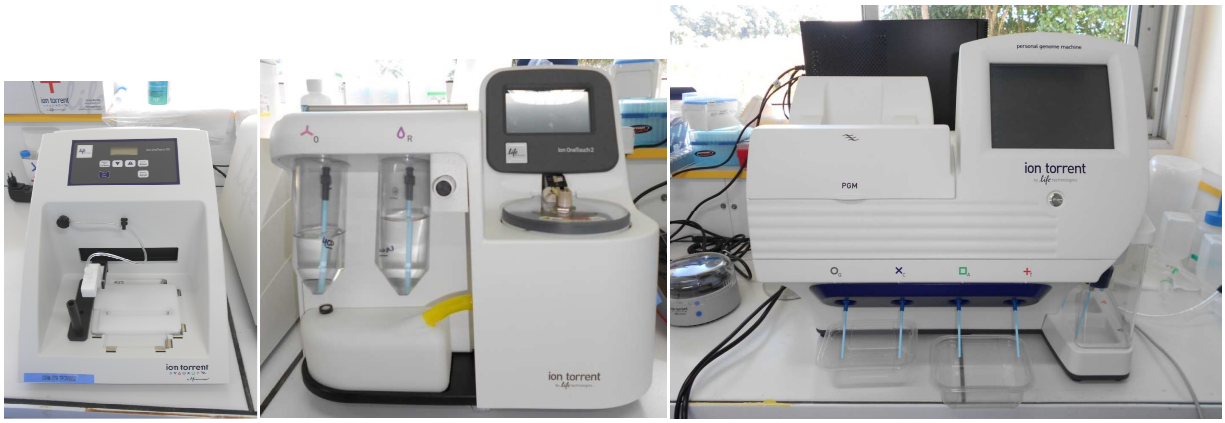
EPIGENESIS 2013 > 2016
Acquisition of new technologies

Within the framework of the EPIGENESIS project, CIRAD-Animal health research unit has acquired new highly performant equipment for "OMICS" approaches. These equipment and facilities are an open platform ready to welcome Guadeloupe, Caribbean and international research teams to integrate Regional research in the European Research Area. These unique facilities in the Caribbean region, represent a tremendous opportunity to strengthen researches on vegetal, animal, and human health in the context of "One Health" concept.

This equipment now allows to annotate whole pathogen genome (genomics) but also to provide new information on gene expression (transcriptomics). A complementary proteomic approach contributes to provide a global overview and/or identify proteins differentially expressed in infected hosts cells and /or pathogens.
The recent implementation of a high containment laboratory (Biosafety laboratory level 3) at CIRAD Guadeloupe with funding support from CIRAD, Europe and the Region Guadeloupe, has completed the whole cutting edge capacity building of CIRAD center.

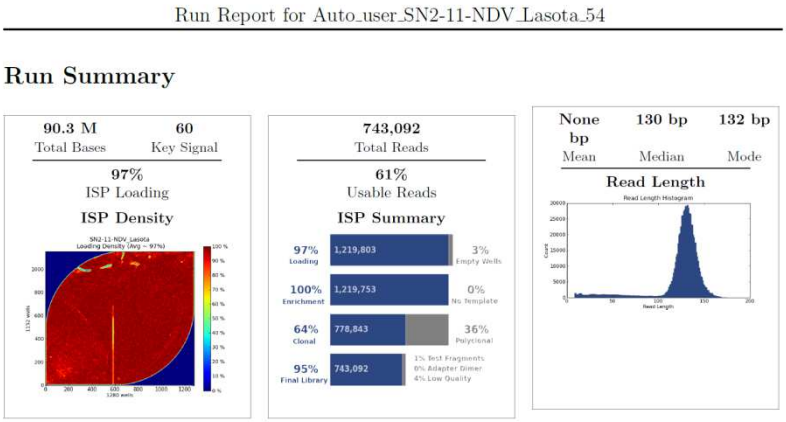
Genomics and transcriptomics approaches: Equipments for DNA and RNA Sequencing.

The new Personal Genome Machine (PGM™) platform from Life Technologies combines semiconductor sequencing technology with natural biochemistry to directly translate chemical information into digital data. Direct, real time sequencing detection provides sequencing results typically in less than 3 hours. This new technology provides an unprecedented capacity to make comparative genomics (for DNA and RNA genomes) and also transcriptomics (RNAseq).



Different equipments of the sequencing platform: from left to right, automate for the enrichment of sequencing beads, emulsion PCR for library amplification, PGM sequencing machine.

Typical run on the Guadeloupean platform with a coverage of 5,800x for a viral RNA genome (about 15,000 bases): left, image of sequencing chip loading, middle, number of reads before and after quality filtering, right, average read length.



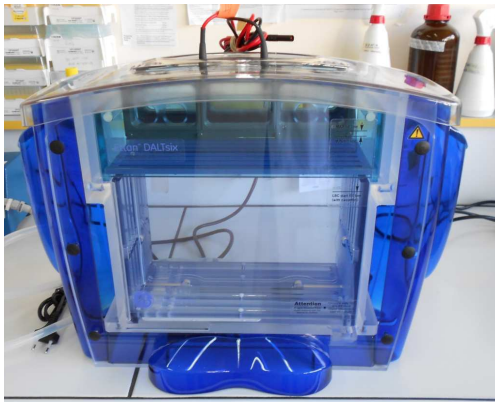
Proteomics approach: New equipments for bidimensional electrophoresis (2DE)

In bidimensional electrophoresis, proteins are separated according to two independent properties in two discrete steps: (1) Isoelectric focusing (IEF), which separates proteins according to their isoelectric points (pI), and (2) SDS-polyacrylamide gel electrophoresis (SDS-PAGE), which separates them according to their molecular weights (MW). At this stage, the gels are scanned by a laser scanner with high sensitivity and accuracy.
Ettan Spot Picker is a robotic system designed to accurately collect protein spots from 2-D gels for further analyses, such as digestion and protein identification by MALDI mass spectrometry (see details in annex).

The power of 2-DE as a biochemical separation technique has been recognized since its introduction in 1975. Its application, however, has become increasingly significant as a result of a number of developments in separation techniques, image analysis, and protein characterization. Applications include: proteome analysis, cell differentiation studies, detection of disease markers in research, cancer research, etc.

First dimension: isoelectric focusing

The Ettan IPGphor 3 is a fully integrated isoelectric focusing (IEF) system that allows proteins to be separated according to their isoelectric points.



Second dimension: vertical electrophoresis

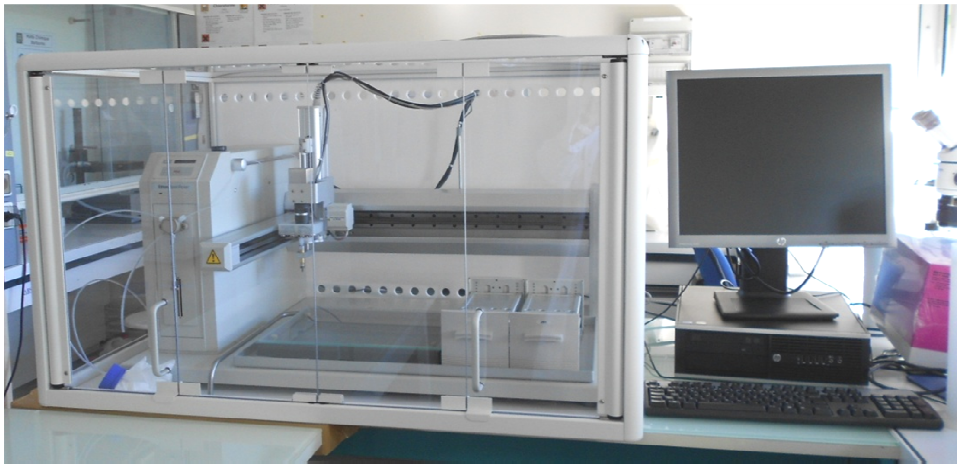
Ettan DALT*six* electrophoresis unit

Gel scanning

The laser scanner Typhoon FLA 9500 will be used to scan the 2DE gels

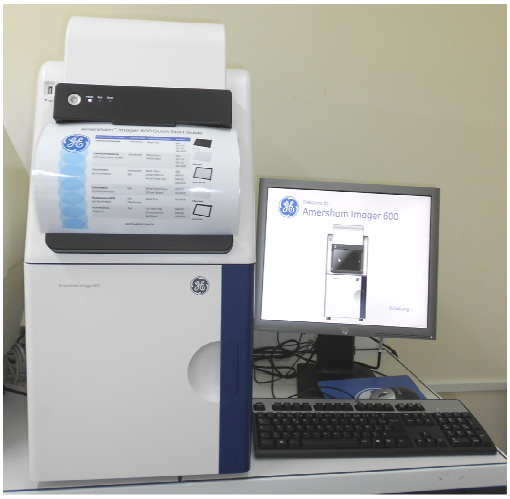
Automatic excision of the protein spots

Ettan Spot Picker



Identifying a specific protein using Western blot

Amersham Imager 600 is a sensitive and robust chemiluminescence imager for high-resolution digital imaging of protein in gels and membranes (Western blotting). Images can be afterward analysed with the ImageQuant TL software to perform protein quantitation, ensuring accurate and consistent results.



Automated platform for nucleic acid extraction (funded on European project, FEDER, Gestion des risques en santé animale et végétale)

This equipment allows to process 96 samples simultaneously in less than one hour and a half with high accuracy and with sensitivity similar to manual RNA/DNA extraction.

Biosafety laboratory with level 3 of containment (BSL3):

The BSL3 (50 m^2) is composed of 3 modules including laboratory, insectarium and animal facilities. It can be used for manipulating diagnostic samples that can containinfluenza virus, West Nile virus or other zoonotic agents. It is also adapted for virus isolation and studies on host-vector-pathogen interactions, including vector competence studies in the Insectarium I3 and Animal facility A3.

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