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CALCULATING THE REAL VALUE OF SYSTEMATIC BIOLOGY COLLECTIONS

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It is often suggested that systematic biology is a "cheap" science in comparison with astronomy or particle physics, both of which require enormous capital investment. In systematic biology the experimental instrument is the collection. The UK's systematic biology collections have been assembled through centuries of effort and their real value is rarely appreciated. Not only do they contain the specimens brought back from expeditions that were, in their time, as complex as the Apollo moon missions but they have subsequently required a huge investment in curation and research.

The enormous scientific and cultural value of these collections have been emphasised by many contributors to this symposium. We will attempt to illustrate the real value of a major systematic biology collection by considering the example of the Natural History Museum in London.

THE FINANCIAL VALUE OF CULTURAL AND HERITAGE COLLECTIONS

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While the cultural and scientific values of museum and like collections are widely appreciated, the propriety of assigning monetary values to collection items for financial reporting purposes merits critical examination. That is the object of this paper.

Some government and accounting policy makers in the English-speaking world have found the notion of valuing museum and other cultural and heritage collections for financial reporting purposes to be appealing. However, our study provides evidence that the capitalization of collections as assets is not mandated in the USA, UK, Canada and Europe; and that collections are not commonly recognised as assets in the financial statements of major arts institutions. Nevertheless, accounting standard setting bodies in Australia and New Zealand now require capitalization of cultural and heritage collections and H.M. Treasury in the UK has recently foreshadowed a similar requirement.

We argue that museum and other cultural and heritage collections cannot properly be described as financial assets. Upon examination of the nature of the repositories of such collections, and the statutes that govern the operations of public arts institutions in Victoria, Australia, we demonstrate that those collections do not satisfy the criteria for recognition as an asset as specified by the standard setting bodies.

To represent the cultural and scientific values of museum and like collections in financial terms for inclusion in balance sheets would be an "intellectual vulgarism" (Adam, 1937, p.2) and an accounting fiction.

THE ETHICS OF DISPOSAL

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[Abstract awaited]

THE FUNDAMENTAL RELATIONSHIP BETWEEN BIOLOGICAL COLLECTIONS AND SCIENTIFIC KNOWLEDGE

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Biological collections are repositories of information on the natural world, yet the relevance of this stored information to science and society is widely disregarded. This paper explores the relationships between biological collections and the scientific knowledge of the biosphere where specimens originate. Collections constitute historical references: their specimens are irreplaceable and cannot be valued in economic terms. The accuracy of existing biological knowledge ultimately depends on scientific specimens - maintaining its integrity requires the preservation of these collections. Taxonomy and systematics interpret the identities and origins of specimens, supplying and organising accountable information essential for all biological sciences. Specimens are the foci in this process. They underpin any biological investigation seeking to interpret complexities of the natural world and generate reliable knowledge. If specimens are preserved for future interpretation, scientific findings can be independently verified and results of studies compared. This central dependence of biology on collections is insufficiently appreciated within the scientific community. Solutions to the problems facing humanity and the environment requires scientific knowledge of a complex natural world: our existing knowledge is seriously inadequate. The fundamental relationship between collections and this knowledge, and thus their value, underpins their future management, utilisation and expansion.

THE SCIENTIFIC VALUE OF COLLECTIONS

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Nature conservation is one of many science-based applications of biological knowledge. English Nature (EN) is the statutory body responsible for wildlife and natural features, and adviser to government for nature conservation in England. With the Countryside Council for Wales (CCW) and Scottish Natural Heritage (SNH), EN shares wider national and international responsibilities administered through the Joint Nature Conservation Committee (JNCC).

The global action plan Agenda 21 adopted by the United Nations Conference on the Environment and Development (UNCED) at Rio de Janeiro in 1992, together with Convention on Biological Diversity, call for participating countries to establish national strategies to inventory and understand their own biodiversity and develop programmes

to conserve it for the future. The UK response was published in January, 1994.

In support of the task to define ecosystems, designate sites and categorise rare or endangered species in need of conservation, staff of English Nature (and of any other national conservation organisation) depend on systematic knowledge and reliable identifications.

A worldwide trade has placed severe pressures on some natural populations. Effective monitoring and enforcement of laws preventing illegal trade, for which EN is responsible through JNCC, depend on accurate identifications of species, many of which often look very similar.

In 1990-91, a study of systematic biology research was undertaken by the House of Lords Select Committee on Science and Technology, under the chairmanship of Lord Dainton, FRS. In its Report, the Select Committee recognised that properly curated specimens are fundamental to the conduct of accurate and useful systematic biological research and noted that practically every witness stressed the importance of collections. The House of Lords enquiry also emphasised requirements for the reliable identification of organisms in other important contexts. In all this multitude of important uses, properly curated and identified reference collections are indispensable. Paramount among these are collections of preserved material in museums or similar institutions. It is also important to note that relevant collections may also take the form of living organisms maintained in zoos, aquaria, insectaries, aviaries and botanical gardens, or specialised repositories of germplasm, frozen tissue, and type cultures of micro-organisms.

A prior requirement to managing the biosphere intelligently is to discover, describe and inventory its species. Because most species are very small, organisms are often difficult to study and the biological diversity in all parts of the world remains imperfectly known. The many ecosystems in the world certainly contain millions of species, having extraordinarily complex interactions. Nature conservation managers study the dynamics of these interactions, but because of gaps in knowledge about the identity of even some common species and their distributions, basic descriptions of how these ecosystems function are inevitably incomplete. Managers charged with conserving biodiversity in protected areas need to know the identities and geographic distribution of species so that they can design and implement effective strategies.

The collections held in United Kingdom museums are particularly important because of their international scope and, in some cases, their antiquity. In the museums of our universities and local authorities, with independent or private museums, the grand total in this country must exceed 70 million specimens. Worldwide, it has been estimated that natural history collections house over 2 billion specimens. These preserved collections of plants, animals, and other organisms provide the only permanent record of world biota.

Critical among biological specimens are the 'types' - those to which scientific names are permanently linked. These form the basis of biological nomenclature and are essential in ultimately establishing the correct usage of names. The regulatory bodies of taxonomic nomenclature have laid down special rules for the care and safe-keeping of type specimens.

Collections of specimens can provide a record of alterations in biological communities and ecosystems, and thus document responses to environmental stresses over time. These same collections, because they contain the primary scientific evidence for the existence and identification of different species, also provide the most reliable documentation of species extinction. Without documented scientific knowledge of which species exist and where they live, accurate evaluations of ecological change and species extinction are not possible. While the specimens themselves provide this database of geographical distribution, other information attached on labels or in original field collection notes can also be important. Technical innovation in biology in recent years has benefited from the variety of methods of collection and preservation, providing new means to define species and to distinguish between them. DNA recovery and reconstitution is an example of an inordinately valuable character for science, totally unanticipated by the collectors or original curators of the specimens from which it is being obtained.

The apparent decoupling of morphological and molecular evolution deduced by molecular studies on African rift-valley lake fishes is exemplified by the mean level of mtDNA sequence divergence among these species and genera being less than that within a single species of horseshoe crab or within the human species, which itself exhibits low intraspecific mtDNA differentiation compared to many vertebrates, including other fishes.

Over exploitative fisheries have seriously affected the biodiversity of the world's seas and the proper management of fisheries is a vital step in achieving environmental sustainability for the benefit of consumers as much as the wildlife. Proper identification of target species is essential for the management of fisheries.

To safeguard their value, the managers of collections must organise them so that all items are accessible at any time. They should expect constant referral to the resource in their care. The process of curation must also be designed on the premise that the full extent of the scientific value of a specimen was probably not perceived by its collector and may still not necessarily be fully comprehended by the curator. The ideal curation technology should conserve these unknown characters: witness DNA recovery.

Botanists are therefore fortunate that the traditional procedure for preservation was by desiccation. Cryo-preservation offers an ideal, but the simple, dried herbarium specimen, without further treatment, is probably a near substitute. The modern preference for initial fixation and field storage in methanol solution may prove to be less than ideal. Any secondary treatment is probably undesirable although there is obvious temptation to use the chemical insecticides or fungicides that are now available.

The curatorial task, properly pursued, is highly professional, intellectually demanding and of itself inherently rewarding. New computer technologies provide means of handling massive databases that would have overwhelmed sytematists and curators a generation ago. Electronic knowledge bases on a global scale can ensure access for the benefit of all nations.

In effect, systematic collections are the permanent record of our natural heritage, and contain the materials that support the research of many scientific disciplines, including those working to preserve biodiversity and monitor global change. They meet the needs of applied biology, including the health sciences (parasitology, epidemiology, diagnostics), agriculture, resource management and biotechnology. They provide broad support for public and formal education

programs. Through exhibits, they promote public awareness of nature and biodiversity.

Data centres, libraries, and archives associated with systematics collections also provide an essential resource for research in systematic biology. These specialised libraries are not limited to bound books and periodicals but may also include card indices, catalogues, manuscripts, illustrations and photographs, microfiche records, cartographic information, bibliographic files and different forms of electronic media. The enormous proliferation of scientific information over the past few years can only be met by significant expansion of infrastructure, along with major advances in the storage, retrieval and utilisation of systematic databases.

Ms Nicola Donlon see *Professor Stephen Blackmore.*

COLLECTIONS ASSESSMENTS AND LONG RANGE PLANNING.

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[Abstract awaited]

ACCOUNTING FOR MUSEUM COLLECTIONS

Martin Evans, Head of the Technical and Research Division at the Chartered Institute of Public Finance and Accountancy, 3 Roberts Street, London WC2N 6BH.

This session will consider how accountants will record and value museum collections for inclusion in an organisation's published accounts. From 1 April 1994, local authorities in Great Britain have been required to account for the fixed assets, which include museums and their collections, on a new basis, which brings their accounting practice more into line with that in the private sector. The new system of accounting for fixed assets will require local authorities to compile asset registers and to record all material assets in their balance sheets at cost or current value. In July 1994, the Government published a Green Paper 'Better Accounting for the Taxpayers Money' which will require national collections to be accounted for on a similar ('resource accounting') basis. The session will outline the new accounting requirements, their practical implications for museums, and the guidance available.

Gerald R Fitzgerald see *Peter G Whiting.*

VALUATIONS - A PROFESSIONALS' VIEW

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Introduction including the essential and important differences between a valuation which is a matter of opinion and a price, which is a matter of fact.

The various reasons for which instructions may be given to value an object, including insurance, whether on the world open market or locally, probate, family division, sale, other tax purposes, rent.

The factors which influence a valuation including age, rarity, condition, fashion and sub-divisions of the above, all of which are the subconscious factors that the experienced valuer considers before giving an opinion.

Comparative pricing information such as auction records, reference books and retail prices.

Outside factors above and beyond an individual purchaser or valuers control including political embargo, international exchange rates and internal Bank rates.

DEFINING AND DISPOSING OF SPARE COLLECTIONS - AN UNRESOLVED PROBLEM.

Max Hebditch, Director, Museum of London, London Wall, London EC2

Museum collecting can be characterised as "front end", representative objects selected to meet the needs of an educated visiting public; or "scientific", comprehensive sets of objects and data meeting the needs of a discipline. Art galleries, cultural history museums and technology museums are examples of the former. Natural science, archaeology and anthropology museums reflect the latter approach.

The Museum of London, dealing with the history and present state of a great metropolis, follows both approaches to collecting, particularly in relation to the archaeology of early London. Tension between the two raises a range of problems: sampling strategy, priority in the allocation of financial resources, relative scientific importance, cost of the collecting processes, definition and disposal of unwanted material.

This experience suggests that while a financial valuation of the "assets" might be an interesting exercise, it is unlikely to assist the solution of the problems, which require professional judgment and confidence.

SCIENTIFIC AND DIDACTIC VALUATION OF MOVABLE MONUMENTS OF INANIMATE NATURE IN MUSEUM'S GEOLOGICAL COLLECTIONS

Prof Krzysztof Jakubowski, Museum of the Earth, Polish Academy of Sciences, Muzeum Ziemi PAN, 00-488 Warsaw, Al.Na Skarpie 20/26, Poland.

Geological collections in museums play an especially important role for the protection of natural heritage. A considerable part of these collections is gathered because of the necessity to protect valuable finds of unique minerals, rocks, and fossils from classical sites. The fact of their inclusion in museum collections often creates the only chance for the preservation of these invaluable specimens. Many times we are forced by circumstances to transfer a monument from its site of occurrence for fear of inevitable destruction. In Polish museological traditions these kinds of museum objects are defined as so-called "mobile monuments of inanimate nature", different from "immobile monuments of inanimate nature" protected in the natural environment . Both are the subject of direct interest, which is reflected in the research and popularization carried out by natural history