Wondrous order

Could the prosaic vernacular of science benefit from a little enthusiasm for nature's beauty?

Matthew Cobb

There is a stark contrast between the vocabulary that appears in scientific articles and that used in laboratories or even lecture theatres. Adjectives, rigorously excised from the prose in journals, are allowed to make an appearance in speech. Emotion, the alleged enemy of all things objective, may even be expressed. Results can be described as elegant, impressive, sometimes even beautiful. What we don't allow ourselves to say in print, we are prepared to express orally.

It wasn't always this way — the straightjacket of scientific prose began to appear at the same time as modern science took shape, roughly the middle of the seventeenth century. Scientific texts from this early modern period reveal the tensions between the anecdotal and the objective, the felt and the observed.

The work of the Dutch anatomist and pioneer microscopist Jan Swammerdam (1637–80) provides a particularly striking example of this tension. Swammerdam's key discovery — that all insects are produced from eggs laid by a female of the same species — was coupled with amazingly precise studies of comparative anatomy and of metamorphosis, and was used to develop a revolutionary taxonomy on the basis of developmental patterns. Opposing all non-materialist explanations of reproduction and development, Swammerdam was a profoundly mystical and religious man. Indeed, for a short period in 1675–76, he fell under the influence of a cult leader and abandoned science for a life of religious contemplation.

The language that Swammerdam used to express his findings in his books, and the personal conclusions he drew from his discoveries, were markedly emotional and religious. His vivid descriptions, which accompanied and enriched his magnificent drawings, were very different from the dull prose that is considered necessary by today's scientists. Swammerdam's descriptions ranged from the poetic: the nerves of a beetle larva, "shooting like sun-beams, ... beautifully and wonderfully distribute themselves through the body of the creature", through the striking: the faeces of the hornet larva "glitter like gold" with insect remains, to the prosaically quaint: the snail eye looks like "a turnip roasted in the fire, until it is very black, and burst".

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Because his published drawings were limited to black and white (both by technical necessity and by choice), Swammerdam had to describe in words the colours of the complex structures he saw under the microscope: dull-white fat globules, yellowish-red larval feet, the transparent blue of a maggot belly, and the silver whiteness of the tracheal system contrasting with the purplish intestines. Sometimes, as in describing insect eggs, he simply gave up: "In some is to be seen a beautiful mixture of several colours, so as it makes it almost impossible to give a particular account of them."

This impression of indescribable awe in the face of nature's beauty is frequently found in Swammerdam's work. Although 2,000 years of aristotelian orthodoxy maintained that insects are devoid of any internal organs, Swammerdam showed that they are just as complex as large mammals. Under the inquiring lens of the microscope, the whole of nature seemed to be imbued with order.

For Swammerdam, the source of this structure could only be divine, and the only appropriate response was rapture. As he put it when summarizing his findings on the anatomy and metamorphosis of butterflies: "How then can we avoid crying out, O God of miracles! How wonderful are all thy works! How beautiful are the ornaments! How well adapted the powers which thou has so profusely bestowed upon thy creatures!"

But although he could not realize it, Swammerdam's awed response was flawed by twin contradictions. First, although he felt that showing the falsity of spontaneous generation was a way of proving the existence of God (in his opinion, chance had no role to play at any level of creation), his consistent materialism in the realm of development actually reduced the scope for divine intervention, limiting the "Supreme Deity" to the role of prime mover and thus allowing science to appropriate all other aspects of the natural world.

Second, the "wondrous order" he observed through the one-millimetre lens of his simple microscope, far from being the product of design, was the result of the very randomness he rejected, albeit filtered through the slow, cumulative action of natural selection. He would have been deeply dismayed to learn that there is neither Creator nor Design, but simply adaptation.

Labour of love: Swammerdam's work reflects his painstaking study and his awe at nature's beauty.

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Awe and wonder, of course, are not synonymous with religion, nor are they abhorred by science. As Richard Feynmann pointed out, our perception of beauty is actually heightened by an understanding of the processes that have produced the Universe as we see it. The fragility of nature and the lack of any ultimate meaning or plan make the world an even more amazing place in which to live than if everything were pre-ordained.

Swammerdam's religious obsessions are light years away from the motivations of most of today's scientists, yet his emotional descriptions touch the modern reader. Swammerdam's writings speak to us not only because they represent the beginnings of much of biology, but because we can sense the human being behind the microscope. Sadly, humans are generally excluded by today's journals, which tend to replace the personal 'I' or 'we' with an awkward passive voice. But science is, after all, about communication — would the objectivity and precision of the modern scientific article really suffer if we were to express just a fragment of our feelings about our work? ■

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