



invenesis
A BIOSCIENCE COMPANY

ASSAY CATALOGUE 2025

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***"Every brilliant experiment, like every great work of art,
starts with an act of imagination."***

Jonah Lehrer



Who are we ?

Invenesis is led by a team of dedicated scientists with decades of experience in industrial R&D and a track record of successful drug discovery in a large pharmaceutical company.

Assays & parasite breeding



Stéphane Wohlhauser
Laboratory technician



Gautier Pizzolon
Laboratory technician

Pipetting & compound logistics



Yves Desaulles
Laboratory technician



Laura Chappuis, MSc
Scientist

Invenesis France



Alexandre Vernudachi, PhD
Managing Director

Molecular biol. & electrophysiology



Coralie Belgrano
Laboratory technician



Anouk Sarr
Laboratory technician



Kevin Shoetan
*Laboratory technician
Apprentice*



Lea Schepis
*Laboratory technician
Apprentice*

Management



Elodie V. Rufener
Co-founder, CFO



Lucien Rufener, PhD
Co-founder, CEO



Thomas Duguet, PhD
CSO



Maxime Alessandri, PhD
CTO

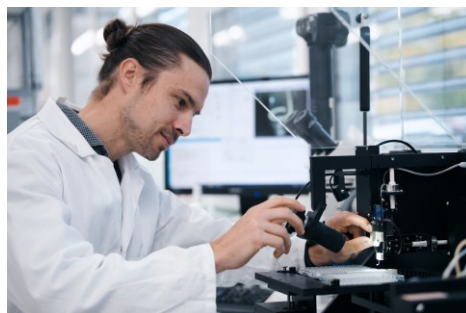
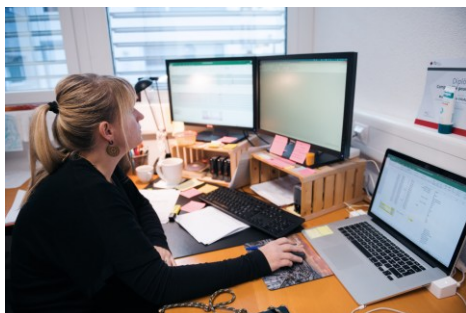
Our missions

Invenesis provides a comprehensive platform for studying the impact of active ingredients on specific targets, organs, and entire organisms. Our catalogue includes a range of **validated assays** that enable testing of small molecules and natural extracts (such as those obtained from HPLC extracts), many of which are **compatible with high-throughput screening (HTS) campaigns**. Our assays cover a diverse array of organisms, including nematodes, insects, acari, sea lice, and zebrafish. We also offer enzymatic and electrophysiological assays on *Xenopus laevis* oocytes, enabling functional testing of reconstituted ion-channels and transporters from both invertebrates and vertebrates. At Invenesis, **we strive to be your one-stop-shop for all your testing needs**.

- **Organism-based assays:** their key advantage rely on the **measurement of phenotypes independently of molecular target assumptions**. We developed a whole pipeline of assays to allow high-throughput with high value assays for hit identification, lead optimization as well as resistance evaluation. Active compounds in organism-based assays have not only to act on their targets but also have to cross biological barriers, resist metabolization and reach one or more targets causing an effect at the **whole - organism level**.



- **Electrophysiology assays:** represent our second main domain of activity. The *Xenopus* oocyte expression system allows to express **functional ion-channels** in the membrane of individual cells and measure their **physiological function**. We measure the effect of compounds on **ligand-gated ion-channels, voltage-gated ion-channels, GPCRs** and **transporters**. Oocytes are injected with cDNA or cRNA encoding the receptor of interest using an automated injection platform (Roboinject). The effect of compounds on the heterologously expressed channels are recorded using an **automated two electrodes voltage-clamp automate** (HiClamp, Multichannelsystem). This system does not require months of cell culture: **we can inject on a weekly basis** and start measurements after 2-3 days of expression. We process automated protocols to detect **agonism, antagonism, positive** and **negative modulators** as well as **silent agonists**. Compounds can be pre-applied or co-applied with the natural agonist or applied alone. As the oocyte is moved across wells, this method is **non-destructive**, and measurements of other cells can be performed in a unique sample. We can also measure the electrophysiological response of sensory organs in mosquitoes and ticks.
- **Our confidentiality policy:** we are committed to maintaining total confidentiality for our customers. To this end, we anonymize both our customers' company names and the compounds they submit to us. Additionally, we keep the entire billing process in-house and manage it directly through our CFO, Elodie Valazza Rufener, ensuring a fast and reliable accounting process. You can trust that we take your confidentiality seriously and will go to great lengths to protect your proprietary information throughout every step of the testing process.



Invenesis (Switzerland)

Established in St-Blaise on the Neuchâtel lake shore, Invenesis in Switzerland beneficiates from brand new state of the art laboratories with a total surface of 370m² (including 100m² of BSL2 labs) and 165m² of office space. Invenesis in Switzerland is in charge of performing all ectoparasite and electrophysiology-based assays. The company's headquarters are located there.



Invenesis France

Located on the INRAE research center in Nouzilly (France), our sister company Invenesis France takes advantage of both a facilitated access to endoparasitic species of veterinary importance and of years of collaboration with top level scientists in parasitology. Invenesis France is in charge of performing all our endoparasite-based assays and our french customers can benefit from the "Crédit impôt recherche", a fiscal-based cost reduction initiative.



Our labs

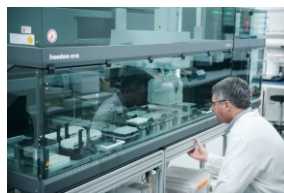
BSL1 lab space:

- Bacteriology
- Molecular biology
- Electrophysiology



Automatized pipetting platform:

- Compound handling
- Compound storage
- Plate dilutions
(up to 384-well plates)



BSL2 lab space:

- Parasite breeding
- Assay recording
- R&D



Main technical equipments

Automatized liquid handling



Chemical storage cabinets

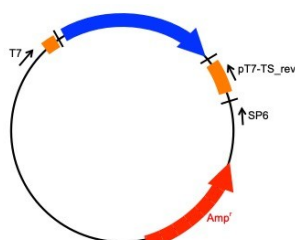


TECAN® 8 tips
(serial dilutions)

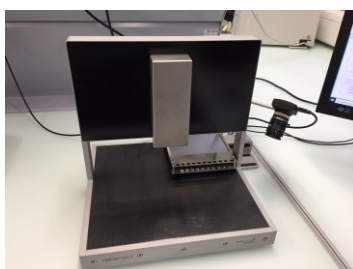


TECAN® 96 / 384 tips
(test plate prep)

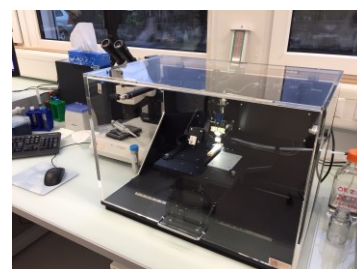
Electrophysiology platform



Molecular biology
(DNA / RNA / protein equipment)



Roboinject
(*X. laevis* oocyte cRNA injection)



HiClamp
(*X. laevis* oocyte TEVC)

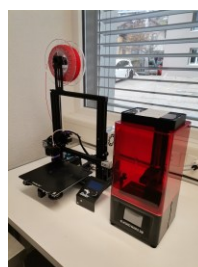
Other technical platforms



PCR / qPCR
(Roche Lightcycler® 480 II)



Microscopy
(Leica DMI6000B)



3D-printing
(R&D)

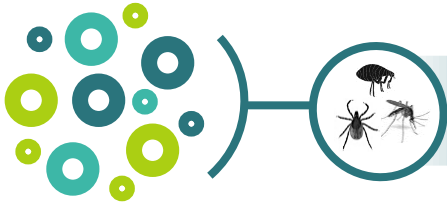
- Incubators
- Centrifuges
- Safety cabinets
- Fume hoods
- -80°C freezers

BSL1 / BSL2
(standard equipment)



Ectoparasites / vectors

• Oral	• INV-T-009: Flea oral • INV-T-012: Blowfly adult oral • INV-T-020: Tick adult oral • INV-T-049: Tick adult feeding NEW • INV-T-015: Fly adult oral
• Tarsal	• INV-T-010: Flea tarsal • INV-T-017: Tick egg-to-larvae tarsal • INV-T-042: Tick larvae tarsal • INV-T-018: Tick nymph tarsal • INV-T-019: Tick adult tarsal • INV-T-002: Fly adult tarsal • INV-T-033: Mosquito adult contact • INV-T-039: Whitefly adult contact
• Repellency	• INV-T-022: Tick larvae repellent • INV-T-021: Tick nymph vertical repellent • INV-T-029: Tick adult vertical repellent • INV-T-048: Tick adult repellent (tracked) • INV-T-025: Mosquito adult repellent (1 warm body) • INV-T-030: Mosquito adult repellent (2 warm bodies) • INV-T-043: Flea adult repellent • INV-T-040: Whitefly adult repellent
• Development	• INV-T-011: Blowfly development • INV-T-027: Flea development
• Immersion	• INV-T-016: Sea lice copepodites immersion • INV-T-028: Tick adult immersion
• Sterilization	• INV-T-032: Dust acarian mixed population • INV-T-035: Flea oral development
• Injection	• INV-T-047: Tick adult injection



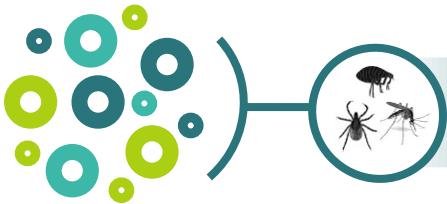
Endoparasites

• Development

- **INV-T-005:** Gastrointestinal nematodes larval development (egg to L₃)

• Immersion

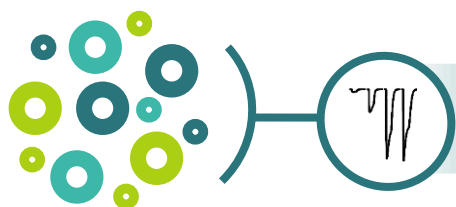
- **INV-T-004:** *Fasciola hepatica* adult immersion
- **INV-T-006:** Gastrointestinal nematodes L₃ immersion
- **INV-T-031:** Migration trap assay (MTA)
- **INV-T-041:** Nematode adult immersion
- **INV-T-044:** Filarial nematodes L1 immersion
- **INV-T-045:** Filarial nematodes L3 immersion **NEW**



Model organisms

• Development

- **INV-T-001:** *Caenorhabditis elegans* development (egg to L₄)
- **INV-T-003:** Zebrafish development (egg to 72h embryo)



Electrophysiology

Xenopus oocytes

- **INV-T-502:** *Xenopus* oocytes, agonist protocol
- **INV-T-503:** *Xenopus* oocytes, antagonist protocol
- **INV-T-504:** *Xenopus* oocytes, PAM or NAM protocol
- **INV-T-505:** *Xenopus* oocytes, 123 protocol
- **INV-T-506:** *Xenopus* oocytes, IVC protocol
- **INV-T-507:** *Xenopus* oocytes, custom protocol



Enzymatic assays

Enzymes

- **INV-T-023:** Microtubulin polymerization
- **INV-T-034:** Acetylcholine esterase inhibition

Assay throughput (1/2)

Assay	Test ID	Rep/DTP	Compound (mg)	Max datapoint / year	Assay throughput	Price discount (HTS)
Flea oral *	INV-T-009	3	< 2	32'000	+++	++++
Blowfly adult oral	INV-T-012	3	< 2	Project-based	+	++
Fly adult oral	INV-T-015	3	< 15	160	+	+
Tick adult oral	INV-T-020	2	< 15	160	+	+
Tick adult feeding	INV-T-049	3	< 5	160	+	+
Flea tarsal *	INV-T-010	3	< 2	32'000	+++	++++
Fly adult tarsal	INV-T-002	3	< 2	160	+	++
Tick egg-to-larvae tarsal	INV-T-017	3	< 2	> 100'000	++++	++++
Tick larvae tarsal	INV-T-042	3	< 2	32'000	+++	+++
Tick nymph tarsal	INV-T-018	3	< 2	32'000	+++	++
Tick adult tarsal	INV-T-019	3	< 2	32'000	+++	+
Mosquito adult contact	INV-T-033	3	< 15	Project-based	+	+
Whitefly adult contact	INV-T-039	3	< 15	Project-based	+	+
Whitefly adult repellent	INV-T-040	3	< 15	Project-based	+	+
Tick larvae repellent	INV-T-022	3	< 2	Project-based	++	++
Tick nymph vertical repellent	INV-T-021	3	< 15	Project-based	+	+
Tick adult vertical repellent	INV-T-029	3	< 15	Project-based	+	+
Tick adult repellent (tracked)	INV-T-048	3	< 15	Project-based	+	+
Mosquito adult repellent 1 *	INV-T-025	3	< 2	Project-based	+	+
Mosquito adult repellent 2	INV-T-030	3	< 2	Project-based	+	+
Flea adult repellent	INV-T-043	3	< 15	Project-based	++	+++
Blowfly development *	INV-T-011	3	< 2	32'000	+++	++++
Flea development	INV-T-027	3	< 2	1'000	+	++++
Sea lice copepodite immersion	INV-T-016	3	< 2	10'000	+++	+
Tick adult immersion	INV-T-028	3	< 2	10'000	+++	+
Dust acarian mixed population	INV-T-032	3	< 2	Project-based	+	++
Flea oral development	INV-T-035	3	< 15	10'000	+	+
Tick adult injection	INV-T-047	3	< 15	Project-based	+	+

* Assays performed on a weekly basis



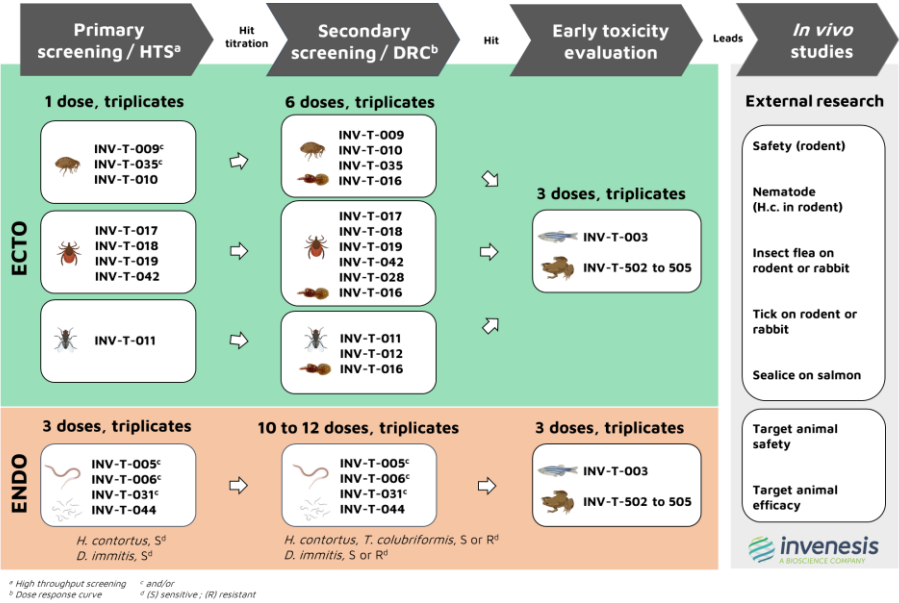
Assay throughput (2/2)

Assay	Test ID	Rep/DTP	Compound (mg)	Max datapoint / year	Assay throughput	Price discount (HTS)
Gastrointestinal nematodes larval development	INV-T-005	3	< 2	100'000	++++	++
<i>F. hepatica</i> adult immersion	INV-T-004	3	< 15	500	+	++
Gastrointestinal nematodes L ₃ immersion	INV-T-006	3	< 2	On request	++++	++
Nematode adult immersion	INV-T-041	3	< 10	On request	+	+
Filarial nematodes L1 immersion	INV-T-044	3	< 2	On request	++++	+++
Filarial nematodes L3 immersion	INV-T-045	3	< 2	On request	++	+
Migration trap assay	INV-T-031	3	< 2	100'000	++	++
<i>C. elegans</i> development *	INV-T-001	3	< 2	> 100'000	++++	+++
Zebrafish development	INV-T-003	3	< 2	10'000	++	++
<i>Xenopus</i> oocytes, agonist *	INV-T-502	3	< 1	5'000	++	++
<i>Xenopus</i> oocytes, antagonist *	INV-T-503	3	< 1	5'000	++	++
<i>Xenopus</i> oocytes, PAM/NAM *	INV-T-504	3	< 1	5'000	++	++
<i>Xenopus</i> oocytes, 123 *	INV-T-505	3	< 1	5'000	++	++
<i>Xenopus</i> oocytes, IVC *	INV-T-506	3	< 1	5'000	++	++
<i>Xenopus</i> oocytes, custom *	INV-T-507	3	< 1	5'000	++	++
Microtubulin polymerization	INV-T-023	2	< 1	> 50'000	+++	+
Acetylcholine esterase inhibition	INV-T-034	2	< 1	> 50'000	+++	+

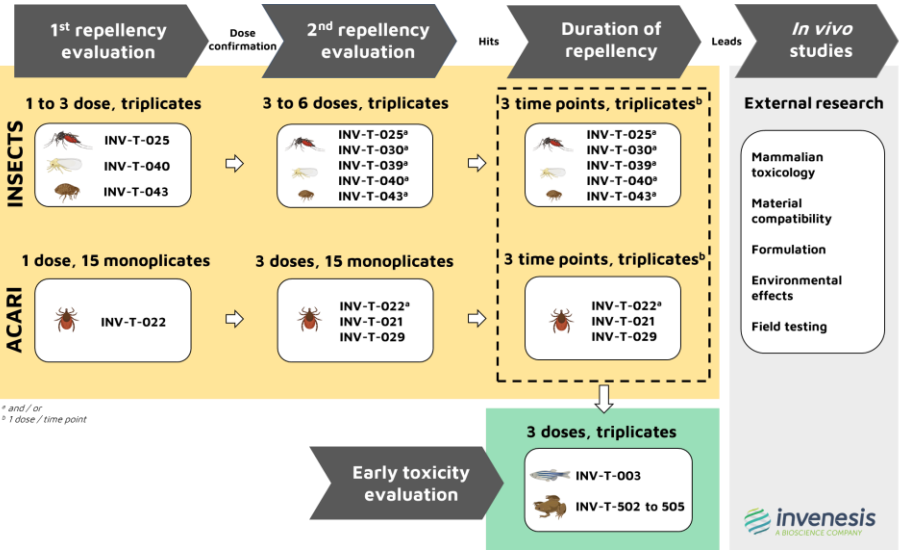
* Assays performed on a weekly basis



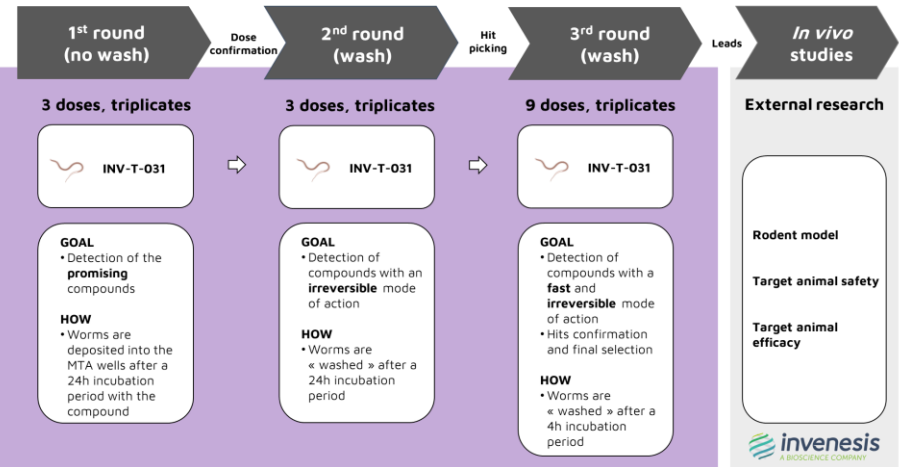
Animal Health screening cascade proposal



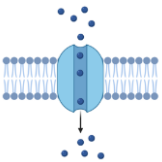
Repellency assays - cascade proposal



Motility Trap Assay - flowchart

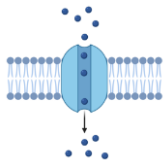


List of available or under cloning* receptors



Category	Species	Ligand
Arthropods	<i>Tetranychus urticae</i>	Acetylcholine*
		GABA*
		Glutamate*
		Glycine*
	<i>Varroa destructor</i>	Acetylcholine*
		Glutamate*
	<i>Ctenocephalides felis</i>	Acetylcholine*
		GABA
		Glutamate
	<i>Lepeophtheirus salmonis</i>	Acetylcholine
		GABA
		Glutamate
	<i>Rhipicephalus microplus</i>	Acetylcholine*
		GABA
		Glutamate
	<i>Aedes aegypti</i>	Acetylcholine
		Octopamine
		Tyramine
		Histamine
		Voltage-gated channel
	<i>Drosophila melanogaster</i>	GABA
		Phenylacetaldehyde
		Propionic acid
	<i>Apis mellifera</i>	Acetylcholine*

List of available or under cloning* receptors



Category	Species	Ligand
Nematodes	<i>Ancylostoma caninum</i>	GABA
		Acetylcholine*
		Amine*
		Ca ²⁺ and Voltage-gated
	<i>Dirofilaria immitis</i>	GABA
		Glutamate
		Glycine*
		Serotonin
	<i>Haemonchus contortus</i>	Acetylcholine
		Betaine
		GABA
Vertebrates	<i>Caenorhabditis elegans</i>	Betaine
		Ca ²⁺ and Voltage-gated
		Acetylcholine*
		Ca ²⁺ and Voltage-gated
		GABA
		Glycine*
	<i>Canis lupus lupus</i>	Na ⁺ and Voltage-gated*
		Serotonin*
		Acetylcholine
		Acetylcholine
		Acetylcholine
		Acetylcholine

Contacts

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Invenesis Japan Desk

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Japan



www.Invenesis.com

References

The following references summarize the contribution of Invenesis in academic and / or industrial research:

- Nicotinic acetylcholine receptors: *Ex-vivo* expression of functional, non-hybrid, heteropentameric receptors from a marine arthropod, *Lepeophtheirus salmonis*. Rufener L, Kaur K, Sarr A, Aaen SM, Horsberg TE. PLoS Pathog. 2020 Jul 27;16(7):e1008715.
- An electrophysiological characterization of naturally occurring tobacco alkaloids and their action on human $\alpha 4\beta 2$ and $\alpha 7$ nicotinic acetylcholine receptors. Alijevic O, McHugh D, Rufener L, Mazurov A, Hoeng J, Peitsch M. Phytochemistry. 2020 Feb;170:112187.
- Antiparasitic properties of leaf extracts derived from selected *Nicotiana* species and *Nicotiana tabacum* varieties. Schorderet Weber S, Kaminski KP, Perret JL, Leroy P, Mazurov A, Peitsch MC, Ivanov NV, Hoeng J. Food Chem. Toxicol. 2019 Oct;132:110660.
- High level efficacy of lufenuron against sea lice (*Lepeophtheirus salmonis*) linked to rapid impact on moulting processes. Poley JD, Braden LM, Messmer AM, Igboeli OO, Whyte SK, Macdonald A, Rodriguez J, Gameiro M, Rufener L, Bouvier J, Wadowska DW, Koop BF, Hosking BC, Fast MD. Int. J. Parasitol. Drugs Drug Resist. 2018 Aug;8(2):174-188.
- Book chapter: Discovery and development of new antifilarial drugs (*In vitro* assays). Rufener L, Vernudachi A, Kaminsky R, Duguet T.
- NemaCol is a small molecule inhibitor of *C. elegans* vesicular acetylcholine transporter with anthelmintic potential. Harrington S, Pyche J, Burns AR, Spalholz T, Ryan KT, Baker RJ, Ching J, Rufener L, Lautens M, Kulke D, Vernudachi A, Zamanian M, Deuther-Conrad W, Brust P, & Roy PJ. Nature Com. 2023 - 14, 1816

Collaborations



Notes

DRUG DISCOVERY



FOR EVERYBODY

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