



## Comment on “Taxonomy and the DNA Barcoding Enterprise” by Ebach (2011)

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Since Linnæus (1735) proposed a now globally adopted classification scheme, taxonomists have benefited greatly from the ‘Linnæan Binomial Enterprise’. Ebach’s (2011) concerns, particularly that taxonomy “is slowly dying off”, were around well before DNA barcoding began. Here we discuss the integrative potential of DNA barcoding with morphology, which contrary to Ebach’s comments, has proved a useful addition to the taxonomists tool-kit; such molecular applications to taxonomy are not new and have been widely used by taxonomists for over 30 years (e.g., Kitchener *et al.* 1984).

We argue that taxonomy, like the vast majority of disciplines, must continue to develop in response to changing technologies. Taxonomy is not the static science as Ebach portrays. Scanning Electron Microscopy (S.E.M.) is a good example of a valuable tool that has assisted taxonomists since it became commercially available around 1965; and now the use of environmental S.E.M., confocal microscopy and mini-CT scanners are proving useful as taxonomic tools (e.g., <http://digimorph.org/>). DNA barcoding enters this category. It has the added advantage that its application crosses many facets of science and we agree with Ebach that the benefits of DNA barcoding in biosecurity, food sciences and forensics are certainly a clear highlight (see also Mitchell 2011).

Ebach rightly points out that the “...payoff for the taxonomist is funding and elevated importance in their home institution” (p.67), but several of his subsequent statements are confusing. For example, Ebach fears that “*The proposed solution...is to re-vamp taxonomy as a service industry to provide ready identification and classifications for non-taxonomists.*” (p.67) and thus “...liberate other fields, such as ecology, to practice species identification without any taxonomic training” (p.67). Are these not already practices that have been undertaken by taxonomists since the Linnæan classification scheme was widely adopted? Most biological disciplines currently rely on taxonomy to formalise the model organisms they study. In fact, taxonomy, through binomial naming, is the basal hypothesis that one deals with entities with homologous properties among individuals. So why is this an issue? Type material lodged in museums is, we assume, for others to identify and compare specimens with in the future. Other scientific fields have benefited from taxonomic expertise since museums and other institutions became the repositories of our publicly available natural antiquity.

Before DNA barcoding, taxonomists were no less involved than today in routine identification for other fields of study, rather taxonomists pursue their own goals (from description of new species to phylogenies). Often the identifications of specimens not done by specialists were error prone and/or did not reach the species level. It is not entirely clear why Ebach assumes that “*most readers of Zootaxa would be cringing...*” (p.67) if non-taxonomists practice species identifications using taxonomic tools, namely published descriptions and keys provided by taxonomists for identification purposes (one of the goals of taxonomy); such practices have been around as long as taxonomy itself and are constantly being updated as new species are described or revised, and they continue to adapt to new technologies (e.g., Cranston 2005; Maddison *et al.* 2007). This view appears to revolve around the phrase “parataxonomists”, which is clearly an issue for Ebach, and refers in this case to a biodiversity study of ants identified to genus in Madagascar (Smith *et al.* 2005). Simply put, this brings a name to assistants to taxonomists in field collection, sorting and identification of taxa using available taxonomic tools (i.e., keys elaborated by taxonomists), a practice that is common-place (see Krell 2004 for a discussion of ‘parataxonomy vs. taxonomy’).

It appears that Ebach has two real issues. The first relates to how taxonomists could use DNA barcoding as a taxonomic character; he suggests that “...nowhere do we find its uses for taxonomy” (p.67). The second issue relates to