International Society for Neuroethology

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THIS ISSUE INCLUDES

Need more information? Check the ISN website!

President's Column

Alison Mercer
President of the ISN

Dear ISN Members,

2013 has taken me to several very beautiful corners of the world; in May to the 2nd Caribbean School of Neuroethology in Cuba organized by **Emanuel Mora** (Havana University), in early July to San Diego to a meeting of the Executive Committee, and in mid-July

to Japan to take part in the Annual Meeting of the Japanese Society for Comparative Physiology and Biochemistry (JSCPB) in Himeji, and to meet with members of the 2014 ICN/JSCPB Local Organizing Committee in Sapporo.

Advanced schools are fantastic – intense – but hugely rewarding. The 2nd Caribbean School of Neuroethology in Cuba was no exception. The course was run for doctoral students and post-doctoral researchers from Latin America. Students from Argentina, Brazil, Chile, Colombia, Cuba, Mexico, Peru and Uruguay took part in the school, and I believe it would be hard to find a more talented and interesting group. Neuroethology is clearly alive and **kicking** in South America and I'm very much hoping that the students and faculty who took part in the course will meet again at the 2016 ICN in Uruguay.

***Artibeus jamaicensis*, the fruit eating bat** – one of several species of bat studied by **Emanuel Mora** and his students at Havana University. Photograph taken at the 2nd Caribbean School of Neuroethology by **Juan Bacigalupo**, faculty member from the University of Chile.

ISN provided support for the 2nd Caribbean School of Neuroethology ($10,000) and having seen the caliber of the students who took part I am convinced that investment in advanced schools is a great way for ISN to support and build the next generation of neuroethologists. There are plans afoot to run a similar school for students from the Asia region in Sapporo, Japan in 2014, immediately prior to the 2014 ICN / JSCPB. Details will be posted in the ISN Newsletter later this year.

The Executive Committee meeting in San Diego was also very productive. An Executive Summary prepared by **Susan Fahrbach** (ISN Secretary) will be posted on the ISN website. **Yoshi Oka** (Chair of the 2014 ICN/JSCPB Local Organizing Committee), together with **Heather Eisthen** & **Masashi Kawasaki** (Program Co-Chairs) provided a detailed summary of the planning that is underway for the 2014 Congress in Sapporo. It is going to be a very exciting meeting – the response to the call for symposium proposals has been outstanding and absolutely every effort is being made, both by the Local Organizing Committee and the Program Committee, to make the 2014 Congress a meeting to remember. **Please note the call for proposals for satellite symposia (Hokkaido Neuroethology Workshops) in the Announcements sections of this Newsletter.**

Sapporo is a very attractive city set in beautiful surroundings. The Congress Center is light, bright and welcoming – easily accessible from the city center by train – and very close to a food court that you will find quite distracting! The food court is only a few minutes' walk from the Congress Center and offers a fascinating array of different foods. Sapporo is also the home of a very famous brewery and Sapporo beer, as many of you will know, is delicious. I was taken to see the brewery because this will be the venue for the Farewell Party on the last evening of the Congress. It is set in very attractive gardens and has a great atmosphere – relaxed, friendly and welcoming.

Please be sure to check out the 2014 ICN/JSCPB website (http://www.icn2014.jp). The wildlife photography is spectacular. It is easy to understand, from the photographs displayed, why one of Hokkaido University's most famous graduates (Mark Konishi) has a fascination for owls. Take a look – you won't be disappointed.

One very important event that has occurred recently is the election of graduate-student and post-doctoral representatives to serve on ISN Council. A huge thank you to all of our early-career members who put their names forward for election. Your willingness to support the Society is very greatly appreciated.

As it turned out, the voting was extremely close – indeed, in the case of the graduate students, the two leading candidates received exactly the same number of votes! Council decided that there was everything to be

gained at this time in having two graduate student representatives rather than one, so as a result of the election I am delighted to be able to announce that we have three new members of Council. Congratulations to **Christa Baker** and **Gabriella Wolff** (our two graduate student reps), and to **Cindy Harley,** who was elected as the post-doctoral representative.

I am pleased to be able to report also that there is an exciting new initiative underway that is aimed at providing support for early-career researchers. **Paloma Gonzalez-Bellido** is gathering together an impressive line up of PIs to discuss, on camera, a range of issues of Interest to early-career researchers, including coping with the stresses of research (why am I doing this? whose data is it anyway?), personal choices in scientific life (the two body issue, pregnancy during PhD, Postdoc or tenure), and the highs and lows of doing research. Filming is being undertaken currently at the Woods Hole Marine Biological Station. Paloma plans to assemble a series of videos that she hopes will assist early-career researchers, particularly those working in neuroscience. The videos will be posted on the ISN website, probably sometime next year. Thumbs up to Paloma! This is an important initiative. Thank you also to all of the people who are contributing their time and energy to this project, and sharing their experiences. If you are an early-career scientist with ideas and opinions about how the Society could provide greater support for its graduate students and post-doc members, you are strongly encouraged to contact your newly-elected representatives so that your views can be echoed and your ideas implemented.

ISN is in a strong position financially, its membership is stable and there are exciting things in store for us at the upcoming Congress in Sapporo. Keep an eye out for updates on 2014 ICN/JSCPB and most importantly, start planning your 2014 visit to Japan!

Best wishes,

Alison

2014 ICN/JSCPB

Visit the website: http://www.icn2014.jp/.

2014 ICN/JSCPB is a joint meeting of the 11th International Congress of Neuroethology (ICN) and the 36th Annual Meeting of the Japanese Society for Comparative Physiology and Biochemistry (JSCPB). The conference will be held at the Sapporo Convention Center in Sapporo, Japan, July 28 through August 1, 2014. The meeting is co-organized by the **International Society for Neuroethology** (ISN), the **Japanese Association of Neuroethologists** (JAN), and the **Science Council of Japan** (SCJ).

*The following remembrance was contributed by **Brian McCabe**, Department of Zoology, University of Cambridge.*

Sir Gabriel Horn (1927–2012)

Gabriel Horn's many friends and colleagues in the neuroscience community were saddened by his death in August 2012 at the age of 84. Gabriel was an influential figure in his field over the last half-century. After leaving school at the age of 16 to work in his father's tailoring business, he studied part-time in order to qualify as an engineer but then decided to read Medicine at the University of Birmingham. At Birmingham he came under the influence of Solly Zuckerman, the Professor of Anatomy. Gabriel started his research career while a medical student and his first paper, entitled "The Neurological Basis of Thought," was published in 1952. Zuckerman was impressed, to the extent that he sent the paper to the philosopher A. J. Ayer for comment. Gabriel subsequently visited Ayer to discuss the paper and was, by his own account, rather nonplussed at Ayer's diatribe to the effect that physiology had nothing to say about sensory perception! One might reasonably expect Gabriel to have held his ground in that particular discussion. He continued his

research on the brain, using neuroanatomical methods to study the effects of reduced thyroid function and malnutrition. In 1956, he was appointed Demonstrator in the Department of Anatomy at the University of Cambridge and subsequently became Lecturer in Anatomy, Reader in Neurobiology and a Fellow of King's College.

After spending time with Herbert Jasper in Montreal and in other laboratories in North America to become familiar with electrophysiological techniques, Gabriel returned to Cambridge and pursued several lines of research, much of it conducted on freely-moving animals. At the time few people in Western Europe were doing such experiments and the available methods for collection and processing data from microelectrode recordings were relatively primitive. He worked on the stochastic behavior of spike activity in the cerebral cortex, multi-modal interactions in sensory processing, habituation, attention, hippocampal function and the neural basis of behavioral imprinting. His work on cortical spike trains was an early contribution to the statistical analysis of cortical activity and of functional linkage between cortical neurons. He studied multi-sensory neurons in the brainstem and superior colliculus, and habituation of visual unit responses in the superior colliculus. He was quick to identify preparations with the potential to elucidate processes of general neurobiological importance, and continued his work on habituation by turning to the locust visual system and the squid giant synapse. His work on tilt-sensitive neurons in the visual cortex illustrated how animals as disparate as mammals and crustaceans can solve the problem of coordinating visual and vestibular information in analogous ways. The research on multisensory integration led to an interest in selective attention and the habituation work seems to have stimulated Gabriel's long-standing interest in learning and memory. This interest was developed by single unit recording in the hippocampus of awake monkeys.

The importance of finding a good preparation in which to study memory mechanisms arose in a conversation between Gabriel and Pat Bateson, who was working on the learning process of imprinting in domestic chicks. Together with Steven Rose, Gabriel and Pat enquired whether changes could be identified in the chick brain (they chose to measure net protein and RNA synthesis), which could be ascribed specifically to learning. A number of carefully designed experiments led to the identification of a region in the chick forebrain, then known as the IMHV and subsequently renamed the IMM, which had the characteristics of a memory system. In 1985 Gabriel gave a detailed account of the imprinting work to date in his book *Memory, Imprinting and the Brain* (OUP, Oxford). This research, which he continued up to the day he died, is a multifaceted study of learning and memory mechanisms. It involved behavioral studies; identified morphological and biochemical changes in synapses associated with learning; identified cell populations within the IMM that are activated in a learning-related manner; characterized the electrical activity of neurons in the IMM after learning; and has begun to reveal the role of sleep in memory. Neural network modeling based on the neurobiological results generated predictions testable by behavioral experiments. An interesting outcome of the work, intended to delineate neural mechanisms, was to elucidate problems originally identified in behavioral studies. Conversely, behavioral studies of imprinting stimulated the neurobiological analyses. Such cross-fertilization between different levels of analysis was, on occasion, a bonus: it was not always anticipated when the experiments were designed. An excellent summary of some of this work may be found in Horn, G (2004), "Pathways of the Past: the Imprint of Memory", Nature Reviews Neuroscience, 5: 108-120.

In 1974, Gabriel was appointed Professor of Anatomy at the University of Bristol and in 1977 returned to Cambridge as Professor of Zoology, a post he held until his retirement. Gabriel became Head of the Department of Zoology at Cambridge in 1978. Under his headship the Department took on a form still recognizable today; research in the department increased in diversity and the annual number of students reading Zoology in their final undergraduate year more than doubled. He made a major contribution to the establishment of the current final year undergraduate Neuroscience course and, more generally, to the Cambridge neuroscience community. One aspect of the latter contribution, the annual Cambridge Neuroscience Seminar, continues to flourish as one of the activities promoted by the body now known as Cambridge Neuroscience.

Gabriel was elected a Fellow of the Royal Society in 1986 and was awarded the Society's Royal Medal in 2001. In 1992 he was appointed Master of Sidney Sussex College Cambridge, serving until 1999. On retiring as Head of the Department of Zoology, he moved back to the Sub-Department of Animal Behaviour at Madingley, where the imprinting work had started. Despite periods of ill health, in 2001 he chaired a UK government committee to review the origin of Bovine Spongiform Encephalopathy and in 2005 chaired a steering committee on "Brain Sciences, Addiction and Drugs" for the Academy of Medical Sciences, reporting to the British Government. Service to the University continued as Deputy Vice-Chancellor and Chair of the Cambridge University Government Policy Programme. Gabriel held honorary doctorates at the Universities of Birmingham and Bristol, and was similarly honored by the Georgian Academy of Sciences. In 2011, he was honored by the British Neuroscience Association for

outstanding contributions to neuroscience. In 2002 he was knighted for “Services to Neurobiology and the Advancement of Scientific Research”. A fascinating video of a conversation between Gabriel and Sir Patrick Bateson about Gabriel’s life can be found at http://www.sms.cam.ac.uk/media/1121995.

*The following commentary was submitted by **David King** of Southern Illinois University, Departments of Zoology and Anatomy. It is a response to **Paul Katz’ President's Column** published in the March 2012 ISN Newsletter, in which he invited discussion on unifying concepts. In this column, Katz invited the ISN membership to start thinking BIG. He asked: What are the organizing principles of brains and behaviors? Can we create a modern synthesis of neuroethology?" Responses to* dgking@siu.edu.

WHAT CAN GIANT AXONS TELL US ABOUT GENETICS AND EVOLUTION?

Naturalists have long noted that behavior evolves with remarkable ease, such that adaptive alteration of instinctive behavior commonly precedes concomitant adaptive adjustment of morphology. Yet all behavior depends on the exquisitely intricate organization of an entire nervous system. Between these two commonplace observations lies a mystery that has not yet been extensively explored and is seldom even acknowledged.

How can it be that complex, integrated neural organization is so evolutionarily malleable? In particular, to what extent are the characteristic properties of individually identifiable neurons (or "equivalent sets" of cells; Bullock 1984) free to vary and evolve independently from one another?

Giant axons, which in some animals can attain diameters greater than a millimeter, epitomize how clearly some individual nerve cells can be distinguished from all others (Figure 1). These outstanding nerve fibers warrant attention not only because they are, by definition, "far larger than the other fibers in the same animal" (Bullock & Horridge 1965, II, p. 1467). Giant axons also hint at the degrees of freedom that must be available for genetic adjustment of specific cellular parameters.

"Repeatedly in each group, we find that related species differ in respect to possession of giant fibers, which must therefore evolve rather readily" (Bullock & Horridge 1965, I, p. 18). Thus giant axons exemplify not only the importance of axon diameter along certain neural pathways but also the facility with which evolutionary processes can adjust the properties of individual cells. And of course nerve fibers come in many sizes besides "exceedingly large" and "standard," so giant axons represent only a conspicuous extreme along a continuum of axonal size variation. This means, to paraphrase the above observation, we repeatedly find that related species differ in their pattern of axon diameters, so that size distinctions among individual axons must evolve rather readily.

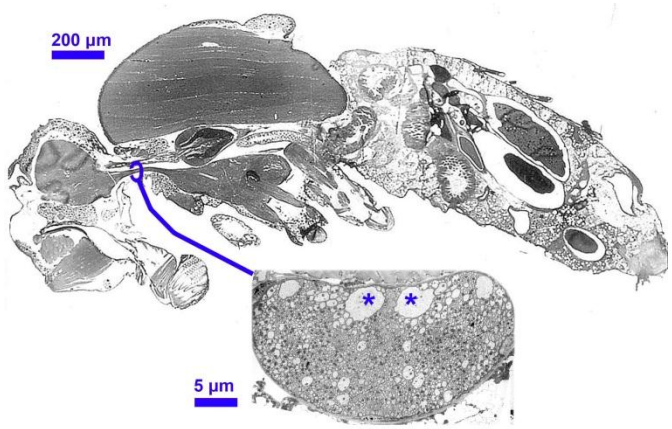

Figure. 1. The cervical connective of *Drosophila melanogaster* Meigen (family Drosophilidae). Asterisks indicate a pair of dorsomedial giant fibers.

Several patterns of axon diameter are illustrated in Figures 2 through 5, from the cervical connectives of various dipteran flies. (The cervical connective is the insect equivalent of a "spinal cord," connecting a fly's brain with the rest of its body.) Each connective contains several thousand axons, although most of the smaller ones cannot be resolved in these images.

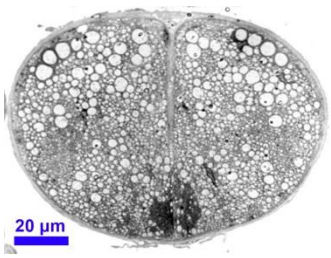

Figure 2. Tipulidae, *Tipula bicornis* Forbes.

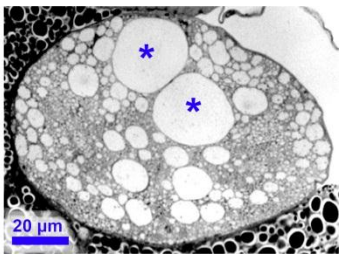

Figure 3. Lauxaniidae, *Minettia magna* (Coquillett).

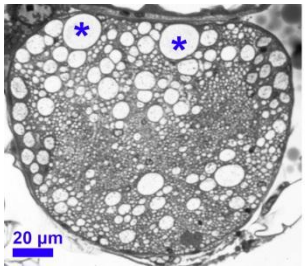

Figure 4. Muscidae, *Muscina pascuorum* (Meigen).

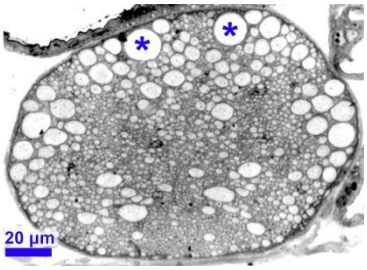

Figure 5. Sarcophagidae, *Sarcophaga bullata* Parker.

Some flies, such as the crane fly in Figure 2, have no exceptionally large axons. Other fly species, including

several but not all muscoid flies, have a conspicuous pair of large dorsomedial axons (asterisks in Figures 3, 4, 5). These are putative homologs, by the criteria of similar position and course as well as relative size, for those which participate in a startle response in *Drosophila melanogaster* (King 1983; King & Valentino 1983; Wyman *et al*. 1984). The fly in Figure 3, with its especially prominent giant axons, lies midway in body size between the one shown in Figure 1 and those in Figures 4 and 5, so difference in proportional size is not a simple matter of allometry.

Additional diversity in axon size distributions is illustrated in Figures 6 through 9. Certain commonalities are evident in all of these specimens, such as the concentration of most large axons dorsally with a few bilaterally symmetrical pairs also present ventrally. But various differences are also readily apparent. Note that the two species shown in Figures 8 and 9, in spite of belonging to the same family of bee flies, display distinctly different patterns of axon size.

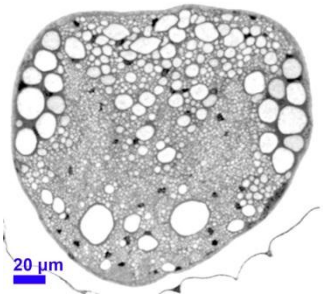

Figure 6. Tabanidae, *Tabanus calens* Linnaeus.

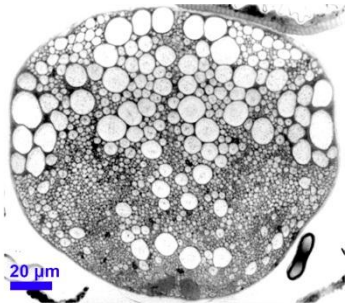

Figure 7. Syrphidae, *Helophilus fasciatus* Walker.

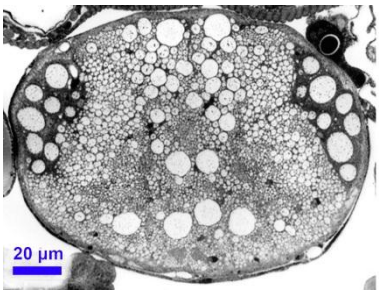

Figure 8. Bombyliidae, *Sparnopolius* sp.

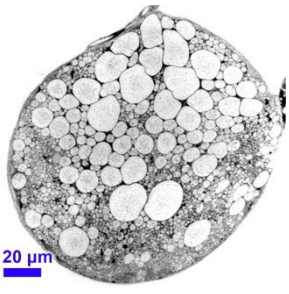

Figure 9. Bombyliidae, *Poecilanthrax* sp.

Among the many nerve cell properties with putative behavioral significance (*e.g*., cell shape, connectivity, chemical action, membrane function, *etc*.; Bullock 2000), axonal diameter stands out both for ease of assessment and for relatively straightforward interpretation of functional impact. Larger axons increase the speed of impulse conduction as well as reliability of synaptic transmission, while smaller axons take up less volume and require less energy to build and to maintain. One can readily imagine scenarios in which selective advantage for specific axon size distributions reflects the relative importance, in different ecological niches, for signal speed and reliability along each of many diverse pathways. The typical association of giant axons with rapid escape reflexes supports this adaptationist perspective.

Nevertheless, identifying an adaptive advantage for a particular assortment of axon sizes comprises only part of a complete evolutionary explanation. Before natural selection can favor increased conduction rates for some individual axons and decreased rates for others, there must first exist considerable flexibility for genetically "tuning" the sizes of individual nerve fibers. Just how many such details of neuronal organization can be individually informed by a finite genome? How many "genes," or genetic loci for adjustment, must exist to enable such facile evolutionary adaptation of the neural substrates for behavior? In other words, how are genomes organized to supply variation of appropriate quality and quantity to sustain behavioral evolution?

The simplicity of the protein code, with its direct correspondence between DNA sequence and amino acid sequence (subject of course to certain complexities of translation from RNA to protein, including excision of introns), should not be expected for the encoding of cellular morphology or organismal behavior. These emerge only through complex developmental and epigenetic interactions involving multiple genes as well as the external environment. Nevertheless, for any feature to be subject to natural selection, there must be a heritable correspondence between selectable differences in phenotype (including behavior) and DNA sequence differences at specific genetic loci.

Yet genetic sources for variability sufficient to specify the distinguishing functional parameters of uniquely identifiable cells, such as the diameters of giant axons, are certainly not obvious in current genome maps. If evolutionary adjustment of such cell parameters depended on variation in protein coding genes, the task would seem to require a far greater number of genes than are found in any animal's genome, even if genes had nothing else to do.

This apparent paradox suggests a question. What manner of mutations, and of genetic information, must be necessary as the material basis for behavioral evolution? Conventional evolutionary theory characterizes mutations as the accidental result of imperfect DNA replication and then simply presumes that "random" mutations must be adequate to sustain all adaptive evolution. Challenging this traditional view is a growing appreciation of implicit genetic "protocols" for mutation. These are mechanisms which constrain mutations within patterns that increase their potential or probability for adaptive utility (Doyle *et al*. 2006; Doyle

& Csete 2011) and which could be shaped by indirect selection precisely for that function (King 2012).

By focusing attention on the necessity for versatile, high-resolution genetic control over neural organization, comparative study of neuronal and behavioral evolution in closely related taxa (as suggested here by axon diameter in flies) may help elucidate molecular sources of adaptive variation. For example, might neuronal properties be "tuned" not by conventional genes (i.e., protein coding sequences) but by combinations of regulatory sequences, perhaps comprised of simple tandem repeats which are far more numerous than genes (*cf*. Fondon *et al*. 2008)? On the other hand, might there also be features of neural organization which emerge from deeper principles of self-organizing development rather than from individual cell-by-cell adjustment, such as nested sets of fundamentally similar *ur*-circuitry?

Such questions invert the typical paradigm of evo-devo investigation. Instead of using developmental genetics to explain evolutionary transformation, this neuroethological approach would apply knowledge of comparative neuronal anatomy to address fundamental questions of genomic organization.

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SUBMISSIONS FOR FUTURE NEWSLETTERS

Please send meeting announcements, advertisements, and other related information for the next newsletter (November/December 2013) to the ISN secretary, Susan Fahrbach (fahrbach@wfu.edu). Advertisements for jobs and graduate/postdoctoral positions should be no more than 150 words. Suggestions for feature articles, including research group reports, autobiographical sketches, meeting summaries, and *Neuroethological Viewpoints*, should also be sent to the ISN secretary. Please do not submit full articles of this type without a response from the Secretary. Feature articles may be up to 1,500 words in length. If you have explained some aspect of neuroethology to a non-specialist audience (see the example of ISN member Gene E. Robinson's congressional testimony in this newsletter), please consider sharing a copy of your remarks with fellow members so that we can all be inspired to advocate for our field!

The newsletter also welcomes research commentaries, book reviews, teaching ideas, and other material that might be of interest to the ISN community. These should be no longer than 450 words in length, and should be submitted after consultation with the Secretary.

ICN2016 URUGUAY

The 2016 Congress will take place in Montevideo, Uruguay, March 29 through April 3, 2016.

AN ISN MEMBER TESTIFIES TO THE U.S. CONGRESS

*On Wednesday, July 31, 2013, ISN member **Gene E. Robinson** presented testimony to the U.S. House of Representatives. His testimony, made in the context of U.S. President Obama's BRAIN initiative, used clear language to build a strong case for basic research on brain and behavior "in a variety of animal species." Excerpts of his remarks appear below; the full transcript is available in The Congressional Record.*

TESTIMONY
of
Gene E. Robinson, Ph.D.
Swanlund Chair of Entomology and Neuroscience
Director of the Institute for Genomic Biology
University of Illinois at Urbana-Champaign

to the

Committee on Science, Space, and Technology
Subcommittee on Research and Technology
U.S. House of Representatives
July 31, 2013

Good morning, Chairman Bucshon, Ranking Member Lipinski, and members of the Subcommittee. Thank you for the opportunity to provide testimony today on the frontiers in human brain research and the importance of an interdisciplinary and interagency approach to neuroscience. My name is Gene E. Robinson and I am the Swanlund Chair of Entomology and Neuroscience and the Director of the Institute for Genomic Biology at the University of Illinois at Urbana-Champaign. I am a member of the US National Academy of Sciences and currently serve on the Advisory Council of the National Institute of Mental Health.

Today I will address three topics: first, the importance of basic research on brain and behavior; second, the wisdom of studying a diverse set of animal models; and third, the power of interdisciplinary research, which is essential for building new tools to study the human brain.

A few years ago, the National Science Foundation (NSF) sponsored a workshop that I chaired to address the challenges of 21st century biology. Our report, published in 2010 in *BioScience*, concluded that, "Addressing the challenges of 21st century biology requires integrating approaches and results across different subdisciplines of biology…as well as technologies, information, and approaches from other disciplines…" This applies to many areas of biology, including neuroscience, and in particular, the recently announced Brain Initiative, that is, the Brain Research through Advancing Innovative Neurotechnologies Initiative. The BRAIN Initiative needs to develop a broad and inclusive agenda that funds basic research on brain and behavior, both in humans and in a variety of animal species.

Why is a broad approach necessary? What are the benefits of studying a wide array of species in our efforts to understand the human brain? One of the goals of the BRAIN Initiative is to understand how the brain produces human behavior, with all of its complexity and potential for disorder. We are fortunate that the diversity of animal life on the planet provides us with many potential models for aspects of human behavior, so long as we have the knowledge to recognize and take advantage of them. This approach of exploring and capitalizing on the resources provided by nature falls perfectly within the mission of NSF. NSF supports a wide scope of basic science on brain and behavior that provides the breadth of knowledge necessary for continued advancement of the field of neuroscience.

…Let me give you one example from my own research to illustrate the benefits of integrating research on the brain with research on behavior in an interdisciplinary manner, as well as the synergy between basic science and its sometimes unexpected applications.

I study social behavior, specifically how it arises in nature and what mechanisms govern it. I use honey bees to address these questions. The reason I use honey bees is that they live in one of the most complex societies on the planet, with tens of thousands of individuals involved in intricate forms of communication and division of labor. Intriguingly, they produce all this complex social behavior with a brain the size of a grass seed! How can such a tiny brain produce such complex behavior and what does this say about our own brains?

One question my laboratory has addressed is how do bees know what job to perform in their hive. There are about a dozen different jobs that bees perform, including feeding the baby bees, foraging for nectar and pollen from flowers, and turning nectar into honey. Bees divide labor in a very organized fashion, with different groups specializing in the different jobs. But bees don't do these jobs like little robots; rather they adjust their behavior to the needs of the whole group. When a hive of bees loses some of its foragers, others will drop what they're doing and start to forage. Thanks to a Highway Easy-Pass-like system developed in my laboratory by retired computer entrepreneur and current citizen scientist Paul Tenczar,

we can now outfit bees with Radio Frequency ID tags to automatically detect this behavioral shift, enabling us to more easily explore related neurobiological questions.

One intriguing aspect of job-switching is that bees do this without receiving commands from centralized control. Neither the queen nor any other individual directs the actions of the rank and file worker bees, but everyone in the beehive does what needs to be done. Each bee is able to synthesize information about the environment inside and outside the hive, along with internal cues about its physiological state, to appropriately direct its own behavior. We suspected that this might involve reprogramming the bee's brain to perform the different job, but we needed new tools to monitor brain activity.

In the early 2000s, with the advent of more advanced genome sequencing technology, we pushed to sequence the honey bee genome, the assemblage of all the genes, in order to develop powerful new tools for brain analysis. Fortunately the NIH's National Human Genome Research Institute at the time was considering additional species for sequencing in order to better understand the human genome, and the honey bee was selected because of its compelling social behavior; the United States Department of Agriculture also contributed because of the vital role bees play in pollinating our nation's food and fiber crops.

…My laboratory performed a series of experiments that explored the relationship between behavioral changes and changes in brain gene activity; that is, how much cells in the brain were calling on each gene in the genome to produce the protein it encodes.

We found that the brain of the bee is indeed reprogrammed to perform a different job, but the way this reprogramming occurs was a big surprise. Not only does the genome provide a script for building and operating the brain; when it comes to behavior, the genome also improvises—it is sensitive to the environment and alters the activity of genes in a dynamic way. When a bee detects a decrease in the number of foragers in its hive, thousands of genes in its brain change their activity, and this causes the bee to start to forage. The bee's experience is embedded in its genome in the brain so that it can change its behavior appropriately.

It turns out that bees are not the only ones with dynamic genomes in their brains. Birds, fish, mice, and other animals also have been found to exhibit dynamic brain genomes. In addition, as expected when a feature of biology is similar in many different organisms, humans also appear to exhibit the same dynamic brain genome. But it is much more difficult to study this phenomenon in humans than in animals, and it never would have been done without the animal discoveries.

The question of biological embedding—how social influences are perceived, processed, and ultimately transformed into signals inside brain cells--is one of the most important questions in neuroscience, and it has profound health and public policy implications. It is clear that early adversity changes behavior, learning capacities, and social functioning, but how this happens –how the brain develops differently under adversity—can only be studied in animals in a basic research framework. Our research on honey bees helped initiate this line of research, but it will take the integration of this and many other research efforts to reach a complete answer…

My laboratory's research on honey bees shows the value of combining the power of new technology with knowledge derived from basic research on both brain and behavior. The BRAIN Initiative similarly needs to commit to a creative blend of basic and applied research, to increase the opportunity for transformative discoveries. The initiative will likewise benefit from the selection of experimental models and behaviors that provide illuminating contexts in which to apply them. However, neuroscientists are increasingly relying on the study of just a few species to understand behavior and brain function. These classic model organisms, including the fruit fly and mouse, do offer experimental advantages. They are easy to breed in the laboratory and they are easy to use for many types of genetic experiments to learn the functions of different genes. As attractive as these advantages are, the use of only a few model organisms is unnecessarily limiting. Many aspects of biology are the same across species, but each species has unique characteristics as well; to distinguish between these two possibilities, multiple species must be studied and compared. The unique features of some organisms offer research opportunities that more traditional study organisms do not, often because they represent an extreme of a biological property of interest. Studies that make strategic use of well-chosen, and diverse, animal models can have tremendous impact on a field. Neuroscientists have long known this—the lowly squid essentially launched the modern era of neuroscience because its nerve cells are so big that their activity could be studied even with the primitive techniques of the late 1940s. Because an increasing number of species have had their genomes sequenced over the past few years, there are more choices than ever before for high-powered molecular analyses of the brain…

Understanding how the brain works represents a formidable challenge to our collective ingenuity and dedication. It is important that we consider carefully how to best direct our efforts and resources to meet this challenge, united by our common interest in improving the health and structure of our society. I appreciate the opportunity to be here today with you and the committee to discuss this important topic. **We must remember that basic science research is called "basic" not because it is simple, but because it provides the foundation for innovation.** I am confident that this initiative will bring great improvements to our understanding of the human body, the brain, and our health by promoting the continuation of impressive work in our university research centers and government laboratories, in partnerships with private organizations, and enabled by funding from government agencies. Through the united effort of biologists and mathematicians, engineers, physicians, and other explorers of the brain, both big brains and little brains, we must – and we will -- find the answers we need.

INTRODUCING – OUR NEW MEMBERS OF COUNCIL

Congratulations to our new members: **Cindy Harley** (CMHarley@umn.edu), **Gabriella Wolff** (gabbycat@email.arizona.edu) and **Christa Baker** (cabaker@wustl.edu).

Cindy Harley is a post-doctoral researcher working currently at the University of Minnesota. She is interested in how sensory information guides locomotion, and has used behavioral observation to ask questions about command formation and decision making in both the cockroach and the leech. She is **"*unequivocally and unapologetically a neuroethologist.*"** She feels that as a seasoned postdoc, she is familiar with the issues surrounding postdocs today and is in a good position to represent ISN's post-doctoral constituency.

Gabriella Wolff has just completed the third year of her PhD program in Neuroscience at the University of Arizona. She is interested in the evolution of learning and memory brain centers across vertebrate and invertebrate taxa. One of her goals is to elucidate their common ground plan circuitry and evolutionary origin. Gabriella highlighted the need to bolster public support for neuroethology through greater exposure on the internet. She says she would love to see an ISN Youtube channel, where members could submit videos targeted towards a general audience. **"*If science is indeed becoming ever more hermetic, then an intertwining of science, media and art could be key to research that resonates with everyone, irrespective of culture or education*."**

Christa Baker is studying for her doctoral degree at Washington University in St Louis. She is interested in the neural basis of the perception of communication signals in weakly electric fish and is studying how the integration of excitation and inhibition can act as a temporal filter for behaviorally relevant synaptic input. Christa sees a need also to increase public interest in science, and is keen to identify ways to help scientists communicate their research to non-specialists. "***By continuing to produce and effectively communicate exciting science, hopefully we as a community can ensure the future of neuroethology funding.***"

Attention early-career members – if you have ideas, news or views of interest to ISN members, please contact Cindy, Gabriella or Christa so that they can discuss these with you, and represent your views on Council

SATELLITE MEETING
NEURAL BASES OF BEHAVIOR

Neuroethology and Neurobiology of Memory in the Southern Cone

A Tribute to Héctor Maldonado
Córdoba, Argentina
September 30 – October 2, 2013

Héctor Maldonado (1927-2010) was an outstanding scientist who strongly contributed to the understanding of the neural bases of animal behavior by using innovative and non-traditional model systems. He was also a great team leader, the founder of neuroethology in Argentina, and a promoter of neuroethology across Latin America. This symposium honors his legacy.

Two days of presentations will precede the Closing Homage Ceremony, which will be highlighted by the participation of Professors **Yadin Dudai** and **Randolf Menzel**. In addition, this meeting will serve as the first step in the organization of the 2016 ICN to be held in Montevideo, Uruguay. Reflecting this emphasis, the President and President-Elect of the ISN will Skype in to a special session titled "The ISN in South America." See the ISN website or http://www.saneurociencias.org.ar/ for more details.

2013 HEILIGENBERG TRAVEL AWARDS

Congratulations! The following winners will attend the **2013 GRS/GRC in Neuroethology: Behavior, Evolution, and Neurobiology** in Mount Snow, VT, USA August 2013): **Jeff Brown** (University of Illinois); **Bryce Chung** (Georgia State University); **Eva Fischer** (Colorado State University); **Charuni Gunaratne** (Georgia State University); **Jessica Hansen** (Indiana University); **Rayna Harris** (University of Texas); and **Katrina Schrode** (University of Minnesota). **Paula Pouso** (UdelaR, Uruguay), will attend the 2013 **Society for Neuroscience Annual Meeting** in San Diego, CA, USA. **Kathryn Feller** (University of Maryland, Baltimore County) will attend the **International Conference on Invertebrate Vision** in August 2013.

Remember that eligibility for travel awards is restricted to members, and is therefore an **important perk of membership** in the ISN. If you are reading this newsletter, you are in a good position to encourage your friends and colleagues to join today. A two year membership in the ISN costs only $40 for graduate students and $100 for postdocs! A membership is a cost-effective way to support the field of neuroethology at the same time you are supporting your own professional development.

CALL FOR NOMINATIONS

FELLOW OF THE INTERNATIONAL SOCIETY FOR NEUROETHOLOGY

April 30, 2014 is the deadline for submitting nominations for the honorary position of Fellow of the Society for Neuroethology. (Relax, you have almost a whole year to think about your nomination. But don't forget to tackle this important task.)

Eligibility: Candidates must have been a member of the ISN continuously for at least six years prior to nomination. Candidates must be a current member.

Criteria: Fellows are recognized for meritorious efforts to advance the science of neuroethology. These include:

- a significant body of published research
- leadership in educational and outreach efforts
- extraordinary service that promotes science, particularly neuroethology

Who can nominate? Fellow nominations may be made by any current regular, lifetime, or emeritus member of the ISN. The nominee must not be a member of the nominator's current department nor be a doctoral or postdoctoral associate of the nominator (either currently or within the past 10 years).

Nomination procedure: A letter from the nominating member must be submitted detailing the qualifications of the nominee and providing evidence of achievements that demonstrate fulfillment of the criteria. Supporting letters must be submitted by two additional current members of the ISN. The nomination should include a brief biographical sketch of the nominee (< 250 words) that includes educational and professional background and a description of major achievements. Send materials in the form of a single pdf file to Joyce Lancaster at jlancaster@allenpress.com

New Fellows will be formally recognized at the 2014 International Congress of Neuroethology.

Selection of Fellows will be based entirely on scientific merit, irrespective of race, creed, sex, age, or nationality.

POSITION ANNOUNCEMENT

POST-DOCTORAL RESEARCH FELLOWSHIP NEUROPHYSIOLOGY/ANIMAL BEHAVIOR

A **Fellowship** is available immediately to study the **neuromechanics of movements in soft bodied animals**. The project will involve making extracellular recordings from specific muscles in intact, freely moving insects and from sensory nerves in reduced preparations.

This post-doctoral position will in the **Biology Department** at **Tufts University** near Boston and is funded by the **National Science Foundation**. The appointment will initially be for one year, with the possibility of extending further. The work will be carried out in a new multidisciplinary building with excellent facilities for electrophysiology, muscle work-loop analysis, motion capture, cell culture, molecular science, rapid prototyping and device fabrication (see http://ase.tufts.edu/bdl) for more information

A background in electrophysiology is essential and experience studying invertebrates would be particularly advantageous. Even more important than specific skills, I am interested in recruiting a scientist who will bring curiosity, enthusiasm, and creativity to this project.

Contact: barry.trimmer@tufts.edu (617.627.3924).

CALL FOR SATELLITE SYMPOSIUM PROPOSALS

HOKKAIDO NEUROETHOLOGY WORKSHOPS 2014 (HNW2014)

The following is from Toshiya Matsushima, Hiroshi Aonuma, and Makoto Mizunami, who are organizing the ICN Satellite Symposia for the 2014 meeting in Sapporo.

We cordially invite proposals for ICN Satellite Symposia, which will be called "Hokkaido Neuroethology Workshops 2014" and held on 27 July 2014 at the Faculty of Science, Hokkaido University on the Sapporo campus. Up to 9 slots (8 small / medium sized rooms with 33-108 seats and one theater that accommodates 262 people) are available from 08:30 to 20:00, each equipped with video projector, screen, microphones and free WiFi. Coffee and light snacks will be served by the local host, and room charges are not required. The HNW2014 is sponsored by the Faculty of Science, and hosted by Laboratories of Behavioral Neurobiology in the Department of Biological Sciences. Please note that if required, it will be possible to hold workshops for 2 consecutive days starting from 26 July; contact us for details.

Workshop organizers must be members of ISN or JSCPB, and all participants of the proposed workshops are expected to register for 2014ICN/JSCPB. Please note that HNW2014 is planned to encourage people to come to 2014ICN/JSCPB, but is organized independently of the main body of the congress. Upon request, and after careful assessment of the submitted proposals, the local host will offer partial support for travel expenses (max JPY \100,000 per person) for a limited number of speakers travelling from abroad (ca. 10 people in total).

The deadline for submission of proposals is **30 September 2013**. Proposals will be reviewed by the local host committee and decisions on slot allocation and travel expense support will be announced as soon as possible. The following workshops are welcome:

1. Topics specialized in particular groups of animals, methods and/or concepts in neuroethology and related fields of science. Novel and challenging interactions among different subjects in biology, neuroscience, psychology and robotics are also encouraged.
2. Each workshop organizer(s) is responsible for contacting speakers and making announcements to the participants, as well as management of the workshop. The announcements may be sent to the potential participants via the ISN mailing list and/or the sites of 2014ICN/JSCPB and HNW2014. Ask the local host for details.
3. Workshops are expected to be open for all participants who have registered in 2014ICN/JSCPB, however closed meetings may

also be accepted. Extra charges for participants are not recommended.

4. The topic and the proposed speakers may partially overlap with the symposia accepted by the ICN Program Committee and the Gordon Research Conference.
5. The number of speakers and the style of sessions may be freely determined by each workshop organizer. The timetable need not be coherent among parallel workshops.

Include the following information in your proposal:

1. name and affiliation of the corresponding organizer(s).
2. the title of your proposed workshop together with the basic theme or area of the workshop.
3. a short statement (2-3 sentences) describing the goal of your workshop and its contribution to neuroethology.
4. name, affiliation and contact information (e-mail and postal address) of 1-2 speakers whom you consider appropriate for travel expenses support.
5. expected number of participants (organizers + speakers + participants) and your requested meeting room (see ISN website for details).
6. any other requests (e.g., space for poster session, poster boards, assistance for people with disabilities etc.).

Please contact us for submission of proposals and further inquiries at: **hnw2014@mail.sci.hokudai.ac.jp**

The URL for the satellite symposia is as follows:
http://www.icn2014.jp/satellite/workshop.html

2013 NEUROETHOLOGY GORDON CONFERENCE

NETWORKS, CIRCUITS, AND MODULES

The Co-Chairs (**Heather Eisthen** and **Hans Hofmann**) of the 2013 Gordon Research Conference (GRC) in Neuroethology: Behavior, Evolution & Neurobiology announce that registration for the GRC is ongoing. View the truly multidisciplinary program at http://www.grc.org/programs.aspx?year=2013&program=neureth. The program brings together scientists studying neurobiology, computational neuroscience, robotics, and human health.

The meeting will be held August 18-23, 2013, at Mount Snow Resort in West Dover, Vermont, USA. The conference will be preceded by a weekend Gordon Research Seminar (GRS; August 17-18, 2013) designed to foster professional development and networking among graduate students and post docs conducting neuroethology research. The theme of this meeting is **Closing the Loop**, and the Co-Chairs are **Brian Dias** and **Paloma Gonzalez Bellido**. Registration for the Gordon Research Seminar is separate from that for the main conference, and can be accessed at: http://www.grc.org/programs.aspx?year=2013&program=grs_neuret Young investigators may attend one or both of the meetings. **Eve Marder** has graciously agreed to participate in the GRS as a mentor.

The following is from Tim Gentner, Mike Brainard, & Sarah Woolley, who are the organizers of this year's songbird satellite meeting, to be held just prior to the SfN meeting in San Diego, CA.

SATELLITE MEETING

MECHANISMS OF COMMUNICATION: CRITICAL PERIODS AND SOCIAL LEARNING

The **3rd annual Society for Neuroscience songbird satellite meeting,** sponsored by the birdsong community, will convene on November 8, 2013, from 8AM - 8PM. The goal of this meeting is to identify and explore conserved mechanisms that transcend species differences between songbirds, humans, and other mammals. Scientists who study the mechanisms of communication at any level, in any species, are welcome to attend.

This meeting will focus on recent advances in understanding developmental critical periods and social learning, and how these processes shape behavior. A wide range of speakers will discuss their work in vision, language, and motor control, from a range of organisms including songbirds, rodents and humans. There will be an open poster session.

The songbird satellite meeting will be held at the **Scripps Seaside Forum,** 8610 Kennel Way, in La Jolla, CA.

Confirmed speakers are **Frances Champagne** (Columbia), **Susan Goldin-Meadow** (University of Chicago), **Mike Goldstein** (Cornell), **Takao Hensch**

(Harvard), **Mimi Kao** (UCSF), **Wan-chun Liu** (Rockefeller), **Luke Remage-Healy** (University of Massachusetts), **Constance Scharff** (Free University, Berlin), **Regina Sullivan** (NYU), and **Larry Young** (Emory).

All attendees must register for the meeting @ moc3.eventbrite.com. Registration fees are required to offset the costs of food and reception refreshments. **REGISTRATION CLOSES October 24 @ 5PM PDT**.

To reserve space for a poster, please send the title, authors, and abstract to tgentner@ucsd.edu. Poster space is limited. Some selection may be necessary to ensure that the session provides the broadest representation of labs and content.

Blue-throated bee-eaters (*Merops viridis*). Image courtesy of thawats (FreeDigitalPhotos.net). Need to hear them? Go to http://avocet.zoology.msu.edu/recordings/10151

SUPPORTING THE ISN AND ITS PROGRAMS

Feeling generous? Consider making a donation to support the ISN and it programs. You can contribute to the ISN **General Fund** or designate any of the following special funds: **Capranica Prize** (recognition of an outstanding achievement or future promise in the field of neuroethology); the **Bullock Visiting Lecturer Fund** (supports travel of invited lecturers); the **Developing Neuroethology Fund** (supports scientists in non-western countries having trouble acquiring travel funds to attend an ISN Congress); and the **Heiligenberg Travel Award** (supports student travel related to neuroethology, including lab visits to learn new techniques). Honor a friend, colleague or a milestone in your own career by making a donation in support of the ISN.

Sapporo Convention Center, the venue for the 2014 ICN/JSCPB. Members of the Local Organizing Committee, **Toshiya Matsushima** (left) and **Makoto Mizunami** (right), with ISN President, **Alison Mercer**.

(See this month's President's Column for more information about the preparations for the 2014 ICN/JSCPB.)