UV lamp and 0.25% for observations at fluorescent microscope.

5.02

VECTORIAL CAPACITY OF THE *GLOSS*INA SPECIES, EFFECTS OF THE FEEDING STATE DURING THE FIRST INFECTED BLOOD MEAL AND / OR THE GAMMA RAYS IRRADIATION DOSES

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The susceptibility of infection of the tsetse flies by the trypanosomes varies according to the species of flies & trypanosomes, the sex of the *Glossina*, its state of feeding during the first infected blood meal, the *Gamma rays* irradiation doses, the season and even the strain of the trypanosome.

In Guinean Sudanese zone (Ranch of Madina Diassa), *Glossina morsitans submorsitans* has a total infection rate of 19.5%, against 14.6% for *G palpalis gambiensis* and 11% for *G tachinoides*. The sub-genus *Duttonella* (*Trypanosoma vivax*) represents 80.9% of the infections in *G tachinoides*, against 59.4% in *G morsitans submorsitans*. The sub-genus *Nannomonas* (*T congolense*) represents 21.9% of the infections in *G morsitans submorsitans*, against 13.8% in *G tachinoides*. The infection rates in *G morsitans submorsitans* are higher in cold dry season (25.4%) that in dry hot season (15.6%).

In the Sudanese zone (forest gallery of Niger River), the trypanosome infection rate of *Glossina palpalis gambiensis* is higher at the end of the rainy season (10.66%) than at the beginning of the season (6.66%). 80% of the infections are due to: the sub-genus *Duttonella* (*Trypanosoma vivax*), the sub-genus *Nannomonas* (*T. congolense*: 4%), the sub-genus *Megatrypanum* (*T. grayi*: 2%) and immature infections, located only in the midgut (14%).

The riverine species (*G palpalis gambiensis* and *G tachinoides*) transmit less *Trypanosoma congolense* than *G morsitans submorsitans*. Indeed, the feeding of *Glossina* males on a rabbit infected with *T congolense*, gave a mature infection

rate of 65.4% in *G morsitans submorsitans*, against 6.4% in *G palpalis gambiensis*. The labrum infection is higher in the males than the females, respectively 41.0% and 21.0% with *G. palpalis gambiensis*, against 19.0% and 8% with *G tachinoides*.

The *Gamma rays* irradiated *Glossina palpalis gambiensis* males at the pupal stage have longevity to transmit all the pathogenic species of trypanosomes. The action to feed the males before releasing them does not have an effect on the infections by *Trypanosoma vivax*; on the other hand it reduces considerably the risks of infection per *T congolense* and *T brucei brucei,* and makes the tsetse flies more competitive, because they go directly to the research of the females.

The irradiation with an optimal dose (80 Gy at day_{28} or 100 Gy at day_{30}) makes the male tsetse flies more susceptible to the infections, even after given blood meal before the release. The addition of the trypamidium (15µg/ml) to the blood meal can decrease considerably the infections with the sensitive strains of trypanosomes.

5.03

DEVELOPMENT OF STRATEGIES TO MANAGE THE SALIVARY GLAND HYPERTROPHY VIRUSFOR IMPROVED MASS-REARING OF *GLOSSINA PALLIDIPES*

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Many species of tsetse flies (Diptera: Glossinidae) show salivary gland hypertrophy (SGH) caused by the salivary gland hypertrophy virus (SGHV) and flies with SGH symptoms have a reduced fecundity and fertility. The prevalence of SGH in wild tsetse populations is usually very low (0.2-5%) but higher prevalence rates have been observed occasionally (15.2%). Under the PATTEC initiative, several African countries,including Ethiopia, embarked on feasibility studies to assess whether the Sterile Insect Technique (SIT) should be incorporatedin their national tsetse control programs. A*Glossinapallidipes*colony originating from the target area in the Rift Valley was successfully established in 1996 in Addis Abeba, but later up to 85% of adult flies displayed SGH. As a result, the colony declined and became extinct by 2002. Similar difficulties with the rearing of *G. pallidipes* of Ethiopian origin were experienced at the FAO/IAEA's Insect Pest Control Laboratory in Austria. The presence of the virus in *G. pallidipes* colonies was, therefore, jeopardising the successful implementation of integrated control programmes that incorporate the release of sterile male flies. Consequently, the FAO/IAEA launched a research programme to better understand the dynamics of the virus as a first step towards the development ofurgently needed strategies to manage SGHV. Different approaches to prevent virus replication and its horizontal transmission during blood feeding have been proposed. These include the use of antiviral drugs such as acyclovir and valacyclovir added to the blood for feeding or the use of antibodies against SGHV virion proteins. In addition, preliminary attempts to silence the expression of essential viral proteins using RNA interference will be discussed.

5.04

GENETIC POPULATION STRUCTURE OF *GLOSSINA PALPALIS PALPALIS* FROM CENTRAL AFRICAN SLEEPING SICKNESS FOCI

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Glossina palpalis palpalis (*Diptera: Glossinidae*) is the main vector of sleeping sickness in Cameroon as well as in the Bas Congo Province of the Democratic Republic of Congo (DRC). This tsetse species is one of the most important throughout Africa. However, little is known on its population structure, and on genetic relations between different populations. We investigated *G. p. palpalis* population structure in five sleeping sickness foci (four in Cameroon, one in Democratic Republic of Congo) using eight microsatellite DNA markers.

A strong isolation by distance explains most of the population structure observed in our sampling sites of Cameroon and DRC. The populations here are composed of panmictic subpopulations occupying fairly wide zones with a very strong isolation by distance. Effective population sizes are probably between 20 and 300 individuals, densities between 120 and 2000 individuals per km², migration rate between neighbours between 0.05 and 0.8 and

dispersal distance between reproducing adults and their parents between 60 and 300 meters.

This first investigation of genetic structure of *G. p. palpalis* in Central Africa confirms what was found on *G. p. palpalis* in West Africa regarding microstucturing, and brings new information on isolation by distance at macrogeographic scale. These results bring useful information on how to organise regional tsetse control. Future investigations should be directed at sampling timely spaced samples to have more accurate measures of demographic parameters in order to help vector control decision.

5.05

INTERACTIVE TRAPPING RESPONSES OF THE TSETSE FLIES *GLOSSINA BREVIPALPIS* NEWST AND *G.PALLIDIPES* AUSTEN IN KENYA

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Tsetse flies in the field often exist as sympatric species -populations, and it is desirable to catch them in the same appropriate trap. Trapping studies carried out simultaneously for *Glossina pallidipes* Austen and *Glossina brevipalpis* Newstead in Kibwezi using different traps failed to catch the latter species. Presence of *Glossina brevipalpis* was demonstrated using electrified grids of mosquito netting as well as catches in a moving vehicle. This species however became available to biconical traps in the absence of *Glossina pallidipes*. Both sympatric populations exist in most areas of Meru National Park but *Glossina brevipalpis* predominates along a riparian vegetation in Bwatherongi plains. Catches of *G.pallidipes* in odour baited NG2G were obtained in all areas of the park while *G.brevipalpis* was nearly exclusively apparent in Bwatherongi. This suggested occurrence of differences in trap entry behaviour between the two species. Thus *G.pallidipes* have swift trap entry responses unlike *G.brevipalpis.* The latter species moreover avoided entry into traps already occupied by *G.pallidipes*. This behaviour will most likely occur because the activity period of the latter is very short and crepuscular. Tsetse trap catches may therefore not provide reliable information for *G.brevipalpis* under conditions of mixed infestation, thus calling for use of electric targets, but are useful for single – species infestation. This needs to be considered during evaluation of tsetse control or eradication programs.

5.06

POPULATION GENETIC STRUCTURE AND REPRODUCTIVE STRATEGIES OF AFRICAN TRYPANOSOMES

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Trypanosomatidae represent a dangerous family of Euglenobionta parasites that threatens human health and economy of millions of people around the world. Describing the most precisely the population biology and reproductive mode of such pests is not only a matter of pure science, though they can usefully serve as model to understand parasitism evolution, adaptation, evolution of specialisation (parasite specificity) and evolution of complex life cycles. In Trypanosomatidae, these parameters are known to interact with complex reproductive modes and hence have something to bring in the evolution of sex issue that has been continuously generating articles and text books during the last 40 years. It also brings key factors in the understanding of the epidemiology of associated diseases, provides clues for elaborating control programs or predicting probable or less probable success of a vaccine and emergence or re-emergence risks. Population genetics tools, if appropriately used, can provide precise and useful information as regard to such findings. During my speech we will review recent results obtained during population genetics surveys of different *Trypanosoma* species in Sub-Saharan Africa. We will discuss the contrasting pattern of reproductive modes and

population structure, depending not only on the taxon but also on the geographical location and quality of data. We will conclude on issues regarding future directions of research, in particular regarding sampling strategies, which is still a relevant, yet too often neglected, issue.

5.07

RESPONSES OF G. *PALLIDIPES* AND *G MORSITANS MORSITANS* TO MOBILE BAITS

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Studies on the attractiveness and probing responses of *G.pallidipes* and *G. morsitans morsitans* to men wearing different uniform colours (black, red, yellow and white) were conducted at Rekomichi Research Station in the Zambezi Valley, Zimbabwe. Tsetse flies attracted to man in different uniform colours were captured using hand nets and sticky panel. The catches were then compared to a standard epsilon trap catches made during the time the men were mobile along a demarcated transect. In the first part of the experiment the trap was the control of the experiment.

The assumption is that the more the attractiveness and probing responses of tsetse to men the greater the chances of transmission of sleeping sickness to men. Preliminary results showed that there were no significant differences in mean between the sticky panel and the hand net because the significant value is greater than 0.05. The p value is 0.19. The sticky panel had 31.69 mean catches and a standard deviation of 5.55 and hand net had mean catches of 33.31 and standard deviation of 5.76. In all cases the *G.morsitans morsitans* is the predominant fly captured using the two techniques.

The black colour had the highest mean with 30.25 and standard deviation of 48.12 the red colour with mean of 29 and standard deviation of 28.23 white with a mean of 20.5 and standard deviation of 34.12 and the least were yellow with a mean of 14.67 and a standard deviation of 29.10. There is no significant difference between the dark coloured and light coloured uniforms since the p value is 0.76. The results indicate that few tsetse are attracted to the light colours than the dark colours. The light coloured uniforms promises to offer better protection to men than dark colours due to fewer flies attracted and

probing on men. However more work needs to be done to cater for all seasons and different vegetation types.

5.08

GEOMETRIC MORPHOMETRICS AS A TOOL TO HELP DECISION FOR TSETSE CONTROL STRATEGY

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Vector control can help to fight against trypanosomiasis. Two main strategies exist: "Eradication" leads to tsetse-free areas while "suppression" is the reduction of tsetse-flies density with the aim of interrupting the transmission cycle of the disease. To achieve eradication, the whole target population has to be taken into account, thus this population must be isolated (or isolable) from other tsetse populations, in order to avoid reinvasion.

Isolated tsetse populations can be detected by molecular analysis, but this tool is expensive. Geometric morphometrics applied on tsetse wings could be a good alternative since it is much cheaper (and much faster). In order to assess the potential of this new approach, we have conducted a study in two tsetse infested countries in West Africa: Senegal in the Niayes and Missirah region, and in the 3 Banco sites of Côte-d'Ivoire: the forest area of Banco and its relics at the University of Abobo-Adjamé and in the zoological parc.

Geometrical morphometric showed significant differences between isolated populations (between Missira and Niayes region in Senegal) and nothing when tsetse populations are not isolated from each other (Banco area of Abidjan). This approach can thus be helpful in the choice of adequate strategy for a vector control program.

Key words: *geometrical morphometric, tsetse, vector control, trypanosomosis, strategy*

CONTROL

5.09

DEVELOPING CONTINENTAL MAPS OF *GLOSSINA* SPECIES

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Evidence on the contemporary distribution of tsetse flies (Diptera: Glossinidae) is essential for sound decision making across the whole spectrum of interventions against trypanosomoses. However, the latest global maps depicting the geographic distribution of tsetse flies in sub-Saharan Africa were published over three decades ago. Since then, despite considerable technological advancements, no attempt has been made to systematically assemble and harmonize entomological field data collected by the many stakeholders involved in tsetse research and control. In an effort to address this gap, the Food and Agriculture Organization of the United Nations and the International Atomic Energy Agency, in the framework of the Programme Against African Trypanosomosis, set out to develop an Atlas of *Glossina* species. The Atlas aims to collate, analyse and disseminate up-to-date, spatially-explicit information on the presence and abundance of tsetse at the continental level. Input datasets include scientific papers and unpublished technical reports, which enable to map entomological information at the level of "site" (e.g. village). Whenever available, data at the level of "trap" are used for superior geographical accuracy. Methodology, preliminary results and the way forward for the Atlas of tsetse are outlined in this paper. While the specific objective of the Atlas is to develop maps of tsetse distribution at a range of scales, the overall goal of the initiative is to strengthen data management and streamline data collection, sharing and analysis at the national, regional and international levels.

5.10

ASSAYS TO EVALUATE EFFECTS AS WELL AS DURABILITY OF DELTAMETHRIN-TREATED NETS (ITN) FOR THE CONTROL OF VARIOUS INSECT VECTORS

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The efficacy of ITN was assessed during field trials in Africa and Europe. Bio-assays were undertaken in a TestBox® using house flies (*Musca domestica*) and tsetse flies (*Glossina palpalis gambiensis*). Simultaneously, chemical analyses of the amount of active ingredient (AI) allowed monitoring an eventual, time-dependent decrease of deltamethrin. Environmental studies of beneficial arthropods (indicator species) provided information of potentially negative impacts against non-target insects. Further emphasis was put on assessing eco-toxicological effects of this control technique. Both, TestBox® method as well as chemical analyses of AI indicated a long-lasting durability of 12 – 24 months against target insects. Non-target insects, for instance, bees (hymenoptera) or hovering flies (*syrphidae*) were only negligibly affected. Threshold values of AI or metabolites in samples of milk, meat, soil and groundwater were not attained. In conclusion, ITN constitute an effective, non pollutant control technique against various vectors of medical and/or veterinary relevance. Beneficial insect species were only marginally affected.

***Key words**: Insecticide-Treated Nets, durability, environmental effects, eco-toxicology*

5.11

ERADICATION OF TSETSE FROM THE LOOS ISLANDS, GUINEA: WHERE WE ARE?

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The tsetse fly *Glossina palpalis gambiensis* is the main vector of sleeping sickness (Human African Trypanosomiasis – HAT) in West Africa, in particular in littoral Guinea where this disease is currently very active. The Loos islands constitute a small archipelago some 5km from mainland Guinea, where *G. p. gambiensis* is well known as a nuisance and potential disease vector by inhabitants of the three main islands, Fotoba, Room, and Kassa. The National Control Program against HAT of Guinea has decided to eradicate tsetse in Loos islands in order to sustainably protect humans and economic activities. After baseline data collection, tsetse control began on the islands in 2006. On each of the three islands a specific combination of control methods was implemented according to the entomological situation found.

Starting densities before control operations were 10, 3 and 1 tsetse/trap/day in Kassa, Room and Fotoba respectively, but by July 2010, were no longer caught in any of the sentinel traps used for monitoring. The reduction rate was faster where several control methods were implemented as a combination (impregnated traps and targets ITT, selective groundspraying, epicutaneous insecticide treatment of pigs, and impregnated fences around pig pens), whereas it was slower when ITT were used as the only control method.

This 100% suppression is a promising step in the eradication process, but *G. p. gambiensis* may still occur at very low, undetectable, densities on the archipelago. Next step will consist in assessing a 0.05 probability of tsetse absence to ascertain a provisional eradication status. Throughout these

operations, a key factor has been the involvement of local teams and local communities without whom such results would be impossible to obtain. Work will continue thanks to the partners involved until total eradication of the tsetse on Loos islands can be declared.

5.12

AN OPERATION TO ELIMINATE TSETSE FLIES FROM 10,000 KM^2 COVERING PARTS OF ANGOLA AND ZAMBIA WITH USE OF THE SEQUENTIAL AEROSOL TECHNIQUE (SAT)

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From May to July 2009, an operation was undertaken to eliminate tsetse flies from approximately 10,000km^2 covering parts of south-east Angola and western Zambia. Using the previous series of SAT operations in Botswana as a model, use was made of a complementary system of aircraft track guidance to ensure precise placement of the insecticide in the sprayed area and to guide decisions on any corrective measures required. The experience gained during the Botswana operations guided much of the planning and management of the operation. Spraying was accompanied by an Environmental Impact Assessment (EIA) whereas monitoring of the operational results on the target species was based on trypanosomiasis surveillance data. Use was made of temperature data to estimate appropriate dates for the start of each of the last four of the five spray cycles. A tsetse front remained on the eastern edge of the spray block in Zambia. Prior to the operation the mean trypanosomiasis prevalence in 3 sentinel herds (cattle) in the area was 8%, and no case of trypanosomiasis had been recorded in these sentinel herds by December 2010. The operation was carried out under the Kwando-Zambezi Regional Tsetse Eradication Programme which is under the auspices of the Pan-African Tsetse and Trypanosomiasis Eradication Campaign (PATTEC).

5.13

PARASITOLOGICAL PREVALENCE OF BOVINE TRYPANOSOMIASIS PRIOR TO FIELD TRIAL OF TSETSE REPELLENT PROJECT IN KWALE DISTRICT OF COSTAL KENYA

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Prior to field trials of large scale repellent technology validation, a cross-sectional survey of bovine trypanosomosis and its vectors was carried out in Kwale District of Coastal Kenya. The trypanosome prevalence in cattle with regard to age, sex, location and apparent tsetse density was investigated. The overall trypanosome prevalence in cattle in Kwale District was 27.6%. Two types of infections were recorded in various parts of the District in the following proportions: *T. congolense* 57.6%, *Trypanosoma vivax* 42.4%. Therefore, the majority of trypanosome infections were contributed to *T. congolense* followed by *T. vivax* in that order. Findings from this study indicated that the Divisional-dependent trypanosome prevalence can be stratified in four main levels: low (Mtsangatamu 4.3%), moderate (Mkongani 16.7%), high in (Kizibe 25%, Zunguluka 25.5% and Mangawani 26.7%) and very high in (Katangini 32.2%, Mkanda 34.4%, Msulwa 42.4% and Mawia 46.4).

The mean apparent density for *G. pallidipes* was 31flies/trap/day while that of *G. austini* 1.2 flies/trap/day and *G. fuscipes* was 0.5 flies/trap/day. There was a positive significant correlation ($p < 0.05$, $R = 0.82$) between the trypanosome prevalence and tsetse apparent density.

***Key words**: Trypanosomosis; Tsetse repellent technology; Kwale District; Kenya*

5.14

ERADICATION OF TSETSE FLY, G*LOSSINA PALLIDIPES* NEWST FROM LAMBWE VALLEY, KENYA, USING INSECTICIDE IMPREGNATED ODOUR BAITED TARGETS THROUGH PUBLIC-PRIVATE SECTOR PARTNERSHIP

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The 300 square kilometre Lambwe valley in western Kenya with endemic sleeping sickness includes 120 sq km fenced Ruma Game Park. It is infested with *Glossina pallidipes* that transmits *Trypanosoma rhodesiense* to human, and T. *congolense*, T. *vivax* and *T. brucei* to livestock in adjacent settlements. Outbreaks led to bush clearing in settlements from 1930s, air spraying in the Park 1969-1971, 1981, and 1983. From 1988 to 2006, insecticide impregnated odour baited targets were deployed unsuccessfully until commissioning of public-private sector partnership under PATTEC initiative.
First contract in October 2006 was to reduce tsetse population from 78.44 ftd to 5 within six months was followed by a second from May 2008 to reach 0 within six months and maintain it for four months using odour baited targets impregnated set at 200m intervals. Installation started in Park periphery to reduce tsetse population that could transmit disease to personnel deploying targets along east-west transects at 400-500m intervals. They were installed in 1255 sites in the Park and 103 outside to reduce reinvasion, old fabrics being replaced every 9 to 12 months.

Tsetse densities fell by 99.72% from the first intervention. The residual population stabilised between April 2007 with apparent density of 0.06 ftd and May 2008 with 0.33 ftd before the second contract was implemented, the last fly being caught in November 2008. Results confirm that odour baited quality targets can eradicate tsetse with correct setting and servicing. Public-private sector partnership with experienced contractors increase national capacity in tsetse control and eradication.

5.15

CONTROL OF TSETSE USING FOOTBATHS IN CHAD

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Livestock farming is presently the main occupation for 40% of the population in Chad. It generates 18% of the Gross Domestic Product (GDP) and 50% of the export income. African Animal Trypanosomoses are amongst the main constraints to its development. Three tsetse species are present: *Glossina m. submorsitans, G. tachinoides* and *G. f. fuscipes*, which infest about 100 000 km², with around 450 000 cattle at risk. Moreover, human sleeping sickness is endemic, with an average number of 300 cases by year. The main foci are Bodo and Moissala, associated to Mandoul and Nana Barya rivers. The control of these diseases relies mainly on the use of curative and preventive trypanocidal drugs.

However, a tsetse control trial using an innovative control technique developed at CIRDES, the restricted insecticide treatment of cattle using footbaths, was implemented in 2009. Two sites were thus selected, one of which was located in the area of Tapol (an historical sleeping sickness focus), and the other in the area of Moussafoyo (close to the focus of Bodo). In each site, cattle herds were treated using footbaths from June 2009 and the impact of this treatment on the densities of tsetse was monitored and compared to control sites, where herds were not treated. Footbaths allowed reducing tsetse densities by 95% (*G. f. fuscipes* was the predominant species) whereas their

densities remain constant in the control sites. The use of this method at a wider scale in Chad is discussed.

5.16

THE ENVIRONMENTAL IMPACT OF DELTAMETHRIN AERIAL ULV SPRAY AGAINST TSETSE-FLY ON NON-TARGET INVERTEBRATES IN SESHEKE AND SHANGOMBO DISTRICTS OF WESTERN ZAMBIA.

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An environmental impact assessment (EIA) and monitoring of deltamethrin aerial ULV spray against tsetse flies on non-target invertebrates in Sesheke and Shangombo districts of Zambia was carried out in 2009/10. The objective of the study was to assess and monitor the abundance, population structure and status of aquatic and terrestrial invertebrates at pre- during- and post spray; to identify and monitor the impact on aquatic and terrestrial invertebrate bio-indicators; and to determine the impact of the deltamethrin ULV aerial spray on the biological integrity and function non-target invertebrates in the ecosystem.

The study area was located on the Kwando river that forms the boundary between Zambia and Angola and within the spray block. The deltamethrin formulation used contained 3.57g/l of active ingredient and applied as an aerosol ULV spray at the rate of 0.26g/ha of active ingredient for each spray cycle. Several entomological sampling gears were used to collect data on aquatic and terrestrial invertebrates. The study showed that deltamethrin had no impact on the population dynamics and function of non-target aquatic and terrestrial invertebrates within and outside the spray block.

5.17

TOWARDS AN OPTIMAL DESIGN OF TARGET FOR TSETSE CONTROL: COMPARISONS OF NOVEL TARGETS FOR THE CONTROL OF PALPALIS GROUP TSETSE IN WEST AFRICA

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Tsetse flies of the Palpalis group are the main vectors of sleeping sickness in Africa. To control them, insecticide impregnated targets are one of the most effective tools for control. However, the cost of these devices still represents a constraint to their wider use. The objective was therefore to improve the cost effectiveness of currently used devices.

Experiments were performed on three tsetse species, namely *Glossinapalpalisgambiensis* and *G. tachinoides* in Burkina Faso and *G. p. palpalis* in Côte d'Ivoire. The 1×1 m2 black blue black target commonly used in W. Africa, was used as the standard, and effects of changes in target size, shape, and the use of netting instead of black cloth were measured. Regarding overall target shape, we observed that horizontal targets (i.e. wider than they were high) killed 1.6-5x more *G. p. gambiensis* and *G. tachinoides* than vertical ones (i.e. higher than they were wide) ($P<0.001$). For the three tsetse species, catches were highly correlated with the size of the target. However, beyond the size of 0.35 sq. meter, there was no increase in catches. Replacing the black cloth of the target by netting was more cost efficient.

Reducing the size of the current 1 sq. meter black-blue-black target to horizontal designs of around 50 cm , and replacing black cloth by netting will

improve cost effectiveness six-fold for both *G. p. gambiensis* and *G. tachinoides*. Studying the visual responses of tsetse to different designs of target has allowed us to design more cost effective devices for the effective control of sleeping sickness and animal trypanosomiasis in Africa.

Key words
Tsetse flies, target, size, shape, cost effectiveness, sleeping sickness, vector control, West Africa

5.18

DEVELOPMENT OF SITE SPECIFIC ANIMAL HEALTH PACKAGE TO IMPROVE LIVESTOCK PRODUCTIVITY IN KENYA BY CONTROLLING VARIOUS INSECT VECTORS

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Development of site specific animal health packages is in progress in Kenya, Ghana and Burkina Faso under an IFAD funded FAO Project (GCP/RAF/444/IFA). In Kenya, the animal health packages being developed focus on protecting zero grazing cows from tsetse and other biting flies. Baseline data generated indicate no tsetse flies in the project sites in Kisii and Bungoma contrary to farmers believes, with abundant presence of other biting insects (mostly stomoxys). Major diseases diagnosed included mastitis, tick-borne anaplasmosis and helminthosis. Animal health packages being introduced include use of insecticide treated nets to protect cows from biting flies. In Kenya the animal health packages being introduced are expected to significantly increase milk productivity and milk hygiene and resultant cash income of farmers. Development of such packages is an important strategy to enhance livestock productivity in areas where tsetse populations have been controlled. Preliminary results will be presented.

POSTER

5.19

APPLICATION OF ODOUR-BAITED TARGETS IN TSETSE CONTROL: THE CHALLENGE AND CAUSES OF VANDALISM IN NORTH-EAST ZAMBIA.

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Following reports of cases of human trypanosomiasis in an area covering parts of Isoka and Chama districts in north-east Zambia, bordering Malawi's Vwaza Game Reserve, a tsetse barrier with odour-baited targets was established in 2007 in an effort to prevent tsetse invasion from the Vwaza gamereserve into human settlements in the adjacent parts of Zambia. The targets in the barrier are servicedtwice per year with about 80% of the labour force employed from within the local community. One major challenge with the tsetse barrier has been highlevels of vandalism. Awareness creation was undertakenprior to establishment of the barrier and it had been envisaged that having the workforce from within the local communitywouldfacilitate good levels of awareness and assistprevent vandalism. Unfortunately, a consistentlyhigh level of vandalism has been reportedsince 2007, with losses of up to 30% for MEK bottles, screens (cloth) and wire. Againstthis background, a study was undertakenearlyin 2011 to establish the nature of the problem, the root causes and potential solution. This was donethrough a structured questionnaire and interviews with key and ordinarymembers of the community – lookingat (1) Views and knowledge on targets relative to the barrier, the intentedpurpose of the barrier in the area, ownership of the targets, perceivedbenefits, etc., (2) why vandalism occurs, (3) what could be done to prevent vandalism, (4) whatrole was expected of government, etc. The findingsrevealedseveralmisconceptions and hence uses of key components of targets such as MEK, bottles, wire and cloth screen, it was also learnt that travellers from neighbouring Malawi could be key culprits. It was concluded that the level of awareness relative to targets was low in the area, that it should address the myths about alternative use for components of targets.

Cooperation with authorities in Malawi was necessary relative to curbing vandalism in the area. The presentation provides the following: a map showing location of tsetse barrier relative to settlements, pictures showing extension meetings in progress and vandalised targets, local workforce servicing targets, extension material in the area, and a summary of results from questionnaire/interviews.

5.20

A STUDY ON TABANIDS AND MUSCIDS IN KHARTOUM STATE, SUDAN

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The seasonal abundance of tabanids (Diptera: Tabanidae) and muscids (Diptera: Muscidae) was studied during October 2007 to September 2009 at El Yarmouk Industrial Complex farming area (15.29˚N 32.30˚E) which is located in Jabra locality, Khartoum, Sudan. Four Nzi traps were deployed in the study area using octenol/phenols blend (OPs). Temperature, rainfall(s), relative humidity data of the study area during the period January 2007 to September 2009 were collected from Administration of data services, Meteorological Authority, Ministry of Science and Technology, Khartoum, Sudan. Three species of horse flies were captured; *Atylotus agrestis*, *Tabanus sufis* and *T. taeniola.* Only females of tabanids were captured by the traps. The traps also caught Muscids including *Stomoxys* spp. and non biting *Muscinae.* Both tabanids and muscids were more abundant during the rainy season (July-October) than the dry cool (November- February) or dry hot (March- June) seasons. Tabanids peak was in October, while the muscids peaked in July. Another tabanids peak was observed in February 2009 due to the unusual higher temperature with the availability of water in the canals observed at that time. On the other hand low catches of tabanids were observed in September due to insecticide spraying. Unlike the rest of tabanids, *T. sufis* did not drop in September 2009. High numbers of horse flies were caught in 2007-08 than 2008-09, due to the high rain fall in the year 2007. linear correlation analysis indicated that changes in monthly catches of both tabanids and muscids was significantly correlated to temperature, while monthly changes in relative humidity and rain fall were not correlated to the changes in catches of flies.

5.21

BILATERAL/MULTILATERAL PROJECT INTERVENTION IN TSETSE AND TRYPANOSOMOSIS CONTROL IN AFRICA: PROSPECTS, CHALLENGES AND IMPLICATION FOR FOOD SECURITY. BICOT I NIGERIA AS CASE STUDY

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Africa is a land full of promises and potentials, yet, because of famine, disease and growing populations, almost 200million are undernourished and 33million children go to sleep malnourished and hungry every night. It is a case of food and nutrition insecurity amidst huge agricultural resources. Tsetse flies and the disease they vector - trypanosomosis constrains agricultural productions in the areas of Africa that hold the continents greatest potential for expanded agricultural production. Central to the control of Africa trypanosomosis is the control of the vector-tsetse flies. Over the years, African Governments have employed several methods towards tsetse control/ eradication. However, various interventions by Donor agencies and international organizations through bilateral or multilateral projects have significantly contributed to the success of tsetse and trypanosomosis control/eradication. Prominent among them is BICOT I which is the focus of this paper. The author outlined some achievements of this project to include the eradication of *Glossina palpali palpalis* and 90% of *Glossina tachinoides*, increased livestock and crop farming. The short life span of the project, logistic problems, inconsistency in policy leading to non implementation of BICOT II are among the challenges the author mentioned as responsible for non consolidation of BICOT I achievements. Research work carried out by the author, two decades after BICOT I was sited to buttress this point. The negative impact of this development on the rural population is enormous. In conclusion, the author suggested a comprehensive review of tsetse and trypanosomosis intervention policies towards sustainable agriculture and rural development.

5.22

COMPARISON OF THE INFECTION RATE OF THE TSETSE FLY, *GLOSSINA MORSITANS MORSITANS*, FED *IN VITRO* ON CITRATED BLOOD OR *IN VIVO*

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Experiments were conducted to investigate the possibility of replacing the *in vivo* (rabbits) feeding system of tsetse flies by an *in vitro* feeding on citrated, gamma- irradiated, sterile bovine blood obtained from International Atomic Energy Agency (IAEA) laboratories for trypanosome infection experiments. The infection rate of male *Glossina morsitans morsitans* Westwood (Diptera: Glossinidae), for *Trypanosoma congolense* or *T. b. brucei* and maintained *in vitro* or *in vivo* was compared. For this purpose, teneral (less than 32-h-old) male flies were given their first blood meal on anaesthetized mice, either infected with *T. congolense* (stock IL 1180) or *T. b. brucei* AnTAR1 (stock EATRO 1125). After the infective meal, one group was fed on rabbit ears (*in vivo* group). The second group was fed through a silicon membrane, on gamma-irradiated, sterile and citrated bovine blood obtained from the IAEA laboratories (*in vitro* group) three times a week. After twenty one (for infection with *T. congolense*) or thirty days (for infection with *T. b. brucei)* the surviving flies were dissected and examined for the presence of immature and mature trypanosome infections in midgut, mouthpart or salivary gland. The results showed that *in vivo* feeding for infection with *T. b .brucei* and *T. congolense* resulted in significantly more midgut and salivary gland or proboscis infection than *in vitro* feeding. Moreover, statistical analysis showed that, for *T. b. brucei* infections, *in vivo* feeding caused significant higher maturation than *in vitro*. For infections with *T. congolense*, on the other hand, there was no significant effect on the maturation rate.

Key words: *Glossina morsitans morsitans, Trypanosoma congolense, Trypanosoma brucei brucei, in vivo, in vitro , citrated bovine blood, midgut , mouthparts, salivary glands*

5.23

COMPETITIVITY OF STERILE MALES *GLOSSINA PALPALIS GAMBIENSIS* (DIPTERA: GLOSSINIDAE) IN PREPARATION OF AN ELIMINATION CAMPAIGN IN BURKINA FASO

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Experimental irradiated *Glossina palpalis gambiensis* males release was carried out on a distance of 3km along a river side. Over the total released flies, 93.80% flight off. Periodic entomological surveys allowed determining ratios between released males and wild ones, the apparent density of irradiated and wild tsetse. The abortion rate amongst the wild females and their spermathecal fill were assessed. There was significant difference between abortion rates of females before and those during the release period ($p<0.000$). From the second to the tenth weeks of release, abortion rates increased. The spermathecal fill did not show significant difference between females before and during the release. However the spermathecal fill was higher for the wild females than for the virgin females mated with irradiated males in the insectary ($p=0.015$). Irradiated males showed good dispersal along the river side. Indeed the monitoring traps caught almost the same proportion of irradiated tsetse ($p> 0.05$). The average half life of the irradiated males was low (4.58±1.26 days). The ratio irradiated males/wild males remained lower than 2. However the release did have measurable impact on the wild females' reproduction. Hence, the irradiated males of *G. p. gambiensis* could be used in Sterile Insect Technique for the elimination of tsetse in Burkina within the framework of the Pan African Tsetse and Trypanosomiasis Eradication Campaign (PATTEC).

Keywords: *Glossina palpalis gambiensis, half-life, Sterile Insect Technique, competitivity, PATTEC, Burkina Faso*

5.24

EVALUATION OF THE EFFECTS OF THE TEMPERATURE OF INCUBATION AND THE DURATION OF COLD STORAGE ON THE PERIOD OF SELECTION OF MALES FROM FEMALES OF *G. P. GAMBIENSIS* PUPAE AND ON THE VIABILITY OF THE HATCHED MALE FLIES: CONTRIBUTION TO THE TECHNIQUE OF THE RELEASE OF STERILE MALES

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Studies were conducted in view of evaluating the influence of temperature on separation of male and female pupae of *G.p. gambiensis* during hatching period and the impact of pupae cold stored duration on the male flies viability. The aim of these studies were to determine the best conditions of selecting and transporting male pupae under cold. Concerning the effect of temperature on hatching, pupae aged 20jours after larviposition were subjected to three incubation temperatures as 15±1°C, 20±0,3°C and 28±1°C. For each temperature three batches of 120pupes were established, the control was 25±1°C temperature. The results show that the dates which it gets the maximum of male pupae after the emergence of females at three temperatures are respectively 46th, 42nd and 27th days after larviposition against the 30th day for the control. There is no significant difference between the rates of mortality before mating and daily mortalities at incubation temperatures of 28±1°C and 25°C (P = 0. 2). Regarding the impact cold stored at 9±1°C duration on the viability of flies, near male 1400pupes have been kept under cold and output at different dates by batch of 200. Flies hatched from different batches were compared to controls. The results show that the average rates of viability of hatched male flies are between 90% and 95% during the 6first days and less than 85% beyond 6days of storage. This work contributes to male pupae selecting and transporting improvement under cold within the scope of sterile insect technique.

***Key words**: G.p.gambiensis, pupae, male, selection, viability, cold*

5.25

IDENTIFICATION OF DIFFERENT TRYPANOSOMES SPECIES IN THE MID-GUTS OF WILD TSETSE FLIES OF THE MALANGA (KIMPESE) SLEEPING SICKNESS FOCUS OF THE DEMOCRATIC REPUBLIC OF CONGO

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To improve our knowledge on the epidemiology of Human African Trypanosomiasis (HAT) in the Malanga focus (Bas Congo Province) of the Democratic Republic of Congo, different trypanosome species and subspecies were identified in the mid gut of wild tsetse flies. For this study, 33 tsetse traps were set up and 947 *Glossina palpalis palpalis* were captured during 4 days: given an apparent density of tsetse flies per trap per day of 7.17. Of the 947 flies caught, 437 living flies were dissected and 60 (13.7%) blood meals were collected. The amplification of specific sequences for *T. brucei* s.l., *T. congolense* forest and savannah types, *T. vivax* and *T. simiae* revealed 48 (20.25%) tsetse flies infected by at least one trypanosome species. No *T. simiae* infection was identified in this locality. *T. congolense* savannah type showed the highest infection rate (14.3%: 34/237); followed by *T. brucei* s.l. (5.5%: 13/237), *T. congolense* forest type (3.8%: 9/237) and *T. vivax* (0.4%: 1/237). Four mixed infections were identified: three mixed infections including *T. brucei* s.l. and *T.congolense* savannah type, and one mixed infection of *T. vivax* and *T. congolense* savannah type. Of the 13 *T. brucei* s.l. mid-gut infections, 11 (4.64%) were due to *Trypanosoma brucei gambiense*. The heteroduplex PCR based method enabled to identify 48 blood meals: 60% (29) were from pigs, 35 % (17) from man and 5% (2) from other mammals not yet identified. The identification of *T. b. gambiense* in tsetse mid-guts and the

presence of human blood meals illustrates the circulation of this parasite between tsetse and mammals; thus suggesting an active transmission of HAT in the Malanga focus. The considerable number of pig blood meals associated to the circulation of *T. b. gambiense* in this focus suggests investigations on animal reservoir of HAT in this focus. The various species of trypanosomes found in tsetse of the Malanga HAT focus indicates the presence of both Animal and Human African Trypanosomiasis. To reduce the costs of disease control in this locality, new strategies integrating control measures for both human and animal trypanosomiasis are required.

5.26

THE SYSTEMATIC OF TSETSE FLIES USING GEOMETRIC MORPHOMETRIC OF THE WINGS: "SHOW YOUR WINGS AND I WILL TELL YOU WHO YOU ARE''

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This study is the first one exploring the potential of landmarks based geometric morphometrics (GM), as a low cost tool to provide a fast and accurate alternative of species diagnosis in tsetse flies.

In the present work, we applied the GM approach on the wings of male and female tsetse flies to compare four taxa of the palpalis group. They are the major vectors of sleeping sickness in Africa: *Glossina f. fuscipes, G. tachinoides, G. p. palpalis and G. p. gambiensis*.

We found a significant shape variation between them corroborating the ability of this approach to discriminate taxa. We also observed a significant size differences between sexes, suggesting a constant sexual size dimorphism in tsetse flies. This latter observation could itself be the subject of comparisons between species and / or populations.

We conclude that the GM method provides a valuable tool to study the systematics of tsetse flies, offering also interesting perspectives in the study of sexual dimorphism in natural populations.

Key words: *geometric morphometrics, tsetse flies, systematics, sexual dimorphism, species.*

5.27

NUTRITIONAL STRESS OF FEMALE TSETSE FLIES AFFECTS THEIR OFFSPRING'S VECTORIAL CAPACITY

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Tsetse-transmitted trypanosomiasis poses a serious threat to animals and humans in sub-Saharan Africa. The epidemiology of the disease depends, among other factors, on the proportion of infected flies in a tsetse population. A wide range of intrinsic and extrinsic factors seem to determine the ability of a tsetse fly to become infected and to transmit the parasite. In this paper, we investigated whether the nutritional stress of reproducing female *Glossina morsitans morsitans* affects the susceptibility of their offspring to trypanosomal infections. A colony of 20-days old female tsetse flies was starved by feeding only one a week on healthy rabbit (starved colony) while a second colony of 20-days old females were fed 4 times a week (non-starved colony). Pupae from each colony were collected and emerging tenerals were offered bloodmeal containing either *Trypanosoma congolense* or *T. brucei brucei*. Reproducing female flies that were deprived of blood feeding for seven consecutive days, produced pupae with a significant lower weight and offspring with a significant lower fat content (1.4 ± 0.4 mg versus 2.5 ± 0.1 mg, $p<0.0001$). Moreover, the normalized gene expression levels of the immune peptides attacin, defensin and cecropin were respectively 1.5, 1.8 and 2.03 times lower in teneral male from pupae produced by the starved females. Interestingly, the experimental infection showed that the proportion of flies from the starved colony that developed mature infection with *T. congolense* or

T. brucei brucei was significantly higher compared to flies from non-starved colony ($p<0.001$). These observations suggest that in the field, the overall infection rate of the tsetse fly population may significantly increase during and after a period of high nutritional stress of the reproducing tsetse females through an increasing proportion of the freshly emerged flies that acquire a mature infection.

5.28

THE ISSUES AND CHALLENGES OF VECTOR CONTROL IN PASTURES FLOOD-PRONE AREAS OF THE FAR NORTH REGION CAMEROON

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The Far North Region of Cameroon, mainly Sahelian area abounds with larger herds of cattle and small ruminants in Cameroon. Logone et Chari and Diamaré Divisions contain more animals.

Very popular in these areas for reindeer breeding, especially around Lake Chad, which attracts thousands of animals from Chad, Niger, Nigeria and Cameroon, spending trypanocidal remain the object of expenditure is higher.

The existence of National Parks in these areas creates a microclimate that facilitates the development of vectors of trypanosomes, making it very difficult to conduct pastoral activities. For example, the night pasture became a common practice during certain seasons.

Entomological surveys were conducted to assess the magnitude of the problem and assess the prevalence of flies according to the assembly points of animals (including water points). The results allow a finding that mechanical vectors in this case, stable flies and tabanids are most encountered.

These operations are specific, they benefit from being sued for more results and the implementation of vector control strategies for the welfare of animals and their owners.

Key words: *Stomoxes, horse flies, Far North Cameroon*

5.29

PROGRESSIVE TRENDS AND ADOPTION OF TSETSE CONTROL TECHNOLOGIES IN KENYA OVER THE LAST SIX (6) DECADES

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Tsetse fly *Glossina* infestation in otherwise agriculturally and livestock productive areashas been a big constraint to the development of the Sub-Saharan African economies. Theefforts to control tsetse fly in Kenya started in early 1930s at Kiboko, Kibwezi District using different control methods. In between 1940s and 1970s, discriminate bush clearing by hand-labour and machines; destruction of wildlife, ground and aerial aerosols spraying using dieldrin were being used. Methods of surveillances used ranged from use of man and oxen as bait, hand-catch by 'fly boys' in 1950s-1970s. With increased knowledge on tsetse biology and behaviour, better and advanced control and surveillance tools that are environmental friendly are now in use. This review demonstrates a pictorial trend that has occurred in the field of tsetse fly control in Kenya over the last six (6) decades and its adoption by the community.

Keywords: *Glossina, trend, dieldrin, adoption*

5.30

TSE-TSE FLIES SURVEY AND CONTROL IN QUISSONGO COMMUNAL AREA, PROVINCE OF CUANZA.SUL, ANGOLA

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With regards to Tsetse - flies and Trypanosomosis activities, in Angola, a survey was carried out in the Quissongo Communal Area in order to evaluate its social impact on the local population and livestock production. Pyramidal and Epsilon traps were used to determine the presence and extension of Glossinas of medical importance. The survey was performed last year during four periods, covering an area of about 60 Km^2 in association with a wide range of tsetse control, using 250 traps. Our Field team was camping during 22 days in the village of Quissakina.

G. morsitans centralis was found in savannah, being the most important fly of the Central Pocket in regard with the other pockets of South-Eastern Angola. Large variation of its density has been registered, very high in March, up to 80 t/t/d and very low, down to zero after burning gazing fields, followed by a rebound phenomenal. *G. fuscipes quanzensis* was always caught close to rivers and sometimes confused with G. palpalis palpalis.

The direct impact of tsetse infestation is of negative results because no domestic animals are found in this area. Taking into account the high Tsetse-fly population in the area, only a few cases of sleeping sickness are reported.

Tsetse suppression is still a matter of concern due to the typical topography of the area with many mountains. The Sequential Aerosol Technique cannot be applied. Instead we plan to use ground spraying in combination with traps deployment especially pyramidal as Epsilon is inadequate in this environment.

5.31

TRAPABILITY AND ATTRACTANTS EFFICIENCY AGAINST *GLOSSINA FUSCIPES FUSCIPES* AND OTHER DIPTERA IN RIVER YABUS TSETSE BELT, BLUE NILE STATE, SUDAN.

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Four trap designs including pyramidal, biconical, Nzi and vavoua traps were tested against *Glossina fuscipes fuscipes* (Newstead) in River Yabus Tsetse belt, Blue Nile State, Sudan. Results showed significantly higher catches obtained by the biconical trap, which was then used to study the responses of *G. f. fuscipes* together with other Diptera to natural and synthetic odour baits. 1-octen-3-ol, acetone, fermented- cow urine and water had no substantial effect on *G .f . fuscipes* catches. A slight increase in male and female *G. f. fuscipes* catches was induced by an octenol- phenol blend which, however, showed no significant difference at $p<0.05$. Similar patterns of response were displayed by *Tabanidae* (*Tabanus taeniola* and *Atylotus agrestis*), though the trap design used revealed low catching efficiency. Nevertheless, *Muscidae* (*Stomoxys spp*. And *Musca spp*.) catches increased significantly in response to the octenol- phenol blend.

5.32

TSETSE DIVERSITY AND TRYPANOSOME INCIDENCE IN THE SLEEPING SICKNESS ENDEMIC FOCUS OF WESTERN KENYA

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Cross sectional studies were undertaken to establish the current status of tsetse and trypanosomiasis situation in the sleeping sickness endemic region of Western Kenya. Entomological and parasitological parameters were obtained in randomized sites selected on the basis of geographical location, vegetation cover and habitat suitability. Standard biconical traps baited with acetone and phenols was used in tsetse sampling, while HCT techniques were used for parasitological detection. Results indicated varying tsetse density with ftds ranging between 49 in Teso to 1.2 in Bungoma districts. Two tsetse species *Glossinna pallidipes* and *G. fuscipes* were identified as single and sympatric populations. Peridomestic infestation was predominant at Kakurikit, Katotoi and Kakamer in Teso. Trypanosomiasis incidence in cattle ranged between 11.3% at Katotoi in Teso to 0.117%, at Buduvusi in Trypanosomes were most diverse Buduvusi where *T. brucei, T.congolense, and T. theileri. T. brucei* were found, while in only *T.vivax* was detected at. However, trypanosome incidence in cattle was highest in Aloiet and Bubango. Implications of these results on the endemic stability of Human African Trypanosomiasis in the region are discussed.

Key words*: tsetse, trypanosome, sleeping sickness, Teso, Bungoma, Busia*

5.33

CRYPTIC DIVERSITY WITHIN THE MAJOR TRYPANOSOMIASIS VECTOR *GLOSSINA FUSCIPES* REVEALED BY MOLECULAR MARKERS

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Tsetse population genetic data contribute more and more to African trypanosomiasis control. However, for *Glossina fuscipes s.l.*, responsible for transmission of approximately 90% of the cases of human african trypanosomiasis in Sub Saharan Africa, because few molecular genetic studies have been conducted, our understanding of the taxonomy and population structure is too incomplete to fully inform intervention strategies.

It was previously proposed on the basis of subtle differences in the morphology of their genitalia that *G. fuscipes* is composed of three sub-species: *G. f. fuscipes*, *G. f. martini* and *G. f. quanzensis*. By performing a macrogeographic genetic study of *Glossina fuscipes* from Ethiopia, Kenya, Tanzania, Uganda and DRC, using genetic evidence from nuclear, mitochondrial and symbiont DNA, we show that the morphological subspecies do not correspond well to genetic differences between the flies. Instead, we

found at least 5 main allopatrically distributed groups of *G. fuscipes* flies. The most genetically distinct group of lies originated from Ethiopia, where a sterile insect release programme is planned by the PATTEC. From a programmatic perspective this may be both positive, given that it may reflect limited migration into the area, or negative if the high levels of differentiation are also reflected in reproductive isolation between this population and the flies to be used in the release programme.

We propose that the morphological classification alone is not used to classify populations of *G. fuscipes* for control purposes but that population genetics studies using both nuclear and mitochondrial loci are used to determine the level of genetic isolation.

LAND USE, ENVIRONMENT AND SOCIOECONOMICS

ORAL

SOCIOECONOMICS

6.01

ADVOCACY HAT PROJECT IN UGANDA (2008-2011)

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Advocacy HAT focal person, Uganda.

Uganda advocacy HAT project whose purpose is to increase awareness and prioritization of HAT interventions at local, national and international levels, has the objectives of establishing well coordinated and harmonized HAT control, increasing index of HAT suspicion among health workers, improving health infrastructure, improving diagnosis and surveillance of HAT, enhancing awareness and ownership of HAT problem at local, national, regional and international levels. It covers 6 AT endemic districts in N/W focus and 28 in S/E focus. Uganda has two forms of HAT occurring in two geographically distinct regions/foci. The *T.b. gambiense* HAT occurs in the North West focus. It boarders South Sudan to the North and DRC to the west. 2 million people are at risk. The *T.b. rhodesiense* HAT is found in south, east and now mid north. It boarders Western Kenya. 8-9 million people are at risk. Epidemic out breaks are known to occur from time to time in each focus. The possible merger of the two foci remains unpredictable. The project is expected to end in December 2011.The key strategies are being used: *advocacy itself* targeting policy makers (political,religious,cultural,opinion leaders and decision makers) in order to influence policies and allocation of resources, *social mobilization* targeting line ministries, media houses, development partners and other organizations such as NGOs to generate support and participation, *behaviour change communication* targeting those who have influence over others and those we aim at influencing to create behaviour change, *Information ,Education and communication (IEC)* targeting endemic populations for behaviour change and awareness raising and *Community Mobilization* targeting community members and local leaders for capacity

building at community level and raising awareness*, individual and group meetings for awareness* and *Trainings of health workers for capacity building on diagnostics and surveillance* . Measurable impact has been realized in the country for example: Increased AT national budget from $8,636 in 2009/2010 to $25,260 in 2010/2011.Inclusion of AT in the national master plan for all NTDs control in the country for 2011/2015 with estimated cost for advocacy component at $31,196,505. Renewal of the PATTEC/COCTU/MOH with approved work plan up to the end of 2011. Improved collaboration between Ministries of Agriculture and Health through COCTU and other stake holders. Physical participation of key Ministers in advocacy activities including officiating at launching of HAT sentinel sites. Provision of a vehicle for AT advocacy activities by the Ministry of Health. AT joint plan action *(narrative)* for all stake holders, inclusion of HAT in the training curricula for primary schools, tertiary institutions (paramedical schools), health promotion community hand book and in Uganda Clinical guidelines. Follow up is on Makerere University medical school. There is increased demand for AT services in the country. The progress of the project strongly suggests that current information on HAT is getting more harmonized, HAT control is better coordinated and harmonized, index of suspicion for HAT among health workers is increasing, diagnosis and surveillance of HAT is improving and finally awareness and ownership of HAT problem at local, national, regional and international levels is on its way to enhancement. With more resources and ample time, the situation is anticipated to improve greatly. Attainment of outputs varies from 59%-over 100%. Adequate resources support and commitment from government and development partners should be invested in the project for elimination of the HAT and its vector in a period of 5 years.

6.02

DIFFERENCE IN KNOWLEDGE OF ANIMAL TRYPANOSOMOSIS AND ITS CONTROL BETWEEN TWO MAIN ETHNIC GROUPS IN NORTHERN BENIN: CASE OF FULANI AND BATONOU

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Trypanosomosis is a disease transmitted by the tsetse fly; it is classified as important in majority of the sub-Saharan countries affected, where it is ranked among the first three priority veterinary diseases. While it is always mentioned that the Fulani or Peulh ethnic group known as livestock keepers have more knowledge on trypanosomosis and its control, there is no study supporting the statement. In this paper, we analyzed the difference in knowledge between Fulani and Batonou, two main ethnic groups in northern Benin. The analysis was based on a 2009 survey covering 14 villages randomly selected from the 68 villages of Banikoara Commune in the north of Benin, where 30 livestock keepers were selected randomly from each village. Data were collected using a knowledge, attitude and practices (KAP) questionnaire. Results showed that Fulani cattle farmers were able to cite more signs of the disease compared to the Batonou. The proportion of Fulani that cited tsetse fly as cause of the disease and was able to recognize tsetse fly was significantly higher compared to Batonou. Fulani cattle farmers used modern medicines (isometamidium chloride and diminazene aceturate) to treat sick animals compared to the Batonou. The results suggest that cattle farmers from Fulani ethnic group know more about the disease and its control than the Batonou. The finding has an implication on the design of knowledge and information dissemination campaign where more emphasis should be put on activities to enhance knowledge of cattle farmers from Batonou ethnic group in the Commune.

***Keywords**: Knowledge, trypanosomosis, ethnic group, Banikoara, Benin*

6.03

SOCIO-ECONOMIC IMPACT OF BOVINE TRYPANOSOMOSIS ON CATTLE PRODUCTIVITY IN THE SUDAN

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Socio-economic surveys were conducted in two tsetse-infested areas in the Sudan to estimate the impact of trypanosomosis on cattle productivity. Area 1 was around Damazin town, Blue Nile State (BNS), south-eastern central Sudan; and area II was around Juba town, Central Equatoria State (CES), Southern Sudan. Both areas possess huge numbers of livestock, particularly cattle; and are infested with several species of tsetse flies. The objective of these surveys is to assess the impact of trypanosomosis on the cattle owners' welfare. Data were collected using questionnaires of sixty respondents selected by purposive sampling techniques in each area and by direct observations as well as by interview of community leaders and group discussions. In both states trypanosomosis causes high losses in milk, the majority of farmers admitted that trypanosomosis reduces milk in their herds to 25% of the normal yields. Eighteen percent of farmers in the BNS and 17% in CES said that trypanosomosis reduced milk yield by 50 .0 %, some farmers stated that trypanosomosis prevents milk production in the affected animals completely. 92.0% and 89.0% of the farmers in the BNS and CES respectively believe that trypanosomosis causes high mortality in calves and more than 83.0 % of farmers in the BNS and CES believe that abortion in cattle herds is mainly caused by trypanosomosis.

POSTERS

6.04

FRAMEWORK OF A TOOL USED IN HAT ADVOCACY

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Advocacy HAT focal person, Uganda.

In Uganda a tool referred to as a communication strategy which sets direction and answers five specific questions for attainment of a programme goal and objectives has been the overall guiding principle for effective HAT advocacy and has been used adequately. The specific questions it answers are: What is the current situation? *(current communication needs),* where do we want to go? *(Goal and objective),* How do we get there*? (Strategies)* what do we need to enable us get there? *(Internal and external resources)* and how do we know we have got there? *(Monitoring process and impact indicators).*The purpose of this tool is two-fold as: a mechanism to guide systematic planning of focused advocacy, IEC and social mobilization interventions, and lastly to provide a basis for developing IEC messages and advocacy materials. The advocacy tool defines levels as National, District, Health Facility, community and house hold. Under each level, the following are examined and defined: Target audience, communication/current problem/issue, expected behaviour, barriers/gaps to the expected behaviour, communication objective, message concept, channels, activities, advocacy materials, and process and impact indicators under evaluation.

6.05

MESSAGE DEVELOPMENT FOR BEHAVIOUR CHANGE.

Florence Muhumuza

Advocacy HAT focal person, Uganda.

The process of material/message development is systematic; It normally defines target audiences, formats of message delivery remain a function of the needs of the target audiences, messages are tailored to audience needs, behavioral models are applied and multi channel approaches utilized. The process of material development and its justification , 7Cs of communication messages, types of appeals and usage are critical in the process.Behaviour change communication itself (BCC) has many definitions but simply, it is an interactive process with individuals and communities to develop tailored advocacy materials/ messages and approaches using a variety of communication channels to promote and sustain behavioral change. Material development process follows a number of steps; Identification of the communication issue to be handled-normally based on research, identification of the primary &secondary/tertiary audiences, defining the desired behaviors as compared to the undesired ones, identification of appropriate channels of communication, development of the message concept& script, selection of channel and type of material to use, development of the draft material, review by technical team of developed materials,pre-testing of materials/messages on intended audiences, adjusting of pre-tested materials in the local languages, approval by the Ministry of Health, mass production, developing distribution strategy/mechanism and finally distribution for public consumption. Justification for material production is obvious; they have a strong multiplier effect-cover, provide message credibility, enhance retention and comprehension, remind audiences about messages, reduce room for misinformation, they make learning interesting, effective and reinforce community mobilization. The 7Cs in communication messages are crucial. All messages must: **C**ommunicate a benefit, **C**ommand attention, and give **C**larity of Message/clear, be **C**onsistent as consistency counts, **C**ater for the heart and head (emotions), **C**reate trust and **C**all for Action. *The appeal and tone of the message in the context of Values& norms also important.* The appeal is the

way one organizes the content of the message to persuade or convince people to change. There are various types of appeals in health Communication and are put under consideration during the material development for communication. Not everyone responds in the same way to a message. So what might convince you might not convince the other. Fear, humour, factual/logical, emotional, Positive and negative appeals including one- and two- sided messages are pillars for effective message development for behavior change communication.