

Nature and nurture in brain development

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The second conference of the new Institute of Neurobiology of the Mediterranean Sea (INMED; **Figure 1**), on the mechanisms that regulate formation of cortical networks, had all the culinary ingredients required for a successful meeting: exciting topics, enchanting speakers, and a gathering in a friendly place inviting discussions that made a good banquet. The topics included:

(i) Roles of activity in synaptic plasticity. In the keynote TINS lecture by Mu-ming Poo (see article by Zhou and Poo in this issue), synaptic plasticity was shown to be not only stabilized, but also reversed, by physiological activity.

(ii) Neuronal migration. The roles of ephrins and their receptors are a striking realization of Sperry's chemoaffinity hypothesis – namely, that topographic connections are established by complementary expression of receptors on projecting neurons (see article by Vanderhaeghen and Polleux). Kriegstein and colleagues used real-time imaging of migrating neurons *in situ* to provide a framework into which the molecular steps can be integrated (see article by Kriegstein and Noctor). Pat Levitt described the consequences of abnormal hepatocyte growth factor (HGF) signaling for regulation of interneuron migration and differentiation (see article by Levitt, Eagleson and Powell).

(iii) Genes and activity in neurotransmitter expression during development. Most genes involved GABA function in the nematode *Caenorhabditis elegans* are conserved in the vertebrate nervous system, indicating that the components of the nervous system were not gradually perfected as more complex organisms arose (see article by Schuske, Beg and Jorgensen). However, altering patterned Ca²⁺ spike activity generated by different embryonic spinal neurons *in vivo* changes expression of neurotransmitters in a homeostatic manner (see article by Spitzer, Root and Borodinsky).

(iv) The developmental sequence of maturation is retained throughout evolution. Interneurons become functional before pyramidal neurons and before GABAergic synapses (which form before glutamatergic ones) are excitatory, suggesting that GABA is a pioneering transmitter (see article by Ben-Ari, Represa and Gozlan). In the forebrain and midbrain, NMDA receptors switch from being predominantly NR2B-rich to being predominantly NR2A-rich, which might affect their trafficking and synaptic localization (see article by van Zundert, Yoshii and Constantine-Paton).

The success of this operation encouraged the editors of TINS to propose a long-lasting collaboration with INMED



Figure 1. The Institute of Neurobiology of the Mediterranean Sea (INMED). *En elle même* sculpture by Pierre de Graw. Photograph by Constance Hammond.

– a series of INMED/TINS meetings with an annual TINS issue on the proceedings. These INMED/TINS issues will provide a unique opportunity to select subjects that are indeed of general interest and attractive to TINS readers – and will contribute to generating discussion of central issues in neuroscience.

La Ciotat is highly suited for these meetings. It is a typical small French town on the Mediterranean Sea that is not too associated with *far niente* and in which there is life outside the summer. The result is a nice combination of scientific sessions and amiable discussions and debates in a place that is not too secluded and is part of real life.

The topic selected for the next INMED/TINS meeting ‘The Multiple Facets of GABA’ is more than appropriate considering the remarkable recent discoveries on the roles of GABA during development and in most integrative functions, including the generation of oscillations that govern most aspects of our behavior, not to mention epilepsies and the action of drugs of abuse, notably cannabinoids. The empire clearly strikes back and, like the legendary rising phoenix, GABAergic mechanisms have a rich future. The list of speakers, as in previous INMED meetings, crosses traditional disciplinary boundaries, providing good conditions to stimulate conceptual discussions (see announcement in this issue).

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