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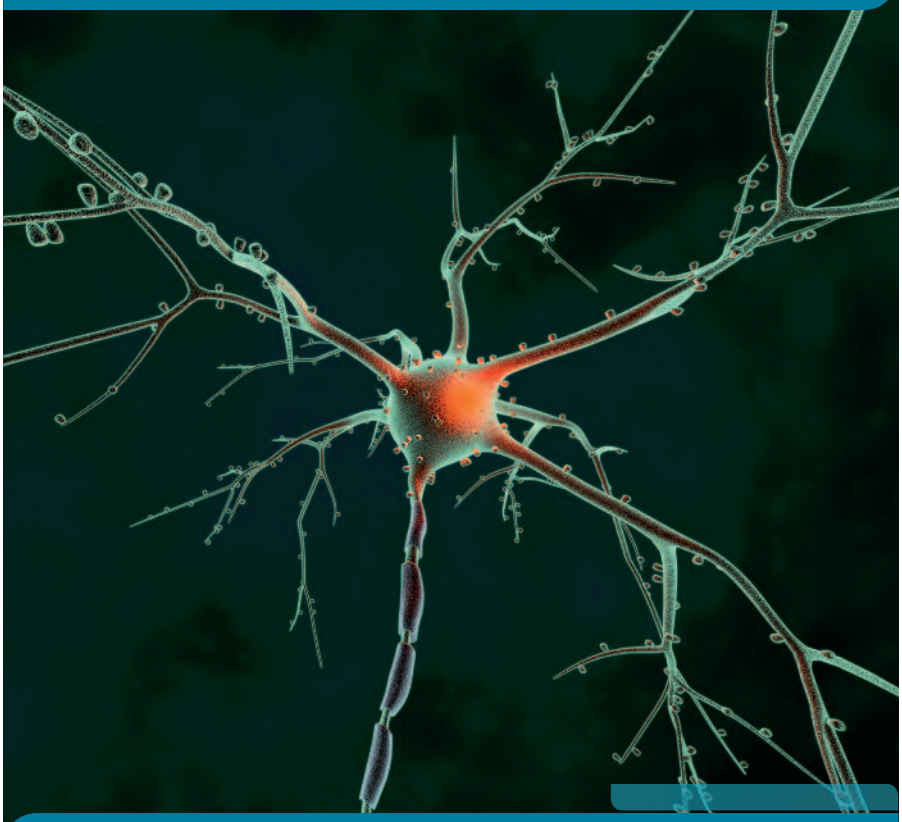
Neurex Newsletter n°25



Strasbourg

Freiburg

Basel

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Edito

Soon over, the year 2012 has marked for Neurex the implementation of its new Interreg project of support: *TriNeuron*. Still characterized by the regular occurrence of workshops & meetings, our 2012-2015 project also involves new activities that were (will be) developed for the first time before the end of the year. Among them, the controversy debates, such as the one that was organized last May on the beta amyloid hypothesis, or the development of interactions with companies. The CorTec start-up opened its doors to Neurex members last June in Freiburg and a Meet & Match event will take place at the beginning of December in Strasbourg, organized in collaboration with BioValley.

Presented during an introductory update at the Neurex annual meeting, our actions also include financial support to start-ups, to junior scientists back in Neurex universities in order to set up a research team, as well as financial support to publications (see news inside). Neurex is also pleased to welcome new research groups in Basel and Freiburg, as detailed inside this newsletter. Last but not least, a new cluster of excellence - Brainlinks Braintools- was created this year in Freiburg. A start for TriNeuron which bodes well for the dynamics of our network: meet you beginning of November at our next workshops! ■ P.P.

neurex
neuroscience·upper·rhine·network


Dierk Reiff

Prof. Dr. Dierk Reiff and his team. Shown are from left to right: Vitus Oberhauser (Akademischer Rat), Vaienoe Haikala (Post Doc), Andrea Buderer (secretary), Beate Ziser (technician), Ulrike Förster (animal care), Cathrin Eschbach (technician), Martin Piringer (Hiwi), Eva Abraham (Diploma student), Dierk Reiff.

Prof. Dr. Dierk Reiff, University of Freiburg

Dierk Reiff is a professor for animal physiology & neurobiology at the University Freiburg where he combines teaching with research on visual information processing. In October 2011 he left the MPI for Neurobiology in Martinsried where he was head of the *«Drosophila group»* in the department of Alexander Borst. His lab aims at understanding how intelligent behavior arises from neural activity in the brain. To tackle this central question in neuroscience he employs a combined genetic, physiological and behavioral approach in the genetically amenable fruit fly *Drosophila melanogaster*.

In the past 10 years D. Reiff pioneered the study of cellular processing steps underlying *visual motion detection in Drosophila* (Borst, Haag and Reiff 2010; An. Rev. Neurosci.). Advances in his lab in the electrical and optical recording of neural activity, visual stimulation and genetic manipulation of neural circuitries enable his team to reveal fundamental new insights into this classical question in neuroscience. In his work, insect motion vision is used to study the cellular principles of information processing. Experiments in his lab are guided by a mathematical model, the correlation type motion detector (Reichardt, 1987, J. Comp. Physiol.) that accurately reproduces cellular and behavioral responses to motion stimuli in a wide range of animal species including results from human psychophysics. Images drifting on the retina of the fly elicit elementary motion detectors that compute local motion estimates. This local motion information is spatially integrated on the elaborate dendrites of large field directionally selective neurons, the LPTCs, in the lobula plate of the fly visual system. Such LPTCs have extensively been studied in large fly species. However, the cells and cellular processes underlying local motion detection presynaptic to LPTCs could not be addressed so far due to the small size of the columnar neurons constituting the elementary motion detectors.

In a first step toward the analysis of elementary motion detection in *Drosophila*, D. Reiff and coworkers disclosed the biological hardware underlying the integration of local motion signals on LPTC dendrites (Raghu et al., 2007, J. Comp. Neurol; Raghu et al., 2009, J. Neurogenetics). Subsequently, his team used whole cell recording to demonstrated that the responses of *Drosophila* LPTCs precisely match the predictions made by the correlation type motion detector (Joesch et al., 2008, Curr. Biol.; Schnell et al., 2010, J. Neurophysiol.). Thus, the time was ripe for the further identification of the neurons and cellular mechanisms underlying local motion detection in the network presynaptic to LPTCs.

To enable direct measurements from columnar neurons, D. Reiff developed an optical approach based on Two-Photon-Laser-Scanning-Microscopy (2PLSM) combined with genetically encoded indicators for calcium (GECIs). Optical recordings in *Drosophila* were pioneered by D. Reiff since the first functional GECIs were published and his team contributed to many advances in this timely field of research (Reiff et al., 2002, 2005, J. Neurosci.; Guerrero et al., 2005, Nat. Neurosci.; Mank et al., 2006, Biophys J; Mank et al., 2008, Nat. Methods; Hendel et al., 2008, J. Neurosci). By developing a technique for the temporal separation of visual motion stimuli from fluorescence recording at the 2PLSM, he provided first evidence for a dedicated OFF-channel in the fly visual system (Reiff et al., 2010, Nat. Neurosci.). Combining whole cell recording in LPTCs with the expression of genetic blockers of activity in presynaptic neurons, the team around Reiff and Borst disclosed separate channels for the encoding of brightness increments (L1) and decrements (L2) that underlie the detection of

drifting ON- and OFF-edges, reminiscent of ON- and OFF bipolar cells in the vertebrate visual system. These results revealed fully unexpected commonalities in the early visual processing between insect and vertebrates (Jösch et al., 2010, Nature). Based on these findings and further experiments a revised model of the original correlation type detector was recently published (Eichner et al., 2011, Neuron).

Current research of the AG Reiff in Freiburg aims at identifying the missing cells and cellular processing steps underlying motion vision and the control of visually guided behavior. To reach this goal optical and electrical recording of neural activity are being combined with recent genetic tools for the activation or inactivation of neuronal activity by heat or light (thermo- and optogenetics) in tethered behaving animals. Based on these techniques and the described advances in the analysis of motion vision, the AG Reiff recently started a research program on the cellular mechanisms underlying the detection of color, a so far uncharted territory in *Drosophila* physiology. Finally, new insights into the neural circuitries underlying motion vision and optomotor behavior are currently being used to investigate the role of specific molecules, in particular Down-Syndrome-Cell-Adhesion-Molecules (Dscams) in neural circuit assembly and function. The research program of the AG Reiff enables studying development, function and behavior as a whole and promises to contribute fundamental insights into the function and dysfunction of the brain in flies and humans. ■ D.R.

Dr. Brigitte Kieffer appointed Director of the IGBMC

The CNRS (Centre National de la Recherche Scientifique), Inserm (Institut de la Santé et de la Recherche Médicale) and University of Strasbourg nominated Brigitte Kieffer at the head of the IGBMC (Institute of Genetic and Molecular & Cellular Biology), a decision effective from the 1st June, 2012. Brigitte Kieffer will thus take over Dr. Olivier Pourquier who was head of the institute since 2009.

B. Kieffer is a neurobiologist interested in opioid receptors and the endogenous peptides which activate these receptors. Her group uses gene targeting approaches in mice (knockout, conditional knockout and knock-in), behavioral analysis, pharmacology, as well as receptor and cellular imaging to decipher the neuromodulatory role of opioids in chronic pain or psychiatric disorders. ■ P.P.

Two New Professors of Neurobiology appointed at the Biozentrum

Early next year, two new professors will start at the Department of Neurobiology of the Biozentrum (University of Basel).
Thomas Mrsic-Flogel, new Associate Professor, will address the question of how the brain perceives sensory stimuli and explore the extent to which this depends on the structure of neural networks.
Assistant Professor Sonja Hofer will investigate how modifications in synaptic connections contribute to learning and memory formation. explore the structure and function of neural networks. Both have already received several major awards for their scientific work. ■ P.P.

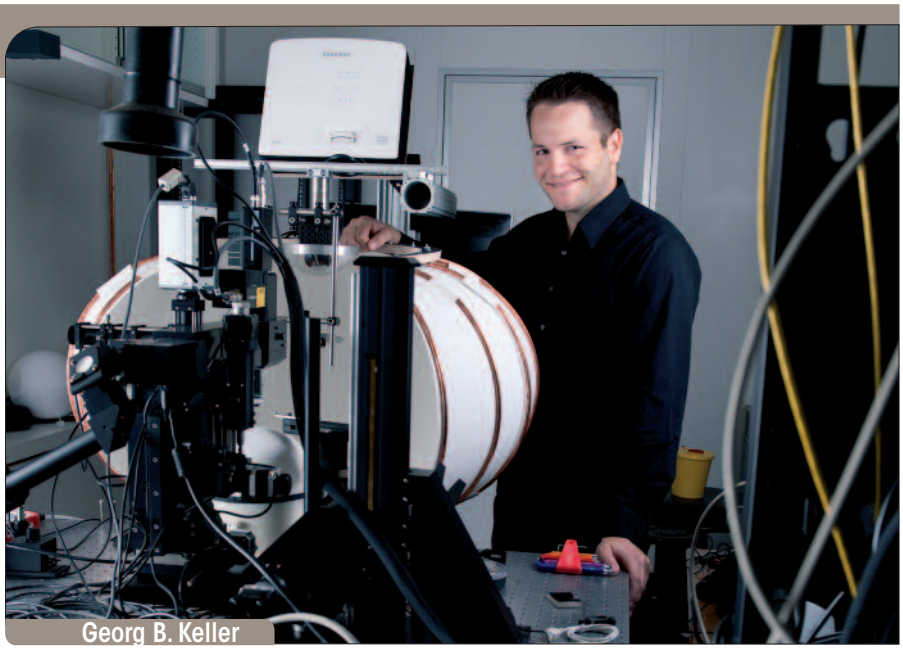
More details on
http://www.biozentrum.unibas.ch/news-events/news-details/article/two-new-professors-of-neurobiology-appointed-at-the-biozentrum/

A new cluster of excellence in Freiburg

A new Cluster of Excellence was chosen by the Joint Commission of the German Research Foundation and the German Council of Science and Humanities at the University of Freiburg: called BrainLinks-BrainTools, this cluster unites life sciences, engineering, and clinical applications in Freiburg, thus anchoring neurotechnology as a research axis between three faculties of the University and various cooperation partners. As thoroughly detailed by Prof. Ulrich Egert during our recent Annual Meeting, these emerging opportunities for strong joint research and education between neuroscience and engineering will bring unprecedented and novel interdisciplinary results in an area highly relevant for society as a whole. Clusters of Excellence are internationally visible, competitive research and training facilities, which aim at enhancing scientific networking and cooperation among the participating institutions. ■ P.P.
More information on
https://www.brainlinks-braintools.uni-freiburg.de/

Dr. Georg B. Keller

FMI, Basel



Georg B. Keller

On the first of April 2012, Dr. Georg B. Keller was appointed Junior Group Leader at the Friedrich Miescher Institute (FMI, Basel). Dr. Keller got his diploma in theoretical physics at the ETH Zürich in 2005 and graduated in 2009 after PhD training at the Institute of Neuroinformatics at the ETH/ Uni Zürich. Dr. Keller joined the FMI following a 3 years postdoctoral period at the Max Planck Institute of Neurobiology in Munich. He and his group are interested in the study of sensory processing in the visual cortex. Zoom on Dr. Keller's research interests. ■ P.P.

We see, hear, smell, taste and feel - we experience everything of the world around us through our senses. Physical stimuli impinge on our sensory organs, where they are transduced into neural signals. These signals are then processed and transformed by a hierarchy of brain areas and eventually give rise to perceptions. In other words, the sensory system transforms a peripheral representation of the stimulus to a more complex high-level representation that can be processed by associative areas of the brain. In the visual system, this idea of feed-forward processing has yielded – amongst many other things – the very fruitful concept of the feature detector [Barlow 1953] from which our notion of receptive field stems. The same idea was later used by Hubel and Wiesel [Hubel and Wiesel 1962] in explaining the generation of simple and complex cell responses found in the primary visual cortex. Still today, the models most successful in explaining size, translation and rotation invariance of higher order visual neurons are based on feed-forward, sensory processing hierarchies [Riesenhuber and Poggio 1999].

However, there is accumulating evidence for activity in sensory areas of active, behaving animals that cannot be explained by a simple feed-forward processing hierarchy. Activity of visual neurons, for example, is modulated by eye movements [Leopold and Logothetis 1998; Martinez-Conde et al. 2000]. A large part of the responses in marmoset auditory cortex is suppressed during vocalization [Eliades and Wang 2003; Eliades and Wang 2005], while a subset of neurons is selective for unexpected auditory perturbations exclusively during vocalization [Eliades and Wang 2008]. In the zebra finch auditory pallium (the avian analogue of auditory cortex) a subset of neurons selectively responds to auditory perturbations during vocalization, while other neurons are insensitive to such perturbations and seem to code for a correlate of expected rather than actual sensory feedback [Keller and Hahnloser 2009]. All of these effects fail to be explicable in the absence of input from motor or planning related brain areas. The detection of unexpected feedback during motor output for example, requires the comparison of actual sensory feedback with predicted sensory feedback.

It is not altogether surprising to find such effects, as perception has long been known to be directly influenced by motor output. The sensory system can compensate for self-initiated movements, as demonstrated in the ingenious

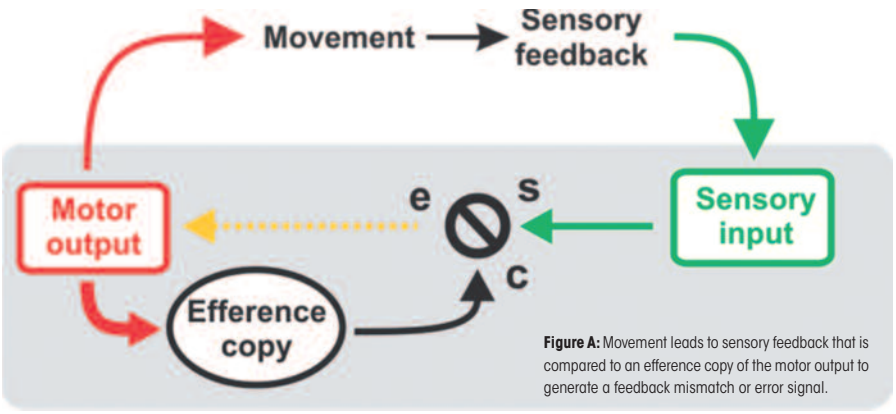


Figure A: Movement leads to sensory feedback that is compared to an efference copy of the motor output to generate a feedback mismatch or error signal.

experiments of von Helmholtz [von Helmholtz 1867]. He found that gently pushing on one's eye with a finger will create the illusion of a moving world, whereas during a normal movement of the eye no such illusion occurs. Von Helmhotz's explanation of this phenomenon was that during active movement of the eye a copy of the motor command controlling the eye movement is combined with sensory feedback to generate a stable percept of the visual scene. Illusory movements of the visual scene would arise only during passive movements of the eye, in the absence of a motor command. These ideas were later experimentally validated and rephrased by Sperry, von Holst und Mittelstaedt as what is today known as the corollary discharge theory [Sperry 1950; von Holst and Mittelstaedt 1950].

Why does our voice sound so different when we hear it on tape? The answer to this question lies only in a small part in acoustical properties of our head and is mainly to be found in the fact that auditory processing is fundamentally different when we speak as opposed to when we just listen. It is likely that while we speak our auditory system uses predictions to detect errors in vocal output (as has been shown in monkeys and zebra finches). Thus, what we hear while we speak is a mixture of these predictions and the actual auditory input.

Sensory predictions can be based on surrounding sensory information, memory, and motor output. In the visual system, optical illusions and filling-in effects (which are for example prominent in the blind spot) are well known effects that can be explained by predictions based on surrounding visual information. Learned associations between stimuli in two different sensory modalities, e.g. visual and auditory stimuli, are a common example of memory related predictions. These learned associations are apparent when upon seeing a falling object one anticipates the sound it makes on hitting the ground, or in a more intricate way in the phenomenon that seeing the lips of a speaker while he is speaking significantly improves speech-perception. And lastly there are motor related predictions: we move our eyes, head or body and have a certain expectation of the consequence this has on the visual scene we are seeing. We move our eyes to the left and the visual scene shifts to the right etc. That these visuo-motor couplings exist and are learned is nicely illustrated by the fact that one is a lot less likely to become motion sick when driving a car as opposed to just being a passenger.

To investigate visual feedback processing in the context of active behavior with an emphasis on underlying motor and memory related predictions, we study mouse visual cortex in awake animals using mainly methods of two-photon imaging, electrophysiological recordings, and optogenetics. A detailed description of the key principles of cortical sensory processing will not only be of relevance in practical matters such as understanding the mechanisms of anesthesia, sensory illusions or hallucinations, but lies at the very core of our thinking about cortical function in general. ■ G.K

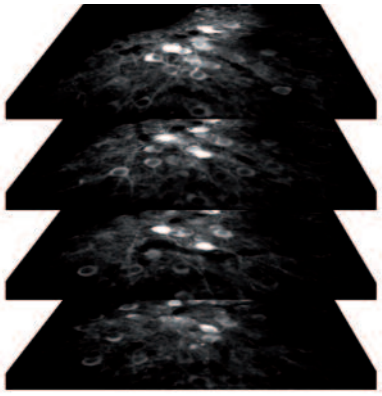
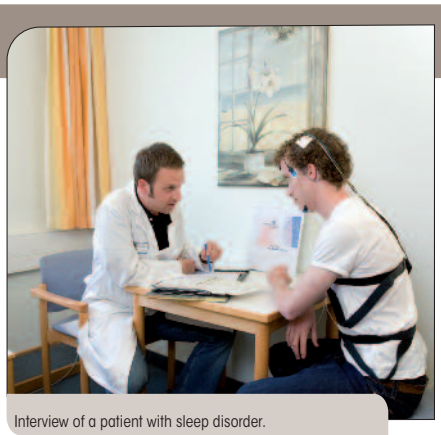


Figure B: A two photon imaging stack acquired in visual cortex of a behaving mouse navigating a virtual environment.

A new center of Sleep Medicine inaugurated at the University Medical Center Freiburg

The sleep research department at the section for Psychiatry & Psychotherapy, University of Freiburg.

Main entrance of the "Abteilung für Psychiatrie & Psychotherapie".



Interview of a patient with sleep disorder.

In May 2012 a new interdisciplinary Sleep Disorder Center at the University Medical Center Freiburg welcomed its first patients. Sleep medicine and sleep research have a long-standing tradition at the University Hospital of Freiburg. Already in the 1960ies the neurologist Prof. Dr. R. Jung performed polysomnographic sleep studies and discovered the pathomechanism of obstructive sleep apnea. Later on, his research group was the first to perform tracheostomy as a rather invasive treatment for obstructive sleep apnea. In the meantime several groups at the University Hospital have engaged strongly in the field of sleep research and sleep medicine including the Departments of Pneumology, Psychiatry and Psychotherapy, the Clinic for Child and Adolescent Medicine and the Clinic for ENT. Given this diversity of disciplines it was considered mandatory by all involved departments to form a joint center for sleep medicine at Freiburg University Medical Center. This initiative, born by the 4 mentioned departments was taken to the executive board of the Medical Center and accepted in 2011.

First of all, the Center for Sleep Medicine is a clinical initiative aiming at improving patient care in the field of sleep medicine for patients in Freiburg and surroundings. By close collaboration of the involved centers it will be possible to provide improved patient care and better transparency for patients where they should seek help when they have a specific sleep problem. Further information about the Sleep Center can also be found on its homepage (http://www.uniklinik-freiburg.de/schlafzentrum/live/index.html).

The official inauguration of the Sleep Center took place on May 5th 2012 with a scientific symposium lasting a half-day. During the symposium an overview on the actual state and on the history of sleep medicine in Europe, Germany and Freiburg was given. In addition, all centers had the opportunity to present their on-going clinical work and main focus of their activities. Whereas the Departments of Pneumology and the ENT Hospital have a major clinical aim in the fields of snoring and sleep apnea, the Hospital for Child and Adolescent Medicine provides patient care and treatment for children and adolescents suffering from sleep disorders, especially those with a nocturnal respiratory disorder. In contrast, the Department of Psychiatry and Psychotherapy offers clinical services for patients suffering from any kind of insomnia, co-morbid sleep disorders with mental disorders and hypersomnias like narcolepsy.

Further activities will include twice yearly clinical half day symposia focusing for example on neuropsychiatric sleep disorders or especially on sleep disorders during childhood and adolescence. In January and February next year a series of public evening lectures will take place giving a general overview of the science and clinical aspects of sleep and dreaming.

With respect to research, at present in the field of sleep and sleep medicine especially the Psychiatric Department is very active. Actual research studies focus on the neurobiology of insomnia, the role of sleep for brain plasticity and related aspects (http://www.uniklinik-freiburg.de/psych/live/personen/riemann/cv-de.html). The sleep medicine and sleep research group at the Department of Psychiatry and Psychotherapy under the leadership of D. Riemann is also very active on an European level. D. Riemann is a board member of the European Sleep Research Society (www.ESRS.eu) and with his international colleagues he aims

Off-line analysis of a polysomnographic recording.

at developing guidelines for clinical care on the one hand and bringing together research initiatives in Europe in the field of sleep on the other hand. ■ D.R.

Contact: **Dieter Riemann, PhD**
dieter.riemann@uniklinik-freiburg.de
http://www.uniklinik-freiburg.de/schlafzentrum/live/index.html.

Patient prepared with the appropriate equipment necessary to perform a polysomnographic recording.

BFS-3NeuroProject Contest: And the winners are:

The winners

For the first time, Neurex has launched a contest entitled **«The BFS-3NeuroProject»** (for Basel, Freiburg and Strasbourg) opened to students and junior scientists. The challenge was to design a virtual scientific project with partners among the three Neurex cities.
The cross boarder competition ran over the summer and the results were published during the Neurex Annual Meeting, on October 25th in Illkirch (France) where the winning teams gave a short presentation of their collaborative project. Thereafter, the President of Neurex, Dr. Paul Pévet, was pleased to hand over the prizes to the winners.

Congratulation to the winning teams:
1st: The Inter-Connected Brains team:
Anaïs Grangeray Vilmint (Strasbourg) and Archana Ramadoss (Basel), with their scientific collaborative project entitled «Understanding the effect of Glioma microenvironment on the Cerebellum using Two-Photon Microscopy»,
2nd-tie: MagStim:
Harsharan Singh Bhatia (Freiburg) and Audran Charmarty (Strasbourg), with their scientific collaborative project entitle «Action mechanisms of repetitive magnetic stimulation (rTMS): combined molecular and electrophysiological approach»,
2nd-tie: The Trinational-Translational-Team (3-T team): Tanzil Mahmud Arefin (Freiburg), Virginie Gabel (Basel) and Michaël Loureiro (Strasbourg), with their scientific collaborative project entitled «PER3 clock gene and acute alcohol exposure: a pro-amnesic cocktail?».
■ S.K.

Start of the university year for the very first NeuroTime PhD students

NeuroTime is a Erasmus Mundus Joint Doctorate program launched by Neurex in 2011. One year later, on October 1st 2012, the 7 very first NeuroTime doctoral fellows coming from 7 different countries are starting their PhD in France, Netherlands, Germany and Switzerland.
The students will perform their scientific collaborative project in 2 or 3 partner universities. On January 14-16th 2013, in Freiburg (Germany), will be held the Annual NeuroTime Meeting, organized in partnership with Neurex and EuroSPIN (a second Erasmus Mundus program). During the meeting, students will present their PhD project in front of the Steering Committee and the Advisory Board of NeuroTime.
Students with a master (or who will obtain a master over the current academic year) can now apply for the second Edition of the NeuroTime program. Applications are available online until December 8th 2012. ■ D.B.
Information on
http://www.neurotime-erasmus.org/

JOBS

Graduated Master Student in Neurosciences, with a one year experience in laboratory, is looking for a position (other than PhD training) in biological research. Experienced in biochemistry, immunostaining and molecular biology. Used to work on mice and is familiar with cell culture. For more information, please contact pascale.piguet@unibas.ch who will forward you the relevant information about the candidate. ■ P.P.

The motor neurons

in the spinal cord and the brainstem directly communicate with skeletal muscle fibres through the neurotransmitter acetylcholine at the neuromuscular junctions. The loss of these specialized synapses is characteristic of neurodegenerative conditions, such as amyotrophic lateral sclerosis, or ALS, which is the most frequent, adult-onset form of motor neuron disease. ALS affects both upper and lower motor neurons, and is often associated with frontotemporal lobar forms of dementia. During the last decade, multidisciplinary studies, from the molecule to the patient, have brought to light the implication of new genes, as well as of complex cell-to-cell interactions and pathological alterations beyond the motor neurons, which altogether will help us to understand more precisely motor neuron pathophysiology. ■ J.L.G.D.A.

A workshop entitled **"New breakthroughs in motor neuron disease"** will take place on Monday, the 12th of November in Strasbourg (Salle Pasteur, Palais Universitaire, Place de l'Université). In this workshop organized by Dr. Jose-Luis Gonzalez de Aguilar (Inserm U 692, Strasbourg), an international group of outstanding researchers in the field will reveal plenty of these exciting and promising discoveries.

We would like to express our gratefulness to Dr. Gonzalez De Aguilar and to all the scientists who have kindly accepted to participate in this event. ■ P.P.

The pioneering work

that Matsumoto and Hikosaka published in 2007 in Nature revealed in monkeys a crucial role for the lateral habenula in sending negative reward signals to the dopaminergic system. Since then, the habenula has been the focus of intensive investigations. This tiny epithalamic structure, lying between the medial thalamus and the third ventricle, has been shown to exert a prominent role in behaviors and brain functions such as value-based decision making, response to stress, cognition, circadian rhythms and sleep. Moreover, its dysfunction has been linked to pathologies of the central nervous system such as depression, drug addiction and schizophrenia. Time has now come to review recent advances in this field. ■ L.L.

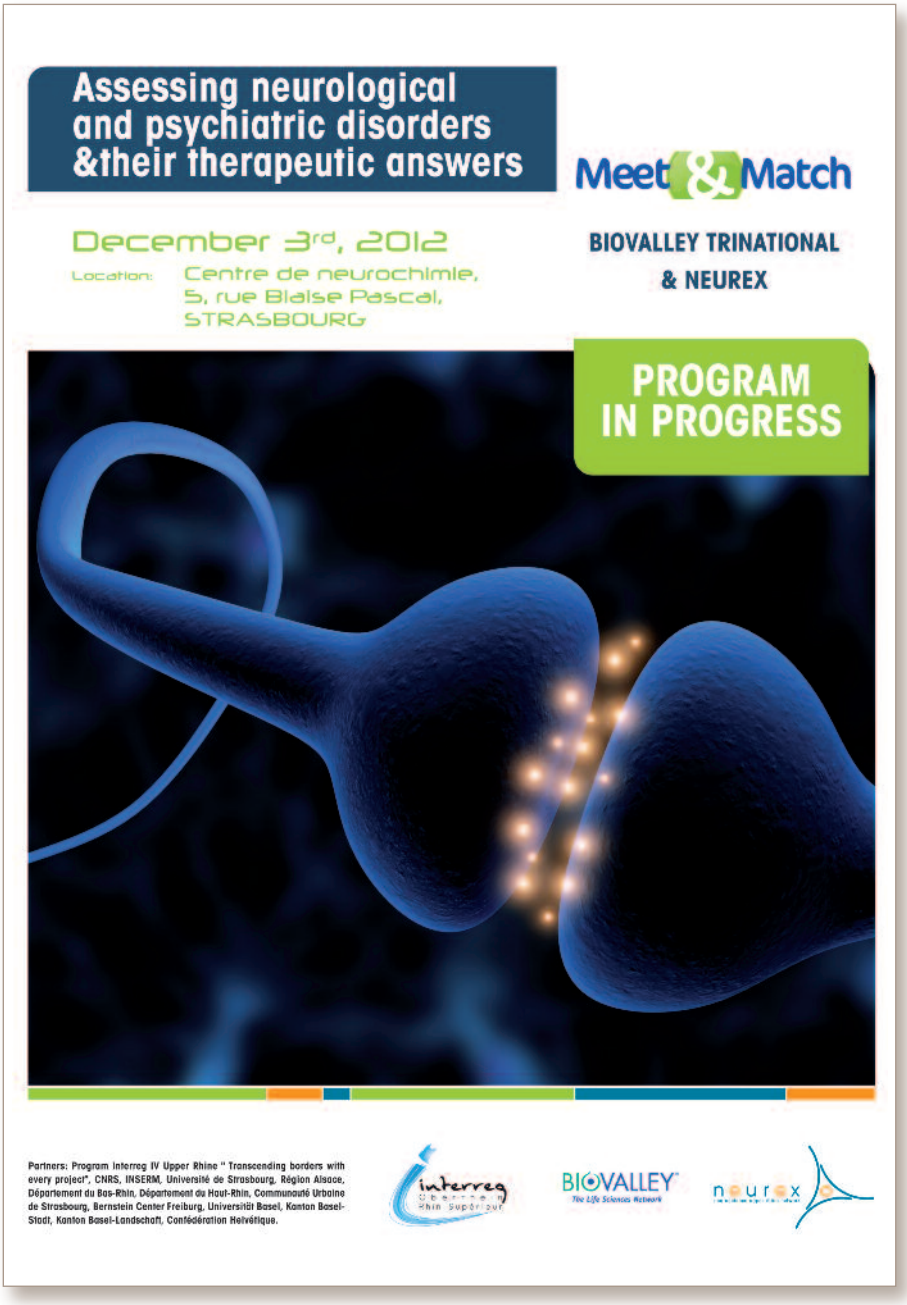
To that purpose, a workshop entitled **"If only Descartes had known about the Habenula"** will be held on November 19th and 20th 2012 at the Collège Doctoral Européen in Strasbourg (46 Boulevard de la Victoire), gathering some of the leading scientists in the field.

We would like to express our gratefulness to Lucas Lecourtier, Jean-Christophe Cassel, Brigitte Kieffer and Michel Barrot for the organization of this workshop and to all the scientists who participate in this event. ■ P.P.

Meet & Match

"The TriNeuron projet" that led to the attribution of the current Interreg program of support to Neurex included several innovative actions. Among them, a new kind of event called **"Meet & Match"** will take place in Strasbourg (Centre de Neurochimie, 5 Rue Blaise Pascal) on the 3rd of December.

Prepared in collaboration with Biovalley, such event aims to foster interactions between academic laboratories and industries. ■ P.P.



< To startups:

Neurex just closed the registration process of its 2012 session of support to start-ups. Applications will be reviewed in the coming weeks.The results should be published beginning of 2013.

Support to publication:

Neurex supports some costs inherent to the publication process: Publication fees, color charges, etc. Further details will be sent by e-mail to all Neurex members and be published on the Neurex website. ■ P.P.

< To junior scientists who launch their team in 1 of the 3 Neurex universities:

Neurex just closed the registration process of its 2012 session of support to junior scientists who, often back from a postdoctoral fellowship spent abroad, develop their team in one of the 3 Neurex universities. Welcome back!
Applications will be reviewed in the coming weeks.The results should be published beginning of 2013.

Dr. Pascale Piguet

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Bi-annual.

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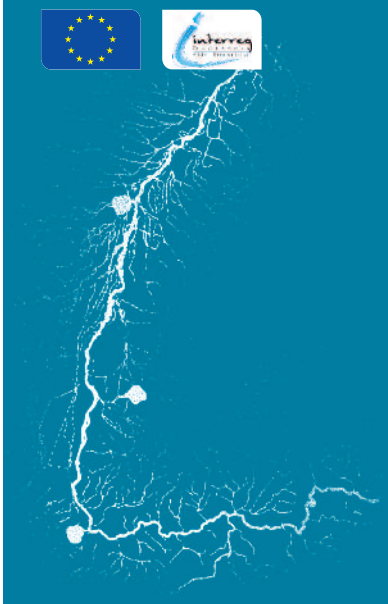

www.neurex.org

Coming events

NOVEMBER 2012

- 12th - Workshop
  «New breakthroughs in motor neuron disease»
  Strasbourg, France
- 19th-20th - Workshop
  «If only Descartes had known about the Habenula»
  Strasbourg, France

DECEMBER 2012

- 3rd - Meet and Match (Neurex/BioValley)
  «Assessing neurological and psychiatric disorders & their therapeutic answers»
  Strasbourg, France
- 10th - «Le temps biologique face au temps du travail» (Neurex/DNA)
  «À l'école ou au bureau, quand travailler pour mieux travailler?» par Yvan Touitou
  Strasbourg, France

JANUARY 2013

- 14th-16th -
  First NeuroTime-Workshop
  jointly organized with another Erasmus Mundus Program:
  «EuroSPIN - European study programme in Neuroinformatics»
  Freiburg, Germany

MARCH 2013

- 11th-17th
  Brain Awareness Week
- 14th-16th - Symposium
  «Cognitive disorders and remediation in schizophrenia and other mental diseases»
  Strasbourg, France

SPRING 2013

- Workshop
  «Synaptic transmission: structural plasticity and regulation of transmitter release»
  Strasbourg, France
- Workshop
  «Joint Neuro-Rhine-Trineuron»

JUNE 2013

- 10th
  Neurex annual meeting
  Basel, Switzerland

This description is not definitive, but lists the events which are ready or in preparation. Please check again on www.neurex.org or in the next newsletter for additional events.

Info & links

NEUROSCIENCE FEDERATIONS & LABORATORIES IN THE UPPER RHINE VALLEY

The Neurex network includes the 3 neuroscience federations of Basel (NNB, Neuroscience Network Basel), Freiburg (Neurag) and Strasbourg (IFR 37) plus additional research units performing research in the NS. For a detailed description of the institutes making up the neuroscience landscape in Neurex, you may download our supplement to newsletter 14 on www.neurex.org.

- IFR 37
  http://neurochem.u-strasbg.fr
- NEURAG
  http://www.neurag.uni-freiburg.de
- NNB
  http://www.neuronetwork.unibas.ch

NEWSLETTERS

- Unibasel
  http://www.unibas.ch/Section newsletter
- A.L.UNi Freiburg
  http://www.studium.uni-freiburg.de/newsletter
- Unistrasbourg
  http://www.unistra.fr/index.php?id=1180
- Computational Neuroscience: Bernstein newsletter
  http://www.nncn.uni-freiburg.de/Aktuelles-en/BernsteinNewsletter-en

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