

Part Five

Debating HIV/AIDS

“Scramble for Cameroon” Atypical Viruses and Scientific Zeal in Cameroon (1985-2000)

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The history of scientific and medical mobilisation against AIDS remains, to a large extent, a history of the *centre*. Even the most inspired studies¹ are limited to the reassuring scene of major western cities² – a scene which is certainly one of conflict and which is “impure” but one which is well and truly confined. The peripheries of the rest of the world, and Africa in particular, appear only in the wings as sinister places, in a state of permanent waiting which is in strong contrast to the scientific and militant turmoil of the centre. However, even if it is only because of the enormous impact of the epidemic on the continent, Africa has functioned not only as a more or less “pathological” background to research on AIDS but has managed to occupy, on a scientific, political and even industrial level, the very centre of western experience of AIDS. Ignoring this presence would be tantamount to missing an entirely new process of globalisation, which accompanied the emergence of scientific issues of the “South” at the outset, but which did not leave the western “centre” unscathed – think of France whose “national grandeur” on the global AIDS scene is largely due to her symbolic and material deployment in Africa, indeed to the institutional and demographic signs of her former colonial links.³ This is why it is important, in the style of recent attempts of the so-called “postcolonial history of the sciences”⁴ to overturn the perspective: interpret History within the parameters which it has set itself, interpret, especially and constantly, how the periphery informs and reforms the centre.

¹ See for instance Steven Epstein, *Impure science: AIDS, activism and the politics of knowledge* (Berkeley, University of California Press, 1996). On AIDS research in France: Sébastien Dalgalarondo, *Sida, la course aux molécules, Cas de figure* (Paris, Éditions de l'École des Hautes Études en Sciences Sociales, 2004).

² Cristiana Bastos' work is a notable exception. It simultaneously considers the heterogeneity of the scientific scenes of the North (where “AIDS doctors”, firms and activists cross paths) and the constitution of a transnational field whose players and institutions reproduce this heterogeneity whilst at the same time coupling it with movements and asymmetries of the Centre-Periphery type: Cristiana Bastos, *Global responses to AIDS: science in emergency* (Bloomington, Indiana University Press, 1999).

³ The Pasteur Institute and the Agence nationale de recherche sur le sida (ANRS), two French “cultural exceptions”, insist on their specific relations with francophone African countries. Moreover, the presence of African migrants, in the Parisian region in particular, contributes to the magnitude of the HIV/AIDS epidemic in France, as compared to other European countries.

⁴ Warwick Anderson “Postcolonial Technoscience,” *Social Studies of Science*, 32, 5-6 (2002), 643-58; Roy MacLeod, “Reading the discourse of colonial science”, in Patrick Petitjean (ed.), *Les sciences coloniales, figures et institutions* (Paris, Orstom Éditions, 1996), 87-96.

In this spirit I shall attempt to write a global history of the research into AIDS in Cameroon.¹ This does not mean that I shall simply concentrate my remarks on a limited locality in order to re-interpret a global context, by “changing the angle of the magnifying glass”: I shall rather offer detailed and precise discussions of the global integration of Cameroonian research by examining the common devices – institutional, social, technological – which transcend international boundaries without, of course, losing sight of the unequal relations which they integrate and re-orientate. By its very form, this article is part of this project, by conceiving of itself not as an isolated “case study” from which one could draw, because of its anonymity and abstraction, a few generalities concerning “African science”, but by attempting to be *a narration, a true story* which is fully integrated into the larger story – scandalous or glorious – of the *Big Science* and its “races”.

The main reason for Cameroon’s integration into the international field of AIDS was that it was “favourable terrain” for research into the AIDS viruses. As Franco-American controversies concerning the isolation of the HIV-1 virus in 1983² have shown, the “race for the viruses” jeopardise significant interests, whatever the geographic area: whereas the identification of a virus represents a source of knowledge and recognition for academics, for pharmaceutical firms this identification, strengthened by the law of intellectual property, signifies the immediate and remunerated reward of diagnostic tests. These stakes which are reduced by the scale of the AIDS epidemic, have, since 1984, affected Africa which decades of colonial and post colonial research have shown to be a terrain rich in “biological unknowns” and “health threats”.³ Apart from epidemiological surveillance, virological work and the related diagnostic questions have thus constituted from the first – albeit late – distribution of antiretrovirals at the end of the 1990s, the main scientific activity in Africa in the field of AIDS, certainly in terms of media and academic visibility.

During the 1990-2000 decade more than ten international teams have established research projects in Yaoundé, the administrative capital of Cameroon. Explicitly geared towards the collecting and analysing of retroviral colonies circulating in Cameroon, these projects have rallied private companies, international institutions of health surveillance and university laboratories in France, Germany, Belgium, Japan and the United States. This unprecedented craze for Cameroonian biological material – in this case the blood samples of patients and monkeys – has sometimes taken the form, in the words of the researchers themselves, of a “race for collecting”: the competitive extraction of “raw scientific material” enhanced by molecular analyses in laboratories of the North. As a result of the conflicts to which it has given rise, it can be said that this race had become the scientific version of the “scramble for Africa” which, in the past, opposed colonial powers. Importantly, what political pundits call “tactics of extraversion”⁴ have superimposed themselves on and adapted themselves to the “logics of extraction”. Fred Eboko, in his analysis of policies of the fight against AIDS in Cameroon⁵ has shown that foreign scientific zeal and the structural

¹ For this research I have consulted the (mostly unclassified) archives of the Pasteur Centre of Cameroon in April and May 2002, with the assistance of its director, Jocelyn Thonnon. They include the annual reports of activities of the Pasteur Centre. I also made use of the archives of the OCEAC General Secretariate with the assistance of Mr Frédéric Berteau and Mr Georges Soulat. The full collection of the OCEAC technical reports are kept in these archives. More than forty open-ended interviews have been conducted with various role-players in Cameroon, in several European and American research institutions (Institut Pasteur, IRD, CDC), as well as with retired development workers. Some interviews are only quoted anonymously.

² On this point, one should, of course, consult Mirko D Grmek, *Histoire du sida*, 3rd ed. (Paris, Payot, 1995).

³ On these issues see Jean-Pierre Dozon, “D’un tombeau à l’autre”, *Cahiers d’études africaines*, 121-122, vol. 31, 121-122, 1-2 (1991), 135-57; Nicholas B. King, “Security, disease, commerce : ideologies of postcolonial global health”, *Social studies of science*, 32/5 (2002), 763-789.

⁴ Jean-François Bayart, “Africa in the World: A History of Extraversion”, *African Affairs*, 99 (2000), 217-67.

⁵ Fred Eboko, “Logiques et contradictions internationales dans le champ du sida au Cameroun”, *Autrepart*, 12 (1999), 123-140.

dependence of the health system and research in Cameroon have provided a resource for certain local players: a handful of Cameroonian academics have learnt, with decided talent, how to exploit and even create this unequal relation. “Gatekeepers”¹ of a favourable site, these researchers have been the catalysts and main local benefactors of an international infatuation for Cameroonian territory. I propose putting this infatuation into its historical perspective and explaining the scientific and biotechnological stakes of the study of the Cameroonian virus.²

The unobtrusive beginnings of research into AIDS in Cameroon, 1984 -1988

When the first cases of AIDS were diagnosed in Cameroon at the beginning of 1985, the field of medical research was marked by the ascendancy of two institutions, the Pasteur Centre of Cameroon (CPC) and the Organisation for the Control and Fight Against Great Epidemics in Central Africa (OCECA). Situated in the heart of the administrative centre of Yaoundé, their massive buildings, close to the Central Hospital, embody the heritage of French scientific presence. In 1985, “health hill” accommodated, in fact, many French volunteers, doctors or researchers who, each in his or her own way, followed in the footsteps of French colonial doctors who have been in Cameroon since 1916.³

The Pasteur Centre rapidly became a privileged place for the study of the new pathology. Its large laboratories for medical analyses which were responsible to the Cameroonian Ministry of Health were managed by French military doctors. Linked to the Pasteur Institute in Paris since its founding in 1959, the Pasteur Centre also undertook some research work notably on hepatitis B, under the aegis of the expatriate managerial staff, the *Pasteuriens*. Already in a position to diagnose opportunistic infections and lymphocyte counts, the virology service received the first Elisa tests, “ELAVIA”, in June 1985 which had been marketed by Pasteur Institute Production and perfected the use of the first Western Blot test at the end of 1985. Four cases were immediately positively identified by the Centre’s virologist, Jean-Paul Durand.⁴

Together with OCEAC, the Pasteur Centre led the investigations into the seroprevalence of the virus responsible for AIDS⁵ in July-August 1985. Since its creation in 1962, OCEAC had also accommodated French military doctors; its initial mission was to conduct and coordinate, at regional level, the work carried out by mobile teams of doctors, the celebrated flagship of French colonial medicine. True to their vocation of men on the ground, the French doctors of OCEAC formed a tandem with the *Pasteuriens* and multiplied the

¹ “Gatekeepers”, an expression used mainly by Frederick Cooper. See F. Cooper *Africa since 1940: The Past of the Present* (Cambridge, Cambridge University Press, 2003).

² This article is a shortened and reworked version of the second section of Guillaume Lachenal’s DEA dissertation, “Le Centre Pasteur du Cameroun: trajectoire historique, stratégies et pratiques de la recherche biomédicale en coopération (1959-2002)” (Dissertation for the DEA [diploma taken before completing a PhD] in Epistemology, History of Sciences and Technologies, University of Paris 7 Denis Diderot, 2002), 173 pages. Some parts of this article were presented at the conferences of the Society for the History of Technology (SHOT Annual Meeting, 16 October 2003, Atlanta, USA) and the Society for the Social Studies of Science (4th Annual Meeting, 28 August 2004, Paris, France.) The author thanks Charles Becker for his advice and re-reading of the text, as well as Anne Marie Moulin, Fred Eboko and Roland Waast.

³ Cameroon is an ex German colony (Kamerun) which, after the First World War, was placed under French and British rule (with the status of territory under the mandate of the League of Nations and, after 1945, territory under protection of the UN). Most of its territory (with the exception of the western part of the country) was governed, up until independence in 1960, as though it were a French colony.

⁴ Guy Garrigue, *Rapport sur le fonctionnement technique du Centre Pasteur du Cameroun, 1984-1985*, 120. Archives of the Pasteur Centre of Cameroon.

⁵ Named LAV/HTLVIII in 1985, in reference to the “joint” discovery of identical viruses by the teams of Luc Montagnier and Robert Gallo, the virus was renamed HIV as of May 1986.

investigations into AIDS between 1985 and 1988 (seven in Cameroon in two years, twenty-two in total¹ over the entire sub-region²) alternating polls amongst the general population (cluster investigations which consisted of visiting every home in a road chosen at random) and studies amongst “populations at risk”.

The initial results, published at the end of 1985 in a report concerning the activities of the Pasteur Centre were “less alarming than in other African countries”³. Those which followed, reported extremely low levels of people being HIV positive: a 1986 study on blood samples taken at the Pasteur Centre and the PMI found a 0% level of HIV positive people. A total of fifteen cases of AIDS was counted in June 1986⁴. OCEAC’s epidemiologists ended their summary of cluster investigations carried out in the sub-region with a reassuring conclusion:

The spread of HIV in Central Africa is clearly confirmed.

However, the levels of HIV prevalence (from 0 to 4.6%) are much lower than those which were recently announced by some influential information media. [...] It is therefore appropriate to lessen those fears that the publication of the preliminary results obtained in Central Africa by the study of high risk groups (...) may have engendered.

The estimation of HIV prevalence found in the samples [...] which were selected in a totally random fashion seems to be a good way of *avoiding the over estimation of the phenomenon*⁵.

In this context, the international visibility of Cameroon was limited. The attention of the first AIDS specialist in Africa was, at this time, concentrated in countries such as Zaire, Uganda and Rwanda which were affected by the disease. In particular, following on the discovery of numerous cases of AIDS amongst migrants from Zaire to Belgium, the city of Kinshasa attracted the first large scale researcher from 1983: this was followed by the “AIDS Project” epic which was put in place at the Mama Yemo Hospital by academics from the Center for Disease Control of Atlanta (CDC) and the Institute of Tropical Medicine of Antwerp⁶. The Pasteur Institute of Paris, another leading institution in the field, concentrated its efforts in Africa in its Bangui venture where, in October 1985, the main researchers into AIDS in Africa gathered to elaborate a clinical definition appropriate to the African context, the famous “WHO definition of Bangui”. Finally, Dakar asserted itself as an emerging site on the map of African research: from 1985 Souleymane Mboup, a pharmacist at the Le Dantec Hospital in Dakar collaborated with American and French researchers from Harvard and Tours in notable work on the Senegalese HIV epidemic (see below).

Cameroon was therefore somewhat abandoned, as a Cameroonian doctor recalls:

Why go to a country where we had perhaps to wait for two years before we had about a hundred patients whereas in other countries where there was a high prevalence, one could have as many (patients) in 2-3 months?⁷

The scientific (and media) exploitation of research carried out in Cameroon, although naturally limited, was a Pasteur monopoly during these early years. Guy Garrigue and Jean

¹ The reports of investigations are combined in the technical reports of the OCEAC, and were consulted in Yaoundé (Offices of the OCEAC) in April 2002. They are filed under RT/OCEAC/SG/SES Nr 559 to 658.

² That includes Gabon, Equatorial Guinea, Chad, Central African Republic and the Congo.

³ Guy Garrigue, *Rapport*, 1984-1985, 120.

⁴ Guy Garrigue, *Rapport*, 1985-1986, 87.

⁵ M. Merlin, R. Josse, J.P. Gonzales, E. Delaporte, A. Dupont, R. Jossier, R. Kollo, E. Boyer, H. Fleury, C. Bailly, D. Garin, J. Limmassa, D. Kouka-Bemba, and A.J. Georges, “Séroprévalence en Anticorps Anti-Virus Immunodéficientaire Humain (VIH-HIV) au sein d’échantillons représentatifs de population en Afrique Centrale,” *Bulletin de Liaison et de Documentation de l’OCEAC*, 76 (1986), 27-34.

⁶ For accounts which are sometimes romanticised, see: Laurie Garrett, *The coming plague: newly emerging diseases in a world out of balance* (New York, Farrar, Straus and Giroux, 1994); Joseph B McCormick, Susan Fisher-Hoch and Leslie Alan Horvitz, *Level 4: Virus Hunters of the CDC* (Atlanta, Turner Publishing, 1996).

⁷ Interview with Léopold Zekeng, Yaoundé, 29 avril 2002.

Paul Durand presented their findings at the International Conference on AIDS in Paris in June 1986, then at the WHO Regional Conference on AIDS in Brazzaville¹ in November 1986. They were also locally active with Guy Garrigue appearing in the *Cameroon Tribune*, the national daily, in November 1985² and Jean Paul Durand chairing a round table discussion on the subject at the Faculty of Medicine (the CUSS). In June 1987, Jean Paul Durand presented a poster “AIDS in Cameroon”³, on behalf of the Pasteur Centre and OCEAC, at the International Conference of Washington. Not a single Cameroonian signed this presentation.

The emergence of Cameroonian researchers

Despite this, since 1986 Cameroonian researchers have participated in epidemiological investigations carried out by the Pasteur Centre and OCEAC. Professor Lazare Kaptue is one of them. A serologist who was trained in France, former pupil at the Pasteur Institute, Lazare Kaptue, by virtue of the fact that he was a professor at the CUSS and director of health, became, in 1985, one of the main figures in the Cameroonian medical field. After having created a follow-up committee on AIDS in the Ministry of Health, he rapidly became, in the Cameroonian health ranking system, “Mr AIDS”.⁴

At the time, when it all began, not a single Cameroonian doctor wanted to work on AIDS [...]. I was obliged to work with AIDS because, as director of health, I had to set an example. [...]; It wasn't deliberate, it came about because of the situation where everyone was afraid. I was the very first person to become involved in this fight, here in Cameroon [...].⁵

Local specialist in an illness which terrified people, Professor Kapute did not benefit from the material means offered by the Pasteur Centre, nor from its links with the Pasteur Institute – producer of AIDS detection tests. Towards the end of 1985 he obtained, with difficulty and after the Wellcome laboratories had refused them, kits from the Behring laboratories for use in his CHU service which housed the blood bank. Léopold Zekeng, a young specialist in medical biology who trained in Dakar – together with Souleymane Mboup – as well as in France, was appointed to this service as his first post in Cameroon; his specific brief was the serological detection of HIV which began in 1986 at the blood bank.

The field of research into AIDS in Cameroon was to be drastically reorganised at the end of 1987 by the creation of the National Programme for the Fight Against AIDS, on the official instructions of the WHO⁶. Lazare Kaptue quite logically assumed the directorship of the National Programme which effectively came into action in October 1988 with the launch of the Medium Term Plan of Action which made provision for epidemiological surveillance as well as psycho-social studies. In collaboration with OCEAC, a “system of

¹ “Le sida au Cameroun”, paper read at the regional conference on AIDS organised by the WHO, Brazzaville, 11-13 June, 1986, also published in Guy Garrigue, *Rapport, 1985-1986*, 94 and seq.

² Guy Garrigue, “Faut-il avoir peur du SIDA?”, *Rapport, 1985-1986*, 94 and seq.

³ J.P. Durand, M. Merlin, R. Josse, and G.-P. Garrigue, “AIDS in Cameroon,” Poster-IIIth International Conference on AIDS, Washington, June 1-5, 1987.

⁴ For a more complete picture of the role of Professor Lazare Kaptue in the fight against AIDS, see Fred Eboko, “Logiques et contradictions internationales dans le champ du sida au Cameroun”, *Autrepart*, 12 (1999), 123-140; Fred Eboko, “Pouvoirs, jeunesse et sida au Cameroun” (doctoral thesis in Political Sciences, University Denis Diderot – Bordeaux II, 2002) 490 p.

⁵ Interview with Lazare Kaptue, Yaoundé, 6 October 2003.

⁶ For a general study of the history of the establishment of the Global Programme on AIDS by the WHO, which supervised the creation of national programmes for the fight against AIDS, one can consult Cristiana Bastos, *Global response to AIDS: science in emergency* (Bloomington, Indiana University Press, 1999), 50-67.

guard duty” was organised¹ whose epidemiological findings resulted in several articles being written and published from 1990 onward². They specifically allowed Lazare Kaptue and Leopold Zekeng to attend international conferences, in Naples in 1987 for the Conference on AIDS in Africa and in Stockholm in June 1988 where Lazare Kaptue contributed to no less than seven presentations – clear proof of his standing in the international arena as the Cameroonian representative. In their wake, other Cameroonian academics began to work on AIDS and to participate in its political management³: the Conference on AIDS in Africa organised in Yaoundé in 1992 bore witness to Cameroon’s participation in the African and International *academy* on AIDS⁴.

This emergence coincided with the effacing of the Pasteur Centre. In 1988, its director and virologist left Cameroon at the end of their contract; their successors who were less motivated and less qualified did not assume their posts. The institution’s finances were, at the same time, affected by the economic crises which struck the Cameroon with full force; money which was earmarked for analyses and vaccinations disappeared; certain projects, such as the ambitious construction of a high security P3 laboratory, were suspended.⁵ In particular, the inclusion of Cameroonians in the international scene, together with their knowledge of the local politico-administrative situation furnished them with the political and scientific means to control and vie with the Pasteur Centre: in 1988 its director remembers being politely asked “not to put himself too much in the forefront”⁶ in the field of AIDS.

Atypical serology: beginnings of a “hot topic”

At the end of the 1980s, virologists specialising in AIDS became aware of the scientific and sanitary importance of certain anomalies discovered during the testing of blood for AIDS in Africa. Cameroon, where these anomalies were particularly frequent, took on a new status: that of an area of research requiring investment.

Although it was discreet, this research began to raise problematic aspects of the Cameroonian epidemic as early as 1985. Apart from the hardly discernable presence reported in the Cameroonian investigations, sometimes suspected of “hiding something” – a virological anomaly or a political instruction – the importance of the level of “false positives”, in other words, samples which tested positive at Elisa, and negative when retested by RIPA or Western Blot, commanded attention from the very beginning. To be more precise, some of the Western Blot tests showed “atypical profiles”: whilst certain chains were clearly located (usually capsid proteins such as p24) unknown chains appeared, and other chains, although always present in infected people (protein envelopes gp41 and gp120) were not visible. This can be interpreted as the presence, in patients who were tested, of antibodies compared to a portion only of viral reference proteins, traces of a possible infection by a virus resembling HIV. From the end of 1985, this possibility was explicitly formulated because the director of the Pasteur Centre wrote to Luc Montagnier on the 24 October 1985 asking him to invite Jean-Paul Durand to his Paris laboratory so that he could be trained in the necessary

¹ J. Gardon, A. Trebucq, R. Salla, L. Zekeng, and J.P. Louis. “RT 747/OCEAC/SG/SES/90. Système de surveillance sentinelle des infections HIV1. Résultats de février 89 à janvier 90 pour la ville de Yaoundé”, OCEAC Archives, 1990.

² For example: J. M. Garcia-Calleja, L. Zekeng, J. P. Louis, J. L. Mvondo, A. Trebucq, D. Sokal, D. Yanga, A. Ndoumou, D. Andela, R. Salla, and et al., “HIV infection in Cameroon: 30 months’ surveillance in Yaounde,” *AIDS*, 6 (1992), 881-882.

³ Fred Eboko has analysed the politico-academic career path of these and men of science, particularly those who took over as head of the PNLS: Fred Eboko “Pouvoirs, jeunesse et sida au Cameroun ...” (see footnote 25).

⁴ Fred Eboko, “Logiques et contradictions ...” (see footnote 25).

⁵ Guillaume Lachenal, “Le Centre Pasteur du Cameroun: trajectoire historique, stratégies et pratiques de la recherche biomédicale en coopération...” (see footnote 10).

⁶ Interview with Guy Garrigue, Nîmes, 2 July 2002.

corroboration techniques “given the existence of false positives [and] the hypothesis of positive reactions with relation to similar viruses (?)”¹.

It was exactly at the end of 1985 that the problem of atypical bloods began to assume international importance. In December 1985, the prestigious journal *The Lancet* published the work of a team led by Max Essex and Phyllis Kanki, researchers at the Harvard School of Public Health, and including the Senegalese Souleymane Mboup and two French academics from Limoges and Tours, François Denis and Francis Barin, both of whom had been seconded to Dakar.² Some months earlier, Mboup, Denis and Barin had also noticed, during their early investigations amongst Senegalese sex workers, atypical Western Blot profiles. The samples were quickly taken to Harvard by Souleymane Mboup himself. The laboratory, which Francis Barin knew well having just spent time there doing post-doctoral research, was at the forefront of virological research into AIDS mainly for having isolated, in the green monkey, a virus linked to HTLV-III (the American name for HIV) the STLV-III agm. The elucidation of atypical bloods took on the aspect of a revelation: the Senegalese serums, tested using Western Blot made with green monkey viruses, clearly reacted to a range of simian viral proteins. The photographs of Western Blot in *The Lancet* article are crystal-clear: the Senegalese sex workers were infected with a virus which is closer to the STLVIII agm virus than the human AIDS virus. The publication at the end of 1985 was a triple event: it provided serological “proof”, which was almost visual, of the proximity of simian and human viruses, an argument which evidently favoured the simian origin of AIDS; it placed the key to this argument in Africa – a discourse of undoubted media efficiency; but especially, it underlined the urgent problem of diagnosis as the carriers of the Senegalese virus had not been positively identified using the normal tests.

The event had rapid repercussions in Cameroon. In April 1986, *The Lancet* published a short paper co-authored by five researchers from the University of Bordeaux II and by a doctor seconded to the Service des grandes endémies de Nkongsamba (The Service for Endemic Diseases in Nkongsamba) in the south west of the country where OCEAC had been carrying out investigations since November 1985.³ This publication mentioned the presence of a “virus similar but not identical to LAV/HTLVIII in Cameroon”⁴. The study simply reported the presence of positive serums in Elisa with atypical results in Western Blot, comparable to those obtained in Senegal. The investigation and its findings suggest the pertinence of Cameroonian territory for research into new colonies of the retrovirus by explicitly stressing the serological reasoning of Barin’s team (the article is quoted).

At almost the same time, Jean-Paul Durand confirmed, in the annual report of the Pasteur Centre, “the importance of the number of false positives in ELAVIA and Western Blot [which] suggest the movement of one or several other similar viruses which are perhaps transmitted in the same way”. During the following two years, the Virology Service of the Pasteur Centre attempted to set up viral cultures using “false positives” lymphocytes. If viral isolation for some patients succeeded and was sent to the Pasteur Institute in Paris, it failed in

¹ Letter 2884/85/CP/DIR, Carton Réseau, Archives of the Pasteur Centre of Cameroon, Yaoundé.

² F. Barin, S. M’Bou, F. Denis, P. Kanki, J. S. Allan, T. H. Lee, and M. Essex, “Serological evidence for virus related to simian T-lymphotropic retrovirus III in residents of west Africa,” *The Lancet*, 2 (1985), 1387-1389.

³ The report concerning this investigation is published in M. Merlin, C. Bailly and R. Josse. RT 593/OCEAC/SG/SES - Rapport de l’enquête séroépidémiologique par sondage menée à Nkongsamba, en république du Cameroun du 18 au 27 Novembre 1985, pour évaluer la prévalence des anticorps anti HIV-VIH, OCEAC Archives, Yaoundé, 1986.

⁴ H. J. Fleury, M. Babin, J. F. Bonnici, C. Bailly, B. Chancerel, and M. Le Bras, “Virus related to but not identical with LAV/HTLV-III in Cameroon,” *The Lancet*, 1 (1986), 854.

the precise case of false positives.¹ The existence in Cameroon of retroviruses close to HIV remained, between 1985 and 1988, a somewhat monotonous hypothesis for concluding reports and publications: neither the Pasteur Centre nor OCEAC, neither the Cameroonians at CHU nor the transitory researchers managed to resolve the question of the atypical Cameroonian serums. In 1987 Jean-Paul Durand drew up a list of his attempts, just before finally leaving Cameroon for Dakar:

The [...] work did not allow us to suggest a solution to the problem of false positives in Elisa which provided antibodies that were isolated by Western Blot.

Only intensive production of cultures in diverse and unexplained clinical tables could perhaps result in the eventual isolation of other retroviruses.²

Durand's conclusion has the value of a paradigm: the atypical serums pose a "problem" of diagnosis, therefore one of public health, which require that we show an interest in them; the diagnostic anomalies, for their part, could provide, if they are present in affected patients, these "unexplained clinical tables" which could allow for the isolation of the undetected virus.

This two-fold relevance of the diagnostic question – the end and the means of identification of new viruses – made the fortune, in the true sense of the word, of the Pasteur Institute in Paris. From the samples sent from Lisbon, of a patient, who came from Guinea Bissau, suffering from AIDS, and who tested negative on all the blood tests³, Luc Montagnier's team, working in collaboration with researchers from the CNRS (National Centre for Scientific Research), succeed in isolating and in sequencing a new retrovirus which was given the name LAV-2, which became HIV-2 in May 1986. This time, the Pasteur Institute benefited from intellectual copyright, exclusive this time, of the blood tests for HIV-2 and these were marketed from 1987. Whilst the controversy surrounding the "paternity" of the first virus isolated in 1983 and henceforth known as LAV-1/HIV-1 was at its height, the Pasteur Institute held the upper hand in the negotiations which ensued: the time had come to update the available diagnostic tests with the HIV-2 antigens which the Pasteur Institute had patented.

The importance of such a discovery, in terms of scientific visibility as much as in terms of economic value, had been demonstrated, if this was necessary, to all the researchers and institutions in the field. However, in contrast to West Africa where it was rapidly shown that the "atypical" virus which had infected some sex workers corresponded to HIV-2 which was endemic in the region, the discovery of HIV-2 did not solve the problem of atypical serums found in Cameroon and more generally in Central Africa: the reaction of "falsely positive" serums was very weak compared to the Western Blots which were specific to HIV-2.

This problem came to a head in Belgium, when a team of researchers from the Institut de médecine tropicale (Institute of Tropical Medicine) of Antwerp received, during 1987, samples from a Cameroonian couple living in Belgium. These two patients, who had developed clinical signs of AIDS, presented atypical Western Blot profiles, whether HIV-1 or HIV-2 (with very weak reaction to glycoprotein gp 120). The researchers worked at creating a culture and then did molecular analyses of the virus which had infected the Cameroonian couple, in close cooperation with a small, neighbouring firm which specialised in diagnostic

¹ Which represent almost 70% of positive serums in ELISA and which possess antibodies against different viral proteins, but not against the envelop's protein.. During the 85-88 period, 14.089 tested serums, 698 positive, 226 confirmed by WB (Paul Ghipponi, *Rapport annuel sur le fonctionnement technique du Centre Pasteur du Cameroun, 1988-1989*, 96. Archives of the Centre Pasteur of Cameroun).

² Garrigue, *Rapport, 1987-1988*, 172.

³ Grmek, *Histoire du sida*, 146

tools, Innogenetics. On the 9 June 1988, Innogenetics filed a patent with the European Patent Office for future diagnostic and vaccine applications of a new retrovirus: “HIV-3”¹ (!). At the Stockholm conference, the team announced, according to serological criteria, the use of a new retrovirus, different from HIV-1 and HIV-2 on the Cameroonian couple and which was called ANT-70.²

At the beginning of 1989 a major study on the problems of atypical serums in Central Africa was published in *AIDS*.³ The results which were presented were drawn from OCEAC epidemiological investigations which had been carried out since 1986 in all the countries of the sub-region except for Cameroon. OCEAC, which was based in Yaoundé, had chosen as a scientific partner an institution which was also supported by the Coopération française (French Development Agency) but was situated in Franceville Gabon, the CIRMF (Franceville International Centre for Medical Research). We should note here that the institutional arrangement, which looked rather strange, reflected the suspension of collaboration – for more or less unfathomable personal reasons – between OCEAC and the Pasteur Centre, despite the fact that its technical profile is comparable to that of CIRMF. The samples taken by OCEACs epidemiologists were sent to CIRMF where a young French volunteer doctor, Éric Delaporte, took it upon himself to “technicalise”⁴ them; the unravelling of atypical serums benefited from the expertise of the Bichat Claude Bernard Hospital virological laboratory which admitted, situated as it is on the northern periphery of Paris, many patients who were migrants from sub-Saharan Africa – a considerable number of whom were infected with HIV-2 or who manifested unusual profiles. In the article, the researchers suggest, without really being able to draw any conclusions, that the many atypical serums are not only non-specific reactions (due, for example, to an environmental factor) but reveal the existence of an unknown virus linked to HIV. A viral isolate was even obtained from a Gabonese blood sample and then studied at the Pasteur Institute; the virus, called HIV-1 OY1 in the publication, was even patented.⁵

Towards the end of the 1980s, an entire field of international research was focused on the question of atypical serums and the identification of new retroviruses. This led to competition amongst the most prestigious institutions of biomedical research (Institute of Tropical Medicine at Antwerp, the Pasteur Institute, Harvard School of Public Health) and lead to specialisation, not only amongst long-standing virologists, but also amongst much younger researchers. Practical principles of functioning appeared: the teams maintained links which were tantamount to mergers with diagnostic firms whilst all the while depending on African outposts where cooperative projects were organised. Research efforts, already rewarded by several publications, were justified not only by the urgency of interpretation and solving of the diagnostic anomalies, but also by reflections, defined as more “fundamental”, on the origin and the evolution of the HIVs. The simian viruses were thus studied simultaneously often because they occurred in the same areas: whilst HIV-2 was coupled with

¹ The name HIV-3 has never been officially recognised. The patent was filed on the 9 June 1988, European Patent Office, Nr 88109200.

² B. Vanderborght, R. J. De Leys, and A. Van Geel. “Isolation and identification of a novel human immunodeficiency virus from two Cameroonians. Abstract n° 1552-1553.” Paper presented at the International Conference on AIDS, Stockholm, 12-16 June 1988.

³ E. Delaporte, M. Peeters, F. Simon, A. Dupont, D. Schrijvers, D. Kerouedan, R. Josse, M. Merlin, A. Trebucq, M. Collet, et al., “Interpretation of antibodies reacting solely with human retroviral core proteins in western equatorial Africa,” *AIDS*, 3 (1989), 179-182.

⁴ “Technicalise” is a dedicated expression which is used to indicate the action of manipulating the blood samples so as to perform serological and molecular analyses.

⁵ Patent filed on 28 October 1987 (United States Patent Nr 19870113655).

the SIVs in certain monkeys¹ in West Africa, an SIV was isolated in 1989 in a chimpanzee kept at CIRMF. When it was sequenced at the Pasteur Institute, it was found to be very close to the known HIV-1s², renewing speculations on the simian origin of the AIDS pandemic.

The discoveries of CIRMF in Gabon and the publication in March 1990 of a partial analysis of the “Cameroonian” clone ANT-70³ in some ways tightened the noose around Cameroon at the exact moment when the local biomedical field was busy reorganising itself with the withdrawal of the Coopération française and the Cameroonian academics taking over. They would be the ones to play a decisive role in the identification of the Cameroonian viruses and contribute to making Cameroon a “hotbed” for virological research.

How the territory became favourable: Isolation of hiv-1 o, 1988-1994

The beginning of the 1990s saw the writing one of the most glorious pages in Cameroonian biomedical history, the identification of a “Cameroonian” group of viruses, HIV-1 group O; at the same time it heralded scientific and social mechanisms which would explain and maintain the retrovirological attraction of Cameroon: the establishment and increase of cooperative projects which enabled the emergence and training of young researchers, which strengthened the position of their mentors and which culminated in first class scientific discoveries. The director of the blood bank, Léopold Zekeng, who was put in charge of the CHU blood bank in 1990, gave a (voluntary) account which warrants being heard:

So, our first breakthrough, the first big feather in our cap, goes back to the discovery of what is today known as group O. At the beginning of the 1990s we admitted a young woman of 26 who showed all the signs of AIDS, [...] diarrhoea, [...] temperature ... We carried out the Elisa test (...) with, unfortunately, negative results or indeterminate results.

Then [...] quite by coincidence, I received a bursary from the our German collaborators to spend a month in Germany at the Lutz Gürtler laboratory (at the Max Von Pettenkofer Institute in Munich) in order to perfect my skills in molecular biological techniques [...].

So here we are, the 1st May 1990 and I spend the whole night flying to Germany and finally arrive in Munich [...] I had brought with me seven problem samples taken from patients [including that of the woman patient]. Together Professor Gürtler and I isolated the lymphocytes and placed them into cultures, strangely, it was only that of the woman that began to grow [...]. We later called it MVP-5180. At the end of my training period, Lutz said to me, “As there has been viral development, I am going to create chains of Western Blot from the cellular culture for you so you can return to Cameroon to work”. Lutz created Western Blot chains [from the proteins of the Cameroonian virus] and [checked] to see that all went smoothly. He tested them on [serums of] positive German patients, and haemophiliacs. He was greatly surprised, [...] the crossed reaction was weak, especially on the envelope’s protein. The laboratory technician said “It hasn’t worked, I’ll chuck it into the bin” and [Lutz] said “No, something’s wrong; here is a sick [Cameroonian] woman who is infected, we have isolated the virus, we have tested [the virus of] the sick woman against the [serums of] haemophiliacs and there is a discrepancy. There is a strong possibility that these two viruses, even though they are responsible for AIDS, do not possess the same properties”⁴.

The attentive reader will have recognised in the method used, the elucidation of the “unexplained clinical table” which Jean-Paul Durand had hoped for in his time. It is indeed from a diagnostic incompatibility that the virus is detected and then characterised, and the “home made” elaboration of a Western Blot test using proteins from the Cameroonian virus,

¹ V. M. Hirsch, R. A. Olmsted, M. Murphey-Corb, R. H. Purcell, and P. R. Johnson, “An African primate lentivirus (SIVsm) closely related to HIV-2,” *Nature*, 339 (1989), 389-392.

² T. Huet, R. Cheyner, A. Meyerhans, G. Roelants, and S. Wain-Hobson, “Genetic organization of a chimpanzee lentivirus related to HIV-1,” *Nature*, 345 (1990), 356-359.

³ R. J. De Leys, B. Vanderborght, M. Vanden Haesevelde, L. Heyndrickx, A. Van Geel, C. Wauters, R. Bernaerts, E. Saman, P. Nijs, B. Willems, H. Taelman, G. van der Groen, P. Piot, T. Tersmette, J.G. Huisman, and H. Van Heuverswyn, “Isolation and partial characterization of an unusual human immunodeficiency retrovirus from two persons of West-Central African origin,” *Journal of Virology*, 64 (1990), 1207-1216.

⁴ Interview with Léopold Zekeng, Yaoundé, 29 April 2002.

results in a “inverted” image: a patient who is infected with a “European” virus is not diagnosed as positive with the Cameroonian test. It is simply another type of virus.

As part of his doctoral thesis, another young Cameroonian member of the team, Jean-Marie Tsague, participated in the culture and the sequencing of the virus in Germany. The cloning and the sequencing took many long months, absolutely necessary because of the “highly divergent” nature of the clone. The importance of the work in hand did not escape the Behring laboratories. They actively supported the project and helped with the perfecting of the specific immunological tests of the MVP-5180 colony which were used at the CHU to estimate the prevalence of the Cameroonian clone.

At the same time in Antwerp, the team led by Peter Piot and Guido Van der Groen continued its investigations on the ANT-70 clone which also underwent a sequencing which covered almost the entire genome. In collaboration with Innogenetics, Elisa tests were adjusted which allowed for the detection of specific infections by the viruses related to ANT-70. It was no surprise when the Antwerp team, already joined by a few former volunteers at the CIRMF, Martine Peeters and Éric Delaporte, turned towards Cameroon for a preliminary survey concerning the movement of such viruses. Contact was established with an immunologist at the Faculty of Medicine, the head of the Central Hospital, Peter Ndumbe, who already had an impressive background in the field of international medical cooperation (he was the spokesperson for WHO in the field of vaccinations). Cameroonian serums were sent to Antwerp and two young researchers (John Nkengasong and Phillip Nyambi) were trained in Antwerp as a result of the links which had been formed, in some way parallel to the Yaoundé-Munich axis which had been established with Zekeng and Kaptue. The study on the serums sent to Antwerp was published in July 1993; it reported the presence of viruses similar to the “aberrant ANT-70 clone” from Cameroon and Gabon.¹

In 1992 in Yaoundé and in 1993 in Marrakech, the two teams, now in competition with each other, met one another as well as specialists in the field. Taking cognisance of the great similarity between their two viral clones, they coordinated the publication of their results accompanied by a phylogenetic analysis of the sequences which had been obtained. The March 1994 issue of the *Journal of Virology* contained an article signed by Lutz Grtler, four other German authors and three Cameroonians, Zekeng, Tsague and Kaptue, and, in the following pages, an article by the Belgian/Netherlands group from Antwerp where none of the Cameroonian authors of 1993 appeared. The German/ Cameroonian article combined the results of the two articles and suggested that the MVP-5180 clone and the ANT-70 clone be grouped together in a new “sub-type”² of HIV-1, “sub-type O” (for *outlier*).³ The two articles both stressed the importance of this point in order to question the “natural origin of HIV-1” the O variant filling the “very special” place of “the closest relation to HIV’s ancestor”, probably embodying “a common origin for human and chimpanzee lentiviruses”.⁴

¹ J. N. Nkengasong, M. Peeters, M. vanden Haesevelde, S. S. Musi, B. Willems, P. M. Ndumbe, E. Delaporte, J. L. Perret, P. Piot, and G. van den Groen, “Antigenic evidence of the presence of the aberrant HIV-1ant70 virus in Cameroon and Gabon,” *AIDS*, 7 (1993), 1536-1538.

² This terminology (the HIV-1 viruses organised into “sub-types” including the “sub-type O”) turned out to be very provisory.

³ L. G. Grtler, P. H. Hauser, J. Eberle, A. von Brunn, S. Knapp, L. Zekeng, J. M. Tsague, and L. Kaptue, “A new subtype of human immunodeficiency virus type 1 (MVP-5180) from Cameroon,” *Journal of Virology*, 68 (1994), 1581-1585.

⁴ Vanden Haesevelde et al. “Genomic cloning ...” (see footnote 53).

The phylogenetic importance of this new variant was confirmed at the end of the summer of 1994 in *Virology*¹: Montagnier's team at the Pasteur Institute of Paris published the sequence of a virus similar to the two Cameroonian clones which had been isolated in 1992 from a European patient who had no apparent link with Africa. Faced with the differences which existed between the two apparently similar clones as well as their geographic deployment, the article suggests consolidating them into a single "group" O (for *outgroup*), different from an M "group" (*major group*) where all the other "sub-types" of HIV-1 are classed. In order to be sufficiently technical in its details, this reorganisation of nomenclature of HIV-1 clearly designates Cameroon as the "birthplace of HIV-1"² where new clones of the human viruses needed to be sought:

The discovery of a virus like ANT-70 (.....) will perhaps lead us to the origin of the HIV-1 family. The analysis of additional SIVcpz and other different human clones could well provide us with the information necessary for attaining this goal.³

But more than the evolutionary considerations, it was clearly the question of the diagnosis of the "O group viruses" and their epidemic emergence which was the burning issue. From June 1994, researchers in the virology laboratory at the Claude Bernard Hospital (which was associated with INSERM) presented a preliminary evaluation of the sensitiveness of the commercial tests for the detection of infections of the group O virus. The title of the article published in *The Lancet* and which was relayed throughout France by *Le Monde*⁴ was unequivocal: "Séronégativité HIV-1 and HIV-2 des patients infectés par le HIV-1 sous-type O"⁵ ("HIV-1 and HIV-2 seronegativity in patients infected with the HIV-1 sub-type O"). The study coordinated by François Simon, a para-cytology doctor who had already participated in the Gabonese atypical serum study, tested and compared the findings of the main screening tests of samples from about a dozen patients who had been monitored since 1990 at the Bichat Hospital, as well as in a few French hospitals and who had shown atypical reactions to Western Blot in spite of signs (clinical or biological) of being infected with HIV. After having proved, using "home made" tests perfected with Behring, that these Cameroonian and French patients were carriers of HIV-1 O, the French authors confirmed the dissemination in Europe of O variants, a highly disturbing fact given that some of the identification tests in common usage had systematically come up *negative* with these patients. The International AIDS Conference in Yokohama on 8 August 1994 devoted a "Special Recent Report Session" to infections of the O group thereby ensuring media coverage for its discovery and the fears that it was beginning to raise. At the end of 1994, researchers at the Centers for Disease Control in Atlanta went one better in *The Lancet* about the lack of sensitiveness of the tests available in the United States for HIV-1 O which had been assessed with serums taken in Yaoundé by Zekeng and Kaptue. Together they warned "that the adaptation of current tests is urgently needed".⁶

¹ P. Charneau, A. M. Borman, C. Quillent, D. Guetard, S. Chamaret, J. Cohen, G. Remy, L. Montagnier, and F. Clavel, "Isolation and envelope sequence of a highly divergent HIV-1 isolate: definition of a new HIV-1 group," *Virology*, 205 (1994), 247-253.

² "The birthplace of HIV-1" as the specialist Jaap Goudsmit called it. See J. Goudsmit, *Viral Sex: the Nature of Aid* (Oxford, Oxford University Press, 1977), 77.

³ Vanden Haesevelde et al. "Genomic cloning ..." (see footnote 53).

⁴ Jean-Yves Nau, "L'apparition d'un nouveau sous-type de virus du sida préoccupe les autorités sanitaires", *Le Monde*, 16 June 1994.

⁵ I. Loussert-Ajaka, T. D. Ly, M. L. Chaix, D. Ingrand, S. Saragosti, A. M. Courouce, F. Brun-Vezinet, and F. Simon, "HIV-1/HIV-2 seronegativity in HIV-1 subtype O infected patients," *The Lancet*, 343 (1994), 1393-1394.

⁶ C. Schable, L. Zekeng, C. P. Pau, D. Hu, L. Kaptue, L. Gurtler, T. Dondero, J. M. Tsague, G. Schochetman, H. Jaffe, and et al., "Sensitivity of United States HIV antibody tests for detection of HIV-1 group O infections," *The Lancet*, 344 (1994), 1333-1334.

The stakes were not only health related: the Antwerp, Munich and Pasteur Institute¹ HIV-1 O clones had all been immediately patented and Innogenetics, who benefited from the precedence, marketed a specific test for group O at the end of 1994. There is no need to insist on Cameroon's attraction: it was considered as the "home" of the virus. The 1994 series of publications mark, in a way, the official beginning of a veritable *race for blood samples*. Contributors to *The Lancet* expressed this in terms that were totally unambiguous:

Another challenge for public health [...] An intense hunt has already begun to collect other isolates of the O sub-type (so that the immunological tests can be evaluated and modified) and other variants of HIV. A sudden lively interest is evident for what was formerly simply a laboratory brain teaser. [...] The quest began in Central Africa [...] Let us hope that the effort to detect and describe the HIV variants will be more coordinated than the unbelievable scramble for HIV-2 which, in 1985, saw research teams, institutions of public health and industry squabble over opportunities to collect blood samples and the specimens themselves.²

The race for serums (1994-1998)

The 1994-1998 period was one of scientific affirmation for Cameroon which established itself as a territory of interest through the series of publications during 1994. More than seventy articles, in international journals dealing with the subject, would be published by Cameroonian or foreign academics, compared to a dozen or so during the 1989-1993 period. This unquestionable visibility reflected an intense activity and a clear increase in the players in Yaoundé, particularly, as we have seen, at the beginning of the 1990s.

The race for Cameroonian blood samples had a double goal: the identification of new clones of the virus and a quantitative supplying of serums. The isolation of viral variants (from lymphocytes from infected patients) had proved, in the case of HIV-2 and HIV-1 O, its economic and symbolic value but also its extreme difficulty: for example, seven years were to go by between the initial detection of the ANT-70 clone and its definitive identification. This "noble" objective co-existed with a more subdued but perhaps more practically important organisation, the collection and stockpiling of serums from patients infected with the variant viruses. These serums which carried the "immunological trace" of a patient's infections were needed to assess the sensitivity of the tests and their (re)adjustment or were used as reference during research into atypical infections. In contrast to the viruses which could be cultivated *in vitro* and whose protein components could be produced by genetic engineering, the serums constituted a unique biological material which was limited in quantity. The serums and the "serum banks" assumed, in the strictest sense of the word, an economic value. A researcher in the field remembers the first few months after the discovery of HIV-2 as a period when "in certain Parisian laboratories, a millilitre of HIV-2 serum was sold for a fortune".³ In 1994 the diagnostic problems posed by HIV-1 O caused Cameroon to be coveted as a source of serums and lymphocytes. To say that the fight in Yaoundé was grim would not be an exaggeration:

When one found someone with group O he was bled like a pig so that the blood could be sold. I saw this many times. Pockets. We emptied their pockets. The guy who was about to kick the bucket, we rifled his pockets and sold the contents. It was all sent away. It was the Americans who first suggested this golden bridge for this type of activity.⁴

¹ The patents concern the peptic sequencing which could be used for blood testing and nucleic sequences of PCR beginnings, which are useful in so-called "molecular" identification and especially for research itself (detection and sequencing of new clones).

² T. J. Dondero, D. J. Hu, and J. R. George, "HIV-1 variants: yet another challenge to public health," *The Lancet*, 343 (1994), 1376.

³ Interview with a French doctor, 2003.

⁴ Interview with a French doctor who had been a development worker in Cameroon, 2002.

Lazare Kapute and Léopold Zekeng, the two Cameroonians involved in the discovery of group O, obviously benefited from the passing fancy for the Cameroonian serum because of their triple status, newly recognised scientific experts, directors of hospitals and local notables, a trump card when it came to negotiating the setting up or carrying out of research. The Munich-Yaoundé collaboration was continued particularly as regards the assessment of the diagnostic tests.¹ The two academics began to increase official collaborations with the North: their list of publications revealed the fact that they had (occasionally) established links with other partners, such as the Abbot (Chicago) or Organon (Netherlands) companies² and the University of Kyoto in Japan. Their work was not limited to virological analyses of the O variants; questions of public health, methods of prevention and the epidemiology of the HTLVs, the other family of retroviruses found in Cameroon were also part of the areas of expertise of the CHU researchers. The projects put in place foresaw the need for and supported the training of young researchers “in the North” such as Jean Marie Tsague or Innocent Mboudjeka (in Kyoto) to whom the most technical aspects of the work were entrusted.

The collaboration between the Institute of Tropical Medicine in Antwerp and its local representative, Peter Ndumbe, continued and went hand in hand with the brilliant international careers of Phillip Nyambi and John Nkengasong, both of whom were trained in Antwerp and head-hunted by American institutions. Peter Ndumbe also proved to be a person who could not be ignored on the local scene by organising around himself a “radial” group of diversified collaboration which extended from organising the production of Cameroonian diagnostic test (a project in collaboration with Canadians) to the molecular epidemiology of Hepatitis C.

One of the former members of the Antwerp group, Éric Delaporte, would contribute, by becoming interested in the Cameroonian virus, to the emergence of another Cameroonian

¹ For example: N. T. Constantine, L. Zekeng, A. K. Sangare, L. Gurtler, R. Saville, H. Anhary, C. Wild, “Diagnostic challenges for rapid human immunodeficiency virus assays. Performance using HIV-1 group O, HIV-1 group M, and HIV-2 samples,” *Journal of Human Virology*, 1 (1997), 45-51; J. Eberle, I. Loussert-Ajaka, S. Brust, L. Zekeng, P. H. Hauser, L. Kaptue, S. Knapp, F. Damond, S. Saragosti, F. Simon, L. G. Gurtler, “Diversity of the immunodominant epitope of gp41 of HIV-1 subtype O and its validity for antibody detection,” *Journal of Virological Methods*, 67 (1997), 85-91; L. G. Gurtler, L. Zekeng, F. Simon, J. Eberle, J. M. Tsague, L. Kaptue, S. Brust, and S. Knapp, “Reactivity of five anti-HIV-1 subtype O specimens with six different anti-HIV screening ELISAs and three immunoblots,” *Journal of Virological Methods*, 51 (1995), 177-183; T. M. Rehle, P. Mattke, G. N. Liomba, S. Kramer, G. M. Gershy-Damet, K. Konan, A. Sangare, L. Zekeng, J. M. Tsague, L. Kaptue, J. Eberle, L. Gurtler, “Evaluation of a quantitative double ELISA strategy for confirmation and differentiation of HIV infection,” *Journal of Virological Methods*, 66 (1997), 203-209; J. van Binsbergen, D. de Rijk, H. Peels, C. Dries, J. Scherders, M. Koolen, L. Zekeng, L. G. Gurtler, “Evaluation of a new third generation anti-HIV-1/anti-HIV-2 assay with increased sensitivity for HIV-1 group O,” *Journal of Virological Methods*, 60 (1996), 131-137.

² Par exemple, with Abbott : C. A. Brennan, J. Hackett, Jr., L. Zekeng, J. K. Lund, A. S. Vallari, R. K. Hickman, L. Gurtler, L. Kaptue, J. Von Overbeck, H. Hampl, S. G. Devare, “Sequence of gp41env immunodominant region of HIV type 1 group O from west central Africa,” *AIDS Research and Human Retroviruses*, 13 (1997), 901-904; J. Hackett, Jr., L. Zekeng, C. A. Brennan, J. K. Lund, A. S. Vallari, R. K. Hickman, L. Gurtler, L. Kaptue, and S. G. Devare, “Genetic analysis of HIV type 1 group O p24gag sequences from Cameroon and Equatorial Guinea,” *AIDS Research and Human Retroviruses*, 13 (1997), 1155-1148; J. C. Hunt, C. A. Brennan, A. M. Golden, J. Yamaguchi, J. K. Lund, A. S. Vallari, R. K. Hickman, L. Zekeng, L. G. Gurtler, H. Hampl, L. Kaptue, and S. G. Devare, “Molecular analyses of HIV-1 group O and HIV-2 variants from Africa,” *Leukemia*, 11 (1997), Suppl 3, 138-141; J. C. Hunt, A. M. Golden, J. K. Lund, L. G. Gurtler, L. Zekeng, J. Obiang, L. Kaptue, H. Hampl, A. Vallari, and S. G. Devare, “Envelope sequence variability and serologic characterization of HIV type 1 group O isolates from equatorial guinea,” *AIDS Research and Human Retroviruses*, 13 (1997), 995-1005. With Organon : J. van Binsbergen, W. Keur, M. vd Graaf, A. Siebelink, A. Jacobs, D. de Rijk, J. Toonen, L. Zekeng, E. Afane Ze, and L. G. Gurtler, “Reactivity of a new HIV-1 group O third generation A-HIV-1/-2 assay with an unusual HIV-1 seroconversion panel and HIV-1 group O/group M subtyped samples,” *Journal of Virological Methods*, 69 (1997), 29-37

figure in the field of research into AIDS. In fact, in 1994 Éric Delaporte was appointed head of the research laboratory into the retroviruses ORSTOM (which later became the IRD¹), the French public establishment charged with research abroad. Based in Montpellier, having already set up collaborative ventures in Dakar, Éric Delaporte was planning to install his team in the inevitable town of Yaoundé. With the main sites in the town (the CHU, the Central Hospital and the Faculty of Medicine) already “occupied”, he turned to the man who was the director of the PNLS in 1995, Eitel Mpudi Ngole, an army doctor and specialist dermatologist and venerologist who had trained at the École de santé navale in Bordeaux. Set up in the heart of a military hospital, this collaboration consisted of the biological and clinical follow-up and therapeutic treatment of a multitude of sick people. The virological analyses of the samples and all the molecular tests were done in Montpellier. A link between Montpellier and the Military Hospital was thus established in 1995 and Colonel Eitel Mpudi Ngole became an international figure. He knew how to exploit this position by becoming, in turn, an important personage on the local research scene.

The Pasteur Centre became rapidly involved in virological research into AIDS – a field described as a “cat and dog battleground” – even foreseeing the announcements of 1994. Through the impetus of Phillipe Mauclère, the military doctor who had been appointed section head in 1992, the virology laboratory prepared itself for a large scale study for the detection and analysis of “atypical serums”. The Pasteur Centre’s first major trump card was to organise a massive programme to obtain serums, especially atypical serums, through a hospital network which it was able to establish because it was the PNLS’s official centre for the verification of serums² and coordinator of other research (polio and HTLV). In addition to its daily clients at the HIV screening centre, the Pasteur Centre therefore had access to a considerable amount of blood samples in 1993.

In an economic context which remained difficult, Phillipe Mauclère also benefited from a “deal” with the Sanofi Diagnostics Pasteur laboratories³ and their Research and Development service. At no charge, they provided the material for rapid identification (tests of the Elisa type) for HIV and HTLV serologies and in exchange the Pasteur Centre would provide Cameroonian serums, in other words, isolated viral clones. From as early as 1990 it would appear, the firm’s knowledgeable experts rekindled interest in Cameroonian HIV and the agreed investment (in the order of 25000 tests⁴) is without doubt indicative of the hope placed in the Cameroonian serums. These same experts, aware of the work in progress on the O group in Antwerp, Munich, Paris and Yaoundé, advised and even supervised, in January and then in April 1994⁵, the first retrospective work of the laboratory’s blood bank in an attempt to find samples which were carriers of an infection by the (sub-type) group O which were absolutely necessary if the firm’s tests were to be adapted. Phillipe Mauclère remembers:

It was the people from Sanofi Diagnostic Pasteur who contacted me and said: “There are variants in circulation and it will be interesting to work on them and we have the necessary tests to detect them”. [...] This was even before the paper on group O came out [...] and we started to work on a blood bank. We simultaneously used the commercial test and their makeshift test: [on certain serums] the

¹ The acronym ORSTOM initially stood for “Office de la recherche scientifique et technique outremer” (Overseas Office for Scientific and Technical Research) before becoming known as “Orstom – Institut français de recherche scientifique pour le développement en coopération” (French Institute for Scientific research for Cooperative Development) and later “Institut de recherches pour le développement (IRD)” (Research Institute for Development).

² Jacques Millan, *Rapport, 1991-1992*.

³ Sanofi Diagnostics Pasteur took over the diagnostic activities of Pasteur Productions.

⁴ Interview with Phillipe Mauclère, Paris, 3 July 2002.

⁵ Jacques Millan, *Rapport, 1994-1995*, 98.

commercial test was negative and their test was positive for the O groups. That was the beginning of the research [...] [but] they were businessmen and interested in the development of a test and I soon began to look for scientific partners.¹

Phillipe Maucière found just the partner that he was looking for in François Simon whom he met in December 1994 through Sanofi in Paris.² His experience in the identification of HIV viruses was used to advantage.³ Since 1993, Phillipe Maucière had perfected and applied a new protocol for serological identification at the Pasteur Centre which was faster and cheaper, by replacing Western Blot confirmations with a series of Elisa tests: together they adapted this algorithm for the rapid detection of O variants. The technicians Tina Abada and Jermie Mfoupouendoum, already experienced in the rapid identification of HIV serologies, could henceforth screen the overcrowded blood banks in search of HIV-1 O (+) without having recourse to Western Blot or to genotyping by using biological molecular techniques. The results were spectacular.

By the end of 1995, sixty-nine patients who were infected with HIV-1 O were identified using the Pasteur Centre serological protocol. Lymphocytes were sent to Françoise Barré-Sinoussi in Paris for her to try to isolate and sequence the new specimens. Another technical innovation proved itself to be invaluable for the detection of the “O groups”: Francis Barrin, from the Centre hospitalier universitaire (CHU) in Tours, perfected and validated, on the Pasteur Centre serums, a serological technique (a variation of the Elisa test, using synthetic peptides) which allowed for the efficient identification of the HIV-1 group⁴. The technique called GSEIA would be routinely used at the Pasteur Centre from 1996 for the retrospective study of its blood bank since 1986 and resulted in the identification of an additional series of serums infected by HIV-1 O. International publications did not immediately explain these technical innovations and the intense work being carried out by the Pasteur Centre “crisis team” as Phillipe Maucière like to call them. The results of the HTLV, the initial priority in terms of research, accounted for the totality of this research up until 1997,⁵ before the vast quantity of epidemiological work on the O group began to appear in journals.⁶ Pasteur’s epidemiological data confirmed first impressions particularly that of Zekeng’s team:⁷ the prevalence of HIV-1 O, even in Cameroon, remained feeble – therefore, no “emergent virus” on the horizon.

¹ Interview with Phillipe Maucière, Paris, 3 July 2002.

² IX Symposium on Retroviruses held at the Nikko Hotel on 2 December 1994 in Paris.

³ François Simon also benefited from being funded by the ANRP specifically for HIV-1 O infections.

⁴ P. Mauciere, F. Damond, C. Apetrei, I. Loussert-Ajaka, S. Souquiere, L. Buzelay, P. Dalbon, M. Jolivet, M. Mony Lobe, F. Brun-Vezinet, F. Simon, F. Barin, “Synthetic peptide ELISAs for detection of and discrimination between group M and group O HIV type 1 infection,” *AIDS Res Hum Retroviruses*, 13 (1997), 987-93.

⁵ The work on HTLVs benefited from several field studies from the Centre Pasteur du Cameroun with important results. For example: A. Gessain, P. Mauciere, A. Froment, M. Biglione, J. Y. Le Hesran, F. Tekaia, J. Millan, “Isolation and molecular characterization of a human T-cell lymphotropic virus type II (HTLV-II), subtype B, from a healthy Pygmy living in a remote area of Cameroon: an ancient origin for HTLV-II in Africa,” *Proceedings of the National Academy of Sciences of the USA*, 92 (1995), 4041-4045.

⁶ Mauciere et al. “Synthetic peptide” (see footnote 74); P. Maucière, I. Loussert-Ajaka, F. Damond, P. Fagot, S. Souquieres, M. Monny Lobe, F.X. Mbopi Keou, F. Barre-Sinoussi, S. Saragosti, F. Brun-Vezinet, and F. Simon, “Serological and virological characterization of HIV-1 group O infection in Cameroon,” *AIDS*, 11 (1997), 445-53.

⁷ L. Zekeng, L. Gurtler, E. Afane Ze, A. Sam-Abbenyi, G. Mbouni-Essomba, E. Mpoudi-Ngolle, M. Monny-Lobe, J. B. Tapka, L. Kaptue, “Prevalence of HIV-1 subtype O infection in Cameroon: preliminary results,” *AIDS*, 8 (1994), 1626-1628.

HIV-1 n and the quest for the “missing link” (1998-2000)

But the interest in Cameroon had already been rekindled when these somewhat “disappointing” results appeared. Since 1995 the report of the Pasteur Centre’s activity had mentioned the existence of serums which remained indeterminate, that is to say which did not belong to either group O or to group M of the HIV-1.¹ One of them concerned a woman patient of forty who, in May 1995, showed a typical clinical picture of AIDS and who died in December. Her blood count was indeterminate: certain Elisa tests (in competition) were negative, others positive whilst she showed a normally positive Western Blot HIV-1 profile. One could say that she would have passed unnoticed (negative or positive according to the ELISA test applied) with a classical identification protocol. The GSEIA tests “specific to the group” were negative for the M and O peptides. On the other hand, the serum showed a marked reaction when a test conceived by Innogenetics was used with peptides of an SIV taken from a chimpanzee from Gabon. The importance of such an atypical infection escaped no one and the lymphocytes sent to Paris resulted in a viral isolation².

Retrovirological war was declared in Paris between the Pasteur Institute of Paris, the Cochin Institute and the Bichat-Claude Bernard Hospital who all took up cudgels: by the end of 1996 the complete sequence of this new clone called YBF-30 was registered and phylogenetic analyses had begun at the Pasteur Institute. An application for patent which included the methods of sequencing (based exclusively on the PCR methods) was filed on 6 December 1996³. The Pasteur Centre then adapted the GSEIA technique used to detect clones similar to YBF-30, so as to estimate their prevalence: there were few cases and only five cases were confirmed as a result of the study of serums which had been stockpiled between 1989 and 1998. These sporadic cases were however enough for the Paris-Yaoundé collaboration to retain exclusivity of a problem of major scientific interest.

It was in September 1998 that the prestigious journal *Nature Medecine* announced the discovery of a new HIV-1 virus which was distinct from the M and O group and which was signed, amongst others, by François Simon and Phillipe Maucière.⁴ The presence of a few cases discovered in Cameroon allowed for the creation of a new group, the group N which stood for *Non-M* and *Non-O* or for *New*. In contrast to the case of the O group four years previously, diagnostic problems posed by the clone were fewer not only because it seemed to be extremely rare, but rather because the majority of the tests came out positive. It was its genetic originality which was particularly highlighted by the authors: the YBF-30 virus is closer to the Gabonese SIVcpz than to the two groups of human HIV-1,⁵ a phylogenetic position which, for the first time, affirmed a direct transmission of the ancestor of the virus from chimpanzee to humans. The article substantiated and reaffirmed the importance of Cameroonian territory by opening up obvious perspectives: the possibility of chimpanzee SIV being closer to the two different HIV-1, research into the “lentivirus close to the M group or to the O group in non-human primates is of capital importance” and Cameroon, indisputably “at the heart of events pertaining to inter-specific transmission”, is the origin – supposed – of the AIDS epidemic. Formulated by *Pasteuriens* according to the doubtful register of the

¹ Jacques Millan, *Rapport, 1994-1995*, 99.

² Paul Martin, *Rapport d’activité (Centre Pasteur du Cameroun), 1995-1996*.

³ Patent (France) Nr FR19960015087.

⁴ F. Simon, P. Maucière, P. Roques, I. Loussert-Ajaka, M. C. Muller-Trutwin, S. Saragosti, M. C. Georges-Courbot, F. Barre-Sinoussi, F. Brun-Vezinet, “Identification of a new human immunodeficiency virus type 1 distinct from group M and group O,” *Nature Medecine*, 4 (1998), 1032-1037

⁵ For certain parts of the genome only.

evolution of man in the “Out of Africa” mode, it is this quest for the “missing link”¹ that is being launched in Cameroon.

A “broad study amongst non-human primates” such as the article mentions is, in effect, underway: since 1997 the Pasteur Centre has been working, coordinated by virologists at the Pasteur Institute in Paris, on simian retroviruses by taking blood samples from monkeys in the zoos in Limbe and Yaoundé. Since 1997 as well, the IRD has put a lot of effort into this issue, by launching a vast investigation into the spread of SIV amongst the monkeys eaten as “wild meat”, sold in markets or kept as pets. Backed by its veterinarian, Xavier Pourrut, who arrived from Dakar, the IRD team made the most of experience gained both in the field and in the laboratory when, in the preceding years, it had run a similar project in Senegal. Lazare Kaptue also took blood samples from the monkeys in the Yaoundé zoo for his Japanese partners. A competition sprung up *in situ* for blood samples and in the “North” for the isolating and identification of the viruses, which was even fiercer than the one concerning human variants.² From 1999, publications began to appear. The Pasteurian team obtained two clones of SIV from chimpanzees which were even closer to HIV-1 N.³ Beatrice Hahn an international leading light in virology, could henceforth state that the problem of the “origin of HIV-1 has been solved”.⁴ An entire series of new SIVs analysed in Europe, Japan and the United States were identified in different species of Cameroonian monkeys: the problem of the origin having been solved – according to Beatrice Hahn – a new scientific discourse asserted itself and was mainly transmitted in publications that were co-signed by the IRD.⁵ Prompted by current fears concerning the “emergent viruses”, these discourses warned against the risk posed by the consumption of “wild meat” which could expose humankind to the emergence of an HIV-3 or an HIV-4 – a problematic message which requires further analysis.

Epilogue and conclusions

At the beginning of this new millennium, the Cameroonian territory is arousing a passion whose acuteness and topicality cannot be denied. Remarkable institutional configurations have appeared, an indication of the intensification of the “research in partnership and on a specific subject”⁶ which has imposed itself as the principal method of scientific work in Cameroon. Let us take two recent examples: at the very end of the 1990s Dr Mpudi-Ngole added two additional projects to his “historic” collaboration with the IRD, one with the CDC in Atlanta and the other with John Hopkins University (Baltimore) whose most obvious tasks are the collection and subsequent dispatching of blood samples across the Atlantic. Although they are strictly independent of one another on a scientific level⁷ the three projects share the same building in the city centre and, it is often said, the same freezers – an extreme picture of

¹ Paul Martin, *Rapport d'activité (Centre Pasteur du Cameroun), 1996-1997*, 70.

² Guillaume Lachenal, “Le Centre Pasteur du Cameroun ...” (see footnote 10).

³ The results were known as early as the beginning of 1999, then published in M. C. Muller-Trutwin, S. Corbet, S. Souquiere, P. Roques, P. Versmisse, A. Ayoub, S. Delarue, E. Nerrienet, J. Lewis, P. Martin, F. Simon, F. Barre-Sinoussi, and P. Mauclore, “SIVcpz from a naturally infected Cameroonian chimpanzee: biological and genetic comparison with HIV-1 N,” *Journal of Medical Primatology*, 29 (2000), 166-172.

⁴ Beatrice Hahn, “The Origin of HIV-1: A Puzzle Solved?” Keynote lecture, Conference on Retroviruses and Opportunistic Infections, 31 January 1999, Chicago.

⁵ M. Peeters, V. Cournaud, B. Abela, P. Auzel, X. Pourrut, F. Bibollet-Ruche, S. Loul, F. Liegeois, C. Butel, D. Koulagna, E. Mpoudi-Ngole, G. M. Shaw, B. H. Hahn, E. Delaporte, “Risk to human health from a plethora of simian immunodeficiency viruses in primate bushmeat,” *Emerging Infectious Diseases*, 8 (2002), 451-457.

⁶ To be understood in the strict sense of the word: a device for short term financing (a few years) by an “agency with means” functioning by tender (the NIH is an historic example as is the ANRS in France) and explicitly controlling the “North-South” scientific relations.

⁷ To this day (October 2004), the three parties have not signed any joint publication.

the “juxtaposition “ of the North-South segments which underlie Cameroonian research. In the same vein, the destiny of “l’Hygiène mobile” a modest building on health hill, is just as evocative. From 1998 Dr Zekeng has installed an identification centre in a disused ward inherited from the colonial Health Services, for the study of microbicides.¹ These premises, repainted in the interim, house the freezers used to store the massive consignments of blood samples which will be sent to the American Food and Drug Administration and to the IRD in Montpellier. In a nutshell, this is the intriguing story and picture of the minimalist institutional conditions where the public research of an economically strapped State is cobbled together, often with great inventiveness.

I wanted this story to be an illustration: Africa has not waited for the appearance of tritherapies, the relative lull in western epidemics, and the controversy surrounding the general availability of generic treatment in order to be at the centre of a veritable scientific and medical turmoil. By giving this account the urgent rhythm of the “race for serums” I wanted, by the very form of the narrative, to attempt to show the inevitable integration of an “African periphery” into large scale international science. It goes without saying that my account will raise a series of comments and complementary analyses. The sociology of the actors and the different forms of their global circulation warrant an in depth study in order to describe better the appearance and reconfiguration of a *transnational* field. A study of institutional modalities and technologies of work in local research which would compare the strategies of sample collection and of funding would also permit the evaluation of the novelty – and equity – of the scientific practices which have been established². Certain controversies concerning Cameroon, specifically those about the origin of HIV, need to be scientifically analysed. Finally, the “answers” which the “race for serums” has presented, its public representations, indeed its “subjects” reactions are just so many possible anthropological view-points to this story.

For we must remember that the Cameroonian race for serums, in spite of many brilliant success stories, has been disturbing³ – not so much because of its logic but for the impropriety of “individual and collective hostilities [...] interminable and ludicrous”⁴ which brought the majority of the players into conflict in a dramatic epidemiological context. However it is, not without paradox, from the very strategies of scientific capitalisation that the most desirable aspects of the “scientific race” have emerged: the interventions by public health gradually became indispensable to the recognition of the projects before access to anti-retrovirals in Africa presented itself as an “urgent scientific question” which, seen in this light; was capitalisable. This was doubtless one of the hopes expressed by the most prominent article of the year in Yaoundé: the study which appeared in *The Lancet* in July 2004 co-authored by a Franco-Cameroonian team which bridged the habitual institutional divide. This did not announce the discovery of any “new clone” but recommended the funding and distribution of a generic tritherapy, Triomune.⁵

¹ In collaboration with the NGO Family Health International.

² One could consult Guillaume Lachenal “Les réseaux post-coloniaux de l’iniquité” in *Santé et maladie : histoire de la diffusion des savoirs*, special issue of the journal *Outremers* due to come out in 2005.

³ To the point that they resulted in audits and meetings which were explicitly aimed at “restoring order”.

⁴ These words are those of Céline describing the colonial society of Douala: Louis-Ferdinand Céline, *Voyage au bout de la nuit* (Paris, Denoël, 1932, rééd. Gallimard, 1952, 125).

⁵ C. Laurent, C. Kouanfack, S. Koulla-Shiro, N. Nkoue, A. Bourgeois, A. Calmy, B. Lactuock, V. Nzeusseu, R. Mognutou, G. Peytavin, F. Liegeois, E. Nerrienet, M. Tardy, M. Peeters, I. Andrieux-Meyer, L. Zekeng, M. Kazatchkine, E. Mpoudi-Ngole, E. Delaporte, “Effectiveness and safety of a generic fixed-dose combination of nevirapine, stavudine, and lamivudine in HIV-1-infected adults in Cameroon: open-label multicentre trial,” *The Lancet*, 364 (2004), 29-34.

