

FACILITIES and EQUIPMENT DESCRIPTION

The UCR Institute for Integrative Genome Biology

Genomics Core Facility. The Genomics Core Facility at the Institute for Integrative Genome Biology (IIGB) provides technical, instrument, and professional development. The Core has two suites of instrumentation. In the Genomics Suite, capabilities include extraction and purification of plasmids from bacterial cultures in deep-well plates (Beckman Multimek robot), automated handling of liquids for DNA sequencing reactions (Multiprobe II robot, Perkin Elmer) and PCR (Dyad, Biorad, Eppendorf thermocyclers). For routine sequencing, the facility utilizes a 96-capillary sequencer (ABI 3730x1), whereas for genotyping, amplified microsatellites can be detected using a 16-capillary instrument (ABI 3100) and appropriate computer software (ABI GeneMapper). In the Gene Expression Suite, commercial microarray services are available. For custom arrays, the core offer two arrayers, a macroarrayer with 96 pins (Genetix Qpix) and a microarrayer with 1~48 pins (Biorad VersArray ChipWrite Pro spot arrayer). Three scanners are available for arrays, one for macroarrays and two for microarrays. For macroarrays and nucleic acid and protein blots, a Typhoon scanner (GE) with a resolution of 10~500uM can generate and quantify images from a variety of fluorophores and phosphoimage screens. For microarrays, the core offers two different scanners, the GenePix 4000B (Molecular Devices) and the ScannArray Express (Perkin Elmer) along with appropriate software for analysis. For commercial Affymetrix arrays, hybridization (Hybridization Oven 640), staining and washing (Fluidics Station 450), and quality control of RNAs (Bioanalyzer, Agilent) are offered. For array data analysis, two software packages (Molecular Devices Acuity and Stratagene ArrayAssist) are available. Gene expression can be validated by quantitative PCR using one of several instruments (ABI-7700 & BioRad-iQ5). For fluorescence cytometric and sorting applications with whole cells, the facility houses an advanced cell sorter (BD FACSAria) which is a high-speed sorter with fixed-alignment cuvette flow cell and three air-cooled lasers (488nm, 633nm, and 407nm).

The Center for Plant Cell Biology (CEPCEB)

Microscopy Core Facility. The ~2000 ft² microscopy core facility provides a comprehensive suite of confocal microscopes, and supporting peripheral equipment. Under the supervision of a full-time imaging expert and Academic Coordinator, Dr. David Carter, the Center is developing high throughput imaging capability and a range of optical imaging applications for use in plant and other systems. The Microscopy Core has five confocal microscopes: A high resolution UV spectral system with 9 laser lines (Leica TCS SP2 UV); a high resolution visible system with five laser lines (Zeiss LSM-510) and built-in laser ablation capability (Photonic Microsystems MicroPoint); one fully automated white-light confocal imaging workstation (BD Pathway HT), a real time ocular viewing laser confocal microscope (Meridian InSight Point); and a high speed Yokogawa spinning disc system with EMCCD camera (PhotonMax 512B) for very low light imaging. The Yokogawa system has a Terabyte of storage memory and includes an Optical Insights DualView eyepiece for simultaneous imaging of CFP/YFP fluorescent proteins for FRET analysis. Imaris Bitplane and Mercury Amira software are used for 3D image rendering and analysis. Other microscopy core equipment include a Hitachi TM-1000 tabletop scanning electron microscope; a Molecular devices Arcturus XT for laser capture; one ultramicrotome for electron microscopy sample preparation (Leica Ultracut T), with cryosectioning system for EM immunolocalization studies (Leica EM FCS); two fluorescence dissection stereo microscopes (MZIII), one having attachments for fluorescence imaging at sub-cellular resolution (Fluoro Combi/ SPOT RT210-3), and the other having a Spot Pursuit 4Mpixel camera for fluorescence and color imaging; a cryostat for rapid sectioning of frozen tissue (Microm HM 500 OMV); a microtome for sectioning wax or plastic embedded samples

(Hacker 5030 Microtome); an oscillating tissue slicer (EMS5000); a particle gun for inserting DNA into living tissue (BioRad PDS1000/HE Hepta); an automated microscope with premium image analysis system (GE MCID Elite) and a fluorescence microplate reader (Wallac Victor 2). For chemical genomics screens, we have two small BioTek Precision 2000 liquid-handling robots in laminar flow hoods for clean work, and a Beckman Coulter Biomek FX double bridge fluid handling robot with Cytomat hotel, for library management and distribution. The Biomek FX has eight independent Teflon tipped dispensers for cherry picking, a 96 tip head for bulk distribution, and two pin tool fixtures for dispensing sub-microliter volumes. There is also a Percival Arabidopsis growth chamber, and a Stanford Photonics Onyx luminescence imager. The equipment is available on a user fee basis.

Bioinformatics Core Facility. The ~900 sqft CEPCEB Bioinformatics Facility is supervised by Dr. Thomas Girke. The facility has a state-of-the-art server room, one office and a multifunctional bioinformatics lab that can accommodate eight programmers/students and hands-on workshops with 14 participants. For programming and workshops, the lab has 8 triple-bootable PC/Mac/Linux workstations and one molecular modeling workstation from Silicon Graphics. A 16 CPU production server system with 12TB storage space and a 24TB backup server system manage large databases, data storage and multi-user activity. All public web services are managed through a separate 8 CPU web/database server with an attached 24TB storage area network (SAN). A 64-CPU Linux cluster for large-scale parallel computing is fully integrated into this hardware infrastructure. A strong focus on remote access systems maximizes the availability of all hardware and software resources for many simultaneous users from any networked location. Over 300 open-source bioinformatics software packages are available for sequence analysis, data mining, molecular modeling, cheminformatics and statistical analysis. In addition, the facility maintains commercial licenses for transcriptional data mining (BioConductor), protein modeling (Insight II), pharmacophore searches (Catalyst) and large-scale small molecule mining (Cerius2). The mission of the group is to actively develop research collaborations with other scientists, to keep them informed about new bioinformatics approaches by instructing workshops (<http://faculty.ucr.edu/~tgirke/Workshops.htm>) and to build user-specific data mining tools and databases. The bioinformatics facilities and expertise are available on a user fee basis.

Proteomics Core Facility. The CEPCEB Core Proteomics Facility is supervised by a full-time Academic Coordinator, Dr. Songqin Pan, and has a series of instruments for protein separation, sample preparation, and mass spectrometry analyses. Together with the Institute for Integrative Genome Biology, the facility houses a Micromass Q-TOF nano-ESI MS/MS, an ABI Q-STAR oMALDI MS/MS, capillary LC equipment, protein digestion, and 2-dimensional gel electrophoresis equipment. The facility has been upgraded with most recent Q-TOF Premier technologies including continuous expression scanning, ultra performance liquid chromatography (UPLC) with non-splitting direct nano-flow, and more advanced data processing software, which will enable researchers to perform large-scale quantitative proteomics analyses with increased sensitivity and sequence coverage. The proteomics facilities are available on a user fee basis.

Other facilities

Arabidopsis growth facilities. The Department of Botany & Plant Sciences has several shared Arabidopsis growth rooms with a total of approximately 2600 ft² of growth space. In addition, a new transgenic plant facility is available with 640 ft² of Arabidopsis growth space.

Department facilities. The Department of Botany and Plant Sciences has cold-rooms, X-ray film processor, dark rooms, word-processing services, printing facilities, a Molecular Dynamics PhosphoImager facility, automated DNA sequencers, Arabidopsis growth facilities, reach-in and walk in growth chambers and incubators for growing plants on sterile media. The department has HPLC equipment and a Hewlett-Packard 5890 Series II gas chromatograph with a 5971A mass-selective detector.

Campus Facilities. Researchers associated with this proposal can utilize the resources in the *Analytical Chemistry Instrumentation Facility (ACIF)* and the *Plant Transformation Research Core (PTRC)*. The equipment in the ACIF includes five mass spectroscopy instruments, a diffractometer for X-ray crystallography and four high field NMR spectrometers. The PTRC provides ~2,100 square foot tissue culture laboratory space and two greenhouses. It is equipped with two growth chambers, laminar hoods, autoclaves, imaging equipment, a particle gun and more. The campus *Central Facility for Advanced Microscopy and Microanalysis* is equipped with TEM (Phillips CM300) and SEM (Phillips XL30-FEG) systems, a critical-point-dryer (Balzers CPD0202), Cryofixation system (Reichert-Jung KF80) and two ultramicrotomes (RMC XT-X and Sorval MT2).. This equipment is available on a user fee basis. A combined science library serves UCR and most current journals are available on the web without charge through the California Digital Library.