## Research Support Facilities

*Head*
TAKADA, Shinji

**● Large Spectrograph Laboratory**

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| *Professor (Adjunct)* | WATANABE, Masakatsu |
| *Technical Staff* | HIGASHI, Sho-ichi |
| *Technical Assistant* | ICHIKAWA, Chiaki |
| *Secretary* | ISHIKAWA, Azusa |

**● Tissue and Cell Culture Laboratory**

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| *Assistant Professor* | HAMADA, Yoshio |
| *Technical Assistant* | TAKESHITA, Miyako |

**● Computer Laboratory**

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| *Assistant Professor* | UCHIYAMA, Ikuo |
| *Technical Staff* | MIWA, Tomoki |
| | NISHIDE, Hiroyo |
| | NAKAMURA, Takanori |
| *Technical Assistant* | YAMAMOTO, Kumi |

**● Plant Culture Laboratory**

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| *Technical Staff* | NANBA, Chieko |
| *Technical Assistant* | SUZUKI, Keiko |

## 1. The Large Spectrograph Laboratory

This laboratory provides, for cooperative use, the largest spectrograph in the world, the Okazaki Large Spectrograph (OLS), dedicated to action spectroscopical studies of various light-controlled biological processes. The spectrograph runs on a 30kW Xenon arc lamp and has a compound grating composed of 36 smaller individual gratings. It projects a spectrum of a wavelength range from 250nm (ultraviolet) to 1,000nm (infrared) onto its focal curve of 10m in length. The fluence rate (intensity) of the monochromatic light at each wavelength is more than twice as much as that of the corresponding monochromatic component of tropical sunlight at noon (Watanabe *et al*., Photochem. Photobiol. *36*, 491-498, 1982).

Figure 1. The Large Spectrograph

The NIBB Cooperative Research Program for the Use of the OLS supports about 20 projects every year conducted by visiting scientists, including foreign researchers, as well as those in the Institute.

Action spectroscopical studies for various regulatory and damaging actions of light on living organisms, biological molecules, and artificial organic molecules have been conducted (cf. Watanabe, M. *In* "CRC Handbook of Organic Photochemistry and Photobiology, 2nd ed.". pp. 115-1~115-16, 2004).

An advanced irradiation system composed of CW lasers (364nm, 390-410nm, 440-460nm, 532nm, 655nm, 752nm) and uniform-fluence-rate irradiation optics interconnected by optical fibers was constructed in 2003. An advanced observation system for cellular and intracellular photobiological responses utilizing a two-photon microscope (FV300-Ix71-TP with a MaiTai laser) and a microbial photomovement analyzer (WinTrack2000/Ecotox) was also introduced.

### Publication List on OLS Collaboration

〔Original papers〕


- Ikehata, H., Kawai, K., Komura, J., Sakatsume, K., Wang, L., Imai, M., Higashi, S., Nikaido, O., Yamamoto, K., Hieda, K., Watanabe, M., Kasai, H., and Ono, T. (2008). UVA1 genotoxicity is mediated not by oxidative damage but by cyclobutane pyrimidine dimers in normal mouse skin. J. Invest. Dermatol. *128*, 2289-2296.
- Ioki, M., Takahashi, S., Nakajima, N., Fujikura, K., Tamaoki, M., Ioki, M., Takahashi, S., Nakajima, N., Fujikura, K., Tamaoki, M., Saji, H., Kubo, A., Aono, M., Kanna, M., Ogawa, D., Fukazawa, J., Oda, Y., Yoshida, S., Watanabe, M., Hasezawa, S., and Kondo, N. (2008). An unidentified ultraviolet-B-specific photoreceptor mediates transcriptional activation of the cyclobutane pyrimidine dimer photolyase gene in plants. Planta *229*, 25-36.
- Mori, E., Takahashi, A., Kitagawa, K., Kakei, S., Tsujinaka, D., Unno, M., Nishikawa, S., Ohnishi, K., Hatoko, M., Murata, N., Watanabe, M., Furusawa, Y., and Ohnishi, T. (2008). Time course and spacial distribution of UV effects on human skin in organ culture. J. Radiat. Res. *49*, 269-277.
- Nagai, Y., Miyagishi, D., Akagawa, T., Ohishi, F., Ueno, H., Kobayashi, K., Yamashita, K., and Watanabe, J. (2008). Photodegradation mechanisms in poly(2,6-butylenenaphthalate-co-tetramethyleneglycol) (PBN-PTMG), Part III: Photodegradation induced by the carbonyl group in n, π* excited states. Polym. Degradat. Stabil. *93*, 134-138.
- Nagao, A., Zhao, X., Takegami, T., Nakagawa, H., Matsui, S., Matsunaga, T., and Ishigaki, Y. (2008). Multiple shRNA expressions in a single plasmid vector improve RNAi against the XPA gene. Biochem. Biophys. Res. Commun. *370*, 301-305.
- Simamura, E., Shimada, H., Ishigaki, Y., Hatta, T., Higashi, N., and Hirai, K-I. (2008). Bioreductive activation of quinone anti-tumor drugs by mitochondrial voltage-dependent anion channel 1. Anat. Sci. Int. *83*, 261-266.
- Suzuki, T., Takashima, T., Izawa, N., Watanabe, M., and Takeda, M. (2008). UV radiation elevates arylalkylamine N-acetyltransferase activity and melatonin content in the two-spotted spider mite, *Tetranychus urticae*. J. Insect Physiol. *54*, 1168-1174.


## 2. Tissue and Cell Culture Laboratory

Various types of equipment for tissue and cell culture are provided. This laboratory is equipped with safety rooms which satisfy the P2/P3 physical containment level. This facility is routinely used for DNA recombination experiments.

## 3. Computer Laboratory

The computer laboratory maintains several computers to provide computation resources and the means of electronic communication within NIBB. Our main computer system, the Biological Information Analysis System (BIAS), consists of a shared memory parallel computer (SGI Altix 350; 8CPU, 48GB memory) with a disk array storage system (D-RAID; 1.6TBx10), a high-performance cluster system (DELL PowerEdge 1850; 2CPU (16+1) nodes), and a data visualization terminal (DELL Precision 370). Some personal computers and color/monochrome printers are also available. On this system, we provide various biological databases and data retrieval/analysis programs, and support large-scale data analysis and database construction for institute members.

The computer laboratory also provides network communication services. Most of the PCs in each laboratory, as well as all of the above-mentioned service machines, are connected to each other by a local area network (LAN), which is linked to the high performance multimedia backbone network of the Okazaki National Research Institute (ORION). Many local services, including sequence analysis services, file sharing services, and printer services, are provided through this network. We also maintain a public World Wide Web server that contains the NIBB home page (http://www.nibb.ac.jp/).

## 4. Plant Culture Laboratory

Plant culture laboratory consist of biotron, plant cell culture facility, and experimental farm. Biotron contains a large number of culture boxes and a limited number of rooms with environmental control for plant culture. In some of these facilities and rooms, experiments can be carried out at the P1 physical containment level under extraordinary environments such as strong light intensity, low or high temperatures, etc. Plant cell culture facility is equipped with autotrophic and heterotrophic culture devices and equipment for experimental cultures of plant and microbial cells. Facilities for the preparation of plant cell cultures, including an aseptic room with clean benches, are also provided. Experimental farm consists of two 20 $m^2$ glass-houses with precise temperature and humidity control, four green houses at the P1 physical containment level, a small farm, and two greenhouses (45 and 88 $m^2$) with automatic sprinklers. The laboratory also includes a building with storage and work space.

Facilities for the preparation of plant cell cultures, including an aseptic room with clean benches, are also provided.