

The ongoing need for education provision for whole-plant biology

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This talk will not focus on succulent plants, but is intended to flag up the urgent need to restore or maintain teaching at all educational levels for whole plant biology. It was previously presented at the UK's Association for Science Educators (ASE) annual conference (January 2010) and is therefore focused on the situation in the UK, but its relevance for many other countries is hopefully obvious.

Plants and fungi are the largely unseen heroes of our planet's ecosystems and much of nature nowadays is alien to us, because we live in cities and our foraging is in the supermarket, its neatly packaged goods all far removed from the soil. Yet plants have never been more vital for our continued existence. Most people will recognize that we all depend on them for food, whether directly or as fodder for the animals we eat, but in many societies around the world they are also the source of medicines, shelter, fuel and in every way deeply woven into human culture. Less well understood by the majority is that whilst green plants may be rooted in the soil and derive water and minerals from it, they absorb and are primarily built from atmospheric carbon – thus healthy vegetation has a mitigating effect on climate change. Sadly, however, its destruction, which goes on ignored in places far away from our city homes, is placing more carbon into the atmosphere than all the world's fossil-fuelled transport systems.

Our great botanical institutes, museums and universities know most of what is already recorded about the diversity and importance of plants in the world, but there is still much more to discover and time is running out. It may come as a surprise that our catalogue of the world's flora is still so incomplete, even if the molecular revolution of the last two decades has provided a more robust framework for its classification. But with the environmental crisis now upon us, the knowledge that can enable the monitoring and advice for the conservation of remaining vegetation is vested in ever fewer individuals. Whole plant science and especially the vitally important means of classifying and ordering living things has all but disappeared from higher education providers – the university that educated me as well as a recent director of Kew Gardens no longer offers a degree in either botany or horticulture! Where are our future plant conservationists going to come from?

At Kew "Breathing Planet" is a programme aligning knowledge of plant diversity around the world with the means to conserve what remains and restore areas capable of recovery. We mount expeditions in partnership with our many overseas stakeholders to collect, identify and carefully document the plants that represent huge and complex ecosystems. We use satellite technology and geographical information systems to pinpoint biodiversity hotspots and to draw the attention of those we hope can take action, be they politicians, government departments and NGOs. This requires people with good botanical and horticultural knowledge or at least the enthusiasm and interest to obtain it. Those with the training to acquire, assemble, analyse and interpret complex sets of data are also in demand. Likewise, the ability to interpret this work and convey its importance to the public, engendering their support, is also a skill that the botanic garden looks for.

As a child my acquisition of plant knowledge was almost assumed, because the learning environment was conducive. There was the family garden plot given by parents for young Nigel

to grow his vegetables and eventually a greenhouse for the cactus collection. At primary school, classrooms had nature tables and the teachers could be expected to recognize much of what the kids brought in of biological interest from the local park or as encountered *en route* to school. How many teachers today can identify more than 10 species of the British or European flora? Three species is a challenge for many! Plants must not be seen any longer as merely the sepia background to our daily environment. Their diversity and the health of their habitats around the world are steadily eroding and will continue to do so if we do not bring the importance of plants in our lives higher up educational agendas. Kew has been proactive about getting plants included in UK high school science curricula, but it will require greater focus on the part of teachers at all levels to ensure that the fruits of interest and knowledge are realised.