



HAL
open science

Historical model of settling and spread of Bell Beakers Culture in the mediterranean France

Olivier Lemerrier

► **To cite this version:**

Olivier Lemerrier. Historical model of settling and spread of Bell Beakers Culture in the mediterranean France. Similar but different. Bell Beakers in Europe, 2004, Poznan, Poland. pp.193-203. halshs-00087311

HAL Id: halshs-00087311

<https://shs.hal.science/halshs-00087311>

Submitted on 22 Jul 2006

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Historical model of settling and spread of Bell Beakers Culture in the mediterranean France

Olivier Lemerrier

Paru dans : CZEBRESZUK J. (Dir.) – *Similar but different. Bell Beakers in Europe*, Poznan : Adam Mickiewicz University, 2004, p.193-203.

Summary

Here we present some elements of reflexion which are developed in a PhD thesis taken during March 2002 in Aix-en-Provence (Lemerrier, 2002). This work concerned all the bell-beaker elements present in more than 300 sites in the South East of France wherein almost 1200 pots were discovered. This study permitted to confirm the existence of 4 stylistic assemblages and most of the chronology based upon the decorated ceramics that J. Guilaine proposed. The analysis of these assemblages, both in their context of discovery and their location, allows to set a new interpretation of the settling and development of the bell-beaker culture in the mediterranean France and to question the nature of the phenomenon itself. The first bell-beaker settling, that match with the geometric dotted style, can be regarded as counters established along the mediterranean shore, the mouths of the main rivers and the rivers themselves. In these sites, the artifacts immediately appear mixed with elements of local cultures, nevertheless these settlements present particular geography and topography which make them unic among the local settlements. Their origin must be located in the south western area (iberic peninsula, maybe atlantic coast). Standardized pots are spread from these sites towards the inland populations. This first diffusion goes beyond the South East of France, following the Rhone river. The development of a regional stylistic group, called « rhodano-provençal » like the « pyrénéen » group, squares with a phase of acculturation of the local population under iberic influence. As this acculturation goes, new elements from the north east area appear, showing that the south east area has become a relay in an important road for communication and exchanges. The apparition of the « barbelé » style may be the result of the arrival of new people from Italy in the country. (at work). Both artifacts and sites data show that Bell Beaker culture should be considered, during this first phase of apparition in the mediterranean and atlantic Europe, not as a simple diffusion of a fashion, a rite or even of objects, but as a cultural spread with its phases of exploration, settling and acculturation of the local populations. From the iberic origin (Portugal ?) of this first phenomenon to its spread until the far eastern parts of Europe, great lines of communication appear ; they will permit numerous multipolar exchanges of ideas, artifacts and populations.

Résumé

Un modèle historique d'implantation et de développement du Campaniforme en France méditerranéenne
Ce court article a pour but de présenter quelques éléments de réflexion issus d'une thèse de Doctorat soutenue en mars 2002 à Aix-en-Provence (Lemerrier, 2002). Le travail a pris en compte tous les éléments campaniformes présents sur plus de 300 sites recensés qui ont livré les fragments de près de 1200 vases décorés, dans le sud-est de la France. Il permet de confirmer l'existence de 4 ensembles stylistiques et, en grande partie, la chronologie proposée par Jean Guilaine à partir de la céramique décorée. L'analyse de ces ensembles, de leur contexte de découverte et de leur répartition permet de proposer une nouvelle interprétation de l'implantation et du développement du Campaniforme en France méditerranéenne, en s'interrogeant, au-delà sur la nature même du phénomène. Les premières implantations campaniformes, qui correspondent au style pointillé géométrique, peuvent être comprises comme des comptoirs implantés le long du littoral méditerranéen, aux embouchures des principaux fleuves et le long de ceux-ci. Ces implantations sont immédiatement marquées par une mixité avec des éléments des cultures locales mais présentent à la fois une géographie et des topographies particulières qui les isolent au sein des implantations indigènes. Leur origine est très probablement sud-occidentale (Ibérique et peut-être atlantique). A partir de ces sites, des vases standardisés sont diffusés vers l'intérieur des terres auprès des populations locales. Cette première diffusion dépasse très largement le sud-est de la France pour s'étendre au-delà en remontant le Rhône. Le développement d'un groupe stylistique régional « Rhodano-Provençal », comme celui du groupe « Pyrénéen », correspond à une phase d'acculturation des populations locales sous l'influence ibérique qui se poursuit mais avec l'apparition de nouveaux éléments d'origine nord-orientale, montrant que le sud-est est devenu une sorte de relais sur une importante voie de communication et d'échanges. L'apparition du style barbelé traduit sans doute l'arrivée dans la région de nouveaux groupes d'origine italique.

Les données des mobiliers et des sites montrent que le Campaniforme doit être compris, dans cette phase initiale d'apparition en Europe méditerranéenne et probablement atlantique, non comme la simple diffusion d'une mode, d'un rite ou d'objets mais bien comme une expansion culturelle avec ses phases d'exploration, d'implantation et d'acculturation des populations locales. De l'origine ibérique (Portugal ?) de ce premier phénomène à son extension jusqu'aux confins de l'Europe, ce sont de grandes voies de communication qui apparaissent et vont permettre de nombreux échanges multipolaires d'idées, de mobiliers et sans doute de populations.

Zusammenfassung

Die Glockenbecherkultur im mediterranen Südfrankreich : ein historisches Interpretationsmodell

Im Folgenden werden einige Teilergebnisse aus einer Dissertation vorgestellt, die im März 2002 an der Universität Aix-en-Provence vorgelegt wurde (Lemerrier 2002). In dieser Arbeit wurden sämtliche Glockenbecher-Elemente (1200 verzierte Gefäße bzw. Gefäßfragmente) aus über 300 südostfranzösischen Fundstellen mit annähernd berücksichtigt. Diese Untersuchung bestätigt das Vorhandensein von vier Stilgruppen und die Gültigkeit der von J. Guilaine auf der Basis der verzierten Keramik vorgeschlagenen Chronologie weitgehend. Die Analyse dieser Gruppen, ihrer Fundumstände und ihrer Verbreitung führt uns dazu, das Aufkommen und die Ausbreitung der Glockenbecher im mediterranen Südfrankreich und darüber hinaus die Frage nach dem Wesen des Phänomens neu zu interpretieren. Die ersten Glockenbecher-Niederlassungen (Style pointillé-géométrique) können als Kontore interpretiert werden, die entlang der Mittelmeerküste, nahe der Mündungen oder entlang der Hauptflüsse erbaut werden. Diese Niederlassungen sind durch die Aufnahme von Elementen aus den einheimischen Kulturen charakterisiert, heben sich jedoch durch eine besondere geographische und topographische Lage von den Siedlungen der einheimischen Kulturen ab. Ihre Herkunft ist höchstwahrscheinlich im Südwesten zu suchen (iberische Halbinsel oder atlantische Küstengebiete). Von diesen Siedlungen aus breiten sich stark standardisierte Gefäße ins Landesinnere innerhalb der einheimischen Bevölkerung aus. Diese erste Ausbreitung reicht bis weit über Südostfrankreich hinaus und folgt dem Rhonetal in nördlicher Richtung. Die Entwicklung von regionalen Stilen wie die „Groupe Rhodano-provençal“ oder „Groupe pyrénéen“ ist das Ergebnis einer Akkulturation lokaler Bevölkerungsgruppen unter iberischem Einfluss. Hinzu kommen neue Elemente nordöstlicher Herkunft, die deutlich machen, dass Südostfrankreich zu einer Etappe innerhalb eines wichtigen Kommunikations- und Austauschweges geworden ist. Das Aufkommen des „Style barbelé“ spiegelt wahrscheinlich die Ankunft neuer Bevölkerungsgruppen aus Italien wieder. Die materielle Kultur und die Fundstellen zeigen, dass die Glockenbecher bereits in einer frühen Phase nicht nur als Ausdruck der Ausbreitung einer Mode, eines Rituals oder von besonderen Objekten verstanden werden sollten, sondern als das Ergebnis einer kulturellen Ausbreitung mit einer Pionierphase, einer Konsolidierungsphase und schliesslich einer Phase der Akkulturation lokaler Bevölkerungsgruppen. Zwischen der Entstehung des Phänomens auf der iberischen Halbinsel (Portugal?) und seiner Ausbreitung über ganz Europa kommen die grossen Kommunikationswege zum tragen und ermöglichen die Ausbreitung von Ideen, Gütern und Menschengruppen.

Framework and context of the study

The South of France is one of the richest regions concerning Bell Beakers. We present a brief synthesis of it, under the direction of J. Guilaine, during the Congress of Riva del Garda (GUILAINE *et al.* 2002). Since this day, the realisation of a PhD thesis concerning a large part of the South of France, the south-east corner, has permitted us to precise several aspects and to make new assumptions (LEMERCIER 2002). We have been able to record more than 300 sites in this area (Fig. 1), where almost 1200 Bell Beaker decorated vases were found.

At the same time, the presence of easily identifiable distinct styles, whose definition is based on decorative patterns, the existence of closed sets, the large part of domestic sites, and an increasing knowledge of the chrono-cultural context shall enable us to propose a spatial and temporal scheme of appearance and development of the Bell Beakers in this area and, furthermore, to draw informations about the origin and the nature of the phenomenon itself, as we expected at the beginning of this work (LEMERCIER 1998).

1. The reports

1.1. The Bell Beaker styles in the south-east of France¹

The decorated ceramics of Style 1 (corded, linear spotted, international and mixed decorations) are present not as entire dish sets but as few standardised items (beakers) which fit into the criteria defined by L. Salanova (SALANOVA 2000). They are not associated with a specific domestic ceramic and, most of time, they appear in the local contexts of the Final Neolithic, such as settlements and graves. We still do not know where they were produced, as we are waiting for more abundant analysis. The raw material they were made of may be from this area, but the way they were realised squares with specific technical traditions. The « new » items associated with this style are scarce and of metallic ware. Last important fact : the ceramics that belong to style 1 appear also among assemblages where style 2 prevails.

The ceramics of style 2 (geometric spotted decorations “pointillé géométrique”) show a variety of decorative patterns, with few atlantic standard, and numerous morphologies, marked by the abundance of low shapes. A fine undecorated but specific ceramic is present. Few sites provide the ceramics of style 2, they are essentially located in the left bank of the low Rhône valley. There, these pots are associated with remains that can be linked to the local Fontbouisse and Rhône-Ouvèze groups. The domestic ceramic belongs to the local tradition, Rhône-Ouvèze or Fontbouisse, but some Bell Beaker characteristics can be distinguished. We can observe some transfers of techniques between the Bell Beaker productions, locally made, and the Rhône-Ouvèze ones, even some cases of stylistic mixity among the decorated ceramics. There are other elements that can be considered as specific, such as metallic items, jewels and, maybe, a lithic tool-kit. The sites often have a particular topography. Some houses were discovered and the whole domestic and agro-pastoral activities were recognised. There are few graves, all collective and most of time located in caves.

The ceramics of style 3 (incised, incised-and-stamped and complex spotted decorations of the « rhodano-provençal » group defined by J. Courtin (COURTIN 1967, 1974) show many morphologies, the low shapes being very important. The decorations are very diverse too. We can observe some decorations imitating the barbed wire pattern. These decorated potteries are associated with many undecorated ceramics, among them a specific domestic ware ; together they constitute the entire vessel kit. Many types of jewels and metallic items and the lithic industry are specifics for Bell Beaker. These assemblages are present in a lot of sites in the entire area of study. In most of this region the sites are homogeneous and no association with elements of local styles can be observed. Nevertheless, in the “département” of the Gard and in some sites along the Rhône there are artifacts of the Fontbouisse tradition associated with Bell Beakers. Concerning the sites of the style 3, the types of settling and architectures vary from a district to another. All the activities are present, some sites may even have been complementary. The graves are abundant and various, but still the dolmens and the caves were more often used.

The decorated ceramics of style 4 (incised decorations and barbed wire pattern) are marked at the same time by the Bell Beaker tradition and specificities concerning the morphologies and the technique of decoration itself. They are associated with a domestic ceramic and specific elements such as scarce bronze items. The contexts are almost homogeneous, but we often discover some vases of style 4 associated with rhodano-provençal assemblages or in rhodano-provençal sites. Among the various kinds of settlements, the sites in the heights are the more

¹ Figures of the ceramics are published in Lemerrier 1998 and Guilaine et al. 2002.

abundant. Sometimes they are associated with enclosures that may be regarded as fortifications. There are less sites than for the other styles and we do not find them all around the area of study, as we are used to do with the rhodano-provençal Bell Beakers. The graves are mostly collective deposits in caves, but there are some individual ones.

1.2. A domestic Bell Beaker : a Bell Beaker culture

Another important observation concerning these assemblages is the obvious domestic characteristic of the Bell Beakers in the south-east of France.

Both the number and the quota of the habitations among the recorded sites is very important. Even if all the non-funeral sites cannot be considered as strictly domestic sites, they represent more than two thirds of the recorded sites, contrary to what is known for the other areas.

Thus we can assume that the Bell Beaker culture is not a funeral phenomenon, even if there are Bell Beaker elements in the graves, in almost a hundred graves (LEMERCIER *et al.* to be published).

Moreover, the domestic sites where Bell Beaker elements are found can be specific or pure, namely free from any element of the local final Neolithic.

In these sites, whose domestic architecture must be regarded as culturally invested as in the local groups of the final Neolithic, all the activities of handcraft (pottery, tool-kit making ...) and subsistence (agriculture or at least grain stocking, rearing and hunting) are present.

Finally, the Bell Beaker is a « normal » material culture.

All these remarks are valid for the sets of styles 2, 3 and 4. The style 1, that includes some elements of the standard, cannot be considered as a material culture in the general sense, but as a « facing » in the assemblages of the local final Neolithic.

1.3. Bell Beakers and local cultures

The relationships between the Bell Beaker and the local cultures of the final Neolithic are recognised in certain assemblages, at least for the styles 1 and 2 and in few cases for style 3. For all those cases in the south-east of France, the local cultures are the Fontbouisse group and mostly the Rhône-Ouvèze group in Provence, which is the result of the main influence of the Fontbouisse group over the local Couronnien group.

Contrary to what we once thought during this study, no association between Couronnien and Bell Beaker elements could be proved or considered as valid.

As we have described yet, there are two types of associations. Either it is a simple « facing » the presence of standardised Bell Beaker vases (style 1) among complete and specific assemblages of local groups, either a mixed set which even presents technical shifts and cases of stylistic mixity (style 2).

In fact, one could think that the Bell Beaker culture did not appear in a world totally with no population (Fig. 2).

With the Bell Beaker phenomenon, we are lucky we can observe the different phases of a main change in the material culture, what we cannot do for the other transitional phases of the Neolithic.

2. Implications and interpretations

2.1. The chronological articulation of the styles

The general succession of the two main styles is obvious :

A first set is composed by elements linked to the styles widely spread in Europe (styles 1 and 2). They are associated with elements of the local cultures of the final Neolithic. The second set consists of the specific regional elements of the rhodano-provençal group and the barbed wire group, which are generally independent.

Within these sets the succession of the different styles is difficult to establish. The analysis of the contexts of discovery and the associations of remains does not enable us to determinate if, in this area, the style 1, with elements of the standard, is anterior to the style 2, with geometric spotted decorations. Analysing the styles 3 and 4 in the same way, we find out they are, in part at least, contemporary. The barbed wire style is the only one whose dates constitute an actual chronological phase during the Bell Beaker phenomenon.

2.2. The origin of the Bell Beaker elements present in the south-east of France

Here we question ourselves about the origins of the Bell Beaker elements, about the constitution of the different assemblages : is it the result of a local evolution or of some distinct inflows ?

If we look for elements of comparison out of the area of study, we find (Fig. 3) :

- For the early phase (style 1 and 2) : the presence of identical elements in western Languedoc and beyond, the Iberic Peninsula until the atlantic coast. The style 2 (spotted geometric decorations) present a particular repartition that follows the mediterranean coastway and concentrates at the mouths of the rivers and along them, but avoids the inlands, contrary to certain isolated elements of style 1.
- For the rhodano-provençal Bell Beakers : once more we turn west towards the Pyrénéen group and the iberic groups for comparisons. At the same time, the presence of northern elements can be assumed, but it must have been a secondary influence.
- I have not made further researches for the barbed wire group. The subject is studied nowadays in several specific ways (VITAL *et al.* 1999 ; LEMERCIER to be published). Still, we can remark that the origin of these elements may be partly Bell Beaker. However, some morphological features remind us the Bell Beakers of central Italy, but the decorative patterns look like elements from north eastern Italy and Slovenia, yet their precise chronological place is to be established.

Whereas the potential geographical origins of the different elements remain imprecise, we can conclude there were several inflows, both successive and from distinct origins. Among these inflows the Iberic Peninsula plays a great role, as the western Languedoc.

2.3. A spatial and temporal scheme and its interpretation

We still find it difficult to date the apparition of the Bell Beaker culture in the south-east of France, though there is an hypothetical date : the middle of the third millennium B.C. Its origins is western, we could not discover any actual characteristic from the northern areas. The Rhône axis is important , but only for south-north direction at first.

Two hypothesises can be proposed :

The first hypothesis is the chronological succession of the styles 1 and 2. The vases of the standard would fit into a very little important first spread, some contacts preceding the settling of actual sites where we can find items of style 2 (geometric spotted decorations).

This would square with the scheme proposed by J. Guilaine (GUILAINE 1967, 1976). Yet another hypothesis, a functional one, would propose a strict synchronism of the styles 1 and 2, which was observed in some sites.

With this point of view, the isolated vases of style 1 would be the result of the diffusion of standardised beakers from the settling of the styles 1 and 2 towards the inlands. This diffusion would have produced « counters », established close to the indigenous people, along the routes of communication. This hypothesis seems to be the most satisfying one to explain the assemblages we can observe.

The diffusion of the geometric spotted style is concentrated in the Mediterranean coast, in the mouths of the rivers and along the main rivers, but it continues beyond the south-east of France, following the Rhône (Fig. 4).

The second hypothesis concerns the development of the rhodano-provençal Bell Beaker : it would be the result of the acculturation of the local cultures. The possible comparisons show that repeated contacts must unite the south-east of France and the Iberic Peninsula during this period. As some elements show the influence of northern and eastern areas, the south-east of France seems to have become a kind of relay on an important route of communication and exchange which spread goes beyond this region towards north. At this time, Bell Beakers reach the borders of the area and may displace all the local cultures.

For the barbed wire group, the frequency of the reoccupation of the rhodano-provençal settlements and the presence of imitation of the barbed wire pattern in assemblages of the style 3 indicate a phase of partial synchrony. However, the dates show that the barbed wire group is to be distinguished of the Bell Beaker culture and continues after the change of millennium.

Synthesis and interrogation

In this area, the Bell Beaker phenomenon is constituted by a succession of historical events, it is neither a fashion or a simple diffusion of objects and their use. The analysis of the remains and the sites has shown that human groups actually moved. The distribution of the sites and their nature itself recall the protohistoric models proposed for the Greek settling in the same area. These models can be summed up like this : explorations, contacts, settlings, diffusions and acculturation/assimilation.

If this model squares perfectly with the archaeological of the South of France, it may be not valid for the areas close to the Iberic Peninsula, the atlantic coast and the lands along the Rhône. Yet, the ways the populations reacted to these contacts and settlings may have been different and may have generated various situations.

Within the South of France there are important differences from a district to another, for example the group of Fontbousse seems to have strongly resisted in the eastern Languedoc, where the Bell Beakers arrives later than in Provence.

Nevertheless, one of the most important facts is the opening of main routes of communication and exchange through Europe, across the mediterranean South of France and the Rhône valley and beyond the Alps, that created the conditions for the development of the Bronze Age. From this point of view, the development of the barbed wire group in the South of France, with its probable italic origin, remains anecdotal. At the same time, a new movement from the

east and the north going through the Rhône valley marks the actual appearance of the early Bronze Age.

Whatever the application of these ideas on the archaeological data, the questions they provoke are abundant and important.

Where is the actual origin of the Bell Beakers we can trace until the Iberic Peninsula (confirmed by radiocarbon dating)? And above all, why did this expansion follow two directions : along the Atlantic coast and the northern Mediterranean coast ? The situation in Portugal in the middle of the third millennium, with the exacerbation of the characteristics of the final Neolithic (extreme density of sites, fortifications and building of monuments, social and individual markers) may constitute the only one answer to these two questions.

Finally, these few remarks do not suffice to explain the function and the appeal of the Bell Beakers towards the local populations from the Bell Beaker settlements, sometimes far in the inlands. This diffusion must have a sense that the quality of making and decoration of these vases, or their novelty, does not permit to justify and make us think of an ideological dimension (STRAHM 1997).

Bibliography

COURTIN J. 1967. La culture du vase campaniforme en Provence, note préliminaire, Cahiers Ligures de Préhistoire et d'Archéologie, 16, 27-36.

COURTIN J. 1974. Le Néolithique de la Provence, Paris : Klincksieck, 355 p. (Mémoire de la Société Préhistorique Française, 11).

GUILAINE J. 1967. La civilisation du vase campaniforme dans les Pyrénées françaises, Carcassonne : Gabelle, 240 p.

GUILAINE J. 1976. La civilisation des gobelets campaniformes dans la France méridionale, in GUILAINE J. Dir. : La Civilisation des vases campaniformes, IXe Congrès de l'UISPP, Colloque XXIV, Nice, Prétirages, 197-213, 2 pl.

GUILAINE J., CLAUSTRE F., LEMERCIER O., SABATIER P. 2002. Campaniforme et environnement culturel en France méditerranéenne. in : NICOLIS F. (ed.). Bell Beakers today. Pottery, people, culture, symbols in prehistoric Europe. Proceedings of the International Colloquium, Riva del Garda (Trento, Italy), 11-16 May 1998. Provincia Autonoma di Trento, Trento, Volume 1, 229-275.

LEMERCIER O. 1998. Phénomène, culture et tradition : statuts et rôles du Campaniforme au IIIe millénaire dans le Sud-Est de la France, Bulletin de la Société Préhistorique Française, tome 95, n°3, 365-382.

LEMERCIER O. 2002. Le Campaniforme dans le sud-est de la France. De l'Archéologie à l'Histoire du troisième millénaire avant notre ère. Thèse de Doctorat, Aix-en-Provence : Université de Provence / ESEP, 4 volumes, 1451 p. (dont 487 figures, 35 cartes) et 11 cartes hors-texte.

LEMERCIER O. to be published. L'origine du groupe « barbelé » de la transition Campaniforme – Bronze ancien dans le sud-est de la France. L'hypothèse italique, en préparation.

LEMERCIER O., PELLISSIER M., TCHEREMISSINOFF Y. to be published. Campaniforme et sépultures. Au-delà du standard. La place du Campaniforme dans l'évolution des sépultures du sud-est de la France au troisième millénaire avant notre ère. In : CHAMBON P. (Dir.) : Les sépultures du Néolithique final et du Bronze ancien (2700-2000 av. J.-C.), Table ronde internationale de Sion, 2001, à paraître.

SALANOVA L. 2000. La question du Campaniforme en France et dans les îles anglo-normandes. Productions, chronologie et rôles d'un standard céramique, Paris, : Editions du CTHS : Société Préhistorique Française, 392 p. (Documents préhistoriques, 13).
STRAHM, C. 1997. Le Campaniforme : phénomène et culture, in : L'énigmatique Civilisation Campaniforme, Dijon : Editions Faton, 6-13 (Archéologia H.S. 9).
VITAL J., CONVERTINI F., JALLOT L., LEMERCIER O., LOISON G. (Dir.) 1999. Projet Collectif de Recherche : Composantes culturelles des premières productions céramiques du bronze ancien dans le sud-est de la France, Rapport 1999 : Provence-Alpes-Côte d'Azur, Valence : CAP, 135 p., 33 fig.

Remerciements :

Je remercie Annabelle Gallin et Samuel van Willigen (UMR 6636) pour leur traductions de ce texte et des résumés en langues anglaise et allemande, et Robin Furestier pour avoir présenté en mon absence forcée cette communication au symposium de Poznan 2002.

Olivier Lemerrier
Economies, Sociétés et Environnements Préhistoriques, UMR 6636 – ESEP.
MMSH – ESEP, 5 rue du Château de l'Horloge, BP 647, F-3094 AIX-EN-PROVENCE
cedex 2 (France)

Contact actuel :

Olivier Lemerrier

Archéologie, Cultures et Sociétés UMR 5594-ACS

Université de Bourgogne, Bâtiment Sciences-Gabriel, 6, Bd Gabriel, F-21000 Dijon

Olivier.lemerrier@u-bourgogne.fr