

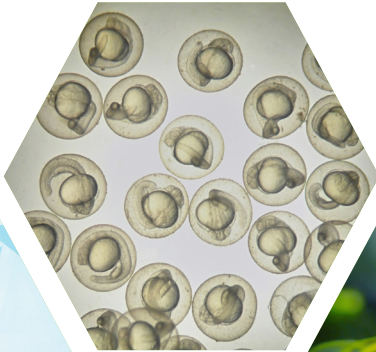
ViewPoint

Behavior Technology

Created in 1990
More than 30 years of experience Worldwide

Zebrafish & other aquatic species behavior solutions

Neuroscience and ecotoxicology



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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 behavioral research. Whether you're working on behavioral auditory system, ecotoxicology, compound screening, visual acuity assessment, learning and memory, social behavior and much more, ... our team delivers tailored solutions to fit your needs of zebrafish behavioral research.

A customer oriented approach

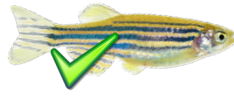
At ViewPoint we take care of our clients so users can focus on the meaningful with easy to use software interfaces and software training to make your experiment processes run smoother in the long term. ViewPoint material meets biomedical sciences facilities requirements and is ISO 9001 certified to ensure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

Worldwide success stories

Working with well-known clients for years in more than thirty countries, we have been managing numerous neurobehavioral 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 other fields such as ecotoxicology for example.

ZebraLab

High throughput
monitoring
of fishes

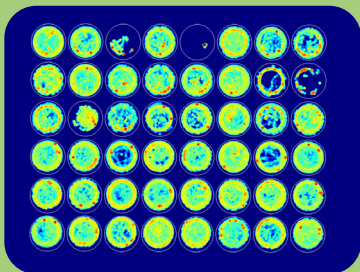


Automated fish behavior analysis System

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 mosquito 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-throughput behavioral applications scoring of locomotion, activity, responses to stimulation or conditions and specific behavior.

Various applications

- Animal behavior analysis
- Safety Pharmacology
- Toxicology and Eco-Toxicology
- Drug Screening and Drug Development
- Behavioral Genetics
- Seizures
- Circadian rhythmicity
- 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...
- **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

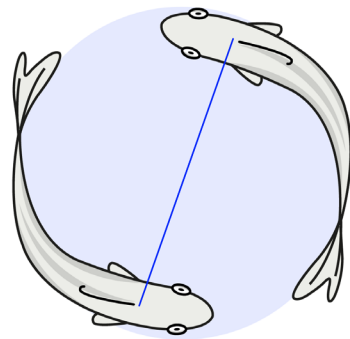
- Rotation and histograms
- Social contact
- Juvenile sizing
- Cardio vascular screening
- High speed behavior (escape response)
- Multitracking and shoaling behaviors

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.

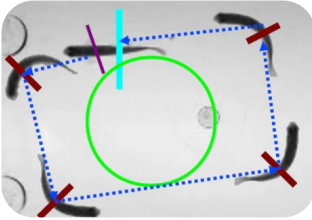
Social contact

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

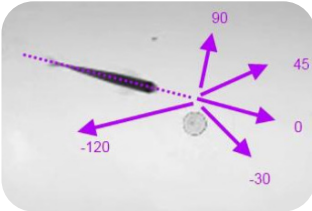


Rotation and path angles



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.

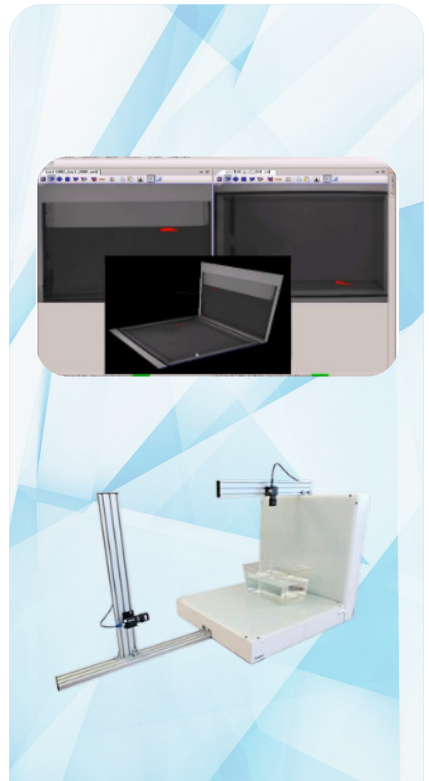


Since zebrafish are capable of regeneration after spinal cord injuries, this add-on in complement to ZebraLab locomotion analysis is also relevant to score regeneration after SCI or muscle disorders.

ZebraLab GrandView - Live 3D tracking

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

- Real 3D analysis; Live reconstruction of (X; Y; Z) position of the animal
- ZebraLab extension to handle two synchronized cameras
- High Resolution Analysis
- Automated Locomotion monitoring and calculation
- Data analysis in real time
- 3D Locomotor behavior
- Replay of the experiment as you desire

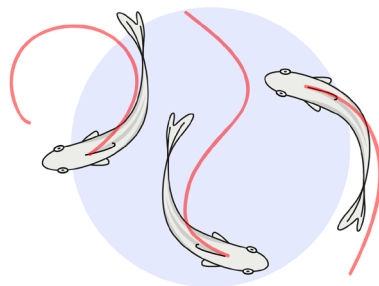


Shoaling: Group behavior analysis of different subjects in the same tank

- Inter-individual distance (mean distance from each subject to all others)
- Nearest neighbor distance (mean distance between the subject and its nearest neighbor)
- Polarization (magnitude of the mean vector of all subjects)
- Average speed of the shoal

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 (average detection of subjects per time bin).





Manual detection of Morphology

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 upload videos or screenshot from videos
- User friendly interface with an intuitive toolkit to draw different lines, shapes in order 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).

No hassles, no complicated calculations, our software will give you several output data such as:

- Image of the maximum length detected,
- SVG file with a highlighted segment for maximum length detected,
- TXT file with the timestamp data (frame used for calculation), position (x;y) of each point used, length in user scale;
- XLS (or CSV) with maximum length detected (for each time point), surface, speed, and curvature.

This add-on can be used with a live acquisition (from our equipment) or processed with AVI files.

ZebraBox

**Zebrafish embryo
and larvae research**

**The first ever
observation
chamber designed
for zebrafish
observation
since 2005**

ZebraBox Revolution



Since first developed in 2005, the ZebraBox was the first observation chamber designed for zebrafish 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
- Strong light stimulation
- Direct observation technology
- Many stimuli available

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... 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 zebrafish, and zebrafish embryos. For embryos an higher resolution camera is provided.

The ZebraBox is capable of analyzing zebrafish larvae in multi-well plates, up to 96 individuals simultaneously. ZebraBox can revolutionize your research thanks to its scalability: connect up to 4 ZebraBox to one computer running the ZebraLab software.

Key Features

- Total control of the experiment conditions
- Automated observation and tracking of larval zebrafish
- Multi-well plates compatible, up to 96 individuals simultaneously
- Scalable and versatile system
- Reliable and reproducible data
- Fast data processing for time saving

Available add-ons

- Temperature control
 - Controllable vibration and sound
 - Isolated chamber for ZebraBox
 - Shocker
 - Photomotor response
 - Optogenetic top light
 - High speed camera
- ...and more to fit your specific research needs!
Don't hesitate to contact us!



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 upgrade 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
- Power supply integrated in the ZebraBox

Top light - Photo motor response

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

- ZebraLab software extension for High Intensity Light Source.
 - Projection of high intensity light source on top of the zebrafish
 - 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: 8000 to 10000 Kelvins
- Power supply integrated in the ZebraBox



Sound and Vibration Module

Zebrabox upgrade to trigger vibrations to micro plates, including:

- Vibration module;
 - Frequency range 80 to 10 000 Hz
 - Integrated 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



Isolation Chamber

Made with robust steel and flattened with Polyurethane foam the acoustic ZebraBox reduces environmental sound.

We implemented an easy software module to program and control the vibrations time, duration, frequency, and parameter different edge or slope variation of each noise. Supply with a standard 30FPS high resolution it is up to you to upgrade your system with a faster Camera (from 100 to 1000 FPS) and run startle response or PPI test and monitor how the zebrafish react (C/S shape). ZebraBox acoustic offers total environmental control of the experimental conditions.



Temperature Control Unit

The temperature control unit facilitate internal temperature regulation in the experimenting arena. Non mandatory, but help you to keep your fish warm for long term experiments:

- Temperature heating and cooling control from 10°C to 40°C (device only to heat up available)
 - Temperature stability (°C) in the TCU: ± 0.1
 - Automated Thermal shocks possibilities - add-on
 - Change of +7°C within 10 minutes' max
 - Pump and Tubing kit to connect to the ZebraBox
 - Valves to set the output flow
 - Adapted Water tank
 - Bright, white, easy to read display
 - Space-saving cooling coil design
 - Removable ventilation grid
 - Refrigeration unit without side vents
 - High-quality bath tanks made of stainless steel with bath lid and drain tap
 - Possibility to control the temperature with the ZebraLab software
- Exhaust flow is gravity dependent; the control unit has to be installed underneath the bench.

ZebraBox PPI Hybrid

ZebraLab for PPI test



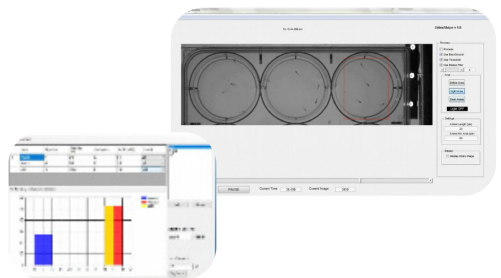
The ZebraBox PPI hybrid is a 3 in 1 solution.

- Standard ZebraBox 30 fps (live)
- PPI 1000 FPS (offline)
- High Resolution Camera

PPI Backed by years of research and development, ZebraBox Revolution brings state of the art observation and video tracking to your laboratory. A special device synchronizes the stimulus and the camera frames to allow an accuracy under 1 millisecond ! The ZebraBox is designed to have a perfect synchronization of the sound stimulus over every well (less than 100 μ s).

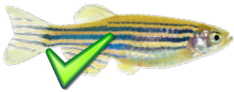
Complete turnkey fast behavior apparatus system for high speed applications for zebrafish including:

- ZebraLab "Lightning Fast" software
- Two step analysis: time controlled acquisition and batch processing to detect multiple animals.
- PPI Generator application:
 - Stimulus sequence definition
 - Acquisition workflow management
- Batch Processing, data analysis:
 - Distance swam
 - Displacement
 - Time to reaction, latency
 - Response type classification: scoots or turn
 - Angle bend and amplitude
 - Trajectory
 - Latency type: LLC (long-latency C-start) /SLC (short-latency C-start)



Zebra Aggression Box

Aggression Monitoring Tool on Juvenile zebrafish



The Zebrafish Aggression Box is an observation system designed 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 towards a mirror.

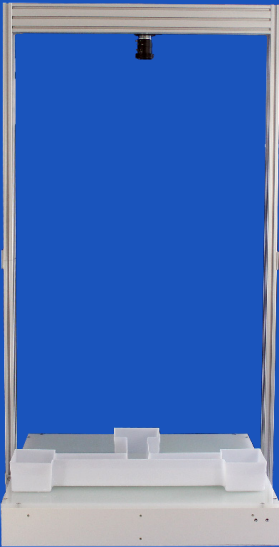
Available for the applications:

- 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



Several applications:

- Zebrafish 3D tracking
- Sizing assay of zebrafish
- Sizing in zebrafish

Automatic Adult fish Monitoring



Using our fast cameras technology, 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:

- Camera : high sensitivity - up to 30 frames/sec acquisition board
- Openfield with Infrared Lighting module 50*50cm
- Camera stand

Specification of ZebraTower

- Infrared Lighting system:
 - For a precise detection of the zebrafish
 - Camera will only be sensitive to this infrared light source
- High sensitivity camera
 - Live analysis at 30 to 100 Frames /Sec
 - Up to 200 Frames /Sec at 640 X 480 (offline processing)
 - Up to 300 Frames /Sec at 320 X 240 (offline processing)
- ZebraLab software extension for adult analysis
- Appropriate lens for sharp picture quality
- Acquisition board
- Camera stand to hold the high speed camera

Live 3D tracking with mirror

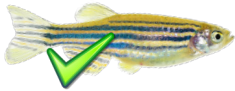
Live 3 Dimensional (3D) tracking of fish in tank including:

- ZebraLab 3D GrandView software
- Real 3D analysis; Live reconstruction of (X,Y,Z) position of the animal
- Automated Locomotion monitoring and calculation
- Data analysis in real time
- 3D Locomotor behaviour of zebrafish in tank:
 - Distance travelled
 - Position (X;Y;Z) and trajectory
 - Time spent in 2D Areas of the tank
 - Entry count in each areas of interest
 - Counting for each state (movement categories)
 - Time duration in each state
 - Transition count of the states
 - Distance swum by the animal in each state
- Replay of the experiment with a different protocol (replay of the raw data)
- One year free on-line update
- Digital user manual
- Technical support one year on site and internet remote support

ZebraCube & Extensions



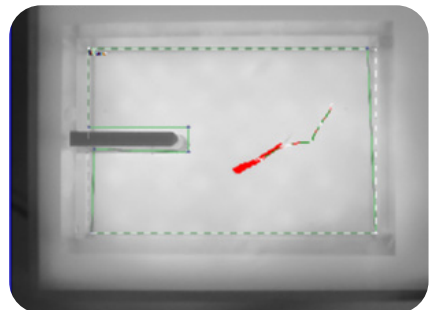
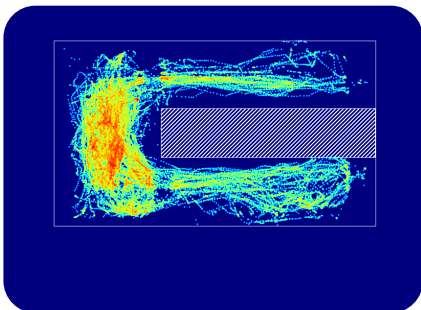
Compact cabinet for adult zebrafish screening



ZebraCube is similar to the ZebraBox, it is an enclosure to monitor and score adult zebrafish behavior under controlled condition for large tanks or multiple dish, based on a 50 x 50 cm infrared floor.

Total control of the experiment conditions

Controlling the environment during a behavioral experiment is the key to success. ViewpPoint has developed a new Cubicle enclosure to control light and optionally sound, vibration and temperature. ZebraLab can monitor up to 4 Cubicles.



**Large enclosure
behavior chamber
All in one cabinet for
adult zebrafish
experiments**

Vibration Module

ZebraBox upgrade to trigger vibrations to micro plates, including:

- Shaker and Vibration module;
 - Frequency range 80 to 10 000 Hz
 - 40 W amplifier
- ZebraBox Adapter for Shaker
- Software module to program and control the vibrations:
 - Vibration modulation control and sequences
 - Vibration Time
 - Vibration Duration
 - Vibration Frequency
- Power supply:
 - Power requirements: 12Volt DC, 2.0Amp (max)
 - Mains adapter: input 100-240 V.AC, output 12 V.DC, 2 A

Live 3D tracking with mirror

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

- ZebraLab 3D GrandView software
- Real 3D analysis; Live reconstruction of (X,Y,Z) position of the animal High Resolution Analysis
- 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
 - Time spent in 2D Areas of the tank
 - Entry count in each areas of interest



Micro ZebraLab

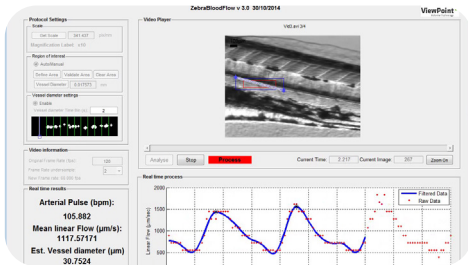
Cardiovascular monitoring and bloodflow

Zebrafish Cardiology and Physiology



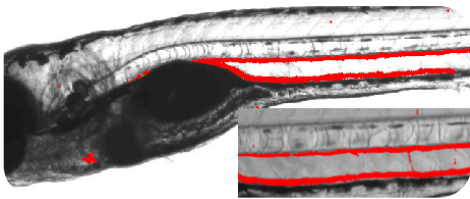
Heart Beat and Blood flow analysis

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

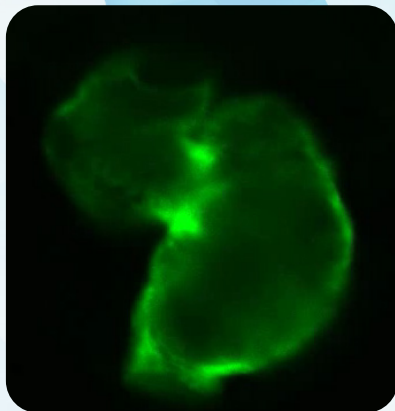
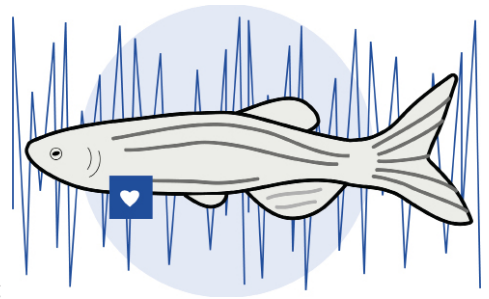
ViewPoint developed MicroZebraLab to bring high level of precision to cardiovascular data recording, opening up the possibility to zoom into greater detail: measure cardiovascular feature automatically such as heart-beat, flow rate, and the size of the blood vessel under the microscope without fluorescence or other markers, and easily extract results from your videos. New add on available allowing morphology analysis based on MicroZebraLab acquisition picture, more information page 11 «manual detection of morphology».



Cardiac Performance

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

- Ejection fraction, qt interval and beat defects on both chambers
- Easily extract results



VisioBox 2.0

Optokinetic Response - OKR

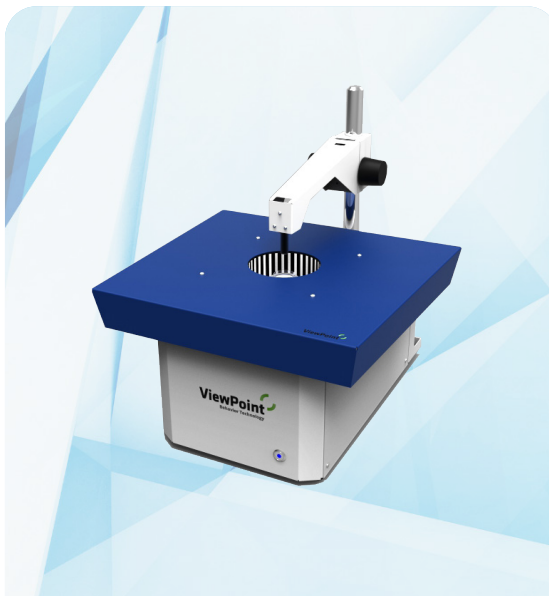


Optokinetic response tests are commonly performed when screening visual acuity in disease models of zebrafish and are of critical importance to help finding new treatments for visual deficiencies. Tracking of zebrafish oculomotor performance is generally done using standard handmade OKR drums that lack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

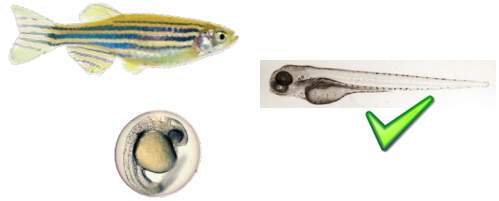
Oculomotor performance :

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 zebrafish larvae should be a smooth, controllable and flexible process allowing you to identify the slightest zebrafish visual defect thanks to:

- A full control and adaptability of the zebrafish 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 Slow Phase Velocity (SPV) and Fast Phase Velocity (FVP) and angles.



Visual Screen Stimulation



OptoMotor Response

OptoMotor Response (OMR) is a reflex behavior observed when an animal naturally follows a rotating grating around it. OMR is widely used to assess the visual functions of zebrafish (larvae and adults).

The swimming direction has to be monitored. If the fish responds to a rotating stimulus by swimming equal amounts of time clockwise or counter clockwise, they would be scored as not detecting the stimulus. If they spent most of their time swimming in the same direction as the stimulus, they detect it. The grating size could be adjusted to determine threshold detection.



Visual acuity performance :

Define a specific environment projected around the zebrafish using the ZebraLab software.

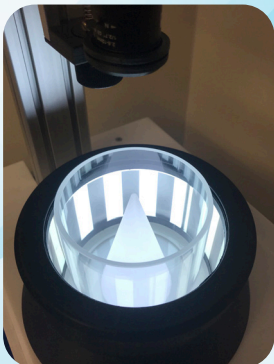
- A full screen square wave grating, which moves left- or rightwards
- Monitoring of the visual response of the fish
- Trigger of light conditioning
- Full control and adaptability of the zebrafish' environment (Stripes colors, number of stripes, rotating speed, contrast, brightness, half mask,...)
- Adapt the environment to the subject's behavioral responses

Color Place Preference

- Component of ZebraLab and ZebraBox.
- Allows the automated observation and tracking of adult or larvae zebrafish visual behavior in a freely moving environment.
- Applications : OptoMotor Response, anxiety like/color place preference

Operant Conditioning

Automated protocols triggering visual cues and electroshocks to investigate learning paradigms. The aim being 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.



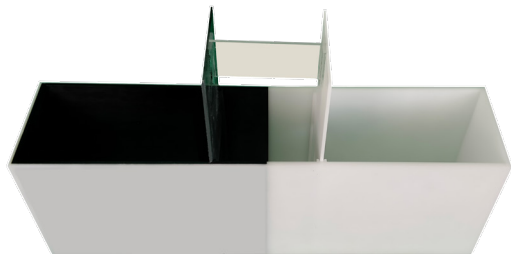
Other Hardware

Water Circulation

- Regulated temperature control
- Variable temperature control

Maze

Aquatic T-Maze
Aquatic Light/dark preference test
Larval aquatic light/dark preference test in microplate



ToxMateLAB

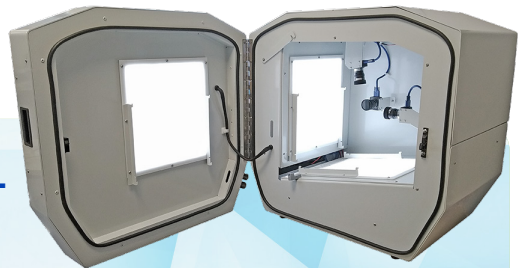
Long term multispecies screening of bioindicators



- 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



BEHAVIOR ASSESSMENT

**MULTISPECIES AND UP TO
48 ORGANISMS**

**CONTINUOUS MONITORING
AND WATER FLOW**

C-Elegans Tracking 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 high resolution acquisition, allowing to observe general locomotion as well as more complex behaviour. It can also be coupled with light stimulation (optogenetic, white light).

This system can be used as part of various scope of research : toxicology drug screening, neurobiology, genetic, phenotypic plasticity.

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 through the discovery of our catalog specific to rodent's and other mamals species behavior.

Contacts :

North America

info@vplsi.com

+ (1) 514 343 5003

Europe

info@viewpoint.fr

+33 (0)4 72 17 91 92

Asia Pacific

info@viewpoint.cn.com

(+86) 021 61767237 / 7233

ViewPoint

Behavior Technology



www.viewpoint.fr
info@viewpoint.fr



@ViewpointBehav



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