

In defence of taxonomy

In *Nature* of 16 August (Vol. 346, 602; 1990), H. T. Clifford, R. W. Rogers and M. E. Dettmann argued that taxonomists might usefully dispense with the existing massive herbarium collections. We have received many letters criticizing this view. Here we publish those received first; the remainder make many of the points below.

SIR—Clifford, Rogers and Dettmann have exaggerated the problems faced by taxonomic institutes and have misunderstood the role of herbaria. They suggest a solution that displays ignorance and a surprising lack of understanding in professional biologists.

The worry is that their solution may appeal to the uninitiated, and could be taken up by busy administrators and politicians seeking quick remedies to immediate ills. As representatives of the systematic botany community in Australia, we would like to stress that systematics is not merely an exercise in stamp collecting or a naming service for other branches of biology.

Briefly, Clifford *et al.* state that herbaria are becoming choked by ever-increasing numbers of specimens, most of which, in their opinion, have so little value that we would be better off without them; they should, the authors say, be pulped. The principle can be applied to all taxonomic collections. With touching optimism, they go on to suggest that funds and staff-time so saved would be diverted to "taxonomic research proper".

No part of Australia's flora is well known *in toto*, but we probably all know of individual species that are so well-represented that some specimens could be pruned without loss. But even if a specialist were to prune, the saving in curatorial load would be negligible. All the institutes we represent already practise some pruning and quality control of incoming material; some reserve sterile material apart until after publication of results, and disposal seems appropriate. But no case at all can be made for ditching the bulk of the collections.

The lack of understanding of the difference between written records and specimens shown by Clifford *et al.* is little short of stupefying. A description makes accessible a selection, a subset, of the total information that a specimen yields. There is no such thing as a complete description; there will be as many descriptions as there are disciplines studying that specimen, and many of them will not overlap. Yesterday we would have had descriptions of gross morphology, anatomy and palynology. Today, we have electron microscopy and biochemistry in many new and revealing facets. Tomorrow, who knows? No specimens, no information.

Today, systematic biology is being rejuvenated by new and more disciplined ways of thinking; the computer provides

powerful new tools and the predictive power of the resulting classifications — the central aim of the systematist — improved. Without specimens, variation cannot be assessed. The amassed collections of ourselves and our forebears now have new potential in the urgent task of discovering, describing, naming and above all understanding the relationships and biology of the riot of life around us while it lasts. It is time to build on the resources of our collections, not to discard them untapped.

Finally, the authors confuse herbaria (the collection of dried plant specimens) with Herbaria (the institutes that care for and use them). The value and usefulness of herbaria are judged by the number of specimens, the geographical areas covered, the groups represented, the state of their curation and the proportion of 'classical' material mentioned in the literature, including types. But Herbaria are indeed judged in part by the quality of their research, in part by their attitude and accessibility to visiting researchers. The quality of the research is a much more complex mix of factors than Clifford *et al.* allow — published floras, monographs and papers in the scientific literature are the most obvious, but accuracy in the identification of collections derives in large part from long familiarity with the collections. In turn, these identifications are the key to the literature and are thus of crucial importance to all those other disciplines that rely on taxonomists' insight and experience.

It is to be hoped that those concerned with support and management of our biological collections are not misled by the simplistic, short-sighted and ill-conceived ideas put forward by Clifford *et al.* Comprehensive, well-curated collections are essential for the production of high-quality systematic research sought by these authors.

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SIR—Clifford *et al.* raise some interesting points concerning housing collections in the natural sciences. But I will not be jettisoning any part of our herbarium.

First, plants, unlike chemical compounds, are much more complex subjects

where any current description interprets only x out of n characteristics. Experience shows that the next investigator will want to see all the available material, not just an historical account.

Second, we keep well-documented specimens, as well as type(s), because the originally described material may not adequately show the range of variation in species (super-orders are too coarse a taxonomic category) and may not reflect the changing distribution of species.

Finally, reference material is needed to identify enquiries and for educational purposes, and specimens are both historically interesting and aesthetically pleasing.

At a time when many institutions in the public sector are under pressure to provide short-term solutions to cash problems, it is tempting to cast doubt on long-term scientific objectives and commitments to material culture. But with most of the world's species still to be documented, this is no time to weaken our resolve. Rather, natural scientists should focus their skills and what resources they have left in overcoming the mid-term blues. They could start with a look at collecting policies and regional needs.

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SIR—The taxonomic Brave New World outlined by Clifford *et al.* is strange indeed: natural history collections, they say, are not needed because chemists do not store the compounds they synthesize; taxonomy should be based on descriptions and type specimens and should have a rational economic basis.

But one cannot synthesize individuals as a chemist synthesizes compounds. A chemical compound and a herbarium sheet are not comparable entities, as philosophers of science have long acknowledged. To say they differ in degree, not nature, simply will not do.

Descriptions alone, even when accompanied by type specimens, are no basis for the comparative biology of the future. For one thing, descriptions are often poor representations of what is described — and, in this area, taxonomists need to progress. And taxonomists make mistakes.

By way of illustration, species limits now need extensive change in a phylogenetically critical group related to the mangosteen (*Garcinia mangostana*), found from the Philippines to New Caledonia. I know this only because I have access to collections assembled at great cost over 250 years; the descriptions of the species, even recent descriptions, are of little help, but the specimens, and some new characters, are.

Knowledge of plants in the field is important, but well-maintained herbarium collections contain a mine of information. Future monographers are