ViewPoint
Behavior Technology

Created in 1990
More than 30 years of experience Worldwide

Fish & other aquatic species Behaviour monitoring solutions

Scientific Research

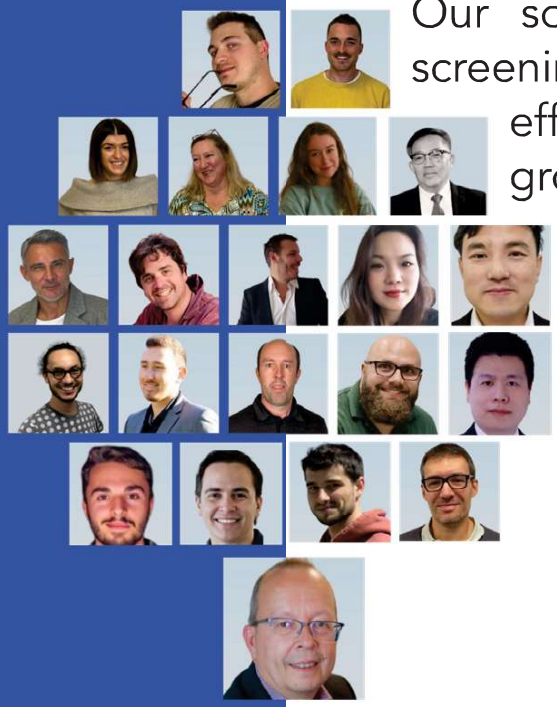
Contents

Introduction

Pioneer in automated behavior analysis

The company was established in 1990, and has developed into a major actor in animal behavioral research solutions.
We offer our expertise in video image processing to stakeholders working on the major challenges of the planet : health, water, food.

In 2001, our innovative status elicited a request for zebrafish larval analysis and the first worldwide videotracking software for zebrafish came to life : ZebraLab.
The first commercial behavior enclosure for zebrafish, the ZebraBox was developed following requests from Harvard University and Boston University.



Our solution gives access to high throughput screening, reliable data, better time and cost efficiency and ground-breaking studies.
ViewPoint is currently recognized as the leader in the industry, and is the go-to resource for top scientists looking for reliable video tracking solutions.

Delivering tools that match your research!

Our mission is to build tools that match your behavioural research. Whether you're working on behavioural auditory system, ecotoxicology, compound screening, visual acuity, learning and memory, social behavior and much more. Our team delivers tailored solutions to fit your needs of fish behavioural research (freshwater and marine species), at different developmental stages.

A customer oriented approach

At ViewPoint we take care of our clients so users can focus on the meaningful with easy to use software interfaces and software training to make your experiment processes run smoother in the long term. ViewPoint material meets biomedical sciences facilities requirements and is ISO 9001-14001 certified to ensure high quality research projects. With its dedicated international teams of tech engineers delivering constant software improvements and technical support you are sure nothing is getting in the way of your work, whatever your location is.

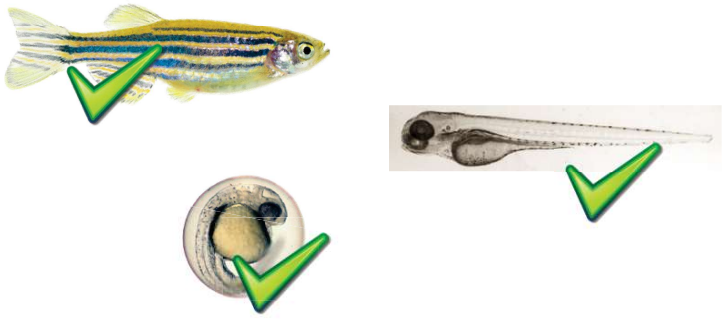
Worldwide success stories

Working with well-known clients for years all around the world, we have been managing numerous behavioural projects and made partnerships with prestigious research centers for development of new behavioral analysis tools. This has led us to bring talent and constant innovation in the service of present and newly eminent researchers in fields such as neuroscience or ecotoxicology for example.

ZebraLab

Automated fish behavior analysis System

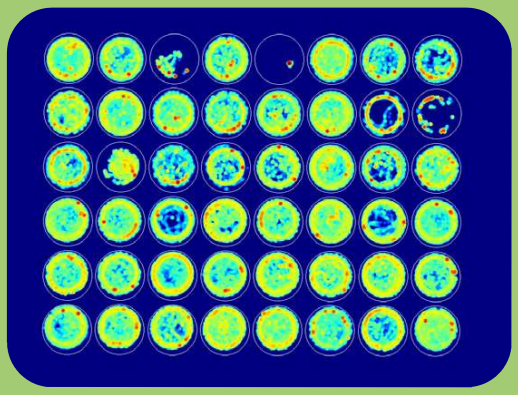
High throughput monitoring of fishes



ZebraLab software can analyze very small subjects such as embryos or bigger such as larvae or adult fish (zebrafish, medaka, danionella etc ...). As well as others species like mosquitoe larvae, drosophila... It is suitable for research in drug development, safety pharmacology such as cytotoxicity, behavioral genetics, learning and memory, circadian rhythmicity and other. It can be used for very high-throughout behavioral applications scoring of locomotion, activity, responses to stimulation or conditions and specific behavior. It works in real time as well as with recorded videos.

Various applications

- Animal behavior analysis
- Safety Pharmacology
- Toxicology and Eco-Toxicology
- Drug Screening and Drug Development
- Behavioral Genetics
- Seizures
- Circadian rhythmicity /sleep
- Light response and Vision tests
- Escape response C-Stat, S-start
- Muscle disorder/ Muscle recovery
- Ethology
- And many other applications …



ZebraLab has been especially designed for fish movement patterns and tests. It is the cutting edge of behavior analysis; it is an easy to use and high throughput system able to automate almost all behavioral tests known for fish. In a few simple steps of set up you are able to analyze several animals simultaneously, live or using the videos you already recorded in the past. Using our system will save your time, increase your productivity and accelerate your manipulation in order for you to focus on your interest with very precise data.

Turnkey package

• **Locomotor behavior** : classification of locomotion states via distance travelled, speed, stimulation sequences and more ...

• **Activity quantization** : classification of activity states (freezing, burst)

Key Features

- Reliable data & perfect tracking in multi-well plates
- Total control of automated experimental conditions
- High throughput analysis of zebrafish
- Cost-effective & easy to use
- Expandability & customization
- Replay and reuse your data
- Stimuli synchronization along the experiment and datas

Available analysis extension

- Rotation and histograms
- Social contact
- Juvenile sizing
- Cardio vascular screening
- High speed behavior (escape response)
- Multitracking and shoaling behaviors

and many more

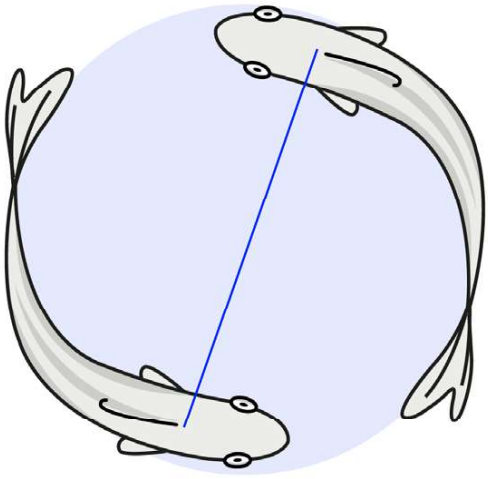
ZebraLab Extension

ZebraLab allows multiple analysis to be performed at the same time. Simply select from a list of options the different parameters you would like to score. Our protocol creation wizard will assist you throughout the setup of your protocol. It will automatically place the areas of interest and apply the different defined conditions to all the locations to be scored in a few clicks.
Only 3 steps to define your protocol !
Be ready to generate your first datasets in a few minutes.

Social contact

Zebrafish are social animals and have complex group behaviors, which can tell about numerous disorders and specificities of studied models. Therefore, we have developed specific applications for social interactions:

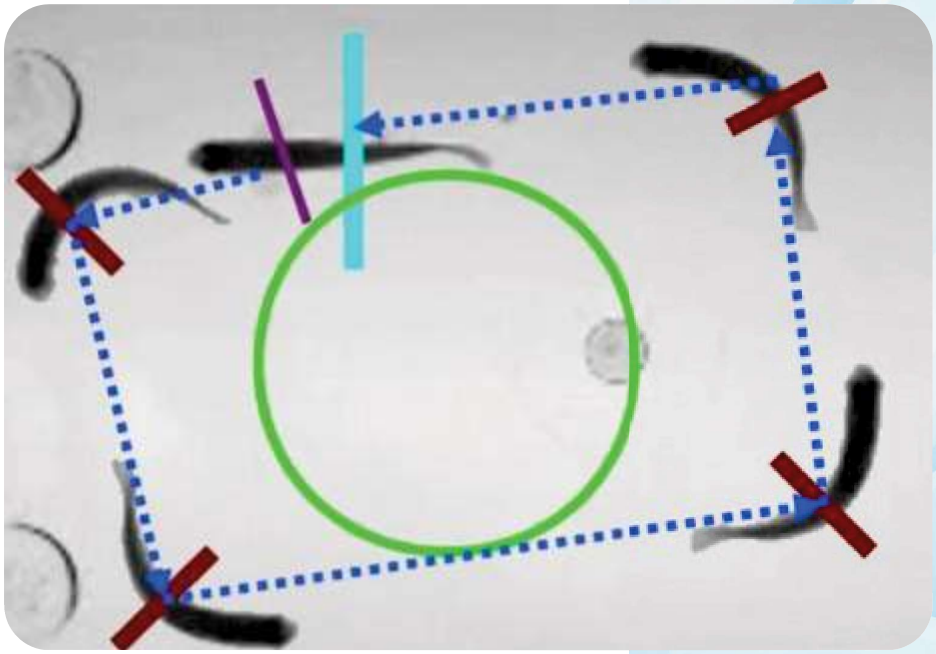
- Distance between two animals (set by user)
- Animal to Animal contacts detection
- Time spent in which two animals are within each other's proximity



Rotation and path analysis

Lateralization of brain and behavior is the apparent predisposition towards side bias {left-right), which often manifests in terms of motor output.
This add-on can assist you in understanding neuromechanical control and assess behavioral asymmetries such as turning and path bias.
Classify the fish locomotion based on angle classes.

Since zebrafish are capable of regeneration after spinal cord injuries, this add-on in complement to ZebraLab locomotion analysis is also relevant to score regeneration after SCI or muscle disorders.



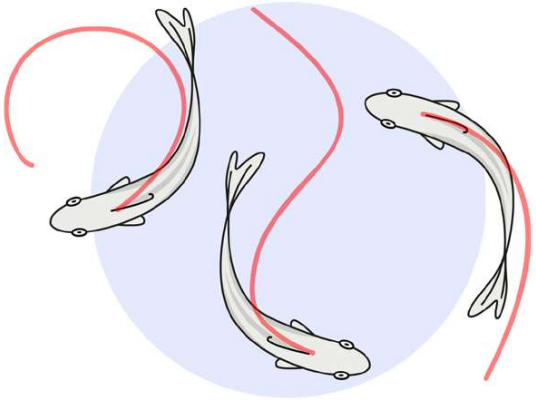
ZebraLab Extension

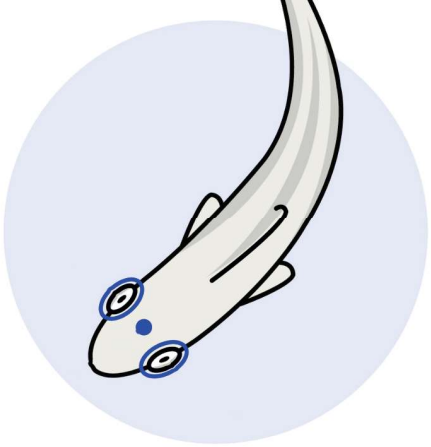
Shoaling: Group behavior analysis of different subjects in the same tank

- Inter-individual distance
- Nearest neighbor distance
- Polarization
- Average speed of the group

Group screening

- Extended analysing system to increase the number of animals analysed simultaneously in the same tank
- Classification of the group behaviors within histograms. Count of the number subject in each area throughout the test





Morphology Analysis

Extension of the ZebraLab software for morphology analysis, allowing to measure :

• Different part of the body (eyes size, body length...). Can be used at different time-points to evaluate growth, malformation over the time.
• Based on uploaded videos or screenshot from videos
• User friendly interface with an intuitive toolkit to draw different lines, shapes to get immediate measurements

Automatic Sizing

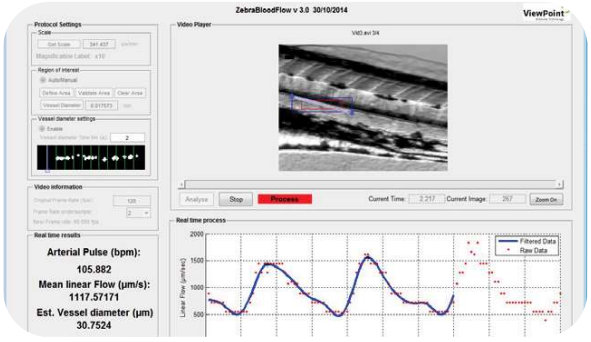
Sizing add-on to get an automatic size of your zebrafish. (length > 1cm)
Fully automatized, our sizing add-on can help you to evaluate a growth study over a group of animals (or a single).

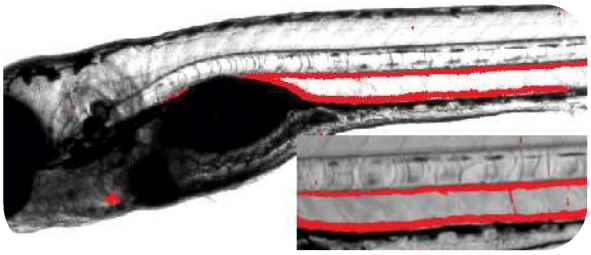
Micro ZebraLab

Cardiovascular monitoring and bloodflow

Heart Beat and Blood flow analysis

MicroZebraLab is the reference tool since 2008 to investigate live and in a non- invasive way a scope of zebrafish embryo and larvae physiological parameters. Developed by ViewPoint from researchers' demand, it measures cardiovascular activity and blood flow.



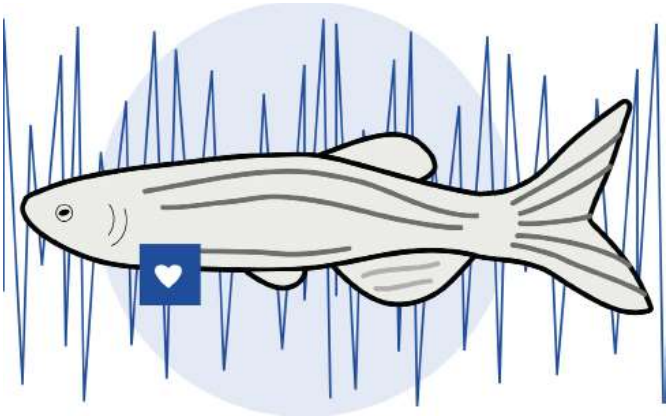


Easily extract results

ViewPoint has developed MicroZebraLab's software to bring high level of precision to cardiovascular data recording, opening up the possibility to zoom into greater details : measure cardiovascular feature automatically such as heart-beat, bloodflow, the size of the blood vessel under the microscope without fluorescence or other markers, and easily extract results from your own acquisition set-up on your recorded videos.

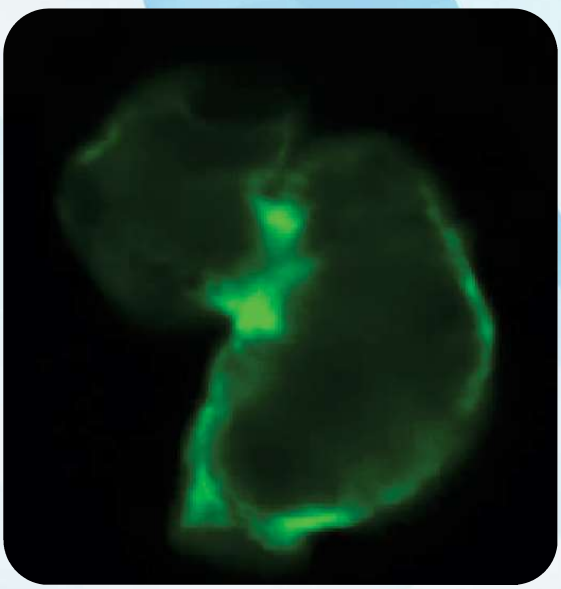
New add-on available allowing cardiac performance, see next page!

Cardiac Performance



The cardiac performance software enables the zebrafish cardiac screening and the cardiac performance measurement. The analysis is based on GFP's heart expression videos:

- Ejection fraction,
- qt interval
- Beat defects
- Extract results from both chambers

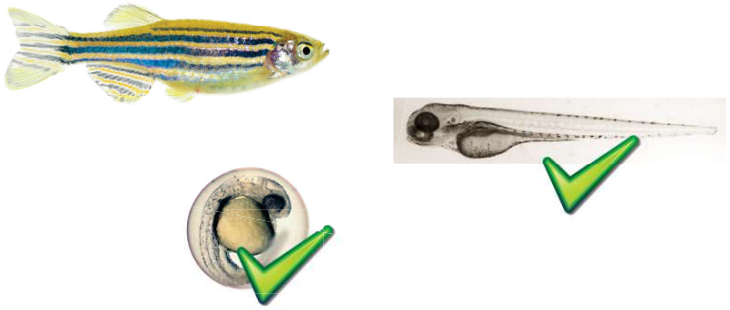


ZebraBox

Zebrafish embryo and larvae research

The first ever observation chamber designed for fish since 2005

ZebraBox Revolution



Developed in 2005, the ZebraBox is the first observation chamber designed for fish observation. The 4th generation of ZebraBox is the result of 15 years of close collaboration and development with zebrafish researchers. Unlike other systems inspired from the ZebraBox, the subjects are in direct observation, without the use of fresnel lens which can create heat, condensation, image distortion and ultimately stress to the subjects.

Control of the experiment conditions:

- Double Anti-vibration system
- Built-in strong light stimulation
- Direct observation technology
- Many stimuli available
- Real time data processing

Automated observation chamber for zebrafish larvae and embryos

The ZebraBox is a complete system, designed for the high-throughput analysis of zebrafish, medaka, fathead minnow larvae, mexicanus, c-elegans and many other species, in multi-well plates with a total control over the experiment environment.

The ZebraBox is a component of ZebraLab and allows the automated observation and tracking of larval fish, and embryos. For embryos a higher resolution camera can be provided.

The ZebraBox is capable of analyzing fish larvae in multi-well plates, up to 96 individuals simultaneously. ZebraBox can revolutionize your research thanks to its scalability: connect up to 3 ZebraBox to one computer running the ZebraLab software.

Key Features

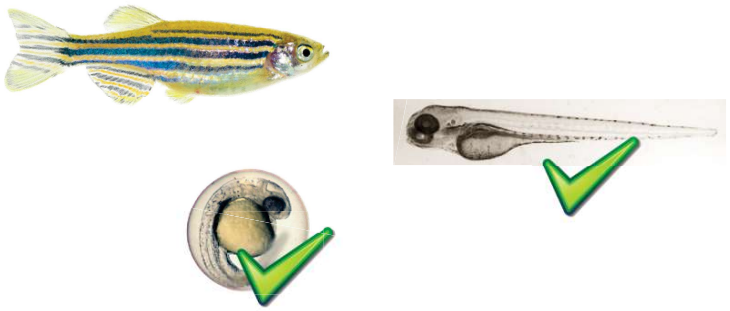
- Total control of the experiment conditions
- Automated observation and tracking of larval fish
- Multi-well plates compatible, up to 288 individuals simultaneously (up to 3 ZebraBoxes can be connected to a single software licence)
- Scalable and versatile system
- Reliable and reproducible data
- Fast data processing for time saving

Available add-ons

- Temperature control
- Visual acuity
- Acoustic module for startle response
- Isolated chamber for ZebraBox
- Shocker - Operant conditioning
- Photomotor response
- Optogenetic top light
- High speed camera

…and more to fit your specific research needs!

ZebraBox Hybrid



ZebraBox Hybrid

The ZebraBox hybrid is a 3 in 1 solution allowing several acquisition features. Based on our standard ZebraBox with a versatile camera allowing :

- Standard acquisition for live acquisition - 30 fps
- Ultra fast acquisition at +/- 500 FPS for startle response
- High Resolution Camera for embryo monitoring

A wide range of standard and custom-made tools for aquatic species behaviour analysis

Visual Screen Stimulation

Applications

Phenotypic study,
new drug discovery
for eye and brain disorders

Our High Definition screen opens the possibility to perform a wide range of visual stimulation which evokes complex behavioural responses. Such endpoints gives great opportunities for gathering a comprehensive understanding between visual and motor centers.
A full screen square is placed underneath the well plate where images, videos, graphical patterns can be displayed.
Our ZebraLab software controls the screen and allows a full experimental control to adapt the fish environment, in term of graphical patterns displayed on the screen, sequence duration, environment adaptability based on subject's behavioural responses. Datas are synchronised with the stimuli sequences.

OMR Larvae

OptoMotor Response (OMR) is a reflex behavior to assess visual performance. It is observed when an animal naturallly follows dynamic stripes, trying to swim and stabilize themselves in the visual motion, driven by the nervous system. OMR is widely used to assess the visual functions of fish (larvae and adults). The screen placed underneath the well plate displays the dynamic stripes: left-right, up-down which are customizable.

Color Place Preference

To validate zebrafish model for color associated learning and memory test. It is crucial to assess its natural preferences for further tests involving aversion, anxiety or fear paradigms. Several color sequences can be triggers and customized.

Operant Conditioning

Behavioural adaptation in fish can be assessed, performing operant conditioning tests. When the fish faces a changing environment, they will try to adjust their behaviour to optimize rewards and minimize punishment. Automated protocols, triggering visual cues and electroshocks to investigate learning paradigms can be perfomed. The purpose is to assess the behavioural performance of zebrafish along their development. Learning and memory are complex brain process that animal use to adapt their behaviour along the experience to optimize reward and minimize punishment. The use of our screen and ZebraLab software allows to create a wide range of associative learning.

Prey Capture

It is a natural behaviour which starts when fishes start to swim for the first time. Several neural processes such as visual perception, decision-making, recognition and moto-control are involved. A nice approach to study cognitive function. The software synchronized with the screen allows to display fixed images : prey, predators, graphical patterns or dynamic patterns.

Zebrabox Extension

Automated observation chamber for Zebrafish, larvae and Embryos

Top light – Optogenetics

Use light to modulate molecular events in a targeted manner in living cells or organisms. ZebraBox was upgraded to trigger Real Color Vision light stimulation in micro plates, including:

- ZebraLab software extension for top Light Source. Control of light sequences and intensity
- ZebraBox Real Color Plug-in
- Several wavelengths available depending on user's applications
- Protocol definition for vision
- Homogenous direct and diffuse light illumination on subjects
- Up to 2 differents wavelenghts open bracket.

Top light - Photo motor response

ZebraBox was upgraded to trigger Photo Motor Response in micro plates, according to David Kokel protocol, including:

- ZebraLab software extension for white light source (high intensity)
  - Projection of high intensity light source on top of the fish
  - Monitoring of the fish response to the stimulation
  - Control of light sequences
- ZebraBox PMR Plug-in
  - Monogeneous High Intensity Lighting system
  - Controllable high power light source
  - Infrared sensitivity independent of the light stimulation
  - Data synchronization according to light status
- Controllable High Power Light intensity from 0 to 40,000 lux.
- White Light temperature: 8,000 to 10,000 Kelvins

Zebrabox Extension

Acoustic / Vibration Module

ZebraBox was upgraded to trigger vibrations to micro plates, including:

• Acoustic module:
- Frequency range 80 to 10,000 Hz
- Adapted amplifier
• Software module to program and control the vibrations:
- Vibration modulation control and sequences
- Vibration Time
- Vibration Duration
- Vibration Frequency
• Option Calibration
- Sonometer to reach a requested dB
• Applications : startle response, auditory functions and more

Isolation Box

Our Isolation Box is a dedicated enclosure designed to minimize sound transmission between its interior and the external environment. Designed to help researchers looking towards hearing loss, the Isolation Box is a versatile tool.

This chamber was meticulously engineered to create a controlled acoustic space, shielding the sound source (such as people talking or loud equipments), from ambient noise, reverberations and unwanted interferences. Chamber developed with Dr Benjamin Delprat (MMDN Montpellier, France)

Technical features :

Polyurethane foam
Fan less design
20 dB to 38 dB sound reduction
(frequency independant)

Temperature Control Unit

The temperature control unit facilitates internal temperature regulation in the experimenting arena.

Technical features :

- Possibility to heat up, cool down or maintain the temperature
- Temperature control from 10°C to 40°C
- Automated Thermal shocks possibilities with data synchronisation
- Fast temperature change
- Exhaust flow is gravity dependent

Fish Aggression Box

Aggression Monitoring Tool on Juvenile fish

The Fish Aggression Box is an observation system designed in collaboration with Dr Will Norton's Lab (Leicester, UK) with our state of the art video tracking technology and a practical cubical to have a perfect detection of the fish aggression when the fish sees its own image in a mirror.

Available for the applications:

- Controllable values
- Detect alterations to aggression levels produced by drug treatments or mutation
- Powerful screening technology - the drugs to reduce the aggression from the fish
- Scalable system – unlimited experimental fishes and cabinet to connected to speed up the research
- Validated software - comparison to manual quantification

ZebraTower

Adult fish monitoring

Automatic Adult fish Monitoring

Using our ZebraTower, you can automate any kind of test involving refined behavior analysis such as social contact and aggressive behavior in various tank shapes.

ZebraTower system includes:

- Complete video acquisition system
- Openfield with Infrared Lighting illumination - 50*50cm
- Top view camera stand

Several applications:

- Zebrafish 3D tracking
- Sizing assay of zebrafish
- Place preference
- Social interaction

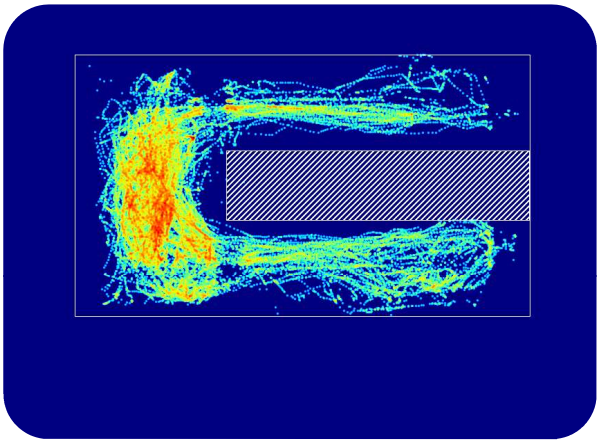
ZebraCube

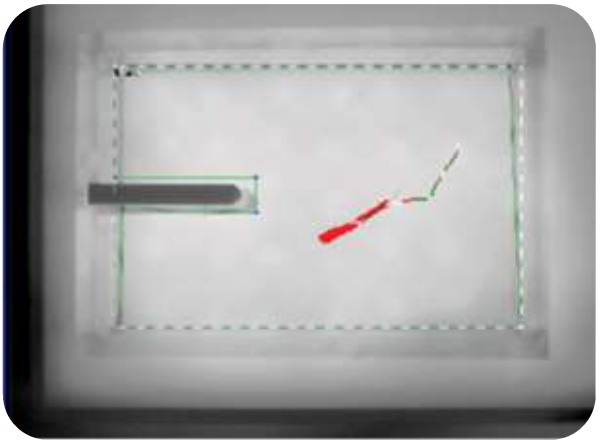
Compact cabinet for adult fish screening

ZebraCube is similar to the ZebraBox, it is an enclosure to monitor and score adult fish behaviour under controlled condition for large tanks or multiple dish, based on 50x50cm infrared floor.

Total control of the experiment conditions

Controlling the environment during a behavioural experiment is the key to success.
ViewPoint has developed a new cubicle enclosure in which you can trigger light sound, temperature and more. ZebraLab can monitor up to 3 cubicles.





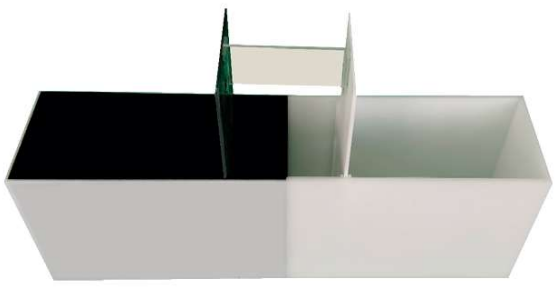
Adult tracking system add-ons

Acoustic / Vibration Module

ZebraBox was upgraded to trigger vibrations to tanks (see tecnical specifications on page 21).

Maze and Others

Aquatic T-Maze, Y-Maze
Aquatic Light/dark preference test
Novel Tank Diving
Swimming Endurance
Olfactory test
Thermal Preference
and many others based on request.



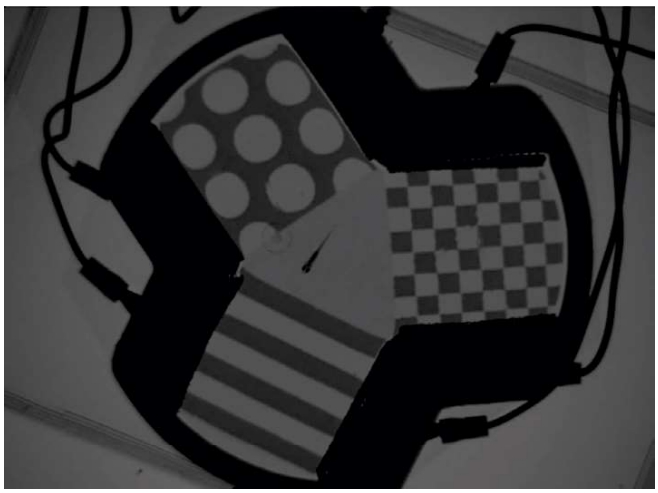
Live 3D tracking

Live 3 Dimensional (3D) tracking of fish in tank including:

- ZebraLab 3D GrandView software
- Automated Locomotion monitoring and calculation
- Data analysis in real time
- Automatic stop of the experiment
- 3D Locomotor behavior of zebrafish in tank:
  - Distance travelled
  - Position (X;Y;Z) and trajectory

Operant Conditioning

Many operant protocols may be set with the fish tracking software ZebraLab. It allows to perform passive avoidance test, place preference for learning and memory tasks for fish (juvenile, adult).
For example, individual learning can be assessed with specific visual cues and shocks based on maze exploration (y-maze for example).
The experimental design can be discussed and customize upon request.



Novel Tank diving test (NTT)

The Novel Tank diving test (NTT) allows to perform vertical fish assessment and see their distribution on top and bottom part of the tank, a validated measure of anxiety-like behaviour as thigmotaxis, light & dark chamber assays.
Such instinctive behaviour appears in fish when discovering a new environment. They will tend to dive, seeking for protection, avoiding predators and will start exploring the whole tank, swimming to the top.
Our dedicated set up allows to follow such behavioural endpoints in a very easy way as we still follow the general locomotion activity from a top view.

VisioBox

Dedicated system with High Definition and flexible screens in order to display images, videos, patterns to the fish. The experimental design can be customized and is automatized.

I° OptoKinetic Response - OKR

Optokinetic response tests are commonly performed when screening visual acuity in disease models of larvae fish and are of critical importance to help finding new treatments for visual deficiencies. Tracking of zebrafish oculomotor performance is generally done using standard handmade OKR drums that lack the possibility to automatically change the stimulus during the experiment, thereby producing misleading results because of the user intervention.To avoid this, the VisioBox technology meets the challenges of fish vision science with precise automation, robust data and a steady fish eye observation tool.

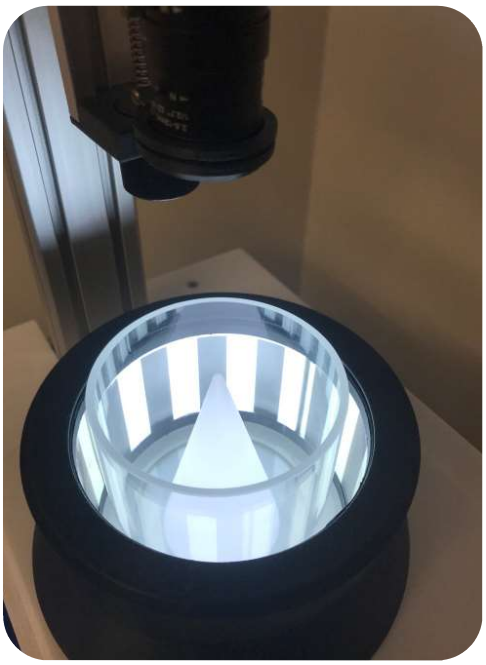
Optokinetic Response test on larvae fish

Visual system performance is assessed on the basis of the OptoKinetic Response, which involves reflexive slow stimulus following eye movements alternated with rapid resetting saccades. Assessing visual function in larval fish should be a smooth, controllable and flexible process allowing you to identify the slightest fish visual defect thanks to :

- A full control and adaptability of the fish environment and behavioral response
- Tracking of visual acuity and contrast intensity thanks to an automated software for eyes detection
- The opportunity to adapt the environment to the subject's behavioral response (color, light intensity, speed, stripes thickness)
- Differentiation of eyes angles, Slow and Fast phase velocity

OptoMotor Response on adult fish

OptoMotor Response (OMR) is a reflex behavior to assess visual performance. It is observed when an animal naturallly follows dynamic stripes, trying to swim and stabilize themselves in the visual motion, driven by the nervous system. OMR is widely used to assess the visual functions of fish (larvae and adults). The screens placed all around the fish displays dynamic stripes : clockwise/counter clockwise.
The freely swimming direction is monitored and the fish response is evaluated based on how the the fish responds to the dynamic stimulus by swimming equal amounts of time clockwise or counter clockwise.



ToxMateLAB

Long term multispecies screening of bioindicators

- Aquatic : gammarus, lymnea, radix, magna daphnia...
- Terrestrial : spiders, mollusca...
- Airbornes : mosquitoes, bees...

The ToxMateLAB is a brand new product developed by ViewPoint, able to perform long term and high throughput behavioral assessment in a controlled environment, up to 48 organisms tracked simultaneously :

- White light source for stimuli/circadian sequences
- Thermo regulation via a temperature control unit
- Oxygen with a continuous water circulation (compound exposure, ...)
- Vertical monitoring (daphnia - water column)

BEHAVIOR ASSESSMENT

MULTISPECIES AND UP TO 48 ORGANISMS

CONTINUOUS MONITORING AND WATER FLOW

C-Elegans Monitoring System

Dedicated solution to monitor nematodes such as Caenorhabditis elegans in high throughput using standard well plates, up to 96 simultaneously. The system is based on an ultra high resolution device using multiple cameras, allowing to observe general locomotion as well as more complex behaviour. It can also be coupled with light stimulation (optogenetic, white light).
This sytem can be used as part of various scope of research : toxicology drug screening, neurobiology, genetic, phenotypic plasticity.

Valvometry software
Bivalves assessment

ViewPoint has developed a new software for bivalves monitoring

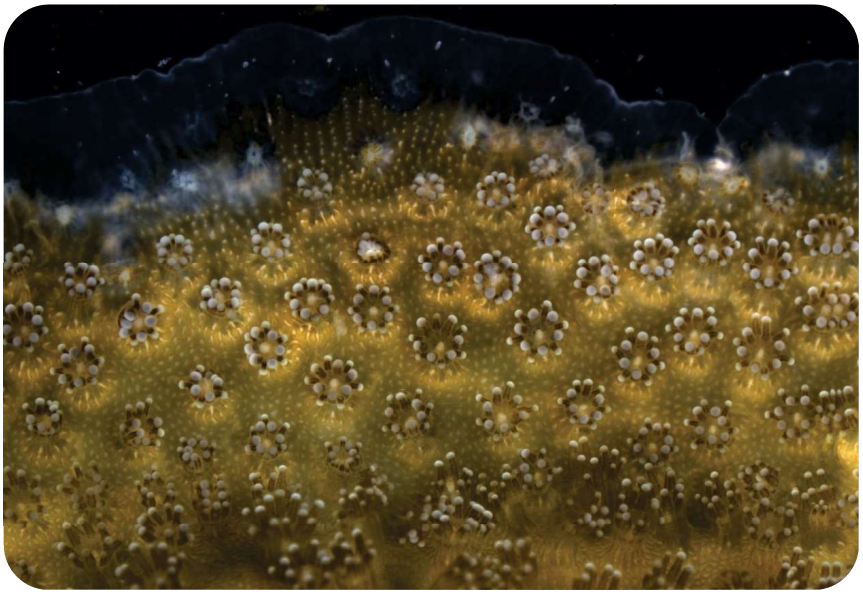
Valvometry application is a non-invasive method to study water toxicity and can be used as an early warning approach. The bivalves are great bio indicators to evaluate water toxicity. Our software allows to continously monitor gaping behaviour (opening time, distance, frequency), several bivalves can be monitored simultaneously

"Dreissena polymorpha"

Corals development

ViewPoint has developed a new software for corals development

Coral reefs are vital ecosystems that play a crucial role in our planet's health. Using our system to analyze their development under changing conditions will help researchers to have a better understanding of climate change and human impacts. As one of the most sensitive marine invertebrates, the anthozoans family is monitored worldwide to define protection strategies.



"Xenia" - soft marine coral

ViewPoint behavior technology

Our motto

Working for the well-being of the people and the Earth, in a spirit of benevolence and commitment..

Our core values

Viewpoint and all of its collaborators are committed to our customers and partners around the values they hold dear:

HONESTY
Motivate, respect our motto and our values

COMMITMENT
Motivate, set an example, don't take the easy way out

KINDNESS
Show mutual aid, solidarity and tolerance

PLEASURE
Working in a friendly and pleasant atmosphere, developing interest in the work

Don't miss our other technologies in our specific catalog for rodent's and other mamals species behaviour.

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