

## HAIL HEPHAESTUS, INTERDISCIPLINARY DEITY!

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Late Bronze Age eruption presaged (but did not actually cause, we learn on p. 185) the demise of the mighty Minoan dynasty on Crete. The so-called Minoan eruption was one of many eruptions from Aegean volcanoes that took place under the watchful eye of the Ancient Greek gods, not least Hephaestus, god of fire and son of Zeus.

Perhaps due to economic pressures on the deity of the time, or maybe because of limited numbers of suitable applicants, Greek gods had to multi-task. They needed to cover not just one topic but a whole slew of different fields, from arts to sciences to technology. Hephaestus' heavenly ministry, for example, concerned itself not just with fire but also with metalworking, stone masonry, sculpture and volcanoes themselves. To achieve mastery of his dominions, Hephaestus had to be a polymath, comfortable across a wide range of subjects. Hephaestus (pictured here in his sub-volcanic workshop) might reasonably be considered a multidisciplinary deity.

As modern Earth scientists we are urged frequently to become multidisciplinary in our research. Funding agencies exhort us to “see the big picture”, “think outside the box”, and “challenge the orthodoxy”. This is all well and good, but, as anyone who has ever tried to get all interdisciplinary knows, it's not that easy. The biggest impediment is language ... scientific language. The challenge of learning to express ourselves with confidence in the dialects and idioms of other scientific disciplines all too often holds us back from full integration. And therein lies a metaphor. If we think of different scientific disciplines as different cultures, each replete with a shared set of values and taken-for-granted assumptions about ways of thinking and doing, it is clear how a lack of common language can keep cultures apart. For example, how often has difficulty with a foreign tongue been confused for ignorance? How many modern societies struggle to embrace the diversity of language and culture that ultimately make us wiser and more creative? When people who belong to different cultures try to communicate, these factors become barriers, in science as in society.

My first experience of multidisciplinary science came in the mid 2000s via a large research project to look at rifting in the Afar region of Ethiopia, a spectacular land of volcanoes, faults and searing desert heat. The Afar Rift Consortium brought together petrologists, volcanologists, modellers

and geophysicists from Europe, Africa and North America. At the outset we shared a rudimentary means of scientific communication, ‘geo-pidgin’ if you like, but struggled with the finer points of each other's scientific culture. This lack of common language prevented translational thinking, mostly through a fear of looking foolish by asking innocent or obvious questions. Better stay quiet than to look stupid. I recall early in the project, at the end of a petrological talk on Afar obsidians, apprehension in the voice of one geophysicist as he asked, “What exactly is aenigmatite? What does its occurrence mean?” Likewise, around the same time, I came to my own realisation that ‘receiver function’ was not something I performed at my front door every time the delivery man from DHL came knocking, but a seismological tool of great value when hunting for underground magma or for mapping the Moho. Over the next few years, through a growing mutual trust, borne of spending time together at workshops and in the field, we learned a shared scientific language, allowing us to absorb, tentatively at first, each other's scientific cultures. I don't yet speak fluent Geophysics, but I came away from the project with my understanding of rifting greatly enhanced.

One can argue that multidisciplinary science is just multicultural society in microcosm. To succeed, both require recognition that we speak different languages, yet share a common aspiration, in our case to understand the planet we live on. Unfamiliar words and expressions, like unfamiliar cultural practices, should not become barriers to this shared vision. As the modern world dissolves almost daily into backwards-looking nationalism, retreating behind long-standing cultural divides and hierarchies, it is worth remembering the many parallels between science and the wider world. How often have you wanted to ask a question at a scientific conference, but demurred through fearfulness? How often have you attempted to submit a manuscript to a journal in a different field only to encounter a reviewer who diminishes your efforts because you seem unfamiliar with some arcane jargon or protocol? We like to talk multidisciplinary Earth sciences, but don't necessarily make it easy for new generations to embrace it.

But let's not despair. For a start, we have *Elements*. This is one of the few international journals to open up specialist fields to new audiences through easy-to-read articles by expert authors, so helping us grow our interdisciplinary skills. And we can do our bit too. Next time the seismologist in the audience queries your aenigmatite, avoid the derisory snort and explain that it's a little brown mineral, rich in sodium and titanium, but insignificant in the grand scheme of plate tectonics. The seismologist will leave reassured, enlightened, and perhaps even ready for arfvedsonite. And you'll come away with a warm, interdisciplinary glow, like a modern Hephaestus.

Jon Blundy, Principal Editor

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