

The Editorial in the June 2013 issue of *IMA Fungus*, "Mycospeak and Biobabble", not unexpectedly evoked a range of reactions. Two letters received are presented here in order to broaden the debate

## Of babies and bathwater?



I agree that there are many unnecessary anatomical terms to describe the non-reproductive and reproductive stages of fungi. For example, to understand *moniliform* one would need to know what *Monilia* was like, but *verrucose* and *reniform* are self-explanatory. Furthermore, I would be loath to get rid of convenient short-hand when it comes to description of

ecological preference of an organism (such as *saxicolous*, *coprophilous*, and *lignicolous*). As I see it, the only alternative would be to say *stone-dwelling*, *dung-dwelling*, or *wood-dwelling*. Are modern mycologists so lacking in education that they cannot cope with a few terms rooted in Latin or Greek? I cannot believe that to be the case. These terms abound in the literature, old and new, and we cannot avoid them.

There are certainly some words that could easily be substituted, such as *asexual/sexual* for *anamorph/teleomorph*. But *mycobiont/phylobiont/phytobiont* are useful short-hand although, I suppose, we should add *bacteriobiont* for completeness and accuracy. Much terminology has been inherited from the 18th century onwards, but I do not think it should be jettisoned without considerable thought. However, I do applaud the suggestion that the term

*fruiting body* should be expunged from the mycological lexicon because, as stated, it is essentially borrowed from botany. *Fruiting body* and *sporocarp* should be substituted, without fail, by *sporophore*. But we should also ditch *ascocarp* and *basidiocarp*, because these too are based on botanical terms, and stick with *ascoma* and *basidioma*.

I am all in favour of terminological clarity, but we also need succinctness and accuracy, so don't let us throw the baby out with the bathwater please. I do think it is about time there was a spring cleaning exercise in biological terminology as a whole, but the English form is not always the best. We need clear and precise words for description, and then all should be prepared to learn them.

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## In defence of the terms holomorph, teleomorph, and anamorph

In his editorial in the previous issue of *IMA Fungus*, Hawksworth (2013) made a plea for the simplification of mycological terminology, channelling his countryman James Lovelock's derisive term biobabble, and adding his own slightly less condescending term mycospeak. In the process of introducing these new terms to mycologists, Hawksworth questioned the value of the widely-used terms holomorph, teleomorph, and anamorph. They are not understood by other biologists, he felt, and their usefulness is now past, in part because of the switch to single name nomenclature in fungi. Although the morph terms are still used in the Melbourne *Code*, it could be that if he is an editor of the 2017 *Code* he would propose they were removed from that. This would be premature.

I have listened to Hawksworth's attacks on terminology since the First International *Penicillium* and *Aspergillus* Workshop in Baarn, The Netherlands, in 1985, where he led an assault by the British delegation on the specialist terminology applied then, and still applied today by most workers in

those groups, in morphological descriptions of these important moulds (Minter *et al.* 1985). You can read the transcribed reactions to these ideas in the published discussion following that paper, for example, "Are we going to have 'supporting cell' in Swahili?" When writing about biology (but perhaps not nomenclature), I concede that Hawksworth tends to follow his own advice and avoid jargon even when deeply imbedded in his own field of lichenology.

My intellectual childhood occurred in the laboratory of Bryce Kendrick, during the years when the 'morph' terminology was first proposed (Hennebert & Weresub 1977, Weresub & Hennebert 1979), the second Kananaskis conference was conceived, organized and held, and the proceedings that eventually became *The Whole Fungus* (Kendrick 1979) were published. I was immersed and indoctrinated in the wisdom of these terms, with all their nuances, especially their intended separation from karyology. The morph terms were widely applauded and rapidly adopted in mycology, a rare achievement for a set of



terms. The concept of the holomorph and the separation of these anatomical terms from developmental, functional and genetic processes, brought intellectual clarity to themes and variations among fungal life-cycles. Students and professors could discuss without ambiguity situations where either teleomorphs or anamorphs were unknown in a particular life-cycle. It was this clarity, in my opinion, that initiated considerations of an integrated taxonomic system, which over the course of 30 years led us to

abandon dual nomenclature. Just because dual nomenclature is now behind us, does not mean that the terms that led us to this clarity are no longer useful.

That was not the first attack on these terms. During and following the “Holomorph Conference” in Newport, south of Portland, Oregon in 1992 (Reynolds & Taylor 1993), there was an influential attempt to replace anamorph by mitosporic state, teleomorph by meiosporic state, and conidium and all of its derivative terms with mitospore. This move was initiated by Sutton (1993) at that conference where he suggested that the mito- and meio- prefixes would be more accessible to other biologists. These terms were adopted by him for the entries for conidial fungi he prepared for the 8<sup>th</sup> edition of *Ainsworth & Bisby's Dictionary of the Fungi* (Hawksworth *et al.* 1995), and even wriggled into the *St Louis Code* of 2000. However, they failed to supplant the ana-teleo-holo- terminology in common usage. Why? Because the terms were not actually synonymous; the *mito-* and *meio-* prefixes introduced karyological dimensions to terms that were specifically defined as anatomical.

Many attempts at simplifying terminology are rationalized with the idea of making students' lives easier, an argument that was also advanced against dual nomenclature. Is there empirical data demonstrating that serious students are significantly discouraged by excessive jargon? In my experience, admittedly less extensive than many colleagues, some are actually stimulated by terminology. It is true that modern students lack classical training in Greek and Latin, a shortcoming that might make many scientific terms seem like jargon. But I remember one particularly hallucinatory evening in my undergraduate years when all the Latin binomials careening around in my tired brain suddenly became distinct, pronounceable, and began to accumulate meaning. We all learn that to understand the depths and subtleties of an academic discipline, we need to absorb the vocabulary. Those who denigrate certain terms as jargon are often quite blind when using the esoteric but essential lexicon of their own disciplines. Language, including scientific language, has an aspect of Darwinian selection to it; if the words are useful, they will be used. If they are really useful, they will spread into other fields. Perhaps our morph terms would be useful for entomologists, phycologists, protistologists, and botanists dealing

with pleiomorphy. Otherwise, perhaps mycology will have to adopt ‘instar’ from entomology as a replacement for synanamorph. At the least, we need to hold on to the morph terms for discussing our 100 year legacy of dual nomenclature; thus they need to remain in the *Code*.

Admittedly, as an author who has written many, many paragraphs about hyphomycetes, I use these terms more often than many mycologists. For the past several months, I have tried to avoid using ‘morph’ terms and started using asexual and sexual state or form or morph instead. I find that subtleties of meaning become obscured, that sentences become unnecessarily complex, often because I have to find other phrases to describe what is accurately and concisely encapsulated by the existing morph terms. If we must write awkward constructions that mix together anatomical and karyological concepts, like ‘syn-asexual’ state or ‘asexual genus’, we are still going to have to explain ourselves to the uninitiated.

Abandoning these terms makes our writing more wordy and less precise, hardly an admirable result. All who care about the craft of writing realize the importance of the economy of words. I have great sympathy for colleagues who must cope with reading and writing English when their minds operate fluently in another language. I'm a fan of C. K. Ogden's Basic English, a 500 word vocabulary intended to allow ready communication of any idea, and which was actually used in the first edition of *A Dictionary of the Fungi* (Ainsworth & Bisby 1943; Ainsworth 1983). If you search the Internet, you will find word lists intended as supplements for Ogden's for specific fields, such as biology and some of its subdisciplines. You will not find one for mycology amongst them. If anyone was to propose one, there would easily be room for the three terms holomorph, teleomorph, and anamorph.

Have the morph terms really outlived their usefulness? Are they adequately replaced with the proposed substitutes? I'd say no. The decision of what words to use is the prerogative of an author, and word choice should not be censored as a matter of editorial policy<sup>1</sup>. I hope that mycologists will continue to use and propose terms that allow them to be precise, concise, and understood.

I am grateful to Bryce Kendrick and Lorelei Norvell for their comments on an earlier draft of this letter.

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<sup>1</sup>Journals develop and adopt their own styles and editorial practices in order to facilitate consistency in readability and presentation between the included papers. When I first became the senior editor of a scientific journal (*The Lichenologist*) in 1978, I remember being warned by the editor of a recent multi-authored book that now I would never have any friends! Today, thankfully, authors have much greater freedom to select the journals to which they submit their papers. My striving to encourage avoidance of unnecessary jargon stems from experience in: (1) teaching students not majoring in mycology in universities; (2) teaching citizen scientists with little organismal biology background on field courses; (3) preparing expert reports in civil and criminal legal cases which have to be understood by barristers, jurors, police, etc; and (4) involvement in interdisciplinary initiatives with bacteriologists, botanists, and especially zoologists. [Ed.]