International Society for Neuroethology

Newsletter
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Next ISN Congress: Vancouver, Canada, in 2007. Local organizer: Catharine Rankin, Univ. British Columbia, Dept. Psychology, 2136 West Mall, Vancouver BC V6T1Z4, Canada. Phone: +1 604-822-5906; Fax: +1 604-822-6923; crankin@psych.ubc.ca

This Issue Includes

The ISN President's Column

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The 8th ICN: The largest item looming on the agenda for the ISN is our upcoming Congress in Vancouver (July 22-27). I can tell you that we are in excellent hands with Barb Beltz chairing the Congress Committee and Cathy Rankin as the Chair of the local organizing committee. Ron Harris-Warrick and Sten Grillner are the Congress Vice-Chairs. These folks, with excellent advice from the membership and the Council, have put together an outstanding program of invited lectures and symposia. Cathy has done an unbelievable job of arranging for housing and meeting rooms at the University of British Columbia. This has been a real labor of love for all these folks and even with considerably more help for the

organizers from our management firm (Linda Hardwick at Allen Press, Inc.) this time around, it still remains a huge amount of work. We believe that the outcome will be worth the effort, of course, and that we all can look forward to another spectacular event.

Young Investigator Awards: It's now time for our members to send in applications for the Young Investigator Awards for the Congress (http://www.neuroethology.org/membership/awards.php#YIA). The deadline for applications for these awards is **December 15**, and it is important to note that the applications and all supporting materials should arrive by that date and should be sent directly to our management firm and *not to the President*. The web site soon will be updated to make that completely clear, but the award application form and the website now specify that information. The applications will be evaluated by an International Committee chaired by Martin Giurfa, and announcements of the names of awardees will be made as soon as possible after the completed applications have been reviewed. We will decide on how many of these awards we can make. This will be dependent on funding, but at least 3 and possibly 4 awards will be made. The winners will be announced in the Newsletter, and one of the symposia at the Congress will be dedicated to the awardees, each of whom will give a talk at that symposium. A post-Congress issue of the Newsletter will feature photos of the awardees and a summary description of their research submitted by the winners. Our emphasis on these awards remains that the Young Investigators represent the future of the ISN, and the Executive Committee of the Society feel that it is very important for the Society to acknowledge and honor our future in this way.

Travel and Heiligenberg Awards: In addition, we anticipate that there will be funds available for Travel Awards for the Congress, but this will depend on pending grant applications and all members will receive announcements as soon as these funds are in hand. Funding now is available for Heiligenberg Awards (http://www.neuroethology.org/membership/awards.php). These can be used for student travel to the Congress (the award requires that a presentation be given by the student and that the sponsor be a member of the Society).

At the Congress: There will be two important items on the agenda for the next Business Meeting at the Congress: one is to discuss the possibility of having ISN Congresses more often than once every three years; the other is to select the site for the 2010 Congress. Obviously these two issues are intimately related, and any decision on more frequent Congresses therefore probably will not have an impact on the choice of the year 2010 for the post-Vancouver Congress. After mentioning the possibility of more frequent Congresses in my last President's Column, a number of members emailed me to discuss the matter. Most of the discussants did not think that more frequent Congresses were a good idea for a variety of very good reasons. I still believe, however, that more frequent meetings are required for a growing and dynamic field. We have not heard from much of the membership on this important matter though. Therefore I propose to discuss with our Web Committee the possibility of opening a discussion site (chat room) on the ISN web site where members can express their views on this topic. We have 8 months remaining before the start of the Vancouver Congress. If members who care about this issue would be willing to post reasoned (and not too long) discussions of their point of view on the topic of meetings every two rather than every three years, we can open the discussion in the very near future rather than waiting until the summer. Moreover, we will try to set the site up so that comments will be accepted on other people's posts in order to have a real discussion. Our management firm will announce to the membership when this site will be available. PLEASE, if you care about this issue, get involved. This should not be decided by any one individual. It should be decided by you, the members.

As to the site of the 2010 Congress, at present Madrid is likely to be one of the choices. We encourage members to offer other possibilities, however, as choices are important. If you would like to host the 2010 Congress at your home base, please email Martin Heisenberg, our President-elect, who will be coordinating this effort (heisenberg@biozentrum.uni-wuerzburg.de). In order to actually present your home base as a possible Congress site, it is necessary for you to prepare a package with information for our members. This should include: estimated housing (including special student housing) and travel costs, the availability of suitably sized meeting rooms, the ease of housing 500-600 people close to the meeting site, scenic views and outside-meeting activity possibilities, etc. We will attempt to post the candidate cities and the pros and cons of selecting one or the other of the proposed sites for the 2010 Congress on our web site prior to Vancouver.

See you all in Vancouver, I hope! Ed Kravitz.

We acknowledge ISN donors

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Each year, donations are received from ISN members that contribute to the operating funds, or to selected funds administered by the Society. We would like to acknowledge receipt of these generous donations for the last 12 months, and the special role they play in helping provide the Society's services. Thank you all very much.

The list of **2005/2006 donors** includes:

Judith Chapman (Brown University, USA); Hillel J. Chiel (Case Western Reserve University, USA); Matthieu Dacher (Arizona State University, USA); Robert W. Doty; Daniel Eberl (University of Iowa, USA); Peggy L Edds-Walton (Loyola University Chicago, and Emory University, USA); William Evoy; Cole Gilbert (Cornell University, USA); Albert S. Feng (University of Illinois, USA); Martin Giurfa (Université Paul Sabatier - Toulouse III, France); Hans-Willi Honegger (Vanderbilt University, USA); Kathleen A. Killian (Miami University, USA); Karl Kral (Karl-Franzens Universität, Graz); Edward A. Kravitz (Harvard Medical School, USA); Esther M. Leise (University of North Carolina Greensboro, USA); John Phillips (Indiana University, USA); Hans-Joachim Pflueger (Freie Universität Berlin, Germany); Roy E. Ritzmann (Case Western Reserve University, USA); Daniel Robert (University of Bristol, UK); Eric J. Warrant (University of Lund, Sweden); Marc Weissburg (Georgia Institute of Technology, USA).

The list of donors for the next 12 months will appear in the November Newsletter next year.

Welcome: new ISN members

As of Sept. 30, 2006, ISN welcomes the following new members.

Canada. Mathieu Dupont (student)

New Zealand. Kyle Beggs (regular); Thorin Jonsson (student)

USA. Regular members: Robert R. Capranica; Megumi Fuse; Kevin Crisp. Student members: Hani El Shawa; Tiffanie Holloway; Kasey Fowler-Finn.

This issue of the Newsletter

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Regular readers of recent issues will notice two new items in the November issue of the Newsletter. These are brief reports of new developments in the literature, or themes drawn from these. These articles are most welcome additions to our columns, and remind us that our mission lies in extending and promoting science in all areas of neuroethological research. The Editor therefore welcomes similar submissions from anyone who may wish to present a report on the recent literature, or a particular viewpoint on a field within neuroethology. Such perspectives can be used to highlight not only important findings that may have attracted attention in some other forum, but also neglected findings, or those that may represent non-traditional approaches to neuroethology. For example, the two perspectives in this issue both underscore the importance of genetic determinants of behaviour, one by Troy Zars, on memory formation in *Drosophila*, and a second by Elizabeth Hammock and David King, on the relationship between microsatellite DNA and their role as mutationally adjustable regulators of animal behaviour.

Report on the literature: News on the Fly

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We all know that good and bad events can lead to happy or sad memories. **But how do these events lead to different types of memories?** Studying the relatively simple nervous system of insects, the dopaminergic and octopaminergic systems had been implicated in aversive and appetitive memory formation (Hammer and Menzel 1998, Schwaerzel, et al. 2003). André Fiala and colleagues in the Department of Genetics and Neurobiology at the University of Würzburg recently developed a novel tool to determine whether the dopaminergic and octopaminergic / tyraminergic systems are sufficient in determining the aversive or appetitive valence of a memory (Schroll, et al. 2006). A light-sensitive cation channel, channelrhodopsin2 (ChR2), was cloned from an alga and placed under the two part GAL4 transcription activation control. To determine the physiological effects of exciting this channel, it was expressed in motor neurons and illuminated with blue light. This led to excitatory junction potentials measured in body wall muscles and whole-body contraction. When expression and activation of this channel in the dopaminergic or octopaminergic / tyraminergic systems was paired with odor presentation, the larvae had unambiguous odor preference. If the ChR2 was activated in the dopaminergic system with an associated odor, the larvae crawled away from that odor source. Larvae approached the odor source when the same experiments were done but with manipulation of the octopaminergic / tyraminergic systems. This study indicates there are two separate neuronal pathways that can *substitute* for appetitive and aversive reinforcement.

References

Hammer M, Menzel R (1998) Multiple sites of associative odor learning as revealed by local brain microinjections of octopamine in honeybees. Learning and Memory 5:146-156

Schroll C, Riemensperger T, Bucher D, Ehmer J, Voller T, Erbguth K, Gerber B, Hendel T, Nagel G, Buchner E, Fiala A (2006) Light-induced activation of distinct modulatory neurons triggers appetitive or aversive learning in Drosophila larvae. Curr Biol 16:1741-1747

Schwaerzel M, Monastirioti M, Scholz H, Friggi-Grelin F, Birman S, Heisenberg M (2003) Dopamine and octopamine differentiate between aversive and appetitive ol-

factory memories in Drosophila. J Neurosci 23:10495-10502.

Genes and neuroethology: How can evolution adjust behavior?

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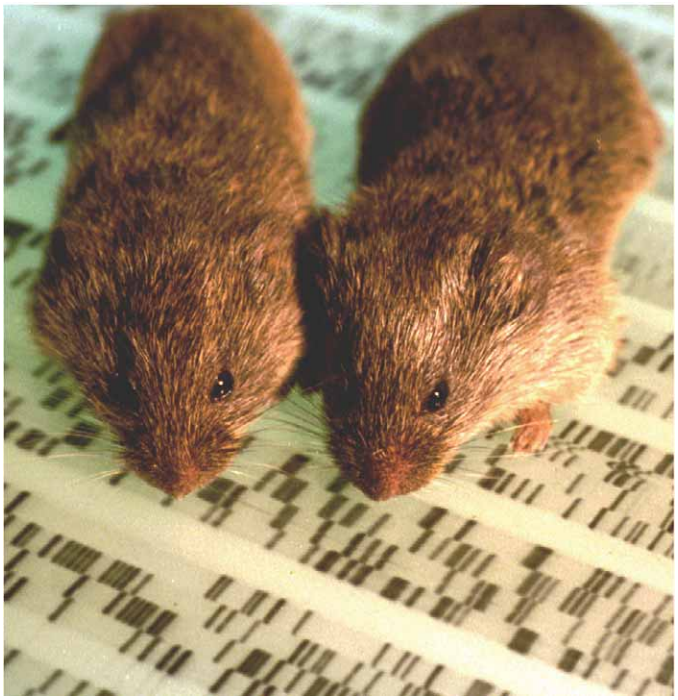
(This is the second installment in a continuing story. For part one, see *ISN Newsletter*, July 1997. http://www.neuroethology.org/newsletter/news_archive/isn.news.july97.sec2.htm#4.)

What genetic feature do the following phenomena have in common? (1) Neurotransmitter receptor distribution and associated social behavior vary among individual prairie voles (*Microtus orchrogaster*). (2) A gene influencing several aspects of *Drosophila* behavior has alleles whose frequencies vary with climate across several natural populations. (3) Several hereditary neurological and neuromuscular disorders display genetic "anticipation", such that children develop the disease at an earlier age, and with greater severity, than the affected parent.



Pair of prairie voles (*Microtus orchrogaster*)

Answer: In each case, the observed variation -- whether in social behavior, sensitivity to climate, or disease development -- depends on the number of motif repetitions in a tandem-repetitive DNA sequence (referred to here as microsatellite DNA).

All tandem repeat tracts are susceptible to characteristic "slippage" mutations which incrementally increase or decrease the number of repeating motifs. These mutations occur at rates which may be several orders of magnitude higher than rates for single-nucleotide substitution. The resulting variation has proven to be immensely useful in forensics, pedigree analysis and marker-assisted selective breeding, to name a few applications. But the variation in microsatellites that provide such useful genetic markers have been widely regarded as "neutral", without any adaptively significant effect on phenotype (e.g., Ellegren, 2004). Until the early 1990s, hardly anyone expected microsatellites to have great functional importance.

Thus news of "repeat instability diseases" made quite a splash when, in rapid succession, Fragile-X, spinobulbar muscular atrophy, myotonic dystrophy, and Huntington's disease were each found to be caused by expansion of a tract of tandemly repeating base pair triplets. These disease-causing repeat loci were found both within and near coding regions of genes. At these loci, repeat number varies across healthy individuals. However, if the length of one of these repeat tracts exceeds a certain “pre-mutation” threshold (typically a few dozen repeats), then further mutations can cause extreme lengthening of the repeat tract, up to thousands of repeats. While there appears to be a length threshold for disease status, the length of the repeat tract above such a threshold can be associated with disease severity and age of onset. The susceptibility of expanded repeat tracts to further expansion underlies the clinical phenomenon of "anticipation", where successive generations have increased disease severity. Thus a child may inherit not just an abnormal parental allele but a freshly-mutated, more-drastically-expanded version. The number of known repeat instability diseases has grown to more than forty; most are based on triplet repeat tracts, but some are also associated with repeating tetra- or penta-nucleotide motifs (Pearson, 2005). [Curiously, the human prion protein also contains an eight-amino-acid repeat, encoded by a 24 base-pair minisatellite motif. Of the 55 mutations known to be associated with Creutzfeldt Jakob disease, 27 involve the addition of up to nine additional 24-bp repeats (Leliveld *et al*. 2006).]

Certain features of the repeat instability diseases suggest questions of interest to neuroethology. First of all, the mutations which cause these disorders are not all-or-nothing; the *number* of repeats matters, as shown by anticipation. Do these diseases reveal, in deleteriously exaggerated form, the existence of a previously unsuspected mechanism whereby the number of repeats in a *normal* microsatellite tract regulates some aspect of nervous system function? Second, since many examples known to date have profound impact on human nervous tissue, could repeat DNA hold some clue to the

evolution of the human brain? Third, pathological repeat tracts are somatically unstable, so that variation accumulates in different parts of the diseased brain, even among non-dividing cells. Could normal microsatellites also generate somatic variation, perhaps contributing to neuronal differentiation in the developing brain? Finally, if microsatellites matter to the human brain, might they also have some broader significance for the nervous system and behavior of other animals?

The variation which arises from microsatellite mutation is so abundant that any given gene, in any given genome, is likely to be associated with one or more variable repeat loci. Microsatellites are commonly presumed to be "junk" -- after all, highly mutable genetic "stutters" seem unlikely to convey any reliable, or even useful information -- nevertheless evidence for a functional role for microsatellite variation has been accumulating for over two decades. Not only are microsatellite mutations both frequent and reversible, but effects of repeat-number variation have been found for microsatellites located in exons, in introns, and in upstream and downstream regulatory domains. The number of repeats in a microsatellite sequence (and in minisatellites as well; the defining difference lies in the length of the motif) can influence practically any aspect of genetic function, from protein coding to exon splicing to regulatory interaction (Kashi & King, 2006).

So, what about those fruit flies and prairie voles? Evidence for the functional influence of microsatellite repeat number has come from many different studies involving many different organisms. But the most complete stories, which tie the effects of repeat number not only to measurements of gene function but also to the phenotype of intact, behaving animals, are those involving the *period* gene of *Drosophila*, which is involved in the regulation of the fly's circadian rhythm, and the *avpr1a* gene of mammals, which encodes a vasopressin receptor.

The fruit fly story was the first to emerge. Briefly, the *period* gene includes a hexanucleotide repeat, encoding a sequence of alternating threonine-glycine repeats. Variation in the number of repeats not only changes the length of this *thr-gly* run but also influences the temperature sensitivity of flies' circadian rhythm, and this variation apparently matters to flies living in natural environments. Several different repeat-number alleles occur in wild populations, and the frequency distributions of the more common alleles display a latitudinal cline. The shorter allele, which at warm temperature yields a circadian period closer to 24 hours, predominates in warmer regions, while the longer variant, which yields better temperature compensation so that temperature fluctuations have a lesser impact on circadian cycle, is more prevalent in cooler climates. This pattern, first reported for populations across Europe and north Africa, has recently been found in Australia as well (Sawyer *et al*., 2006). The frequencies of these repeat number alleles are even differentiated in populations separated by only a few hundred meters, across the sunny south-facing and shady north-facing slopes of "Evolution Canyon" in Israel (Zamorzaeva *et al*., 2005). Evidently, spontaneous repeat-number variation permits natural selection to "tune" the *period* gene to suit the local climate.

The vole microsatellite story has emerged over the past several years. Comparative analyses of closely related vole species of the neural mechanisms underlying social attachment, has demonstrated that the distribution of vasopressin receptors is a functional link in a chain that ties variation in brain activity to individual and interspecies differences in affiliative behavior and pair-bond formation. The junior author of this ISN news article (EADH) was privileged to join Larry Young's lab at Emory University as a graduate student at about the time that a remarkable species difference had been identified in the length of a complex microsatellite in the upstream regulatory domain of *avpr1a*, a gene which encodes one of the vasopressin receptor proteins (Young et al, 1999). Two monogamous species of voles (prairie and pine) have a very large microsatellite at this locus, while two non-monogamous species (montane and meadow) have a very small microsatellite locus. The prairie/pine locus is an order of magnitude larger than the montane/meadow locus. Knowing from prior literature that repeat number could have functional effects, members of the lab (especially me, Larry and his first post-doctoral fellow, Steve Phelps) were intrigued by the potential for this variation in microsatellite length to regulate the observed species differences in brain vasopressin 1a receptor distribution patterns and potentially species differences in behavior. I (EADH) was the lucky graduate student who got to investigate whether or not such a relationship existed. Using a series of approaches (cell culture, selective breeding, behavior and neuroanatomy) within and across closely related vole species, our results indicate that repeat number in this microsatellite does indeed influence both the brain distribution of the vasopressin receptor and also the behavior of the voles (Hammock and Young, 2005). If microsatellite variation matters for the behavior of individual voles, and if homologous microsatellites vary significantly among species, then perhaps microsatellites are

Tuning knobs from the world of music, from David King's image

one component in a general-purpose genetic toolbox for facilitating evolution. One metaphor for the role of microsatellites is that of mutationally adjustable "tuning knobs" (King *et al*., 1997). When incorporated as functional elements into extended genes, tandem repeats provide a reliable and abundant supply of variation for efficient evolutionary adjustment of quantitative traits. Some microsatellites also provide reversible on/off switches for gene expression, a mechanism exploited for antigen switching by pathogenic bacteria (Bayliss, 2006) and also noted as the developmental-genetic basis for black spotting in red pigs, through somatic mutation (Kijas, 2001). Implications for neurobiology have barely begun to be explored, but tandem repeat variation has already been implicated in several aspects of behavior in humans and other primates. For example, increased susceptibility to stress-induced depression in humans (Caspi *et al*., 2003) and younger age at the time of a male rhesus monkey's dispersal from its natal group (Trefilov *et al*., 2000) are both associated with the shorter of two alleles of a repeat locus in the promoter of a serotonin transporter gene. This shorter allele reduces transcriptional efficiency of the serotonin transporter.

It may be important to clarify that we are not suggesting that microsatellite variation in genes is a privilege of genes involved in nervous systems. In fact, there is an irresistible example of microsatellites potentially involved in craniofacial development. Fondon and Garner (2004) compared microsatellite variation in the coding regions of genes known to be involved in craniofacial development across various dog breeds: changes in jaw morphology of breed standards over the past 150 years were associated with microsatellite length of those genes for craniofacial development. This rapid change in craniofacial morphology invokes images of Charles II of the Spanish Hapsburg family line of 17th century Europe. The Hapsburg royal family line contained many examples of what appears to be mandibular prognathism. Was the historical worsening (i.e. anticipation) of the "Hapsburg jaw" (and perhaps Charles' other disabilities) due to expanding repeats in genes with a role in craniofacial (and brain) development? Does consanguinity exacerbate anticipation?

Thus far, the data on the functional roles of microsatellites in inter- and intra-specific trait variation excites the imagination and raises many more questions. How generalizable are these findings? Are there certain gene ontologies that make the best use of such a mechanism? Are certain taxa better positioned to take advantage of such heritable mutation? Have any genomes evolved mechanisms to regulate the rate of mutation at microsatellite loci (e.g. similar to mechanisms implicated in some cancers or akin to the "SOS" response in bacteria)? Do certain cell types (perhaps in the brain?) actively regulate somatic expansion and contraction of microsatellite loci? These questions are readily addressed with the plethora of molecular tools that can be used across taxa.

As evidenced from the robust diversity of heritable behavioral traits among closely related species, animal behavior evolves with great facility, and such rapid evolutionary adaptation must depend on novel non-lethal genetic variation. If we shift metaphors in our attempt to capture the genome-wide impact of variable microsatellite loci, we might imagine that each site paints a restless, shimmering pixel on a "molecular canvas", one in which an image of adaptive behavior is continually adjusted by the variation that microsatellite mutability provides.

Further reading:

Bayliss, C.D., and Moxon, E.R. (2006) Repeats and variation in pathogen selection. In: Caporale, L.H., ed. *The Implicit Genome*. Oxford University Press, Oxford, pp. 54-76. **An example of adaptive advantage conferred by variable repeats.**

Caspi, A., Sugden, K., Moffitt, T. E., Taylor, A., Craig, I. W., Harrington, H., McClay, J., Mill, J., Martin, J., Braithwaite, A., and Poulton, R. (2003) Influence of life stress on depression: Moderation by a polymorphism in the 5-HTT gene. *Science* **301**: 386-389.

Ellegren, H. (2004) Microsatellites: Simple sequences with complex evolution. *Nature Reviews Genetics* **5**: 435-445. **An overview of microsatellites and their mutations.**

Fondon JW III, Garner HR. 2004. Molecular origins of rapid and continuous morphological evolution. *Proc Natl Acad Sci USA* **101**: 18058–63.

Hammock, E.A.D., and Young, L.J. (2005) Microsatellite instability generates diversity in brain and sociobehavioral traits. *Science* **308**: 1630-1634. **Describes the role of repeats in vole reproductive behavior.**

Kashi, Y., and King, D.G. (2006) Simple sequence repeats as advantageous mutators in evolution. *Trends in Genetics* **22**: 253-259. **Provides access to literature on functional effects of repeat-number variation.**

Kijas, J. M. H., Moller, M., Plastow, G., and Andersson, L. (2001) A frameshift mutation in *MC1R* and a high frequency of somatic reversions cause black spotting in pigs. *Genetics* **158**: 779-785. **An example of phenotypic effects resulting from somatic mutation in a tandem repeat.**

King, D.G., Soller, M., and Kashi, Y. (1997) Evolutionary Tuning Knobs. *Endeavour* **21**: 36-40. **Introduces the metaphor of repeats as adaptively useful adjusters of gene function.**

King, D.G., and Soller, M. (1999) Variation and fidelity: The evolution of simple sequence repeats as functional elements in adjustable genes. In S. P. Wasser, ed. *Evolutionary Theory and Processes: Modern Perspectives.* Kluwer Academic Publishers, Dordrecht, pp. 65-82. **Develops the hypothesis that genes with adjustable repeats may be shaped by indirect selection.**

Leliveld, S.R., Dame, R.T., Wuite, G.J.L., Stitz, L., and Korth, C. (2006) The expanded octarepeat domain selectively binds prions and disrupts homomeric prion protein interactions. *Journal of Biological Chemistry* **281**: 3268-3275.

Pearson, C. E., Edamura, K.N., and Cleary, J.D. (2005) Repeat instability: Mechanisms of dynamic mutations. *Nature Reviews Genetics* **6**: 729-742. **Reviews research related to the repeat instability diseases.** (This issue of NRG includes several other articles on related topics.)

Sawyer, L.A., *et al*. 2006 The *period* gene Thr-Gly polymorphism in Australian and African *Drosophila melanogaster* populations: Implications for selection. *Genetics* **174**: 465-480. **Latest instalment in the story of repeat variation in the *period* gene in *Drosophila*, with review of prior work.**

Trefilov, A., Berard, J., Krawczak, M., and Schmidtke, J. (2000) Natal dispersal in rhesus macaques is related to serotonin transporter gene promoter variation. *Behavior Genetics* **30**: 295-301.

Young, L.J., Nilsen, R., Waymire, K.G., MacGregor, G.R., Insel, T.R., 1999. Increased affiliative response to vasopressin in mice expressing the V1a receptor from a monogamous vole. *Nature* 400 (6746), 766–768.

Zamorzaeva, I., Rashkovetsky, E., Nevo, E., and Korol, A. 2005 Sequence polymorphism of candidate behavioural genes in *Drosophila melanogaster* flies from 'Evolution Canyon'. *Molecular Ecology* **1 4**: 3235–3245. ***Period* gene frequency divergence in relation to local microclimate.**

Neuroethology Meets Visual Perception: Highlights from the 29th ECVP Conference in St. Petersburg

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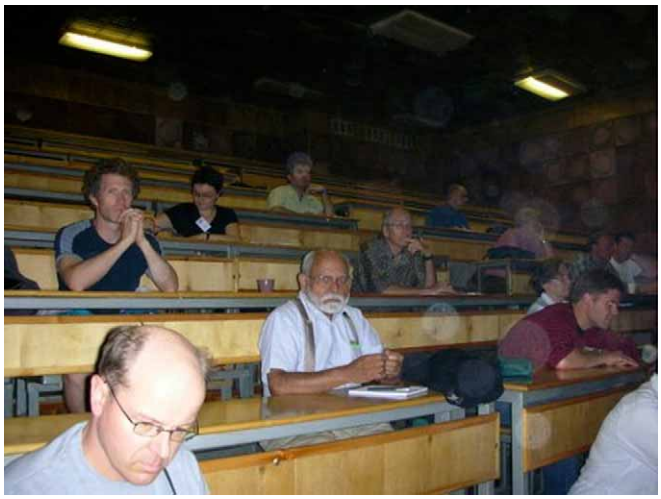
The European Conference on Visual Perception (ECVP) is an annual meeting which has been held every year since 1987 at various locations across Europe, which is traditionally joined by scientists interested in human vision. Remarkably, the meeting is organised by enthusiasts who volunteer from within the research community, and who thus operate without the framework of any formal organisation. For further information on this group see www.ecvp.org. The conference is open for all fields of vision research, and this year was held in St. Petersburg (Russia), and was given a strong flavour of zoology. The chair of the organising committee, Yuri Shelepin (I.P.Pavlov Institute of Physiology, Russian Academy of Sciences) responded positively to the idea to enhance the cross-talk between researchers in the fields of human and animal vision. As a result, two symposia and a poster session were devoted to comparative and evolutionary aspects of visual perception and its underlying mechanisms.

Beautiful St. Petersburg and the Spit of Basil Island from the River Neva

A break between lectures

Victor Govardovskii (Russian Academy of Sciences) invited participants to continue the debate about the functional adaptations shaping cone- and rod-based vision in vertebrates, in a symposium entitled "The rod/cone dichotomy: molecules and cell morphology". Yoshinori Shichida (Kyoto University, Japan) presented results showing how differences in opsin molecular properties between rod and cone visual pigments are related to scotopic and photopic response properties of the corresponding photoreceptors. The molecular evolution of rod and cone visual pigments was summarised by Shaun Collin (University of Queensland, Australia) and Jim Bowmaker (University College, London, UK) reporting their studies on early vertebrates such as lampreys, sharks and lungfish and with cichlid fish of the African Great Lakes. Evidence was presented that ancestral photoreception in the vertebrate line was based on a

cone-based (photopic) visual system and that duplex vision may have evolved through the rod/cone hybrids that have been found in lampreys. Rosalie Crouch (Medical University of South Carolina, USA) took a



Audience in place (Abner B. Lall, centre)

closer look at the interactions between different opsins and their common ligand, 11-cis retinal, which locks the protein into its inactive conformation, but which also plays an important role for the respective functions of the visual pigment. She reported that the ligand structure is crucial for a number of opsin pigment functions, such as pigment stability or the rate of transduction activation. The contributions by M.Carter Cornwall (Boston University School of Medicine, USA), Trevor Lamb (Australian National University), and Sergei S.Nikonov (University of Pennsylvania, USA) focussed on the functional differences between rods and cones, with a particular interest in the mechanisms underlying fast response recovery in cones following bleaching. Andrew Stockman (University College London, UK) linked a three-step model of light adaptation in cones obtained by measuring psychophysical functional parameters, such as temporal sensitivity and phase delay, to properties of molecular mechanisms at different light levels. Finally, Kristian Donner (University of Helsinki, Finland) and Victor Govardovskii (Russian Academy of Sciences, St. Petersburg) extended the view beyond the phototransduction cascades and molecular properties of pigments to other parameters, such as differences in photoreceptor morphology, pigment-related dark noise and body temperature, giving examples from comparative studies and optical modelling.

The symposium "Evolution of Vision“, organised by Natalie Hempel de Ibarra (University of Sussex, UK) and Misha Vorobyev (University of Queensland, Australia), was devoted to comparative and evolutionary aspects in the study of vision. Jochen Zeil (Australian National University) opened the session with an excellent talk on how vision is related to behaviour, reminding the audience that vision occurs as an active process of information aquisition while animals behave in a dynamic world. He reviewed examples from flies and crabs in the context of flight control, view-based homing and predator avoidance. Jeremy Niven (University of Cambridge) compared the energy consumption and performance in

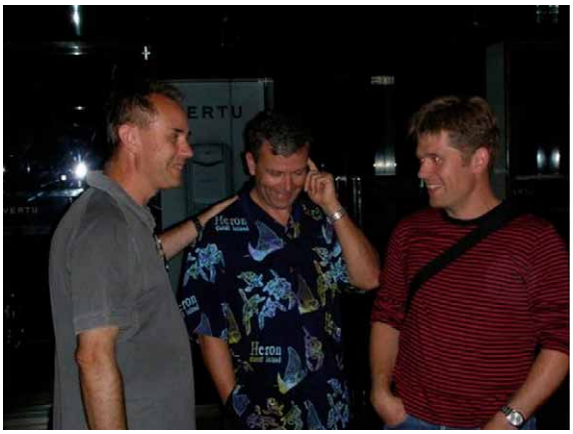
Jeremy Niven (left) and Misha Vorobyev in conversation

the homologous R1-6 photoreceptors from four fly species,emphasising the importance of the trade-off between maintenance and signalling costs, which may explain neural designs of invertebrate visual systems but can also be extended to any neural architecture. Martina Wicklein (University College London, UK) summarised her work on sphingid motion vision, integrating behavioural, neurophysiological and modelling results. She showed how sphingids stabilise distance during hovering flight, relying on a network of wide-field neurons responding differently to the expansion and contraction of flow field patterns. The peculiarities of colour and brightness perception in the honeybee and butterflies were introduced by Michiyo Kinoshita (Sokendai Graduate University for Advanced Studies, Japan), Doekele Stavenga (University of Groningen, Netherlands) and Natalie Hempel de Ibarra (University of Sussex, UK) focussing on the evolutionary relationship between visual perception in pollinating insects and the colours and patterns of flowers and butterfly wings. Though humans and most other vertebrates are colour-blind at night, lizards and nocturnal insects are not. Almut Kelber (University of Lund, Sweden) reported about her brilliant behavioural experiments and proposed that the drastic spectral changes in nocturnal illuminations may have favoured colour vision in many more nocturnal

Left to right: Michiyo Kinoshita, Almut Kelber, Dan-Eric Nilsson and Martina Wicklein

and deep-sea animals then thought until now. Tom Cronin (University of Maryland, USA) impressed the audience once more with the complex visual system of stomatopod crustaceans. He showed results already confirming the existence of eight of the hypothesised sixteen opsins expressed in the stomatopod retina. Dan-Eric Nilsson (University of Lund, Sweden) took us from the most complex retina to one of the most simple, but no less astonishing visual systems, that of box jellyfish, asking what could have been the first visual tasks of early eyes and what requirements these would have placed on their structure and function.

The second part of the symposium was devoted to the spectral diversity of vertebrate visual pigments and its adaptative value for visual behaviour. David Hunt (University College London, UK) explained how spectral tuning is achieved in different classes of rod and cone photoreceptor pigments through interactions between opsins and retinal. Misha Vorobyev (University of Queensland, Australia) elucidated why vertebrate groups lost cones in the course of evolution while their ancestors were equipped with no less than four cone types. His model calculations showed that it was convenient to reduce or eliminate cone pigments under dim light conditions because colour vision was improved or even not



Left to right: Dan-Eric Nilsson, Justin Marshall and Anders Garm

used. Justin Marshall (University of Queensland, Australia) provided more evidence for the assumption that ancestral vertebrate vision was based on four cone types from studies on the lung fish, a living fossil, which in Australia is currently under strong threat of extinction (for information about a protest action reported by Justin, see
http://www.thepetitionsite.com/takeaction/610807318).
Daniel Osorio (University of Sussex, UK) provided an excellent account for our understanding of the odd fact that L and M cone sensitivitites overlap so strongly. He explained that beside the molecular constraints, the trade-off between demands of luminance and colour vision as well as the optimisation for specific foraging tasks seem to have worked in favour of such tuning. Finally, Barbara Finlay (Cornell University, USA) and Leo Fleishman (Union College, USA) introduced two other fields of current neuroethological and evolutionary research. Leo Fleishman presented a retinal model consisting of a double-array of simple motion-detection circuits which is able to filter out movements that are relevant, such as food or prey, from irrelevant natural movements, such as those created by windblown vegetation. Barbara Finlay compared variations in mature visual systems in New World monkeys with the developmental alterations of retinogenesis, that produce observed species differences separating adaptive functions from developmental constraints in brain evolution.

Ladies night out (from left to right): Michiyo Kinoshita, Natalie Hempel de Ibarra, Almut Kelber and Martina Wicklein

Both symposia were extremely well received by the diverse audience in attendance, and hopefully set a motivation point for future interactions between the two big vision communities brought together in the beautiful city of St. Petersburg.

Neuroethology in Ecuador

Winfried Wojtenek (wojtenek@usfq.edu.ec)
Universidad San Francisco de Quito, Quito, Ecuador

Neuroscience is one of the most dynamic and rapidly growing fields in biological sciences. Progress in neuro science has the potential to revolutionize medicine and our understanding of ourselves. However, the majority of research in this field has been confined to highly industrialized nations and to relatively few research organisms. Many important discoveries in neuroscience have been the result of comparative studies that exploit the diverse behaviors and physiology of organisms. Major breakthroughs in ecological, evolutionary, and behavioral science have resulted from comparative studies of tropical organisms and these tropical systems may be an important source for innovation within neuroscience as well. Ecuador is a small country but it has five distinct biological regions: the Amazon, the Sierra, the coastlands, the Pacific and the Galapagos islands.

Each region has a diverse variety of species exhibiting unique behaviors that could greatly expand our knowledge in neuroscience and neuroethology.

Three scientist working in neuroethology and neuroscience in Ecuador (left to right): Thomas Small, Winfried Wojtenek, Janeth Katherine Aldas Saltos.

Neuroethology/Neuroscience Research in Ecuador

Although neuroethology and neuroscience is still in its infancy in Ecuador, progress is being made at the Universidad San Francisco de Quito (USFQ). Preliminary

Field site where weak electric fish, p.e. Eigenmannia is found in the vegetation at the shore of the Sacha Lodge, near Francisco de Orellana (Coca).

research on weak electric fish in the Amazon (Eigenmannia) was presented at the last SfN meeting in Atlanta and we look forward to making further contributions to upcoming meetings. The jamming avoidance response (jar) of captive *Eigenmannia* is well documented and understood but almost nothing is known about the function of jar in wild animals. While the brain of this species is well understood, its living situation is just starting to be investigated in Ecuador. Further, USFQ has developed a collaboration with Dr. Ignacio Moore and Dr. Thomas Small of Virginia Tech (Blacksberg, VA, USA) to study neurogenesis in tropical birds. Experiments on captive and free-living birds are presently being conducted with the assistance of Ecuadorian university students. Additionally, an imminent collaboration with Eric Fortune (Johns Hopkins University, Baltimore, US) is on the way.

Field site were work is done on rufus winged sparrows, 3000 m above sea level near Papallacta.

Neuroethology/Neuroscience Education in Ecuador

Training Ecuadorian students in neuroscience is a critical aspect of promoting neuroscience and neuroethology in this country. USFQ has established a “Minor in Neuroscience”. We extended neuroscience education to a second university in Quito, Escuela Politécnica del Ejército (ESPE), in cooperation with M.Sc. Aldas Saltos. Through lower and upper level courses students are exposed to the principles of neuroscience and neuroethology, and are encouraged to take part in ongoing research projects in association with USFQ, ESPE, and Virginia Tech (US). Additionally, guest lectures in neuroscience and neuroethology delivered when speakers from the US and Europe are invited twice a year to teach and promote neuroscience as well as neuroethology in Ecuador. Our final goal is to strengthen our neuroethology curriculum and expand this throughout Ecuador.

This year, USFQ hosted the first International Brain Research Organization (IBRO) educational course in Ecuador. The Volunteer Lecture Team Program of IBRO exposed over 70 students from the Andes to internationally renowned neuroscientists and to the potential for long-lasting contacts.

A Request for Assistance

The biological diversity of Ecuador has immense potential for neuroscience and neuroethology. Further, the wealth of highly qualified and motivated students in Ecuador presents an exciting opportunity to help train a generation of neuroscientists while developing new research opportunities. However, we need help to develop neuroscience and neuroethology in Ecuador. Both expertise and equipment are needed to continue our efforts. If you are considering expanding your research to tropical systems, please consider Ecuador as a home for

your research. Also, please consider donating old equipment that is no longer in use in you laboratory. Amplifiers, stimulus isolation units and equipment for tissue sectioning are of particular interest.

Final Remarks

Ecuador is a country of marvelous biological diversity and friendly people. The potential for neuroscience and neuroethology in Ecuador is enormous and we invite all who are interested to contact us with ideas, collaborations, and support. We hope you will assist our effort to give neuroscience and neuroethology a new home and join us in utilizing the beauty and potential of this amazing country. Muchas gracias.

Deep thanks to John Nicholls, Jack McMahan, Walter Stühmer, Elain del Bel, Charles Granger, and Harold Zakon for traveling to Ecuador to teach Neuroscience here. Additional thanks to Thomas Small, Ignacio Moore and Eric Fortune for developing collaborations with the Neuroscience and Neuroethology Program at USFQ. They have all worked hard to encourage the development of Ecuadorian students and Neuroscience in Ecuador. And loving thanks to Janeth Katherine Aldas Saltos for inviting me to this country to further my professional development.

Electrosensory Systems Satellite Symposium

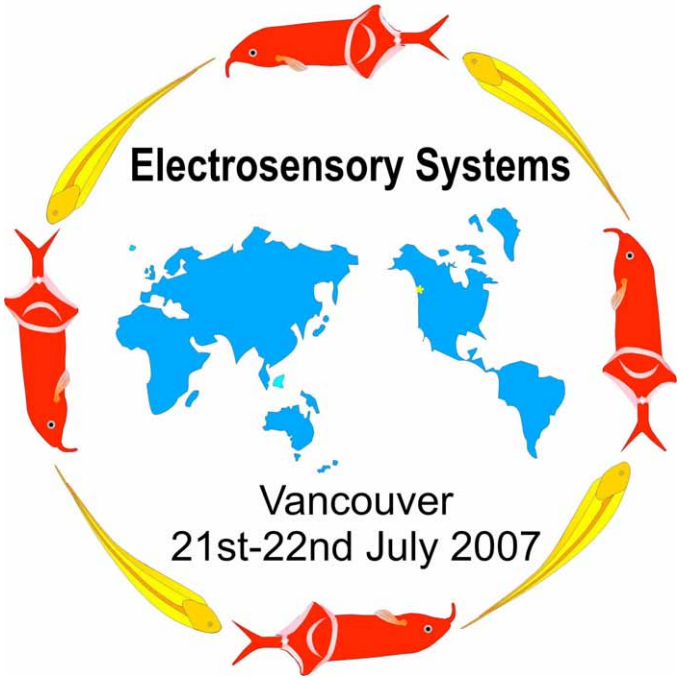
8th International Congress of Neuroethology, UBC Campus, Vancouver, Canada. Saturday 21-Sunday 22 July 2007

Gerhard von der Emde
(vonderemde@uni-bonn.de) Abt. Neuroethologie/Sensorische Ökologie, Institut für Zoologie der Universität Bonn, Germany
Kirsty Grant
(grant@unic.cnrs-gif.fr) Unité de Neurosciences Intégratives et Computationnelles, CNRS, Paris, France

Continuing tradition, a satellite symposium on Electrosensory Systems will be held at the University of British Columbia campus in Vancouver, Canada, on Saturday July 21 and Sunday July 22 2007, immediately before the 8th International Congress of Neuroethology. This meeting is now the fifth, following on from those in Gif sur Yvette in 1989, Montreal in 1992, San Diego in 1998 and Bonn in 2001.

Two full days of talks, discussions and posters will bring us up-to-date on current research and future directions of interest in electrosensory systems including amongst many: sensory perception in complex environments, evolution and behavioural ecology, molecular genetics, theoretical models of sensory images and information processing networks, and applications to robotics and sensory technology. A celebration banquet will be held in the evening of Saturday July 21.

Keep these dates free! A website will be set up soon to give further details of the programme and registration.



For further information or if you wish to be included in the mailing list, please contact Kirsty Grant (grant@unic.cnrs-gif.fr) or Gerhard von der Emde (vonderemde@uni-bonn.de).

Support for travel and registration for students and young investigators at the Vancouver ISN meeting

Ian A. Meinertzhagen, (iam@dal.ca)
Dalhousie University, Halifax, Nova Scotia, Canada
Ron Harris-Warrick (rmh4@cornell.edu)
Cornell University, Ithaca, NY, USA

The conference organisers for the ISN Congress in Vancouver, Barbara Beltz and Ron Harris-Warrick, are preparing proposals for both NIH and NSF, to support the travel and registration costs for students and young investigators at the Vancouver Congress. In anticipation of successful applications, all those who require such assistance should be prepared to complete an application once the announcement of a possible award is made in the Spring.

Positions Available

Professor in Marine Sensory Physiology, University of Southern Denmark, Odense

A professorship with special responsibilities in marine sensory physiology is available immediately at the Institute of Biology, University of Southern Denmark (SDU) with placement at the Institute's Marine Biological Research Centre in Kerteminde. The appointment as professor with special responsibilities lasts for a period of 5 years with the possibility of extension. By the end of the appointment, the position is converted to an associate professorship. The position will be associated with the newly formed Danish Centre for Marine Mammal Research (DCMMR); cooperatively established between SDU and Fjord&Bælt, an attraction and research institution. Research at the DCMMR encompasses all aspects of marine mammal biology with special emphasis on physiological, behavioural and biophysical aspects of sound production and hearing to foster the understanding of marine mammal sound communication and biosonar. However, research into sensory physiology of prey animals (such as fish) will be a welcome supplement to existing research.

For further information regarding this position please contact the Head of Institute, Dr. Ole Næsbye Larsen, Head, Institute of Biology, SDU, DK-5230 Odense M, Denmark; Telephone: +45 6550 2444; Fax +45 6593 0457; e-mail: onl@biology.sdu.dk

For a full description of the position, see the following website:
http://www.jobs.sdu.dk/vis_stilling.php?id=2903&lang=eng

Faculty Position in Systems Neurophysiology University of Southern California, USA

The Section of Neurobiology in the Department of Biological Sciences at the University of Southern California (USC) invites applications for a tenure-track faculty position, at any rank, in the area of systems neurophysiology.

The Section is part of a broad interdisciplinary Neuroscience community at USC, composed of more than 60 faculty conducting research in basic, engineering, and clinical sciences. For further information on the section, see http://www.usc.edu/programs/neuroscience/

For consideration, applicants must have a Ph.D., M.D., or equivalent degree and have demonstrated the ability to conduct innovative research into fundamental questions of neural function. Candidates who investigate sensory, motor, or cognitive processing from single cell to network levels are encouraged to apply. Experimental approaches such as imaging, intracellular, or multicellular recording in the whole animal, or a combination of *in vivo* with *in vitro* preparations, are of particular interest. Given the interdisciplinary emphasis of neuroscience at USC, a candidate's potential to collaborate with other Experimental and/or Computational Neuroscientists is highly desirable. Applications received before December 31, 2006, will be certain to receive consideration.

Applicants should supply their *curriculum vitae*, a statement of research interests, and three letters of recommendation to:
Judith Hirsch, Ph.D. c/o Vanessa Clark
University of Southern California
Hedco Neuroscience Building 120, MC 2520
3641 Watt Way
Los Angeles, CA 90089-2520
USA

Assistant/Associate Professor in Psychology, Hunter College, CUNY, USA

Tenure track position. Ph.D. degree, active research program and potential or present external funding required. Responsibilities include teaching and supervising graduate and undergraduate research. Special attention to those with experience with urban, ethnically diverse populations and who are sensitive to the cultural dimensions of people's experience. For further information, see:

http://maxweber.hunter.cuny.edu/psych/index.html

Neuroscience. Neuroethologist/Neurophysiologist with emphasis on analysis of neural mechanisms of behavior to join an active group of neuroscientists. Experience/interest in conservation to participate in a thriving Master's program in Animal Behavior and Conservation is desirable. Assistant/Associate Professor.

Salary commensurate with experience. Please submit a letter describing research and teaching interests, CV and 2-3 representative publications to Gordon Barr, Ph.D. Psychology, Hunter College, 695 Park Avenue, NY, NY 10021. Provide the name and email addresses of three references. Hunter College is an equal opportunity/affirmative action/ADA/IRCA employer. Women and members of underrepresented minorities are particularly encouraged to apply.

Assistant Professor in Neuroscience, Department of Biology, Washington University in St. Louis, USA

The Department of Biology at Washington University in St. Louis seeks a junior colleague at the rank of tenure-track Assistant Professor in the area of Neuroscience. Under exceptional circumstances, tenured appointments may be considered at the rank of associate or full professor. The successful candidate will establish a vigorous research program, and participate in undergraduate and graduate teaching. Candidates with expertise in systems, developmental, computational, or cellular neuroscience, or neuroethology will be viewed with particular interest. All candidates must have their Ph.D. in hand at the time of the appointment. The successful candidate will be encouraged to participate in University-wide initiatives in Neuroscience, Imaging and Systems Biology. For further information, see the Department of Bi-

ology (biology.wustl.edu) and the Neuroscience Program (neuroscience.wustl.edu). Review of applications will begin November 1, 2006. Applications will be accepted until the position is filled. Please submit a cover letter, curriculum vitae, brief statements of research and teaching interests, reprints of up to three papers, and the names and affiliations of three persons who have been asked to send letters of recommendation. We prefer electronic submissions e-mailed to: neurosearch@biology.wustl.edu If you prefer hard copies, please send them to: Chair of Neuroscience Search, Department of Biology, Washington University, Campus Box 1137, One Brookings Drive, St. Louis, MO 63130-4899, USA. Washington University is committed to excellence through diversity, and we particularly encourage applications from persons from underrepresented groups. Washington University is an Affirmative Action Employer.

Paul S.G. Stein, PhD, Professor of Biology, Biology Dept., Washington Univ, St Louis, MO 63130 USA
Tel: 314-935-6824; fax: 314-935-4432.
http://www.biology.wustl.edu/faculty/FacultyPage.php?IDProf=31
http://neuroscience.wustl.edu/research/faculty.php?id=88

Daljit S. and Elaine Sarkaria Professorship of Insect Physiology and Toxicology

Located in Ithaca, N.Y., USA, Cornell University is a bold, innovative, inclusive and dynamic teaching and research university where staff, faculty, and students alike are challenged to make an enduring contribution to the betterment of humanity.

Job Description: The Entomology Department and New Life Sciences at Cornell University seek to fill the Daljit S. and Elaine Sarkaria Professorship in Insect Physiology and Toxicology. This position creates a unique opportunity for an eminent scholar to lead a world-class program in insect integrative biology. The appointee will help direct the Daljit S. and Elaine Sarkaria Institute of Insect Physiology and Toxicology at Cornell University, which provides support for graduate and post-doctoral education. The New Life Sciences coupled with vibrant research programs in behavior, ecology and evolutionary biology create a diverse and rich intellectual environment within which insect physiology and toxicology can be studied. This position is in the New York State College of Agriculture and Life Sciences and the appointment will be at the rank of Professor. The position has research and teaching responsibilities. The appointee will lead an internationally recognized and externally funded research program in Insect Physiology and should be able to form collaborations and develop integrative projects that address biological systems, their complexity, and emergent properties. The ideal candidate will be capable of integrating the interactions of genes, proteins, biochemical processes and the organism´s external environment from the perspective of insect physiology. We feel that consideration of insect physiology in the context of higher-level interactions (species interactions, population control, etc) has great potential in the new integrative biological sciences and we seek a candidate who can work towards this end. The successful candidate will also contribute to instruction and mentoring of students and should be strongly motivated to direct graduate students, advise undergraduates, and provide opportunities for undergraduate research.

Qualifications: An exemplary and internationally recognized record in research, teaching, and mentoring in insect physiology or a related field. A strong desire to lead a world-class program in insect Integrative biology that capitalizes on the rich intellectual resources and capabilities at Cornell University. Demonstrated excellence in obtaining extramural support and training graduate students.

Availability: January 1, 2007 (flexible) Salary: Commensurate with experience and qualifications. This position is supported by an endowment including an annual research allocation. An attractive fringe benefits program is available.

Application: Applicants should forward: 1. Letter describing qualifications and interest in the position. 2. *Curriculum vitae* and list of publications. 3. Statement of teaching philosophy and description of courses taught. 4. Names and addresses of 3-5 references. 5. Names and addresses of 2-4 recently matriculated graduate students. Send application to: Jan Nyrop, Chairman Department of Entomology Comstock Hall, Cornell University Ithaca, NY 14853-2601.

Application Deadline: November 1, 2006 or until a suitable applicant is found.

Cornell University is an Affirmative Action/Equal Opportunity Employer and Educator. For more information see:

http://chronicle.com/jobs/profiles/2377.htm

Assistant Professor in Neuroethology

The Section of Integrative Biology of the University of Texas at Austin seeks applications for an Assistant Professor in the area of Neuroethology to begin September 2007. The successful applicant will join a strong program in behavior, ecology, and evolution, with strengths in sensory ecology, behavioral ecology, neuroendocrinology, behavioral genomics, phylogenetics, and population biology. Applicants may work on any organisms, but candidates working on arthropod neuroethology are particularly encouraged to apply. A Ph.D. is required in Biological Sciences or related areas and postdoctoralexperience is preferred. Teaching duties will include an undergraduate course in animal behavior and a graduate course in the candidates' area of interest. The successful candidate will be eligible for affiliation with the Institute of Neuroscience, which provides state-of-the-art core facilities and graduate program support (see www.utexas.edu/neuroscience).

Applicants should send a curriculum vita, brief statements of research and teaching interests, up to five reprints/preprints, and arrange for three letters of recom-

mendation. Application material should be sent as a single PDF file (including cover letter, vita, statements, and reprints/preprints) to: ibjob@uts.cc.utexas.edu. Letters of recommendation should be sent by regular mail to: Neuroethology Search, Integrative Biology, 1 University Station C0930, Austin, TX 78712, USA. Review of applications will begin 2 January 2007. For more detailed information see http://www.biosci.utexas.edu/jobs/. UT-Austin is an EEO/AA employer.

Assistant Professor, Molecular Basis of Chemoreception and/or Behavior in Insects.

The Department of Entomology at the University of California, Riverside CA, USA, invites applications for an Assistant Professor, with an emphasis on the molecular basis of chemoreception and/or behavior in insects, starting July 1, 2007. Position is tenure track, 11 months/year, 25% teaching, 75% research. Appointment level and salary commensurate with experience. Ph.D. with extensive training in using molecular biology techniques to investigate chemoreception and/or behavior in insects is required. Postdoctoral experience an asset. The appointee will develop a strong basic and applied research program, participate in graduate and undergraduate teaching in Entomology and interdepartmental programs, and supervise graduate students. Applicants should send CV, statement of research interests, reprints and manuscripts in press, and arrange to have four letters of reference sent to Jocelyn Millar, Search Committee Chair, Department of Entomology, University of California, Riverside, CA, 92521, USA; e-mail: Jocelyn.millar@ucr.edu, phone (951) 827-5821, FAX (951) 827-3086. Applications may be submitted electronically or by mail or courier service. Letters of reference may be sent by email initially, with signed hard copies following. Applications, including letters of reference, should be received by Dec. 31, 2006, but the position will remain open until filled. Further information about the Entomology Department and the position can be found at http://www.entomology.ucr.edu. Information on UC Riverside's numerous Interdepartmental programs can be found at http://www.ucr.edu/academic.html

The University of California is an equal opportunity/affirmative action employer.

Postdoctoral position (BAT IIa): Insect neurobiology

Group of Prof. Dr.Hans-Joachim Pflüger, Neurobiology, Institute of Biology, Department of Biology, Chemistry, Pharmacy, Free University Berlin, Germany.

Research field: cellular analysis of behaviour and sensory-motor networks in insects (including Drosophila) with mainly electrophysiological and/or imaging techniques.

We are searching for a team-oriented young scientist who actively contributes to the lively neurobiological environment in Berlin (for example, graduate college "Functional Insect Science"). We seek a person with skills in electrophysiology (including voltage clamp, patch clamp) and preferably also in imaging techniques as well as immunocytochemistry. The person will take responsibility for the laboratory PCs and the confocal microscope, and is expected to write his/her own research grants.

The position will involve teaching for undergraduates and graduates, mainly in the German language (undergraduates).

The position is temporary for a maximum of 5 years (and ideal for a German postdoc working abroad who wants to return to Germany).

Please send your application to Prof. Dr. Hans-Joachim Pflüger at the address below, or at: pflueger@neurobiologie.fu-berlin.de

Prof. Dr. Hans-Joachim Pflueger
Freie Universität Berlin
Fachbereich Biologie, Chemie, Pharmazie
Institut fuer Biologie, Neurobiologie
Koenigin-Luise-Strasse 28-30
D-14195 Berlin
Germany
tel +49-30-838 54676
fax +49-30-838 55455
email pflueger@neurobiologie.fu-berlin.de

Postdoctoral Position: Medical College of Wisconsin

Join my lab http://www.phys.mcw.edu/fac_tryba.htm in studying neural network, cellular and ionic mechanisms underlying respiratory rhythm generation in mammals; this rhythmic activity is necessary for breathing and essential to sustain life. For these studies, we use brain slice preparations from wild-type and mutant mice to understand rhythmic activity during normal breathing, as well as irregular breathing patterns in Rett Syndrome, SIDS and sleep apnea. We also study another rhythm: cortical rhythmic activity underlying human pediatric epilepsy in which we use cortical tissue removed from patients with intractable epilepsy. This translational research has been instrumental in helping several young patients with seizures and revealed new insights in our understanding of pediatric epilepsy. Please send CV, contact information and three recommendation letters to: Andrew K. Tryba, Ph.D., Medical College of Wisconsin, Dept. of Physiology, 8701 Watertown Plank Road, Milwaukee, WI 53226, USA. email: atryba@mcw.edu

Two graduate assistantships in fish sensory ecology/evolution

Graduate assistantships available in fish sensory ecology/evolution. Two graduate assistant positions are available in the laboratory of Dr. Dennis Higgs (http://www.uwindsor.ca/HiggsLab.htm) at the University of Windsor, Canada beginning September 2007. Eligible

students may also be considered for placement in a prospective graduate program in Behaviour, Cognition, and Neuroscience at the University of Windsor. One of the two assistantships will be in collaboration with Dr. Daniel Heath (http://cronus.uwindsor.ca/units/glier/genetics/lab.nsf) on the evolution of hearing, using advanced techniques in electrophysiology and DNA sequencing. This position will require travel for onsite electrophysiology. The second assistantship is in the area of auditory behaviour and ecology with the specific question relating to sound localization in fish and its potential role in invasive species control. Assistantships will be at the Master's or Ph.D. level, dependent upon interests and abilities of applicants. Some knowledge and appreciation of sensory ecology and evolution is required but training in electrophysiology, sequencing, and/or behavioural analysis will be provided. Interested parties should contact Dr. Higgs at dhiggs@uwindsor.ca with a statement of interest, stating the position being applied for and why the applicant fits, and a *curriculum vitae*.

Dennis M. Higgs, Ph.D.
Department of Biology
University of Windsor
Windsor, Ontario, Canada N9B 3P4
Tel: 519-253-3000 ext 4771
e-mail:dhiggs@uwindsor.ca
www.uwindsor.ca/higgslab

Postdoctoral Position: Department of Electrical and Computer Engineering, Michigan State University

A postdoctoral position is available immediately in the Neural Systems Engineering Laboratory of Prof. Karim Oweiss at the Department of Electrical and Computer Engineering, Michigan State University (http://www.egr.msu.edu/nsel). The project objective is to develop novel techniques for understanding how large populations of biological neurons process information over short and long time scales. Special emphasis is on the ability to quantify the degree at which neurons alter their connectivity in response to variations in external conditions during behavioral tasks.

The ideal candidate should have:
1- A good biological skill set.
2- Electrophysiological recording and microsurgery expertise in acute and chronic experiments with small animal models.
3- Expertise in multi-unit activity data analysis involving spike detection and sorting.

The candidate will gain advanced knowledge of how to process and extract information from large ensemble neuronal recordings with microelectrode arrays using advanced techniques currently being developed in Dr. Oweiss' lab. The position is for two years with a strong possibility of extension. A competitive stipend will be offered.

Application materials should include:
- Resumé
- Statement of research interests (1-2 pages),
- 2-3 reference letters

The position is available immediately and will remain open until filled. Please send materials electronically to koweiss@msu.edu

Karim G. Oweiss
Assistant Professor
Electrical & Computer Engineering Department
Michigan State University
East Lansing, MI 48824-1226
USA
email: koweiss@msu.edu
Tel: (517)432-8137
URL:http://www.egr.msu.edu/~koweiss

Fellowships in Neuroethology
The Smithsonian Tropical Research Institute (STRI) located in the Republic of Panama is a division of the Smithsonian Institution in Washington DC and maintains research facilities in different marine and terrestrial locations on the Isthmus of Panama. STRI offers fellowships for undergraduate, predoctoral and postdoctoral research in the areas represented by its scientific staff. Disciplines include **Neuroethology**.

STRI Earl S. Tupper 3-Year Postdoctoral Fellowship (deadline: 15 JAN 2007):
Applications should include detailed research proposal with budget, *curriculum vitae*, two letters of recommendation, names and telephone numbers of three additional references. Applicants should consult with STRI scientists who will serve as advisors before submitting final application. For more information: fellows@si.edu.

SI Postdoctoral, Senior Postdoctoral and Predoctoral Fellowships (deadline: 15 JAN 2007):
From 3 months up to two years depending on research. Available through the Office of Research Training and Services, Victor Building Suite 9300, MRC 902 PO Box 37012, Washington DC 20013-7012 USA, or visit www.si.edu/research+study

SI Molecular Evolution Fellowships (deadline: 15JAN07):

Available through the Office of Research Training and Services, Victor Building Suite 9300, MRC 902 PO Box 37012, Washington DC 20013-7012, USA or visit www.si.edu/research+study

STRI Short Term Fellowships (deadlines: Feb 15, May 15, Aug 15 and Nov 15) thru STRI. For information, visit www.stri.org. Proposals in Spanish are accepted.

STRI Fellowship Program for students in Latin America (deadlines: Feb 15, May 15, Aug 15 and Nov 15).

Candidates must be from universities in Latin America, particularly Central America, to carry out short-term pro-

jects and/or internships. For more information: see instructions for short-term fellowships and internships, www.stri.org, or contact fellows@si.edu. Proposals in Spanish are accepted.

STRI applications may be submitted either in English or in Spanish. Applications consist of one (1) printed copy, plus one electronic copy of all requested materials. The electronic copy should be submitted on a CD or by e-mail, as a single file in Word, WordPerfect or preferably PDF, including application form, proposal with budget and CV. Send hard copy of the application to STRI/Office of Academic Programs, Unit 0948, APO AA 34002-0948 from the US or Apartado 0843-03092, Balboa, Panama from Latin America. Electronic version should be sent to fellows@si.edu.

Awards are based upon merit, without regard to race, color, religion, gender, national origin, age or condition of handicap of the application.

EPSRC PhD Studentship - Visually guided navigation in insects and robots

Centre for Computational Neuroscience and Robotics, School of Life Sciences, University of Sussex, UK.

Applications are sought from UK candidates for a 3.5 year D.Phil. studentship available from January 2007. (Due to funding restrictions, EU candidates can only be considered if they have been resident in the UK for the last three years). Initial inquiries should be made to Dr. Paul Graham (P.R.Graham@sussex.ac.uk) in the Centre for Computational Neuroscience and Robotics.

We are studying insect navigation using both behavioural experiments and robotic modelling. There is a D.Phil. studentship available for a student to study the sensori-motor basis of visually-guided navigation in ants. Students will be expected to be involved in both behavioural experiments and computational modelling. Ideally, applicants should have a biological background as well as some programming skills and candidates with computational modeling experience (e.g. image processing, agent based modelling, neural networks) are especially encouraged.

Material for Future ISN Newsletters

The Editor would welcome, indeed wholly depends upon, material for future newsletters to fill the various sections of each issue. Reference to past issues will reveal the scope and style of contributions, the breadth of their variation and the depth of their originality. Material is solicited for meetings, courses, and job opportunities which might include some aspect of neuroethology and therefore be of interest to readers of the Newsletter. Advertisements for positions (faculty or trainees) should generally aim to be not longer than 200 words, or 300 words for multiple jobs advertised in a single submission. Announcements of new books (copyright 2005) *written or edited by ISN members* should include the full citation information (including ISBN) *plus* a 40-50 word description of the book. (Note that books containing chapters contributed by an ISN member are not appropriate for inclusion.) We also welcome announcements of awards to ISN members, and of courses and future meetings, reports on recent meetings, discussions of research areas or topics of interest to neuroethologists, laboratory profiles, and editorials. We also regretfully publish occasional obituaries and memorials. Word limits depend on the type of article.

Material should be submitted no earlier than one month before the next issue (in this case, March, 2007). Have an idea for an article that you or someone else would write? Contact the Secretary prior to submission to determine the length and suitability of material to be submitted. For those who may feel their particular interest (research field, geographical region, chromosomal complement, age group, whether to dress to the left or right, etc) has been under-represented in past Newsletters, please see this as both an invitation and challenge to offset the perceived lack of representation. Remember: the Newsletter represents us all, but an empty Newsletter represents nobody, or worse still, may actually represent nothing. All material must be submitted electronically, preferably as an attached file to an e-mail prepared in MS Word and sent to Ian Meinertzhagen at iam@dal.ca

Add our Link to Your Website!

Adding a link to ISN (http://neuroethology.org) on your website helps raise our profile in the scientific community.

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