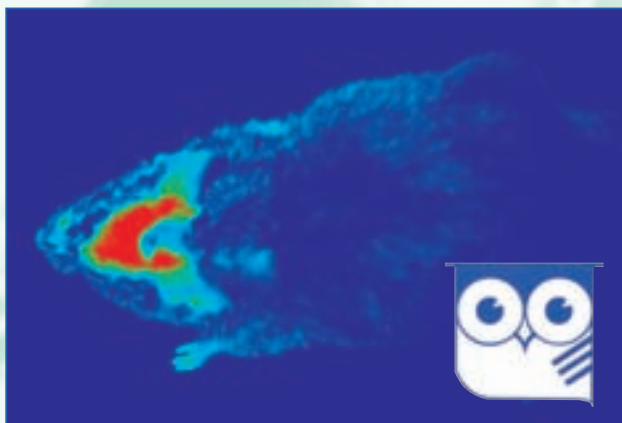
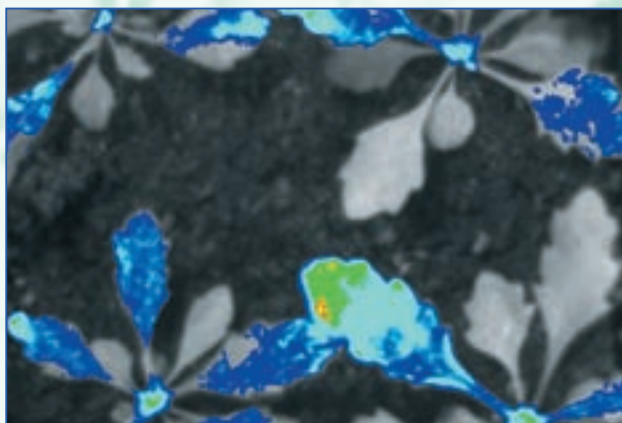


detect and identify



NightOWL II LB 983

Superiority in
Molecular Imaging

NightOWL II LB 983

Superiority in Molecular Imaging

Bioluminescence imaging (BLI) and biofluorescence imaging (BFI) make monitoring of gene expression in living organisms possible.



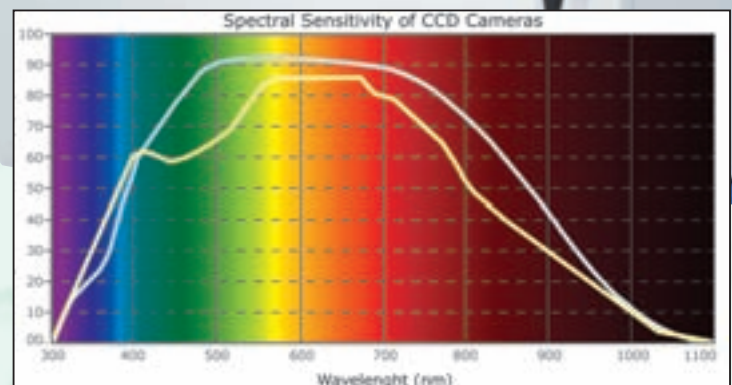
In 1989 BERTHOLD TECHNOLOGIES introduced its first low light imaging instrument – the LB 980 Luminograph. The first in-vivo gene expression experiments in plants and animals were performed on this instrument before 1993.

BLI utilizes light emitted by luciferase enzymes. Today bioluminescence markers can be tailored to any gene, enabling detailed research of gene function. BFI utilizes proteins, which fluoresce under illumination, either applied as exogenous reagents or endogenously expressed. Both BLI and BFI have contributed to the understanding of disease mechanisms and the development of new treatments.

Cameras

Today's generation of low light imagers from BERTHOLD TECHNOLOGIES, the LB 983 NightOWL II, is equipped with cooled slow scan CCD cameras:

- Front-illuminated NC 320 is ideal for fluorescence applications with 3.2 million pixels for high resolution. Micro-lenticular arrays on top of the CCD chip enhance light collection to maximum quantum efficiency of 85 %.
- Back-illuminated NC 100 with high full well capacity for large dynamic range is the appropriate model for luminescence applications. Broadband coating enhances the quantum efficiency in the spectral range between 500 to 750 nm ideally suited for luciferase and GFP emissions. The efficient Peltier cooling keeps the chip temperature low, reducing the dark current and thereby enhancing sensitivity.



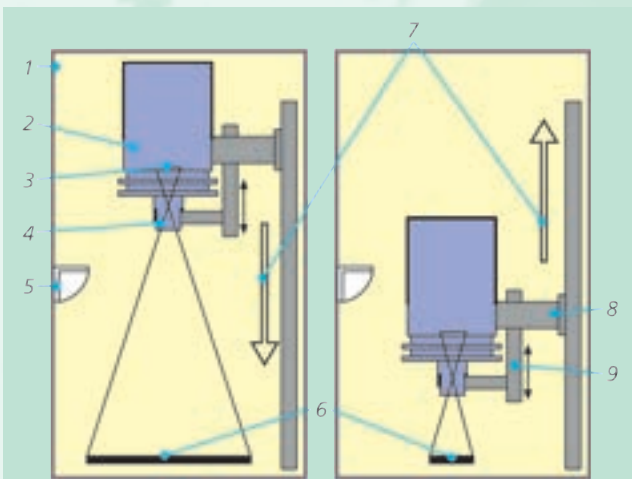
Camera NC 100

Camera NC 320

Cabinet

The NightOWL cabinet is extremely light-tight preventing any interferences from ambient light.

NightOWL is the only imager with a motor-driven camera inside the cabinet. Optimum resolution and focus of the sample is achieved by automatic positioning of the camera according to the actual sample size.



NightOWL dark cabinet

Light-tight housing (1) containing the Peltier cooled CCD camera (2) with a motor-driven vertical adjustment of magnification (7,8), CCD chip (3), the lens (4) with a second vertical precision drive for focus adjustment (9), a fluorescence light source (5) with exchangeable filters, the sample table (6) supporting 2D and 3D objects from 35 (right drawing) to 260 mm (left drawing).

The camera can be moved from a height of 35 mm to 725 mm allowing focussing on every sample size up to 260 mm. For close-ups a macro table can be used.

The camera is set up with flat field and height correction. This calibration eliminates non-uniformities caused by variations in the optical path due to height, illumination or lens effects.

The NightOWL cabinet has enough space to install special light sources or to place transilluminators, heaters, coolers etc. These devices may even be switched on and off through the software and the built-in sockets.

The flange option provides light-tight access to the inner part for tubings and cables.

Fluorescence Reflectance Imaging (FRI)

requires a range of illumination devices to excite the sample from above. As the camera is positioned directly with view to the sample it can easily measure the signals emitted. To excite the fluorophors and measuring its emission, the proper illumination and set of filters have to be chosen.

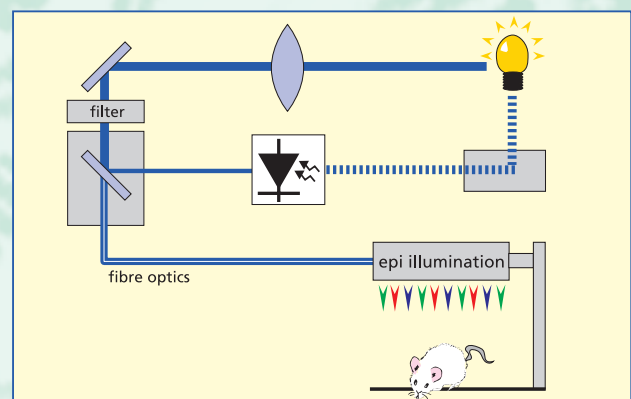
Excitation & Emission Filters

Software-driven filter carriers provide quick change of emission and excitation filters within one reading sequence especially important for all applications with a ratiometric readout. Measurement at different wavelengths at one time can be carried out due to the flexible protocol definition software.

The time for changing the adjacent emission filters is less than 500 ms, much faster than the camera readout. Selected high quality interference filters are mounted in the required positions and additional filters can easily be added by the user.

Optics and lamp control

The unique optical system from the LB 940 Mithras Multimode Reader has been integrated in the NightOWL II model. The light beam is kept constant for each fluorescent measurement, which is ideal with the ring-light epi illumination. If the ring-light is always set at the same height, the excitation energy on the sample will always be the same.



The lamp energy can be set by a lamp factor in the software. This allows calibration of the imaging system for each fluorophor. Comparison of the amounts of different fluorophors in one sample becomes very easy.

detect and identify

indiGO™ Software

The new easy-to-use indiGO™ software has been developed together with users. Well organized menus and dialogue boxes guide the user through camera set-up, image processing and image analysis.



Some techniques for generating and/or detecting light in biological subjects are patented and may require licences from third parties. Users are advised to independently determine for themselves whether their activities infringe any valid patent.

- quantitative analysis
- display of luminescence, fluorescence or photographic images in black & white or pseudocolour
- contrast and image enhancement tools
- colour overlay e.g. photographic image with luminescence image, e.g. fluorescent gel with the hybridization signal, or of various fluorescent images
- line plot function
- surface plot function
- zoom function (up to 5-fold)
- definition of areas of insert and evaluation
- geometrical analysis
- arithmetic functions
- data export into spreadsheet
- raw data and processed data are filed separately (according to GLP rules)
- individual exposures or image sequences
- macro function to automate image processing steps
- image import and export (16-bit TIF file generated by indiGO™ can easily be processed by further software packages, e.g. for multimodality or co-registration)
- printing on any Windows printer via software

Versatility and flexibility

The conditions to image living organisms can be very different. Gas anaesthesia e.g. is nowadays used for small animals but never used in plant imaging. In that case controlling of light, temperature or humidity is more important.

In the field of infectious diseases or food processing the growth of bacteria will be the aim of interest. In dermatology and material science the very faint luminescence of radical oxygen species (ROS) is measured. In live science, quality control or forensic studies you need a very sensitive instrument for Western, Southern and Northern blots.

To cover all these applications an imaging system has to be very flexible. BERTHOLD TECHNOLOGIES ensures such flexibility with the NightOWL itself and provides a huge variety of accessories (please refer to brochure Accessories for NightOWL).

Moving of camera inside the cabinet	✓
Height correction in each position	✓
Enough space inside the cabinet	✓
Easy exchange of camera	✓
Microscope and plant chamber adaption	✓
Power sockets inside the cabinet	✓
Control of interface inside the cabinet	✓
Positioning plates	✓
Macro table	✓
Flange	✓
Gas anaesthesia unit	✓
Workstation	✓
Fluorescence Reflectance Imaging	✓
Ring-light epi illumination	✓
Dual line epi illumination	✓
Gooseneck spot illumination	✓
Transilluminators	✓
Orthogonal 3D-Imaging option	✓
Animal beds for multimodality imaging	✓

detect and identify

Applications*

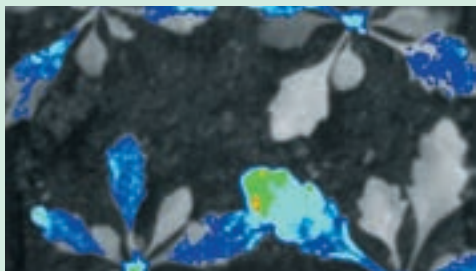
Whole animals and plants can be imaged as well as blots, gels, microplates, cell culture dishes and arrays regardless of the luminescent or fluorescent markers used. Optical calibration ensures the comparability of all images captured with the NightOWL.

Detection of weak light signals with CCD cameras can be achieved with high quantum efficiencies and extremely low noise levels to enable long exposure times. The camera and cabinet design are the key to superior imaging performance, complemented by scientific evaluation software for quantification.

Applications	NC 100	NC 320
Biochip	+	+
Bioluminescence	+++	++
Blot documentation	++	++
Chemiluminescence	+++	++
Colony counting	++	++
Fluorescence	++	+++
Gel documentation	++	++
In-vivo Imaging	+++	++
Microplates	+	+
Microscopy	++	+++
Multi-label measurements	+++	++

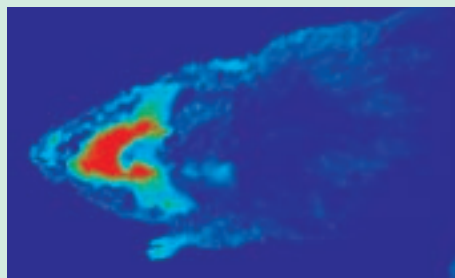
+ good performance ++ superior performance +++ excellent performance

- In-vivo visualization of reporter gene expression in prokaryotic and eucaryotic cells, in living transgenic animals and plant.



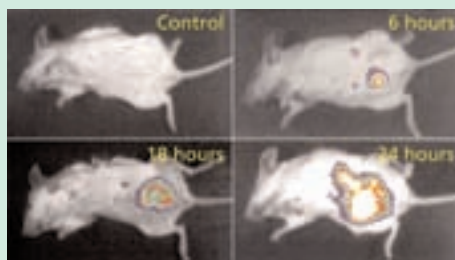
- Visualization of bacterial growth in food
- In-vivo visualization of skin diseases in dermatology
- Research and product optimization in varnish, paint and pigment production
- Imaging of chemiluminescence of solid polymers
- Detection of ROS (reactive oxygen species)
- Forensic Science
- Imaging of microplates: immunoassays, reporter genes detection, gene probes and phagocytosis

- In-vivo visualization of fluorophors, e.g.



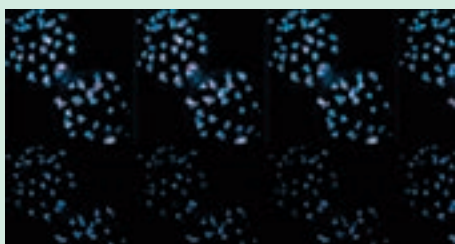
Oxazines bound to beta-amyloid deposits as present in Alzheimer's disease.

- In-vivo visualization of infectious diseases



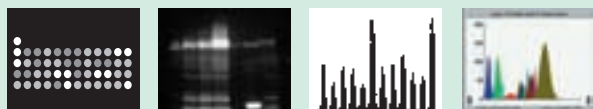
Intraperitoneally inoculated with *Salmonella enteritidis* carrying a lux Operon of *Xenorhabdus luminescens*; exposure time: 60 sec. (Courtesy: P. Hill, Nottingham, UK).

- Study of circadian rhythms via reporter genes in living transgenic plants.



The time-course follows the rhythm of transcription from the CAB2 promoter over 48 hours.

- Gels and blots: imaging and measuring of chemiluminescent stained Southern, Northern and dot blots as well as Western blots.



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NightOWL II LB 983

Technical Specification and Order Information

CCD Cameras	for more information refer also to the brochure of NightOWLcam LB 982
NC 100	back illuminated, 1024 x 1024 pixel, quantum efficiency 90 % at 620 nm, sensitive from 300 to 1050 nm, dynamic range of 82 dB, cooling performance of > -90 °C
NC 320	front illuminated, 2184 x 1472 pixel, quantum efficiency 85% at 600 nm, sensitive from 300 to 1050 nm, dynamic range of 73 dB, cooling performance of > -60 °C
Exposure times	from 30 milliseconds to hours
Pixel binning	variable in x and y to increase sensitivity
Filters	4 excitation filters per slide 4 emission filters per wheel user selectable frame 340 nm up to 1100 nm additional filter slides/wheels available
Light Source	75 W tungsten lamp
Working distance	automated positioning of the camera allows working distances between 35 mm and 725 mm. For working distances below 35 mm the macro table has to be used. Connection to a microscope changes field of view also.
Interfaces	to place transilluminators, heaters, coolers, light sources etc.
Dimensions	122 x 60 x 40 cm (HxWxD)
Weight	85 kg

Order Information

Order Number

NightOWL II LB 983 NC 100 complete incl. Software	40508-10
NightOWL II LB 983 NC 320 complete incl. Software	40508-20

The new indiGO™ software will be available in Q2/2008.

For a huge variety of accessories please see separate brochure. For further information of available filters please see filter data sheet.

Recommended minimum data system:

Pentium 200 MHz, 32 MB RAM, 2 GB hard disk, true Colour 22" display

BERTHOLD TECHNOLOGIES reserves the right to implement technical improvements and/or design changes without prior notice. NightOWL and indiGO are trademarks of BERTHOLD TECHNOLOGIES.



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