Okinawa Institute of Science and Technology Graduate University (OIST)

SUB-TROPICAL JAPAN BREEDS RESEARCH EXCELLENCE

Most scientists familiar with research in Japan may be surprised to learn the unique attributes of the Okinawa Institute of Science and Technology Graduate School (OIST): it is a Japanese university operating fully in English, without hierarchy or academic compartmentalization, where researchers are asked to resist the trend towards specialization and where young, independent scientists mix freely with senior professors. OIST is quickly becoming the most international and energetic research university in the country.

Researchers are rushing to OIST from top academic institutions across the globe in search of something increasingly difficult to find elsewhere: freedom to follow their curiosity. As a bonus, nestled in the protected forest of a sub-tropical island, they find an expansive, modern building designed by a Nikken Sekkei team led by Takashi Okamoto and Kenneth Kornberg — son of a Nobel prize winning molecular biologist and brother to another — to stimulate scientific creativity.

Stellar recruits

Launched a decade ago, OIST established a powerful, core, research faculty around figures such as Kenji Doya whose blend of robotics and neurobiology research has produced a broad range of research findings. Last year, OIST President Jonathan Dorfan went on a recruiting drive. OIST now has over 200 researchers spread over five priority fields — neuroscience; molecular, cell, and developmental biology; mathematical and computational sciences; environmental and ecological sciences; and physics and chemistry. Researchers within OIST's 44 independent research units, however, follow whatever scientific direction captures their interest. Inaugurated as a graduate university last November, the OIST will welcome its first class of 20 graduate students in the latter half of 2012.

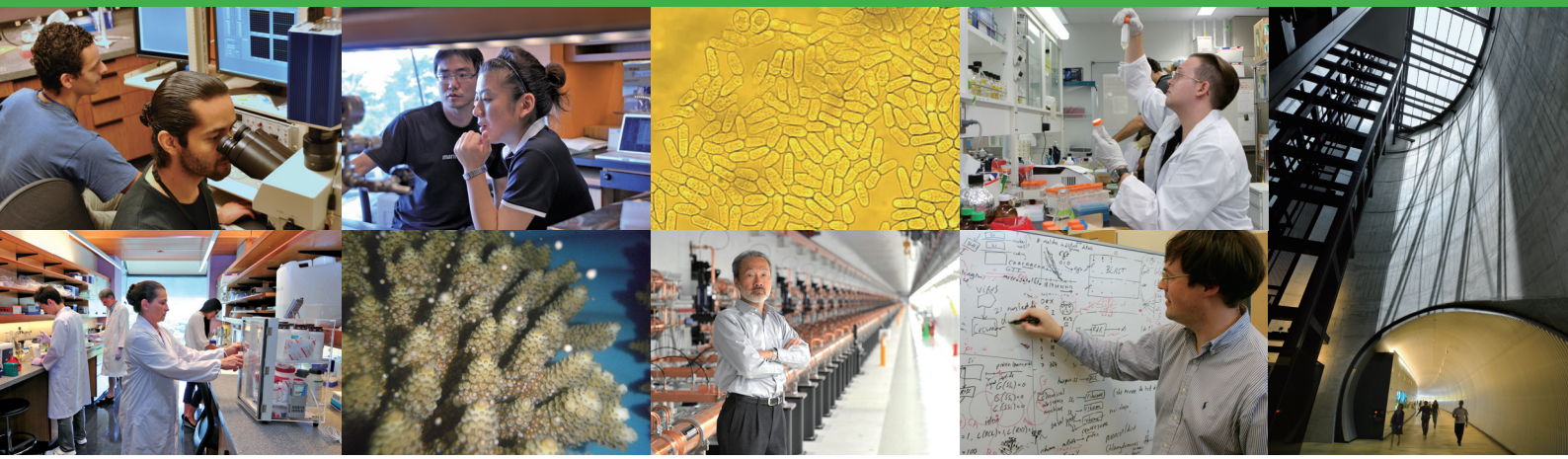
Scientific publications from OIST have increased dramatically, jumping some 40% to nearly 80 peer-reviewed publications in 2010. The increase is coming exactly how Dorfan wants it: with high impact papers in top research journals.

That pace is set to increase as the new recruits roll in, stimulated by the research culture. "The research support provided at OIST translates to what I consider the cardinal value of academic life: intellectual freedom," says OIST researcher Pinaki Chakraborty, who is studying the mechanics of turbulent and geological flows. Academic life elsewhere can be a time-consuming and an "unceasing existential struggle for research grants," he adds. Mathematician and systems biologist Tatiana Marquez-Lago, similarly sees working at OIST as a rare chance to perform cutting-edge research "devoid of inefficient practices accumulated through the years or inherited from obsolete structures."

The generous start-up funding and complete freedom to choose the direction of his research also attracted Denis Konstantinov to OIST. As an experimentalist working with high magnetic fields and ultra-low temperatures to study the mechanism of microwave-induced zero conductance states, Konstantinov had high requirements in setting up a laboratory. OIST has struck the right balance of Western independence in communication between very young researchers and senior scientists, and a sense of Japanese order and security in institute management, according to Konstantinov.

Sterling equipment

Dorfan knew he would need top-notch equipment to win the caliber of scientist that he wanted. Befitting OIST's diversity of exploration, OIST has assembled a broad collection, including multiple electron and two-photon microscopes, several of the latest model gene sequencers, with planning well-advanced for



a table-top X-ray source and a coastal ocean-observing system.

OIST's state-of-the-art, high-resolution, cryo-electron microscopy combined with a significant computational infrastructure, in part, lured biophysicist Matthias Wolf from the USA. He is studying the conformational changes of the papillomavirus capsid as it enters cells at near atomic resolution. As important as the hardware was, the technical competence of his new colleagues, who he describes as senior mentors with global experience, was irresistible. His colleagues now include Nobel laureate geneticist Sydney Brenner, Dorfan, Robert Baughman, a neurobiologist with a wealth of experience in science policy and funding, Mitsuhiro Yanagida, famed for his work using yeast to untangle chromosome segregation, and Ulf Skoglund, who is pioneering the use of electron tomography to image molecular mechanisms within cells.

Wolf notes that this rich environment will allow him to grow beyond his current scientific insights. He also says that OIST's broad vision allows creative cross fertilization while retaining structure. "Unlike other places with similar resources and ambitions, OIST provides a more general focus with a solid foundation in the physical sciences."

Interdisciplinary strength

Researchers from different backgrounds are expected to mingle at OIST. The key to justifying such intellectual diversity is making it more than the sum of its parts. Scientists must look beyond their own fields for new ideas. Even Kornberg's building design is meant to make people with no connection cross paths regularly.

Yabing Qi, who holds simultaneous interests in developing organic electronics for use in energy materials and devices as well as a molecular level understanding of structure-property relationship in organic and inorganic nanomaterials, appreciates the interdisciplinary mindset that pervades OIST. "The non-departmental academic structure of OIST provides an ideal environment for my research," says Qi, who hopes to create a novel nanostructured inorganic/organic hybrid solar cell at the institute.

That atmosphere also appealed to Nicholas Luscombe, a life scientist from the UK. Luscombe, who spent his childhood in Japan, had long sought an academic homecoming but found it impossible in the traditional Japanese academic environment. OIST's interdisciplinary, collaborative, and international atmosphere, with its level structure, made him jump at the chance. Luscombe was also excited by the excellent genomic facilities that enabled sequencing of interesting marine invertebrates such as coral and octopus. "These have been neglected elsewhere because they are not directly relevant to human health. But they are nonetheless important for biological research," he says.

Veteran researchers too are finding OIST a place of new challenges. For the first time in his long career, world-renowned developmental biologist Noriyuki Satoh was able to lead a sequencing project from sample collection to sequencing and analysis when he pieced together the coral genome in an attempt to understand why some species bleached in the summer of 1998. This feat was made possible by the generous sequencing capacity at OIST. Satoh and his colleagues then moved to another fittingly marine success with the pearl oyster genome.

Solution central

Although the grand space in a beautiful natural setting comes at a price — isolation from the established academic centers — for most, concerns over isolation quickly dissipated. Guest lecturers visit on a regular basis. And, seasonal workshops lasting one to two weeks — covering topics from complex quantum systems to computational neuroscience to comparative genomics to fluorescence microscopy — regularly bring in renowned guest teachers.

Marquez-Lago says concerns about the distance to collaborators in Europe and North America was easily solved with flexibility and great support for traveling. "What struck me the most about OIST is everyone's visible willingness to simply do their best, and come up with creative solutions to approach all challenges." She adds, "OIST refreshingly embodies the phrase 'where there's a will, there's a way,' a much needed attitude towards education and science." ■