

Thomas M. Jessell (1951–2019) ☆

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Tom Jessell grew up in London, immersed in art through his mother's painting conservation work, deeply devoted to cricket, a passion he shared with his father, and in the shadow of his chemist grandfather. He started his life-long quest to understand the nervous system with a Bachelor of Pharmacy degree at the University of London in 1973, followed by Ph. D. studies of neuropeptide function under the supervision of Leslie Iversen at Cambridge University, culminating in a Ph. D. degree awarded in 1977. In 1978, following a Royal Society fellowship in Japan, working with one of his heroes, Masanori Otsuka, Tom took a postdoctoral fellowship in Gerald Fischbach's lab at Harvard University, and in 1981, launched his own research lab there.

His training and early independent work perhaps sparked a typically Jessellian reasoning: the obscure principles (if any) of neuropeptide function in the adult nervous system contrasted with the relative simplicity of developing synapses, suggesting that the study of the fully grown nervous system would greatly gain from molecular insights drawn from observing Cajal's "young wood", i.e., the developing nervous system. Thus began the next two phases of Tom's career, spent entirely at Columbia University: the dissection of the molecular logic of the developing nervous system and the application of these principles to the study of how the nervous system orchestrates movement. The first phase was remarkable for Tom's discovery of the principles through which morphogen signalling gradients are converted into the discrete molecular identities of spinal neurons, and the identification of molecular signals that shape neuronal connections. This created waves throughout the vast disciplines of neurobiology and developmental biology, which are continually felt in fields as distant as mechanisms of neurodegenerative

diseases and cell replacement therapies. The second phase took the developmental molecules and linked them to adult neuronal function, providing a molecular dimension to age-old neuronal anatomy and physiology. Both phases were anything but an opportunistic use of long sought-after molecular tags of neurons. They were deliberate efforts to glean the functional logic and organisational principles of neuronal ensembles and derive principles of neuronal circuit function, allowing Tom to see neuronal rhyme and reason where others saw an impenetrable jungle. Unfortunately, Tom's contemplation of the nervous system was cut short at age 67, on April 28, 2019. In Tom's death, neuroscience lost an inspiring visionary figure, and very likely many paradigm-shifting ideas.

Despite Tom's passing, we are heartened by the number of scientists who stood on Tom's shoulders. Many of them were lucky enough to be directly inspired by Tom through his mentorship. He had a particular approach to choosing his trainees: true to his breadth of knowledge and relentless pursuit of new ideas, he chose his trainees not necessarily according to their direct experience in neurobiology, but apparently to expand the diversity of perspectives in the lab. This strategy, combined with the collegial atmosphere in the lab, marathon lab meetings and "floor talks" with neighbouring labs, made for an extraordinarily rich training environment, complementing the thoughtful and thorough one-on-one discussions with Tom. Although Tom's intellect was widely appreciated in the field, working closely with him revealed its true encyclopaedic breadth. His knowledge of neuroscience arcana came through in particular during "summer school", a summer-long journal club series surveying a particular topic, which required plumbing the depths of old literature using pre-digital methods. Tom's mastery of a broad range of topics was profound and seemed to derive from his extraordinary memory and his ability to assimilate a vast number of sometimes esoteric details, producing a coherent picture of how a certain part of the

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nervous system might work. This dexterity served Tom well as one of the stewards of *The Principles of Neural Sciences*, a neuroscience *vade mecum* essential to students and leaders of the field alike. Tom's proclivity for synthesis was particularly evident in his lectures and papers, in which he could present the most complicated experiment in a way that is accessible to the non-expert, but also satisfying those who are seeking exquisite details, while resting everything on the bedrock of logic. Reflecting Tom's appreciation of diversity of opinions and expertise within the lab, many of his projects relied on skills found outside of it, and he invited many of his collaborators to visit and work in the lab and encouraged us to share unpublished data. This was consistent with his philosophy that working together on a problem is much more satisfying and fun than working against one another, providing his trainees with new insights and extraordinary chances to meet and interact with amazing scientists. Tom is also remembered for his generosity to people near and far: he always had time to talk, to read, think about and discuss colleagues' manuscripts or ideas, often shared the position of corresponding author with senior trainees and made widely available the lab's resources and reagents, such as antibodies and genetically modified mice. Tom inspired awe in many of us, but also, by example, he inspired us to take action, working harder on our experiments, our writing, our critical thinking and our knowledge and to brave the ever-expanding realms outside our narrow scientific comfort zones, and to take risks with challenging experiments using new technologies. In brief, Tom made us all try to be the best scientists that we can be.

It's difficult to reminisce about Tom without mentioning his other passion in life: art, which he shared with his partner and scientific collaborator Jane Dodd and their three daughters. He was immersed in art in his office and home, two spaces that served to exhibit an art collection curated as well as some of the foremost modern art galleries. "I need the escape from science that is provided by immersion into the world of art" is testament to his co-habitation of two seemingly mutually exclusive worlds. This art-science interdependence can be seen in the visual language of Tom's data presentation, and in the deliberate choice of journal cover art that eventually became iconic. This was Tom's way of "saying a small thing edgily", an aspiration that he shared with one of his favourite artists, Prunella Clough. He came close to making big art of his own, by contributing to Renzo Piano's designs of the building that houses Columbia University's Zuckerman Mind Brain Behavior Institute (ZMMBI), edgily swelling out of the humdrum skyline of upper Manhattan.

Tom's scientific contributions earned him accolades that included election to professional societies such as the Institute of Medicine and the National Academy of Sciences (USA), and The Royal Society and the Academy of Medical Sciences (UK). Tom was also an awardee or co-awardee of some of the world's most distinguished prizes including the J. Allyn Taylor International Prize for Medicine, the March of Dimes Prize in Developmental Biology, the Kavli Prize, the Gairdner International Award, the Gruber Foundation Prize, the Vilcek Foundation Prize and the Ralph W Gerard Prize. He gave numerous endowed lectures, was honoured with Honoris Causa doctorates and contributed to the development of many institutions and foundations in an advisory capacity.

Tom's last years were marred by progressive supranuclear palsy, a sickness that slowly robbed him of voluntary movement and speech, which must have been extremely frustrating for a man known for his eloquence. The behavioural and cognitive symptoms that accompany this disorder did not spare Tom's *joie de vivre* and acumen, although he apparently fought against this devolution as those who visited him in his last days describe the light in his eyes, and how he would let them know that "he was still in there". Juxtaposed against this progressive decline was the abrupt end to Tom's scientific career. In March 2018, Tom was stripped of all administrative posts at Columbia University and of all grants and titles awarded by the Howard Hughes Medical Institute, because of a "relationship with a lab member under his supervision". The events triggering these injunctions were never made public. The scientific activities of his lab were progressively wound down to allow his trainees to complete essential experiments.

Sustaining Tom's legacy are his many trainees running labs or treating patients around the world, many of them carrying a kernel of Tom's passion for the nervous system and rigorous science. He also leaves his impression on the ZMMBI: his openness to new ideas and drive to excel perdure in the collective wisdom of the faculty members that he helped recruit, many of whom are likely to be the future leaders of neuroscience. However, his most enduring epitaph is the vast body of scientific work that will inspire others to continue his exploration of the wonders of neuroscience.

This special issue of *Neuroscience* honours Tom's contributions to the fields of neural development and circuit function with original research and review articles patterned after his scientific trajectory that attempted to glean the logic of development of neurons and their connections and derive from it the principles of neuronal function.