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ORGANISMS DIVERSITY & EVOLUTION

A sampling of the science from the International Biodiversity Observation Year 2001–2002

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This special issue provides a snapshot of the biodiversity research and products generated during the International Biodiversity Observation Year (IBOY) 2001–2002. IBOY was a grassroots effort of the international biodiversity research community, initiated by DIVERSITAS, the international program on biodiversity science. The 'year' arose from biologists' growing concern about unprecedented and accelerating anthropogenic loss of global biodiversity and its consequences for Earth system functioning. They identified a need for a pulse of activity to stimulate generation of scientific information that is urgently needed to support biodiversity conservation, and to improve communication of that information to stakeholders. They thus initiated an intensive 'year' to capture broad attention and raise awareness of important science-based information about biodiversity, defining its overarching goals as to:

- network and integrate biodiversity researchers to advance a holistic understanding of biodiversity and its connections to society
- increase communication of science-based information on biodiversity and its importance, to a wide-ranging audience.

Since the beginning, IBOY was envisaged as a broad initiative that would derive its breadth and energy from the 'grass roots' of the biodiversity researcher and education community. To develop a structure and activities that were 'bottom-up', rather than the 'top-down', DIVERSITAS invited the community to propose projects for IBOY. IBOY did not fund these projects, but rather networked and promoted them and coordinated capacity-building and outreach activities in which they could participate

One hundred-and-six biodiversity research and education projects, with activities in more than 150 countries, took part in IBOY. The projects included both international networks, that enabled IBOY to engage a large number of scientists, and smaller scale, national or regional projects, that enabled IBOY to include innovative projects working on place-based issues in developing, biodiverse countries. The Projects explored all levels of biological organization from genes to ecosystems, considered taxa from microbes to megafauna, and addressed habitats from highly managed agriculture to remote deep sea sediments. Throughout 2001 and 2002 they conducted pure and applied research, and used varied approaches such as taxonomic surveys, molecular techniques, GIS, and socio-economic analyses, to generate and communicate new data and information on biodiversity. Together they generated new:

- networks for biodiversity research, education and conservation,
- tools and resources for information transfer, and
- skills and opportunities for communicating science-based biodiversity information to end-users.

The 7 papers in this issue are from just 7 of the 106 projects that participated in IBOY, but they illustrate how many fundamental questions about biodiversity remain unanswered and the diversity of approaches being conducted around the world to address them. The papers also describe new technologies and approaches that can rapidly accelerate accumulation and communication of knowledge about biodiversity, providing hope that we may yet deliver, in time, the scientific tools that society needs to conserve biodiversity

An estimated 90% of species on Earth remain undescribed, and many of IBOYs projects surveyed and inventoried life on Earth during 2001 and 2002. Two papers in this issue describe new taxa from collections made during IBOY. In a review of knowledge of the biodiversity of Bolivian Orchidaceae, VÁZQUEZ et al. describe two new orchid species and provide the first diversity and endemism maps. Although the Orchidaceae are among the most charismatic of tropical plants, they are the most diverse botanical family in Bolivia with high endemism, and the authors estimate that only half of Bolivias orchidacea species have been described. The Orchidaceae survey is part of ongo-

ing work under the auspices of the Fundacion Amigos de la Naturaleza Noel Kempff, which integrates taxonomic research with education and capacity building in sustainable approaches to conservation in Bolivia. BOXHALL and JAUME describe a new genus of Epacteriscidae collected in an anchialine cave in Cuba. Anchialine caves are flooded inland marine caves that are isolated from the ocean and contain ancient and poorly known lineages. During IBOY, Boxshall co-led an informal international network effort to survey the fauna of anchialine caves, and determine their vulnerability to global changes such as coastal development and groundwater pollution.

Among the most ambitious projects launched during IBOY was a survey and inventory of biodiversity of forests, coastal zones and freshwater ecosystems along a latitudinal gradient in Asia and West Pacific, coordinated by DIVERSITAS in Western Pacific and Asia, and a survey of Biodiversity across the Pacific by its sister project PABITRA. The projects aim to establish baseline data, in order to understand the impacts of the rapid development and global change that the region is experiencing. In this issue TAKEUCHI describes the challenges of surveying vegetation very speciose and undocumented habitats, specifically Papua New Guinea. He describes the the long-term sampling protocols established by PABITRA that can help to overcome these obstacles and reports some of the taxonomic discoveries resulting from the work, and thir implications for future floristic work in Papuasia.

Other IBOY Projects investigated the evolution and biogeography of biodiversity. BAIGUN and FERRIZ report an extensive biogeographical assessment of native freshwater fish in Patagonia, based on a review of seminal literature, analysis of biological collections, and field surveys across basins. New information on latitudinal patterns, expanded species ranges and the high degree of endemism is presented. The authors emphasize the critical need to incorporate assessments of introduced species and environmental parameters into surveys of native species, in order to support conservation of native species

One of the major obstacles to science-based understanding and conservation of biodiversity is the lack of synthesis of existing biodiversity data and communication of the resulting information to end-users. Many IBOY projects harnessed new information technologies and applied them to taxonomic datasets to address this problem. ALLISON describes the development of a new informatics tool that has helped to integrate and synthesize more than 4 million specimen records from incomplete and fragmented datasets on Pacific Biodiveristy. The 'Hawaii Biological Survey' was developed by the Bishop Museum, Hawaii, under the auspices of PABITRA and DIWPA. It enables derivation of important information for conservation, such as biogeography, conservation status and invasion patterns. Progress towards expanding the program into a 'Pacific Biological Survey' and a 'Pacific Basin Information Node' in order to guide future research and conservation priorities is discussed.

The impetus behind IBOY was the urgent need to understand and manage the unprecedented biodiversity loss resulting from anthropogenic global change. Many of IBOY's projects worked to identify changes in biodiversity and the consequences for the functioning of ecosystems and societies. These goals are reflected in one of the papers presented in this special issue. GILLISON et al. inventoried biodiversity across a gradient of disturbance and land-use intensification in lowland Sumatra. The faunal sampling was carried out in conjunction with the IBOY project the Global Litter Invertebrate Decomposition Experiment (GLIDE). Soil Macroinvertebrates play key roles in ecosystem functioning, and should be an important component of any biodiversity assessment. However, they are frequently overlooked because their diversity, inaccessibility and highly aggregated distribution generally makes direct inventorying and monitoring impossible. GILLISON et al. determined that certain plant functional characteristics can provide indicators or surrogate measures of termite biodiversity, a finding that may help support development of more rapid assessments of soil macrofauna. DORAN et al. report baseline results from plots established to evaluate the impacts of climate change on biodiversity along an altitudinal gradient at the Warra LTER in Tasmania. Their altitudinal survey reveals that change in vegetation and invertebrate diversity is not linear with altitude, but rather is most dramatic between 700 m and 1000–1100 m (treeline), the zone corresponding to the frequent presence of cloud base and the limit of most vascular plants distribution. The authors suggest that sampling to detect impacts of climate change may be most effectively focused within his zone and, based on preliminary taxonomic analysis, discuss the potential for particular taxonomic groups to act as indicators of biodiversity change.