Vectopole Sud

A network of research infrastructures on emerging disease vectors and crop pests

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PROJET COFINANCÉ PAR LE FONDS EUROPÉEN DE DÉVELOPPEMENT RÉGIONAL

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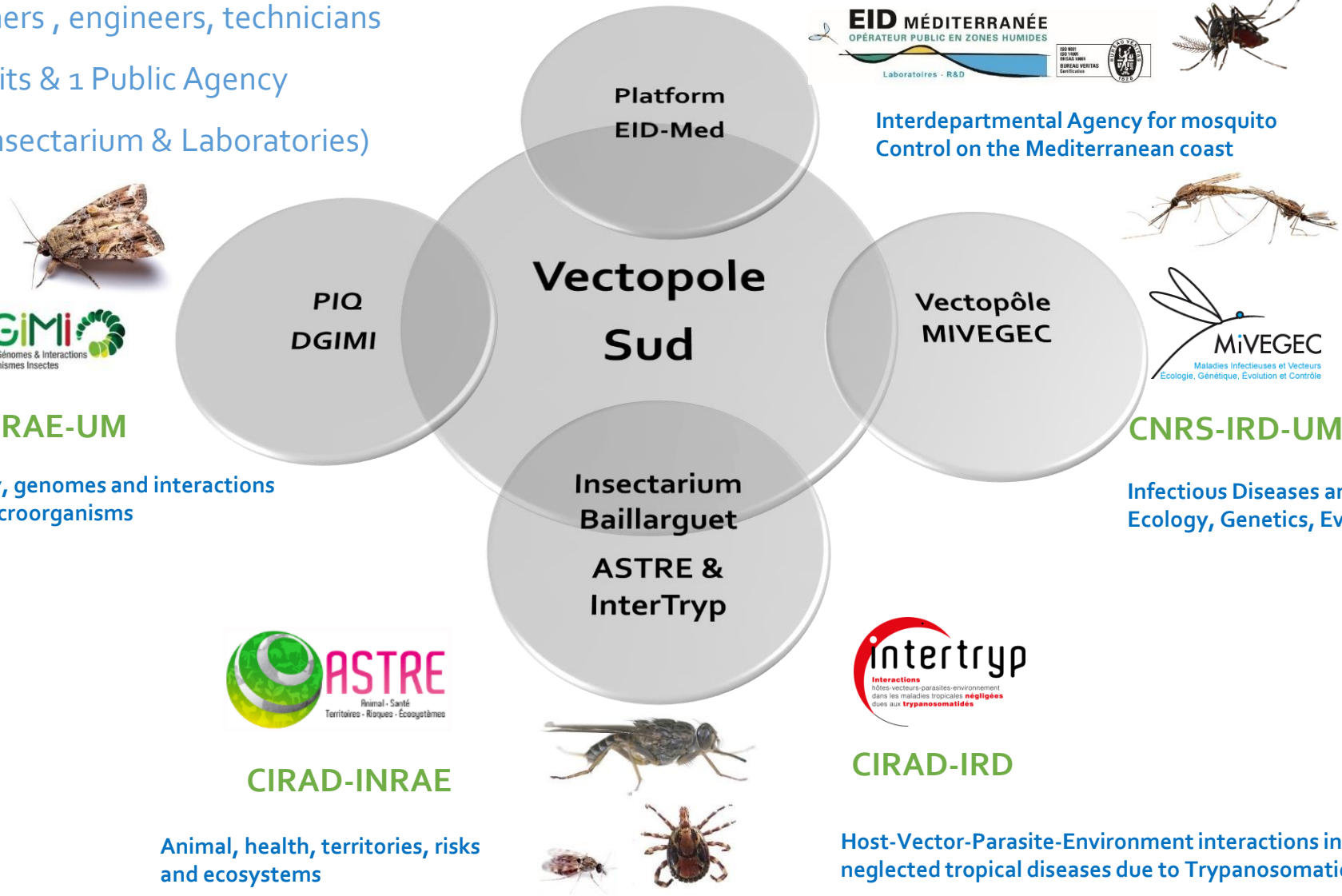
Vectopole Sud is a network of platforms for research on arthropods of medical, veterinary and agricultural importance in Occitanie region (Montpellier, Toulouse)

- + 400 researchers , engineers, technicians
- 4 Research Units & 1 Public Agency
- 4 Platforms (Insectarium & Laboratories)



DGIMI
Diversité, Génomes & Interactions Microorganismes Insectes

INRAE-UM

Diversity, genomes and interactions insect microorganisms

EID MÉDITERRANÉE
OPÉRATEUR PUBLIC EN ZONES HUMIDES
Laboratoires - R&D

Interdepartmental Agency for mosquito Control on the Mediterranean coast

MIVEGEC
Maladies Infectieuses et Vecteurs
Ecologie, Génétique, Évolution et Contrôle

CNRS-IRD-UM

Infectious Diseases and Vectors: Ecology, Genetics, Evolution and Control

ASTRE
Animal - Santé
Territoires - Risques - Écosystèmes

CIRAD-INRAE

Animal, health, territories, risks and ecosystems

intertryp
Interactions hôtes-vecteurs-parasites-environnement dans les maladies tropicales négligées dues aux trypanosomatidés

CIRAD-IRD

Host-Vector-Parasite-Environment interactions in neglected tropical diseases due to Trypanosomatidae

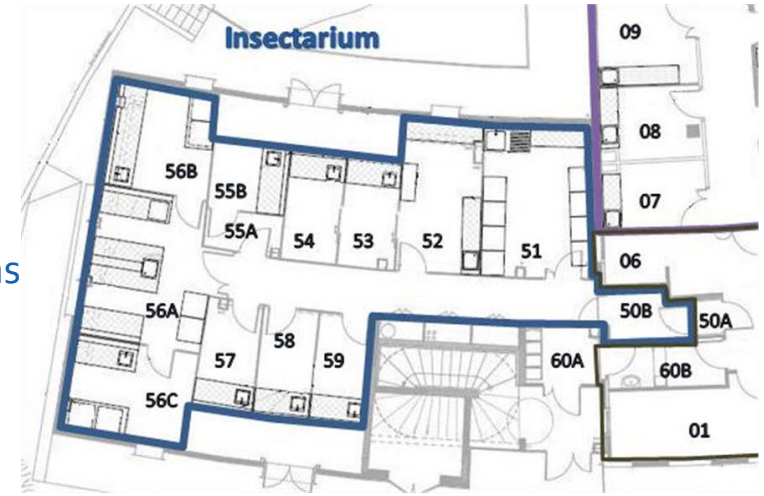
Baillarguet platform on the Cirad Campus

Scientific and Technical Managers
K. Huber, ASTRE - S. Ravel, INTERTRYP

Location: Baillarguet

Research on different models of insect and animal diseases, including zoonoses (BioSafety Level 2)

- Glossina (tsetse flies)
- *Ixodidae* (hard ticks) and *Argasidae* (soft ticks)
- Mosquitoes (*Aedes)*
- Culicoides



- Development of molecular tools for integrative taxonomy and diagnosis of pathogens
- Study of life history traits to understand better the bio-ecology of arthropods
- Study of vector competence by experimental infections
- Connection to other ASTRE P2 and P3 laboratories and animal facilities
- Development of innovative vector control methods





Vectopôle platform on the IRD campus

MiVEGEC
Maladies Infectieuses et Vecteurs
Écologie, Génétique, Évolution et Contrôle

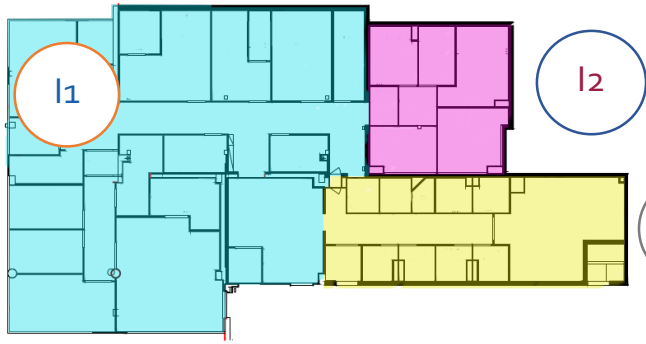
Scientific Manager : F. Chandre
Technical Manager : B. Scheid

Location: Lavalette

Dedicated to the study of insect vectors and pathogens of medical importance (BioSafety Level 1 to BSL3)

- Mosquitoes (*Anopheles*, *Aedes*, *Culex*)
- Sand flies (*Phlebotomus)*

- Bio-ecology of arthropods
- Chemical and sensory ecology, behaviour of vectors (attraction/repellency)
- Vector competence (experimental infections, interactions vector/ pathogen/ vertebrate host models within BSL3)
- Evaluation of public health pesticides (phase I)
- Insecticide resistance mechanisms and impact
- Development of innovative vector control methods



EID-Méditerranée platform and R&D laboratories

EID MÉDITERRANÉE
OPÉRATEUR PUBLIC EN ZONES HUMIDES
Certifié QSE
Laboratoires - R&D

Entomology cell Manager : M-L. Setier-Rio
R&D Dir. : C. Lagneau

Dedicated to operational mosquito control and to invasive mosquitoes (BioSafety Level 1 & BSL2)
Aedes aegypti, *Ae. albopictus*, *Culex* spp., *Ochlerotatus*. spp.

- Study of the biology and ecology of the local Culicidae
- Evaluation of the biological efficacy of biocides in the laboratory and in the field
- Evaluation of alternative and innovative control methods (traps,...)
- Assessment of unintended effects on non-target arthropods
- Invasive species surveillance

Quarantine Pest Insect (PIQ) Platform on the Montpellier University Campus

DGIMI
Diversité, Génomes & Interactions Microorganismes Insectes

A confined zone, approved for experimentation on crop pests : *Lepidoptera*

Scientific Manager : A-N. Volkoff
Technical Manager: M. Eychenne

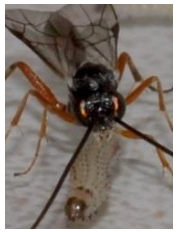
Location:Triolet

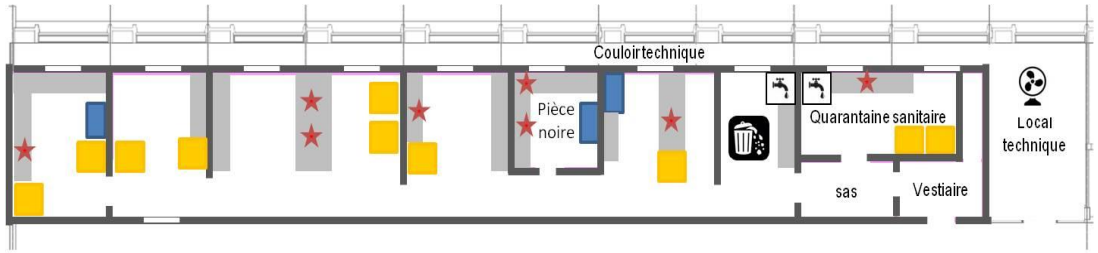
Spodoptera frugiperda

Spodoptera littoralis

Helicoverpa armigera

- Mechanisms of interaction between a pest and its pathogens or parasites
- Diversity and role of microbiota associated with arthropods
- Factors determining the adaptation of the insect to its biotic environment (host plants or insects)
- Development of new bio-control tools



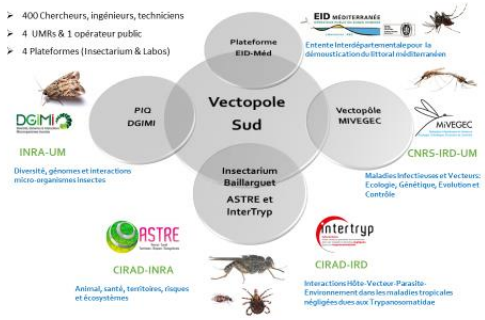


Vectopole Sud : 4 platforms for research on arthropods of medical, veterinary and agricultural importance in Occitanie region (Montpellier, Toulouse)
+ 3 Associated laboratories

anses
agence nationale de sécurité sanitaire alimentation, environnement, travail

Unit of entomology and invasive plant species of the Plant Health Laboratory

- Activities of reference, research and technological watch on entomology and invasive plant species
- National Reference Lab. for French Ministry of Agriculture
- EU Reference Lab. for mites



CBGP
Centre de Biologie pour la Gestion des Populations

CBGP (Biology Center for populations management) carries out research in the fields of systematics, genetics and ecology relevant to the management of populations and communities of organisms for the purposes of agriculture, public health and biodiversity (80 people)

envt
école nationale vétérinaire toulouse

Parasitology Lab. from ENVT (National Veterinary School, Toulouse)

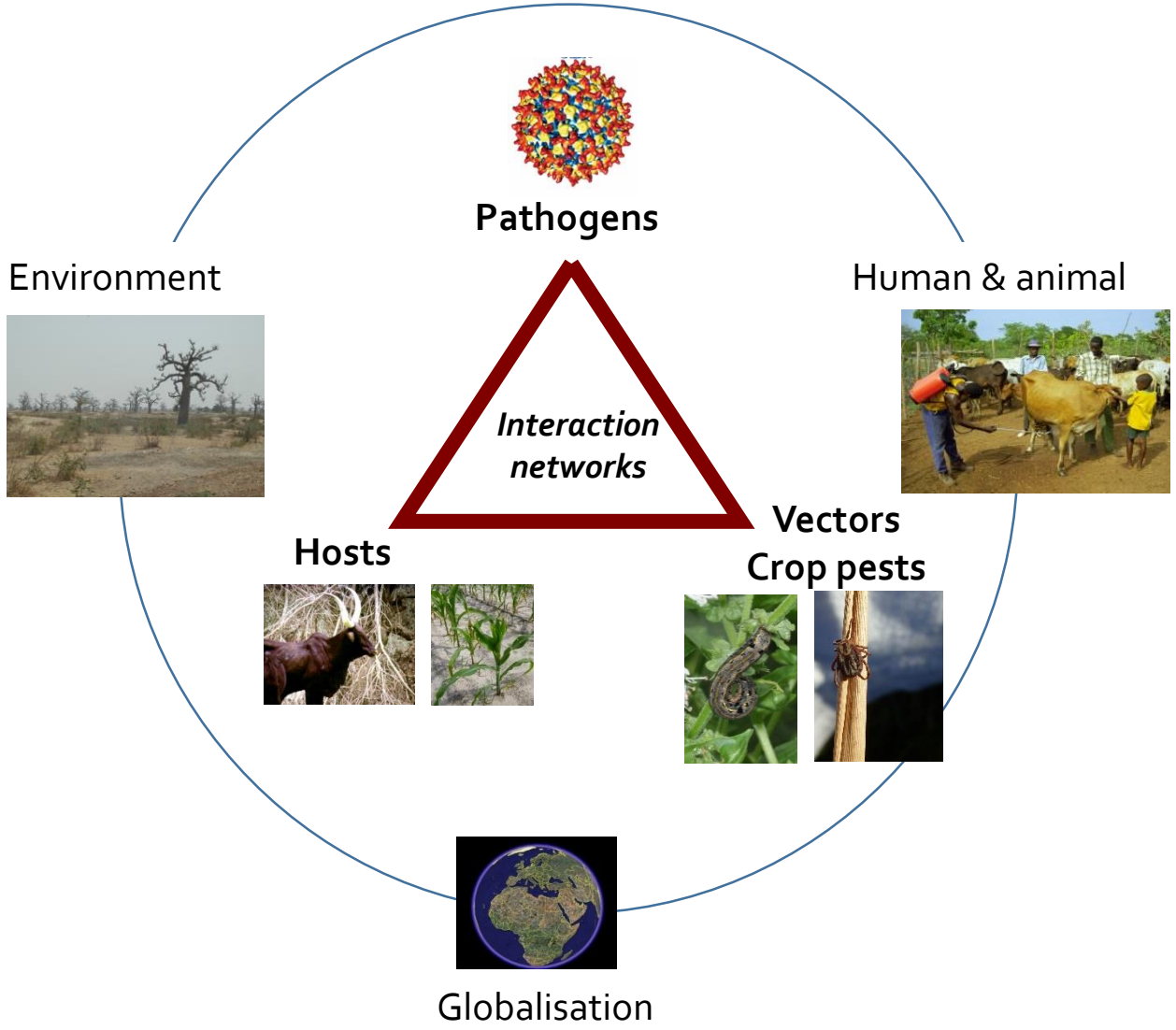
- Insectarium with different models : sandflies, cat fleas (*C. felis*) stable flies (*S. calcitrans*), *Aedes* sp.
- Evaluation of insecticide susceptibilty and characterisation of resistance mechanisms of *C. felis* and *S. calcitrans*
- Evaluation of formulated products for veterinary use

Molecular biology, bioinformatics, experimental greenhouse, collections

Vectopole Sud objectives

- Synergize skills on vectors, pests and associated diseases
  - Pooling expertise and resources
  - Implementing common proposals to calls for projects
- Strengthen Montpellier and Toulouse as poles of excellence and attractiveness in these domains
  - Research (scientific production and dissemination)
  - Training (masters, PhD, teaching modules …)
  - Expertise (scientific and technical support to human, animal and plant health managers)
  - Valorization (research products and impact for the society)
- Develop public and private partnerships (national and international)
  - Access to facilities adapted for experimentation on vectors/pests (confinment BSL1 to BSL3, specific equipments)
  - Supply of arthropods & derived products

A 'One Health' Approach…



- **Integrated approach** to human, animal and plant health based on the study of interactions between pathogens - hosts - vectors/crop pests
- Biological mechanisms of disease emergence, transmission and diffusion
- Analysis scales ranging from the molecular level to the population & ecosystem level
- Combining
  - laboratory experiments and confined spaces
  - experiments and surveys in the natural environment.

Tools, Methods and Strategies for Control

MUSE
MONTPELLIER UNIVERSITÉ D'EXCELLENCE

Feed, Protect and Care

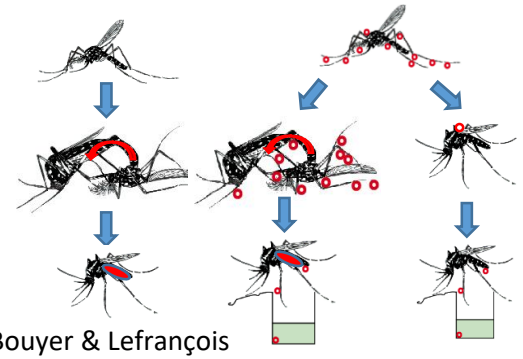
An example of collaborative project : REVOLINC (J. Bouyer)

REVOLINC

cirad

erc European Research Council

Concept : Boosted SIT



Bouyer & Lefrançois
Trends Parasitol 2014

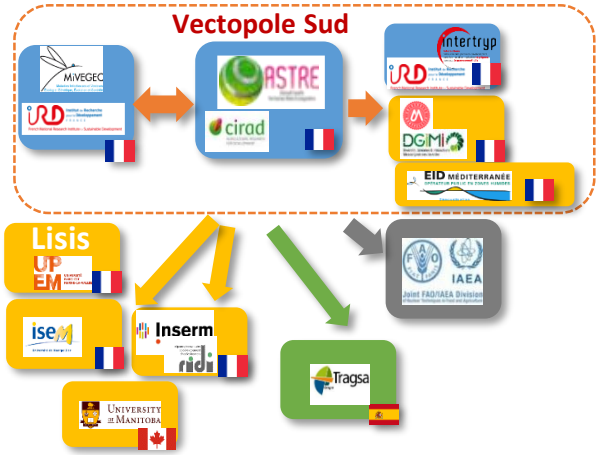
3 Insect models

Aedes albopictus

Ceratitis capitata

Glossina p. gambiensis

Research Partners



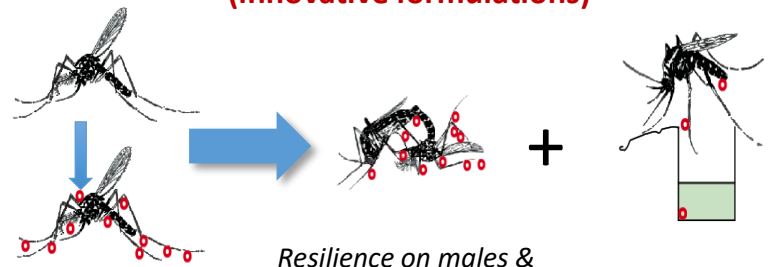
Laboratory evaluations

Pp, Densovirus as biocides candidates (innovative formulations)

R & D Pipeline →

Semi field & field trials

with the best biocide vs. *Ae. albopictus* & *C. capitata*



Contamination technique of males

Resilience on males & transfer to females during mating

Impact on female fertility (+ transfer to breeding sites)

Related Research activities (4 PhDs)

Quality-control, handling, marking & release of SIT mosquitoes
Innovating Genetic Sexing methods for SIT
Modeling on population dynamics & impact of boosted SIT
Public Perception & Acceptability for SIT

No Cost Products, Services and Access

Supplies of Arthropods, dead individuals or live reference colonies

CIRAD : tsetse flies (Glossina sp.), soft ticks, hard ticks,

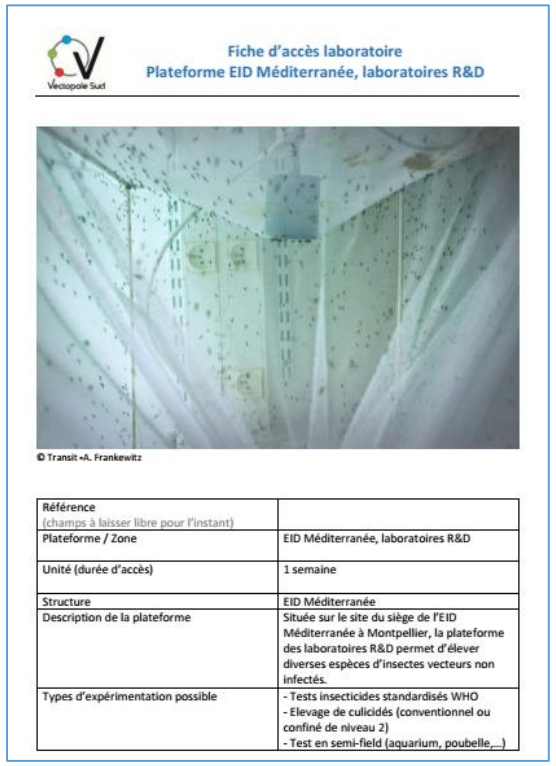
IRD : eggs and adults of mosquitoes: *Aedes albopictus*, *Aedes aegypti*, *Culex quinquefasciatus*, *Anopheles gambiae*

Visit of external scientists & partners on platforms

Countries of users : Europe, Africa, South America, Asia, Oceania

Products and Services will be soon available on the Website www.vectopole-sud.fr

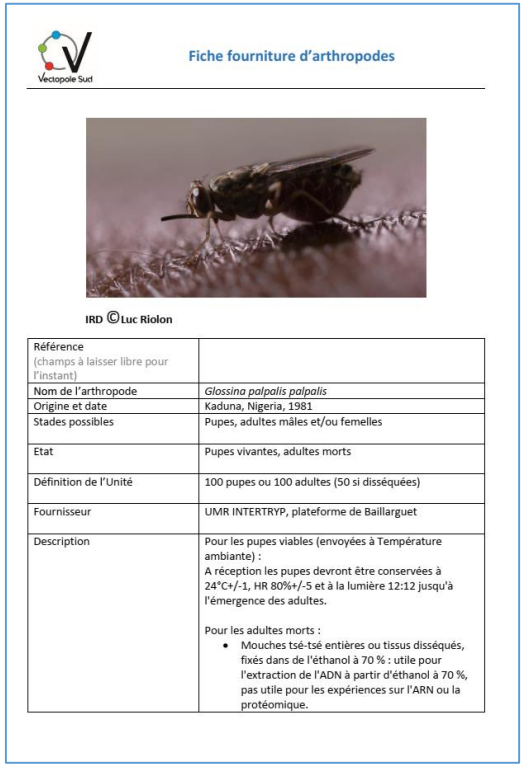
- 16 product sheets for the supply of arthropods (dead individuals, live colonies)
  - ➢ Mosquitoes, Tstetse flies, Ticks, Lepidoptera, Hymenopteran parasitoids, Entomopathogen nematods
- 4 training sessions: insect rearing, susceptibility tests, experimental infection
- 5 kinds of access to the platform



Fiche d'accès laboratoire
Plateforme EID Méditerranée, laboratoires R&D

© Transit •A. Frankewitz

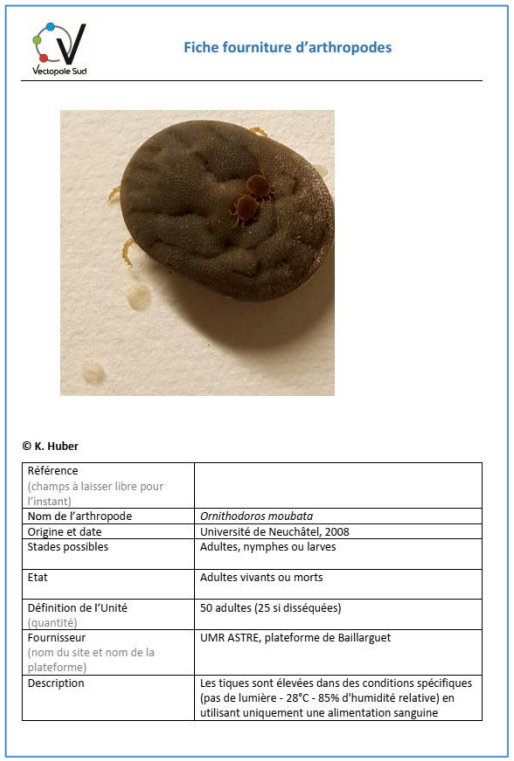
Référence (champs à laisser libre pour l'instant)	
Plateforme / Zone	EID Méditerranée, laboratoires R&D
Unité (durée d'accès)	1 semaine
Structure	EID Méditerranée
Description de la plateforme	Située sur le site du siège de l'EID Méditerranée à Montpellier, la plateforme des laboratoires R&D permet d'élever diverses espèces d'insectes vecteurs non infectés.
Types d'expérimentation possible	- Tests insecticides standardisés WHO - Elevage de culicidés (conventionnel ou confiné de niveau 2) - Test en semi-field (aquarium, poubelle,...)



Fiche fourniture d'arthropodes

IRD © Luc Riolon

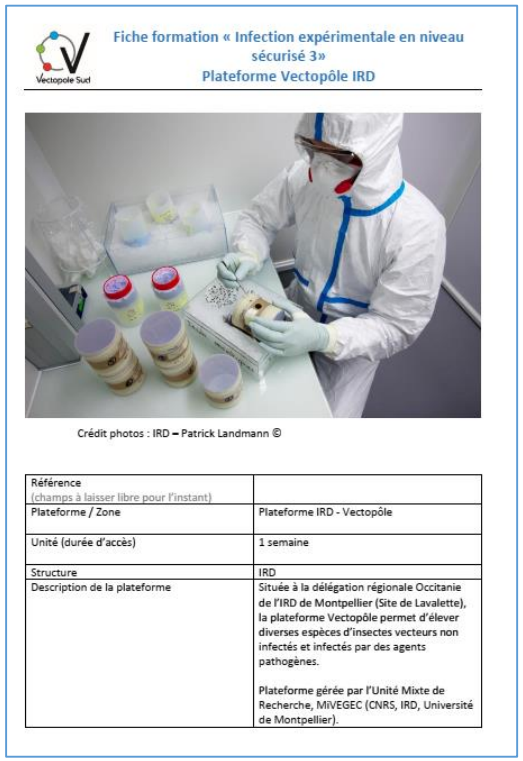
Référence (champs à laisser libre pour l'instant)	
Nom de l'arthropode	*Glossina palpalis palpalis*
Origine et date	Kaduna, Nigeria, 1981
Stades possibles	Pupes, adultes mâles et/ou femelles
Etat	Pupes vivantes, adultes morts
Définition de l'Unité	100 pupes ou 100 adultes (50 si disséquées)
Fournisseur	UMR INTERTRYP, plateforme de Baillarguet
Description	Pour les pupes viables (envoyées à Température ambiante) : A réception les pupes devront être conservées à 24°C+/-1, HR 80%+/-5 et à la lumière 12:12 jusqu'à l'émergence des adultes. Pour les adultes morts : • Mouches tsé-tsé entières ou tissus disséqués, fixés dans de l'éthanol à 70 % : utile pour l'extraction de l'ADN à partir d'éthanol à 70 %, pas utile pour les expériences sur l'ARN ou la protéomique.



Fiche fourniture d'arthropodes

© K. Huber

Référence (champs à laisser libre pour l'instant)	
Nom de l'arthropode	*Ornithodoros moubata*
Origine et date	Université de Neuchâtel, 2008
Stades possibles	Adultes, nymphes ou larves
Etat	Adultes vivants ou morts
Définition de l'Unité (quantité)	50 adultes (25 si disséquées)
Fournisseur (nom du site et nom de la plateforme)	UMR ASTRE, plateforme de Baillarguet
Description	Les tiques sont élevées dans des conditions spécifiques (pas de lumière - 28°C - 85% d'humidité relative) en utilisant uniquement une alimentation sanguine



Fiche formation « Infection expérimentale en niveau sécurisé 3»
Plateforme Vectopôle IRD

Crédit photos : IRD – Patrick Landmann ©

Référence (champs à laisser libre pour l'instant)	
Plateforme / Zone	Plateforme IRD - Vectopôle
Unité (durée d'accès)	1 semaine
Structure	IRD
Description de la plateforme	Située à la délégation régionale Occitanie de l'IRD de Montpellier (Site de Lavalette), la plateforme Vectopôle permet d'élever diverses espèces d'insectes vecteurs non infectés et infectés par des agents pathogènes. Plateforme gérée par l'Unité Mixte de Recherche, MiVEGEC (CNRS, IRD, Université de Montpellier).

Communication

- Organization of scientific seminars/conferences
  - Annual meetings of Vectopole Sud with thematic presentations (Microbiota, Invasive species …)
  - Scientific days with the French Agency for Food, Environmental and Occupational Health & Safety (Anses) in 2019 & 2022

- Co-organization or participation to national & international conferences
  - CIFE9 (Conférences Internationales Francophones d'Entomologie), 2018
  - Ticks and Tick borne diseases 2022, 2023
  - International Workshop on *Aedes albopictus*, 2022, Montpellier
  - E-Sove 2024, Montpellier
  - ….

- Communication with the general public
  - Exhibition and stands for annual « Fête de la Science »

Thanks for your attention!

Official launch of the Vectopole Sud network,
03 May 2018 Agropolis Montpellier

www.vectopole-sud.fr