



## Course on High-Resolution Respirometry

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# International Course on High-Resolution Respirometry: Oxygraph-2k, TIP-2k and DatLab 4.

## 18-22 August 2006



Schröcken, Vorarlberg, Austria

The 35<sup>th</sup> Course on High-Resolution Respirometry starts with a demo experiment using cultured cells, providing a practical overview of the **Oxygraph-2k** in action, with integrated on-line analysis by **DatLab 4**, and with an application of the **TIP-2k** in a FCCP titration. Specific emphasis is placed on hands-on practical sessions to introduce the technical and operational details of high-resolution respirometry.



Experienced tutors guide small working groups step-by-step through the approach of high-resolution respirometry.

Four Oxygraph-2k, two TIP-2k and four PCs are available to provide everybody with a do-it-yourself opportunity for both hardware and software.

During lunch breaks, sufficient time is available for walks and talks (Körbersee and Alpmuseum), and adventures.



DatLab 4 effectively changed the structure of our O2k Course, since now we accomplish data analysis on-line during the experiment, providing final results and their graphical presentation by the end of an experimental run. Thus we gain sufficient time to see the new Titration-Injection microPump TIP-2k in action and practice its simple and automatic operation.



## Lecturers and Tutors



*Hélène Lemieux,  
Rimouski, CA*



*Erich Gnaiger,  
Innsbruck, AT*



*Steven Hand,  
Baton Rouge, US (top)  
Lukas Grادل,  
Innsbruck, AT (left)*

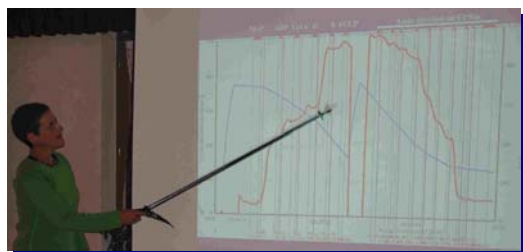
## Programme

### Friday, 18. August

**Afternoon/Evening** Check in at Hotel Mohnenfluh, 19:30 dinner  
After dinner: Setting up the instruments with a glass of wine.

### Saturday, 19. August

**08:45 – 11:45 From switching on the Oxygraph-2k to the experimental result.**



- Oxygraph-2k demo experiment with DatLab 4;
- Oxygen calibration;
- Addition of cells and closing the chamber;
- "Phosphorylation control titration": Routine respiration, oligomycin-induced state 4<sub>o</sub>, uncoupled state u, inhibition by rotenone and antimycin A;
- FCCP titration with the TIP-2k.

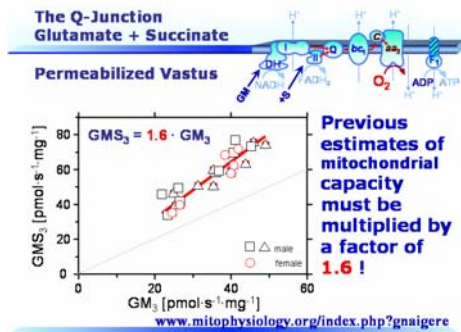
13:00 – 16:00 Walk from Kalbelee to Körbersee ([www.koerbersee.at](http://www.koerbersee.at)), Alpmuseum ([www.alpmuseum.at](http://www.alpmuseum.at)), Schröcken.



16:15 -19:00  
Hands-on with the Oxygraph-2k: Cell respiration experiment (Practical Session 1).



19:30  
Dinner



**21:00** Hot topics in Mitochondrial Physiology: *Erich Gnaiger* (Innsbruck, AT) The upper limits of mitochondrial respiratory capacity.

**Sunday, 20. August**

**08:45 - 11:45**

**Working groups: Hands-on experiments with the Oxygraph-2k** (Practical Session 2).

12:00 - 14:00

Lunch break.

**14:00**

**Special topic discussion group:** Combined measurement of mitochondrial membrane potential (TPP+, TPMP+) and respirometry (Wieslawa Jarmuszkiewicz, PL)

**14:00 - 19:30**

**Working Groups: Hands-on experiments with the Oxygraph-2k** (Practical Session 3).

20:30

Dinner

**21:00**

Hot topics in Mitochondrial Physiology: *Hélène Lemieux* (Ramoski, CA) Control and capacity of mitochondrial respiration as a function of temperature. High-resolution respirometry in permeabilized fibres of the mouse heart.



**Monday, 21. August**

**08:45 - 12:15**

**Working groups: Hands-on experiments with the Oxygraph-2k** (Practical Session 4).

13:00 - 17:00

Adventure park with Joseph Stagg.

**17:30 - 19:00**

**Working groups: Hands-on experiments with the Oxygraph-2k.** Practical Session 4.



**19:00** Dinner at Hotel Mohnenfluh

**21:00** Hot topics in Mitochondrial Physiology: *Steven Hand* (Baton Rouge, US) Arrest of mitochondrial respiration without oxygen limitation in invertebrates: Causes and consequences.



*Pablo Garica-Roves* (Stockholm, SE) Genetic and dietary influences on muscle metabolism.

**Tuesday, 22. August**

Departure

## CONTENTS: OVERVIEW ON HIGH-RESOLUTION RESPIROMETRY

**Introduction: Mitochondrial and cellular respiratory physiology – new challenges for high instrumental performance.**

**High-resolution respirometry – what makes the difference? Presentation of the OROBOROS Oxygraph-2k**

- Low oxygen and measurement of cellular oxygen consumption – pushing the limits of detection.
- Optimum system design - the OROBOROS Oxygraph-2k.
- On-line recording of oxygen concentration and flux; linear slope versus oxygen flux as a function of time.
- The concept of high-resolution calibrations – instrument demonstration.

**OROBOROS Oxygraph-2k and TIP-2k: On-line instrumental performance**

- Instrumental background: measurement and correction as a function of  $pO_2$ .
- High resolution of respiratory flux at various steady-states.
- Conceptual and methodological advantages of measurement at physiological low levels of oxygen.
- High time resolution for kinetic analyses: Determination of the time constant, dynamic corrections.

**Polarographic oxygen sensor and Oxygraph service**

- Cleaning of anode and cathode.
- Electrolyte and membrane application.
- Oxygraph-2k and TIP-2k: instrumental maintenance.

**DatLab 4 – the specialized software for High-Resolution Respirometry: Data acquisition and analysis.**

## Accommodation and Location

**Hotel Mohnenfluh** [www.mohnenfluh.at](http://www.mohnenfluh.at); Tel.: +43 5519 203; [hotel@mohnenfluh.at](mailto:hotel@mohnenfluh.at)  
The course takes place at Hotel Mohnenfluh (Sylvia Schramm-Strolz). Accommodation for all participants is arranged at Hotel Mohnenfluh.

**Further information** Introductory course material is available on our homepage [www.orooboros.at](http://www.orooboros.at).

## Contact

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OROBOROS INSTRUMENTS  
high-resolution respirometry

Oxygraph-2k



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Cooperation and Feedback in Science

## Participants: O2k and Adventure Park



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# IOC35 @ Adventure Park Schröcken

