Centro Universitario Europeo per i Beni Culturali

Ravello

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Ravello


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# Archaeometry of ceramics as a scientific-humanistic discipline: in pursuit of the Ravello spirit. Part II

*To J.-P. Morel*

**Introduction**

In a first part of this contribution - in *Territori della Cultura* n° 8 - I provided a short summary of the methodological framework that we have followed in the study of ancient ceramics from an archaeometric point of view (Cau 2012). In this second part I would like to introduce a few elements for discussion regarding archaeology, archaeological sciences in general and the archaeometry of ceramics in particular and their role in the 21st century, towards the Society of Knowledge and the construction of both a European Research Area and a European Space of Higher Education. The aspects that I would like briefly to address here are: problems of understanding between disciplines, education, career stabilisation and evaluation and publication issues.

The reason for such a narrow scope is that it is difficult to analyse in full detail the problems and challenges faced by archaeometry in general and of ceramics in particular. Other works have done that before (see for instance Maggeti 2006, Mannoni 1987, Jones 2004, Olcese 1993, Picon 1993, Widemann 1982) and the debate has been kept alive over decades. I appreciate the illustrative and positive visions provided by Pollard and Bray (2007), showing how initiatives treating 'science' and archaeology on an equal footing have achieved excellent results; or by Killick and Golbert (2009: 6) who consider that 'the major development in world archaeology over the past decade has in fact been the astounding expansion of archaeological science'. Indeed the application of 'scientific methods to cultural heritage', paraphrasing the excellent book of Artioli (2010), have evolved enormously. I am also positive overall, but I believe that some of the old problems and situations described years ago are still too familiar in the current practice of archaeometry (Capelli 2011), at least in many southern European countries and many other Mediterranean states.

Although this might be weird as an introduction, I would kindly ask the reader to forgive me for several reasons. First because my vision is probably biased first due to my background in archaeology, particularly in Roman and Late Antique Archaeology in the Mediterranean, and in archaeological sciences, in particular in the archaeometric characterisation of ancient ceramics. Second, because the approach may be biased also due to my Mediterranean origin. In spite of my good old times in Sheffield where I was closer to a northern European reality, I was born and

raised in a Mediterranean island and I studied and work in a city washed by its waters. Third, because I have chosen to address these issues using a clear and direct language and not being too academic and leaving bibliographic references to a minimum. I am fully aware that the text can be rather disorganised, passing from a more general vision of archaeological science into a more detailed comment on archaeometry of ceramics and falling into pure archaeological considerations. Archaeological science and archaeometry are used as synonyms, as archaeological scientist and archaeometrists are. I use 'science' as referring to 'natural sciences' but it is simply for operative reasons and not to deny that archaeology is also a science.
The last part of this short contribution gives some ideas, not fully developed, concerning particular initiatives that could be undertaken (we are in fact working on some of them) in order further to strengthen a framework of real international collaborative work in archaeology/archaeometry of ceramics.

**A few problems and challenges**

***Problems of understanding***
Despite the advances and the positive visions of archaeological science there are still **problems with the understanding of how archaeometry works**, its theoretical foundations and assumptions, the potential and limitations of the techniques and the general methodological approach that we apply. And this is what still causes a lack of understanding between archaeologists and archaeometrists. There are also terminological problems and, in pottery studies for instance, concepts such as 'source' that may have a multidimensional meaning (see for instance, Arnold *et al*., 1991: 70-71) are often cause of conflict. There is no one to blame but ourselves, probably due to serious deficiencies in teaching and also because we, as archaeometrists, may not have explained things explicitly and fluently enough to be fully understood. How can a student finish an archaeology degree with any or very limited notions of archaeological sciences? Well, that is still not rare in many universities of different Mediterranean countries.
Inter- and multidisciplinary work have increased in the last decades and it is obvious that we have achieved a high level in 'archaeological sciences' that are now a discipline on its own. There is though a real danger of converting archaeometry into an 'ivory tower' (often used to describe universities). I particu-

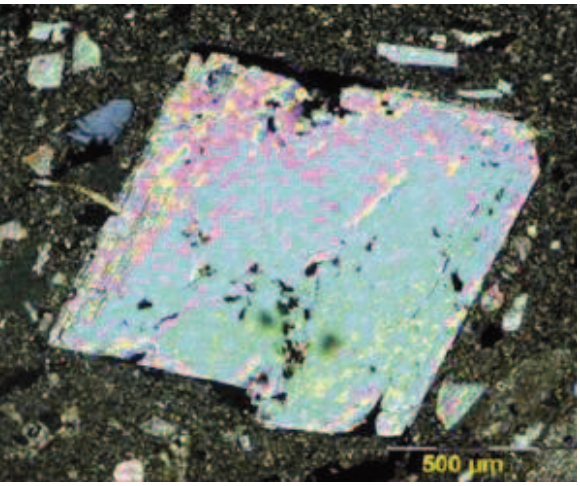


*Fig.1 Calcite crystal used as temper in a ceramic observed in thin-section analysis under the petrographic microscope (in crossed nicols).*

larly disagree with this expression applied to these institutions, and academia in general, as they are absolutely integrated in society and occupied with teaching and research duties and also with what has been called the 'third mission'. I use the expression only because it may help to understand what it has also been a criticism regarding archaeometry from an archaeological point of view. I am not sure whether these critics have a real basis or not, but the fact that archaeometry may still be perceived as such an 'ivory tower', at least by a part of the archaeologists, is certainly worrying. The problem is not simply a matter of understanding due to language or jargon: it is also that some archaeologists do not always see the benefits for 'their archaeology' of many archaeometric studies. These critics have some real basis for their criticism. There are several reasons why this may have happened but in my opinion two are essential. First, because too often there are archaeometric studies that do not really solve archaeological questions. Second, because archaeologists may have 'great expectations' from archaeological sciences, maybe because they are not fully aware of the limitations of the methods, and then results can sometimes be disappointing.

Regarding the first situation, those who regularly attend the *International Symposium of Archaeometry* (ISA) conferences would not be surprised if I say that at some point (not so distant) in the history of the meeting the trend was towards an archaeometry that was increasingly distant from archaeology. The situation was such that it was commented on by some colleagues (coming from both archaeological and natural sciences backgrounds) who attend the ISA conference on a regular basis. The general perception was that the studies that really solved archaeological problems were noticeably decreasing. Quite rightly, for the ISA held in Siena in 2008, the organizing committee wrote:

'*The aim of the Symposium is to promote the development and use of scientific techniques* ***in order to extract archaeological and historical information*** *from the cultural heritage and the paleoenvironment. It involves all Natural Sciences and all types of objects and materials related with human activity.*' (The emphasis is mine).

I would have probably expressed the idea in a different way, but what is important to stress is that the aim is to use scientific techniques (I understand methods and techniques from all natural sciences) to extract archaeological and historical information (I understand to solve archaeological and historical problems). There is no doubt that this statement was a correct at-

tempt to redirect a flow of applications without archaeological/historical results developed progressively over the two previous decades. I do not intend to apportion blame, but to express the view that archaeometry and archaeology have been sometimes, unconceivably, too far from each other.

Regarding the second aspect for which an archaeologist may feel disaffection for archaeological science, a good example is because the results may be somehow disappointing. For instance, they bring a sample to determine the provenance and they get a full chemical, mineralogical and petrographic characterisation but we cannot tell him/her where that pot was made (due to limitations of the method). This situation is probably due to deficiencies in the training of archaeologists in archaeological science, at least up to the level of knowing the potential and limitations of the available methods and techniques. Nothing to blame on the archaeologists themselves, but probably a lot to think about a university system that is still capable of training archaeologists without any knowledge of archaeometry. This can also happen because the 'archaeological scientists' have been incapable to explain what the limitations are and what sort of results could be expected. I agree with the parodies called 'the parachutist' and 'the blind leading the blind' proposed by Pollard and Bray (2007: 254-255), but there are other parodies possible in the relationship between archaeology and experimental sciences. Probably in the 21st century we do not need to talk about the direct relationship between archaeology and 'science', because that is precisely where archaeological science should stand up. Like an interface between the clay body and a glaze in a ceramic, archaeological science is the interface between archaeology and natural sciences, a common ground of understanding and collaboration, because both humanities and pure sciences are intrinsic to the nature of archaeometry.

A different point to be raised is that **pottery studies, both from a pure archaeological and an archaeometric point of view, are in crisis**. Who wants to deal with thousands of fragments? Who wants to spend hours in the laboratory waiting to obtain some results that then have to be interpreted in what is often a very time-consuming process? Pottery is becoming boring for many of our students. Other aspects such as landscape studies, human origins or archaeological computing have become more popular. Moreover, in some Mediterranean countries, a rebirth of the more 'traditional archaeology' seems to be gaining strength again. Even within archaeometry of inorganic materials pottery analy-

sis is not a 'trendy topic' compared to the explosion for instance of interest in glass experienced in the last years. Despite the fact that pottery is not always a hot topic, it is still fundamental for dating sites and reconstructing trade in the ancient world, among other fundamental issues. Therefore, it is just a matter of time before it becomes 'fashionable' again. I believe that, like History, these 'hot topics' are cyclical.

***Education: the key for the future***

**Education is, of course, fundamental**. There is a real need to build both a European Research Area and a European Higher Education Area. Where is the teaching in archaeometry and, more specifically, in archaeometry of ceramics? **We need to increase the interdisciplinarity of the humanities and experimental sciences** in the search for a more integrated approach. Pollard and Bray (2007: 256 ) asked themselves if an 'archaeology student with little if any formal training in the sciences' could become a competent archaeological scientist. They maintained that the answer 'overwhelmingly, is yes'. I feel that we could equally formulate the question in a different way: can a 'pure scientist' or a natural sciences student with little if any formal training in archaeology be a good archaeological scientist? I feel that one can be a good 'archaeological scientist' coming either from an archaeological background or from a purely scientific background, but that in both cases specific training is needed. Archaeometry is at the boundary of disciplines, or rather it has gone far beyond disciplines to stand up as a discipline composed of humanities and natural sciences, so probably it needs specific teaching and training; and we need to find new models of training, specific degrees, master and doctoral programs to do so. Up to my generation we have reached the archaeological sciences either coming from an archaeological or a 'scientific' background, but now we really have been moving towards specific training although I feel that we still need to push forward in that direction. I particularly defend a specific teaching model integrating elements of archaeology and natural sciences to train specifically 'archaeological scientists'. This has already been solved in the United Kingdom, first with a tradition in the teaching of archaeological sciences via Master degrees and Ph.D. programmes, but nowadays even with specific and attractive degrees in archaeological sciences in general or in different subdisciplines in particular. Bradford, Sheffield, UCL, Bournemouth, Oxford, Cambridge and other universities in the

United Kingdom can be models for other initiatives in southern European countries. Killick and Goldberg (2009: 9) for the USA had a similar concern and proposed two options: 'flexible interdisciplinary degrees in archaeology' or to encourage students 'to combine a Ph.D. major in some Departament with a Ph.D. Minor in Anthropology (composed wholly of courses in archaeology)'. Since 2009 I see that some degrees in the USA, particularly in Bioarchaeology, are trying to find their place in the teaching system.

In the previous part of this contribution I defined a model for archaeometry that could be called scientific-humanist, in which the integration is real and methods and techniques from the 'hard sciences' are applied to solve archaeological problems. Education in archaeological sciences should not be separate from that spirit. We all have responsibility on this. In many of the Mediterranean countries, there is no specific teaching of archaeometry, not even at master's degree level. This is threatening the future of archaeometry itself, or at least of a certain way of understanding archaeometry in a real and integrated, or an equal footing way.

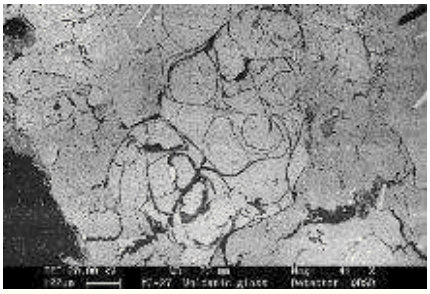

*Fig. 2 A volcanic Late Roman Cooking Ware with a detail of a fragment of volcanic glass as seen in Scanning Electron Microscopy (SEM).*

***A career path***

Training is essential, but so is the definition of a clear **career path and prospects of security** for young researchers. Too often, as Capelli (2011) has proposed, in many Mediterranean countries, an archaeometrist is 'nobody in the middle of nowhere'. If he/she has an archaeological background, this may not be well thought of by colleagues who do 'traditional archaeology' exclusively. If an archaeometrist comes from the 'hard sciences', he/she may not be well-considered by colleagues either. Another question is whether positions for archaeometrists should be created in science or archaeology departments. This problem has been solved in some parts of Europe but others are far from finding a satisfactory solution.

A major problem in my opinion is that in many Mediterranean countries stable work can be only guaranteed if one reaches the top of the 'pyramid' particularly in universities were most researchers devoted to archaeometry are concentrated. I believe that we have created what I call **an 'inverted pyramid' in human resources** for science. In many Mediterranean countries, a person has to be a professor or a lecturer (and therefore at the top of the pyramid), otherwise their situation may be very complicated and their continuity always under threat. I fully understand

that we cannot all be professors as the system cannot absorb this, but there should be enough room for many other researchers. Difficult to defend in this situation of deep economical and financial crisis, but I plead for the creation of more positions as research assistants, research technicians or whatever you may call them in many Mediterranean countries. Such positions are essential to the projects and daily work of laboratories and research teams. Otherwise the pyramid is inverted being all professors or lecturers at the top and not having anyone at the base. This would help to offer a stable career in the earlier stages and not suffering the brain-drain that we witness continuously. Being alone at the top of the vertex of an inverted pyramid can be depressing. In some Mediterranean countries, the situation is such that the same person has to be Principal Investigator, his/her own postdoctoral assistant, his/her own pre-doctoral student, a lab technician, finance manager (at least of his/her own projects), secretary, etc. This 'multitask identity' is normally very inefficient and stressful. Considering the circumstances in many places, it is surprising that research in some areas continues and I have no doubt that it is possible only due to the great personal sacrifice and commitment of many who have chosen research not as a profession but rather as a way of life.



***Research evaluation, publication and related issues***

To be perfectly honest I hesitated to include the evaluation of research and publication (as these are too often linked) in my comments because a superficial analysis is always very risky. However, despite the fact that I may regret having dealt with such a complicated issue, publication and evaluation of research are creating some distress lately and we need to tackle this and not pretend that everything is clear. A full discussion is of course beyond the scope of this contribution, and it would probably deserve a full paper or better a collection of debate essays, but it has to be mentioned at least, to say that this is an aspect that we have not solved yet. It is not a problem that applies to archaeometry and archaeology only, but more broadly to humanities and social sciences in general. We all know of efforts being made at national and international level to evaluate the humanities and social sciences and to rank their journals, but there is still a long path to follow to clarify these issues. The existence of national and international bodies to study evaluation and benchmarking procedures clearly demonstrates that the situation is neither easy nor clear. In my opinion, humanities

(and archaeological sciences are evaluated often as such) are in a deep identity crisis in terms of what to do with evaluations trying to imitate in a short space of time what experimental sciences have done, when the nature and the tradition of each is different. A second problem is that often humanities panels for instance evaluated disciplines like History, Archaeology, Philology or Philosophy where their way of proceeding is completely different and therefore difficult to compare.

In addition, there is an enormous obsession with the publication record, impact factors and citations, but this would be too long to discuss. Apart from specific journals clearly devoted to archaeological sciences, there are few other journals where archaeometric papers can find an entry. Killick and Goldberg (2009) pointed out that the number of pages in archaeological science journals have increased and I would add that in these last years even the number of journals has increased. That is true, but I should say that I would like to see more archaeometry papers, or papers containing on an equal footing archaeological and archaeometric parts, published more often in pure archaeological journals. In a similar plea, we should ask archaeological science journals to be more receptive of the archaeological considerations in 'analytical' papers. The question is to what extent are archaeological science journals ready to allow papers where the archaeological part is as important as the analytical and to what extent other archaeological journals are willing to publish papers where the archaeometric part is prevalent or equal. A different situation, as Maggetti (2006) outlined perfectly well, is that of papers in archaeometry published in pure science journals absolutely unfamiliar to any archaeologists and at least to a part of the archaeological scientists.

It is well known that the evaluation of humanities and social sciences presents many problems and archaeological sciences are not free from these. For archaeometry/archaeology, a few aspects should be borne in mind.

One is the scarcity of impact journals in which a truly integrated approach can be fully understood and published.

A second aspect is the existence of 'hot topics' and a certain progressive (and, in my opinion, 'dangerous') taste for exotics. In addition I have observed lately, particularly in archaeology, a taste for syntheses with no new data whatsoever that are being more appreciated than new studies with new data and results. Other studies with many hours of field or laboratory work behind them, may struggle to find a place for publication.

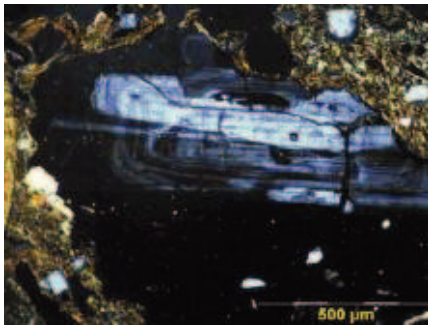


*Fig. 3 A volcanic fabric containing a piece of volcanic rock with plagioclase under the polarising microscope (in crossed nicols).*

It is evident that journals have their editorial policies and preferences for certain regions or periods, as well as for particular subjects. There is nothing wrong with this, but it does reduce the opportunities for those who may not feel represented by that editorial policy.

Another aspect is the language issue. English has become the international scientific language and it is well known that many of the high impact factor journals are in that language, which obviously means that some may find it easier than others to get their papers written. And it is clear that many evaluators consider papers in English more valuable even if there are also impact journals that accept other languages.

A different problem is how to assess the real impact. There is a major debate on the suitability or not of using impact factors and citations in the evaluation of research. A simple look at journals such as *Scientometrics* or *Research Evaluation* will reveal that there is a large amount of literature on these issues. Impact factors and citation indexes are certainly one way of doing this and this may probably work for experimental sciences. It is not clear yet that this may not really work for Humanities and less for archaeology (and therefore for archaeological sciences). A typical example is that of a paper in a high impact journal that is not cited by anyone and a similar paper (what we could call a secondary paper in the native language, for instance) by the same scholar in a conference proceedings  so useless in terms of evaluation  that is widely cited. So what is the real impact? There are probably different impacts, but this would open another debate.

There is also a 'territoriality issue' that affects at least a few aspects. First, as I have mentioned above, due to this increasing taste for exotics. Those who do not work in exotic countries (or who work in regions that might be considered of 'marginal interest') may find it difficult to get through the publication system. Along the same line, and in terms of evaluation, we should also understand that in archaeology/archaeometry when the subject/project has an impact on a specific territory, for political and/or outreach reasons it may be appropriate (and sometimes it is compulsory) to publish for a more local or regional audience too. Of course, a publication record should not be built on local journals only, but we probably should not pretend the reverse. By definition, archaeology and archaeometry involve team work, and therefore it is absolutely normal to publish jointly. Therefore, it is difficult to see why some people still think that papers

by a sole author are more valuable. In fact, I am an evaluator myself and my reaction is completely the opposite and I believe that actual trends in evaluation at least at European level will appreciate collaborative work better than the isolated one as a demonstration of capability to work as a group or in collaboration, to develop networking and creating synergies between researchers and institutions. In joint papers the order of signature can be also an issue. It is clear that interdisciplinary work leads to joint publications and in those one cannot be always the first nor the senior author. It is obvious also that often it is convenient to allow younger researchers to sign as first authors as they may need that more in their careers than we may do. Egocentrism in research is a bad attitude for a positive collaboration, but unfortunately some evaluation processes are forcing us to do so. In the humanities, journals are not used to specifying which is the role of the author in the paper, so you may sign as the last author without being understood as the senior author. In some journals the order of the authors is not 'respected' because for instance in a multiple authorship if any other author is from the same institution as the first author their name goes before that of other authors from other institutions, even if the paper was originally signed in a different order. So, evaluating archaeology (and archaeological science) as if they were medicine or biology can certainly be difficult. We need a change of culture and practices in that respect by researchers, journals, evaluators and the system in general or a full and deep reconsideration of the evaluation criteria and processes.

Other issues need to be addressed in the publication record, such as the consideration of books, conference proceedings and editorial work (both as book editors or linked to journals).

Of course evaluation is not and should not be only about publication and other items such as managerial and organisational tasks, direction of research teams and laboratories, funding obtained, the recognition of knowledge transfer activities, teaching (including supervision of master and Ph.D. students) and other forms of leadership and not only that reflected in the publication record, should be taken into account.

Overall, there is a worrying lack of uniformity in the evaluation procedures. Indeed a major problem is that while some institutions consider some aspects good, other may consider the same to be bad. For instance, we all know that in the EU joint publications are better seen. Instead, some national bodies still believe that a paper with a sole author is more valuable. In oth-

er cases, signing as a senior author is better considered, while others still believe that signing as a first author is more important (or may even not know what a senior author means or believe that being the last one is always because that author is the one that has worked less). One of the concerns that I have grasped around is that researchers do not know what they are supposed to do. With only one career and one CV it is actually difficult to meet all the criteria of all those who will be evaluating our research, whether this is when applying for a job, to obtain funding for projects or for human resources, or for individual career promotion. A final aspect is that these criteria have been only recently introduced and this implies the change of the norms of the game. Just to give you an example, many professors and lecturers of archaeology in southern Europe, with stable jobs often as civil servants, may have obtained their positions without papers in impact journals nor in English.
In terms of research evaluation, what many researchers fear is that we are creating a **machinery** and a system that being fundamental is probably not well adapted to certain disciplines. Talking to many different colleagues from many different countries I can tell that many are not happy with it. So, let's carry on working on it, let's commit ourselves towards evaluation procedures, agencies, peer-review work and so on, because evaluation is the responsibility of all those who form part of the research system. But let's do it seriously, trying to be objective but being aware that equality should also imply correction factors since inherent inequalities in the system can translate into differential CVs. For you to understand what I am trying to say, let me ask you a question: who should be better evaluated - someone who with all resources and 30 researchers working for him/her has done an excellent job or someone who without any resources and only one postdoctoral under his/her supervision has done a good job? Be careful, because with evaluation procedures we can fall into the trap of creating a 'monster', as we have done with the 'markets' now ruling the global economy and the faith of the entire world and that we do not know how to stop.

* * *

Some **other problems** with archaeometry and particularly with archaeometry of ceramics are: a lack of large mid- to long-term research programmes; the proliferation of studies with very few samples; the inclusion of archaeometric studies as mere ap-

pendixes and not fully integrated; a proliferation of teams and or laboratories with no clear focus; funding problems; and excessive bureaucratisation of research activities. Of course, each of these merits its own discussion, but we shall leave this for another paper.

**Proposal for the immediate future: being positive about the future**

It is always easy to analyse the situation and 'complain', but it may not be so easy to take action and propose possible initiatives to go forward towards the Society of Knowledge and the construction of both a European Research Area and a European Space of Higher Education. Of course, for reasons of space I cannot fully develop the ideas that follow, but I hope that they are self-explanatory.

*ACTION A: European master's degree and doctoral joint programme on archaeology and archaeometry of Mediterranean ceramics*

In the construction of the European Higher Education Area (and of the European Research Area) it is obvious that a fully integrated and interdisciplinary approach to archaeological ceramics needs to find its way through. There is a real need for a better career definition, and to achieve this it is essential to provide educational instruments. Despite the efforts made at European level, the different policies for master's degree and doctorate studies that have been adopted in countries and universities across Europe make it difficult for some initiatives to survive on a isolated basis. For instance, in Spain the model that we have adopted does not allow us to create master's degree courses with a low number of students (around 20 seems to be the minimum number fixed). Other Mediterranean countries may be facing a similar situation. Therefore, I believe that for certain disciplines (or subjects) that traditionally do not attract too many students the only option will be to undertake collaborative initiatives at national and international level to build up something together at master's degree and doctorate levels. I feel, as I have mentioned before, that the British model could be an inspiration for many other territories and degrees, master and doctoral programmes in archaeological sciences should be also implemented in other countries.

*ACTION B: Network of Archaeometry laboratories in the western Mediterranean*

Intercalibration, standardisation and harmonisation of method-


*Fig. 4 Some of the main international journals for the publication of archaeological sciences.*

ologies, sharing of data and access to databases are fundamental. A lot of information is available and not fully exploited, due to the lack of formal information exchange. The eastern Mediterranean has its own initiative: *Science and technology for archaeology and cultural heritage in the eastern Mediterranean* (STACHEM), and I assume that we are capable of undertaking something similar in the western Mediterranean, for instance, or making the initiative even broader on a pan-European basis.

*ACTION C: Creation of a European Centre for Roman and Late Antique Ceramics*

This is an old idea that was developed with my colleagues Paul Reynolds and, later, Michel Bonifay. We envisioned the creation of a real network of centres with the same vision and spirit, which would contribute to creating a superstructure of excellence focused on archaeology and archaeometry of Mediterranean ceramics. Research, teaching, archiving, dissemination and publication were the main areas of this centre, which was planned as an institution in which to find sherds, samples, analytical results, bibliography, specific training and dynamic projects on the subject. This idea was presented in Barcelona to the participants of an Exploratory Workshop on Late Roman Fine Wares funded by the Institució Catalana de Recerca i Estudis Avançats (ICREA) and the European Science Foundation (ESF) through the Exploratory Workshops Scheme ICREA/ESF. Other national initiatives have worked in a similar direction on a national basis. In Rome there was recently presented the idea led by Gloria Olcese of a national *Centro di studi interdisciplinari sulle ceramiche e i commerci nell'antichità* based at Ostia.

*ACTION D: An on-line Encyclopaedia for Roman and Late Antique Ceramics*

The use of information and communication technologies in pottery studies was a strategic position of ERAAUB since the creation in collaboration with PROLEG S.L of what we used to call the *Thesaurus* that was supposed to complete a software of management of archaeological excavations known as *Proleg Stratigraph*. The initial idea evolved with time, discussion and the input of other scholars such as M. Bonifay. As a result, a more ambitious aim arose: to try to build a single Encyclopaedia using the same platform and interface. The idea was presented to the participants of an ICREA/ESF Exploratory Workshop on Late Roman fine wares held in Barcelona.

However, this idea seemed to be impossible for several reasons,

mainly because many teams were already (or immediately afterwards) working more or less in a similar direction for their particular areas of expertise (both geographical and /or for classes of ceramic). Examples of these are for instance: *Corpus CEIPAC* (University of Barcelona), *Roman Amphorae: a digital resource* (University of Southampton), *Immensa Aequora. Archaeologic and archaeometric data bank of ceramics produced in Italy* (University of Roma, La Sapienza), *Ceramic Production in the Levant* (Boston University), *FACEM* (University of Vienna), *The Alexandrian Centre for Amphora Studies* (CNRS), and many others.

In this context of increasing interest for ICT, CERAMOPOLE (and its PECL, *Prototype d'Encyclopédie Céramologique en Ligne*) was created within the Maison des Sciences de l'Homme in Aix-en-Provence, initially thought of as a French initiative but that is now achieving a more international goal. ERAAUB, in conjunction with the Catalan Institute for Classical Archaeology (ICAC) and in close collaboration with J.M. Macias and P. Berni, is leading the creation of LRCW.net, a web page and virtual laboratory for coarse and cooking wares in the Mediterranean, which shares a platform with the *Ex-Amphora Hispaniae* initiative as it is part of specific research in virtual laboratories. Although one has to admit that real international collaborative work on a large scale is still difficult to implement in archaeology/archaeometry, I believe that a general platform is possible. I still think that all these initiatives, and many others, could be small parts of a larger *Encyclopaedia*, if we can organise the work and understand that together we can make this initiative stronger. The use of ICT should contribute enormously in the study of ancient ceramics. Many of the data-bases are thought to include analytical results and even other initiatives are being planned as pure analytical data-bases. Here I always say that we should avoid duplication in order to save time, effort and resources.

*ACTION E: A working group for the evaluation of archaeology and archaeometry*

From conversations with other colleagues and from meetings on assessment in social sciences and humanities, I have seen that publication and evaluation (since often the latter is too closely linked to the former) can cause distress and often disappointment. It is time to raise our voice to contribute to developing an evaluation system and evaluation procedures progressing towards objectivity and clarity and taking the benefit of the experience of experimental sciences, but borrowing the

good practices and not those aspects that are controversial, as well as taking into account the specificity of what we do. It looks as if we are progressively accepting evaluation systems (because there is not just one procedure) that in many aspects are not thought satisfactory by many of the main actors. Even more important is that we are creating deep differences across Europe that will be difficult to overcome if they are not tackled soon. I believe that much work is still needed in the evaluation of archaeology and archaeometry.

## Concluding remarks

The intention of this paper was not to provide a full analysis of the situation of archaeometry, but only to complement a previous contribution in this journal. Archaeology will never lose its humanistic character, but it is clear that more and more it needs many other disciplines in order to extract the maximum information from the archaeological record. In consequence, natural sciences and humanities form part of archaeology and it is precisely there where archaeological science has to stand as the guarantee of the right and profitable use of 'scientific techniques' in a humanistic discipline. Often, the resolution of archaeological problems relies on a real combination of natural sciences and archaeology (humanistic). Leaving aside philosophical considerations, the dehumanisation of Experimental Sciences as well as the lack of 'natural sciences' in the Humanities are compromising the future of a real integrated approach. So far archaeological scientists have arrived in the discipline either from an archaeological background or from a 'natural sciences background'; in the future they will come as well from a specific 'archaeological sciences' background, integrating in its intrinsic nature both humanistic and scientific foundations. Some countries are moving in that direction, but many parts of Europe are far from following that path.

Archaeometry, as I understand the term, has certainly broken the boundaries of disciplines and lies in the middle of archaeology and experimental sciences. It is therefore a common playground where real collaborative, inter- and multidisciplinary work takes place. The archaeological record deserves to be fully studied in order to extract the maximum of information possible and that cannot be done without fully integrating archaeological sciences into normal archaeological practice. Of course, in an ideal world many things could be done, but the reality is that often resources limit the immense possibilities that

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a real integrated approach would have in archaeological excavation, for instance.
I would like to finish by recognising that some of the ideas expressed here such as the need for a modification of teaching, and of research careers or a deep revision of evaluation procedures are already contemplated in the Ravello Declaration when it says:
*'Nous souhaitons, pour réaliser ces objectifs, un révision de l'esprit du système éducatif et des structures des organismes de recherche.*
*Nous souhaitons un changement significatif dans les critères officiels d'évaluation des projets de recherches interdisciplinaires et des carrières professionnelles afin que les principes énoncés ci-dessus puissent être au service du patrimoine et du développement culturel.'* (Déclaration de Ravello, 6-7 juin 1984).
Nearly 30 years after that declaration, we need to ask ourselves if we have achieved those objectives. I can say that in many Mediterranean countries certainly not. More importantly, we need to ask ourselves if we still have the will and the strength to pursue that spirit in the 21st century. I say yes, because not achieving this will seriously compromise the future of a real integration between humanities and natural sciences in the real understanding of the past of humankind. There are enormous challenges ahead and we need to tackle these with humanities and natural sciences in a perfect orchestra, and archaeological sciences should be the concert hall where to listen to the Music, but not only siren chants.

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