INTERNATIONAL SOCIETY FOR NEUROETHOLOGY

Newsletter
November 1997

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LETTER FROM THE PRESIDENT

This message must be very brief, owing to a shortage of space. I simply want to announce that the ISN officers and Councilors have unanimously approved a plan to offer the ISN Membership Directory at the Society's Website. Soon you will be able to consult an electronic directory – which will be updated regularly – when you wish to find contact information about, or research interests of, ISN members. At least for the immediate future, a printed Directory will also be produced and sent to members every 2-3 years. For this and other useful enhancements, watch the Website at http://www.neurobio.arizona.edu/isn/.

This NEWSLETTER includes several important and interesting announcements and reports. Please be sure to read about your Society and to let us have your suggestions about the 1998 ISN election, the venue for the 2001 Congress, and other ISN affairs.

With best wishes for the upcoming holiday season,
John Hildebrand

AUTOBIOGRAPHICAL SKETCH

CRICKET-NEUROETHOLOGY AND HOW IT BEGAN
Franz Huber

As a farm boy I early became familiar with animals, played with dogs and cats, chased chickens, guided horses to the field, and watched swallows and bats flying in the dusk hunting for insects. When mowing grass, I spotted lizards, frogs and insects as they tried to escape. I also hunted for crickets, localized them by their songs and tickled them out of their burrows with a thin blade of grass, not knowing that these creatures would later become the center of my scientific interest.

In 1947 I began to study Zoology at the University of Munich, which at that time was a center for insect research. Werner Jacobs, with broad interests in Entomology, concentrated on the acoustic behavior of grasshoppers, and Karl von Frisch, who had recently discovered the language of the honeybee, became my supervisors. Konrad Lorenz, Nico Tinbergen and Erich von Holst, who introduced me to fundamental issues in the study of behavior, influenced me greatly. Ken Roeder, who wrote important articles on the function of insect nervous systems related to behavior, was particularly inspirational.

In my doctoral thesis I first studied the anatomy of the orthopteran nervous system. Later I looked for a model system for studying behavioral and neural mechanisms and finally chose crickets. During field work I studied their behavior and learned how male crickets express different behavioral states with different songs. Back in the lab I focused on mechanisms of sound production.

The complete freedom for doing research under Karl von Frisch and Werner Jacobs in Munich allowed me to choose a new approach for which Ken Roeder had ploughed the field, long before this field was called Neuroethology. Severing nerve connections between ganglia and splitting ganglia showed that male crickets stopped singing without the brain. This led me to concentrate on the brain and its contribution to behavior. With small lesions made in distinct areas of the brain, males began to sing and continued to sing for several hours. They also exhibited complex courting and aggressive displays. Karl von Frisch, to whom I demonstrated my first results, urged me to continue with a well known saying "a single swallow does not make a summer", and finally all of my teachers encouraged me to stay in science.

In 1954 I moved to Tuebingen and became familiar with the work of W.R. Hess in Zurich, who had elicited a variety of behaviors in freely moving cats by focal electrical stimulation within the brainstem. From Hess I learned the method of focal brain stimulation and transferred this method to the much smaller brain of crickets. I elicited calling, courtship and aggressive songs and associated behaviors. In November 1956 I demonstrated my work in front of the Swiss Medical Physiological Society. Hess, who moderated my demonstration, convinced the audience that insects have a brain as important for behavior as the brain of cats.

In 1960 I received my habilitation degree in Tuebingen, and Ted Bullock, who visited me and learned about my work, invited me to join his group in LA. Ken Roeder convinced me to go there to learn new recording techniques, and in 1961, on my way to LA, I visited him. Ken also guided me to Woods Hole, where I met Stephen Kuffler and his group, Otto Loewi, Harry Grundfest, Ernst and Berta Scharrer, Ladd Prosser, David Nachmanson and Susumu Hagiwara, and experienced the lively scientific atmosphere there. I then stopped in Ann Arbor to meet Dick Alexander and Thomas Moore, who worked on insect bioacoustics. They taught me about their field studies and helped me prepare my first lecture in English to be given at Purdue University.

In LA I moved from crickets to the marine snail Aplysia, learned intracellular recording techniques, and got some insight into how nerve cells communicate with each other. Ted Bullock considerably broadened my view about invertebrate nervous systems. Through visits to Don Wilson at Berkeley and Graham Hoyle at Eugene I learned how to record from muscles in rather unrestrained insects and to correlate their activity with behavior, and Don Maynard at Ann Arbor gave me a first introduction how to treat small nerve nets.

With this new information about nervous systems and the newly adopted techniques I returned to Germany, took over a chair in Cologne, and moved back to crickets and grasshoppers. With the help of students and guests we learned how different muscles were recruited and activated by their motoneurons during sound production, and David Bentley, a postdoc in my lab at that time, made the first intracellular recordings from motor-and interneurons during stridulation elicited by focal brain lesions.

This was the beginning of a long way to study behavior at the level of single nerve cells and networks. Much later, and after I had taken up a position in Seewiesen as one of the successors of Konrad Lorenz, I concentrated on hearing, pattern recognition and sound localization in crickets. My early work on the neural basis of sound production was continued in Norbert Elsner's lab. With my method of brain stimulation his group confirmed that single descending brain neurons trigger the network responsible for song production in crickets and grasshoppers.

My take home-message is: One should search for a suitable model system, study its behavioral tactics in the field, select those that can be treated under controlled conditions with no hesitation to adopt a variety of methods to solve riddles at molecular, cellular and network levels. But behind all is the curiosity for the living world and how it evolved.

YOUNG INVESTIGATOR AWARDS -- REVISED CALL FOR APPLICATIONS

As has been done for previous Congresses, the ISN will present up to three Young Investigator Awards to young neuroethologists who will participate in the 1998 Congress. To be eligible for an award, an individual must: (a) have completed his/her doctoral dissertation and received a doctoral degree in the period 1995-97, (b) have published a paper based on the dissertation research (or have had a paper manuscript accepted for publication) by the time of application, and (c) be committed to attending the 1998 Congress in San Diego. Each awardee will receive a waiver of the Congress fee, a monetary prize of $1,000 (which may be used toward the costs of participating in the Congress), and an invitation to give a short research talk in the program. One of the Plenary-Lecturer slots at the Congress will be devoted to, and shared by, the awardees.

Each candidate should submit FIVE copies of each item: (a) a published paper or manuscript that has been accepted for publication, (b) a letter of application, outlining his/her accomplishments and aspirations in the field of neuroethology and explaining the significance of the submitted paper; and (c) his/her Curriculum vitae.

The applicant also should arrange for letters of recommendation to be sent directly by two scientists who know him/her well. These materials must be received, no later than the REVISED deadline date of 15 December 1997, by the President of the ISN: Dr. John G. Hildebrand, ARL Division of Neurobiology, Univ. of Arizona, 1040 E. 4th St., PO Box 210077, Tucson AZ 85721-0077, USA.

Applications will be evaluated by a selection committee appointed by the President and the Chair of the Congress Committee. The three top-rated candidates will be notified by 1 February 1998.

All qualified candidates are encouraged to apply for these awards. Questions may be directed to Dr. Hildebrand via email at: jgh@neurobio.arizona.edu.

ERNST FLOREY (1927 - 1997)

Ernst Florey died on September 26 – the time of the year he normally spent at the Marine Station in Naples (Italy). Florey was vibrant and active when pancreatic cancer suddenly ended his life. We have lost a mentor, a scholar and a friend.

Florey was a cosmopolitan, who spent half of his scientific life in the United States and half in Europe. His name is inseparably associated with the discovery of the "Factor I" (1953/4) and its characterization as GABA (1957), the principal inhibitory transmitter in both vertebrates and invertebrates. His wise comparative approach culminated in the concept of "modulatory substances" (1967), which, in addition to the classical neurotransmitters, influence neuronal excitability. His view became widespread, as is now apparent by the current interest in neuromodulation and hormone action.

Born and raised in Salzburg, Florey maintained his Austrian charm throughout his life. Just as WWII was ending, although a pacifist, he was drafted and wounded in action. The damage to his right hand and ear prevented him from pursuing a career as a musician, but it did not prevent him from single-handedly isolating the crayfish stretch receptor organ, a preparation which, with its complex innervation and pharmacology, fascinated him for life.

Florey studied philosophy, botany and zoology in Salzburg, Wien and Graz. His Ph.D. thesis (1950) dealt with neuropharmacology, the topic which characterized his scientific career. He was among the first Europeans to receive a Fulbright Fellowship, allowing him to study with C.A.G. Wiersma at Cal Tech, where Florey was introduced to the stretch receptor preparation from crayfish freshly caught from the Los Angeles River.

Subsequent years he spent at Goettingen, Wuerzburg and Montreal. In 1956, he took a tenure-track position at the University of Washington, where he later became chairman of the Department of General and Comparative Physiology. His Introduction to General and Comparative Animal Physiology, published in the US (1966) and in Germany (1970), remained the most widely used textbook in its field for a long time.

In 1968, Florey returned to Europe. The newly founded University of Konstanz (Germany) offered the chance to design a curriculum for studies in biology. He introduced the concept of lab rotations for graduate students, a novelty in Germany which became highly successful. As a condition of his accepting a professorship at Konstanz (1968), Florey stipulated free summers for research at marine stations around the world. There, without the need for high-tech equipment, he loved to investigate fundamental physiological questions off the beaten track: a ruler, paperclip, piece of thread, and cut sea urchin tube feet (which he collected) were enough to examine muscle performance.

Florey established several forums for interaction among scientists from different backgrounds. In the 60's, Florey and Graham Hoyle established the annual West Coast Conference on Excitable Systems, an informal gathering of neurobiologists, which thrives even today as the Western Nerve Net. After returning to Europe, Florey and Otto Creutzfeldt initiated the Goettinger Neurobiology conferences (1973) because Florey recognized the need to overcome the traditional boundaries separating zoology and medical science. Today, these conferences are the forum for neurobiologists and especially attractive for the younger generation. Florey tried to overcome the isolation of science behind the Iron Curtain by inviting colleagues to participate in meetings and collaborations and by visiting Eastern Europe.

He fulfilled his duties in science management as chairman of two departments, editor, conference

organizer, reviewer of countless grants, and as president of the German Zoological Society. His heart, however, was in the experiments he loved so much. Florey believed in the power of scientific arguments, and he never used his connections or influence to put forward his own ideas.

Florey was an Honorary member of Catholic University of Chile and recently honored by the Stazione Zoologica 'Anton Dohrn' in Naples (Italy). Since 1982, he co-organized the annual meetings of Nobel laureates in Lindau (Germany). In his later years and as Professor Emeritus (1992), he found the time to focus on the history of science and recently became president of the German Society for the History and Theory of Biology.

Ernst Florey was a person with universal humanistic education. He easily bridged different disciplines in zoology and placed them in a context of the history of science. We will miss the enthusiasm, the humor and the kindness with which he touched our lives.

Angela Wenning, Wolfram Kutsch (Konstanz, Germany), Christian Erxleben (Naples, Italy)

SECOND CALL FOR PROPOSALS FOR THE 6TH INTERNATIONAL CONGRESS OF NEUROETHOLOGY IN 2001

As we prepare for the 5th International Congress of Neuroethology in San Diego, California, it is not too early to begin to think about the 6th International Congress, to be held in 2001. As before, the officers of the ISN wish to receive and review proposals for the site and hosting of the 2001 Congress. Suitable proposals will be presented to the ISN members attending the Business Meeting at the 1998 Congress, and one proposal will be selected by balloting at that meeting.

The first five International Congresses will have been held in Tokyo (1987), Berlin (1989), Montreal (1992), Cambridge (1995), and San Diego (1998). In order to ensure that the Congress venue moves among the parts of the world with significant numbers of ISN members, proposals from prospective hosts in Japan and Europe would be especially welcome.

Written proposals will be due by 1 July 1998 and should be sent to the ISN President: Dr. John G. Hildebrand, ARL Division of Neurobiology, Univ. of Arizona, 1040 E. 4th St., PO Box 210077, Tucson AZ 85721-0077, USA. Requests for additional information may also be directed to him via E-mail.

MEMBERSHIP IN ISN

A form for membership and to change member profile is available at the following site: http://www.neurobio.arizona.edu/isn/isn.memapp.html

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NOMINATION OF CANDIDATES FOR THE 1998 ELECTION

In the fall of 1998, shortly after the International Congress of Neuroethology in La Jolla, CA, the ISN will conduct its triennial election of officers and Councilors by postal balloting. As before, the plan is to assemble the slate of candidates prior to the Congress so that the ISN membership will be informed about the election well in advance of the balloting. Thus the Nominating Committee must complete the task of assembling the slate of nominees by June, 1998.

To assist the Committee, all members of the ISN are hereby invited to suggest potential nominees for the positions of President-Elect, Secretary, Treasurer, and members of Council. Nominees must be members in good standing in any membership category except Student Members. Please submit suggestions to the ISN President, John Hildebrand, via email addressed to: jgh@neurobio.arizona.edu.

RESEARCH GROUP REPORT
THE ARIZONA RESEARCH LABORATORIES DIVISION OF NEUROBIOLOGY

The Arizona Research Laboratories Division of Neurobiology (ARLDN) is a multidisciplinary unit of the Univ. of Arizona in Tucson, devoted to research and education in the fields of cellular, developmental, genetic, molecular, and systems neurobiology and neuroethology. A unifying theme of the ARLDN is the use of experimentally favorable insects as models for laboratory research aimed at revealing fundamental

neurobiological processes and mechanisms common to many animal species, including human beings. Because insects are among the most biologically successful animals on earth, the research in the ARLDN also has implications for understanding the evolution, diversity, and adaptedness of neural systems and promises to enhance our ability to control agriculturally and medically harmful insects. The unit's research is funded by agencies charged with promoting research related to human health (NIH), basic science (NSF), agricultural sciences (USDA), and international cooperation (NATO), as well as by private foundations and industry.

In its first decade, the ARLDN grew from 6 to more than 100 personnel. The unit benefits from extensive national and international scientific networking and research collaborations. From its beginning, the ARLDN has benefitted from, and taken pride in, its cosmopolitan character. In the period 1994-1997, for example, the ARLDN included students, postdoctoral associates, visiting faculty, and other personnel from Austria, Canada, China, Czech Republic, France, Germany, Greece, Hungary, India, Japan, New Zealand, Norway, Poland, Sudan, Sweden, and the United Kingdom.

ARLDN personnel represent diverse disciplines that contribute to the power and excitement of modern neuroscience -- including anatomy, behavioral biology, biochemistry, computational modeling, developmental biology, genetics, molecular biology, pharmacology, and physiology. At the same time the faculty and their coworkers emphasize and cluster around important neurobiological problem areas, such as the functional organization and physiology of sensory and integrative systems, intra- and intercellular signaling, motor control, neural bases of behavior, and postembryonic neural development. Cooperation and collaboration among research groups is common and encouraged, and members of the ARLDN and their visitors benefit from experience and interactions throughout the unit, not only within a single laboratory. A prime example of inter-laboratory collaboration in the unit is the program project in neural development, involving five faculty and members of their research groups, funded by a Program Project Grant from the National Institute of Neurological Diseases and Stroke of NIH, and led by Dr. Richard Levine (Principal Investigator).

In addition to research, the ARLDN is strongly committed to education. The ARLDN is the founding home unit of the University-wide Committee on Neuroscience (CN), an interdisciplinary consortium of more than 50 faculty members from seventeen departments throughout the University, and its graduate Program in Neuroscience, which was established in 1988. In addition to the Program in Neuroscience, ARLDN faculty participate in the educational programs of academic departments in which they have joint appointments (Anatomy & Cell Biology, Biochemistry, Ecology & Evolutionary Biology, Entomology, Molecular & Cellular Biology, Neurology, and Physiology), as well as Interdisciplinary Programs (Genetics, Insect Science, and Physiological Sciences). The ARLDN also places high priority on undergraduate teaching, postdoctoral research training, and educational outreach in the community.

The ARLDN comprises 8 research groups, each led by a member of the faculty. Two such faculty positions, in neuroethology and molecular neurobiology, have become vacant, and recruitment to fill those opportunities is currently under way (see recruitment notice elsewhere in this issue of the Newsletter). The established groups are led by:

- (1) REGINALD F. CHAPMAN, Ph.D., D.Sc. (Professor), chemoreception and feeding behavior and evolution of sensory systems; joined by MARK A. WILLIS, Ph.D. (Assistant Research Scientist), sex-pheromonal control of flight behavior, neuroethology, chemical communication systems;
  (2) JOHN G. HILDEBRAND, Ph.D. (Regents Professor & ARLDN Director), neuroethology and development, neuroanatomy, neurochemistry, and neurophysiology of the olfactory system; joined by THOMAS A. CHRISTENSEN, Ph.D. (Associate Research Scientist), neurobiology of olfaction, and NORMAN T. DAVIS, Ph.D. (Research Professor), functional neuroanatomy and immunocytochemistry of the CNS and neurosecretory systems;
  (3) RICHARD B. LEVINE, Ph.D. (Professor), developmental neurobiology and neurophysiology of motor and sensory systems, hormonal regulation of development and metamorphosis of identified neurons;
  (4) LINDA L. RESTIFO, Ph.D., M.D. (Assistant Professor), molecular neurobiology, molecular and classical genetics, neuroanatomy, and mechanisms of neurologic diseases, studies of hormonally regulated genes affecting development of the central nervous system;
  (5) NICHOLAS J. STRAUSFELD, Ph.D. (Professor), functional organization and evolution of the central nervous system, with emphasis on sensory and motor pathways and integrative systems;
  (6) LESLIE P. TOLBERT, Ph.D. (Professor), development, ultrastructure, and functional

organization of the CNS, interactions between neurons and glial cells during development; joined by LYNNE A. OLAND, Ph.D. (Assistant Research Scientist), anatomical and physiological studies of the role of neuroglial cells in the development of the CNS.

In addition, two members of the faculty of the University's Department of Molecular & Cellular Biology hold joint faculty appointments in the ARLDN: SCOTT B. SELLECK, M.D., Ph.D. (Assistant Professor), developmental, cellular, and molecular neurobiology; and MANI RAMASWAMI, Ph.D. (Assistant Professor), molecular mechanisms of synaptic function, change, and development. For additional information about the ARLDN, visit the unit's Website: http://www.neurobio.arizona.edu/arldn/

John G. Hildebrand

The Fifth International Congress of Neuroethology

August 23-28, 1998
University of California, San Diego
La Jolla, California, U.S.A.

(see notice at this site: http://www.neurobio.arizona.edu/isn/isn.congress.html)

MATERIAL FOR FUTURE NEWSLETTERS

Send material for the next newsletter (to be published in early March) to Arthur Popper via E-mail. Advertisements for jobs and graduate/postdoctoral positions should be 225 words maximum. Suggestions for feature articles, including autobiographical sketches, research group reports, Neuroethological Viewpoints, should also be sent to Art Popper. However, please do not submit full articles of this type without a response from the Editorial Board.

COURSES, MEETINGS, WORKSHOPS

Neuronal Mechanisms For Generating Locomotor Activity.
A NY Academy of Sciences Conference, March 20-23, 1998 in New York City. Our understanding of the neuronal basis of locomotion in higher vertebrates has progressed considerably in the past few years. This conference will discuss the latest developments in the neuronal basis for locomotion and will be of interest to researchers in neuroscience, neural networks, motor behavior and computational approaches, as well as clinical applications for spinal cord injuries.

Conference Topics: * The Best Understood Simple Motor Systems * Principles for Spinal Locomotor Generation in Higher Vertebrates * Neurotransmitter Control of Pattern Generating Networks * Relation Between Afferents & Central Pattern Generators * Modeling Approaches to Understanding Motor CPGs * Molecular Determinants of Pattern Generator Components * Ontogeny & Phylogeny of Rhythmic Motor Activity * Clinical Aspects of Locomotion and Rehabilitation

Call for Poster Abstracts: Abstract submission deadline is Jan. 16, 1998. For additional program, abstract and registration information, contact: Science and Technology Meetings, N.Y. Academy of Sciences, 2 East 63rd Street, New York, NY 10021. Phone: (800) 843-6927 or (212) 838-0230, ext. 324, Fax: (212) 838.-640, E-mail: conference@nyas.org, website: http://www.nyas.org

Neural Systems and Behavior summer course at the Marine Biological Laboratory in Woods Hole, Mass. now in its 20th year! June 14-Aug. 7, 1998; application deadline, March 2, 1998. This 8-week laboratory/lecture course provides intensive training in state-of-the-art neurobiological techniques applied to understanding animal behavior. Lectures include: fundamental properties of neurons; how individual neurons form simple neural circuits for a variety of behaviors; modulation of neural circuits by hormones and neurotrans-mitters; biophysics of sensory transduction; central processing of sensory information; synaptic plasticity and learning.

Methods taught include intracellular recording and dye-injection; patch and 2-electrode voltage clamp; neuronal culture; analysis of synaptic transmission and plasticity; anatomical techniques; quantitative behavioral analysis; brain slice recordings; in vivo brain recording; computational analysis. A variety of

terrestrial, aquatic, and marine invertebrates and vertebrates are utilized.

Course Co-Directors: Janis Weeks, University of Oregon; Harold Zakon, University of Texas. Faculty include 20+ internationally-prominent instructors and guest lecturers. Enrollment limited to 20 students, graduate or postdoctoral level. Tuition (1997), $3,500; generous financial aid is available. Members of under represented minority groups are encouraged to apply. For further information, visit the MBL home page: http://www.mbl.edu, contact MBL at admissions@mbl.edu or (508) 289-7401, or contact the co-directors (weeks@uoneuro.uoregon.edu; h.zakon@mail.utexas.edu).

FACULTY POSITIONS

Faculty Position in **Neuroethology**, Cornell Univ. The Section of Neurobiology and Behavior invites applications for a tenure-track position at the Assistant/Associate Professor level.
Applicants must have a Ph.D., an excellent record of scientific productivity, and a commitment to undergraduate and graduate teaching. Candidates should have research interests in behavioral neurobiology with expertise in one or more of the following areas: **sensory and motor systems physiology, evolutionary neurobiology, computational neuroscience**. Send application, curriculum vitae, and three letters of reference to: Chair, Neuroethology Search Committee, Section of Neurobiology and Behavior, Cornell Univ., Ithaca, NY 14853-2702. Review of applications begins Nov. 15, 1997. Women and minority candidates are strongly encouraged to apply. Cornell Univ. is an Equal Opportunity/Affirmative Action Employer.

Animal Physiology, Univ. of Utah. The Dept. of Biology seeks applications for a tenure-track position in animal physiology at the assistant professor level. Candidates must have a Ph.D and postdoctoral experience. We are particularly interested in physiologists working at the system or organismal level who are also able to relate their work to broader issues in evolutionary biology. Ours is a large, integrated biology department with existing strength in many areas, including functional and evolutionary morphology and neuroethology. Applicants should submit their curriculum vitae, statement of research interests and arrange to have at least two letters of reference sent to: Animal Physiology Search Committee, Dept. of Biology, Univ. of Utah, Salt Lake City, UT 84112. Review of applications will begin on Dec. 1, and continue until the position is filled. The Univ. of Utah is an AA/EO employer. It encourages applications from women, physiologists and other minorities and provides reasonable accommodation to the known disabilities of applicants

The Univ. of Utah Dept. of Psychology is considering applications to fill one or more of the following tenure-track positions pending budget recommendations at the level of Assistant Professor. Applications will be accepted until Nov. 15, 1997. 1) **Developmental psychologist**. Outstanding scholars are sought who can contribute to our program focusing on how development across the life span occurs in interaction with multiple contexts within society (e.g., within family, work, gender, cultures, school, or health institutions). The most outstanding candidate will be chosen regardless of area of specialization. Quantitative expertise in investigating development across contexts is highly desirable. Submit the materials specified below to Dr. Cindy Berg, Developmental Search Committee (pcycab@vm.usi.utah.edu). 2) **Behavioral Neuroscientist**. The current Neural Science faculty are interested in brain mediation of complex animal behavior and cognition. The ideal candidate will have strong training in neuroscience, in the analysis of complex behavioral systems, and in evolutionary theory, and will have the opportunity to participate in the Universities Graduate Program in Neuroscience. Submit material to Dr. Sheri Mizumori, Neural Sciences Search Committee (mizumori@behsci.utah.edu). 3)The Dept. invites applications for a position designed to **bridge the Developmental and the Cognition and Neural Sciences programs**. The position is open with respect to research interests and training, and is designed to foster interdisciplinary collaborations in the same manner as our successful Clinical Child-Family, Health, and Cognitive-Clinical Neuropsychology programs. Examples of possible research areas include the neurobiology of aging and Alzheimer's, developmental neuropsychology, or the psychobiology of cognitive emotional or social development. Submit material to Dr. Frances Friedrich, Joint Program Search Committee (friedric@psych.utah.edu). Successful candidates must have strong research programs and commitments to undergraduate and graduate instruction. Send vitae, reprints, and statements of research and teaching interests, and have at least three letters of recommendation submitted to the specific search committee chair, Dept. of Psychology,

Behavioral Science Building, Univ. of Utah, Salt Lake City, UT 84112.. The Univ. is an AA/EO employer and encourages applicants from women and minorities, and provides reasonable accommodation to the known disabilities of applicants and employees.

Cellular Physiologist. The Dept. of Biology at the Univ. of Maryland, College Park, invites applications for a tenure-track Assistant Professor who is studying animal or plant cellular function at the physiological, biochemical, or molecular level. Some preference may be given to candidates who interface with the existing physiological research programs of the department (http://www.life.umd.edu/zoology). In addition to developing an externally funded research program, this position requires teaching cell biology/physiology at both undergraduate and graduate levels, as well as advising of undergraduate and graduate students. A Ph.D. degree, post-doctoral experience, and demonstrated research productivity are required. For best consideration, submit application by Jan. 15, including CV, statement of future research plans and teaching interests, two reprints, and names and addresses of three references to Dr. M. Dennis Goode, Dept. of Zoology, Univ. of Maryland, College Park, MD 20742. *The Univ. of Maryland is an equal opportunity/affirmative action employer*.

Vertebrate Behavioral Ecologist, Univ. of Illinois at Urbana-Champaign. Candidates are invited to apply for a full-time, tenure-track position at the rank of assistant professor in vertebrate behavioral ecology, starting in August 1998. Preference will be given to candidates with innovative research that integrates mechanistic and evolutionary analyses of behavior. Applicants must have a Ph.D. degree; postdoctoral training is desirable. Responsibilities include teaching at the undergraduate and graduate level and maintaining a creative, vigorous, and independently funded research program. The applicant is expected to contribute to integrative programs in life sciences and to participate in campus-wide initiatives in ecology and evolution. Salary commensurate with experience. For full consideration applications should be received by November 10, 1997. Women and minority candidates are encouraged to apply. Applicants should submit a vita, statements of research and teaching interests, and the names, addresses, and phone numbers for four referees to: Dr. Scott K. Robinson, Chair, Behavioral Ecology Search Committee, School of Life Sciences, Univ. of Illinois, 393 Morrill Hall, 505 S. Goodwin Ave., Urbana, Illinois 61801 (phone: 217/333-3044; fax: 217/244-1224; E-mail: scottr@mail.inhs.uiuc.edu). The Univ. of Illinois is an Affirmative Action/Equal Opportunity Employer.

Neurobiologist / Neuroethologist: The Dept. of Zoology at the Univ. of Washington is seeking applications for a tenure-track faculty position at the Assistant Professor level. Although applicants in any area of neurobiology will be considered, those using neurophysiological or molecular approaches to study the neural basis of behavior, particularly in marine organisms, are especially encouraged. Successful candidates will be expected to contribute to undergraduate and graduate teaching, and to establish an externally-funded research program. Candidates should have a Ph.D. and at least one year of postdoctoral experience by start of appointment. Send curriculum vitae, a description of research and teaching interests, and three letters of recommendation to: Chair, Neurobiology Search Committee, Dept. of Zoology, Univ. of Washington, Seattle, WA 98195-1800. Priority will be given to applications received before Jan 5, 1998. The Univ. of Washington is building a culturally diverse faculty and strongly encourages applications from women and minority candidates and an Equal Opportunity/Affirmative Action employer.

Faculty Positions in Insect Neurobiology. The Univ. of Arizona's ARL Division of Neurobiology, an interdisciplinary research and teaching unit (see Website at http://www.neurobio.arizona.edu/arldn/) devoted to behavioral, cellular, developmental, molecular, and systems neurobiology using insects as experimental models, invites applications for TWO tenure-track faculty positions for neurobiologists studying insects: (1) NEUROETHOLOGY (emphasizing cellular and systems neurophysiology and neural substrates of behavior) and (2) MOLECULAR NEUROBIOLOGY (emphasizing molecular-genetic and biochemical approaches to neural function and/or development). We expect to fill these state-funded positions in 1998 at the level of assistant professor, but one appointment at the level of associate professor may be possible. Successful candidates will be expected to conduct productive, externally funded independent research, teach undergraduate and graduate classes, supervise research trainees, collaborate on joint projects, and give service in the unit and the University. Candidates must have a Ph.D. or equivalent degree, at least 3 years of postdoctoral research experience, a demonstrated commitment to collaborative and independent research, and previous teaching experience.

Review of applications began with those received by 15 October 1997, but will continue until successful candidates are found. Send c.v., list of publications, reprints of key papers, at least 3 letters of recommendation, and a statement of research and teaching accomplishments and future plans – as soon as possible -- to: Dr. John G. Hildebrand, ARL Division of Neurobiology, Univ. of Arizona, PO Box 210077, Tucson AZ 85721-0077. The Univ. of Arizona is an EEO/AA employer. M/W/D/V

GRADUATE AND POSTGRADUATE OPPORTUNITIES

Postdoctoral Position in Insect Olfaction available immediately for a neurobiologist to study olfactory coding in insects. Candidate must have experience in intracellular recordings in the CNS, a good background in data analysis and statistics, and a strong interest in neural coding. Applicants should send a letter stating interests, curriculum vitae, and names and addresses of three references to: Wayne Getz, Division of Insect Biology--ESPM, 201 Wellman Hall, Univ. of California, Berkeley, CA 94720-3112, getz@nature.berkeley.edu

The **Comparative and Evolutionary Biology of Hearing (CEBH)** group at the University of Maryland, College Park, is accepting applications for its interdisciplinary **predoctoral and postdoctoral** training program. Trainees have the unique opportunity to develop a broad background in the hearing sciences, while participating in research that emphasizes a range of animal species from insects to humans and methodological approaches that span molecular biology to psychoacoustics The major goal of the program is to produce scientists who have an appreciation for, and an understanding of, the diversity and evolution of hearing mechanisms. Emphasis will be placed, wherever possible, on research that crosses experimental approaches and animal species. Faculty members in the program include Catherine Carr (birds), Robert Dooling (birds, reptiles), Sandra Gordon-Salant (humans), William Hall (birds), Cynthia F. Moss (bats), David Poeppel (humans), Arthur Popper (fish, reptiles), Joelle Presson (fish, birds), Shihab Shamma (mammals), and David Yager (insects, amphibians). Doctoral students may receive their degree either from the home department of the mentor or through our new program in Neuroscience and Cognitive Science. Applications are being accepted for pre and postdoctoral support starting July 1, 1998. For further information contact Dr. Arthur N. Popper, Dept. of Zoology, Univ. of Maryland, College Park, MD 20742; E-mail: popper@zool.umd.edu; http://www.life.umd.edu/cebh

The Program in Neuroscience and Cognitive Science (NACS) at the University of Maryland, College Park, announces a new track in **Neuroethology**. Predoctoral students are invited to apply to work with our large group of faculty who have research interests in diverse areas of neuroethology ranging from endocrine control of behavior to bioacoustics to the control of locomotion. Faculty participants in the program include Gerald Borgia, Catherine Carr, C. Sue Carter, Avis Cohen, Robert Dooling, William Hall, William Hodos, Wayne Kuenzel, Cynthia F. Moss, Mary Ann Ottinger, Arthur Popper, Joelle Presson, Gerald Wilkinson, and David Yager. For further information contact any of the investigators or Dr. Avis Cohen, Director, Program in Neuroscience and Cognitive Science, Univ. of Maryland, College Park, MD., 301-405-5609, or ac61@umail.umd.edu. http://www.bsos.umd.edu/psyc/neuroethology

Postdoctoral Position available at the **Bioacoustics Laboratory at the Institute of Zoology, Univ. of Vienna, Austria.** The two-year FWF-funded project is focusing on the correlation between vocalization and sound perception in fishes especially in otophysines and anabantoids. Applicants should have a good background in fish bioacoustics, hearing physiology of fishes and experience with one or more of the following techniques: sound analysis, electrophysiology, ABR-audiometry. Candidates interested in doing a Postdoc in the heart of Europe should send a CV, brief statement of research experience and letters of references to Dr. F. Ladich, Inst. of Zoology, Althanstra§e 14, A-1090 Vienna, Austria. Fax: +431-31336-778. E-mail: Friedrich.Ladich@univie.ac.at

Graduate Program in Neuroscience and Cognitive Science (NACS). The Univ. of Maryland, College Park (UM), has b a new doctoral program in Neuroscience and Cognitive Science that is part of a broader inter-campus program including the Medical School in Baltimore (UMAB) and the Catonsville campus of Baltimore County (UMBC). The program has two concentrations possible: 1) neuroscience, and 2) cognitive and computational neuroscience.

NACS is highly interdisciplinary and encompasses 14 departments on the UM campus alone. The faculty

are drawn from areas including zoology, psychology, linguistics, philosophy, electrical engineering, applied mathematics and computer science. A student may study with any of these faculty members, assemble a multidisciplinary committee and take courses across the disciplines and the campuses.

What makes our program unique is the truly interactive nature of the faculty and the program. This is exemplified by the faculty and their students in the Comparative and Evolutionary Biology of Hearing training program, and evidence for this is found in other training areas as well such as cortical research studied in the animal and in silicon, and locomotion studied from the standpoint of cellular, systems, behavioral, robotics and modeling perspectives.

For further information contact Dr. Avis H. Cohen, Director, Program in Neuroscience and Cognitive Science, Univ. of Maryland, College Park, MD 20742. Phone: (301) 405-5609. E-mail: ac61@umail.umd.edu. http://www.inform.umd.edu:8080/PNACS

Postdoctoral and graduate opportunities in Animal Behavior at Indiana Univ. The NSF-supported Center for the Integrative Study of Animal Behavior at Indiana Univ. seeks outstanding candidates for training in animal behavior that combines approaches from biology, neuroscience, and psychology. PREDOCTORAL candidates should apply by Jan. 15th for fall 1998, while POSTDOCTORAL candidates should apply by March 1st. Inquires to CISAB, 402 N. Park Ave., Indiana Univ., Bloomington, IN 47405; (812)855-9663; FAX (812) 855-0411, E-mail: lisummer@indiana.edu, http://www.cisab.indiana.edu. Applications by minorities and women are encouraged. AA/EOE.

Postdoctoral Position in the laboratory of Mike Nusbaum, Dept. of Neuroscience, Univ. of Pennsylvania School of Medicine, 215 Stemmler Hall, Philadelphia, PA 19104, USA. We are studying the **cellular basis of motor pattern selection** from multifunctional neuronal networks. Specifically, we use the crab Stomatogastric Nervous System to determine how functional flexibility, resulting from neuromodulatory inputs, enables an anatomically hard-wired network to produce multiple motor patterns.

Our next goals include: (1) Using intra-axonal recordings of projection neurons to determine how their transmitter release is locally influenced by presynaptic inputs. (2) Determining which subsets of projection neurons are influenced by distinct sensory pathways. (3) Continuing to identify the transmitters used by each projection neuron and determining how each contributes to the way that neuron influences its network targets.

The ideal candidate would have strong interests in synaptic/cellular physiology and circuit analysis, and be an experienced electrophysiologist. Interested applicants should send a CV and the name of two references to the above mailing address or E-mail to: nusbaum@mail.med.upenn.edu

Recent Publications:

Bartos M, Nusbaum MP (1997) Intercircuit control of motor pattern modulation by presynaptic inhibition. J Neurosci 17:2247-2256.

Blitz DM, Nusbaum MP (1997) Motor pattern selection via inhibition of parallel pathways. J Neurosci 17:4965-4975.

Christie AE, Lundquist CT, NŠssel DR, Nusbaum MP (1997) Two novel tachykinin-related peptides from the nervous system of the crab Cancer borealis. J Exp Biol 200:2279-2294.

Postdoctoral position: **Systems/Auditory Neuroscience** in the laboratory of Auditory Communication and Cognition at the Georgetown Institute for Cognitive and Computational Sciences (GICCS) in Washington D.C. area. The position is for candidates interested in the field of neural processing of communication sounds. The general goal of our research is to explore the neural mechanisms and neural codes for pattern recognition and representation.

One line of investigation is related to studies of cortical processing of communication sounds in bats. For this project, knowledge of in vivo electrophysiology and background in auditory stimulation techniques is required. Additional experience in computational/anatomical or behavioral studies is desirable. There is also opportunity to work collaboratively with other faculty using small animal fMRI and optical recording techniques. A second project requires use of ERP/fMRI techniques for delineating the neural substrate mediating early auditory processes for music perception in humans. For human studies, a working knowledge of fMRI and electrophysiology/computer programming is expected; additional training in fMRI technology will be provided once the candidate joins the laboratory. This is a particularly good opportunity for psychology graduates who want to learn/develop neurobiological approaches for their research. Initial appointment will be for one year with a strong likelihood for extension for an additional two years. Starting

salary will be $28,000+ for those with 1 to 2 years postdoctoral experience. Candidates should send their CV and names of 3 references to Jag Kanwal, GICCS, New Res. Bldg., Rm. WP09, Georgetown Univ. Medical Center, 3970 Reservoir Road, Washington D.C. 20007 (FAX: 202-687-6757; Phone (202) 687-1305; E-mail: kanwalj@giccs.georgetown.edu.)