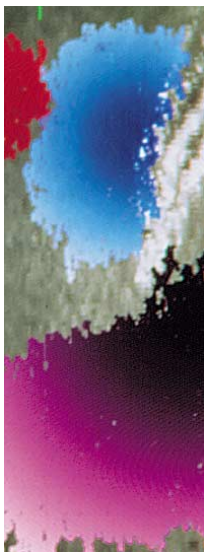
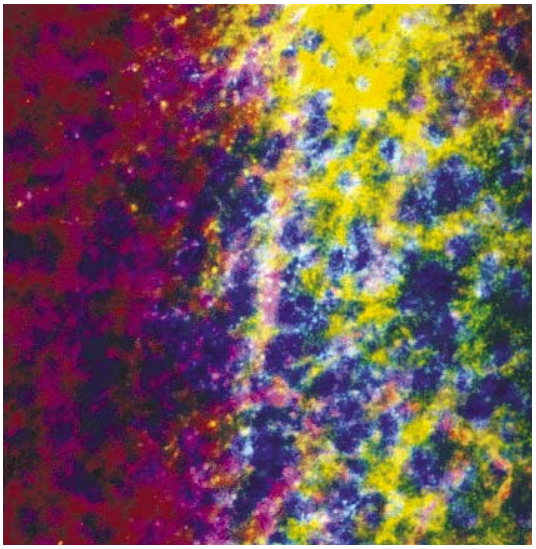


All systems go for neuroscience

Multidisciplinary approaches pave the way towards new frontiers in understanding complex human behaviour and intractable diseases. Diane Gershon assesses the US field.

Exposed: the behaviour of nerve cells are coming under intense scrutiny.

Interest in neuroscience has risen dramatically in the past 30 years. Membership of the US Society for Neuroscience has soared from 500 when it was founded in 1969, to more than 28,000 today. And fresh neuroscience initiatives — be they institutes (see 'Unlocking the secrets of autism', opposite), centres or looser associations of individuals — have been cropping up all around North America. Most new efforts reflect the growing feeling that better treatment for disorders of the nervous system and greater understanding of complex human behaviour will require a more integrated and interdisciplinary approach to neuroscience research and teaching.



C. SHATZ

BUILDING BRIDGES

Carla Shatz: facing the challenge of reassembling neuroscience.

Carla Shatz, chair of the department of neurobiology at Harvard Medical School in Boston, sees the opportunities and challenges for neuroscience as having reached the 'integrative' neuroscience level. She regards the first 30 years of the field as having been largely reductionist. "I think the challenge now is how to put the molecules back into the cells, and the cells back into the systems, and the systems back into trying to really understand behaviour and perception," Shatz says. In order to accomplish this at Harvard, new connections are being built between the college and the medical school — two campuses that are physically separated by the Charles River.

A more integrative approach to neuroscience requires a technological infrastructure. And one important component of this is imaging, says Shatz. Accordingly, the medical school, in collaboration with Boston's Brigham and Women's Hospital, will open a new Brain Imaging Center this month dedicated solely to research. The centre will house a 4.7-tesla magnet for use in magnetic resonance imaging studies in mice and small non-human primates. It will also promote approaches, such as the use of confocal and two-photon microscopy, that allow researchers to look at molecules functioning *in vivo*.

The centre will serve as one of the core facilities for the new Harvard Center for Neurodegeneration and Repair. This large, distributed effort was jump-started recently after the medical school received a large anonymous gift, and so far it has pulled together more than 100 clinicians and researchers.

The medical school is also considering whether to create a specific integrative physiology or neuroscience initiative — perhaps in the form of a new centre, says Shatz. The plans are not formalized and there is talk of broadening any such initiative beyond neuroscience, because the need to understand how systems function goes well beyond those of the brain, she says. In the meantime, the neurobiology department is expanding and will have four or five faculty slots to fill over the next few years.

On the Cambridge side of the river, plans are under way to establish a Center for Systems Neuroscience. "The goal of this initiative is to provide an umbrella for the systems neuroscience research that goes on and — ultimately — to provide a common laboratory building," says Markus Meister, a professor in the department of molecular and cellular biology.

Meister says that the formation of the centre does not mean there are plans to create a new department or to change existing departmental structures. But reallocation of space will allow individuals from biology, engineering and the applied sciences, physics and psychology to work side by side. A new building and vivarium are still four or five years away; when

completed, these will house 10–15 faculty. But Meister is not waiting for new premises to start recruiting. Some appointments have already been made at the junior faculty level, and there is an ongoing effort to attract a centre director.

LOOKING NORTH

Neuroscience in general, and systems neuroscience in particular, has been a strength at Queen's University in Kingston, Ontario. But, until recently, the only formal recognition of this was a seminar series, says physiology professor Douglas Munoz. In January of this year, however, the university set up a Centre for Neuroscience Studies, with Munoz as its director, to promote integration of the neurological and psychiatric professions. Although in its early days, the initiative has already drawn together in a 'virtual' centre some 45 investigators dispersed about the campus and spanning both clinical and basic research.

Initially, the centre will focus on developing a new graduate-training programme in neuroscience, and establishing core facilities. It will also be used to drive strategic recruitments, particularly in the areas of computational neuroscience, molecular neurobiology, cognitive/behavioural neuroscience and clinical/rehabilitation neuroscience.

But, as it is a small university, Munoz acknowledges that Queen's will not become excellent in all areas of neuroscience and instead must focus on a few. Research clusters will be formed around 'research chairs' — the government programme aimed at recruiting and retaining top scientists to Canadian universities. Munoz, who was one of seven Queen's professors to be awarded a research chair in the first funding round, expects that 10 additional faculty will be recruited over the next couple of years.

Even before the new centre was formed, the sensorimotor systems group at Queen's, one of the larger neuroscience groups on campus, was already a cohesive group. Munoz, who belongs to this group, says that, as a PhD student, he was in a lab with one principal investigator, one technician and one other grad student. "That's not at all the model I use to run my lab now," he says. Now, as one of seven principal investigators in the group, he has access to many technicians but pays only portions of their salaries.

Assembling large multidisciplinary research teams to work on a particular neurological problem is all in a day's work for William Luttge, director of the McKnight Brain Institute at the University of Florida in Gainesville, which opened new premises in 1998. On a fairly regular basis, Luttge must deal with 10 or so deans, 50 department chairs and some 325 faculty — a task that is made somewhat easier by having all the professional schools on one campus.

But, as a past chairman and dean himself, he is also aware of the importance of diplomacy. The McKnight institute, for example, does not dictate how graduate programmes should be run. And, even though an individual may receive all or part of their salary from the institute, they still report to a departmental chair. Issues of promotion and tenure are also handled at the departmental level. Luttge says that his role — and that of the institute — is instead to create opportunities, once an area of mutual research interest has been identified, and to remove barriers.

"I try very hard, when we are looking at programmes, to include as many people as possible, not in an egalitarian sense, but to embolden and empower the various departments and colleges," says Luttge.

Space — or lack of it — is the biggest problem now for Luttge. The institute has plans to build a $100-million Neuro-Clinical Research Center adjacent to Shands at the University of Florida, the university's teaching hospital, but this is a longer-term aim, he says. ■

Diane Gershon is assistant editor of *Nature Medicine*, New Technology.

Web links

MIND Institute ▸ **mindinstitute.ucdmc.ucdavis.edu**
International meeting for Autism Research ▸ **www.imfar.org**
McKnight Brain Institute ▸ **www.mbi.ufl.edu**
Center for Neuroscience Studies ▸ **www.queensu.ca/neurosci**

Unlocking the secrets of autism

MIND INSTITUTE

Research director of the MIND Institute, David Amaral (right), plans to get to the heart of neurodevelopmental disorders.

Pressure from parents who have children with autism has helped to boost the neuroscience profile at the University of California, Davis. After parents of autistic children in the Sacramento area demanded that more resources be devoted to understanding and treating the disorder, the Medical Investigation of Neurodevelopmental Disorders (MIND) Institute was launched in 1998. Besides autism, the institute studies other neurodevelopmental disorders, such as Asperger's syndrome, cerebral palsy and dyslexia.

Before the university formed a neuroscience centre about 10 years ago, "it had a pretty meagre community of neuroscientists," says David Amaral, research director of the MIND Institute. In the late 1980s, there were only about half a dozen neuroscientists, compared with 55 campus-wide today.

In September, the university broke ground on a new 135,000-square-foot building complex for the MIND Institute. The buildings are slated for completion by 2003 and will include wet and dry labs, as well as a clinic.

At full strength, the institute will have 20 scientists. Some preliminary appointments have already been made. But the real ramp-up in recruitment won't start until the new premises are nearer completion, says Amaral. The team will eventually consist of people with neuroimaging expertise, along with molecular neurobiologists. And, as there is a strong implication that children with autism have impaired immune systems — as some children have food allergies — Amaral also expects to recruit neuroimmunologists and nutritionists. D.G.