

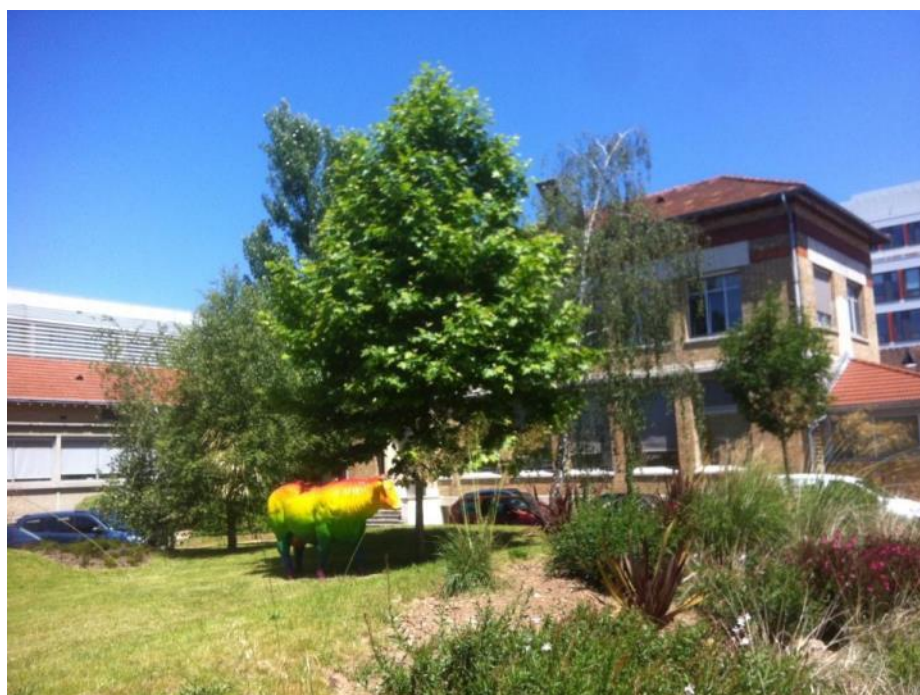
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The Maisons-Alfort Laboratory for Animal Health celebrates its 115th anniversary

19 May 2016



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Maisons-Alfort, 19 May 2016

Press release

The Maisons-Alfort Laboratory for Animal Health 115 years dedicated to "One Health"

Created in 1901, the Maisons-Alfort Laboratory for Animal Health, one of the world's oldest laboratories specialising in the study of infectious animal diseases, celebrates its 115th anniversary this year. This event, incorporated into the celebrations to mark the 250th anniversary of the Alfort National Veterinary School (ENVA), is an opportunity to take stock of its many years of scientific production and expertise, during which it has successfully adapted to exponential technological advances in biology research, and which have made it a reference throughout the world. It is also the moment to pay tribute to its founders, who made a lasting contribution to veterinary infectious diseases, in particular Edmond Nocard and Emile Roux. And lastly, this anniversary is the chance to reflect on the place it occupies and will continue to occupy in the surveillance and control of emerging and re-emerging infectious animal diseases, in relation to human health, in light of the climatic, ecological and socio-economic upheavals that our planet is experiencing.

The Maisons-Alfort Laboratory for Animal Health is required to deal with problems that place the common good in animal health at risk. Its mission is to identify pathogens affecting herds (mainly cattle, sheep, goats, pigs and Equidae) and causing epizootics (animal epidemics) or zoonoses (animal diseases whose pathogens can be transmitted to humans).

It offers new alternatives in vaccination. In this regard, the Laboratory's teams study pathogens of all kinds responsible for infectious diseases such as foot-and-mouth, bluetongue, bovine tuberculosis, trichinellosis, *etc.*, but they also develop research on different disease vectors (ticks, for example). The laboratory works according to the concept of "One World, One Health", and provides scientific and technical support and data to risk managers, particularly in the framework of emerging diseases.

Its integration at the heart of the ENVA campus means that it can share the school's infrastructure, staff and research projects, and benefit from the contribution of the National Institute for Agricultural Research (INRA) through two joint research units (UMRs).

The laboratory is responsible for major reference work in the analytical diagnosis of many animal diseases, at national, European or global level. In this respect it has 23 reference mandates: 15 at national and eight at international level.

What is the outlook for the years to come?

In order to maintain its level of excellence, the Laboratory is working on three major challenges: to continue the modernisation of its infrastructure, to deal with emergencies and re-emergences in its area of activity, and to fully integrate, in the diagnostic-surveillance-control chain, the new technologies currently revolutionising the approach to health.

Global climate change, as well as new forms of globalisation in trade, have led to the emergence in Europe over the last few years of exotic diseases with a high economic impact. The emergence of these animal infectious diseases remains a topical issue and has repeatedly mobilised the Laboratory's teams (new variants of the bluetongue virus, tick-borne diseases, schistosomes, *etc.*).



"Old diseases" are still a concern for our country and warrant the sustained efforts of the Laboratory. Another challenge will be to develop methods of screening, analytical diagnosis and control, according to the European and international standards in force, while integrating new technologies for analysing genomes and proteins.

The detailed analysis of host/pathogen interactions, as well as the development of new methods in epidemiology, will enable the Laboratory to continue to combat emerging and re-emerging animal diseases, dedicated to the concept of "One Health" promoted by the World Health Organisation.

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A brief history

The Maisons-Alfort Laboratory for Animal Health was founded in 1901 to combat the major health risks affecting French livestock (cattle, sheep, goats, Equidae, poultry), in particular foot-and-mouth disease.

Its creation was a direct result of the great discoveries relating to infectious microbes and the development of vaccines during the Pasteur age. Edmond Nocard, the founder of the laboratory with Emile Roux, was fully acknowledged by Louis Pasteur, who had supported him especially during the Egypt campaign of 1883 in an attempt to isolate the agent of cholera. Edmond Nocard had earlier founded the chair of contagious diseases at the Alfort National Veterinary School (ENVA) and had distinguished himself through major discoveries in bacteriology, including several bacteria such as those of the genus *Nocardia* (subsequently named in his honour).

Edmond Nocard also worked on the culture medium of the agent of bovine tuberculosis, thus facilitating its isolation and the transmission of the bacterial strain to Calmette and Guérin (who would produce the BCG vaccine, later used by Henri Vallée, the successor to Edmond Nocard). His work also investigated the agent of glanders and he proposed a screening method, the mallein test. He worked extensively to get tuberculin testing accepted as a method of screening for bovine tuberculosis (this method is still used today). He also studied several parasitic (piroplasms, agents of dourine) and viral (FMD) agents. From the outset his main focus was the different types of infectious microbes (viruses, bacteria and parasites), as well as the methods by which these diseases are transmitted and spread, and this reflects the current organisation of the Laboratory into four sectors: virology, bacteriology, parasitology and epidemiology, thus incorporating these dominant historical themes.

The Laboratory was created at the request of the Minister of Agriculture at the time, Jean Dupuy, to deal with an upsurge in foot-and-mouth disease in France and to find a vaccine against the disease. Thus, the Maisons-Alfort Laboratory for Animal Health was **one of the world's first to specialise in the study of infectious animal diseases** and dedicated to combating foot-and-mouth disease in particular.

The Laboratory was built on the campus of the Alfort National Veterinary School (ENVA), which celebrates its 250th anniversary this year. The experimental facilities, which were built from 1901, were remarkable for their time and incorporated effluent neutralisation using chemical agents.

Later, in the 1920s, in the face of the internationalisation of the Laboratory's activities, Henri Vallée built a new laboratory to accommodate foreign colleagues.

The Laboratory's activities became increasingly diversified and specialised during the course of the last century, according to the host animal species and major pathogens studied.

From the 1960s onwards, a phase of decentralisation was begun with the establishment of laboratories in the provinces. Because France had taken the unique decision to create laboratories for each animal production sector, the Laboratory also went along with this trend of specialisation. Its development in infectious equine diseases in 1990 made it at the time the only laboratory capable of diagnosing the causes of all types of equine infectious pathologies. The same was true for domestic carnivores. This achievement led to it obtaining the mandate, in 2008, of European Union Reference Laboratory for equine diseases, shared with the Dozulé Laboratory for Equine Diseases.

Other decentralisation processes were implemented in 1992, 2001 and then 2007, strongly mitigating the sector-specialisation approach and strengthening the Laboratory's "generic microbiology" activity, which now enables it to adapt to the study of new infectious herd diseases (for example the Schmallenberg virus that emerged in ruminants in Europe in 2012).



The Laboratory, ENVA and INRA united their forces and staff in 1998 to create and develop the first joint research unit (UMR) in parasitology, then that of virology in 2002 within the Laboratory for Animal Health. More recently, contracted units (USCs) have been set up to increase the Laboratory's momentum in necessary themes. The USC VECPAR (parasite vectors) was thus the first to be initiated with the University of Champagne-Ardenne in Reims on the topic of Phlebotominae/Culicoides and parasites in wildlife. Two others, the USC EPITOXO (epidemiology of toxoplasmosis) and EPIMAI (epidemiology in animal health) were then created, to respond to similar needs.

The Laboratory's different names

Throughout its history, the laboratory has belonged to six different agencies and changed its name eight times:

Laboratory for Research on Animal Infectious Diseases (1901-1913), an autonomous institution, created by the Ministerial Order of 31-10-1901

Research Laboratory of the Veterinary Health Service (1912-1921), attached to the Veterinary Services by the Decree of 12-9-1912

National Veterinary Services Laboratory (1921-1936), attached to the Institute for Agricultural Research by the Decrees of 26-12-1921 and 30-6-1934

National Veterinary Services Laboratory (1936-1942), attached to the Veterinary Services by the Ministerial Order of 21-2-1936 and the Decree of 14-5-1941

Central Laboratory for Veterinary Research (1942-1944), attached to the Agricultural Research Services by the Act of 5-11-1942

National Institute of Veterinary Research, an autonomous establishment (until August 1944), created by the Act of 20-7-1944

Central Laboratory for Veterinary Research (1944-1945), attached to the Research and Experimentation Service during the reorganisation of the Ministry of Agriculture

Central Laboratory for Veterinary Research (1945), created by the Ministerial Letter of 1-4-1945
Central Laboratory for Diagnosis, Control and Research (1961), created by the Ministerial Order of 15-12-1961

Central Laboratory for Veterinary Research (1962-2000), created by the Act of 8-7-1965 and the Finance Act of 1968. This name was retained after the creation of CNEVA, by the Decree of 29-4-1988

AFSSA Laboratory for Studies and Research on Animal Diseases and Zoonoses (2000-2010), by the Decree of 26-3-1999

ANSES Maisons-Alfort Laboratory for Animal Health (since July 2010)

According to the "Histoire du Laboratoire Central de Contrôle et de Recherches du Service Vétérinaire" [History of the Central Laboratory for Control and Research of the Veterinary Services] from the book "Vétérinaires de France", bicentenary edition pp399,400. Ed. 1965 and Meurier & Blancou 2006 Bull.soc.fr.hist.med.vet.



From the origins to the Icube building

31 October 1901: A ministerial order appointed Edmond Nocard, with the support of Emile Roux, to conduct studies and experiments on foot-and-mouth disease.

Another ministerial order concerned the creation of the "Laboratory for Research on Infectious Animal Diseases" on the site of the Veterinary School of Alfort. Even before this order was published, construction had already begun.

The buildings, including the "Viruses pavilion" and the "Isolated animal facilities pavilion", were erected by the administrator Viet from the Veterinary School of Alfort, according to instructions from Nocard and Roux. Total cost of construction: 150,000 francs.

1920: The Laboratory became the "National Veterinary Services Laboratory".

1923: An additional building was erected to accommodate French and foreign trainees (the current Vallée building).

1953: A slaughterhouse was built and the Diagnostics Laboratory was transformed into the Immunology Laboratory (the current Roux building).

1964: The administrative building was completed (the current Bachelard building).

1974: 12 *controlled atmosphere* stables were adapted to handle dangerous viruses: foot-and-mouth disease, swine fever and rabies.

1974: A canteen was built for the staff of the Laboratory.

1988: The French Centre for Veterinary and Food Research (CNEVA) was created, with an extension of 200 m² and the modernisation of certain animal facilities.

1999: On the creation of AFSSA, the CIRAD premises were annexed to the laboratory in order to enlarge the administrative building.

2000: The "Central Laboratory for Veterinary Research" (LCRV) was renamed the "Laboratory for Studies and Research on Animal Diseases and Zoonoses" (LERPAZ), with a P2 laboratory in the bacterial zoonoses unit and an EEC-approved P3 laboratory for foot-and-mouth disease.

2016: The high-security infectious disease platform, called Icube, was finalised. It is designed for studies on foot-and-mouth disease and major vector-borne infectious diseases, including those transmitted by ticks and insects.



115 years of work devoted to animal health

1901: The "Laboratory for Research on Infectious Animal Diseases" was created.

1903: Edmond Nocard published his last article, on anti-FMD serum therapy.

1905: Isolation of the canine distemper virus by Henri Carré. Isolation of the first animal retrovirus: the equine infectious anaemia virus (Vallée and Carré).

1914-1918: Mobilisation of staff during the First World War; the laboratory worked at the wound and gas-gangrene serum therapy centre, applying the discoveries of Leclainche and Vallée.

1920: A very serious outbreak of foot-and-mouth disease struck France. Research on tuberculosis and paratuberculosis; diseases in small ruminants and pigs; demonstration that BCG cannot be used for vaccination of cattle.

Work on foot-and-mouth disease: use of infected epithelia, discovery of the first virus serotypes, method for producing the first formalin vaccines.

1924: Extension of research in animal pathology to equine meningoencephalitis, dourine and classical swine fever threatening the French livestock population.

After the Second World War, the Central Laboratory for Veterinary Research became the National Laboratory for Applied Research and Reference for the Diagnosis of Animal Diseases. It became the reference laboratory for the main animal diseases.

1967: Extension of the Laboratory's remit to the free inspections of live animals exported by France and other countries of the European Economic Community.

1972: Organisation at national level of the network of veterinary services laboratories in which the LCRV (Central Laboratory for Veterinary Research) retained its general activities of export control and research on brucellosis and other diseases in Equidae, wildlife and swine. Creation of a mission for national-level epidemiological surveillance, technology watch, in-depth diagnosis and dissemination of scientific progress in the veterinary field.

1975: Isolation of the equine influenza virus (Fontainebleau strain).

1998: Implementation of a quality plan to permanently eliminate cases of human trichinellosis of equine origin (confirmed in 2016).

2001: France became free of bovine tuberculosis. An episode of foot-and-mouth disease led to the slaughter of several thousand animals in France.

2006: France became free of brucellosis.

2006: Emergence of bluetongue, which led to the development of multiple tools.

2012: Emergence of the Schmallenberg virus, which led to the development of diagnostic tools and ELISA tests in record time.

2014: Discovery of two new avian species of the *Chlamydia* bacterium.



2015: More than a century after having been created to combat foot-and-mouth disease and having provided the first original studies on this disease, the laboratory was appointed OIE reference laboratory for foot-and-mouth disease.

Appointment of the laboratory as an OIE Collaborating Centre for the Europe region for foodborne zoonotic parasites.

2015: Isolation of the new serotype 27 of bluetongue virus. Re-emergence of bluetongue, requiring the laboratory to mobilise its resources.

Each year, the laboratory reports around 20 emerging health issues, some of which lead to large-scale crises. The Laboratory for Animal Health is always at the heart of veterinary public health.

A few figures for 2015

120 international publications, of which 106 were category A+/A

20 research agreements

16 theses under way, of which 7 were defended in 2015

30,000 analyses carried out





Women and men dedicated to "One Health"

From 1901 to 1914, six people worked at the laboratory, including the Director Edmond Nocard, the Head of the Research Department Henri Carré, and the Head of the Controls Department Jean Rinjard.

Today, 118 employees work at the Maisons-Alfort Laboratory for Animal Health; they include administrative officers, laboratory agents, animal technicians, mission leaders, research project leaders, managers, laboratory technicians, and a scientific and technical project director.

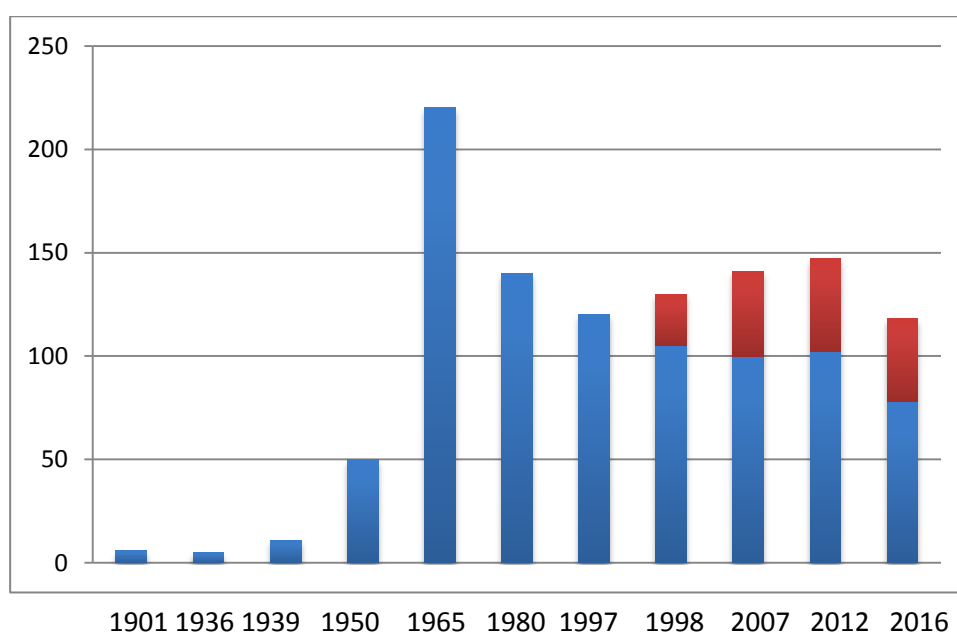
A few figures

71% of the 118 employees are women

Average age: 39 years

13 professions

78 are ANSES employees, 40 work within the joint research units and contracted units



Development of the Laboratory staff since its creation
(in red the UMR and USC staff)



A total of 18 directors have served as head of the laboratory

1902: Edmond **Nocard** and Emile **Roux** (honorary)

1903: Henri **Vallée** - 1913: Emmanuel **Leclainche**

1920: Henri **Vallée** - 1931: Henri **Carré**

1937: Jean **Rinjard** - 1945: Jean-Pierre **Thiéry**

1955: Jean **Vergé** - 1960: Alexandre **Lucas**

1972: Louis **Dhennin** - 1972: Louis **Joubert**

1979: Georges **Gayot** - 1981: Claude **Meurier**

1989: Guy **Tufféry** - 1990: Claude **Meurier**

1992: Eric **Plateau** - 2004: Michel **Pépin**

2007 to this day: Pascal **Boireau**



A benchmark at national and international levels for various infectious animal diseases of herds

For some regulated or emerging pathogens (viruses, bacteria, parasites) of major importance, the health authorities need an effective surveillance system based on a network of reliable laboratories to conduct the official analyses. For each regulated pathogen requiring surveillance, the health authorities appoint accredited laboratories for conducting analyses, as well as a "reference" laboratory. The Maisons-Alfort Laboratory for Animal Health exercises 23 national, European and international reference mandates for animal health. Each of the Laboratory's microbiology units offers this range of national, European and international reference activities.

Reference mandates from the Food and Agriculture Organisation of the United Nations	
Brucellosis	FAO RL
Reference mandates from the World Organisation for Animal Health	
Bovine tuberculosis	OIE RL
Epizootic haemorrhagic disease	OIE RL
Brucellosis	OIE RL
Foot-and-mouth disease	OIE RL
Food-borne parasites	OIE CC
Reference mandates from the European Union	
Equine diseases (other than African horse sickness)	Associated EURL
Brucellosis	EURL
National reference mandates	
Tuberculosis	NRL
Foot-and-mouth disease	NRL
Swine vesicular disease	NRL
Vesicular stomatitis	NRL
African horse sickness	NRL
Foodborne parasites, except <i>Echinococcus</i> sp.	NRL
Glanders	NRL
Bluetongue: virological diagnosis	NRL
Epizootic haemorrhagic disease of deer	NRL
Anthrax	NRL
Viral encephalitis of Equidae: West-Nile encephalitis	NRL
Avian chlamydiosis	NRL
Animal brucellosis	NRL
Tularaemia (clinical form)	NRL
Brucellosis	NRC



A reference laboratory since its creation for foot-and-mouth disease and vesicular-aphthous diseases

Foot-and-mouth disease is one of the most contagious animal viral diseases in susceptible species such as cattle, small ruminants and swine. Due to its considerable socio-economic repercussions, especially in the agricultural sector, foot-and-mouth disease is seen as a major pathology with a global impact on production and international trade in foodstuffs of animal origin, food security and economic development. In this context, it remains one of the major concerns of farmers and health authorities. The foot-and-mouth virus is associated with other viral vesicular-aphthous diseases, which can be clinically confused in contaminated animals.

Foot-and-mouth disease is persistently and permanently present (endemic) in most parts of Africa and the Middle East, and in some parts of Asia and South America. Disease-free countries are not immune to incursions of the disease from neighbouring or even distant infected countries. For example, the reappearance of foot-and-mouth disease in Europe in 2001, which particularly affected the United Kingdom, remains among the most devastating examples in history (costing several billion pounds sterling). The same year, two outbreaks were identified in France, leading to the slaughter of almost 50,000 animals and major economic consequences.

In the face of this threat, an international control strategy was initiated in 2009 by the Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (OIE), as part of the "Global Framework for the Progressive Control of Transboundary Animal Diseases" signed by the two partners in 2004. This global control strategy against foot-and-mouth disease is regarded as an international priority.

The Maisons-Alfort Laboratory for Animal Health was intended, from the very outset, to combat foot-and-mouth disease. The Laboratory has therefore been responsible for several major breakthroughs relating to this pathogen:

- discovery of serotypes O and A (there are several variants of the foot-and-mouth disease virus, meaning that each one must be included in vaccines to protect the herd);
- description of modes of contamination, virulent materials;
- the first vaccines based on aphthous ulcers or tissue from neutralised guinea pigs (Carré, Rinjard and Vallée): this work would pave the way for creation of the vaccine by Schmidt and Waldmann;
- different tests on cell cultures of the foot-and-mouth virus and various studies on adjuvants.

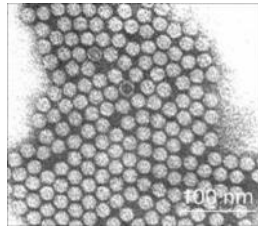
Since then, the Maisons-Alfort Laboratory for Animal Health has remained a benchmark for foot-and-mouth disease (it is the national reference laboratory for this disease). Its new dedicated infectious disease platform (the Icube building), which will open in 2016, will enable it to carry out diagnoses of the disease and in particular urgent diagnoses in the event of suspicion, by doubling the Laboratory's capacity. The Laboratory also provides expertise and scientific and epidemiological monitoring for foot-and-mouth disease. Since June 2015, more than a century after its creation, the Laboratory has also been the holder of the OIE reference mandate for foot-and-mouth disease.

In addition, the Laboratory has expertise in modelling and biostatistics applied to foot-and-mouth disease. It provides scientific and technical support for the control of this disease at national and international levels and conducts original research aimed at improving virus detection and characterisation tools. On a more fundamental level, it studies the mechanisms of viral persistence. The Laboratory conducts its activities under quality assurance standards (17025, 17043) and has been accredited under ISO/IEC 17025 by the French Accreditation Committee (COFRAC).



Did you know?

The agent responsible for foot-and-mouth disease is a virus belonging to the genus Aphthovirus of the family Picornaviridae. In 1897, Friedrich Loeffler, assisted by Paul Frosch, demonstrated the viral origin of the disease. After passing the blood of an infected animal through a porcelain-glass filter, he observed that the fluid obtained could still cause the disease in healthy animals. This was the first animal virus to be discovered.



Viral particles of the FMD virus seen by electron microscope



A reference laboratory for bovine tuberculosis

Bovine tuberculosis is an animal disease caused by a bacterium, which is transmissible to humans. Domestic and wild ruminants (mainly cattle and deer), as well as wild boar, badgers and foxes, may all be infected. Since 2001, France has been considered "officially free of bovine tuberculosis," and yet each year around a hundred outbreaks persist in livestock despite the control measures in place.

The infection is often latent in cattle, with clinical symptoms only appearing much later in the course of a generally very long progression. However, despite presenting no (or few) symptoms, infected animals can have reduced productivity, and in some cases, can shed the bacteria and contaminate humans as well as other wildlife (deer, swine, some carnivores, etc.).

Since 2001, France has been regarded as "officially free of bovine tuberculosis" by the European Union, despite the persistence each year of around a hundred outbreaks in livestock. In some *départements* such as the Côte-d'Or and the Dordogne, the number of these outbreaks has been increasing steadily since 2004.

The Maisons-Alfort Laboratory for Animal Health has been the national reference laboratory for bovine tuberculosis since 1999 but had been developing studies on this pathogen since its origin. As the official laboratory, it is in particular tasked with improving understanding of the mechanisms influencing the spread of the infection, developing analytical methods to identify the most effective strategies for monitoring and controlling the infection, and transferring these methods to the network of accredited laboratories that it coordinates across the country.

For the last few years, ANSES has also been conducting risk assessment work and providing regulatory support to the public authorities with regard to this disease. Since 2006, around twenty opinions on bovine tuberculosis have been issued by AFSSA, then ANSES, with the participation of the Laboratory's experts.

Did you know?

From 1892 to 1896, through a series of communications, conferences, brochures and demonstrations, Edmond Nocard, founder of the Laboratory of Animal Health, endeavoured to prove that the use of tuberculin, extracted from Koch's bacillus responsible for human tuberculosis, could serve as a basis for the prevention of bovine tuberculosis. Tuberculin testing was a major step forward in the gradual eradication of the tuberculosis agent in the herd. It is still used as the official control method around the world.



Edmond Nocard



An expert laboratory in infectious diseases

The Maisons-Alfort Laboratory for Animal Health deals with multi-species animal diseases affecting the different livestock production sectors. Its network of contacts with professionals is thus very broad, in particular with the equine sector (considerably strengthened by the laboratory during the period 1985-2005), the swine and ruminant sectors (certification of farms), hunting federations and the National Office for Hunting and Wildlife (ONCFS), the National Laboratory for Control of Breeder Stock (LNCR), and veterinary technical groups. In its area of expertise, the Laboratory for Animal Health helps carry out reference, research, surveillance, epidemiology and scientific and technical expertise missions.

Scientific production is mainly the work of certified dedicated units in a doctoral school, joint research units certified by the Ministry of Research for five years, or contracted units. Research in the units is supported by numerous contracts (France, Europe, international) that currently provide most of the operating funding for research.

Research themes are characterised by:

- strong involvement in understanding the selected pathogens (markers of virulence, knowledge of genomes applied to typing or definition of the zoonotic nature);
- studies and research on understanding host/tissue or target/pathogen relationships, in order to define the criteria determining changes in the species barrier or tropism;
- the development of new tools for the identification and characterisation of pathogens;
- the collection of validated data, the description and modelling of pathogen dissemination in a population.



Recognised expertise

In France, the scientists of the Maisons-Alfort Laboratory for Animal Health are involved in many **assessment and expertise** bodies and contribute to formulating recommendations and proposals on measures to safeguard animal health and the environment. The Laboratory is closely involved in ANSES's Expert Committee (CES) on Animal Health and its working groups, and in AFNOR's U47 Commission on "analyses in animal health". Similarly, several of the Laboratory's scientists are active members of the Scientific Committee of the French High Council for Biotechnologies (HCB) and the National Centre for Vector Research (CNEV).

The Laboratory's employees sit on the scientific councils of several organisations (French Institute of Research for Development (IRD), INRA's animal health department, stud farms, national veterinary schools, doctoral schools, etc.), which enables it to support the animal health network in France. Similarly, most of the scientists at the Maisons-Alfort Laboratory for Animal Health participate in Ministry of Agriculture working groups (e.g. surveillance plans, group of experts on foot-and-mouth disease, etc.), the French Federation of Health Defence Groups (GDS-France), the French Certification Association for Animal Health (ACERSA) and the National Society of Veterinary Technical Groups (SNGTV). Lastly, some scientists from the Maisons-Alfort Laboratory for Animal Health are very generally associated with working groups of the General Directorate for Health or the French



Agency for Public Health, for the regulated field of microorganisms and toxins, the prioritisation of zoonoses, and issues of biosecurity/biosafety.

At European level, the laboratory participates on a permanent or ad hoc basis in various bodies, such as the expert committees of the European Food Safety Authority (EFSA), the management committees of European research initiatives, *etc.*

At international level, the Laboratory's units are involved in the expertise activities of various agencies (FAO, ad hoc OIE groups, *etc.*), as well as certain specialised committees (for example, cooperation with China: health and safety committee of the 2008 Beijing Olympic Games). The Laboratory is a member of the GFRA (Global Foot-and-Mouth Research Alliance), which brings together research organisations specialising in this disease at a global level.

Monitoring and surveillance of major multi-species epizootic or zoonotic diseases takes place through NRL, NRC and EURL mandates, as well as certain contracts (for example, for the surveillance of parasitic zoonoses, an EFSA contract is shared with ANSES's Nancy Laboratory for Rabies and Wildlife).

Lastly, **the training and information component** is fostered by the presence within the UMR of teachers/researchers from ENVA, enabling the full potential of the different training courses to be developed with the ANSES researchers. The Maisons-Alfort Laboratory for Animal Health is involved in training related to the missions of its NRL, EURL and OIE mandates (for example training of departmental veterinary laboratories in bluetongue, brucellosis, mycobacterial diseases, bacterial zoonoses, trichinellosis) and practical training of mandated veterinarians for "foot-and-mouth disease" alerts.





A laboratory with a long-standing presence at the heart of a scientific and academic centre of excellence

The Ile-de-France region has one of Europe's leading networks in research on infectious diseases and microbiology, with a strong emphasis on the study of zoonotic diseases. This network includes a diversity of partners, with recognised capabilities and a high international profile in basic, applied and clinical research.

The Maisons-Alfort Laboratory for Animal Health has maintained close ties with the Institut Pasteur since its creation by Nocard and Roux. More recently, two UMRs (ANSES-INRA-ENVA) from the Maisons-Alfort Laboratory for Animal Health joined forces with the IBEID (integrative biology of emerging infectious diseases) laboratory of excellence (LABEX) sponsored by the Institut Pasteur. These two teams from the Laboratory for Animal Health are studying the mechanisms by which species barriers are crossed (i.e. how a pathogen can move from one host animal species to another). Projects regularly bring together the international peripheral centres of the Institut Pasteur and the Laboratory for Animal Health. An example is the twinning under way with the Institut Pasteur in Dakar to set up an OIE Collaborating Centre on foodborne parasites for the Africa region. The Institut Pasteur-ANSES cross-functional research programme has also succeeded in organising an initiative on filoviruses.

Concerning the public health aspect, the teams of the Laboratory for Animal Health are associated with different national reference centres (NRCs) for the surveillance of transmissible human diseases, in conjunction with the French Agency for Public Health. The concept of "One World, One Health" is particularly promoted in this NRL/NRC relationship and the laboratory offers many examples, such as the association with the NRC for toxoplasmosis in the form of a USC.

The Ile-de-France region brings together many research units focusing on infectious diseases and microorganisms, under the supervision, often as joint partners, of Inserm, CNRS, the CEA, the IRD, INRA, ENVA and universities. As such, the region has been supporting microbiology research over the past eight years through areas of major interest (DIMs) including those concerning infectious diseases (MALINF 1 and 2). The Laboratory for Animal Health has been a member of the Board of Directors and Scientific Board of the DIM MALINF with various academic partners, and has developed many projects supported by the DIM MALINF. Once again, the concept of "One Health" has prevailed.

The creation of two joint research units within the Maisons-Alfort Laboratory for Animal Health in association with INRA and ENVA was relatively recent (UMR BIPAR in 1998 and UMR for Virology in 2002). This partnership has helped to instil a strong scientific dynamic in animal infectious diseases, with the sharing of resources, infrastructure and skills. It has fostered partnerships with centres of excellence in Ile-de-France such as the IBEID LABEX. Lastly, also worthy of note is the new Paris Saclay Animal Sciences (SAPS) network, initiated by INRA in 2015, in which the Laboratory for Animal Health plays an active role.

The Ile-de-France region also has the largest university science teaching centres in microbiology, immunology and parasitology (Paris 5, Paris 6, Paris 7, Paris 11, Paris 12 and Versailles-Saint Quentin Universities) and scientific *Grandes Ecoles* (National Agronomy Institute - INA P-G, *Ecoles Normales Supérieures*, the *Ecole Polytechnique*, ENVA, etc.). Laboratory scientists of all disciplines take part in various university teaching at Master/Thesis level and in doctoral schools in the infectious diseases domain. Moreover, each year the Institut Pasteur organises specialised biology teaching in microbiology, parasitology and immunology (originally started by E Roux!) with which the animal health specialities are still associated. The Maisons-Alfort Laboratory for Animal Health will be participating in the training/development initiatives of the French Agronomic, Veterinary and Forestry Institute (IAVFF) currently under development. The Laboratory is also involved in the university grouping (COMUE) of



Paris-Est University. Lastly, it has been helping to set up the iSITE project bringing together medical doctors and veterinarians specialising in infectious diseases in a "One World, One Health" project.





A broad-based partnership at national and international levels

The Maisons-Alfort Laboratory for Animal Health is positioned at the interface between the national (departmental veterinary laboratories, mandated veterinarians, farmers and hospitals) and international levels (the European Commission's Directorate General for Health and Food Safety (formerly DG-SANCO), the OIE, the European Centre for Disease Prevention and Control, the European Food Safety Authority).

The Maisons-Alfort Laboratory for Animal Health works closely with most of ANSES's other laboratories. The Laboratory is also involved in animal health networks, *via* its structured partnership (UMR, USC) with ENVA, INRA and universities (Paris-Est, Paris-Sud, Reims), the IAVFF, CIRAD, other veterinary schools such as ONIRIS, the ONCFS, etc. The NRL and NRC activities provide a link with the General Directorate for Food of the Ministry of Agriculture and the French Institute for Public Health Surveillance (now the French National Public Health Agency). Its involvement in the French animal health network regularly requires a high level of coordination from the Laboratory's players.

International cooperation is also an essential component in the operation of the Laboratory. It is active in several regions of the world, including Europe, Africa, the Middle/Far East (China and Thailand) and Latin America.

In Europe, for more than 25 years, the Laboratory has participated in and coordinated various European research contracts (FP4 to 7 R&D Framework Programmes and then H2020, EFSA). The Laboratory for Animal Health regularly collaborates with partners such as the FLI or BfR in Germany, the ISS in Italy, and the CoVetLab and Epizone networks.

The Laboratory works on specific initiatives in North Africa and the Middle/Far East to combat foot-and-mouth disease, bluetongue and brucellosis. As part of this, the Laboratory is continuing its actions in REMESA, the Mediterranean Animal Health Network, whose specific objective is to improve prevention and control against the major transboundary animal diseases and zoonoses, through the strengthening of national and regional resources and capacities, and the harmonisation and coordination of surveillance and control activities. Since 2009, the Laboratory has been a member of the GFRA, which combats foot-and-mouth disease and coordinates research projects throughout the world.

The Maisons-Alfort Laboratory for Animal Health has undertaken many actions in China since 1995. It initiated a twinning project with the University of Jilin (China) and subsequently built an OIE Collaborating Centre for zoonotic foodborne parasites shared with this university. For the past five years, a twinning project on brucellosis has been in place with the CAHEC, with the aim of establishing a reference laboratory (currently being finalised) in Qingdao. Around a dozen Chinese doctoral students have completed their science theses at the Laboratory for Animal Health since 1998, and then returned to practise their acquired skills in different universities or institutes in China.

A strengthening of partnerships and student exchanges with universities and public organisations in Latin America (Argentina, Brazil, Mexico) is under way in the areas of epidemiology and bacteriology (brucellosis, chlamydia and glanders).

These rich and diverse networks of scientific collaboration make the Maisons-Alfort Laboratory for Animal Health an indispensable participant both at national and international level in its areas of expertise. This partnership is reflected by the hosting of students and trainees from all levels and countries, to whom the Laboratory offers specific training (EURL workshops, training for departmental veterinary laboratories, etc.). In addition, the number of scientific articles produced jointly with international partners is constantly growing.



What are the prospects for tomorrow?

The Laboratory is working to tackle three challenges: continue the modernisation of its infrastructure, deal with emergences and re-emergences in its area of activity, and ensure that the new technologies currently revolutionising the approach to health are fully integrated in the diagnostic-surveillance-control chain.

The Laboratory is required to deal with the animal and human health challenges related to new invasive infectious diseases (new variants of the bluetongue virus, tick-borne diseases, etc.) and re-emergences. The Laboratory remains committed to the exchange and transfer of scientific and technological knowledge with its many partners and will continue to initiate specific training, specialised workshops and scientific meetings. It will seek to expand its portfolio of international reference mandates on major pathogens in which it has expertise.

The different Laboratory teams work to adapt and develop detection methods, analytical diagnosis and control by incorporating new technologies. The use of some of these new tools has already led to the discovery of new species of bacteria (*Chlamydia*) and viruses (new bluetongue serotype).

To support it in these challenges, many construction or renovation projects will be required. Thus, 2016 will see the inauguration of the Icube infectious diseases platform, dedicated to handling highly pathogenic animal viruses such as foot-and-mouth, and emerging pathogens transmitted by insects or ticks. Other projects are under preparation and in the preliminary survey stage (particularly for foodborne bacterial zoonoses). These projects are necessary for the Laboratory's modernisation and will bring better collective inter-unit or inter-structure sharing, by bringing together entities currently dispersed in separate buildings.

With these human, technological and material challenges, the Maisons-Alfort Laboratory for Animal Health will undoubtedly remain a major player in the relationship between animal health and public health, in France and around the world. The strengthening of its network of collaboration (national, European and international) will consolidate its influence in the field of infectious diseases in animal health. Thus, thanks to the women and men of the past, the present and the future, it will remain faithful to the original purpose of its creation in 1901... "to combat infectious animal diseases".



Icube infectious diseases platform



French Agency for Food, Environmental and Occupational Health & Safety - ANSES

Created on 1 July 2010, the French Agency for Food, Environmental and Occupational Health & Safety (ANSES) is a scientific body working in the areas of food, the environment, work, animal health and welfare, and plant health. ANSES's core activity is health risk assessment in order to enlighten public policy-making. ANSES is a public administrative body accountable to the French Ministries of Health, Agriculture, the Environment, Labour and Consumer Affairs.

Collective and independent expert appraisal

Through its monitoring, expert appraisal, research and reference activities, the Agency covers all the risks (microbiological, physical or chemical) to which a person may be exposed, intentionally or otherwise, at all ages and times of their life, including at work, while travelling, while engaging in leisure activities or via their food. This is based on the deployment of independent, pluralistic scientific expertise by expert groups, also taking into account the economic and social dimensions of a risk.

To carry out its various missions, the Agency relies in particular on a network of eleven reference and research laboratories, recognised at international level in several areas or disciplines. It has around 1350 employees and calls on approximately 800 external specialists through its expert groups.

ANSES is also responsible for veterinary medicinal products and it evaluates applications for the marketing of pesticides and biocides, as well as chemicals within the framework of the European REACH regulations. The Agency also works in partnership with numerous external organisations, both national and international.

An agency open to society

Open to society, the Agency accords considerable importance to exchanges with all its stakeholders. This is maintained through debate and sharing of information with different players: associations, the scientific community, local authorities, trades unions, etc.

Its Board of Administrators, which consists of the five colleges of the *Grenelle* environmental round table, has set up thematic steering committees which help determine ANSES's policy orientations and work programme priorities, by ensuring it is aware of the main concerns of civil society.

ANSES systematically publishes its work on its website www.anses.fr and organises or participates in some thirty scientific events each year.

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