Report

Workshop on Surveillance and Control of Rabies
Centre Pasteur du Cameroun, Yaoundé, Cameroun
25 October – 5 November 2016

27 December 2016

Aim and objectives

In low and middle-income countries, delivering adequate training for people working in disease control may be a challenge. Many e-training programs are based on participatory learning models in which participants share their understanding and monitor their theoretical knowledge through discussion, questioning and interaction with mentors via the internet. The current most popular e-learning systems for resource-poor settings are massive online open courses (MOOCs) which have been used by tens of thousands of students around the globe. However, this format is not well suited to specific practical training needs. This is the case for the management of neglected zoonotic disease and rabies in particular.

According to estimations, around 60 000 deaths from rabies occur each year due to the inaccessibility of post-exposure prophylaxis, inadequate or absent dog rabies control programs, and lack of governmental financial support but also lack of awareness about rabies or how to control it. There is clearly a need for innovative methods to deliver appropriate education to these areas.

To improve the knowledge of health professionals in rabies enzootic countries, we used an approach called customized online training, (COLT) which focuses on small sets of trainees and is designed for situations where acquisition of skills and direct training by experts are needed. With this approach, it is feasible to tailor training to each individual trainee in a way that would be impractical in a system designed for mass audiences (http://octave.bio-med.ch).

In Collaboration with WHO, the University of Lausanne, Switzerland, The HSET foundation, the EU funded FP7 PREDEMICS program and the International network of Institut Pasteur, and with the active participation of FAO, OIE and Global Alliance for Rabies Control (GARC), we first organized a COLT course on the control and surveillance of rabies in Dakar, Senegal, in December 2013 (http://predemics.biomedtrain.eu/cms/Default.aspx?Page=19812%20&menu=494) (http://www.who.int/bulletin/volumes/93/7/14-149849/en/). The same COLT approach was used in 2015 in Phnom Penh, Cambodia (https://rabiesalliance.org/media/news/customized-online-and-onsite-training-colt-for-rabies-control-officers). and in 2016 for a third session of this training program in Yaoundé, Cameroon.

The purpose of this course was to provide a practical training on rabies with a special focus on Africa for students and professionals of animal and human public health sectors. The course emphasized the need of multidisciplinary approach and intersectorial cooperation. Several major objectives addressing critical issues of the present rabies situation in developing countries and in particular in Africa were targeted during this training session:

- To increase awareness and communication about rabies in Africa.
- To discuss problems and opportunities for rabies control in Africa and elaborate on strategic and practical solutions.
- To improve knowledge and practice on rabies epidemiological data in particular rabies incidence.

- To discuss the present situation of rabies prophylaxis in humans and propose practical solutions to increase access to post-exposure prophylaxis.
- To increase knowledge on dog rabies vaccination and other approaches for dog population management.
- To promote one health approach and dog vaccination to control rabies in Africa.

Successful trainees benefited from 8 ECTS (European Credits Transfer System) of the University of Lausanne, Switzerland.

Interest of the course for the region

Rabies is a lethal encephalitis due to a lyssavirus mainly transmitted by the bite or scratches of infected animals (principally dogs in developing countries). An estimated 21,000 human rabies deaths occur in Africa each year due to a lack of awareness, inaccessibility of exposed people to rabies post exposure prophylaxis, inadequate or absence of dog rabies control programs and a lack of governmental financial support.
All rabies experts and relevant international organizations have recognized the urgent need to provide training on rabies control and diagnosis methods to medical and veterinary staff. This training also benefited from the lessons of the past showing retrospectively that conventional training sessions had little impact on the rabies epidemiological situation and that the approach of Customized On-Line Training Course (COLT) is best suited to develop knowledge and practical use of this knowledge in field conditions (http://www.who.int/bulletin/volumes/93/7/14-149849/en/).

Organizers

This 11-day residential course was organised by the Centre Pasteur du Cameoun with the support of the Institut Pasteur in Paris, the Department of Biochemistry of the University of Lausanne, Switzerland, the Health Sciences eTraining Foundation (HSeT), the World Health Organization (WHO) and the PREDEMICS consortium (FP7 grant nb 278433) in collaboration with the World Organization for Animal Health (OIE), the Food and Agriculture Organization of the United Nations (FAO) and the Global Alliance for Rabies Control (GARC).

This workshop received financial support from several international organizations and consortia. In 2010, the European Commission framework program 7 included a call for research programs with a strong training component on emerging and re-emerging zoonosis. Sylvie van der Werf led, with Hervé Bourhy as a co-leader, the successful PREDEMICS application. The training therefore benefited from the financial contribution and from the expertise of PREDEMICS in the domain of emerging and re-emerging zoonoses and rabies in particular. The huge experience of Jean-Pierre Kraehenbuhl from HSeT Foundation, a PREDEMICS partner, also largely contributed to the organization of this workshop and in particular to the building of all the e-learning support and web site management. Jean-Pierre Kraehenbuhl, the HSeT Team (http://hset.bio-med.ch) and contributors all around the world have developed over the last 10 years, eLearning and eTraining content related to many topics in Immunology & Vaccinology, Microbiology, Hematology, Pharmacology, Nephrology, Bioinformatics, Statistics, Laboratory methodology and Clinical trial

design and management. Presently HSeT collaborates with more than 40 Swiss, European, US and African organizations and institutions.

This workshop was co-organized with WHO and in particular by Dr Bernadette Abela-Ridder, Team leader NZDs in WHO headquarters and Dr Anna Fahrion member of NZD team in WHO headquarters. The International network of Pasteur Institutes also supported this workshop through the selection of the corresponding grant submitted by Dr Hervé Bourhy. The Centre Pasteur du Cameroun and in particular Dr Mathurin Tejiokem participated to the general organization and was in charge of the local organization.

Details of the organizing committee:

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Overall strategy

This course took advantage of the new possibilities offered by e-Learning and already existing documents from WHO and other international organizations.
A pre-training assessment tool was provided to selected motivated applicants in order to prepare them to participate actively in discussions and practical activities during the workshop. To complete this pre-training session, applicants required approximately 70 hours of individual work. The trainees had access to these functionalities through a dedicated web-page (http://predemics.biomedtrain.eu).

The on site course (11 days) focused on practical sessions, as bench work, demonstrations and hands-on sessions, which complemented the theoretical part (pre-training session and lectures).

Selection of the trainees

This workshop was developed for physicians, veterinarians, and specialists in infectious diseases, virology and/or epidemiology with at least a bachelor degree and preferably a master degree. Public health officers involved in the control of zoonotic diseases were welcome. Applications from Africa were encouraged, however applications from other regions of the world were also considered.
Pre-selection of the students was performed on the basis of the quality of their applications including CV, letter of motivation and 3 letters of recommendations (**Annex 1**). A basic knowledge of English was a prerequisite. A total of 86 applications were analysed and 41 pre-selected.
A pre-training assessment tool was then provided to pre-selected trainees to prepare them and help them achieve a sufficient and homogeneous level of knowledge, thereby stimulating more fruitful discussions. The trainees had access to these tools through the dedicated web-page. This pre-training session required approximately 30 hours of lecture and 70 hours of individual work. It was followed by a final evaluation performed online by each applicant.
Thanks to this pre-workshop distance learning all the pre-selected trainees had the opportunity to improve and test their knowledge. This also allowed the board of organizers to select among pre-selected trainees those that showed appropriate knowledge and motivation levels to follow the onsite course in order not to slow down the progress of the rest of the group.

Registration was free of charge and local expenses (accommodation, food) were covered by the organizers. The organizing committee was able to provide travel grants for 18 trainees.

Pre-workshop activities

- Reading seminal rabies-related annotated articles
- Writing a national plan for the control and surveillance of rabies as a team work using a forum
- Writing a manuscript following online guidance with an application “How to write a manuscript”

Workshop achievements

The duration for lectures and benchwork, demonstrations and hands-on sessions are given in **Annex 2**. The organization of the workshop activities favoured debates, discussions and analysis of local contingencies to find practical, economical, sustainable and reliable solutions to the present challenges posed by rabies.

Twenty five students, from 12 different countries (including 11 in Africa), attended the workshop activities (**Annexes 3, 4 and 5**), including veterinarians, physicians, and microbiologists working in ministries, regional veterinary stations, hospitals, research institutions and NGOs involved in public health.

The workshop was held in the training centre of the Centre Pasteur du Cameroun during 8 days including the one day of hands on activities. Field epidemiology training activities related to knowledge attitude and practice surveys, dog population surveys and dog vaccination campaigns were performed in Mbalmayo, a city of approximately 60000 inhabitants located in Nyong-et-So'o province, 50 km South from Yaoundé.

The Ministry of Agriculture and fisheries, the Ministry of Health were represented at the opening ceremony, where the WHO Country Representative and the Director of the Pasteur Center in Cameroon also delivered speeches.

To assess the effectiveness of the workshop process, one intermediate quiz and a final evaluation examination including another written quiz were conducted. All the students succeeded with the final examination.

Twenty one teachers participated to the 11-day residency course in Yaoundé, Cameroon. They originated and from 10 countries (Cameroon, France, Switzerland, South Africa, Iran, United Kingdom, Cambodia, Italy, Belgium and New Caledonia) on 4 continents (**Annex 6**). Several lectures were provided by video conference to limit the travel expenses.

Evaluation of the course by the trainees

At the end of the course, the students were asked to evaluate the training course. 90% of them gave the best score or a very good evaluation to the course.

Conclusions

This course was a unique opportunity for mixing experience and knowledge between international, experts on rabies and a very motivated group of students involved locally, nationally or regionally in the control of rabies in Africa. The organization of the workshop (pre-training activities performed by e-learning and corresponding to approximately 70 hours of personal work) and the duration of workshop activities in Yaoundé (11 days) allowed the presentation of data and knowledge necessary for a better understanding of the guidelines and technical protocols approved by international organizations (WHO, OIE and FAO). The associated lectures, technical bench work and field demonstrations allowed the participants to practice the knowledge dispensed during the lectures and discuss more practical points. The motivation all along the training (pre-workshop and workshop activities), the satisfactory scores obtained by the students, as well as the evaluation of the course by the trainees clearly indicated that the workshop met its objectives. It is expected that the course will boost the training outcome with the transfer of the techniques and knowledge acquired by the participants to other members of the staff of their national and regional institutions. Contacts are continuing with those graduates to help write scientific articles or reports on rabies, and to organize training in their countries. This course also led to intense exchange of experiences between participants and largely contribute to the building of a strong regional network between participants. The outcomes of this workshop were very rapidly advertised in the newsletter of the International network of Institut Pasteur RIIP-INFO (04/11/16) and on the website of the Centre Pasteur du Cameroon (**http://www.pasteur-yaounde.org/index.php/fr/echos-du-cpc/560-surveillance-et-controle-de-la-rage-au-cpc)**. Considering the epidemiological situation of rabies in Africa and Asia,

and after the organization of courses in Senegal, Cambodia and Cameroon, we plan to organize a similar workshop in Central Asia in the near future.

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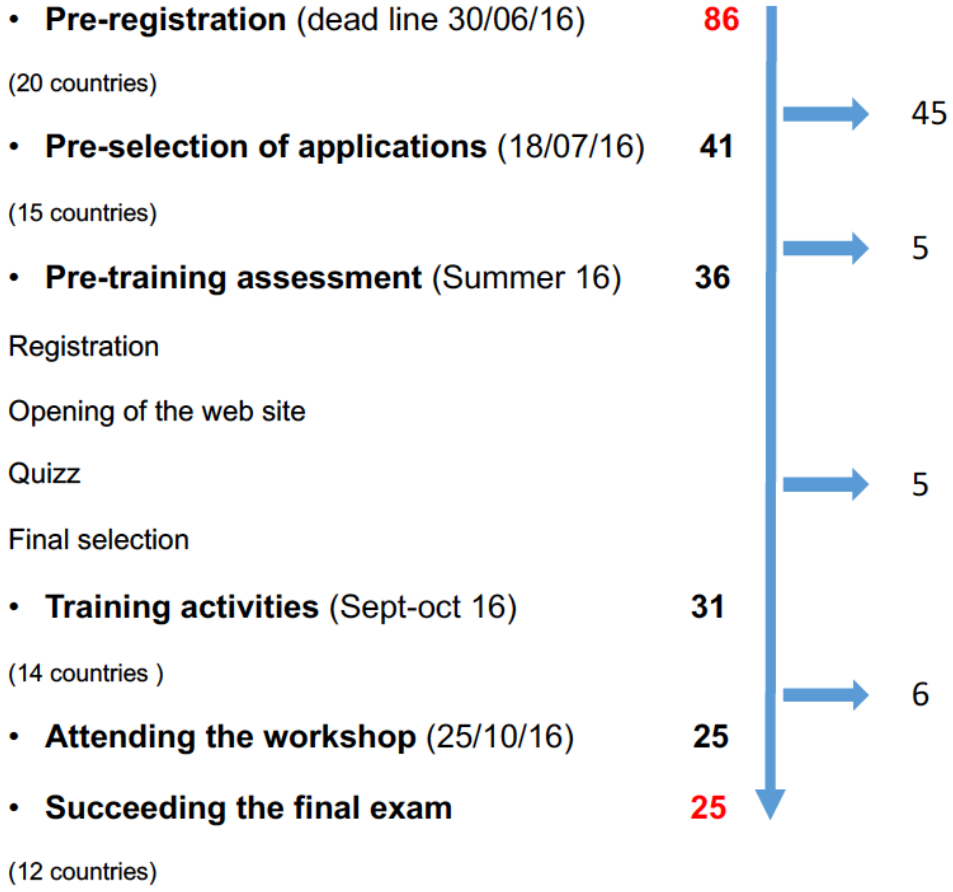
Annex 1: Process of selection of the trainees



Annex 2: Program of the workshop activities

Time	Activities	Contributors
Tuesday October 25		
8h30 - 9h30	**Informal part** Informal part, general introduction, presentation of the workshop, organizing team and trainees. Discussion about expectations of the trainees	Mathurin Tejiokem Hervé Bourhy Jean-Pierre Kraehenbuhl
9h30 - 11:00	**Official opening ceremony** The course and its aims Director of the Centre Pasteur Cameroon Representative of WHO Minister of Public Health, Cameroon Photo Cocktail and end of the official ceremony	Hervé Bourhy Guy Vernet Jean Baptiste Roungou MINSANTE All
11:00-12h30	**Keynote speech**: Freedom from dog mediated rabies is a global public good (20 min) Stepwise approach for rabies control + practical exercise Contact between media and organizers Examination (Quiz 30 min)	Anna Fahrion Abdou Salla
12:30-13h30	***Lunch*** Blood sample (and titration by CPC)	All
13h30 - 15h00	**Surveillance of rabies** 1. Presentation, generalities (30 min) 2. Surveillance Blueprint (30 min)	Moderator Mathurin Tejiokem Anna Fahrion Hervé Bourhy
15h00 - 17h30	**Surveillance of rabies** 3. Type and quality of data (30 min) 4. Presentation of Cameroon situation (30 min) 5.General discussion (1h) ***Social dinner***	Sowath Ly (visio) Mathurin Tejiokem **panel of experts** All
Wednesday October 26		
08:00 - 10h00	**Clinical diagnosis of rabies** In humans (30 min) Holistic management of rabies patients In Animals (30 min) Discussion	Perrine Parize Arnaud Tarantola Hervé Bourhy Chairman: Perrine Parize Jean-Pierre Kraehenbuhl
10h30 - 12h30	**Surveillance of rabies** 6. Practical exercices (work on scenarios)	Working groups

12:30 - 13:30	***Lunch***	
13h30 - 15h30	**Surveillance of rabies** 6. Practical exercices (work on scenarios)	Working groups
15:30 - 16:00	***Coffee break***	
16h30 - 17:30	**Surveillance of rabies** 7. Presentations of the results of the different working groups (1h) Round table on surveillance (45 min)	Moderators: Anna Fahrion & Perrine Parize

Thursday October 27

08:00 - 10:00	**Management of human rabies at hospital** (therapeutic, announcement of prognosis to relatives, risk analysis for the relatives, varying attitudes of relatives concerning hospitalization)	Jean Taguebue 2 groups
	Rabies prevention clinic	
10:00 - 10:30	***Coffee break***	
10:30 - 12:30	**Rabies prevention clinic**	2 groups
12:30 - 13:30	***Lunch***	
	Clinical diagnosis of rabies	
13:30 - 15:30	• PrEP in human (30 min) • PEP (30 min) • Lyssavirus diversity and cross protection	Perrine Parize Mathurin Tejiokem Hervé Bourhy
15:30 - 16:00	***Coffee break***	
16:00 - 17:30	**Laboratory diagnosis** • Principle and specimens to be collected • Diagnosis in the context of Africa • FAT and RTCIT	Laurent Dacheux Serge Sadeuh Paola de Benedictis (visio)

Friday October 28

08:00 - 10:00	**Laboratory diagnosis (hands on activities in working groups)** • G1: FAT and DRIT • G2: ELISA • G3: real time PCRx	Serge Sadeuh Laurent Dacheux Jacques Barrat

10:00 - 10:30	***Coffee break***	
10:30 - 12:30	**Laboratory diagnosis (hands on activities in working groups)** • G1: FAT and DRIT • G2: ELISA • G3: real time PCRx	Serge Sadeuh Laurent Dacheux Jacques Barrat
12:30 - 13:30	***Lunch***	
13:30 - 15:30	**Laboratory diagnosis (hands on activities in working groups)** • G1: FAT and DRIT • G2: ELISA • G3: real time PCRx	Serge Sadeuh Laurent Dacheux Jacques Barrat
15:30 - 16:00	***Coffee break***	
16:00 - 17:30	**Laboratory diagnosis (hands on activities in working groups)** • Debriefing on diagnosis, • Presentation of the results	Trainees

Saturday October 29

08:00 - 10:00	**Round table on diagnosis and management of rabies virus infected patients**	Mathurin Tejiokem Serge Sadeuh (panel of experts)
10:00 - 10:30	***Coffee break***	
10:30 - 12:30	**Education, awareness and community participation** • Presentation (40 min) • Work in group on the organization of a communication campaign	Kevin Leroux (visio)
12:30 - 13:30	***Lunch***	
13:30 - 15:30	**Education, awareness and community participation** • Round table (1h)	Kevin Leroux Daniel Stewart
	KAP Studies (40 min)	Jacques Barrat
15:30 - 16:00	***Coffee break***	

16:00 - 17:30	**Presentation of field activities** + (ANSES) + panel of experts) 1h30 Distribution of the following subject: How would you organise dog vaccination campaigns (mobile, door to door, and/or fixed). Preparation of 15 min presentation per group	Coordinators: Mathurin Tejiokem Daniel Stewart Jacques Barrat Panel of experts 4 groups

Sunday October 30

Social activity

Time	Activities	Contributors

Monday October 31

	Field activities	
8h30 - 12h30	• G1: KAP studies + dog population surveys • G2: Vaccination (fixed and/or mobile) • G3: Capture of free roaming dogs • G4: Analysis of data	Trainees
12:30 - 13:30	***Lunch***	
	Field activities	
13:30 - 17:30	• G1: KAP studies + dog population surveys • G2: Vaccination (fixed and/or mobile) • G3: Capture of free roaming dogs • G4: Analysis of data	Trainees

Tuesday November 1

	Field activities	
8h30 - 12h30	• G1: KAP studies + dog population surveys • G2: Vaccination (fixed and/or mobile) • G3: Capture of free roaming dogs • G4: Analysis of data	Trainees
12:30 - 13:30	***Lunch***	
	Field activities	
13:30 - 17:30	• G1: KAP studies + dog population surveys	Trainees

- G2: Vaccination (fixed and/or mobile)
- G3: Capture of free roaming dogs
- G4: Analysis of data

Wednesday November 2

	Dog rabies control	
8h30 - 10h30	• Theory • Generalities and dog management during vaccination campaigns	Daniel Stewart
10:30 - 11:00	***Coffee break***	
	Dog rabies control	
11:00 - 13:00	• Vaccination of dogs (1h) • Example of mass dog vaccination campaign (1h)	Florence Cliquet Monique Léchenne
13:00 - 14:00	***Lunch***	
	Dog rabies control	
14:00 - 14:30	• Discussion	Florence Cliquet Monique Léchenne Panel of experts
	Field activities	
14:30 - 15:30	• Analysis of data and finalization of restitution on the organization of dog vaccination campaign	Trainees
15:30 - 16:00	***Coffee break***	
	Field activities	
	• Presentation of results obtained during the field study and presentation of the organization of dog vaccination campaign	Moderator Monique Léchenne
16:00 - 18:00	Trainees' presentations (10 min each)	
	• Jacoba Dongo • Rachel Madakurozwa • Dickson Kennedy Ankugah • Philippe Mshelbwala	Moderator: Jean-Pierre Kraehenbuhl

Thursday November 3

8h30 - 10h00	**Other tools** : • Modeling: theory	Pierre Nouvellet
10:00 - 10:30	***Coffee break***	
10:30 - 12:00	**Other tools** : • Modelling: practice	Pierre Nouvellet
12:30 - 13:30	***Lunch***	
13:30 - 15:30	**Other tools** • Phylogeny: theory and practice	Visio (Simon Dellicour)
15:30 - 16:00	***Coffee break***	
16:00 - 17:30	**Other tools** • Phylogeny: practice	Visio (Simon Dellicour)
17:30 - 18:30	**Trainees' presentations** • Rauna Ndinelao • Mathew Kung'u • Charles Kweche Petchu • Amabo Chi	**Moderator** Alireza Gholami

Friday November 4

08:00 - 09:00	**Final examination**	Trainees
09h00 - 10h00	**National program of rabies control**: presentation of the preworkshop team work	Chairman: Gregorio Torres
10:00 - 10:30	***Coffee break***	
10:30 - 12:00	**Feedback from the field work**. Presentations by the 4 workshop groups	Chairman: Mathurin Tejiokem
12:30 - 13:30	***Lunch***	

13:30 - 14:30	**Presentation of Central Asia situation**	Alireza Gholami
14h30 - 15h30	**Elimination of dog-mediated rabies. The African challenge.**	Gregorio Torres
15:30 - 16:00	***Coffee break***	
16:00 - 17:00	**Graduation ceremony** **Closing ceremony**	All

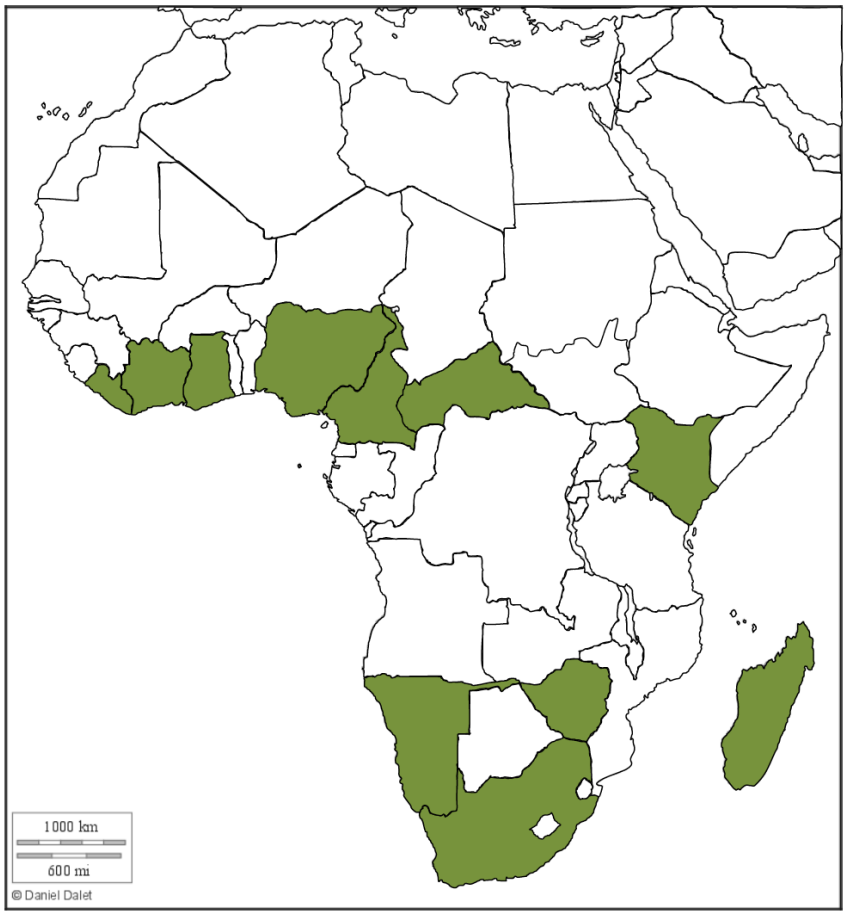
Annex 3: Photo of the participants to the opening ceremony

From right to left on the first front: Dr Jean Pierre Kraehenbuhl (HSET fondation), Dr Anna Fahrion (WHO headquarters, Geneva), Dr Hervé Bourhy (Head of the WHO Collaborating Centre on Rabies, Institut Pasteur, Paris, France), Dr Guy Vernet (Director of the Centre Pasteur du Cameroun), Prof. Sinata Koulla Shiro (Secrétaire Générale du Ministère de la santé Publique, Cameroun), Prof. Mbede Joseph (Président du Conseil d'administration du Centre Pasteur du Cameroun), M. Engamba Philippe Didier (Inspecteur Général N°3, Ministère de l'Elevage, des pêches et des Industries animales, Cameroun), Dr Jean Baptiste Roungou, (Representing WHO in Cameroun).

Annex 4: Photo and name of the participants to the course

From left to right:
Yao Mathurin Koffi, Florence Cliquet, Glenn Edosoa Torrencelli, Mamitiana Andriamananjara, Olabisi Makanju, Eric Mboke Ekoum, Ntantan Michael Wamey, Dickson Kennedy Ankujah, Patrick Anebonam Utchena, Philip Mshelbwala, Serge Sadeuh, Yvonne Muthiani, Franck Chi Amabo, Belayneh Etagegnehu, Mathew Kung'u Muturi, Daniel Stewart, Ahmed Abubakar, Philomena Ikye-Tor, Kia Grace Sabo Nok, Richard Dery Suu-Ire, Jacques Barrat, Aurélie Tschopp, Rachel Madekurozwa, Celine Mbilo, Jkoba Cecilia Dongo, Rauna N. Athingo, Djuicy Delia-Doreen, Monique Lechenne, Mathurin Tejiokem, Hervé Bourhy, Jean-Pierre Kraehenbuhl, Alireaza Gholami, Sandra Miriella Charlène Garba-Ounagole.
(not on the picture: Charles Kweche Petchu)

Annex 5: Countries of origin of the trainees



- **Nigeria** 6
- **Cameroon** 5
- **Ghana** 2
- **Madagascar** 2
- **Switzerland** 2
- **Kenya** 2
- **Namibia** 1
- **Ivory Cost** 1
- **Zimbabwe** 1
- **Liberia** 1
- **RCA** 1
- **South Africa** 1

Annex 6: List of teachers involved

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