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THE BCG/GEM OXFORD CONFERENCE
"Using Natural History Collections – Focus on Education."
(*Mon-Tues 11-12 April, 1994, Keble College, Oxford*)

This conference was attended by some 75 people, with a reasonably even mix of biologists and educationalists. In addition to the six papers printed below, there were a number of other activities to keep the delegates busy. On Monday morning Louise Allen and Timothy Walker took a group to the University of Oxford Botanic Gardens for an interesting demonstration of the educational use of living plants. Back at the College Steve Cross and Gina Couch (Liverpool Museum) gave a talk on the Natural History Centre at Liverpool Museum. In the afternoon everyone was driven to Cogges Manor Farm Museum, where a number of guided tours were laid on; unfortunately these filled up swiftly, so a number of us spent a pleasant sunny afternoon exploring the Farm on our own. All too soon we had to return to Keble College for the heady delights of the BCG AGM; GEM members had to make do with a visit to *Curioxy*, a permanent hands-on science gallery.

In the evening we had a satisfyingly alcoholic reception at the University Museum, where various staff offered behind-the-scenes tours. The insect collections had to be seen to be believed. A few of us were privileged to visit the large attic area of the Museum, presently under repair and refurbishment. This was where the celebrated British Association meeting took place at which Huxley and Wilberforce crossed verbal swords over Darwin's theory of evolution. We then staggered back across the road for the Conference Dinner, served in what was reputedly the largest College dining hall in Oxford. And so to bed.

Next day Kate Pontin (London Borough of Hillingdon, Local Services, UB8 1HD) gave an interesting talk on the *Evaluation of Galleries*, and Alison Thornhill (Wollaton Hall, Nottingham) one on *Resurrecting the Long Dead: the creative use of stuffed animal collections*. After lunch the group divided, with half visiting the Botanic Gardens and the rest of us going first to the Balfour Building of the Pitt Rivers Museum. Here Dr Helene la Rue gave us a very interesting talk about the gallery of musical instruments, and the music garden she is establishing, planted with examples of the trees and shrubs from which different instruments are traditionally made. A brisk walk back through misting rain took us to the main Pitt Rivers Museum, where we had an hour or so to absorb the atmosphere of a real museum, crammed floor to ceiling with wonderful ethnographic objects, and hardly any trendy interpretation to detract from them! A last afternoon tea at Keble, with time to exchange cards, say goodbye and, for me, a last chance to twist arms about papers for the *Biology Curator*. Then Home.

Charles Pettitt, Manchester Museum, University of Manchester,
M13 9PL

Keynote Talk: USING NATURAL HISTORY COLLECTIONS – Focus on Education

Dr. Elizabeth Goodhew, Keeper of Education Services, Horniman Museum, London, SE23 3PQ

My brief for the joint meeting was to take a look at learning theory, including the National Curriculum and how it affects our day to day work to touch on the enormous potential of using Natural History collections for leisure learning activities, and finally to consider how we, with our separate areas of expertise, can work together to interpret these collections for the benefit of the public.

Learning Theory

Museums have a distinctive contribution to make to the educational process. They encourage learning from real things. At their best, museums communicate across boundaries of language, culture and time. The immediacy of the real thing can be a marvellous experience -using hands, eyes, mind and sometimes ears, nose and mouth as well. The greater the number of senses involved, the more intense becomes the experience.

Very young children, reflecting on the purpose of a museum, said, "A museum is a place where you put interesting things". Another child on entering the portals of the Natural History Museum in London asked with awe, "Is this a church for animals?"

Young museum visitors faced with mounted and preserved animal specimens constantly ask, "Is it real?" and we can well understand their disbelief at our reply. They know instinctively that there is more to an animal than that. The learning that goes on in a museum is investigative whether through planned and designed displays or through direct access to material that can be handled.

How do we learn?

The constructivist theory of learning states that we construct our own notion about new information on the basis of our existing knowledge. We do not learn isolated facts, separate from the rest of our lives, we learn in relationship to what else we know, what we believe, our prejudices and our fears. Each meaning we construct makes us better able to give meaning to other sensations which fit a similar pattern. This takes time, learning is not instantaneous. We need to re-visit ideas, try them out, play with them, use them, hence the value of well-planned, hands-on displays and activities. Anything learned is the result of repeated exposure and thought. Intellectual skills are gained step by step. As we encounter each new experience, we react on the basis of our past experience, making comparisons and associations to understand it. To optimise the conditions for learning to take place, the learning environment should –

- * provide real objects to learn concrete concepts
- * demonstrate the relationships between concepts to learn principles
- * offer problem-solving activities by applying previously learned principles

Individuals vary in their preference for learning models. The Theory of Multiple Intelligences proposes at least seven different intelligences, each requiring a different approach to accommodate ways in which people learn. I like the quotation (I do not know the source) that, "The true test of intelligence is not how much we know how to do; but how we behave when we do not know what to do". Different 'horses for courses' can be selected to match the preferred learning styles of different groups of people.

Theory of multiple intelligences

- | | |
|---------------------------|--------------------------------|
| 1. Linguistic | (writers and poets) |
| 2. Logical – mathematical | (scientists) |
| 3. Musical | (musicians) |
| 4. Spatial | (pilots, architects, surgeons) |
| 5. Kinaesthetic | (dancers, athletes, mechanics) |
| 6. Interpersonal | (understanding others) |
| 7. Intrapersonal | (understanding self) |

From Davis and Gardener (1993) "Open Windows, Open Doors"
Museum News

We in museums are seeking multiple windows into learning to give access to many more learning styles. Museums are natural settings for individual-centred learning, where an individual is free to map his/her own course. But firstly, you must catch their interest; motivation is a key component in learning.

Motivation

If we can focus on something that fascinates the visitor we start off on the right foot. Sheer size can do the trick. At the Horniman Museum we have a greatly loved, over-stuffed walrus. He now sits, resplendent on an ice floe and people can compare their weight with his by standing on the scales. He has been in the museum since 1901 and I fear there would be a public outcry if parents and grandparents were not able to bring their offspring to see him; Sunderland Museum has Wallace the lion. I do not think that animals in general are a problem. Animals can present a soft and loveable public image. However, nobody – as they said when we had a teaching session at Kew – wants to cuddle a cactus. Whereas reporters flew half way round the world to record the plight of three trapped whales, there is little media coverage of the predicted destruction of a quarter of the world's flowering plants over the next forty years. I loved Kew's use of the Wow! factor. They told us that "In just six days the giant water lily is capable of growing a leaf

strong enough to support the weight of a baby." They told us that, "When the world's largest flower, *Rafflesia arnoldii*, was first discovered, people believed that it was pollinated by elephants". Does that catch your interest? The amount of interest on the part of the visitor is the starting point for all educational planning. The interest that the museum staff have in a particular subject will not necessarily coincide with that of the users. All interpretation must start with the user. This can be a problem for museums, as it is necessary to find the right balance. How do we set about this?

The museums needs to know

- * Who are the actual and potential users?
- * What do they know?
- * What do they want to know?
- * How do they feel about the museum?
- * How do they want to feel as a result of visiting the museum?

In identifying what we learn in museums we can draw a distinction between cognitive gains -the facts we get to know and affective gains - how we enjoyed the process and how we feel about it afterwards. Present opinion is that museums are strong on affective gains, that is feelings and attitudes, and weak transmitters of facts.

One of the fundamental purposes of a museum is to make its collections as widely accessible to as many people as possible. We should help the public to become museum users, not just museum visitors. Help them to see the museum as supporting their own, individual life-long learning, *ie.* as a place to which they can return and develop concepts throughout their lives. Over 80% of museum visits in this country are not part of formal education. It is the individual, either alone or in small groups who is the typical museum learner. However, having emphasised that schools are but a small proportion of the museum visiting public, I return to my brief and devote some time to the National Curriculum.

National Curriculum

The educational challenge of the National Curriculum is stated as, to help young people -

- * to use leisure time creatively
- * to have respect for other people, other cultures and other beliefs
- * to become good citizens
- * to think things out for themselves
- * to pursue a healthy lifestyle and
- * to value themselves and their achievements

The original 1988 curriculum with its ten subject documents was said to have "carved up the seamless robe of knowledge". I am not familiar with either the Scottish or Welsh curricula but understand that the Scottish system avoids the rigid subject based approach and organises content around 'areas of experience'.

The 1988 curriculum expected too much of both pupils and teachers. In the English school year there are 35 weeks; each week has 23.5 teaching hours, giving a total of 822.5 teaching hours in a school year. This is why it has been necessary to slim down and restructure the National Curriculum and examine ways to simplify the assessment of pupils. By January 1995 the Orders for the slim line National Curriculum will be published. Here is the proposed time table.

Timetable for review of national curriculum (NC)

1994	April	Schools Council and Curriculum Authority (SCAA) advises the Secretary of State on Sir Ron Dearing's proposals to slim down the NC in subjects other than English, maths and science.
	May	Consultation begins on proposals.
	July	Consultation ends.
	Sept.	SCAA reports to the Secretary of State with proposals revised in the light of consultation.
	Oct.	Secretary of State's final decisions made.
1995	Jan.	Distribution of the new Orders to schools.
	Sept.	Implementation of the new Orders for Key Stages 1-3.

1996 Sept. Aim to introduce revised General Certificate of Secondary Education syllabuses in NC subjects for key Stage H.

Sir Ron Dearing has recommended that after this there should be no further major changes for five years.

Let me briefly update you on the jargon currently used in schools. To give coherence across the country your child is no longer in Mr. Brown's class or your teenager in 5th Year Senior School. If the little one is aged 6-7 years that would be Year 2 and the older one in Year 11. Reception class is labelled R and the sixth form, (now being encouraged once more) becomes Y12 = lower sixth and Y13 = upper sixth.

Key stages tie in with end of Key Stage assessments KS1 = 5-7 yrs; KS2 = 7-11 yrs; KS3 = 11-14 yrs; KS4 = 14-16 yrs. National assessments are at ages 7, 11, 14 and 16.

Update on schools jargon

Age	Old names	School year	New names Key stage
4 - 5	Reception		
5 - 6	Infants	Y1	1
6 - 7		Y2	
7 - 8		Y3	
8 - 9	Juniors	Y4	2
9 - 10		Y5	
10 - 11		Y6	
11 - 12		Y7	
12 - 13	Lower Secondaries	Y8	3
13 - 14		Y9	
14 - 15	Upper Secondaries	Y10	4
15 - 16		Y11	
16 - 17	Sixth Form	Y12	
17 - 18		Y13	

The core subjects are English, maths and science as competence in language, numeracy and scientific method is needed throughout the rest of the curriculum and indeed in all aspects of life. Science is the area on which I shall concentrate today, while also highlighting exciting areas of working using Natural History collections in other subjects.

Links between natural history collections and . . .

(1) Biology in the National Curriculum

Life and living processes

- (i) Life processes and the organisation of living things
- (ii) Variation and the mechanisms of inheritance and evolution
- (iii) Populations and human influences within ecosystems
- (iv) Energy flows and cycles of matter within ecosystems

(2) Geography in the National Curriculum

Physical geography

Weather and climate

Landforms

Vegetation: animals and soils

Environmental geography

The use and misuse of natural resources

The quality and vulnerability of different environments

The possibilities for protecting and managing environments

Enquiries and requests for publications should be addressed to:

Customer Services Section, School Curriculum and Assessment Authority, Newcombe House, 45 Notting Hill Gate, London, W11 3JB

Tel: 071 229 1234

In the NC for 5-7 yrs the key activities are exploration, using all the senses, contact with living things and the development of different kinds of self expression. Living/Non-Living is for them the first hurdle. At this age many think that moving or active is alive; fire and clouds are perceived as alive.

7-11 yrs may reason that fires and cars are alive because they need fuel, food and oxygen and in more abstract terms they speculate whether fire 'breathes' or reproduces as sparks are thrown

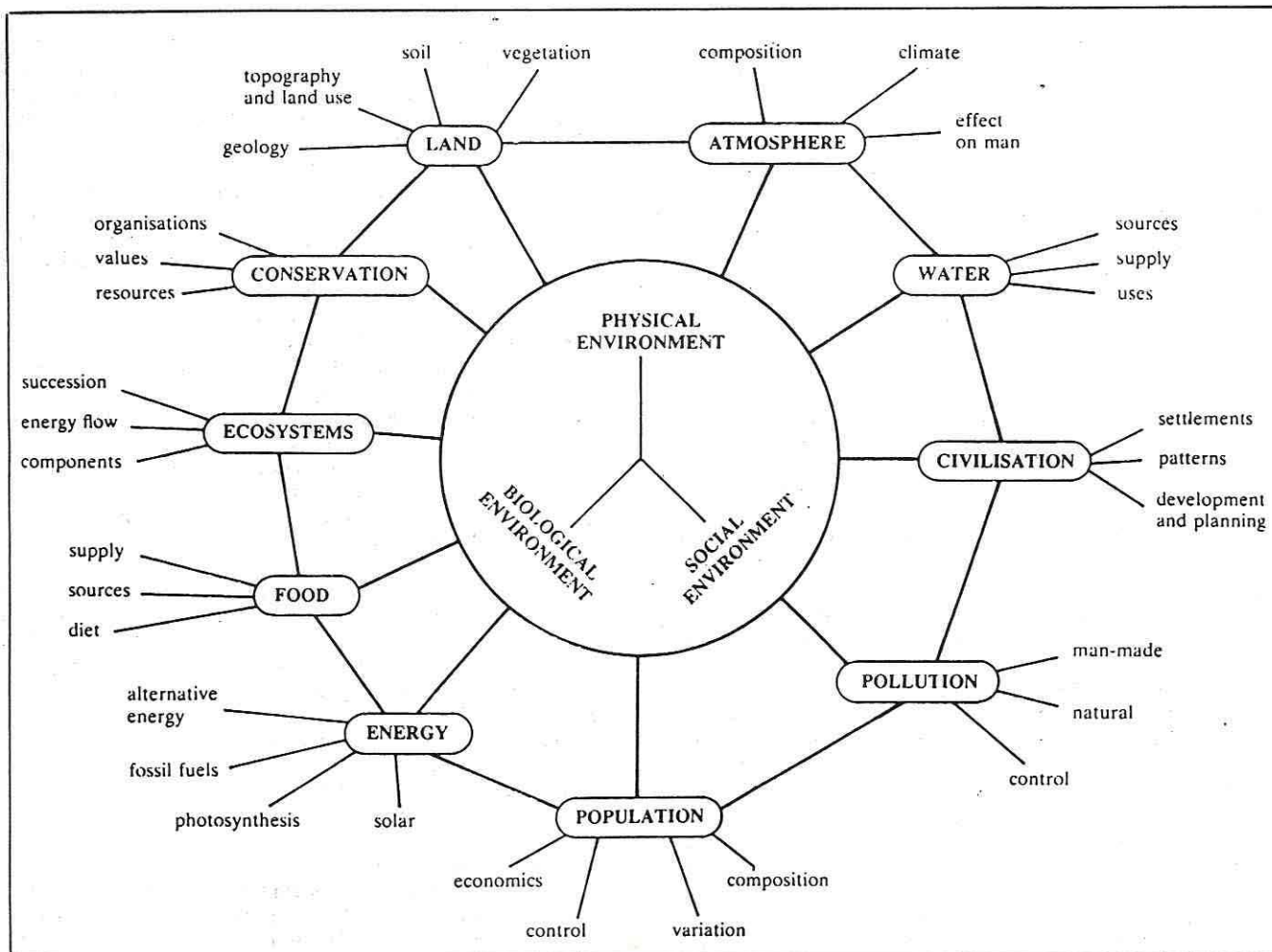


Figure 1. Subject content common to many Biology syllabuses. Reproduced with permission from the NEA Environmental Studies syllabus.

out. For both KS1 and 2 in 5-11 yrs the topics routinely sought by teachers to support curriculum work are – Animals in Their Groups, Animal Movement, and Animal Defences. For 5-7 yrs teachers use animal images in their number work – ‘1 hedgehog has 4 legs, 2 hedgehogs have 8 legs’, or ‘Draw 3 snails on the first leaf and 4 on the next leaf. How many snails altogether?’

A school from along the Old Kent Road had observed two pairs of kestrels nesting in a local playground, and wanted to make closer observation of the birds displayed in the museum. These 6-7 yrs looked at the usual beaks and feet. They looked at beaks specialised for diets of whole animals, seeds, snails, water weed and nectar. The children found the digestive system particularly interesting and were fascinated that some birds swallowed small stones to help them grind their food and that an ostrich would happily eat cacti. The teacher told us that for follow-up work the children divided birds into four groups, water, perching, birds of prey and flightless birds. They experimented with different types of feet made from balsa wood or pipe cleaners to try out ‘swimming’ feet on branches and ‘perching’ feet in water. Flying, swooping, running, hopping, landing movements and courtship dances were mimicked. Using paper, card and balsa wood the children experimented with flying wing shapes, relating them to birds. The children wrote bird words on feathers of cardboard and attached them to a large cardboard cut-out of a bird in flight. They made a nest of ostrich eggs from papier mache to the approximate measurements of 17 cm in length and 1 kg weight of a real ostrich egg. Their teacher added that one of the most important areas that emerged from this study was conservation. These 6-7 yrs were aware of the danger to birds from fishing lines, lead weights, poison and rubbish.

The NC for 7-11 yrs emphasises skills such as those of communication, individual study, using reference materials,

scientific method, observing, measuring, reporting, collecting, classifying, experimenting, cooperation with peers and encounters with adults. First hand experience is important. Scientific activities should allow children to appreciate environmental influences on plant and animal life cycles. Once these processes have been understood locally, the children’s interest can be extended to distant environments. Animals in their groups for 7-8 yrs is often linked to the maths theme of sets. What do members of each animal group have in common? How do the various groups differ? What similarities are shared by animals in different groups? The linguistic precision needed to communicate a scientific experience encourages careful use of language. There is an old story about two men on a train. One of them, seeing some naked looking sheep in a field said, “Those sheep have just been sheared”. His companion thought for a moment and then said, “They seem to be – on this side”. Museum visits reinforce and extend pupils’ vocabularies and language development is seen as an important outcome of a visit, particularly for children with learning difficulties or for whom English is a foreign language.

A class studying small creatures put their feelings into Japanese style Haiku poems. The children were surprised to be asked to write a poem of only three lines, until the teacher explained that although it sounded easy, it was really quite difficult as these three lines should only contain seventeen syllables. Beauty in pattern, colour, shape and function can be explored in music, dance and drama, helping children explore their feelings and develop their ability to express themselves.

A group of 9-10 yrs just looking at an owl found out a great deal about it without any prompting by adults or reading display labels. Here are some of their spontaneous comments – “The feathers make the owl look bigger than it really is”. “It hasn’t got a neck”.

"It's got chubby little legs" "Sometimes they look a bit evil to me". "The face looks like a mask". "It's got huge eyes and the eyes are looking forward just like ours". "The owl looks like an inexperienced hairdresser has been at it". "Look how pointed his beak is". "Yes it looks as if it could break a mouse's back". "The bottom of the beak is curved in. There's a sort of dip in it, like a jug". "It hardly looks like feathers here, it's more like fur". "The feathers on his head are very soft, sort of fluffy". "The wings and tail are not fluffy, they are more shiny". "It's all combining colours, browns, blacks and greys, all different shades". These children were using the education service at Portsmouth Museum.

The NC for 11-14 yrs states that they should begin to make personal decisions and judgements based on their scientific knowledge. Scientific activities should allow pupils to relate environmental factors to human well-being and study the effects of supply and demand and human activity on the exploitation of raw materials including air and water. Museums can help youngsters understand the nature of global interdependence enabling pupils of this age to "think globally and act locally" with a sense of environmental responsibility.

Lastly, the NC for 15-16 yrs states that they should begin to consider the effect of technological developments on individuals, communities and environments. They should consider the impact of human activities on ecosystems and be aware of the exploitation of resources. Currently 85% of pupils are following a double award science course. The single award is designed for pupils who may need for a variety of reasons to spend more time on other subjects. Some schools do three separate science subjects and figure one shows the subject content that is common to many of the Biology syllabuses for the General Certificate of Secondary Education (GCSE).

What can Museums do to help?

In a study John Yorath did on 'Education Provision in Surrey Museums' in 1992 he found that out of fourteen museums only three had part time museum education officers and a few made use of teachers who were temporary, seconded or part time. The majority of school visits were conducted by curators, who clearly enjoyed their contact with children but nevertheless face the dilemma that education work is time consuming and they have several curators who were deliberately not marketing their services fully for fear that they could not cope with the anticipated demand. Whether or not to encourage schools to visit will also depend on what is on offer and far the students have to travel. Visits by pupils in key stages 3-4 will generally have to fit into a two period, eighty minute slot, which may include travel time.

Time spent on teachers' workshops and initial and inservice courses for teachers is time well spent. Similarly time spent in the preparation of simple guides to relate displays to the National Curriculum could save much repetition. Teachers' notes, packs, activity sheets, guides, catalogues, postcards, posters, slide sets, videos, software and laser disks about the museum's collections will help teachers and lecturers prepare their students for museum visits and reinforce learning after the visits.

Curators can often suggest habitats suitable for fieldwork at different ability levels and suggest contacts with organisations and individuals who could help schools extend their studies. Such resources and expertise are valuable not only to schools and colleges but also to individual learners. I shall now touch on some of our leisure time courses that have a Natural History basis.

Leisure Learning

The children's Art and Craft Workshop is open morning and afternoon every Saturday and six days a week in school holidays. This has been going since 1949 and we welcome the first twenty children through the door for each free session. The theme for Easter holidays is 'Desert Designs' which will be interpreted using model making, painting, textiles, pottery and collage. This year's competition theme is 'Small World' and it is heartening to see in the children's work their concern for the 'fragile Earth'. Botanical illustration is an adult course, an intensive week-long course, run

twice a year, always with a waiting list. Botanical spirals were causing them trouble, so by special request we ran a Saturday course with a mathematical tutor, protractors and graph paper. Shells too offer potential for mathematical fun. We are trying to offer windows to different models of learning.

Once a month there are Horticultural Demonstrations in the Gardens and the Horniman Flower Club meets once a month in the Conservatory. More formal courses include 'Garden Design' which we have run for the past two years with the Open College of the Arts. 'The Flower Garden' is a course started at the museum last September in conjunction with Goldsmiths' College. This is one module towards the City and Guilds 'Gardening Scheme'. In the summer we shall have 'Practical Gardening' and move on to 'Trees and Shrubs' in September 94. For many years we have run the Certificate course in 'Ecology and Conservation' in conjunction with the extra-mural department of Birkbeck College.

These examples underline once more that we have many publics. Volunteers help us with ecological management tasks on our disused railway line the last Sunday in every month. There are large groups who watch the horticultural demonstrations and come to talks on Wildlife Gardening or join in Bat Walks. There are those people who seek qualifications or have a more intense interest in the horticultural, ecological or conservation scene. Some want to upgrade their skills as botanical or animal illustrators or flower arrangers and others want to work in family groups making flying creature kites or pop-up cards using the Aquarium as inspiration. All are learning and using the natural history resources of the Museum and Gardens.

The museum networks with many agencies, including Colleges, University Departments, London Wildlife Trust, London Bat Group and many more. We could not do all that we currently manage without their cooperation and we piggy-back on their publicity.

Working together

Education staff in museums are unlikely to have the curatorial expertise of their Natural History colleagues. I am sure that I speak for GEM members in saying that we are most grateful for the instruction on the collections and guidance that Natural History staff can give us. The skills that museum educators offer their colleagues are in concept formulation and the sequencing of learning. They are familiar with language levels for target groups and have knowledge of the needs and expectations of such groups.

I have touched on learning theory, a *souçon* of National Curriculum, leisure learning activities, and the importance of networking. I shall add one *caveat* for 1995. Do not plan any major museum activities between 5-22 May. All the 11 and 14 year olds in the country are going to be tied up with assessments.

Dates to avoid in planning for 1995

May 5-12 National tests in English, maths and science for KS3

May 15-22 National tests in English, maths and science for KS2

In conclusion, the key message I give you today is that natural history curators and museum educators must work together and support each other. Both are in short supply in museums - endangered species almost. Together we have the potential to lay the foundations for an informed community, where individuals will actively participate in the protection of the environment and the careful use of natural resources.

Keynote Talk: CURATORS AND THE CONSERVATION ETHIC

Peter Davis, Museum Studies, Dept of Archaeology, University of Newcastle, NE1 7RU

The challenge.

There is a tiger in the Hong Kong Museum of History. Beautifully mounted, it stares out from a plastic jungle at passing museum visitors, reminding them that the sprawling concrete and neon of the ultimate urban environment was once an area of incredible natural beauty, a true wilderness. There is still beauty in Hong Kong, but of a different kind, the surrounding mountains and