

VAST BioImager™ Platform

Automating the Manipulation of Zebrafish Larvae for Imaging Screens

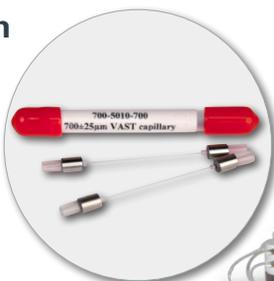


Union Biometrica develops tools for model organism research.

The new **VAST BioImager Platform** (Vertebrate Automated Screening Technology) is designed for zebrafish researchers who need to do high-resolution imaging of large numbers of 2-7 day old zebrafish larvae. Based on technology from the Yanik Lab at MIT the VAST BioImager system accelerates even the most demanding zebrafish handling and cellular-resolution imaging tasks for high-content screens. **By automating the handling of larvae prior to imaging, VAST avoids the time consuming and tedious steps of manual manipulation of larvae for large dataset image acquisitions.**

Base System for Whole Zebrafish Organ-Level Imaging

At the heart of the VAST platform is a capillary where larvae can be loaded and manipulated for imaging. Batches of larvae can be loaded into the system using the 50 ml stirred conical tube sample cup. *(For delivering larvae from multi-well plates see the autosampler option.)*

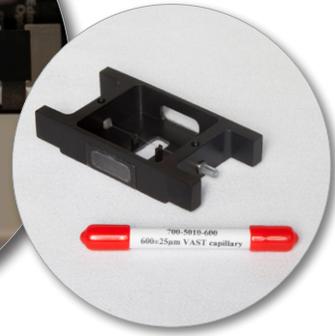
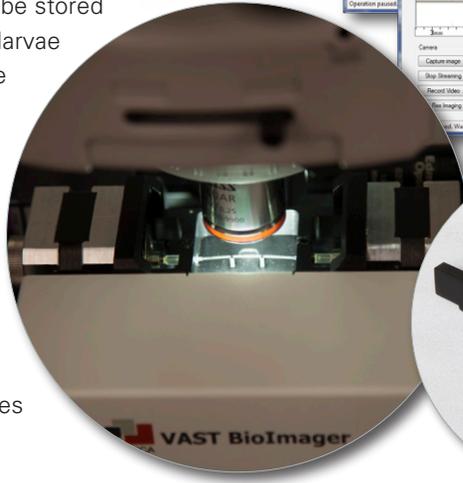
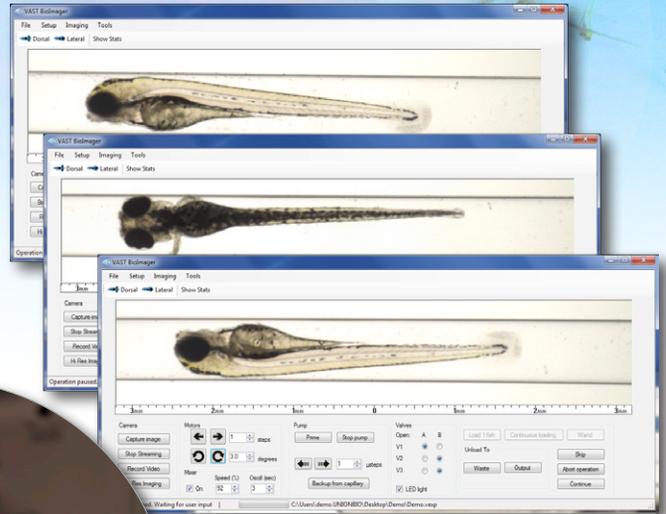


VAST BioImager™ Platform

Base System for Whole Zebrafish Organ-Level Imaging

To begin, the operator clicks the “Load” button within the easy to use software interface. VAST then loads one larva into the capillary and positions it laterally in the field of view of the on-board 10µm resolution camera. Next the system rotates each larva 360 degrees to determine the orientation of the fish. **The operator can then select the desired orientation - lateral, dorsal or any other custom orientation for still or video image capture.** These settings can then be stored as templates so all the remaining larvae automatically will be rotated to the same orientation using pattern recognition algorithms.

Once the image is captured, the operator then clicks on “Continue” to eject the larva and load the next one. The VAST software allows manual or automated control of all the steps needed to capture and store images of the larvae.



Higher Resolution and Fluorescence Imaging with a Microscope

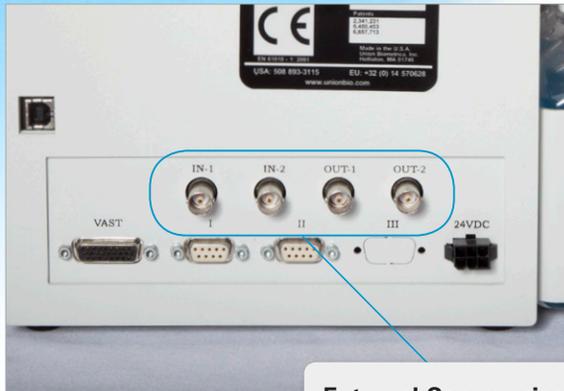
For higher resolution imaging including cellular resolution imaging tasks for high content screens, VAST can be mounted on many models of upright compound microscopes or stereomicroscopes using the optional **High Resolution Microscope Stage and Mounting Kit**. Please see our specification sheet for critical microscope dimensions. *(Note: Inverted microscopes can NOT be used)* This optional kit enables automated micron-level positioning laterally along the zebrafish. The stage from this kit is controllable by the VAST software and replaces the original stages found on select upright microscopes.

When using VAST in this configuration, once the larva is positioned using the on-board camera, the VAST internal light source is turned off and high-resolution images can be captured with the microscope's camera. Mounting VAST on a microscope equipped with fluorescence capability allows collection of fluorescence images.



VAST mounted on a high resolution fluorescence microscope

Automating the Manipulation of Zebrafish Larvae for Imaging Screens



External Communications (BNC connectors)

- Two independent TTL Trigger Outputs
- One TTL Trigger Input
- One TTL Sorting Input

Communications with a Microscope/Camera

The optional **External Communications Package** allows communicating with most microscopes and cameras. VAST systems are equipped with standard BNC quick connectors. There are two TTL inputs & two TTL outputs for bi-directional communications with up to two devices such as a camera and the microscope if your camera and microscope allow. Please contact your microscope vendor for the actual cables required for your particular make and model of microscope.

Automated Sampling from (and dispensing to) Multi-Well Plates

The optional Large Particle Sampler (**LP Sampler™**) module can be added to the system to gently aspirate larvae from multi-well plates and deliver them one at a time to VAST for imaging. This auto-sampler can handle a variety of standard or deep well plates including 24, 48 and 96-well configurations.

The expanded **LP Sampler with Dispenser™** allows you to deposit each larvae into the corresponding well of a daughter plate after imaging is complete. In this way, for example as part of a drug screen, you can remove a larva from one well, image it and return it to the corresponding well of a daughter plate to continue incubation.



Manual Selection

The optional hand-held **flow-through pipettor** can be used to manually load zebrafish larvae into the VAST one at a time at the click of a button thereby allowing the operator to "hand-select" larvae.

In summary, the VAST BioImager System is a modular and expandable automation platform that allows researchers to avoid the tedious manual steps of loading, positioning and rotating zebrafish larvae while collecting large datasets of larval images and videos.



VAST mounted on a high resolution
fluorescence microscope with LP Sampler

Other Tools for Zebrafish Research



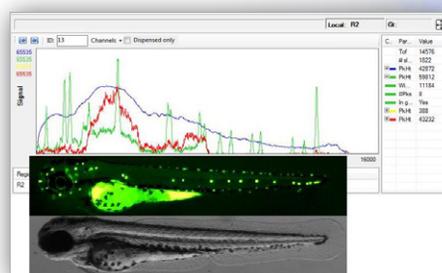
COPAS FP™

Large particle flow cytometer for
analysis and gentle dispensing of
zebrafish eggs and larvae.



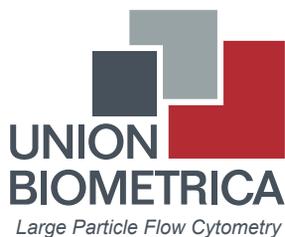
BioSorter®

Multi-range cytometer supports
model organism research ranging
from *C.elegans* to zebrafish.



Profiler™ Software

Digitizes optical density and fluorescence
patterns along the axial length of the object as
it passes through the flow cell.



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