

In defense of pure science: Antonio García-Bellido

FOTIS C. KAFATOS*

EMBL, Heidelberg, Germany

Like others in the field of Developmental Biology, and especially as someone interested in development within the evolutionary perspective, I could have written about Antonio García-Bellido's seminal contributions in this field. But others have already done that, and with better qualifications. I have not worked with Antonio directly, and have got to know him personally mostly in conferences. Therefore, I chose to salute him for an activity which is not widely known: as an indomitable fighter for the value of basic research.

Pure science is a precious cultural activity, an integral legacy of the civilizations of Europe and the Mediterranean basin. Other parts of the world have contributed to the development of science in the past, and certainly today the contributions of other continents, such as North America, loom very large. But, both in the ancient world and in much of the time since the Renaissance, it is largely Europe and the Mediterranean - intersecting worlds to which Antonio belongs - that have built the culture of science. A culture that attempts to understand the reality of our world in rational rather than emotional, artistic or mystical terms. A culture that seeks to discover material mechanisms underlying the phenomena which our senses (or their technological extensions) perceive. A culture which is not satisfied with mere descriptions but is creative, not only building the tools but also constructing the concepts that lead us to a deeper understanding of the world.

As a cultural activity, the conduct of science of course is influenced by the social milieu, and can be muzzled or perverted by prevailing concerns and orthodoxies; eugenics and Lysenkoism are clear examples. Furthermore, scientific understanding is not irrelevant to society, but often influences our thinking in the social sciences and humanities, as is the case with Darwinism. Nevertheless, science is ultimately insulated from subjectivity by its very code. By the insistence that detailed findings must be reproducible, and thus are subject to experimental verification or falsification by others. And by the acknowledgement that our interpretive models are also subject to modification or falsification, when their predictions are compared with new data. Thus, contrary to current attempts to classify it as a subjective activity, science brings a unique objective vision to human civilization. It is not based on politics, revelation or philosophical speculation; it is a celebration of human rationality as it confronts and progressively understands an objective rather than imaginary or socially-constructed world.

In building its tools and concepts, of course, science also opens additional possibilities for humanity: to couple understanding the world to taming and changing it. Science is not only a cultural activity but also the source of technology, and in turn is stimulated by challenges arising in technology. And therein lies a danger: to confuse the essence of science with its utilization towards applied goals. The goals may be important, and scientists

*Address for reprints: European Molecular Biology Laboratory (EMBL), Meyerhofstrasse 1, D-69117 Heidelberg, Germany. FAX: 49/6221-387211. e-mail:Kafatos@EMBL-Heidelberg.de

will and do pursue them avidly, because building reality can be as attractive as understanding it. But in late twentieth century Europe, under the stresses of making our economies world-competitive, science is being starved in favor of technology.

Rather than appreciating the dialectical interaction between science and technology, our decision-makers often act on the basis of linear thinking: "We have done enough science, let us now apply it". In so doing, they undermine one of the most important foundations of our culture. And they also undermine our future competitiveness in whose name they swear. For rapidly developing fields of applications, such as biotechnology and molecular medicine, must be fed continuously by top-quality science. If that is not understood in time, our competitiveness will further decline.

As everyone knows, Antonio is an uncompromising fighter. More than most scientists I know, he is aware of science as culture, and he fights loudly for it. I have been privileged to serve with him on high level committees at the European level, and can report that whenever pure science (all science, not just his own) is neglected, he speaks up. Impolitic sometimes, but always with

genuine passion for our past and concern for our future. He uses his enormous prestige to constantly remind us of what Aristotle wrote 23 centuries ago.

[ὑπολαμβάνομεν] τῶν ἐπιστημῶν δὲ τὴν αὐτῆς ἕνεκεν καὶ τοῦ εἶδέναι χάριν αἰρετὴν οὐδὲσαν μᾶλλον εἶναι σοφίαν ἢ τὴν τῶν ἀποβαινόντων ἕνεκεν. ...ἀναγκαιότεραι μὲν οὖν πᾶσαι ταύτης, ἀμείνων δ' οὐδεμία.

"Of the sciences, that which is desirable on its own account and for the sake of knowing it, is more of the nature of wisdom than that which is desirable on account of its results... All the sciences, indeed, are more necessary than this, but none is better." (Aristotle *Metaphysics* I, 982, Oxford translation).

Thank you, Antonio!

Acknowledgment

I thank Eduardo Boncinelli for reminding me of the Aristotelian passage.