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Cremation burials in central and southwestern Europe: Quantifying an adoption of innovation in the 2nd millennium BC

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Abstract

The Late Bronze Age in Europe represents a perfect case study to test different and competing hypotheses of social dynamics and cultural changes in small-scale societies. Among the most relevant changes which took place in the 2nd millennium BC, the introduction and the development of the cremation rite deserves a particular attention for its relevance. Traditionally, the origin of the so-called Urnfield culture has been placed in the Charpato-Danubian area. From this region cremation burials would have expanded across space and along time toward western and southern territories. It follows that the presence of the cremation rite in the north-east of Iberian Peninsula has been explained as a consequence of such east to west people movements. Recently, scholars started to assume the inner complexity, which characterizes the introduction and the development of the cremation practice, as shown by the variability in grave types, the magnitude of the dispersal area and the social and ideological deep transformations following the adoption of such innovation.

In this paper we want to adopt an innovative approach. Through the chrono- and geostatistical analysis of a comprehensive dataset of radiocarbon-dated cremation burials we aim to model the spread of the cremation practice in the time span 1800-800 BC in central and southwestern Europe. The basic assumption is the detection of a spatio-temporal gradient which is an outcome of an expansive phenomenon, i.e. a dynamic system in which every location, at some well-specified underlying space, has a distinctive behavior through time. When a system expands through time, we can foresee a certain degree of dependence between locations, and this dependence is exactly what gives unity to the process.

Obtained results show the existence of a consistent East to West space-time gradient, which could be explained as a result of spreading movements from the northwestern Alpine region and the Swiss Plateau to western and southern territories.

Keywords: Radiocarbon dating, cremation, Bronze Age, central-western Europe, diffusion.

Résumé

L'âge du Bronze final en Europe est un cas d'étude parfait pour tester différentes hypothèses concurrentes relatives aux dynamiques sociales et aux changements culturels dans les sociétés de petite dimension. Parmi les transformations les plus remarquables ayant eu lieu au IIe millénaire avant J.-C. comptent l'introduction et le développement de la crémation, lesquelles méritent une attention toute particulière. Traditionnellement, l'origine de la culture dite des champs d'urnes est placée dans la région carpato-danubienne. À partir de cette région, cette culture se serait diffusée vers l'ouest et du sud de l'Europe. L'arrivée de cette culture dans le nord-est de la péninsule ibérique est généralement expliquée comme une conséquence de mouvements de population d'est en ouest. Depuis peu, les chercheurs commencent à appréhender la complexité interne qui caractérise l'introduction et le développement de ce nouveau rite funéraire, comme le montre la variabilité des types de tombes, l'ampleur de l'aire de dispersion et les profondes transformations sociales et idéologiques consécutives à l'adoption d'une telle innovation.

Dans cet article nous souhaitons adopter une approche innovante, à travers l'analyse chrono- et géostatistique d'un ensemble de données complet de sépultures à crémation datées au radiocarbone. Nous visons en particulier à modéliser la propagation de la pratique de la crémation entre 1800 et 800 avant J.-C. en Europe centrale et du sud-ouest. L'hypothèse de base est la détection d'un gradient spatio-temporel résultant d'un phénomène expansif, c'est-à-dire un système dynamique dans lequel chaque emplacement, dans un espace sous-jacent bien défini, a un comportement distinctif dans le temps. Lorsqu'un système s'étend dans le temps, il est possible de prévoir un certain degré de dépendance entre les lieux, et cette dépendance est précisément ce qui donne l'unité au processus. Les résultats obtenus montrent l'existence d'un gradient spatio-temporel cohérent d'est en ouest, qui pourrait s'expliquer par un résultat de mouvements de propagation du nord-ouest de la région alpine et du plateau suisse vers les territoires de l'ouest et du sud.

Mots-clés : *Datation au radiocarbone, crémation, âge du bronze, Europe centrale et occidentale, diffusion.*

1. EXPANSION, GROWTH AND DIFFUSION, A THEORETICAL FRAMEWORK FOR ADOPTION OF INNOVATIONS

The main goal of archaeological research is to reconstruct social actions in the past from a more or less coherent sub-sample of material remains from that past context having survived in the present. Our purpose is to understand why someone made something somewhere and somewhen.

In this study our aim is to investigate the causes of space-time distributions of archaeological observables, such as cremation burials in the 2nd millennium BC. We take for granted that the cause of an observed spatial distribution is not 'space', but the nature of social action that generated the precise location and accumulation of material evidence at specific places and specific moments, and the local circumstances at the moment of the action. If an action A took place at some location L, and at some time T, it should be related with the occurrence of observed material evidence around L that can be determined were generated at time T, but also with observed material evidence located elsewhere, and at T-1 and T+1, to explain why A took place where it took place and not in another location and at another place (BARCELÓ, 2005; MAXIMIANO, 2007).

A key concept in this paper is the idea of *expansion*, which allows us to explain the implicit relationship between time and space, as expressed in Tobler's first law of geography (TOBLER, 1970), in dynamic ('historical') terms. We refer to expansive phenomena as dynamical systems such that every location at some well specified underlying space has a distinctive behavior through time (BARCELÓ *et al.*, 2014). Our definition comes from the mathematical concept of *expansivity*, which formalizes the idea of points moving away from one-another under the action of an iterated function (BARCELÓ *et al.*, 2015).

The concept of expansion has been extensively treated in a large variety of fields, such as in physics, in business, and in mathematics, among others. More related with our research goal is the notion of expansion in geography, usually correlated with the notion of directivity. In this domain, expansion refers to a system in which a gradient of a scalar field can be detected. Three types of gradients can be detected: a spatial gradient, a temporal gradient, and a spatio-temporal one (CAPUZZO *et al.*, 2019). They are closely connected; we cannot consider the spatial gradient without the time dimension but within it. The variation in space or in time of any quantity can be represented graphically by a slope. The gradient represents the steepness and direction of that slope and it can be represented by a vector field that points in the direction of the greatest rate of increase of the scalar field, and whose magnitude is that rate of increase. In dynamical terms, we may explain the presence of some degree of directivity in spatio-temporal data in terms of movement, and hence of expansion, in the mathematical and physical senses of the word. Formal conditions for an expansive phenomenon are the existence of a spatial gradient and directivity, which implies a similarity in neighbor regions, as explained in the Tobler's law (TOBLER, 1970).

Expansive phenomena in historical research have been traditionally related with the movement of people through space: invasions, migrations, colonizations, and conquests, what gives the appearance of an expanding population of men and women moving across space (and time). In recent times, however, expansive phenomena in historical research are not limited to the assumption of population movement but can also imply the movements of goods and/or ideas. Therefore, 'historical expansions' are not always a consequence of movement of people (a demic diffusion) but can be caused also by phenomena of cultural diffusion (acculturation) dealing with the 'migration' of ideas (PRIEN, 2005), knowledge or goods. As soon as time passes, farther places begin to use previously unknown goods or ideas, increasing the distance between the place where the good or idea appeared for the first time, and the place where it is used anew.

A spatio-temporal gradient can be the result of people movements across space and time but also of other social mechanisms, like exchange, imitation, or cultural transmission (CREANZA *et al.,* 2017; GARVEY, 2018; WALSH *et al.*, 2019). In early-complex protohistoric societies, besides classic demic diffusion models we should also consider other social mechanisms that may fit better the archaeological data we investigate. Among them, trade, acculturation, imitation, transmission, political domination, or others may be used to explain the space-time differences or similarities in the adoption of certain cultural features, like a particular kind of toll, a specific pottery type, a new funerary ritual, a new economic practice, a new language, or a new religion.

The term *diffusion* has been defined as the process in which something new is communicated through certain channels over time among the members of a social system (HÄGERSTRAND, 1952; BROWN, 1981; ROGERS, 2003). Diffusion is as well the action as the result of phenomena of expansion of ideas, practices or objects, which are usually referred as 'innovations' when they are perceived as new or different by an individual or other unit of adoption. According to Schumpeter (1934), to innovate is to introduce something 'new' or different by *propagating* it in an environment and generating irreversibilities in the evolution of this environment. The more complex the innovation, the more influence its diffusion process will have on transformation of its propagation environment, as effects induced by its adoption will be all the more increased.

Nevertheless, innovations are not necessarily improvements, nor they should be labeled positively. One of the shortcomings of diffusion research is its pro-innovation bias (ROGERS, 2003), implying that any innovation should be always diffused and adopted by all members of a social system because it is necessarily 'better'. Such a bias leads us to ignore the study of ignorance about social, economic, cultural, and technological change, to underemphasize the rejection or discontinuance of change. We should not refer to 'innovativeness' as a positive characteristic of early adopters, because the adoption or rejection is the consequence of social decision, and hence a rational decision weighted by the social and economic situation in which it is taken. In fact, innovation is a complex process involving numerous and often unidentified factors (DÜRRWÄCHTER, 2009).

An innovation should be studied as something that did not exist before, be it better or worse than what existed before. We use the words 'innovation' and 'change' as synonyms. 'New' means here 'different than what existed before, or what was previously unseen' by an individual or another social agent. The adoption of something 'different' is then evidence for 'change'. Changes in ideas, practices or objects are also tightly linked with change in time and in space. Without change in time it is impossible to imagine qualitative changes, it is an independent variable of the said interaction. There is space only, when the observer does not consider time, that is 'dynamic'. We can refer to time as a generalization of changes and modifications in place (BARCELÓ, 2005). A pattern existing at one moment of time is the result of the set of processes that have differential spatial impacts. The key aspect is here the '*location* of cultural, social, economic or technological changes'. *Location* should be understood in its spatiotemporal signification. We understand by it, a characteristic of a concrete event that defines how the characteristics of the event have changed from state 0_1 to state 0_2 at two different places E_1 and E_2, and at two different moments of time T_1 and T_2. When we discover some regularity across space and time, we may say that there is a certain degree of *dependence* between changes and the adoption of innovations, and this dependence, is exactly what gives its appearance of unity to the process of adopting the innovation. What we are looking for are the causes of this location, and we are trying to explain them in terms of the 'influence' that another event located in the space-time has on the events located in the proximity. The assumption is that *space* is a system of concrete relations between physical objects and *time* is some function of modifications which are going on in these objects.

But how can we detect expansive processes and adoption of innovations in archaeology?

Through the analysis of the remains of social actions carried out in the past and buried in the archaeological record, archaeologists aim to reconstruct a wide series of phenomena, like exchange networks, people movements, and episodes of colonization, among others. Theoretically related to the topic of this paper is the methodological framework used to describe the diffusion of agriculture and the process of Neolithization in Europe. Ammerman and Cavalli-Sforza (1971), after the analysis of a wide dataset of georeferenced radiocarbon dates associated to the early occurrence of agriculture in Europe, suggested a demic diffusion that would have brought the agriculture from the Middle East to Eastern and the North-Eastern territories through several waves of advance. The assumption for explaining the origin of this demic movement was related to an episode of demographic growth that would have led to an excessive stress on the available resources. Therefore, this increase in the demographic pressure would have produced a sort of migration toward territories with a lower degree of exploitation. This approach has been then refined, including the possibility of acculturation phenomena (AMMERMAN & CAVALLI-SFORZA, 1984; GKIASTA *et al.*, 2003; RUSSELL, 2004; PINHASI *et al.*, 2005; DOLUKHANOV *et al.*, 2005; BOCQUET-APPEL *et al.*, 2009; ISERN *et al.*, 2012; MAZZUCCO *et al.*, 2018, 2020). Recently, the possibility of demographic increase has also been also addressed for the Bronze Age in central and western Europe (CAPUZZO *et al.*, 2018).

The theory behind the *wave of advance model* to describe people movement assumes the existence of a logistic population growth and a random migratory movement.

The logistic growth model describes a process that is exponential with an initial growth rate α, when the population density $\rho\ (x,\ y,\ t)$ has low values, and it is self-limiting for large densities, with a maximum possible density $\rho_{max.}$ The logistic rate of change of the population size can be described in the following equation:

$$F(\rho)=\alpha\rho\left(1-\frac{\rho}{\rho_{max}}\right)$$

in which $F(\rho)$ is the variation of the population density over time experienced due to population growth, α is the initial growth rate and ρ_{max} is the carrying capacity.

The migratory process is described by the formula:

$$m=\langle\Delta^2\rangle/T$$

Where Δ is the displacement of an individual during a time-span T and the symbols indicate average.

The two assumptions were included in the Fisher model (FISHER, 1937), which was first created for describing the diffusion of some advantageous genes. The result was the developing of the reaction-diffusion equation:

$$\frac{dp}{dt}=D\left(\frac{d^2p}{dx^2}+\frac{d^2p}{dy^2}\right)+ap\left(1-\frac{p}{p_{max}}\right)$$

in which $\frac{dp}{dt}$ is the variation of the population density over time,

$D\left(\frac{d^2p}{dx^2}+\frac{d^2p}{dy^2}\right)$ is the diffusion and $ap\left(1-\frac{p}{p_{max}}\right)$ is the reaction (logistic growth).

In recent times, the wave of advance model has also been employed for the study of a wide range of space-time dispersal processes including not only demic diffusion, but also cultural transmissions, and adoption of innovations.

One of the most robust findings from over 3,000 studies in the diffusion of innovation literature is the S-shaped cumulative adoption curve, which is the plotted result of a cumulative adoption time path or temporal pattern of a diffusion process (BASS, 1969; CASETTI, 1969; Fig.1 and Fig. 2). This vast literature contains data for the spread of an enormous variety of practices, technologies, and ideas in communities and countries throughout the world. These cases include the adoption of 'innovations' such as hybrid corn among Iowa farmers, new governance practices among Fortune 500 companies, chemical fertilizers among small-scale farmers and the practice of not smoking among Americans. Typically, the cumulative adoption curve for the spread of these practices has an S-shape.

The S-shaped (sigmoid) adopter distribution rises slowly at first, when there are only few adopters in each time period. The curve then accelerates to a maximum until half of the individuals in the system have adopted. Then it increases at a gradually slower rate as fewer and fewer remaining individuals adopt the innovation. It is meaningful to highlight that although the diffusion pattern of most innovations can be described in terms of a general S-shaped curve, the exact form of each curve, including the slope and the asymptote, can differ (MAHAJAN & PETERSON, 1985). In fact, the slope can be more flat or steep according to a rapid or a slow diffusion.

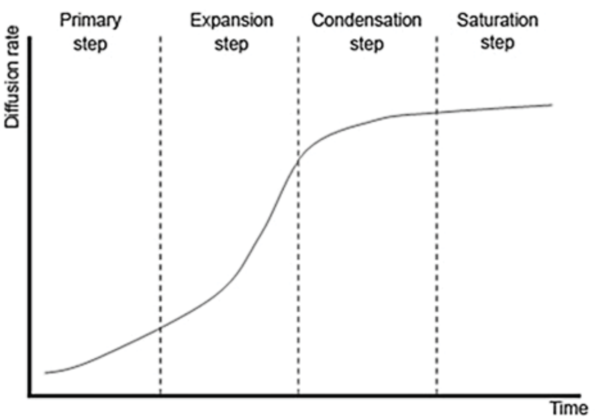

Fig. 1 – The S-Shaped diffusion curve with the four main stages in the adoption of innovation.

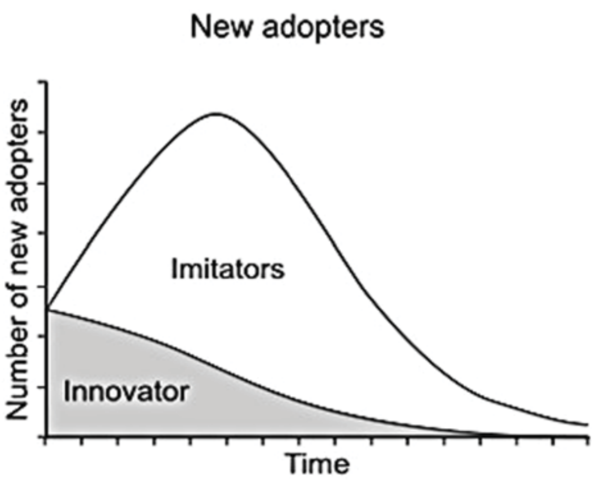

Fig. 2 – The model for forecasting the diffusion of new consumer products proposed by Frank Bass (Source: BASS, 1969).

The time element of any diffusion process allows us to draw diffusion curves and to understand the dynamics of the innovation-decision process. Because time is required for innovations to be adopted by the members of a population and, depending on both internal and external factors, some innovations diffuse faster than others; one can reasonably define the concept of diffusion speed as a measure of how fast a particular innovation is adopted (SHINOARA, 2012). As Nieto *et al.* (1998) argued, the underlying hypothesis in diffusion models that are based on the logistical function is simple: the speed to which the total number of agents that adopt a new technology depends on the number of agents that have already assimilated it and the potential number of those that have not yet incorporated it. In other words, as fewer agents are left to adopt a new technology, the rate at which adoption occurs decreases. This produces the convex segment at the top of the S-curve that marks the inflection point from a rapid to a more gradual increase. The S-curve is produced in a setting where the population of agents is finite.

In terms of development, the S-curve describes a path of an initially slow performance increase followed by a rapid rise in performance that levels off as some physical limit of potential is approached (ALTSHULLER, 1984; ERIKSSON, 1997; NIETO *et al.*, 1998; WEDGWOOD *et al.*, 2003; BOWDEN, 2004). The S-shape of a typical development curve can be viewed as the result of the process of exhausting a 'solution space' of potential improvements: as the pool is explored and exploited there are fewer and fewer improvements remaining to be discovered, slowing the pace of improvement if the number of trials stays the same. Again, the S-curve is produced in a setting where there is a finite potential for improvement.

According to standard accounts, the adoption of an innovation usually follows a normal, bell-shaped curve when plotted over time on a frequency basis. Such a process follows a number of rules, which allow us to distinguish four main stages (Fig. 1).

The first one is the *primary step*, which corresponds to the beginning of the diffusion. At this temporal location, only a few individuals adopt the innovation in each time period, therefore diffusion introduces a new differentiation inside geographical space. This is the time span in which the role of the innovators is crucial for the further stages. A contrast is appearing between places where the event took place and other places. Soon the diffusion curve begins to climb, as more and more individuals adopt it in each succeeding time period. This is the second stage, which is called *expansion step*. In this phase the occurrence of the event takes place generating a gradual softening of the strongest contrasts between places. During the following step, that is called *condensation step*, the rate of penetration into the different places tends to become more homogeneous, while speeds of diffusion in the various places grow closer. In this stage the trajectory of the rate of adoption begins to level off, as fewer and fewer individuals remain who have not yet adopted the innovation. Finally, in the ultimate step, that is called *saturation step*, the penetration rate increases toward a maximum following an asymptotic curve. S-shaped curve reaches its asymptote, and the diffusion process is finished. This point can be interpreted as the maximum carrying capacity of the system. No more adopters can be included in the process.

The S-shaped curve is constructed and plotted in two dimensions, representing the cumulative number of adopters occurring over time. The adoption process can also be drawn in a not cumulative way by a Gaussian (Fig. 3); these are just two different ways to display the same data.

In both the cumulated frequency distribution and the normal distribution, the points 1 and 3 correspond to the early and the late phases of the adoption process. In such phases, which are relatively stable regions, it is difficult to change the system (ROGERS *et al.*, 2005). On the contrary, the highest reactivity across all adopter groups is found at the critical mass inflection point, point 2 on the S-shaped diffusion curve.

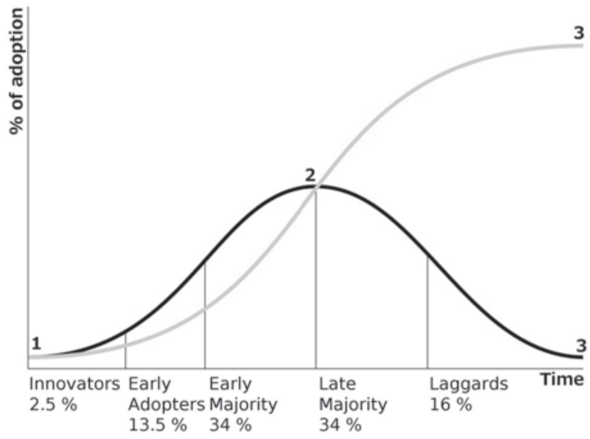

Fig. 3 – The diffusion of innovation according to Rogers (2003). The normal distribution is in black, and the cumulative frequency distribution is in grey.

This is where cascades of change occur. 'Critical mass is reached at the point where there are enough adopters that further diffusion becomes self-sustaining (ROGERS, 2003). At the height of the adoption curve, the fittest members of the social network have self-organized (adapted) to the higher plateau of fitness and adopted the innovation. Bifurcation, or decision, points have been passed on the way at step-like critical-mass thresholds. Unfit adopters, those without sufficient capability or inclination to adopt, have been precluded from participating in the adoption of the innovation' (ROGERS *et al.*, 2005). In such a process Rogers (2003) managed to quantify the amount and the role of agents which take place in the time span, from the innovators to the laggards.

An important point in the S-shaped curve is the so-called point of inflection (point 2). It is the point where the curve changes from increasing faster to increasing slower. It also marks some symmetry for the curve, both for the population and for time. In fact, half of the people are accounted for below the point of inflection, and half are accounted for above that point. Moreover, half of time is accounted for the left of the point of inflection, and half of the time is accounted for the right of that point. This is a key point of interest because it is about where critical mass occurs, *i.e.* the point after which further diffusion becomes self-sustaining (ROGERS, 2003; ROGERS *et al.*, 2005). A continuing increase in the number of adopters, or synapses, or processing elements, increases the energy being processed in the local system at the inflection point. Until that point of critical mass is reached on the S-curve, the rate of increase in the number of adopters per time unit is nearly linear (ROGERS *et al.*, 2005).

The essential meaning of this function is 'the rate of growth is proportional to both the amount of growth already accomplished and the amount of growth remaining to be accomplished'. Understanding of that concept helps to catch part of the answer to the question: 'Why does the S-curve approach possess forecasting powers?' (KUCHARAVY & DE GUIO, 2011).

Casetti (1969) suggested this model based on the following postulates:

1. that the adoption of technological innovations by potential users results primarily from 'messages' emitted by adopters;
2. that potential users have different degrees of 'resistance' to change;
3. that within any region there are potential users with different degrees of 'resistance';
4. that resistance is overcome by a sufficiently large repetition of messages. It can be shown that the dynamic interaction of these postulates causes the proportion of adopters to increase slowly at first, then rapidly, then slowly again until saturation is reached.

Moreover, according to Kucharavy and De Guio (2011) the forecasting power of the S-curve is due to the basic concept of limiting resources that lies at the basis of any growth process. In diverse areas, limiting resources are named in different ways: scarcest resources (geochemistry), restricted resources (economy), limitation of resources, resource constraint (theory of constraints), etc. In most cases, applying an S-curve for forecasting induces the correct measurement of the growth process that in turn can be applied to identify the law of natural growth quantitatively and to reveal the value of the ceiling (upper limits of growth) and steepness of the growth (slope of curve). Obviously, the more precise the data and the bigger the section of the S-curve they cover leads to a lower level of uncertainties. In other words, one can identify a more accurate ceiling and steepness with a larger data set. This effect causes some difficulties in applying an S-curve forecast for emerging technologies, which have not yet passed the 'infant mortality' threshold (when the ratio of new to old technology has not reached 0.1).

The slopes and inflection points of any given development or diffusion curve are potentially affected by several other factors. Conceptually, accordingly to Mahajan and Peterson (1985) it is possible to consider the effect of the communication channels, i.e., the mediums by which information is transmitted to or within a social system, which can be of the following type: vertical, centralized, structured, or formal. According to Young (2009), innovation is diffused through two channels: from the internal source to the group and/or from the external source to the group. The intensity of these sources determines the shape of the curve. The diffusion patterns of these models can be characterized in function of two mathematical properties: the symmetry of the adoption rate curve and the inflection point location relatively to the adopters' accumulation (SAMPAIO *et al.*, 2013).

Eventually, it is meaningful to highlight that the S-curve is innovation-specific and system-specific, describing the diffusion of a particular new idea among the member units of a specific system. The S-shaped curve describes only cases of successful innovation, in which an innovation spreads to almost all the potential adopters in a social system. Many changes are not 'successful'.

2. THE CLASSICAL LOGISTIC MODEL OF TEMPORAL GROWTH

The regularity of systems' evolution, characterized by an initial slow change, followed by a rapid change and then ending in a slow change again are observed since statistical observation was established in the mid-18th century. Various scientists and researchers discovered, reinvented, and adapted the curves of nonlinear growth many times for different domains of knowledge. Therefore, S-shaped curves possess a lot of different names: Logistic curve, Verhulst-Pearl equation, Pearl curve, Richard's curve (Generalized Logistic), Growth curve, Gompertz curve, S-curve, S-shaped pattern, Saturation curve, Sigmoid(al) curve, Foster's curve, Bass model, and many others.

To model the diffusion of innovation and thus determine the rate of growth in the number of users of an innovation and predicting their numbers in the future, one can use the mathematical theory of the spread of infections during an epidemic or the theory of information transfer (KIJEK & KIJEK, 2010). Using the theory of epidemiology, a fundamental model of innovation diffusion can be expressed by the differential equation:

$$\frac{dN(t)}{dt} = g(t)(m - N(t))$$

where:
- t is time,
- $N(t)$ is the cumulative numbers of adopters at time t,
- m is the ultimate ceiling of potential adopters,
- $g(t)$ is the coefficient (rate) of diffusion.

This equation points out that the diffusion rate is a function of the number of the potential adopters who have not yet adopted the technology and the rate of diffusion. The rate of diffusion, $g(t)$, reflects the likelihood that potential adopters will adopt the innovation in some small interval of time around time t. The value of $g(t)$ depends on such characteristics of the diffusion process as the type of innovation, communication channels, time, and the traits of the social system. Depending on the formula for the coefficient of diffusion, $g(t)$, there are three specific models of innovation diffusion (KIJEK & KIJEK, 2010):

1. the external-influence model, where the coefficient of diffusion $g(t)$ is a constant p,
2. the internal-influence model, where the coefficient of diffusion $g(t)$ is $qN(t)$,
3. the mixed-influence model, where the coefficient of diffusion $g(t)$ is $p + qN(t)$.

The constant p in the external influence model is defined as the coefficient of innovation or external influence, emanating from the outside of a social system. Under such a premise, it can be assumed that p depends directly on communication regarding innovation, formulated by market agents, government agencies, etc., and aimed at potential users of innovation. This model is applicable to modeling the diffusion of innovation, where agents of the social system are relatively isolated, when formalized and hierarchical communications dominate the sphere of communication. This is the case of the classical Pearl-Venhurst model. Its equation is:

$$f(x) = \frac{1}{1 + e^{-x}}$$

Where e is Euler's number (e = 2.71828...)

The constant q in the internal-influence model, defined as the coefficient of imitation, reflects the interactions of prior adopters with potential adopters. Therefore, the decision by potential users to adopt an innovation depends directly on the information formulated by existing users. The internal-influence model is appropriate to characterize the diffusion of innovation when a social system is relatively small and homogenous and there is a need for legitimizing information prior to adoption. The specific form of this model is the well-known Gompertz law of mortality, which states the rate of mortality (decay) falls exponentially with current size.

$$y(t) = ae^{-be^{-ct}}$$

Where:
- a is the upper asymptote, since $ae^{be^{-\infty}} = ae^0 = a$
- b, c are positive numbers,
- b sets the displacement along the x axis (translates the graph to the left or right),
- c sets the growth rate (y scaling),
- e is Euler's Number (e = 2.71828...).

Examples of uses for Gompertz curves include mobile phone uptake, where costs were initially high (so uptake was slow), followed by a period of rapid growth, followed by a slowing of uptake as saturation was reached, and population in a confined space, as birth rates first increase and then slow as resource limits are reached.

A final hypothesis is the mixed-influence model, developed by Bass (1969), which subsumes both previous models. For the mixed-influence model, the diffusion coefficient $g(t)$ is equal to $p + q\,N(t)$. In view of its great degree of generality, due to the accommodation of both internal and external influences, mixed-influence models are the most frequently employed in analyses. The mixed-influence model can be expressed using the following equation:

$$\frac{dN(t)}{dt}=\left(p+\frac{q}{m}N(t)\right)(m-N(t))$$

where:
- $N(t)$ is the cumulative number of adopters at time t,
- m is the ceiling,
- p is the coefficient of innovation,
- q is the coefficient of imitation.

Assuming $F(t) = N(t)/m$, where $F(t)$ is the fraction of potential adopters who have adopted the technology by time t, the Bass model can be restated as:

$$\frac{dF(t)}{dt}=(p+qF(t))(1-F(t))$$

The Richards' model (RICHARDS, 1959) is an empirical model developed for fitting growth data. By using a shape parameter that enables the curve to stretch or shrink, the Richards' model encompasses the Gompertz, Fisher–Pry and every other imaginable sigmoidal model (BANKS, 1994; MARINAKIS, 2012).

The *Richards' function,* or also known as *generalized logistic function*, is an extension of the logistic function, allowing for more flexible S-shaped curves.
Its formula is:

$$Y(t)=A+\frac{K-A}{\left(1+Qe^{-B(t-M)}\right)^{1/T}}$$

Where:
- Y is weight, height, size, etc.,
- t is time,
- A is the lower asymptote,
- K is the upper asymptote. If A=0 then K is called the carrying capacity. K-A=C,
- B is the growth rate,
- T > 0 affects near which asymptote maximum growth occurs,
- Q depends on the value $Y(0)$,
- M is the time of maximum growth if Q=T.

When T=0, the model approximates an exponential growth function. When T=0.67, the model behaves like the von Bertalanffy. When v approaches 1, the model behaves like the Gompertz. When T=2, the model behaves like the Logistic model. In this later case, we may assume (BANKS, 1994; SHARIF & RAMANATHAN, 1981):

1. the population of potential adopters is limited (N) and remains constant with time;
2. all members of the population eventually adopt;
4. all adopters are imitators and adopt only after seeing another using the innovation;
5. the adoption rate is dependent only on the number who have adopted but also on the proportion of the maximum number of adopters that is still unrealized;
6. the probability of one pair of individuals meeting is the same that of any other pair meeting.

3. Bronze Age cremation burials and the Urnfield phenomenon

The adoption of the process of body cremation in Europe during the 2nd millennium BC is a complex phenomenon; archaeological evidence has shown the existence of variations in the grave types, in the chronology, and more recently also in the cremation settings between different regions (CAPUZZO & BARCELÓ, 2015; BRUNNER et al., 2020; SCHMID, 2020; STAMATAKI *et al.*, 2021). While in some regions, e.g. in the territory corresponding to modern-day Belgium cremation is attested with continuity since the Early Bronze Age (CAPUZZO *et al.*, 2020), in other areas, like northeastern Spain, the cremation practice took place only from the Late Bronze Age.

Due to its spatial magnitude the spread of the traditionally called *Urnfield culture,* or *Urnenfelderkultur* in the German terminology, certainly covers a main role. With this term we mean the diffusion of a 'new' grave type and a funerary ritual with the cremation of bodies and placing of their ashes in urns as the main characteristic. The long-term deposition of urns for more than a single generation led to the formation of extended cemeteries with a high concentration of burials (MÜLLER-KARPE, 1959; SPERBER, 1987). The accepted chronology of this 'new' burial practice comprises a large period between the *Bz D* and *Ha B3* conventional phases (KOSSACK, 1954; 1995; MÜLLER-KARPE, 1959; HOLSTE, 1962; TERŽAN, 1999; CARDARELLI *et al.*, 2020).

The first scholar writing about 'urn fields of the Bronze Age' was probably Otto Tischler in 1886 (PROBST, 1996: 258). It was around the end of the 19th century and the beginning of the 20th century, with the ever-increasing discovery of cemeteries formed by cremated remains in urns, when cremation started to be considered as the dominant burial practice during Late Bronze Age. The discussion was led by personalities like the Swedish archaeologist Oscar Montelius (1885, 1903) and the Danish paleontologist Sophus Müller (1897). According to the historical traditions at that time, in a socio-political background that tended to look for the origins and roots of modern population in a remote and often 'sacralized' past, urnfields were interpreted as the material evidence of a supposed Urnfield society, whose main feature was the adoption of a new funerary ritual. Despite the association between one ethnos (a coherent social and cultural entity) and material evidence recorded in the archaeological record was a quite usual at the end of 19th century, some archaeologists, like Ingvald Undset (1882: 132) strongly asserted the lack of relationship between this cultural practice and a distinct historical period or an individualized 'population' (STIG SØRENSEN & REBAY-SALISBURY, 2008).

At the end of the first half of the 20th century, researchers like Wolfgang Kimmig started to approach the phenomenon in a global European scale. He was probably the author of the first studies of urnfields in Baden (southwestern Germany) and in France (KIMMIG, 1940, 1951). As a result of those early investigations, the oldest urnfields should be placed in the Carpatho-Danubian-Balkan region (SCHAUER, 1975). From there, the burial practice would have 'expanded' in waves to the western, northern, southern, and southwestern regions during the *Hallstatt* period, which traditionally was characterized by an intense demographic growth, as evidenced by the increase in the number and size of settlements and necropolis (Fig. 4). 'It was assumed that similar forms of material culture in different geographical areas must have had a common source, hence cultural change is seen as a result of diffusion rather than evolution (Sklenář, 1983: 146)' (quoted by STIG SØRENSEN & REBAY-SALISBURY, 2008: 62).

The result of such waves of expansion would have led to the spread of both cremations burials and certain types of metallic and ceramic objects, such as ornaments, weapons, and pottery decorations. Wolfang Kimmig in his article *Seevolkerbewegung und Urnenfelderkultur* started to propose this hypothesis, connecting the expansion of *Urnfield culture* peoples with the attack committed by the so-called Sea Peoples in the Eastern basin of the Mediterranean in the 12th century BC (KIMMIG, 1964). Following this line of reasoning, the *Urnfield culture* of central Europe and in particular in the regions located north of the Alps developed as a result of the arrival of human groups from eastern Europe and their interaction with local population (KIMMIG, 1952; DE MULDER *et al.*, 2009). According to this perspective, the archaeological record located in the Middle Danubian Valley was interpreted as the result of a migration of people that could be identified with the Lusatian culture, as initially proposed by Gordon Childe (CHILDE, 1929). Childe, who strongly defended the importance of movements of people and cultural influences, assumed afterwards a triple origin for the Hungarian and North Alpine Urnfield people: 1) as descendants of an autochthonous population, 2) due to invasions, or 3) a combination of the two hypotheses (CHILDE, 1939). Eventually, he theorized that cremation burials were introduced from Greece not by a mass migration but by missionaries, chieftains, or a conquering aristocracy (CHILDE, 1950).

In the same years, a fervent debate about the origin and the spread of Urnfields was animated by the Catalan archaeologist Pere Bosch Gimpera. He introduced the term *campos de urnas* to characterize the archaeological record of the first Iron Age in northeastern Iberian Peninsula (Catalonia), referring to a 'Culture of the urns' in analogy with the *Urnenfelderkultur* from southern Germany (BOSCH GIMPERA, 1919; RUIZ ZAPATERO, 1985). Evidence for the existence of urnfield burials in the North-East

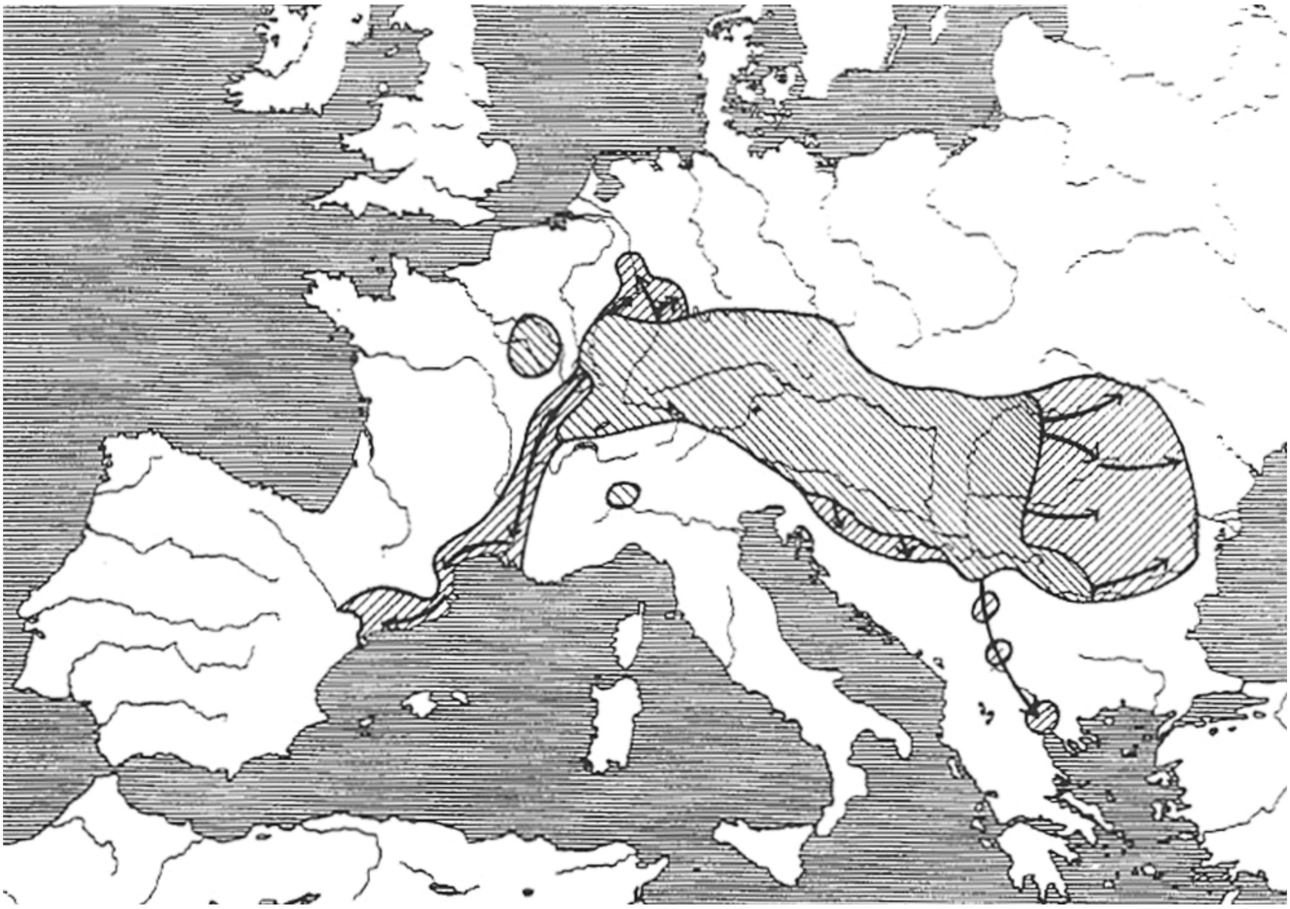

Fig. 4 – The region of formation of the first *Urnfield culture* and its expansion during the *Ha A1* phase (Source: FALKENSTEIN, 1997).

of Iberian Peninsula were the necropoles of Les Obagues de Montsant and El Calvari del Molar, both in the southern part of Catalonia, around the Ebro Valley, studied by Salvador Vilaseca i Anguera at the end of the first half of the 20th century (VILASECA, 1943, 1947). The theory of an invasion from central Europe to the southwestern part of Europe gained agreement among Spanish historians and archaeologists. The arrival of a new population, whose ethnic origin was often described as Celtic, would explain the first apparition of a ritual practice unknown in the area until this period, and would be useful to understand the chronological assignment of specific pottery and metallic typologies. In particular, pottery decorated with grooved motifs (*acanalados*) was traditionally linked with the diffusion of Urnfields (VILASECA, 1954; RUIZ ZAPATERO, 2014). This kind of decoration, formed by large flat grooves decorating the exterior and the interior part of vessels, especially funerary urns (VILASECA, 1954; ALMAGRO GORBEA, 1977), was considered as a proof for the arrival of the new people.

The main debate in northeastern Spain, till the '60s of last century was focused on the number of possible invasions from central Europe. The positions were mainly two: the first one, by Bosch Gimpera and other archaeologists ('the Catalan school'), who maintained the idea of a series of invasions, like waves of expansion, and the one defended by the Spanish archaeologist Martín Almagro Basch, who identified the existence of only one invasion for explaining the phenomenon (ALMAGRO, 1935, 1952; RUIZ ZAPATERO, 1985). In the '70s, this 'invasionist' hypothesis lost part of its acceptance. An invasion could explain the first appearance of some archaeological features, but not the posterior development, which would be explained better according to an autochthonous evolution. This new hypothesis was the consequence of a far greater number of archaeological excavations on a wider scale, which revealed the existence of differentiation at a regional scale (ALMAGRO GORBEA, 1997).

In the '80s, thanks to the work of Patrice Brun (BRUN, 1984; BRUN & MORDANT, 1988), the term 'Rhin-Suisse-France orientale' (RSFO) group was introduced to account for central European cultural influences in Late Bronze Age sites from eastern France. Such 'archaeological group' was considered as part of the *Urnfield culture* (BOURGEOIS, 1989; DE MULDER *et al*, 2007). Far from the invasionist hypothesis, Patrice Brun shifted emphasis from migrations to a socio-economic interpretation of cultural changes observed in Late Bronze Age archaeological records (DE MULDER *et al.*, 2008). The geographic location of the RSFO group includes a wide territory which covers part of southern Germany, Switzerland, and northeast France. From these regions, the RSFO group would have expanded through movements of population in a northern-west and south direction (Fig. 5).

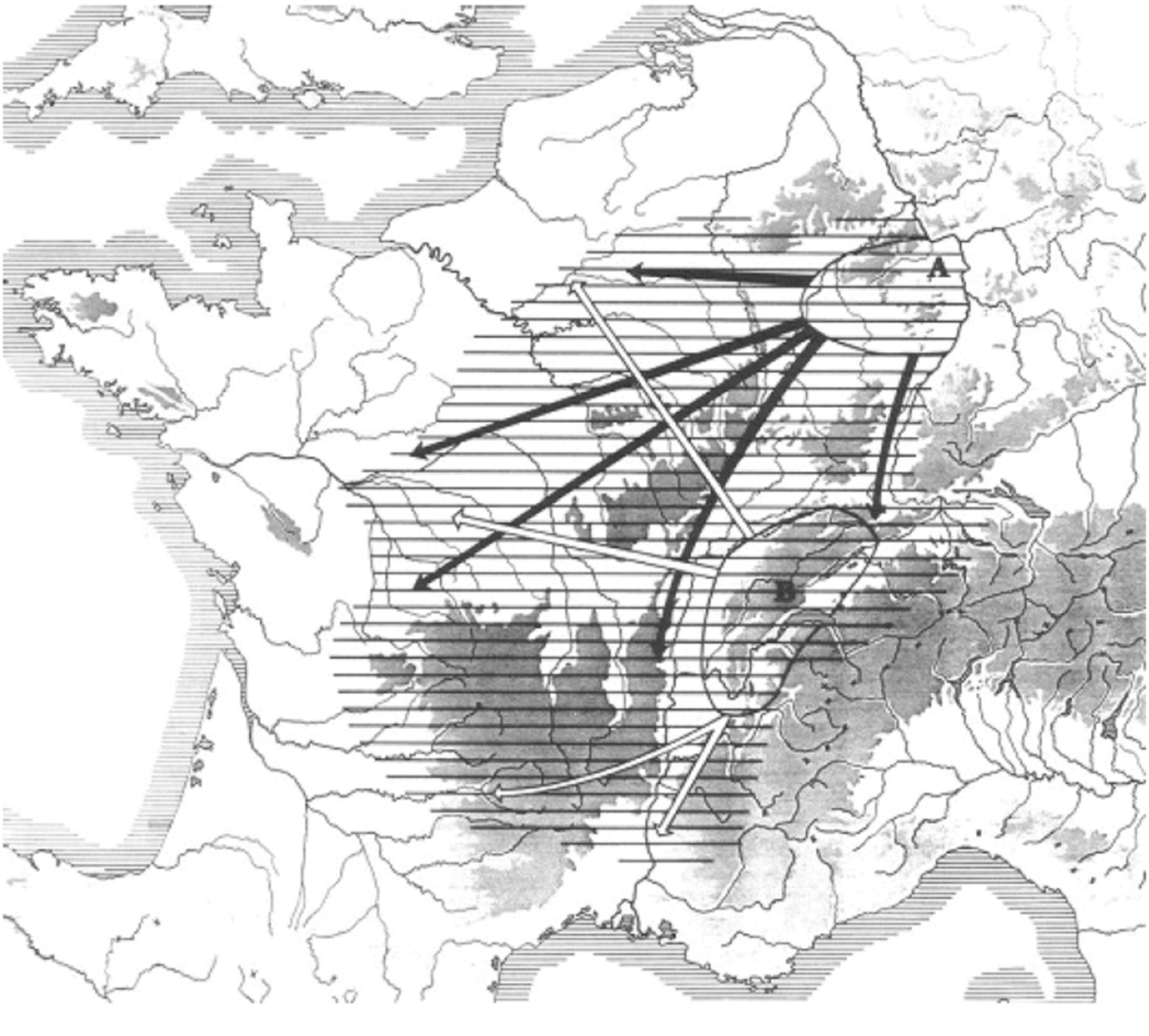

Fig. 5 – The expansion of the Rhin-Suisse-France orientale (RSFO) group during phase 2 of LBA. The areas A and B represent the core areas from which the group RSFO spread over northwestern Europe (Source: BRUN & MORDANT, 1988).

In this latter case, the communication axis was located along the valley of the river Rhone (LACHENAL, 2011). The main archaeological features of such a group are the occupation of open-air sites, the bronze deposits, and the use of cremation burials (BRUN & MORDANT, 1988). The period of its development corresponds to the traditional phases *Bronze Final IIb* and *IIIa* in the Hatt's chronological scheme, which correspond to *Hallstatt A2* and *B1* in the Müller Karpe's chronological framework (LACHENAL, 2011).

Traditionally, the introduction of urnfield burials in the Iberian Peninsula took place from southern France, following a terrestrial way, through the Eastern Pyrenees. Autochthonous population living in the southwestern part of France certainly played a relevant role in the diffusion/transmission of new cultural elements from North of the Alps areas towards the other side of the Pyrenees. Relationships between the Iberian Urnfield groups and those linked with the RSFO are attested by the presence of similar decoration and pottery typologies, like urn with cylindrical neck (NEUMAIER, 2006), traditionally used as a time marker (GUILAINE, 1972; PONS, 1984).

In the '90s, Jordi Rovira i Port (1991), after determining that the oldest Urnfields were located in Catalonia along the middle and southern coast, proposed a maritime arrival for the Catalan cremation burials, which would be dated around 1300/1200 BC. The phenomenon was interpreted in terms of the arrival of small groups that would have later expanded towards the interior of Iberian Peninsula.

A particular care needs the analysis of funerary remains and related archaeological contexts of the Italian Peninsula during the Bronze Age. Cremation burials in urns are largely attested from the end of the Middle Bronze Age in Northern Italy and they become a common phenomenon during Late Bronze Age (VANNACCI LUNAZZI, 1971; SALZANI, 1985, 1994, 2004; VENTURINO GAMBARI & VILLA, 1993; CARDARELLI, 1997, 2014; TIRABASSI, 1997; GAMBARI & VENTURINO GAMBARI, 1998, 2012; CARDARELLI *et al.*, 2003, 2020; SIMONE ZOPFI, 2005a, 2005b). The origin and the developments of the Italian first urnfields was traditionally linked to the arrival of new people, following the Pigorini's theory major episodes of people movements took place from the north-alpine areas (Swiss lake-dwellings), founding the lake-dwellings Polada villages and at a second stage from the Hungarian plain in relation with the establishment of the terramare settlements, whose funerary practice was mainly cremation (HELBIG, 1879; PIGORINI, 1909; CARDARELLI *et al.*, 2020).

As a consequence of Bosch Gimpera's studies, the influence of the Urnfields in northern Italy was recognized in 1963 by F. Rittatore Vonwiller (1963), who proposed an invasion of Urnfielders along the axis of the Ticino, after the analysis of the Canegrate cremation cemetery, which gives the name to the homonymous archaeological culture that spread also in Lombardy, Piedmont, and Canton of Ticino.

De Marinis (1988) placed in the Middle Bronze Age, specifically in the phase *BM 2* (ca. 1500/1450 BC), the introduction in Italy of the cremation burial practice, following Urnfield characteristics. A phase in which cremation rite would have coexisted with the inhumation practice in northern Italy, especially in the Adige and Mincio area (DE MARINIS, 2003). The oldest cremation burials in northwestern Italy (perhaps originally under tumuli), like those discovered at the necropolis of Alba (Cuneo) had an inner organization different from the usual disposition in transalpine Urnfields and in cemeteries of the Canegrate culture (GAMBARI & VENTURINO GAMBARI, 1998). Such difference has been explained in terms of a 'progressional development' of new elements, instead of a sudden arrival ('invasive') of Urnfield elements in northern Italy as a consequence of migration (GAMBARI & VENTURINO GAMBARI, 1998: 245).

Nowadays, the focus on the Urnfields has slightly moved towards other aspects (DE MULDER *et al.*, 2007, 2008; CAPUZZO & BARCELÓ, 2015; CAPUZZO & LÓPEZ CACHERO, 2017; CAVAZZUTI *et al.*, 2019; CARDARELLI *et al.*, 2020; GAVRANOVIĆ & LOŽNJAK-DIZDAR, 2020; SABAUX *et al.*, 2021). The identification of the original Urnfielders has been a widely debated topic; various hypotheses have been addressed (Illyrians, Celts, Dorians and Thracians). In recent times, the possibility that Urnfielders could have originated from different tribes with various ethnicities has been also taken into account (KRISTIANSEN, 1998; KRISTINSSON, 2010). In general, a greater attention into distinguishing the different components of the phenomenon can be recognized in recent studies. Instead of considering the *Urnfield culture* as a homogenous package, it has been decomposed in single features analyzed individually. For instance, several differences in the typology of the cremation burials have been recognized: 1) urn graves, 2) urn less graves, where cremated bones are covered by charcoals from the pyre, 3) urn less graves with only cremated bones, etc. An example is the typological seriation created by De Mulder (2011) to describe cremation burials in the Scheldt valley in northern Belgium.

In few cases, a small mound could also cover the graves, as demonstrated in some cremations dated to a transition phase between the 'Tumulus culture' (*Hügelgräberkultur*) characteristic of Middle Bronze Age in central Europe and the *Urnfield culture* of the Late Bronze Age. At this regard, in the *Bz C* and the *Bz D* phases in Styria (Austria) cremated bones appeared in flat graves, and cremations burials under tumuli are documented in only three cases (TIEFENGRABER, 2007; LOŽNJAK-DIZDAR, 2011). The result of such archaeological variability is the need to argue for the development of innumerable regional and local expressions and specific forms (TERŽAN, 1999; PRZYBIŁA, 2009).

The diffusion of fluted pottery (*cerámica acanalada*), which was traditionally linked with the expansion of cremation burials to the extreme that this archaeological type was seen as a synonymous of the oldest Urnfields (ALMAGRO GORBEA, 1977), is currently considered as the consequence of autonomous processes (RUIZ ZAPATERO, 1997; NEUMAIER, 2006; LÓPEZ CACHERO, 2007, 2008, 2014; ROVIRA HORTALÀ *et al.*, 2012; CAPUZZO & BARCELÓ, 2014; LÓPEZ CACHERO & ROVIRA HORTALÀ, 2017). Notably, in Catalonia, previous forms of settlement and burial practice, and older traditions of pottery decoration and metallurgical types (the local substratum) did not disappear simultaneously with the first presences of Urnfield items. On the contrary, in Central Europe, older traditions of pottery making and metallurgy seem to disappear at the end of the conventional phase *Bz D* (NEUMAIER, 1995).

In the last decades, thanks to scientific advances in human biology and bioarchaeology, new relevant tools have been developed to analyze the genetic differences among human populations in the past, interpreting them as an evidence of people movements and episodes of substitution of population in a specific place and during a certain time. A recent archaeogenetic study carried out in the Iberian Peninsula, have identified a consistent trend of increased ancestry related to northern and central European populations for the Iron Age, with respect to the preceding Bronze Age. Such trend 'documents gene flow into Iberia during the Late Bronze Age or Early Iron Age, possibly associated with the introduction of the Urnfield tradition' (OLALDE *et al.*, 2019).

4. QUANTIFYING THE ADOPTION OF CREMATION FUNERARY PRACTICE

This paper focuses on the adoption of different funerary rites, namely cremation and inhumation, in central and southwestern Europe during the time span 1800-800 BC using the chronological information from radiocarbon-dated archaeological contexts. The use of ^{14}C dates as data has shown large potentialities to reconstruct variations in past burial practices (CAPUZZO, 2014; MCLAUGHLIN *et al.*, 2016; MORELL, 2019; BRUNNER *et al.*, 2020; CAPUZZO *et al.*, 2020; SCHMID, 2020).

To understand the temporal distribution of inhumation and cremation burials, two Summed Calibrated Probability Distributions (SCPDs) (WILLIAMS, 2012) and Kernel Density Estimates (KDEs) have been produced using radiocarbon dates from funerary contexts between the Ebro and the Danube Rivers included in the EUBAR database (CAPUZZO *et al.*, 2014), updated with recent findings (Annex 1, Fig. 6).

The advantage of summing a group of calibrated radiocarbon estimates is to produce a new unique probability density function for a period hypothetically defined, which is the result of the sum of the individual confidence intervals. The obtained result should not be interpreted as an interval of time, but as the probabilistic distribution of the 'best' estimate. To avoid the noise artefacts characteristic of SCPDs, this study uses also kernel density plots (FEESER *et al.*, 2019; LOFTUS *et al.*, 2019; MCLAUGHLIN, 2019; MAZZUCCO *et al.*, 2020; CAPUZZO *et al.*, 2020) to describe variations in the use of different funerary rites in the area under study. The OxCal 4.3 tool KDE_Plot that provides a kernel density distribution for the dates removes the high frequency noise of the SCPDs, retaining only the lower frequency signal and thus eliminating data dispersion (BRONK RAMSEY, 2017). The result is a smoother curve, without sharp spikes and edges typical of the SCPDs, which are still visible in the background of the KDE plots. Peaks in the SCPDs in the KDE plots correspond to episodes of maximum development of the studied phenomenon, whilst troughs are interpreted as moments of contraction. Collected data (Annex 1) have been filtered excluding from the analysis all the ^{14}C dates with a standard deviation greater than 100 years, allowing a reduction in global uncertainty while at the same time maintaining a reasonable sample size. Dates on charcoal that were clearly affected by an old-wood effect, as

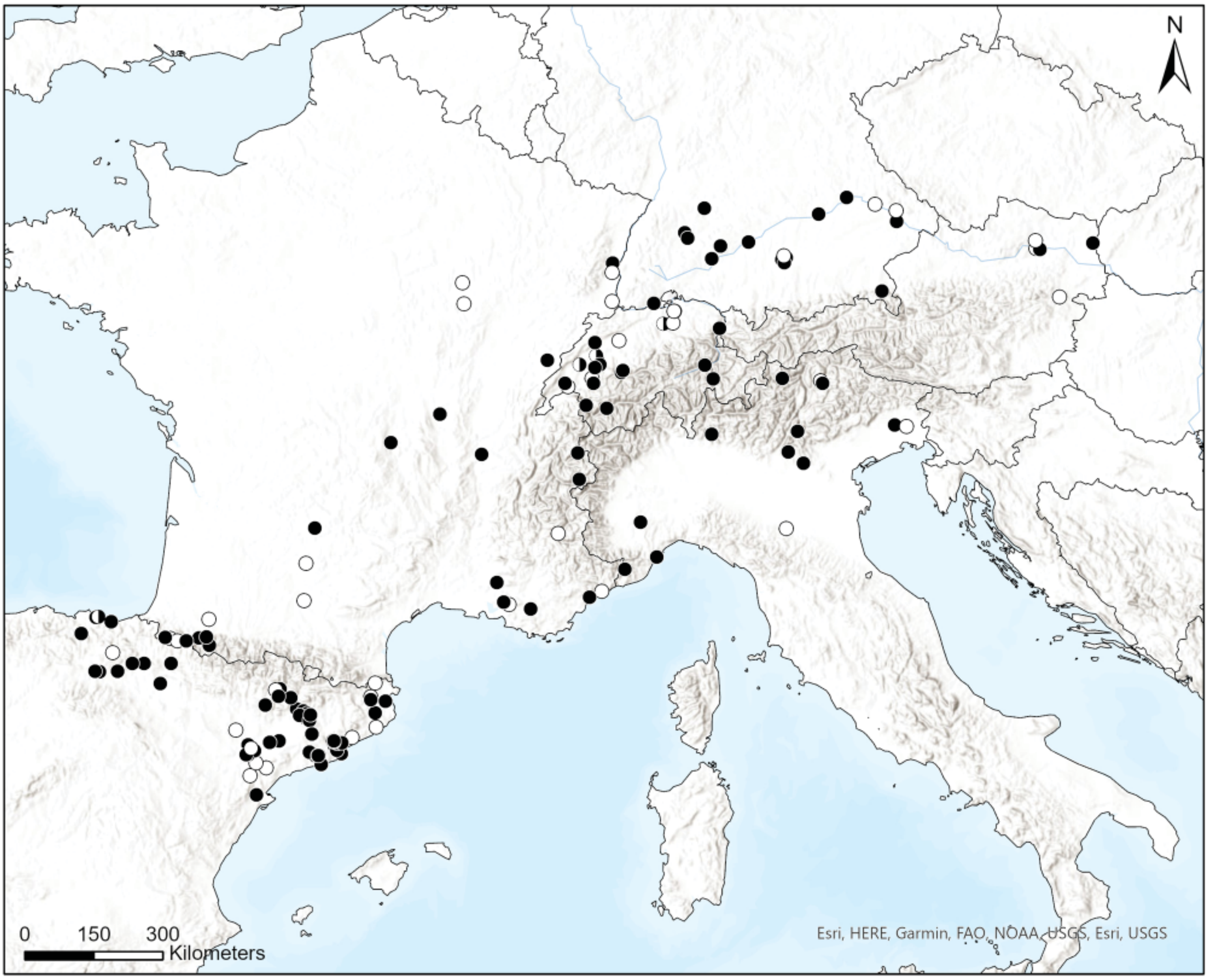

Fig. 6 – ^{14}C-dated funerary sites in central and western Europe included in the study, black dots correspond to inhumation burials, white dots to cremation burials, and black and white dots are sites where the two rites are present.

the date Ua-17897 from Chables/Les Biolleyres, were rejected. Multiple dates from the same dated individual have been combined using the tool R_Combine in OxCal 4.4 (BRONK RAMSEY, 2009). Multiple dates coming from the same site have not been combined since collected dates originating from different burials do not correspond to a single depositional event but to a series of archaeological events with different calendar ages (BOGDANOVIĆ *et al.*, 2014). These events are essential to understand the temporal occurrence of specific funerary rites along more than one generation in the same site.

The aim is to visualize over a macro-scale the possible temporal differences between the two phenomena: the use of inhumation burials and the adoption of the cremation rite both at a macro- and a regional scale. The area under study embraces a large territory in central and southwestern Europe, from the Ebro to the Danube rivers, encompassing northeastern Iberian Peninsula, southern France, northern Italy, Switzerland, Austria, and southern Germany (CAPUZZO *et al.*, 2018).

Two hundred eighty-four ^{14}C dates originating from 117 archaeological sites characterized by the presence of radiocarbon-dated inhumations and 106 dates from 46 sites with cremations have been retained for the SCPDs and KDE plots (Fig. 7). The result of the modeling shows a negative trend in the number of inhumation burials for the time span 1800-800 BC. In particular, the decrease in the number of contexts seems to be more pronounced from the end of the 15th century BC, whilst from ca. 1300 to 800 BC the presence of inhumations shows an overall stability without significant fluctuations. Consequently, observed peaks and valleys in the SCPD-KDE reconstructions may be taken as a probabilistic signal of start and end events. The steepness of the slope may be indicative of the rapidity of this process of contraction. Such result, which points the decrease in the probability of finding inhumations for the time span 1800-800 BC, can be used as a proxy for a reduction of the number of people practicing the inhumation rite.

An opposite trend characterizes the number of cremation burials in the Bronze Age and Iron Age transition at macro scale. A clear positive trend has been identified by KDE modeling ^{14}C-dated contexts, which is more pronounced in the last part of the time span, corresponding to the Late Bronze Age and the Iron Age transition (Fig. 7). The SCPDs and the

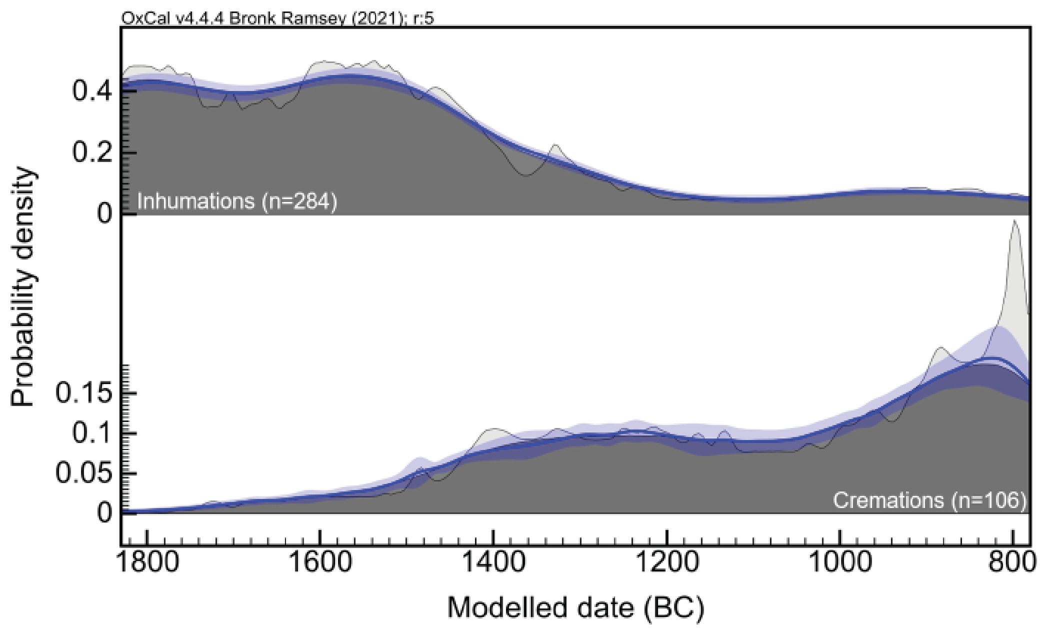

Fig. 7 – SCPDs and KDE plots showing the temporal distribution of inhumation and cremation burials in central and southwestern Europe.

KDE plots have to be interpreted as a graphical visualization of the probability of recovering cremation burials in the analyzed time span and can be used to infer variations in the number of inhumation/cremation practice adopters.

The interpretation of these results suggests that the lesser people were inhumated, the more people were cremated. It implies that the smaller the number of people practicing the inhumation rite, the higher the number of adopters of the cremation rite between 1800 and 800 BC in central and southwestern Europe.

In order to analyze at a smaller scale the temporal frequency of cremation burials four main regions have been selected: the North of the Alps area (Switzerland, Austria, and southern Germany), northern Italy, southern France, and northeastern Spain (Fig. 8). The very low number of available dates in some regions, as in northern Italy and in southern France implies a lower reliability of the shape of the KDE plots for these two areas. For the South of France, the curve does not completely reflect the archaeological data, with less than fifty cremation burials for the sequence from the 13th to the 10th century BC, whereas nearly a thousand of cremated bone deposits have been typologically dated to the 9th century BC. The same lack of dates is detected in the KDE plot of northern Italy, where the absence of ^{14}C data for the end of the sequence does not correspond to the archaeological data, since cremation cemeteries are widely attested in this period. Regional KDE plots can therefore reflect also different research practices and traditions, in particular in those regions in which the practice of radiocarbon dating Late Bronze Age cremations is not particularly widespread and scientific dating methods are used for the earliest graves

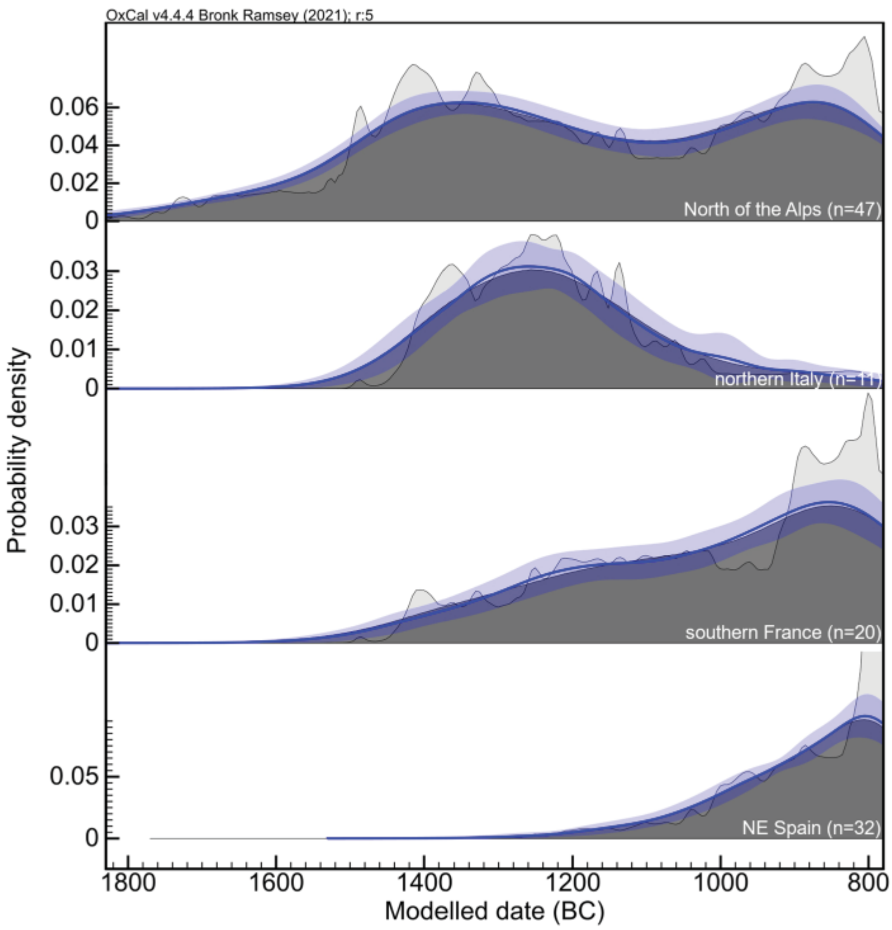

Fig. 8 – SCPDs and KDE plots showing the temporal distribution of cremation burials in, from top to bottom, the area North of the Alps, northern Italy, southern France, and northeastern Spain.

that do not fit into the known typo chronological framework.

The need of increasing in the next future the number of available radiocarbon dates from Bronze Age cremated deposits in these two regions is highly needed.

Despite this research bias, it has been possible to distinguish regional differences from the SCPDs and KDE plots in the chronology for the first adoption of cremation practice in the various territories. The cremation rite during the 2nd millennium BC seems to be placed earlier in the North of the Alps territories, where the phenomenon shows a positive trend as we move to the 800 BC. In northern Italy, the cremation practice appears defined by a more recent chronology with the phenomenon starting from the middle phases of the Bronze Age, from ca. 1500 BC. Similar chronology characterizes southern France, where the probability of the adoption of cremation starts at the end of the 15th century BC and increases in the analyzed time span. A positive trend but with a later chronology can be recognized in northeastern Spain, where the cremation rite reaches its maximum development at ca. 800 BC.

Since the effects of the calibration curve on radiocarbon estimates can alter the shape of the SCPDs and partially of the KDE plots, a simulated SCPD plot composed of uniformly distributed radiocarbon dates (one date per year with 10 years as common standard deviation), under the assumption that the amount of dated funerary sites was the same for each year, was produced in CAPUZZO *et al.*, 2018. This was done to test a null hypothesis of no relationship between the observed SCPDs and KDEs and the effects of particular sections of the calibration curve, such as plateaus and calendar age steps in the time span 1800-800 BC (WILLIAMS, 2012). A prominent peak in the simulated SCPD is visible at ca. 800 BC, corresponding to a steep calendar-age step between 860 and 700 BC in the calibration curve. A second peak of considerably lesser magnitude, is visible at ca. 1420 BC, matching the calendar-age step in the intervals 1500-1380 BC. Beside the area around 800 BC, the simulated SCPD curve maintains a reasonably neutral trend, suggesting an overall limited influence of the calibration curve on our study time window.

5. Fitting the Explanatory Model to Archaeological Data

Predicting the number of archaeological artifacts at a specific moment of time is a fundamental concern in the study of the adoption of new tools, technologies, and behaviors in ancient times. According to what we have considered in previous sections, one model often used to make such predictions is a geometric growth model which assumes that a population of artifacts grows by the same percentage every year. This is the classical frequency model by Ford (1962) and Bordes (1967). This is unrealistic in the long run because geometric growth models ignore issues such as function and production costs that limit the number of artifacts at each moment.

We prefer to work with probabilities instead of frequencies. We are not considering the growth in the quantity of objects, but the growth of the probability that those objects were in used, assuming that the more objects were in used, the higher the probability. Because no population grows without bounds, we have defined a *maximum* not in reference to a *carrying capacity*, but on the basis of the proportion of adopters. If everyone is using/producing the artifact or practicing the ritual, then the probability is 1.

Using summed probabilities for a specific calendar year, we are modeling the possible growth of different populations of tools, sites or burials considering the sequence *Nt*, where *Nt* is a period of validity (BARCELÓ, 2008), defined statistically as the period of time that fulfills the condition that there is a calculable nonzero probability, and at any time interval included therein it contains at least one of the true dates. For the calculation of *Nt*, we must bear in mind that OxCal has summed different probability distributions: the more archaeologically dated samples have the same chronological interval, the higher the probability (N_t) of that particular calendar year. In this way, ours appears to

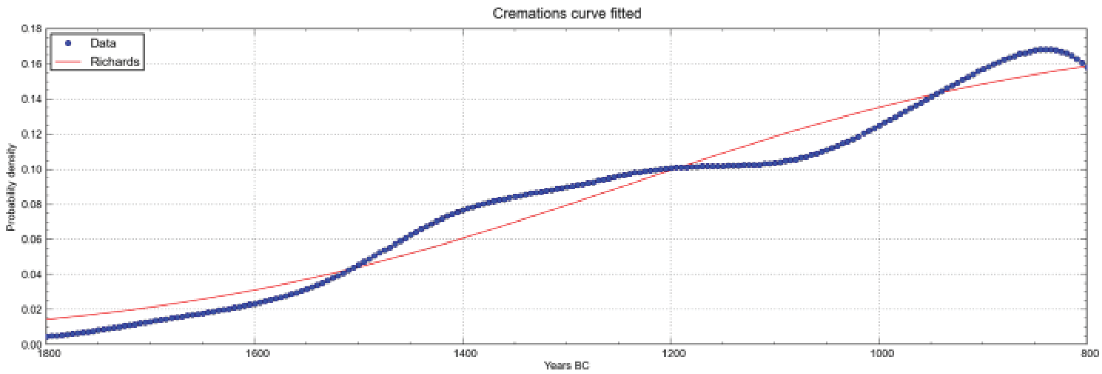

Fig. 9 – Generalized logistic distribution fitted to KDE data of cremation burials at Fig. 7 (Software: CurveExpert Pro 2.0).

be a binomial model including, in addition to the adopters and non-adopters, uncommitted members and members with varying degrees of receptivity to the innovation (SHARIF & RAMANATHAN, 1981).

In our case, we cannot assume that the potential adopter population is fixed and does not change with time. On the other hand, we assume that this population was exposed to some changes and innovations continuously over time and that the members of the population made binary decisions either to adopt or not to adopt the innovations.

In the light of such assumption, we have decided to analyze mathematically the adoption of cremation burials in the 2nd and beginning of the 1st millennium BC, for which the increase in the number of adopters has been detected both at a macro and regional scale.

To tackle this issue, the KDE-modeled data from cremations have been curve fitted using a generalized logistic curve (Richards' curve) (Fig. 9). The produced coefficients and parameter statistics have then been analyzed to ensure the reliability of the process and to infer its causes.

Among the obtained values we have focused on the R-squared, also called coefficient of determination, which indicates how well data points fit the statistical model, in our case the generalized logistic curve. The possible values range from 0 to 1. We have obtained high values, above 0.97 for cremation burials; it means that the adoption of the new funerary rite can be well explained by the generalized logistic curve.

A slow rate of adoption can be detected in the early phases when the role of innovators is predominant. Then the phenomenon is characterized by a more marked growth at least till 800 BC. It follows that the innovation spread fast in the time span 1500-1400 BC and from 1100 BC. Historically, the increase in the rate of adoption can be an effect of the decrease in the number of inhumation burials from the 15th century BC, as we observed in the related KDE plot (Fig. 7).

The obtained results underline the main problem in the application of S-curves to the study of growing processes, which relates to its smooth and regular profile. In fact, compared to fieldwork data, logistic law rather appears as a mathematically ideality; it does not take into account the variability which can characterize phenomena of growth, diffusion and adoption of innovation. These phenomena never exhibit a so smooth and regular profile; on the contrary they are frequently defined by angled curves which are directly correlated to the number of adopters. The lower number of susceptible adopters, the more angled the curve (RAYNAUD, 2010). As Raynaud (2010) argued the gap between the model and the real world lies in the assumption that societies are 'well-mixed populations,' assimilating the adoption of innovation to a random draw.

ID	Site	Latitude	Longitude	Lab code	^{14}C Age BP	±σ	Median (years BC)	Material and archaeological context	References
1	Wehringen, Hexenbergle	48.254602	10.806353	UZ-3556	2790	70	951	Wood; burial mound 8	Hennig 1995
2	Straubing, Kagers	48.916667	12.583329	BM-2991	2720	45	869	Animal bone; grave 48	Schopper 1993; Ambers & Bowman 2003
3	Künzing-Ost	48.833318	12.999994	BM-3027	2840	50	1003	Animal bone; grave 220	Schopper 1995; Ambers & Bowman 2003
4	Franzhausen, S33 Kokoron	48.348096	15.722398	VERA-732	2931	50	1134	Charcoal; grave 65	Lochner & Hellerschmid 2008, 2009
5	Hadersdorf	48.450135	15.716826	VERA-2069	2661	57	832	Animal bone; grave 88	Belardelli et al. 1990; Wewerka 1998
6	Pitten	47.712568	16.187493	VRI-93	3050	90	1291	Charcoal; remains of the pyre, area 372	Felber 1970; Benkovsky-Pivovarová 1991; Sørensen & Rebay 2005
7	Arroyo Butarque	40.338245	-3.681337	Beta-197521	2590	40	782	Human bone; pit 1	Blasco et al. 2007
8	Besalú, Can Barraca	42.208637	2.748324	Beta-216833	2620	40	799	Charcoal; grave 7, inside the urn	Martín Machín 2006
9	Agullana, Can Bech de Baix	42.405218	2.827987	CSIC-242	2770	60	922	Crystallized resin; grave 389, urn 15 of the C.4	Toledo & de Palol 2006
10	Terrassa, Can Missert	41.566381	2.012233	KIA-35577	2815	30	967	Human bone; urn 3581, Museo Episcopal de Vic	Pérez Conill 2009
11	Sabadell, Can Piteu-Can Roqueta	41.536654	2.138320	KIA-24835	2755	30	889	Human bone; urn 294-34B	Carlús et al. 2007, 2008
12	Gandesa, Coll de Moro	41.053401	0.390811	GrA-23646	2630	50	805	Human bone; tumulus, grave T42	Rafel 1991; Rafel & Armada 2008
13	Alcolea de Cinca, La Codera	41.724658	0.110283	GrN-26966	2610	40	794	Unknown; tumulus 6	Montón 2002
14	Palomar de Pintado	39.417068	-3.361345	Beta-178469	2820	40	974	Human bone; grave 76, inside the urn	Pereira Sieso et al. 2003
15	Seròs, Pedrós	41.458347	0.407092	OxA-13565	2657	37	819	Charcoal; tumulus	Higham et al. 2007
16	Vidreres, Pi de la Lliura	41.763779	2.852027	Beta-136241	2850	40	1014	Charcoal; urn E-15	Pons & Solés 2002, 2008
17	Conca de Dalt-Pont de Suert, Turó de la Capsera	42.304263	0.883157	UBAR-667	2835	55	998	Charcoal; tumulus 20, SU 2015	Medina Morales et al. 2012
18	Pau, Cami Salié	43.316626	-0.416666	Ly-2242	2650	140	807	Charcoal; tumulus 1, with urn	Evin et al. 1983
19	Réalville, Camp d'Alba	44.109096	1.477133	Ly-7433	2575	50	743	Charcoal; grave 79	Janin et al. 1997
20	Chaume-lès-Baigneux, tumulus	47.898687	4.537880	Lyon-1610	2985	55	1213	Human bone; central grave	Ratel 1970; BANADORA
21	Aix-en-Provence, Conservatoire	43.525539	5.439461	Poz-42731	2995	35	1231	Human bone; grave 37	Aujaleu et al. 2013
22	Estérençuby, Errotzaté 2	43.045831	-1.170259	Gif-3741	2680	100	855	Charcoal; cromlech	Blot 1977, 1995; Mariezkurrena 1990
23	Appenwihr, Kastenwald	48.033326	7.450001	Ly-2054	2800	130	993	Charcoal; tumulus 5, grave 5	Bonnet et al. 1981; Evin et al. 1983
24	Larrau, Millagate 5	43.009916	-1.030808	Gif-7559	2730	60	883	Charcoal; mound-cromlech	Blot 1991, 1995
25	Savines-le-Lac, La Combette	44.525571	6.404869	Poz-25712	3115	30	1387	Unknown; SU 102, grave	Campolo 2006; Lachenal 2010
26	Sierentz	47.654520	7.454682	Ly-4208	2990	100	1213	Charcoal; pit with cremation	BANADORA
27	Toulouse, ZAC Niel	43.578244	1.445402	Poz-47241	2880	35	1060	Human bone; SP2223, SU 2222-2D2	Verrier 2016
28	Formigine, Casinalbo	44.593219	10.853710	LTL-5100A	3102	45	1356	Human bone; grave 217	Cardarelli 2014
29	Barbiano, Ex Casa di Ricovero	46.603234	11.520332	ETH-25266	2960	45	1173	Charcoal; individual burial in a pit	Dal Ri & Tecchiati 2004
30	Foro di Cesare	41.894181	12.486691	Gra-16432	2920	60	1118	Unknown; grave 1	Nijboer & Van Der Plicht 2008
31	Pozzuolo	45.988092	13.195239	UD-58	2700	100	877	Charcoal; grave 2	Candussio 1980; Càssola 1980; Barbina et al. 1984
32	Roma, Quadrato	41.845227	12.586879	GrA-16423	2820	50	977	Unknown; grave 2	Nijboer & Van Der Plicht 2008
33	S. Palomba	41.707568	12.576605	GrA-27028	2875	35	1051	Unknown; grave 1	Nijboer & Van Der Plicht 2008
34	Trigoria	41.766800	12.479306	GrA-27025	2870	35	1044	Unknown; grave 3	Nijboer & Van Der Plicht 2008
35	Tarquinia, Villa Bruschi Falgari	42.240853	11.759284	GrA-23484	2885	45	1069	Human bone; grave 103	Trucco et al. 2001; Trucco 2006; Nijboer & Van Der Plicht 2008
36	Chodouny	50.533330	15.033328	P-1902	3080	60	1335	Charcoal; grave 7	Barta et al. 2013
37	Manětín, Hrádek	50.016659	13.249995	P-1913	2630	60	804	Charcoal; grave 164	Barta et al. 2013
38	Přáslavice, Díly pod dědinou	49.588368	17.392728	VERA-?	2990	40	1222	Charcoal; grave 14	Barta et al. 2013
39	Birmensdorf-Rameren	47.362281	8.446312	ETH-28490	3210	50	1476	Charcoal; tumulus, grave 9	Mäder 2008
40	Bulle FR, Le Terraillet	46.631112	7.061908	Ua-24629	2950	40	1160	Charcoal; tumulus	Mauvilly et al. 2006
41	Chables/Les Biolleyres 1	46.817499	6.817829	Ua-17888	3100	75	1349	Charcoal; structure FA 19	Duvanel et al. 2018
42	Fällanden-Fröschbach	47.369438	8.644476	UZ-3910	3400	60	1692	Charcoal; grave 12, among the calcined bones	Fischer 1997
43	Koppigen, Usserfeld	47.135554	7.586912	ETH-26775/UZ-4914	3020	55	1266	Charcoal; grave 1, individual burial in a pit	Ramstein 2005; Ramstein & Cueni 2005
44	Murten-Löwenberg	46.938616	7.141140	B-4994	3380	50	1665	Charcoal; tumulus 3, grave 11N.3	Bouyer & Boisaubert 1992; Fischer 1997
45	Neftenbach II (Zürichstrasse 55)	47.525379	8.660720	KIA-11173	3165	32	1443	Charcoal; grave 8, sample 81	Mäder 2009
46	Vidy (Lausanne VD)	46.521682	6.594960	CRG-655	2870	70	1052	Unknown; grave 2	Kaenel & Klausener 1990; David-Elbiali & Moinat 2005

Tab. 1 – First occurrences of ^{14}C-dated cremation burials in the Bronze Age-Iron Age transition in central and southwestern Europe.

6. Modeling the first occurrence of cremation burials between 1800 and 800 BC in central and southwestern Europe

The purpose of this last section is to model the spatial trend linking differences in time for the adoption of the new burial practice of cremation during the Bronze Age. If such a function can be calculated, then by using observations of archaeological chronologies made at some locations, we will estimate the chronology of archaeological evidence at neighbor locations and the probabilities that the new burial practice was adopted at some place at a specific time.

For a better comprehension of the phenomenon analyzed original data have been expanded including also ^{14}C-dated cremation burials from neighboring territories of central Spain, central Italy, and Czech Republic. To be able to create an interpolated map of chronological estimates taking into account the non-stationarity and irregularity of the phenomenon under study we have calculated the first occurrence of the phenomenon at regional scale, medians of radiocarbon dates calibrated with the IntCal20 calibration curve (Reimer *et al.*, 2020) have been used (Tab. 1). Although we are aware that no single value can adequately describe the complex shape of a calibrated radiocarbon probability density function, since a single estimate must be used for the analysis, the medians of the calibrated intervals have been chosen as robust point estimates of the calendar dates for each cremation deposit (Telford *et al.*, 2004).

Then, using an Empirical Bayesian Kriging (EBK) algorithm we have interpolated the chronology at unknown spatial locations based on what we know from some locations; the list of georeferenced 46 radiocarbon estimates (Tab. 1, Fig. 10). Kriging is based on the idea that the value at an unknown point should be the average of the known values at its neighbors; empirically weighted by a function of the neighbors' distance to the unknown point (Cressie, 1993; Stein, 1999; de Smith *et al.*, 2009; Mitchell, 2009). We have chosen a Power semivariogram model, which gave the best visual fit and it assumes that the similarity between data slowly diminishes over distance. Empirical Bayesian Kriging algorithm has allowed to identify a variation in space, defined by geographic coordinates x, y (Geographic Coordinate System: WGS 1984), and in time, measured by medians of calibrated ^{14}C dates for the introduction of cremation practice. The advantage offered by EBK is that it automatically calculates the parameters of the kriging model and yields more accurate outcomes, in particular about small datasets.

The degree of relationship between the 46 georeferenced ^{14}C dated cremation burials and the Earth's terrestrial surface is expressed by the semivariance. The obtained Power semivariogram for adoption of Bronze Age cremations is shown in Figure 11; the x-axis displays distances among observed points, the y-axis, in turn, indicates their semivariance. The visible nugget effect is a consequence of the variance at the origin and it is influenced by many factors, including imprecision in sampling techniques and underlying variability of the measured attribute. In our graph, the small value obtained for the nugget effect could suggest a local homogeneity (Brami & Zanotti, 2015; Mazzucco *et al.*, 2018). The sill refers to the maximum observed variability in the data and it should correspond to the variance of the data as usually estimated in statistics. The distance where the model first flattens out is known as range. Sample locations separated by distances closer than the range are spatially autocorrelated, whereas locations farther apart than the range are not.

The cross-validation graph (Fig. 12) compares the measured and predicted values for all points. Each point of the cross-validation graph represents a location in the ^{14}C data, for which an actual and estimated value is available. The Root-Mean-Square Standardized Error is a measure of the goodness of fit; the obtained value of 0.97 is very close to 1, then it follows that the predicted standard errors are valid.

Our geostatistical results show that the expansive nature of the adoption of the cremation during the Bronze Age in western Europe has a distinctive spatial gradient, which

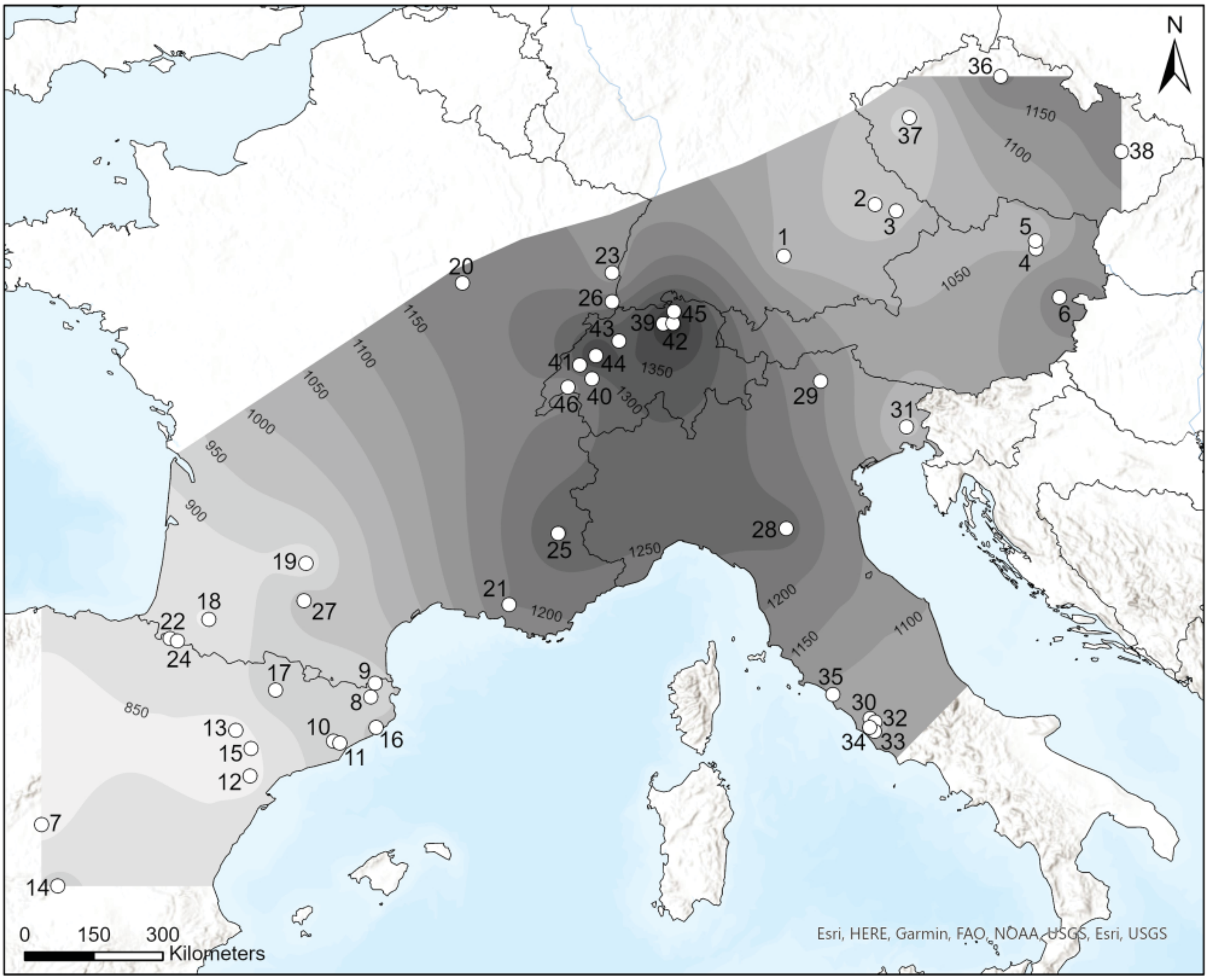

Fig. 10 – Visualizing spatial and temporal variations in the first occurrence of Bronze Age cremation burials; medians of the calibrated ^{14}C dates (Software: ArcGIS Pro). The numbers correspond to the IDs of the dataset at Table 1. Values on the contours correspond to years cal BC.

is characteristic both of demic diffusion and cultural transmission hypotheses.

The results suggest an expansion to explain the adoption of cremation burial practices during the 2nd and the beginning of the 1st millennium BC. Radiocarbon estimates interpolation shows that oldest cremation burials should be located in the Swiss Plateau and the western Alpine regions in Switzerland (Fig. 10). In such an area the phenomenon took place in the first half of the 16th century BC (CAPUZZO & BARCELÓ, 2015). However, these old contexts do not belong to the traditional urnfield horizon; these burials are urnless with the cremated remains deposited or scattered in pits, in cases under burial mounds as at Birmensdorf-Rameren and Murten-Löwenberg.

The area of the Swiss Plateau is defined by a demographic expansion during the 16th and 15th centuries BC (CAPUZZO *et al.*, 2018), that could have potentially promoted the diffusion of people to neighboring territories.

From this region the phenomenon would have expanded to North, East, South and South-West. Western France, northeastern Iberian Peninsula and central Italy appear to be areas where the transformation took place nearly 500/600 years later, also including the possible adoption of cremations without urn.

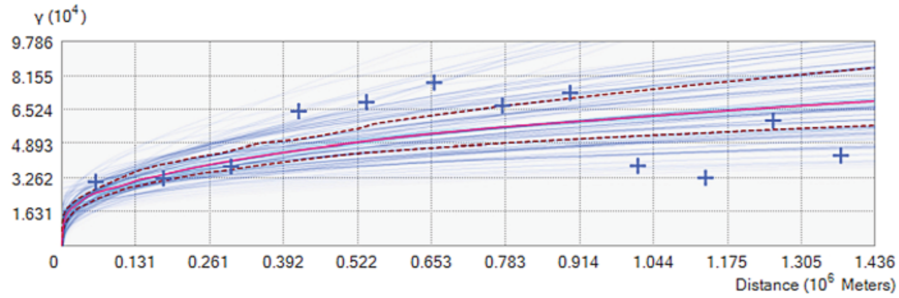

Fig. 11– Spectrum of the distribution of semivariograms produced by the Empirical Bayesian Kriging for the Bronze Age cremation burials. The empirical semivariances are represented by blue crosses, the median of the distribution is marked by a solid red line, and the 25th and 75th percentiles are marked by red dashed lines (Software: ArcGIS Pro).

Regarding the adoption of the cremation practice in the North-East of Iberian Peninsula we can detect two different patterns. The first one along the Mediterranean façade, where oldest cremation burials are placed close to the coast, hence, it could indicate a possible maritime penetration as already argued by Rovira i Port (1991). From this area the innovation would have expanded to the inner territories along the Ebro Valley. The second pattern is located in the Atlantic façade, where the adoption of cremation took place slightly later in time. These differences are in agreement with archaeological data which refer of an Atlantic Bronze Age culture, where cremation burials were mainly attested under cromlech structures and a Catalan Mediterranean façade where cremation burials were mainly in urns and characterized by strong influences from the Trans-Pyrenean region of Languedoc-Roussillon.

The model shows a general East to West spatio-temporal gradient with two origins for the adoption of cremation, the first one is placed in the Swiss Plateau and northwestern Alpine region, whilst the second one is detected at the western boundary of studied area, which corresponds to the Vienna basin and the neighboring Czech territory, close to the Danube-Carpathian regions. In the future, new data from radiocarbon-dated cremation burials will certainly improve the obtained model by filling existing spatial gaps, in particular for southern France and northern Italy. Moreover, adding data from northern and eastern Europe would help in getting a better picture of how cremation diffused in Europe.

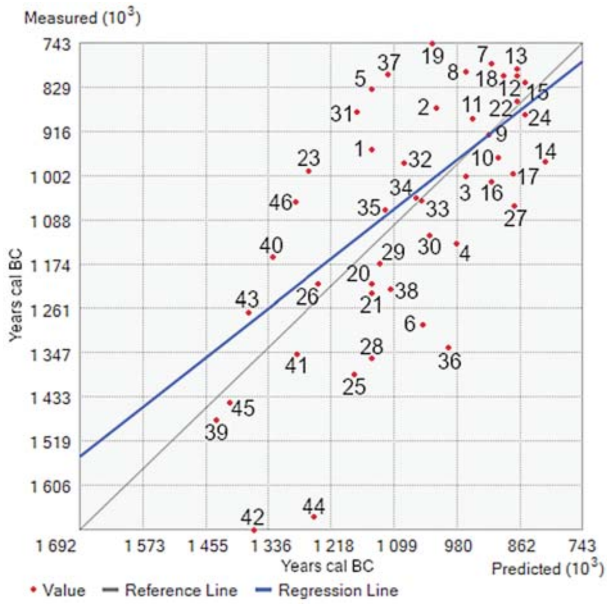

Fig. 12 – Cross-validation graph for the Empirical Bayesian Kriging. The numbers correspond to the IDs of the dataset at Table 1 (Software: ArcGIS Pro).

To sum up, to the question 'Was the first occurrence of cremation the result of an expansive process?' we should stress that our results seem to suggest a positive answer. Was this 'expansion' the consequence of demic expansion (people movements)? Our results give for the moment no conclusive answer. We postulate a statistically significant trend for early cremation burials to become younger with distance from the oldest ones somewhere in the Swiss Plateau. The presence of a clear spatial gradient in initial dates of the first adoption of cremation burials in the southern part of our study area indicates that the phenomenon can be tentatively explained as an expansion. It was, by implication, fast. It is also an implication that the wave speed was determined more by unusually high exploratory mobility than by exceptionally rapid reproductive increase (BARCELÓ *et al.*, 2014). If we could assume that movement (of people, ideas and/or goods) was equally likely in all directions and served to achieve uniform densities, regardless of local variation, we would conclude an average expansion speed of 0.6-1 km/year (values calculated using a standard Fisher-KPP model, BARCELÓ *et al.*, 2014).

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References

ADAMI R., BONAZZA M. & VARANINI G. M. (eds), 2005. *Volano. Storia di una comunità*. Rovereto (TN).

AGUSTÍ A., ALONSO N., GARCÉS I., JUNYENT E., LAFUENTE A. & LÓPEZ J. B., 2000. Una inhumación múltiple de perinatales en la fortaleza de Els Vilars (Arbeca, Lleida) y las prácticas de enterramiento en hábitat durante la 1a edad del Hierro en el valle del Segre (Cataluña). *In*: B. DEDET, P. GRUAT, G. MARCHAND, M. PY & M. SCHWALLER (eds), *Archéologie de la mort, Archéologie de la tombe au Premier Âge du Fer, Actes du XXII^{e} Colloque International de l'Association Française pour l'Étude de l'Âge du Fer (Conques-Montrozier 1997)*. Monographies d'Archéologie Méditerranéenne, **5**: 305-324.

ALMAGRO GORBEA M., 1977. El Pic dels Corbs, de Sagunto, y los Campos de Urnas del NE. de la Península Ibérica. *Saguntum*, **12**: 89-141.

ALMAGRO GORBEA M., 1997. La Edad del Bronce en la Península Ibérica: periodización y cronología. *Saguntum* 30: 217-229.

ALMAGRO M., 1935. *El problema de la invasión céltica en España según los últimos descubrimientos*. Investigación y Progreso IX.

ALMAGRO M., 1952. *La invasión céltica en España*. Historia de España dirigida por Menendez Pidal, T. **I**: vol. II.

ALTSHULLER G. S., 1984. *Creativity as an exact science: the theory of the solution of inventive problems*. New York.

ALTUNA J. & DE LA RUA C., 1989. Dataciones absolutas de los cráneos del yacimiento prehistórico de Urtiaga. *Munibe*, **47**: 23-28.

AMBERS J. & BOWMAN S., 2003. Radiocarbon measurements form the British Museum: datelist XXVI. *Archaeometry*, **45** (3): 531-340.

AMMERMAN A. J. & CAVALLI-SFORZA L. L., 1971. Measuring the rate of spread of early farming in Europe. *Man,* **6**: 674-688.

AMMERMAN A. J. & CAVALLI-SFORZA L. L., 1984. *The Neolithic Transition and the Genetics of Populations in Europe*. Princeton. New Jersey.

APELLANIZ J. M. & FERNANDEZ MEDRANO D., 1978. El sepulcro de galería segmentado de la Chabola de La Hechicera (Elvillar, Alava). Excavaciones y restauración. *Estudios de Arqueología Alavesa*, **9**: 141-221.

APELLANIZ J. M., NOLTE E. & ALTUNA J., 1966. Excavación, estudio y datación por el C14 de la cueva sepulcral de 'Kobeaga' (Ispaster, Vizcaya), con el estudio de la fauna. *Munibe*, **18**: 37-62.

ARIAS P., ALTUNA J., ARMENDÁRIZ A., GONZÁLEZ URQUIJO J. E., IBÁÑEZ ESTÉVEZ J. J., ONTAÑÓN R. & ZAPATA L., 1999. Nuevas aportaciones al conocimiento de las primeras sociedades productoras en la región cantábrica. *In*: J.

BERNABÉU & T. OROZCO (eds), *Actas del II Congrés del Neolític a la Península Ibérica (Valencia, 1999). Saguntum*. Papeles del Laboratorio de Arqueología de Valencia. Extra **2**: 549-557.

ARMENTANO N., GALLART J., JORDANA X., LÓPEZ J. B., MALGOSA A. & RAFEL N., 2006. La cova sepulcral de Montanissell (Sallent - Coll de Nargó, Alt Urgell): pràctiques funeràries singulars durant l'edat del bronze al Prepirineu. *Tribuna d'arqueologia*, 2006: 141-167.

ARNAUD G., ARNAUD S., BUCHET L., DUBAR M. & MULLER A. 1987. Sépultures protohistoriques à Nice (Alpes-Maritimes). La nécropole de Youri. *Bulletin Archéologique de Provence*, **17**: 27-30.

ARTIGUES P., BRAVO P. & HINOJO E., 2006. Excavacions arqueològiques a Can Gambús 2, Sabadell: Vallès Occidental. *Tribuna d'arqueologia*, 2006: 111-140.

AUBIN G. (ed.), 1997. Sollières-Sardières, abri du Châtel. *Gallia Informations,* 1994-1: 233-234.

AUJALEU A., GRANIER G. & LACHENAL T., 2013. Un ensemble funéraire du début du Bronze final à Aix-en-Provence (Bouches-du-Rhône). Les sépultures secondaires à crémation du site du Conservatoire. *Bulletin de la Société préhistorique française*, **110** (4): 719-743.

BALAGUER P., HINOJO E., OLIART C. & SORIANO I., 2011. Dinàmica d'ús de la Cova de la Pesseta (Torrelles de Foix, Alt Penedès) entre el V-II mil·leni cal ANE. Primers resultats. In: A. BLASCO, M. EDO & M. J. VILLALBA (eds), *Actes de les Jornades Internacionals de Prehistòria 'El Garraf, 30 anys d'investigació Prehistòrica, 1978-2008' (Begues, 2008). La cova de Can Sadurní i la prehistòria de Garraf. Recull de 30 anys d'investigació*. Milano: Hugony Editore: 359-365.

BANADORA. BAnque NAtionale de DOnnées RAdiocarbone pour l'Europe et le Proche Orient. https://www.arar.mom.fr/banadora/

BANKS R. B., 1994. *Growth and diffusion phenomena. Mathematical frameworks and applications*. Berlin.

BARANDIARÁN J. M., FERNÁNDEZ MEDRANO D. & APELLÁNIZ J. M., 1964. Excavación del Dolmen de El Sotillo (Rioja Alavesa). *Boletín de la Fundación Sancho el Sabio*, **VIII** (1-2): 9-28.

BARBINA V., CALLIGARIS F., DEL FABBRO A. & TURELLO A, 1984. Udine Radiocarbon Laboratory Date List II. *Radiocarbon*, **26** (2): 293-296.

BARCELÓ J. A., 2005. Multidimensional Spatial Analysis in Archaeology. Beyond the GIS paradigm. *In*: *Reading the Historical Spatial Information in the World. Studies for Human Cultures and Civilizations based on Geographic Information System***.** Kyoto: International Institute for Japanese Studies: 47-62.

BARCELÓ J. A., 2008. La seqüència crono-cultural de la prehistòria catalana. Anàlisi estadística de les datacions radiomètriques. *Cypsela,* **17**: 65-88.

BARCELÓ J. A., ACHINO K F., BOGDANOVIC I., CAPUZZO G., DEL CASTILLO F., MOITINHO DE ALMEIDA V. & NEGRE J., 2015. Chapter 1. Measuring, Counting and Explaining: An Introduction to Mathematics in Archaeology. *In*: J. A. BARCELÓ & I. BOGDANOVIC (eds), Mathematics and Archaeology: 3-64.

BARCELÓ J. A., CAPUZZO G. & BOGDANOVIĆ I., 2014. Modeling expansive phenomena in early complex societies: the transition from Bronze Iron Age in Prehistoric Europe. *Journal of Archaeological Method and Theory,* **21** (2): 486-510.

BARTA P., DEMJÁN P., HLADÍKOVÁ K., KMEŤOVÁ P. & PIATNIČKOVÁ K., 2013. *Database of radiocarbon dates measured on archaeological samples from Slovakia, Czechia, and adjacent regions. Archaeological Chronometry in Slovakia, Slovak Research and Development Agency Project No. APVV-0598-10, 2011 -2014, Dept. of Archaeology, Faculty of Arts, Comenius University in Bratislava*. URL: http://www.c14.sk

BARTHE J. M., MARSAN G. & DE VALICOURT E., 1985. La grotte de la Prédigadère (commune de Castet, P.A.). *Archéologie des Pyrénées Occidentales*, **5**: 259-260.

BASS F., 1969. A new product growth model for consumer durables. *Management Science*, **15** (5): 215-227.

BECKER B., KRAUSE R. & KROMER B., 1989. Zur absoluten Chronologie der Frühen Bronzezeit. *Germania*, **67** (2): 421-442.

BELARDELLI C., GIARDINO C. & MALIZIA A. (eds), 1990. *L'Europa a sud e a nord delle Alpi alle soglie della svolta protourbana*. Treviso.

BELARTE M. C., MALGOSA A., NOGUERA J., OLMOS P. & PIGA G., 2013. Las necrópolis protohistóricas tumulares de Cataluña meridional: el ejemplo de Sebes (Flix, Tarragona). *Trabajos de Prehistoria*, **70** (2): 295-314.

BENKOVSKY-PIVOVAROVÁ Z., 1991. *Das mittelbronzezeitliche Gräberfeld von Pitten in Niederösterreich. Ergebnisse der Ausgrabungen des Niederösterreichischen Landesmuseums in den Jahren 1967 bis 1973, Band 3. Ergänzungskatalog*. Mitteilungen der Prähistorischen Kommision, Österreichische Akademie der Wissenschaften, **24**. Wien.

BICHET P. & MILLOTTE J. P., 1992. *L'Âge du Fer dans le Haut-Jura. Les tumulus de la région de Pontarlier (Doubs)*. Documents d'Archéologie française, **34**.

BLAIZOT F. & THIÉRIOT F., 2001. Un rituel original à la fin de l'âge du Bronze. Les inhumations en fosse des sites des Estournelles et de La Plaine à Simandres (Rhône). *Gallia Préhistoire*, **42** (2000): 195-256.

BLASCO M. C., BARRIO J. & PINEDA P., 2007. La revitalización de los ritos de enterramiento y la implantación de las necrópolis de incineración en la cuenca del Manzanares: La necrópolis de Arroyo Butarque. *Zona Arqueológica*, **10** (2): 215-238.

BLOT J., 1977. Le cromlechs d'Errozaté (Compte rendu de fouilles). *Munibe*, **29**: 77-85.

BLOT J., 1991. Le tumulus-chromlech de Millagate V (Compte rendu de fouilles 1987). *Munibe*, **43**: 181-189.

BLOT J., 1993. Le tumulus Urdanarre Nord 1 (Compte-rendu de fouilles 1991). *Munibe*, **45**: 143-151.

BLOT J., 1995. Contribution à l'étude des cercles de pierres en Pays Basque de France. *Bulletin de la Société Préhistorique Française*, **92** (4): 525-548.

BOCQUET-APPEL J. P., NAJI S., VANDER LINDEN M. & KOZLOWSKI JK., 2009. Detection of diffusion and contact zones of early farming in Europe from the space-time distribution of ^{14}C dates. *Journal of Archaeological Science*, **36**: 807-820.

BOGDANOVIĆ I., BARCELÓ J. . & CAPUZZO G., 2014. A Database for radiocarbon dates. Some methodological and theoretical issues about its implementation. In: *On-line Papers from the 40th Annual Conference of Computer Applications and Quantitative Methods in Archaeology (CAA), Southampton (UK), 26-29 March 2012*: 457-467.

BONNET C., LAMBACH F. & PLOUIN S., 2004. Le tertre II de Colmar-Riedwihr (Haut-Rhin): évolution d'un monument funéraire du bronze Ancien à La Tène A. *Bulletin de la Société préhistorique française*, **101** (3): 547-594.

BONNET C., PLOUIN S. & LAMBACH F., 1981. Les tertres du Bronze moyen d'Appenwihr, forêt de Kastenwald (Haut-Rhin). *Bulletin de la Société préhistorique française*, **78** (10-12): 432-471.

BORDES F., 1967. Considerations sur la typologie et les techniques dans le Paléolithique. *Quärtar Volumen*, **18**: 25-55.

BOSCH A., CHINCHILLA J., MERCADAL O. & TARRÚS J., 1993. El paradolmen de Tafania (Ventalló). *Cypsela*, **10**: 33-50.

BOSCH GIMPERA P., 1919. *Prehistoria catalana. Edat de la Pedra i dels Metalls, colonització grega, etnografia*. Barcelona. Enciclopèdia Catalana, **16**.

BOURGEOIS J., 1989. De ontdekking van nieuwe grondstoffen en de eerste metaalbewerkers in Temse en in het Waasland. *In*: H. THOEN (ed.), *Temse en de Schelde. Van Ijstijd tot Romeinen*. Brussels: 44-68.

BOUYER M. & BOISAUBERT L., 1992. La nécropole de l'âge di Bronze de Murten/Löwenberg. *Archäologie der Schweiz*, **15** (2): 68-73.

BOWDEN M. J., 2004. Moore's Law and the technology S-curve. *Current Issues in Technology Management*, **8** (1): 1-4.

BRAMI M. & ZANOTTI A., 2015. Modelling the initial expansion of the Neolithic out of Anatolia. *Documenta Praehistorica*, **42**: 103-116.

BRIOIS F., CRUBÉZY E. & CAROZZA L., 2000. La grotte Sindou (Lot): une sépulture familiale du Bronze final. *Bulletin de la Société préhistorique française*, **97** (4): 553-559.

BRONK RAMSEY C., 2009. Bayesian analysis of radiocarbon dates. *Radiocarbon*, **51** (1): 337-360.

BRONK RAMSEY C., 2017. Methods for summarizing radiocarbon datasets. *Radiocarbon*, **59** (6): 1809-1833.

BROWN L. A., 1981. *Innovation Diffusion. A new perspective*. London: Methuen.

BRUNNER M., VON FELTEN J., HINZ M. & HAFNER A., 2020. Central European Early Bronze Age chronology revisited: A Bayesian examination of large-scale radiocarbon dating. *PLoS ONE*, **15** (12): e0243719.

BRUN P., 1984. *La Civilisation des Champs d'Urnes, étude critique dans le bassin parisien*. Documents d'Archéologie Française, **4**.

BRUN P. & MORDANT C. (eds), 1988. *Le groupe Rhin-Suisse-France orientale et la notion de civilization des Champs d'Urnes*. Actes du colloque international de Nemours 1986. Mémoires du Musée de Préhistoire d'Ile-de-France, **1**.

BUCH M., MARTÍ M., DÍAZ J., PARPAL A., CARLÚS X. & VILLAFRUELA J., 1992. *Memòria d'excavació dels treballs duts a terme entre el 3 d'agost i el 15 de setembre del 1992 a Can Filuà (Santa Perpètua de Mogoda)*. Servei d'Arqueologia de la Generalitat de Catalunya.

BUI THI M., COURTAUD P., DUMONTIER P., GIRARD M., MIRABAUD S. & REGERT M., 2011. Analyses du contenu des vases déposés en contexte sépulcral au Bronze ancien et moyen dans les grottes de Droundak et Homme de Pouey (Pyrénées Atlantiques). *In*: *Actes 8 Rencontres Méridionales de Préhistoire Récente (Marseille, 7-8 novembre 2008)*: 449-456.

CAMPOLO S., 2006. Découverte récente d'un dépôt de bronzes de l'âge du Bronze final à Savines (Hautes-Alpes). *In*: A. COUDENNEAU & T. LACHENAL (eds), *Espaces, techniques et sociétés de la Préhistoire au Moyen-Age: travaux en cours, Actes de la première table ronde des jeunes chercheurs en archéologie de la MMSH*: 1-11.

CANDUSSIO A., 1980. *Recenti scoperte preistoriche a Pozzuolo del Friuli: Udine*. Società Filologica Friulana: 78-84.

CAPUZZO G., 2014. *Space-temporal analysis of radiocarbon evidence and associated archaeological record: from Danube to Ebro Rivers and from Bronze to Iron Ages*. PhD thesis, Universitat Autònoma de Barcelona.

CAPUZZO G., ACHINO KF. & BARCELÓ J. A., 2019. Ridefinendo il concetto di facies: un approccio quantitativo. *In*: J. DANCKERS, C. CAVAZZUTI & M. CATTANI (eds), *Facies e culture nell'età del Bronzo italiana?* Serie Artes 11. Roma - Bruxelles, Istituto Storico Belga di Roma: 93-102.

CAPUZZO G. & BARCELÓ J. A., 2014. La secuencia crono-cultural de la Edad del Bronce-comienzo de la Edad del Hierro en Cataluña. Los contextos arqueológicos fechados por el C14. *In*: O. MERCADAL I FERNÀNDEZ (ed.), *La transició Bronze Final-1ª Edat del Ferro en els Pirineus i territoris veïns. XV Col·loqui Internacional d'Arqueologia de Puigcerdà. Congrés Nacional d'Arqueologia de Catalunya*: 659-669.

CAPUZZO G. & BARCELÓ J. A., 2015. Cultural changes in the 2nd millennium BC: a Bayesian examination of radiocarbon evidence from Switzerland and Catalonia. *World Archaeology*, **47** (4): 622-641.

CAPUZZO G., BOARETTO E. & BARCELÓ J. A., 2014. EUBAR: A database of ^{14}C measurements for the European Bronze Age. A Bayesian analysis of ^{14}C-dated archaeological contexts from Northern Italy and Southern France. *Radiocarbon*, **56** (2): 851-869.

CAPUZZO G. & LÓPEZ CACHERO F. J., 2017. De la inhumación a la cremación en el nordeste peninsular: cronología y sociedad. *In*: J. A. BARCELÓ, I. BOGDANOVIC & B. MORELL (eds), *Iber-Crono 2016. Cronometrías Para la Historia de la Península Ibérica (Chronometry for the History of the Iberian Peninsula)*, Barcelona (Spain), 17-19 October 2016: 192-208.

CAPUZZO G., SNOECK C., BOUDIN M., DALLE S., ANNAERT R., HLAD M., KONTOPOULOS I., SABAUX C., SALESSE K., SENGELØV A., STAMATAKI E., VESELKA B., WARMENBOL E., DE MULDER G., TYS D. & VERCAUTEREN M., 2020. Cremation vs. inhumation: modeling cultural changes in funerary practices from the Mesolithic to the Middle Ages in Belgium using Kernel Density Analysis on ^{14}C data. *Radiocarbon*, **62** (6): 1809-1832.

CAPUZZO G., ZANON M., DAL CORSO M., WIEBKE K. & BARCELÓ J. A., 2018. Highly diverse Bronze Age population dynamics in central-southern Europe and their response to regional climatic patterns. *PLoS ONE*, **13** (8): e0200709.

CARDARELLI A., 1997. La necropoli di Casinalbo (MO). *In*: M. BERNABÒ BREA, A. CARDARELLI & M. CREMASCHI (eds), *Le Terramare. La più antica civiltà padana, catalogo della mostra (Modena 1997)*. Milano: 688-696.

CARDARELLI A., 2014. *La necropoli della terramara di Casinalbo*. Firenze.

CARDARELLI A., CAVAZZUTI C., FRITZL M., GAVRANOVIC M., HAJDU T., KISS V., KÖHLER K.,

KULCSÁR G., MELIS E., REBAY-SALISBURY K., SZABÓ G. & VAJK SZEVERÉNYI V., 2020. The connections between the plains of the Po and the Danube during the Bronze Age seen through the spread of the 'urnfield model'. *Rivista di Scienze Preistoriche,* **LXX** S1: 231-243.

CARDARELLI A., SALVADEI L., SANTANDREA E. & TIRABASSI J., 2003. Le prime grandi necropoli ad incinerazione in Italia: le necropoli terramaricole di Casinalbo (Modena) e Montata (Reggio Emilia). *In*: *Atti della XXXV Riunione Scientifica. vol.* ***I***: 299-322.

CARLÚS X. & DIAZ J., 1995. El jaciment del Bronze Inicial de Can Ballarà (Terrassa, Vallès Occidental). *Terme*, **10**: 38-45.

CARLÚS X. & GONZALEZ J., 2008. Carrer de la Riereta, 37-37 bis: un nou assentament prehistòric al pla de Barcelona. Primers resultats. *Cypsela*, **17**: 91-114.

CARLÚS X., LARA C., LÓPEZ CACHERO FJ. & VILLENA N., 2007. La necròpolis d'incineració de Can Piteu-Can Roqueta. *In*: X. CARLÚS, FJ. LÓPEZ CACHERO, M. OLIVA, A. PALOMO, A. RODRIGUEZ, N. TERRATS, C. LARA & N. VILLENA (eds), *Cabanes, sitges i tombes. El paratge de Can Roqueta (Sabadell, Vallès Occidental) del 1300 al 500 ANE*, Quaderns d'Arqueologia, **4**, Museu d'Història de Sabadell: 137-182.

CARLÚS X., LÓPEZ CACHERO FJ., TERRATS N., OLIVA M., PALOMO A. & RODRIGUEZ A., 2008. Diacronia durant la prehistòria recent a Can Roqueta (Sabadell-Barberà del Vallès, Vallès Occidental) entre el VI i el I mil·leni cal ane. *Cypsela*, **17**: 115-142.

CASETTI E., 1969. Why do diffusion processes conform to logistic trends?. *Geographical analysis*, **1** (1): 101-105.

CÀSSOLA GUIDA P. & CORAZZA S. (eds), 2004. Dai Tumuli ai Castellieri: 1500 anni di storia in Friuli (2000-500 a.C.). II. 2004. *Aquileia Nostra*, **LXXV**: 525-552.

CÀSSOLA GUIDA P. & CORAZZA S. (eds), 2005. Dai Tumuli ai Castellieri: 1500 anni di storia in Friuli (2000-500 a.C.). III. 2005. *Aquileia Nostra*, **LXXVI**: 345-360.

CÀSSOLA GUIDA P. & Corazza S. (eds), 2006. Dai Tumuli ai Castellieri: 1500 anni di storia in Friuli (2000-500 a.C.). IV. 2006. *Aquileia Nostra*, **LXXVII**: 297-314.

CÀSSOLA P., 1980. Ricerche a Pozzuolo del Friuli. *Memorie Civici Musei Storia ed Arte*, **2**: 148-165.

CASTANY J. & GUERRERO L., 1985. La galeria catalana de La Pera. Ardèvol de Pinós. Solsonès. 1983-84. *In*: *Memòria arqueològica sepulcres megalítics del Solsonès. Servei d'Arqueologia de la Generalitat de Catalunya*: 28-59.

CASTRO P. V., 1994. *La sociedad de los campos de urnas en el nordeste de la Península Ibérica. La necrópolis de El Calvari (El Molar, Priorat, Tarragona)*. Oxford: BAR International Series **592**.

CAVAZZUTI C., SKEATES R., MILLARD AR., NOWELL G., PETERKIN J., BERNABÒ BREA M., CARDARELLI A. & SALZANI L., 2019. Flows of people in villages and large centres in Bronze Age Italy through strontium and oxygen isotopes, *PLoS ONE* **14** (1): e0209693.

CHAUME, B. 2001. *Vix et son territoire à l'Age du Fer. Fouilles du mont Lassois et environnement du site princier*. Protohistoire européenne, **6**.

CHILDE V. G., 1929. *The Danube in Prehistory*. Oxford: Clarendon Press.

CHILDE V. G., 1939 *The dawn of European civilization*. New York: 346 p.

CHILDE V. G., 1950. The Urban Revolution. *The Town Planning Review*, **21** (1): 3-17.

CLOP X. & FAURA J. M., 1995. *El sepulcre megalític de Les Maioles (Rubió, l'Anoia). Memòria definitiva dels resultats de l'excavació arqueológica*. Servei d'Arqueologia de la Generalitat de Catalunya.

CLOP X. & FAURA J. M., 2002. *El sepulcre megalític de Les Maioles (Rubió, Anoia). Pràctiques funerarias i societat a l'altiplà de Calaf (2000-1600 cal ANE)*. Estrat, **7**. Centre d'Estudis Comarcal d'Igualada.

COCKIN G. & FURESTIER R. (eds), 2009. *A8 Saint-Maximin/Chemin de Barjols à Saint-Maximin-la-Sainte-Baume (Var). Rapport final d'opération. Fouilles archéologiques préventives. Mauguio.* Oxford: Archéologie Méditerranée.

COURTAUD P. & DUMONTIER P., 2010. La cavité sépulcrale de l'Homme de Pouey a Laruns (64): les aménagements funéraires dans une grotte de l'âge du Bronze. *In*: A. BEECHING, E. THIRAULT & J. VITAL (eds), *Économie et société à la fin de la Préhistoire, Actes des 7e Rencontres Méridionales* *de Préhistoire Récente tenues à Bron (Rhône), les 3 et 4 novembre 2006*. Documents d'Archéologie en Rhône-Alpes et en Auvergne, **34**: 347-358.

COURTAUD P., DUMONTIER P., ARMAND D., FERRIER C. & HILD G., 2007. La grotte sépulcrale de Droundak. In: P. FOUÉRÉ, C. CHEVILLOT, P. COURTAUD, O. FERULLO & C. LEROYER (eds.), *Paysages et peuplements. Aspects culturels et chronologiques en France méridionale, Actes du VIe Rencontres Méridionales de Préhistoire Récente (Périgueux, 14-16 octobre 2004)*: 191-210.

CREANZA N., KOLODNY O. & FELDMAN M. W., 2017. Cultural evolutionary theory: How culture evolves and why it matters. *Proceedings of the National Academy of Sciences*, **114** (30): 7782-7789.

CRESSIE N., 1993. *Statistics for spatial data*. New York.

CUBAS M., GARCÍA-HERAS M., MÉNDEZ D., DE PEDRO I., ZAPATA L., IBÁÑEZ J. J. & GONZÁLEZ URQUIJO J. E., 2012. La tecnología cerámica de los niveles IV y III en el yacimiento de Kobaederra (Cortézubi, Bizkaia). Aprovisionamiento y modificación de las materias primas. *Trabajos de Prehistoria*, **69** (1): 51-64.

CURA M., THOMMERET Y. & GUILAINE J., 1975. Une datation C14 du dolmen de la Llanera (Solsona). *Pyrenae*, **11**: 154-155.

DAL RI L. & TECCHIATI U., 2004. Una sepoltura ad incinerazione della cultura di Luco da Barbiano-Ex Casa di ricovero (Val d'Isarco, Bz). *Padusa*, **XL**: 171-189.

DAURA J., SANZ M., SORIANO I., PEDRO M., RUBIO Á., OLIVA M., GIBAJA J. F., QUERALT I., ÁLVAREZ R. & LÓPEZ-CACHERO F. J., 2017. Objetos de oro y epicampaniforme en la Cova del Gegant. Relaciones en la costa mediterránea de la Península Ibérica durante la Edad del Bronce. *Trabajos de Prehistoria*, **74** (1): 149-167.

DAVID-ELBIALI M., 1990. L'âge du Bronze en Valais et dans le Chablais vaudois: un état de la recherché. *Jahrbuch der Schweizerischen Gesellschaft für Ur- und Frühgeschichte*, **73**: 19-43.

DAVID-ELBIALI M., 2000. *La Suisse occidentale au IIe millénaire av. J.-C. Chronologie, culture, intégration européenne*. Lausanne.

DAVID-ELBIALI M. & MOINAT P., 2005. Le Bronze final de la Suisse occidentale: révision du cadre chronotypologique, grâce aux découvertes de la nécropole de Lausanne-Vidy (canton de Vaud, Suisse). *Bulletin de la Société préhistorique Française*, **102** (3): 613-624.

DELLA CASA P. & FISCHEr C., 1997. Neftenbach (CH), Velika Gruda (YU), Kastanas (GR) und Trindhøj (DK) - Argumente für einen Beginn der Spätbronzezeit (Reinecke Bz D) im 14. Jahrhundert v. Chr. *Prähistorische Zeitschrift*, **72** (2): 195-233.

DEL LUCCHESE A., 1984. Resti di sepolture dell'Antica Età del bronzo nella Caverna dell'Acqua o del Morto (Finale Ligure – SV). *Preistoria Alpina*, **20**: 155-168.

DEL LUCCHESE A., 2004. Il Bronzo Medio e il Bronzo Recente in Liguria (XVI-XII secolo a.C.). In: RC. De Marinis & G. Spadea (eds.), *I Liguri. Un antico popolo europeo tra Alpi e Mediterraneo*: 117-121.

DEL LUCCHESE A. & ODETTI G., 1996. Nuovi dati sull'antica età del Bronzo nellla Liguria di Ponente. *In*: COCCHI GENICK D. (ed.), *L'antica età del Bronzo in Italia, Atti del Congresso (Viareggio, 9-12 gennaio 1995)*. Firenze: 433-440.

DE MARINIS R. C., 1988. Liguri e Celto-Liguri. *In*: CHIECO BIANCHI A. M. (ed.), *Italia omnium terrarum alumna. La civilta' dei Veneti, Reti, Liguri, Celti, Piceni, Umbri, Latini, Campani e Lapigi*. Milano: Scheiwiller: 157-259.

DE MARINIS R. C., 1994. Preistoria e protostoria nel territorio di Lecco. *In*: S. CASINI (ed.), *Carta archeologica della Lombardia. IV Provincia di Lecco*: 50-56.

DE MARINIS R. C., 2003. Riti funerari e problemi di paleo-demografia dell'antica età del Bronzo nell'Italia settentrionale. *Notizie Archeologiche Bergomensi*, **11**: 5-78.

DE MULDER G., 2011. *Funeraire rituelen in het Scheldebekken tijdens de late bronstijd en de vroege ijzertijd. De grafvelden in hun maatschappelijke en sociale context*. Proefschrift voorgedragen tot het bekomen van de graad van Doctor in de Archeologie. Universiteit Gent.

DE MULDER G., LECLERCQ W. & VAN STRYDONCK M., 2008. *Influence from the 'Group Rhin-Suisse-France orientale' on the pottery from the Late Bronze Age urnfields in Western Belgium. A confrontation between pottery forming technology, ^{14}C-dates* *and typo-chronology*. Oxford: BAR International Series, **1861**: 105-115.

De Mulder G., Van Strydonck M. & Boudin M., 2009. The impact of cremated bone dating on the archaeological chronology of the Low Countries. *Radiocarbon*, **51** (2): 579-600.

De Mulder G., Van Strydonck M., Boudin M., Leclercq W., Paridaens N. & Warmenbol E., 2007. Re-evaluation of the late Bronze Age and early Iron Age chronology of the western Belgian urnfields based on ^{14}C dating of cremated bones. *Radiocarbon*, **49** (2): 499-514.

de Smith MJ., Goodchild MF. & Longley PA., 2009. *Geospatial Analysis. A Comprehensive Guide to Principles, Techniques and Software Tools*. Leicester (UK).

Diaz J. & Villafruela J., 1997. *Memòria de l'excavació arqueològica del jaciment del Bronze Inicial de La Serreta (Rubí, Vallès Occidental) (12-19 de novembre de 1996)*. Servei d'Arqueologia de la Generalitat de Catalunya.

Dolukhanov P., Shurukov A., Gronenborn D., Sokoloff D., Timofeev V. & Zaitseva G., 2005. The chronology of Neolithic dispersal in Central and Eastern Europe. *Journal of Archaeological Science*, **32**: 1441-1458.

Dumontier P., 1999. La grotte d'Apons à Sarrance (Pyrénées-Atlantiques). Note préliminaire. *Bulletin de la Société préhistorique française*, **96** (3): 444-447.

Dumontier P., Courtaud P. & Ferrier C., 2003. *La grotte plurielle de Droundak (Sainte-Engrâce, 64), Rapport de fouille programmée, Service régional de l'Archéologie, Bordeaux*: 150-151.

Dürrwächter C., 2009. *Time, Space and Innovation: an Archaeological Case Study on the Romanization of the North-Western Provinces (50 BC to AD 50)*. Oxford: BAR Intenational Series, **2011**.

Duvanel L., Vigneau H., Guélat M., Mauvilly M., Beckmann-Winter M., Kramar C. & Olive C., 2018. *La nécropole de l'âge du Bronze de Châbles/Les Biolleyres 1 (Fribourg, Suisse)*. Archéologie fribourgeoise, **26**. Fribourg: Service archéologique de l'Etat de Fribourg.

Equip Minferri, 1997. Noves dades per a la caracterizació dels assentaments a l'aire lliure durant la 1ª meitat del II mil·leni cal BC: primers resultats de les excavacions en el jaciment de Minferri (Juneda, les Garrigues). *Revista d'Arqueologia de Ponent*, **7**: 161-211.

Eriksson L. J., 1997. How technology evolves. *Complexity*, **2** (3): 23-30.

Esteve X., 2002. *L'arqueologia prehistòrica al Penedès. Un estat de la qüestió*. Treball Tutelat de Recerca (DEA), Universitat de Barcelona.

Evin J., Marechal J. & Marien G., 1983. Lyon Natural Radiocarbon Measurementes IX. Radiocarbon, 25 (1): 59-94.

Fàbregas L., 2008. El dolmen de Clarà (Castellar de la Ribera, Solsonès). *In*: *Primer Colloqui d'Arqueologia d'Odèn*: 73-80.

Falkenstein F., 1997. Eine Katastrophen- Theorie zum Beginn der Urnenfelderkultur. *In*: M. Roeder & B. Teržan (eds), *Χρόνος. Beiträge zur prähistorischen Archäologie zwischen Nord - und Südosteuropa. Festschrift für Bernhard Hänsel. Internationale Archäologie*. Studia Honoraria 1. Espelkamp: 549-561.

Feeser I., Dörfler W., Kneisel J., Hinz M. & Dreibrodt S., 2019. Human impact and population dynamics in the Neolithic and Bronze Age: Multi-proxy evidence from north-western Central Europe. *The Holocene*, **29** (10): 1596-1606.

Felber H., 1970. Altersbestimmungen nach der Radiokohlenstoffmethode am Institut für Radiumforschung und Kernphysik V. *Mitteilungen des Instituts für Radiumforschung und Kernphysik*, **614**: 62-76.

Felgenhauer F., 1996. *Stillfried, Lebensraum des Menschen seit 30.000 Jahren. Archäologischer Fundplatz von internationaler Bedeutung, Objekt interdisziplinärer Forschung von bedeutendem Rang. Ergebnisse der Ausgrabungen und Forschungen 1969-1989*. FIST (Forschungen in Stillfried), **9/10**, 1990-1992 (1996).

Fernández-Eraso J. & Mujika-Alustiza J. A. 2013. La estación megalítica de la Rioja Alavesa: cronología, orígenes y ciclos de utilización. *Zephyrus*, **LXXI**: 89-106.

Fischer C., 1997. *Innovation und Tradition in der Mittel- und Spätbronzezeit. Gräber und Siedlungen in Neftenbach, Fällanden, Dietikon, Pfäffikon und Erlenbach*. Monographien der Kantonsarchäologie Zürich, **28**.

FISHER R. A., 1937. The wave of advance of advantageous genes. *Annals of Eugenics*, **7** (4): 355-369.

FORCADELL A. & VILLALBÍ M. M., 1991. *Memòria de l'excavació arqueològica d'urgència a Cova Cervereta. Vinallop-Tortosa (Baix Ebre)*. Servei d'Arqueologia de la Generalitat de Catalunya.

FORD J. A., 1962. *A Quantitative Method for Deriving Cultural Chronology, Technical Manual I*. Pan American Institute. Washington.

GALLAY A., 1995. Les stèles anthropomorphes du site mégalithique du Petit-Chasseur à Sion (Valais, Suisse). *Notizie Archeologiche Bergomensi*, **3**: 167-194.

GAMBARI F. M. & VENTURINO GAMBARI M., 1998. The introduction of cremation rites in north-western Italy. In: *Proceedings of the XIII congress, volume 4, (Forlì, 8-14 september 1996), International Union of Prehistoric and Protohistoric Sciences), Session 11: The Bronze Age in Europe and the Mediterranean*: 243-248.

GAMBARI F. M. & VENTURINO GAMBARI M., 2012. Tombe monumentali a recinti nell'areale occidentale della cultura di Golasecca e nella Liguria interna piemontese: tipologia, ideologia costruttiva, rituali. *In*: M. C. ROVIRA HORTALÀ, F. J. LÓPEZ CACHERO & F. MAZIÈRE (eds), *Les necròpolis d'incineració entre l'Ebre i el Tíber (segles IX-VI aC): metodologia, pràctiques funeràries i societat*. Monografies MAC, **14**: 305-320.

GARCÍA GAZÓLAZ J., 2001. Excavaciones arqueólogicas en el abrigo del Padre Areso (Bigüézal, Navarra). Campañas de 1994-1995-1996. *Trabajos de Arqueología Navarra,* **15**: 307-314.

GARCÍA GAZÓLAZ J., SESMA SEMSA J. & TABAR SARRÍAS M. I., 2001. La fosa sepulcral de la Saga (Cáseda, Navarra). *Trabajos de arqueología Navarra*, **15**: 115-122.

GARVEY R., 2018. Current and potential roles of archaeology in the development of cultural evolutionary theory. *Philosophical Transactions of the Royal Society B: Biological Sciences*, **373** (1743): 20170057.

GAVRANOVIĆ M. & LONJAŽK-DIZDAR D., 2020. To Burn or not to Burn: Inhumation Versus Cremation at the End of the Bronze Age in the Region between the Southern Carpathian Basin and the Western Balkans. *In*: M. GAVRANOVIĆ, D. HEILMANN, A. KAPURAN & M. VERČÍK (eds), *Spheres of Interaction. Contacts and Relationships between the Balkans and Adjacent Regions in the Late Bronze / Iron Age (13th–5th Centuries BCE)*, Proceedings of the Conference held at the Institute of Archaeology, Belgrade 15–17 September 2017: 53-74.

GKIASTA M., RUSSELL T., SHENNAN S. & STEELE J., 2003. Neolithic transition in Europe: the radiocarbon record revisited. *Antiquity*, **77**: 45-62.

GÓMEZ BACH A., BORDAS TISSIER A., ARROYO BORRAZ S., HUERTAS ARROYO J., AGUELO MAS J., VELASCO ARTIGUES A., GONZÁLEZ MUÑOZ J., NADAL LORENZO J., SAÑA SEGUÍ M. & MOLIST MONTAÑÁ M., 2015. Evidències arqueològiques de les comunitats humanes en la transició del III al II mil·lenni cal BC al Pla de Barcelona. *Quarhis: Quaderns d'Arqueologia i Història de la Ciutat de Barcelona*, **11**: 82-96.

GÓMEZ F., REY J. & ROYO I. 1992. Estudio de los materiales del poblado neolítico de Riols I (Mequinenza, Zaragoza). Campaña de 1990. *Arqueología Aragonesa*, 1990: 47-53.

GUBLER R., 2010. Spiez-Einigen, Holleeweg 3. Gräber am Übergang zwischen Früh- und Mittelbronzezeit. *Archäologie Bern/Archéologie bernoise*, 2010: 147-173.

GUÉLAT M., HONEGGER M. & RENTZEL P., 1995. Nouvelles données sur la stratigraphie du site de Barmaz I (Collombey-Muraz VS). *Jahrbuch der Schweizerischen Gesellschaft für Ur- und Frühgeschichte*, **78**: 131-144.

GUILAINE J., 1972. *L'âge du Bronze en Languedoc occidental, Roussillon, Ariège*. Mémoires de la Société Préhistorique Française, **IX**. Paris.

HAFNER A. & SUTER PJ., 1998. Die frühbronzezeitlichen Gräber des Berner Oberlandes. *In*: B. FRITSCH, M. MAUTE, I. MATUSCHIK, J. MÜLLER & C. WOLF (eds), *Tradition und Innovation Prähistorische Archäologie als historische Wissenschaft Festschrift für Christian Strahm*. Rahden: 385-416.

HÄGERSTRAND T., 1952. The propagation of innovation waves. *Lund studies in Human Geography Series B*, **4**: 3-19.

HASLER A., 2002. Ventabren - Château Blanc. Les installations de la fin de l'âge du Bronze. In: Archéologie du TGV Méditerranée. Fiches de synthèse. Tome 2. La Protohistoire. *Monographies d'Archéologie Méditerranéenne*, **9**: 567-572.

HELBIG W., 1879. *Die Italiker in der Poebene*. Leipzig: Breitkopf & Härtel: 140 p.

HELLERSCHMID I., 2006. *Die urnenfelder-/hallstattzeitliche Wallanlage von Stillfried an der March. Ergebnisse der Ausgrabungen 1969-1989 unter besonderer Berücksichtigung des Kulturwandels an der Epochengrenze Urnenfelder-/Hallstattkultur*. Mitteilungen der Prähistorischen Kommision Österreichische Akademie der Wissenschaften, **63**. Wien.

HENNIG H., 1995. Zur Frage der Datierung des Grabhügels 8 'Hexenbergle' von Wehringen Ldkrs. Augsburg, Bayerisch-Schwaben. *In*: B. SCHMID-SIKIMIĆ & P. DELLA CASA (eds), *Trans Europam. Beiträge zur Bronze- und Eisenzeit zwischen Atlantik und Altai. Festschrift für Margarita Primas*. Antiquitas, **3** (34): 129-145.

HIGHAM T. F. G., BRONK RAMSEY C., BROCK F, BAKER D. & DITCHFIELD P., 2007. Radiocarbon dates from the Oxford AMS System: Archaeometry Datelist 32. *Archaeometry*, **49** (S1): S1–S60.

HOLSTE F., 1962. *Zur Chronologie der südosteuropäischen Depotfunde der Urnenfelderzeit*. Marburg/Lahn.

ISERN N., FORT J. & VANDER LINDEN M., 2012. Space competition and time delays in human range expansions. Application to the Neolithic transition. *PLoS ONE*, **7** (12): e51106.

JANIN T., BURENS A., CAROZZA L., BIRON M., CAROZZA J.-M., CHARDENON N., GROS L., LAGARRIGUE A., MATILLA V. & PRADAT B., 1997. *La nécropole protohistorique du Camp d'Alba à Réalville (Tarn-et-Garonne)*. Lattes - Toulouse.

JOFFROY R., 1975. Vix: habitats et nécropoles. *In*: P.-M. DUVAL & V. KRUTA (eds), *L'habitat et la nécropole à l'Âge du Fer en Europe occidentale et centrale, Actes du 1er colloque archéologique de la IVème section de l'Ecole Pratique des Hautes Etudes*. Paris: H. Champion: 71-74.

KAENEL G. & KLAUSENER M., 1990. Quelques tombes à incinération du Bronze final (Xe siècle av. J.-C.) à Vidy (Lausanne VD). *Jahrbuch der Schweizerischen Gesellschaft für Ur- und Frühgeschichte*, **73**: 51-82.

KIJEK A. & KIJEK T., 2010. Modelling of innovation diffusion. *Operations research and decisions*, **3-4**: 53-68.

KIMMIG W., 1940. *Die Urnenfelderkultur in Baden*. Römisch-Germanische Forschungen, **XIV**. Berlin.

KIMMIG W., 1951. Où en est l'étude de la civilization des champs d'urnes en France, principalement dans l'Est?. *Revue Archéologique de l'Est et du Centre-Est*, **II**: 65-81.

KIMMIG W., 1952. Où en est l'étude de la civilization des champs d'urnes en France, principalement dans l'Est? (suite). *Revue Archéologique de l'Est et du Centre-Est*, **III**: 7-19.

KIMMIG W., 1964. Seevolkerbewegung und Urnenfelderkultur. *In*: USLAR R, NARR KJ (eds), *Studien aus Alt-Europa* **1**: 220-283.

KOHLER-SCHNEIDER M., 2001. *Verkohlte Kultur- und Wildpflanzenreste aus Stillfried an der March als Spiegel spätbronzezeitlicher Landwirtschaft im Weinviertel, Niederösterreich*. Mitteilungen der Prähistorischen Kommission Österreichische Akademie der Wissenschaften, **37**. Wien.

KOSSACK G., 1954. Studien zum Symbolgut der Urnenfelder- und Hallstattzeit Mitteleuropas. *Römisch- Germanishe Forschungen,* **20**. Berlin.

KOSSACK G., 1995. Mitteleuropa zwischen dem 13. und 8. Jahrhundert v. Chr. Geb. Geschichte, Stand und Probleme der Urnenfelderforschung. *In*: Beiträge zur Urnenfelderzeit nördlich und südlich der Alpen. Ergebnisse eines Kolloquiums. *Römisch- Germanischen Zentralmuseums Mainz Monographien 35*: 1-64.

KUCHARAVY D. & De Guio R., 2011. Application of S-shaped curves. *Procedia Engineering*, **9**: 559-572.

KRAUSE R., 1996. Zur Chronologie der Frühen und Mittleren Bronzezeit Süddeutschlands, der Schweiz und Österreichs. *In*: K. RANDSBORG (ed.), *Absolute Chronology. Archaeological Europe 2500-500 BC (Verona, April 20-23 1995)*. Acta Archaeologica, **67**: 73-86.

KRISTIANSEN K., 1998. *Europe before history*. New Studies in Archaeology, Cambridge.

KRISTINSSON A., 2010. *Expansions. Competition and conquest in Europe since the Bronze Age*. Reykiavík.

LACHENAL T., 2010. *L'age du bronze en Provence: productions ceramiques et dynamiques culturelles*. Thèse pour obtenir le grade de Docteur d'Aix-Marseille Université, Directeur de Thèse Dominique Garcia.

LACHENAL T., 2011. En marge du R.S.F.O.: styles céramiques de l'étape moyenne du Bronze final en

Provence. *In*: *Actes 8 Rencontres Méridionales de Préhistoire Récente (Marseille, 7-8 novembre 2008)*: 157-176.

LACHENAL T. & RÜCKER C., 2009. L'aven de La Mort de Lambert (Valbonne, Alpes-Maritimes) et les dépôts de vases en grotte à l'âge du Bronze en France méridionale. *In*: S. BONNARDIN, C. HAMON, M. LAUWERS & B. QUILLIC (eds), *Du matériel au spirituel: réalités archéologiques et historiques des 'dépôts' de la Préhistoire à nos jours: actes des rencontres 16-18 octobre 2008*. Antibes. Association pour la Promotion et la Diffusion des Connaissances archéologiques: 223-237.

LOCHNER M. & HELLERSCHMID I., 2008. *Ein Gräberfeld der jüngeren Urnenfelderkultur aus Franzhausen-Kokoron. Katalog und Abbildungen*. Version 02/ epub, doi:10.1553/KatalogUFK.

LOCHNER M. & HELLERSCHMID I., 2009. Sozialstrukturen im Gräberfeld Franzhausen-Kokoron, Niederösterreich. Eine Analyse anhand der Urnengrößen. *Archaeologia Austriaca*, **93**: 23-32.

LOFTUS E., Mitchell PJ. & Bronk Ramsey C., 2019. An archaeological radiocarbon database for southern Africa. *Antiquity*, **93** (370): 870-885.

LOISON G., 2003. *L'Âge du Bronze ancien en Auvergne*. Archives d'Ecologie Préhistorique, **14**.

LÓPEZ CACHERO F. J., 2007. Sociedad y economía en el Bronce Final y la primera edad del Hierro en el noreste peninsular: una aproximación a partir de las evidencias arqueológicas. *Trabajos de Prehistoria*, **64** (1): 99-120.

LÓPEZ CACHERO F. J., 2008. Necrópolis de incineración y arquitectura funeraria en el noreste de la Península Ibérica durante el Bronce Final y la Primera Edad del Hierro. *Complutum*, **19** (1): 139-171.

LÓPEZ CACHERO F. J., 2014. Necròpolis d'incineració, tombes i pràctiques de dipòsit funerari a finals de l'Edat del Bronze i principis de l'Edat del Ferro al nord-est peninsular. *In*: O. MERCADAL I FERNÀNDEZ (ed.), *La transició Bronze Final-1ª Edat del Ferro en els Pirineus i territoris veïns*. XV Col·loqui Internacional d'Arqueologia de Puigcerdà. Congrés Nacional d'Arqueologia de Catalunya: 331-369.

LÓPEZ CACHERO F. J. & ROVIRA HORTALÀ M. C., 2017. El bronze final i el ritual funerari incinerador a Catalunya. *In*: *La fi és el principi. Mort i pràctiques funeràries a Catalunya durant la prehistòria*. MAC (Museu Nacional d'Arqueologia): 103-117.

LÓPEZ J. B., MALGOSA A., GALLART J. & RAFEL N., 2005. Cova de Montanissell (Sallent - Coll de Nargó, Alt Urgell). Operació: 'Senyora de les Muntanyes'. *Cota Zero*, **20:** 27-36.

LOŽNJAK DIZDAR D., 2011. Graves of the Early Urnfield Culture in northern Croatia. Some remarks and questions. *In*: C. GUTJAHR & G. TIEFENGRABER (eds), *Beiträge zur Mittel- und Spätbronzezeit sowie zur Urnenfelderzeit am Rande der Südostalpen*, Akten des 1. Wildoner Fachgespräches vom 25. bis 26. Juni 2009 in Wildon/Steiermark (Österreich). Internationale Archäologie, **15**: 37-49.

MÄDER A., 2008. *Die mittelbronzezeitlichen Gräber von Birmensdorf-Rameren*. Zürcher Archäologie, **24**.

MÄDER A., 2009. Zwei spätbronzezeitliche Bestattungen in Neftenbach. *Archäologie im Kanton Zürich*, **01**: 41-50.

MAHAJAN V. & PETERSON R. A., 1985. *Models for Innovation Diffusion*. Beverly Hills.

MAREMBERT F. M. & SEIGNE J., 2000. Un faciès original: le groupe du Pont-Long au cours des phases anciennes de l'Age du Bronze dans les Pyrénées nordoccidentales. *Bulletin de la Société préhistorique française,* **97** (4): 521-538.

MARIÉTHOZ F., 1997. Vufflens-la-Ville VD, En Sency. *Jahrbuch der Schweizerischen Gesellschaft für Ur- und Frühgeschichte*, **80**: 226.

MARIÉTHOZ F. & MOINAT P., 1995. Vufflens-la-Ville VD, En Sency. *Jahrbuch der Schweizerischen Gesellschaft für Ur- und Frühgeschichte*, **78**: 204.

MARIÉTHOZ F. & MOINAT P., 1996. Vufflens-la-Ville VD, En Sency. *Jahrbuch der Schweizerischen Gesellschaft für Ur- und Frühgeschichte*, **79**: 238-239.

MARIEZKURRENA K., 1979. Dataciones de radiocarbono existentes para la prehistoria vasca. *Munibe*, **3-4**: 237-255.

MARIEZKURRENA K., 1990. Dataciones Absolutas para la Arqueología Vasca. *Munibe*, **42**: 287-304.

MARINAKIS Y. D., 2012. Forecasting technology diffusion with the Richards model. *Technological Forecasting & Social Change*, **79**: 172-179.

MARÍN D., GIBAJA J. F., ALONSO N., ORTEGA D., PALOMO A. & MOYA A., 2017. Chipped stone tools from the Early Bronze Age settlement of 139 Minferri (2100-1650 cal. BC) (Lleida, Spain). Raw materials, technology and activities inferred. *In*: A. BRYSBAERT & A. GORGU (eds). *Artisans versus Nobility*. Leiden: Sidestone Press: 139-159.

MARTÍ M., POU R. & BUCH M., 1995. Les estructures prehistòriques del jaciment de Can Filuà, Santa Perpètua de Mogoda (Vallès Occidental). *Limes*, **4-5**: 29-44.

MARTÍN CÓLLIGA A. M. & MESTRES TORRES J. S., 2002. Periodització des de la fi del neolític fins a l'edat del bronze a la Catalunya sud-pirinenca. Cronologia relativa i absoluta. *In*: *Pirineus i veïns al 3r mil·lenni AC. De la fi del neolític a l'edat del bronze entre l'Ebre i la Garona*. XII Colloqui Internacional d'Arqueologia de Puigcerdà: 77-130.

MARTÍNEZ RODRÍGUEZ P., CAMATS MALET A., CARDONA I. & COLELL R., 2010. Camp dels Moros de la Codina (Pinell, el Solsonès). Una de les darreres inhumacions de l'edat del bronze a Catalunya. *In*: GRUP DE PREHISTÒRIA DEL SOLSONÈS (eds), *2n Col·loqui d'Arqueologia d'Odèn [el Solsonès]. Home i territori. Darreres investigacions al Prepirineu lleidatà 2006-2008*: 81-86.

MARTÍN MACHÍN P., 2006. *Can Barraca. Una necrópolis d'incineració de fa 2800 anys a Besalú (La Garrotxa).* Amics de Besalú i el seu comptat. Olot.

MASSY K, 2018. *Gräber der Frühbronzezeit im südlichen Bayern. Untersuchungen zu den Bestattungs- und Beigabensitten sowie gräberfeldimmanenten Strukturen*. Materialhefte zur Bayerischen Archäologie, **107**. Kallmünz/Opf.

MAUVILLY M., DAFFLON L. & BUCHILLER C., 2006. Bulle FR, Le Terraillet. *Jahrbuch Archäologie Schweiz*, **89**: 226.

MAXIMIANO, A. 2007. Teoría geoestadística aplicada al análisis de la variabilidad especial arqueológica intra-site. PhD thesis directed by Prof. Joan Antón Barceló, Universitat Autònoma de Barcelona.

MAYA JL., 1992. Aprovechamiento del medio y paleoeconomía durante las etapas metalúrgicas del nordeste peninsular. In: A. Moure (ed.) *Elefantes, ciervos y ovicaprinos: economía y aprovechamiento del medio en la prehistoria de España y Portugal*. Santander: 275-314.

MAZZUCCO N., CAPUZZO G., PETRINELLI PANNOCCHIA C., IBÁÑEZ JJ. & GIBAJA J., 2018. Harvesting tools and the spread of the Neolithic into the Central-Western Mediterranean area. *Quaternary International*, **470** (B): 511-528.

MAZZUCCO N., IBÁÑEZ JJ., CAPUZZO G., GASSIN B., MINEO M. & GIBAJA J., 2020. Migration, adaptation, innovation: the spread of the Neolithic harvesting technologies in the Mediterranean. *PLoS ONE*, **15** (4): e0232455.

MEDINA MORALES J., GONZÁLEZ PÉREZ J-R. & VÀZQUEZ FALIP MP., 2012. La necrópolis del Turó de la Capsera (El Pont de Suert, Conca de Dalt). In: MC. Rovira Hortalà, FJ. López Cachero & F. Mazière (eds.), *Les necròpolis d'incineració entre l'Ebre i el Tíber (segles IX-VI aC): metodologia, pràctiques funeràries i societat*. Monografies MAC, **14**: 111-117.

MCLAUGHLIN TR., 2019. On Applications of Space–Time Modelling with Open-Source ^{14}C Age Calibration. *Journal of Archaeological Method and Theory*, **26**: 479-501.

MCLAUGHLIN T R., WHITEHOUSE NJ., SCHULTING RJ., MCCLATCHIE M., BARRATT P. & BOGAARD A., 2016. The changing face of Neolithic and Bronze Age Ireland: A big data approach to the settlement and burial records. *Journal of World Prehistory*, **29** (2): 117-153.

MILLOTTE J-P., 2001. Sur le passage de l'Âge du Bronze à l'Âge du Fer dans le Massif jurassien: état de la question et perspectives. En complément à une ancienne datation d'un tumulus de Dompierre-les-Tilleuls. *Dialogues d'histoire ancienne*, 27 (1): 33-80.

MITCHELL A., 2009. *The ESRI Guide to GIS Analysis (Vol. 2 Spatial measurements & Statistics)*. Redlands (CA).

MONTELIUS O., 1885. *Om tidsbestamning inom bronsaaldern med sarskildt afseende paa Skandinavien. Kongliga Vitterhets Historie och Antiqvitets Akademiens Handlingaer 30/10*. Stockholm.

MONTELIUS O., 1903. *Die typologische Methode. Die älteren Kulturperioden im Orient und in Europa 1*. Stockholm.

MONTÓN F. J., 2002. Ritual funerario en la I Edad Del Hierro. La necrópolis de la Codera. *Bolskan*, **19**: 115-120.

MORÁN M., GONZÁLEZ J. R. & PRADA A., 2002. Una sepultura en cista en la vall de Miarnau (Llardecans, Lérida). *Bolskan*, **19**: 37-51.

MORELL B., 2019. *Chronology as a means of social interpretation: the funerary contexts of the north-east of the Iberian Peninsula in the period between the end of the 5th and the beginning of the 4th millennium cal. BC*. PhD thesis, Universitat Autònoma de Barcelona.

MOYA A., LÓPEZ J. B., LAFUENTE A., REY J., TARTERA E., VIDAL A. & EQUIP VINCAMET, 2005. El Grup del Segre-Cinca II (1250-950 cal. a.n.e.) a les terres del Baix Cinca: el poblat clos de Vincamet (Fraga, Osca). *Revista d'Arqueologia de Ponent*, **15**: 13-58.

MÜLLER J. & LOHRKE B., 2009. Neue absolutchronologische Daten für die süddeutsche Hügelgräberbronzezeit. *Germania*, **87**: 25-39.

MÜLLER-KARPE H., 1959. *Beiträge zur Chronologie der urnenfelderzeit nördlich und südlich der Alpen*. Römisch-Germanisches Forschungen, **22**.

MÜLLER S., 1897**.** *Vor Oltid*. Kobenhavn.

MUÑOZ A. M., 1971. Dos nuevas fechas de C-14 para sepulcros de fosa. *Pyrenae*, **7**: 157.

MUÑOZ A. M., 1972. Análisis de Carbono-14 sobre muestras recogidas por el Instituto de Arqueología de la Universidad de Barcelona. *Pyrenae*, **8**: 147-150.

MUÑOZ RUFO V., 2006. El Coll (Llinars del Vallès): una segona tomba del Ferro I. *Cypsela*, **16**: 183-194.

MUÑOZ SALVATIERRA M. & BERGANZA E., 1997. *El yacimiento de la cueva de Urratxa III (Orozko, Bizkaia)*. Bilbao.

NADAL J., SOCIAS J. & SENABRE M. R., 1994. El jaciment neolític de Pou Nou-2 de Sant Pere Molanta (Olèrdola). *Gran Penedès*, **38**: 17-19.

NEUMAIER J., 1995. Los Campos de Urnas del sudoeste europeo desde el punto de vista centroeuropeo. *Revista d'Arqueología de Ponent*, **5**: 53-80.

NEUMAIER J., 2006. Mito, artesanía e identidad cultural: los 'campos de urnas' peninsulares y languedocienses a la luz de elementos 'italianizantes': a propósito del paradigma de los urnenfelder 'norte' y 'sur' entorno del 1300-700 arq. ane. *Quaderns de prehistòria i arqueologia de Castelló*, **25**: 147-166.

NIJBOER A. J. & VAN DER PLICHT H., 2008. The Iron Age in the Mediterranean: recent radiocarbon research at the University of Groningen. *In*: D. BRANDHERM & M. TRACHSEL (eds), *Proceedings of the XV World Congress (Lisbon, 4-9 September 2006), International Union for Prehistoric and Protohistoric Sciences, A New Dawn for the Dark Age? Shifting Paradigms in Mediterranean Iron Age Chronology*. Oxford: BAR International Series, **1871**: 103-118.

NIETO M., LOPÉZ F. & CRUz F., 1998. Performance analysis of technology using the S curve model: the case of digital signal processing (DSP) technologies. *Technovation*, **18** (6-7): 439-457.

NIETO A., MOYA A., LÓPEZ J. B. & AGUSTÍ B. 2014. Ofrenes o deixalles? El cas dels bovins (Bos taurus) en context funerari del jaciment del bronze ple de Minferri (Lleida, Catalunya). *In*: A. GARDEISEN & C. CHANDEZON (eds), *Équidés et bovidés de la Méditerranée Antique. Rites et combats. Jeux et savoirs*, Monographies d'Archéologie Mediterranéenne, 6. Lattes: Association pour la Recherche Archéologique en Languedoc Oriental: 53-113.

OLALDE I., MALLICK S., PATTERSON N., ROHLAND N., VILLALBA-MOUCO V., SILVA M., DULIAS K., EDWARDS C. J., GANDINI F., PALA M. & SOARES P., 2019. The genomic history of the Iberian Peninsula over the past 8000 years, *Science*, **363** (6432): 1230-1234.

OZANNE J.-C., 1993. L'Abri du Châtel à Sollières. *Mémoires et documents de la Société savoisienne d'histoire et d'archéologie,* **95**: 79-84.

OZANNE J-C. & AYROLLES P., 1997. Sollières-Sardiéres. Abri du Châtel. *Gallia Informations,* 1996: 234.

PEDRO M., 2008. Aproximació a les Balmes paradolmèniques del Solsonès. *In*: *Primer Col·loqui d'Arqueologia d'Odèn*: 31-38.

PEDRO M., OMS F. X., BARGALLÓ A., GARCIA-GUIXÉ E., LÓPEZ-GARCÍA J. M., MARTÍN P., MORALES J. I., NIEVAS A., PORTILLO M., SALADIÉ P., SOLÉ À. & SOTO M., 2015. La intervenció arqueològica a la cova del Mort. Campanyes de 2007 a 2009 (Sant Esteve de la Sarga, Pallars Jussà). *In*: *Primeres Jornades d'Arqueologia i Paleontologia del Pirineu i Aran. Coll de Nargó i la Seu d'Urgell, 29 i 30 de novembre de 2013*: 124-133.

PEÑALVER X., 2005. Orígenes. Tafalla.

PEREIRA SIESO J., RUIZ TABOADA A. & CARROBLES SANTOS J., 2003. Aportaciones del C-14 al mundo funerario carpetano: la necrópolis de Palomar de Pintado. *Trabajos de Prehistoria*, **60** (2): 153-168.

PÉREZ CONILL J., 2009. Aportació a l'estudi de la necròpolis d'incineració de Can Missert de Terrassa (Vallès Occidental). *Terme*, **24**: 177-188.

PIERA TEIXIDÓ M., 2016. Diacronies i sincronies al jaciment de l'Espina C (Tàrrega, l'Urgell): ocupacions del V, III i II mil·lenni cal ANE. *Revista d'Arqueologia de Ponent*, **26**: 125-145.

PIERA TEIXIDÓ M., PANCORBO PICÓ A., GARCÉS ESTALLO I. & GALLART FERNÀNDEZ J., 2013. Els assentaments de les edats del bronze, ibèrica i romana dels Llirians del Mas i les Torres (Salàs de Pallars, Pallars Jussà). *Revista d'Arqueologia de Ponent*, **23**: 163-200.

PIGORINI L., 1909. *I primi abitatori dell'Italia*, Nuova Antologia: 277-297.

PINHASI R., FORT J. & AMMERMAN A. J., 2005. Tracing the origin and spread of agriculture in Europe. *PLoS Biol*, **3** (12): e410.

PONS E., 1984. *L'Empordà, de l'edat del bronze a l'edat del Ferro (1100-600 a.C.)*. Sèrie monogràfica **4**. Centre d'investigacions Arqueològiques de Girona.

PONS E. & SOLÉS A., 2002. Pi de la Lliura (Vidreres). Primers avenços sobre la necròpolis d'incineració del bronze final (1100-950 aC). *Quaderns de la Selva*, **14**: 61-93.

PONS E. & SOLÉS A., 2008. *La necròpolis d'incineració del Pi de la Lliura (Vidreres) ara fa 3000 anys*. Ajuntament de Vidreres.

PRIEN R., 2005. *Archäologie und Migration. Vergleichende Studien zur archäologischen Nachweisbarkeit von Wanderungsbewegungen*. Universitätsforschungen zur prähistorischen Archäologie, **120**.

PROBST E., 1996. *Deutschland in der Bronzezeit. Bauern, Bronzegießer und Burgherren zwischen Nordsee und Alpen*. München.

PRZYBIŁA S., 2009. *Intercultural contacts in the western Carpathian area at the turn of the 2nd and the 1st millennia BC*. Warszawa.

RAFEL N., 1991. *La necrópolis del Coll de Moro de Gandesa*. Els materials. Tarragona.

RAFEL N. & ARILLA M., 2015. Recerques al Baix Pallars: les cavitats M21 i M22 i el megàlit de la Foleda (Pallars Sobirà). *In*: *Primeres Jornades d'Arqueologia i Paleontologia del Pirineu i Aran. Coll de Nargó i la Seu d'Urgell, 29 i 30 de novembre de 2013*: 110-115.

RAFEL N. & ARMADA X. L., 2008. Sobre la cronologia de la necròpolis del Calvari del Molar i l'horitzó funerari del bronze final-I edat del ferro a l'Ebre. Noves datacions absolutes. *Cypsela*, **17**: 149-159.

RAMOS AGUIRRE M., 2007. Cortecampo II (Los Arcos) y Osaleta (Lorca, Valle de Yerri). In: *La tierra te sea leve. Arqueología de la muerte en Navarra*: 93-96.

RAMSTEIN M., 2005. Koppigen, Usserfeld. Rettungsgrabungen 1999: spätbronzezeitliche Gräber. *Archäologie im Kanton Bern/Archéologie dans le canton de Berne*, **6A**: 76-77.

RAMSTEIN M. & CUENI A., 2005. Koppingen-Usserfeld. Spätbronzezeitliche Gräber. *Archäologie im Kanton Bern/Archéologie dans le canton de Berne*, **6B**: 547-558.

RATEL R., 1970. Le tumuls à incinération de Chaume-les-Baigneux (Côte d'Or). *Revue archéologique de l'Est et du Centre-Est*, **XXI** (1-2): 181-199.

RAYNAUD D., 2010. Why do diffusion data not fit the logistic model? A note on network discreteness, heterogeneity & anisotropy. *In*: N. MEMON & R. ALHAJJ (eds), *From sociology to computing in social networks: theory, foundations and applications*: 81-96.

REIMER P. J., AUSTIN W. E. N., BARD E., BAYLISS A., BLACKWELL P. G., BRONK RAMSEY C., BUTZIN M., CHENG H., EDWARDS R. L., FRIEDRICH M., GROOTES P. M., GUILDERSON T. P., HAJDAS I., HEATON T. J., HOGG A. G., HUGHEN K. A., KROMER B., MANNING S. W., MUSCHELER R., PALMER J. G., PEARSON C., VAN DER PLICHT J., REIMER R. W., RICHARDS D. ., SCOTT E. M., SOUTHON J. R., TURNEY C. S. M., WACKER L., ADOLPHI F., BÜNTGEN U., CAPANO M., FAHRNI S. M., FOGTMANN-SCHULZ A., FRIEDRICH R., KÖHLER P., KUDSK S., MIYAKE F., OLSEN J., REINIG F., SAKAMOTO M., SOOKDEO A. & TALAMO S., 2020. The IntCal20 Northern Hemisphere Radiocarbon Age Calibration Curve (0–55 cal kBP). *Radiocarbon*, **62** (4): 725-757.

REY P.-J., TREFFORT J.-M. & DE LARMINAT S., 2012. Le site néolithique et protohistorique du Châtelard de Bourg-Saint-Maurice (Savoie). Habitat perché et zone sépulcrale au pied du col du Petit-Saint-Bernard, dans leur contexte alpin. *Bulletin de la Société préhistorique française*, **109** (4): 731-765.

RICCI M., 1998. Alta valle Argentina. *In*: A. DEL LUCCHESE & R. MAGGI (eds), Dal diaspro al bronzo. L'Età del Rame e l'Età del Bronzo in Liguria: 26 secoli di storia fra 3600 e 1000 anni avanti Cristo. *Quaderni della Soprintendenza Archeologica della Liguria,* **5**: 58-62.

RICHARDS F. J., 1959. A flexible growth function for empirical use. *Journal of Experimental Botany*, **10** (2): 290-301.

RITTATORE VONWILLER F., 1963. La cultura di Canegrate ed il problema dei Campi d'Urne in Italia. *In*: *Studi in onore di A. Pedro Bosch-Gimpera*. Mexico: 385-393.

ROGERS E. M., 2003. *Diffusion of innovations (5th ed.)*. New York.

ROGERS E. M., MEDINA U. E., RIVERA M. A. & WILEY C. J., 2005. Complex adaptive systems and the diffusion of innovations. *The Innovation Journal: The Public Sector Innovation Journal*, **10** (3): 1-26.

RONCO D., 1994. Un campione di popolazione dell'età del Bronzo di Paradiso di Laorca (Lecco): paleobiologia. *In*: S CASINI (ed.), *Carta archeologica della Lombardia. IV Provincia di Lecco*: 81-90.

ROVIRA HORTALÀ M. C., LÓPEZ CACHERO F. J. & MAZIÈRE F., 2012. *Les necròpolis d'incineració entre l'Ebre i el Tiber (segles IX-VI aC): metodologia, pràctiques funeràries i societat*. Monografies del Museu d'Arqueologia de Catalunya, **14**. Barcelona.

ROVIRA I PORT J., 1991. Reflexiones sobre los primeros campos de urnas en la Península Ibérica: una arribada marítima. *Cuadernos de prehistoria y arqueología castellonenses*, **15**: 157-172.

ROYO J. I., 1986a. El yacimiento de Los Castellets de Mequinenza y su necrópolis tumular de inhumación e incineración. (Mequinenza, Zaragoza). *Arqueología Aragonesa*, **1984**: 47-51.

ROYO J. I., 1986b. Los Castellets de Mequinenza (Zaragoza). Cuarta campaña de excavaciones arqueológicas. *Boletín del Museo de Zaragoza*, **5**: 401-403.

ROYO J. I., 1987. La necrópolis tumular de Los Castellets de Mequinenza (Zaragoza). Campaña de 1985. *Arqueología Aragonesa,* **1985**: 71-75.

ROYO J. I., 1991. Los Castellets de Mequinenza (Zaragoza). Trabajos realizados en 1986. *Arqueología Aragonesa*, **1986-1987**: 145-148.

ROYO J. I., 1992. Estudio de materiales de Los Castellets de Mequinenza. Campaña de 1990. *Arqueología Aragonesa*, **1990**: 81-87.

ROYO J. I., 1996. Ritual funerario y cultura material en las necrópolis tumulares de Los Castellets de Mequinenza (Zaragoza): Una aportación al estudio del Bronze Final/Hierro I en el N.E. Peninsular. *Gala*, **3-5**: 93-108.

ROYO J. I. & FERRERUELA A., 1983. Noticia preliminar sobre la necrópolis de inhumación e incineración de Los Castellets (Mequinenza, Zaragoza). *Boletín del Museo de Zaragoza*, **2**: 211-219.

RÜCKER C., 2011. Aven de la Mort de Lambert. Un acte de prévention à l'âge du bronze. *Actes de la Société française d'histoire de l'art dentaire*, **16**: 69-74.

RUFFIEUX M. & MAUVILLY M., 2003. La nécropole hallstattienne de Düdingen/Birch et l'occupation pré-et protohistorique du secteur. *Cahiers d'Archéologie Fribourgeoise/Freiburger Hefte für Archäologie*, **5**: 1-16.

RUIZ ZAPATERO G., 1985. *Los Campos de Urnas del NE. de la Península Ibérica*. Madrid.

RUIZ ZAPATERO G., 1997. Migration revisited: urnfields in Iberia. *In*: M. DÍAZ-ANDREU & S. KEAY (eds), *The archaeology of Iberia: the dynamics of change*. London-New York: 158-174.

RUIZ ZAPATERO G., 2014. The Urnfields. *In*: M. ALMAGRO-GORBEA (ed.), *Iberia. Protohistory of the Far West of Europe: from Neolithic to Roman conquest*. Burgos: 195-215.

RUSSELL T. M., 2004. *The spatial analysis of radiocarbon databases: the spread of the first farmers in Europe and of the fat-tailed sheep in Southern Africa*. Oxford.

SABAUX C., VESELKA B., CAPUZZO G., SNOECK C., SENGELØV A., HLAD M., WARMENBOL E., STAMATAKI E., BOUDIN M., ANNAERT R., DALLE S., SALESSE K., DEBAILLE V., TYS D., VERCAUTEREN M. & DE MULDER G., 2021. Multi-proxy analyses reveal regional cremation practices and social status at the Late Bronze Age site of Herstal, Belgium. *Journal of Archaeological Science*, **132**: 105437.

SALZANI L., 1985. *Preistoria e Protostoria nella media pianura veronese*. Oppeano (Verona).

SALZANI L., 1994. Necropoli dell'età del Bronzo a Scalvinetto di Legnago (VR). Campagne di scavo 1991 e 1994. *Padusa*, **30**: 107-131.

SALZANI L., 2004. La necropoli di Scalvinetto (Legnago): nuove ricerche. *Bollettino del Museo Civico di Storia Naturale di Verona*, **28**: 67-84.

SAMPAIO L, VARAJÃO J., SOLTEIRO PIRES E. J. & DE MOURA OLIVEIRA P. B. 2013. Diffusion of Innovation Simulation using an Evolutionary Algorithm. *In*: *Transactions on Computational Science XXI*. Springer, Berlin, Heidelberg: 46-63.

SCHAER A., 2019. Plateau de Diesse, Prêles. *Archäologie Bern/Archéologie Bernoise*, **2019**: 96-101.

SCHAUER P., 1975. Beginn und Dauer der Urnenfelderkultur in Südfrankreich. *Germania*, **53**: 47-63.

SCHOPPER F., 1993. Das Urnenfelderzeitliche Gräberfeld von Straubing-Kagers. *Jahresbericht des Historischen Vereins für Straubing und Umgebung*, **95**: 59-210.

SCHOPPER F., 1995. *Das Urnenfelder- und Hallstattzeitliche Gräberfeld von Künzing, Lkr. Deggendorf (Niederbayern)*. Materialen zur Bronzezeit in Bayern, **1**.

SCHMID C., 2020. Evaluating cultural transmission in Bronze Age burial rites of central, northern and northwestern Europe using radiocarbon data. *Adaptive Behavior*, **28** (5): 359-376.

SCHUMPETER J., 1934. *The theory of economic development*. Cambridge, Massachusetts.

SENABRE M. R., SOCIAS J. & NADAL J., 1994. *Pou Nou-2 (Olèrdola, Alt Penedès). Memòria de l'excavació d'urgència, abril-juny 1993*. Servei d'Arqueologia de la Generalitat de Catalunya.

SESMA J., BIENES CALVO J. J., ERCE DOMÍNGUEZ A., FARO CARBALLA J. A., RAMOS AGUIRRE M., 2009. La cerámica de estilo Cogotas I y los ciclos culturales en las postrimerías de la edad del Bronce en Navarra. *Cuadernos de Arqueología Universidad de Navarra*, **17**: 39-83.

SESMA J. & GARCÍA J., 1995-1996. Excavación de urgencia en los yacimientos de depósitos en hoyo de Aparrea (Biurrun) y la Facería (Tiebas). *Trabajos de Arqueología Navarra,* **12**: 293-297.

SESMA J., GARCÍA J., TABAR M. I., 2007. La Saga (Cáseda). Una sepultura colectiva de la Edad del Bronce. *In*: *La Tierra te sea leve. Arqueología de la muerte en Navarra*: 89-92.

SHARIF M. N. & RAMANATHAN K., 1981. Binomial Innovation Diffusion Models with Dynamic Potential Adopter Population. *Technological Forecasting and Social Change*, **20**: 63-87.

SHINOARA K., 2012. Space-time innovation diffusion based on physical analogy. *Applied Mathematical Sciences*, **6**: 2527-2558.

SIMONE ZOPFI L., 2005a. Urago d'Oglio (BS). Necropoli ad incinerazione dell'età del Bronzo. *The Journal of Fasti Online*: www.fastionline.org/docs/2005-40.pdf.

SIMONE ZOPFI L., 2005b. Capriano del Colle (BS). Tombe ad incinerazione dell'età del Bronzo. *The Journal of Fasti Online*: www.fastionline.org/docs/2005-39.pdf.

SORIANO I. & AMORÓS GURRERA J., 2014. Moldes para puñales en la Península Ibérica durante la Edad del Bronce. El caso de Camp Cinzano (Vilafranca del Penedès, Alt Penedès, Barcelona). *Trabajos de Prehistoria*, **71** (2): 368-385.

SORIANO LLOPIS I., 2011. De tumbas de metalúrgico en el Nordeste peninsular. El Forat de la Tuta (Riner, Solsonès, Lleida). *Revista d'Arqueologia de Ponent*, **21**: 37-56.

SKLENAŘ K., 1983. *Archaeology in Central Europe: the First 500 Years*. New York: Leicester University Press.

SPERBER L., 1987. *Untersuchungen zur Chronologie der Urnenfelderkultur im nördlichen Alpenvorland von der Schweiz bis Oberösterreich*. Antiquitas, **3** (29).

STAMATAKI E., KONTOPOULOS I., SALESSE K., MCMILLAN R., VESELKA B., SABAUX C., ANNAERT R., BOUDIN M., CAPUZZO G., CLAEYS P., DALLE S., HLAD M., SENGELØV A., VERCAUTEREN M., WARMENBOL E., TYS D., DE MULDER G., SNOECK C. 2021. Is it hot enough? A multi-proxy approach shows variations in cremation settings during the Metal Ages in Belgium. *Journal of Archaeological Science*, **136** (2): 105509

STEIN M. L., 1999. *Statistical Interpolation of spatial data: some theory for kriging*. New York.

STENER V. H., ZINK A. & TECCHIATI U., 2017. Frühbronzezeitliche Hockerbestattung aus Schlanders. *In*: *Der Schlern*, **91**, 3: 14-29.

STIG SØRENSEN M. L. & REBAY-SALISBURY K. C., 2008, The impact of 19th century ideas on the construction of 'urnfield' as a chronological and cultural concept: tales from Northern and Central Europe. *In*: A. LEHOËRFF (ed.), *Construire le temps: histoire et méthodes des chronologies et calendriers des derniers millénaires avant notre ère en Europe occidentale,* Actes du XXXe colloque international de Halma-Ipel (CNRS, Lille 3, MCC, 7-9 décembre 2006): 57-67.

STOCKHAMMER P. W., MASSY K., KNIPPER C., FRIEDRICH R., KROMER B., LINDAUER S., RADOSAVLJEVIĆ J., WITTENBORN F. & KRAUSE J., 2015. Rewriting the Central European Early Bronze Age Chronology: Evidence from Large-Scale Radiocarbon Dating. *PLoS ONE*, **10** (10): e0139705.

STÖCKLI W. E., 2009. Contradictions in the relative chronology: archaeological and radiocarbon dating. *Radiocarbon*, **51** (2): 695-710.

SØRENSEN M. L. & REBAY K. C., 2005. Interpreting the body. Burial practices at the Middle Bronze Age cemetery at Pitten, Austria. *Archaeologia Austriaca*, **89**: 153-175.

TARRÚS J. & BOSCH A., 1990. Els nivells postglacials de la cova d'En Pau (Serinyà, Pla de l'Estany). *Cypsela*, **VIII**: 21-48.

TARRÚS J., CASTELLS J., CHINCHILLLA J. & VILARDELL R., 1985. Noves datacions de RC-14 obtingudes recentment i procedents de jaciments arqueològiques de les comarques gironines. *Cypsela*, **V**: 173.

TCHÉRÉMISSINOFF Y., CAZES J.-P., GILABERT C., DUCHESNE S., LACHENAL T., LAGARRIGUE A. & MARET D., 2010. Nouvelles sépultures individuelles du Bronze ancien dans le sud de la France: contextes et problématiques. *Bulletin de la Société préhistorique française*, **107** (2): 331-352.

TECCHIATI U., 2011. Sepolture e resti umani sparsi in abitati della preistoria e della protostoria dell'Italia settentrionale con particolare riferimento al Trentino-Alto Adige. *Notizie Archeologiche Bergomensi*, **19**: 49-63.

TELFORD R. J., HEEGAARD E. & BIRKS H. J. B., 2004. The intercept is a poor estimate of a calibrated radiocarbon age. *The Holocene*, **14** (2): 296-298.

TERRATS N. & PALOMO A., 2002. C/Emili Grahit-C/ Ullastret (Girona, Gironès). *In*: *VI Jornades d'Arqueologia de les Comarques de Girona*. Sant Joan de les Abadesses: 63-67.

TERŽAN B., 1999. An outline of the Urnfield Culture period in Slovenia. *Arheološki vestnik*, **50**: 97-143.

THIИRIOT F., 2005. Le mobilier céramique de l'Âge du Bronze final III des sites des Estournelles et de la Plaine à Simandres (Rhône). *Bulletin de la Société préhistorique française*, **102** (2): 417-438.

TIEFENGRABER S., 2007. Zum Stand der Erfoschung der Mittel- und Spätbronzezeit in der Steiermark. *In*: G. TIEFENGRABER (ed.), *Studien zur Mittel- und Spätbronzezeit am Rande der Südostalpen.* Universitätsforschungen zur prähistorischen Archäologie, **148**: 67-113.

TIRABASSI J., 1997. La necropoli della Montata (RE). *In*: M. BERNABT BREA, A. CARDARELLI & M. CREMASCHI (eds), *Le Terramare. La più antica civiltà padana, catalogo della mostra (Modena 1997).* Milano: 685-687.

TOBLER W., 1970. A computer movie simulating urban growth in the Detroit region. *Economic Geography*, **46** (2): 234-240.

TOLEDO A. & DE PALOL P., 2006. *La necròpolis d'incineració del Bronze final transició a l'edat del Ferro de Can Bech de Baix, Agullana (Alt Empordà, Girona). Els resultants de la campanya d'excavació de 1974*. Serie Monogràfica MAC, **24**.

TRUCCO F., 2006. Considerazioni sul rituale funerario in Etruria meridionale all'inizio dell'età del ferro alla luce delle nuove ricerche a Tarquinia. *In*: P. VON ELES (ed.), *La ritualità funeraria tra età del ferro e orientalizzante in Italia*. Roma: 95-102.

TRUCCO F, DE ANGELIS D. & IAIA C., 2001. Villa Bruschi Falgari. Il sepolcreto villanoviano. In: AM. Moretti Sgubini (ed.), *Tarquinia etrusca. Una nuova storia*. Roma: 81-93.

UNDSET I., 1882. *Das erste Auftreten des Eisens in Nordeuropa.* Hamburg.

VALZOLGHER E., MEADOWS J., SALZANI P. & SALZANI L. 2012. Radiocarbon dating of the early Bronze

Age cemetery at Arano, Verona, northern Italy. *Radiocarbon*, **54** (3-4): 483-503.

VALZOLGHER E. & QUARTA G., 2009. Date radiocarboniche AMS dal Riparo di Peri (Dolcé, Verona). Commento e analisi bayesiana. *Bollettino del Museo Civico di Storia Naturale di Verona*, **33**: 85-113.

VANNACCI LUNAZZI G., 1971. *Necropoli della Media e Tarda età del Bronzo nella Lombardia occidentale*. Como.

VEGAS J. I., 1988. Revisión del fenómeno de los cromlechs vascos. *Estudios de Arqueología Alavesa*, **16**: 235-444.

VENTURINO GAMBARI M. (ed.), 1995. *Navigatori e contadini. Alba e la valle del Tanaro nella Preistoria*. Alba: 68-70.

VENTURINO GAMBARI M. (ed.), 2004. *Alla conquista dell'Appennnino: le prime comunità delle valli di Curone, Grue e Ossona, catalogo dell'esposizione (Brignano-Frascata, 23 aprile 2004 – 2 ottobre 2005)*. Torino.

VENTURINO GAMBARI M., CERRATO N. & OTTOMANO C., 2004. Alba, loc. San Cassiano (nuova piscina comunale). Sepoltura dell'antica età del Bronzo e strutture d'abitato della prima età del Ferro. *Quaderni della Soprintendenza Archeologica del Piemonte*, **20**: 174-176.

VENTURINO GAMBARI M. & VILLA G., 1993. Casale Monferrato, fraz. S. Germano, loc. Vallare. Rinvenimento sepolture della media età del Bronzo. *Quaderni della Soprintendenza Archeologica del Piemonte*, **11**: 199-203.

VENTURINO M., FERRERO L., ARTIOLI G., CANOVARO C. & ANGELINI I. 2018. Sepolture a inumazione dell'età del Bronzo nel Piemonte meridionale. *Quaderni di Archeologia del Piemonte*, **2**: 11-43.

VERRIER G. (ed.), 2016. *Toulouse (Haute-Garonne - 31) ZAC Niel. Rapport d'Opération d'Archéologie Préventive*. Direction Régionale des Affaires Culturelles de Midi-Pyrénées. Service Régional de l'Archéologie. Archeodunum.

VILASECA S., 1943. *El poblado y la necrópolis prehistóricos de Molá (Tarragona)*. Acta Arqueológica Hispanic, **I**.

VILASECA S., 1947. *El Campo de Urnas de Les Obagues de Montsant y la evolución de la cultura de las Urnas en el SW. de Cataluña*. Archivo Español de Arqueología, **20**.

VILASECA S., 1954. *Nuevos yacimientos tarraconenses de cerámica acanalada*. Reus, Instituto de Estudios Tarraconenses 'Ramon Berenguer IV' Centro Comarcal de Reus. Sección de Arqueología e Historia, **2**.

VITAL J., 1999. Identification du Bronze moyen-récent en Provence et en Méditerrannée nord-occidentale. *Documents d'Archéologie Méridionale*, **22**: 7-115.

WALSH M. J, RIEDE F. & O'NEILL S., 2019. Cultural transmission and innovation in archaeology. *In*: *Handbook of evolutionary research in archaeology*. Springer, Cham: 49-70.

WEDGWOOD J., CHADHA B., STAVASH J., EDEN J. & CORTESE A., 2003. *Genetic programming approaches to composable simulation*. Lockheed Martin Advanced Technology Laboratories. SISO Simulation Interoperability Workshop. Orlando, Florida.

WEWERKA B., 1998. Rettungsgrabungen beim Bahnhof von Hadersdorf am Kamp. *In*: Bericht zu den Ausgrabungen des Vereins ASINOE in den Projektjahren 1997 und 1998. *Fundberichte aus Österreich*, **37**: 264-279.

WILLIAMS A. N., 2012. The use of summed radiocarbon probability distributions in archaeology: a review of methods. *Journal of Archaeological Science*, **39** (3): 578-589.

YOUNG H. P., 2009. Innovation diffusion in heterogeneous populations: Contagion, social influence and social learning. *The American economic review*, **99** (5): 1899-1924.

ZOPPI U., FULCHERI E., GAMBARI F. M., HUA Q., LAWSON E. M., MICHELETTI CREMASCO M. & VENTURINO GAMBARI M., 2001. The Copper Age in northern Italy. *Radiocarbon*, **43** (2B): 1049-1055.

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Annex 1: Radiocarbon-dated inhumation and cremation burials in central and southwestern Europe between 1800 and 800 BC.

Site	Country	Lab code	14C Age BP	±σ	Material	Archaeological context	Funerary rite	References
Franzhausen, S33 Kokoron	Austria	VERA-732	2931	50	Charcoal	Grave 65, *Pinus sp.*	Cremation	Lochner & Hellerschmid 2008, 2009
Franzhausen, S33 Kokoron	Austria	VERA-733	2872	45	Charcoal	Grave 267, *Pinus sp.*	Cremation	Lochner & Hellerschmid 2008, 2009
Franzhausen, S33 Kokoron	Austria	VERA-734	2825	37	Charcoal	Grave 336, *Quercus sp.*	Cremation	Lochner & Hellerschmid 2008, 2009
Gänserndorf, Stillfried an der March	Austria	VERA-2918	2747	36	Human bone	Individual I, pit V841/1	Inhumation	Felgenhauer 1996; Kohler-Schneider 2001; Hellerschmid 2006
Gänserndorf, Stillfried an der March	Austria	VERA-2919	2998	36	Human bone	Individual VII, pit V841/1	Inhumation	Felgenhauer 1996; Kohler-Schneider 2001; Hellerschmid 2006
Gemeinlebarn	Austria	Bln-3448	3420	60	Charcoal	Grave 188	Inhumation	Krause 1996
Hadersdorf	Austria	VERA-2069	2661	57	Animal bone	Grave 88, sheep/goat bone	Cremation	Belardelli et al. 1990; Wewerka 1998
Pitten	Austria	VRI-93	3050	90	Charcoal	Area 372, pyre remains	Cremation	Felber 1970; Benkovsky-Pivovarová 1991; Sørensen & Rebay 2005
Aix-en-Provence, Conservatoire	France	Poz-42731	2995	35	Cremated human bone	Grave 37	Cremation	Aujaleu et al. 2013
Aix-en-Provence, Conservatoire	France	Poz-42733	2960	30	Cremated human bone	Grave 33	Cremation	Aujaleu et al. 2013
Aix-en-Provence, Conservatoire	France	Poz-42730	2850	35	Cremated human bone	Grave 32	Cremation	Aujaleu et al. 2013
Aix-en-Provence, Conservatoire	France	Poz-42729	2765	30	Cremated human bone	Grave 28	Cremation	Aujaleu et al. 2013
Aix-en-Provence, Conservatoire	France	Poz-42727	2455	30	Cremated human bone	Grave 31	Cremation	Aujaleu et al. 2013
Apons à Sarrance	France	Lyon-452	3360	55	Charcoal	Burial cave, layer 2, SU 4	Inhumation	Dumontier 1999; Marembert & Seigne 2000
Apons à Sarrance	France	Ly-8332	2730	55	Charcoal	Burial cave, layer 2, SU 4	Inhumation	Dumontier 1999; Marembert & Seigne 2000
Apons à Sarrance	France	Ly-1131	3425	40	Human bone	Burial cave, E5 575	Inhumation	Dumontier 1999; Marembert & Seigne 2000
Appenwihr, Kastenwald	France	Ly-2054	2800	130	Charcoal	Tumulus 5, grave 5	Inhumation and cremation	Bonnet et al. 1981; Evin et al. 1983
Bourg-Saint-Maurice, Chatelard-Mollaret des Granges	France	Lyon-2551	3500	30	Human bone	Grave III-1/2, individual 2	Inhumation	Rey et al. 2012
Bourg-Saint-Maurice, Chatelard-Mollaret des Granges	France	Lyon-2386	3310	40	Human bone	Grave III-4	Inhumation	Rey et al. 2012
Bourg-Saint-Maurice, Chatelard-Mollaret des Granges	France	Ly-4591	3550	125	Human bone	Grave III-1/2, individual 1	Inhumation	Rey et al. 2012
Chaume-lès-Baigneux, Tumulus	France	Lyon-1610	2985	55	Cremated human bone	Tumulus, central grave	Cremation	Ratel 1970; BANADORA
Clermont-Ferrand, Les Patureaux	France	Ly-6015	3285	65	Animal bone	Pit 1	Inhumation	Loison 2003
Colmar, Riedwihr	France	Lyon-42/OxA-4724	3210	50	Human bone	Tumulus II, grave 17	Inhumation	Bonnet et al. 2004
Colmar, Riedwihr	France	Ly-6752	2675	75	Human bone	Tumulus II, grave 16	Inhumation	Bonnet et al. 2004
Dompierre-les-Tilleuls, Planquecet	France	Gif-?	2600	90	Charcoal	Tumulus 1	Inhumation	Bichet & Millotte 1992; Milotte 2001
Estérençuby, Errotzaté 2	France	Gif-3741	2680	100	Charcoal	Cromlech, in the middle	Cremation	Blot 1977, 1995; Mariezkurrena 1990
Estérençuby, Errotzaté 4	France	Gif-4185	2640	100	Charcoal	Cromlech, in the middle	Cremation	Blot 1977, 1995; Mariezkurrena 1990
Larrau, Millagate 5	France	Gif-7559	2730	60	Charcoal	Cromlech, in the middle -0.30 m.	Cremation	Blot 1991, 1995
Laruns, Homme de Pouey	France	Erl-8750	3115	45	Human bone	Burial cave, Sector 4, R1, child	Inhumation	Courtaud & Dumontier 2010; Bui Thi et al. 2011
Laruns, Homme de Pouey	France	Erl-8751	3171	47	Human bone	Burial cave, Sector 5, R3, adult	Inhumation	Courtaud & Dumontier 2010; Bui Thi et al. 2011
Laruns, Homme de Pouey	France	Erl-8752	3046	46	Human bone	Burial cave, Sector 6, R1, adult	Inhumation	Courtaud & Dumontier 2010; Bui Thi et al. 2011
Laruns, Homme de Pouey	France	Erl-9623	3315	42	Human bone	Burial cave, Sector 1, NR 224, adolescens	Inhumation	Courtaud & Dumontier 2010; Bui Thi et al. 2011
Laruns, Homme de Pouey	France	Erl-9624	3031	41	Human bone	Burial cave, Sector 1, SR 15, adult	Inhumation	Courtaud & Dumontier 2010; Bui Thi et al. 2011
Laruns, Homme de Pouey	France	Erl-9625	3427	44	Animal bone	Burial cave, Sector 6, R1, 5, fauna	Inhumation	Courtaud & Dumontier 2010; Bui Thi et al. 2011
Ménerbes, Travers des Baguarettes	France	Lyon-4833	3555	30	Human bone	Burial rock shelter, inhumation in a pot	Inhumation	Tchérémissinoff et al. 2010
Nice, Youri	France	CRG-200	2984	182	Charcoal	Grave, layer 4	Cremation	Arnaud et al. 1987; Vital 1999
Pau, Cami Salié	France	Ly-2242	2650	140	Charcoal	Tumulus 1, urn	Cremation	Evin et al. 1983
Réalville, Camp d'Alba	France	Ly-7433	2575	50	Charcoal	Grave 79	Cremation	Janin et al. 1997
Saint Michel, Urdanarre Nord 1	France	Gif-9144	2990	50	Human bone	Tumulus 1, bottom of the cist	Inhumation	Blot 1993; Marembert & Seigne 2000
Sainte-Engrâce, Droundak	France	Erl-6946	3166	48	Not determined	Burial cave, D-C3-30	Inhumation	Dumontier et al. 2003; Courtaud et al. 2007; Bui Thi et al. 2011
Sainte-Engrâce, Droundak	France	Erl-6948	3272	60	Not determined	Burial cave, B-C1-T	Inhumation	Dumontier et al. 2003; Courtaud et al. 2007; Bui Thi et al. 2011
Saint-Maximin-la-Sainte-Baume, Chemin de Barjols	France	Poz-29414	3500	35	Not determined	Pit 1026, cuvette	Inhumation	Cockin & Furestier 2009; Lachenal 2010
Savines-le-Lac, La Combette	France	Poz-25712	3115	30	Not determined	Pit, SU 102	Cremation	Campolo 2006; Lachenal 2010
Sénaillac-Lauzès, Sindou	France	Ly-8059	2920	35	Human bone	Burial cave	Inhumation	Briois et al. 2000
Serres-Castet, Prédigadère à Castet	France	Ly-3480	3230	100	Human bone	Burial cave	Inhumation	Barthe et al. 1985; Marembert & Seigne 2000
Sierentz	France	Ly-4208	2990	100	Charcoal	Pit	Cremation	BANADORA
Simandres, La Plaine	France	Ly-6130	2845	40	Charcoal	SLP 25, bottom of the pit	Inhumation	Blaizot & Thiériot 2001; Thiériot 2005
Simandres, Les Estournelles	France	Ly-6119	3090	75	Charcoal	Pit SLE A11	Inhumation	Blaizot & Thiériot 2001; Thiériot 2005
Simandres, Les Estournelles	France	Ly-6118	2865	65	Charcoal	Pit SLE A2	Inhumation	Blaizot & Thiériot 2001; Thiériot 2005
Sollières-Sardières, Abri du Chatel	France	Ly-6638	2855	55	Charcoal	Burial rock shelter	Inhumation	Ozanne 1993; Aubin 1997; Ozanne & Ayrolles 1997; BANADORA
Valbonne, Aven de la Mort de Lambert	France	Ly-5394	3245	65	Charred seeds	Burial cave, room 2 -11M	Inhumation	Lachenal & Rücker 2009; Lachenal 2010; Rücker 2011
Valbonne, Aven de la Mort de Lambert	France	Ly-5395	3490	105	Charred seeds	Burial cave, at the bottom -25	Inhumation	Lachenal & Rücker 2009; Lachenal 2010; Rücker 2011
Ventabren, Château Blanc	France	ETH-15269	2720	55	Human bone?	Tumulus	Inhumation	Hasler 2002
Vix Les Tillies, Tumulus 2	France	Lyon-1431	2890	35	Cremated human bone	Tumulus 2, central grave 1	Cremation	Joffroy 1975; Chaume 2001; BANADORA
Vix Les Tillies, Tumulus 6	France	Lyon-665	2685	40	Cremated human bone	Tumulus 6, central grave	Cremation	Chaume 2001; BANADORA
Toulouse, ZAC Niel	France	Poz-47241	2880	35	Cremated human bone	SP2223, SU 2222-2D2	Cremation	Verrier 2016
Toulouse, ZAC Niel	France	Poz-47173	2730	35	Cremated human bone	SP2275, SU 2270.2	Cremation	Verrier 2016
Toulouse, ZAC Niel	France	Poz-47174	2710	35	Cremated human bone	SP6363, SU 6364-1D1	Cremation	Verrier 2016
Toulouse, ZAC Niel	France	Poz-47176	2425	30	Cremated human bone	SP7557, SU 7558	Cremation	Verrier 2016

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Toulouse, ZAC Niel	France	Poz-47177	2580	50	Cremated human bone	SP7562, SU 7563	Cremation	Verrier 2016
Toulouse, ZAC Niel	France	Poz-47178	2620	35	Cremated human bone	SP12693, SU 12695	Cremation	Verrier 2016
Altenmarkt, Osterhofen Am Stadtwald	Germany	MAMS-30970	3441	24	Human bone	Grave 6	Inhumation	Massy 2018
Altenmarkt, Osterhofen Am Stadtwald	Germany	MAMS-30973	3460	24	Human bone	Grave 7	Inhumation	Massy 2018
Altenmarkt, Osterhofen Am Stadtwald	Germany	MAMS-30971	3583	23	Human bone	Grave 8	Inhumation	Massy 2018
Altenmarkt, Osterhofen Am Stadtwald	Germany	MAMS-31892	3475	21	Human bone	Grave 10	Inhumation	Massy 2018
Gäufelden-Tailfingen	Germany	Hd-11794	3455	33	Human bone	Grave 1 (sample 1)	Inhumation	Becker et al. 1989; Krause 1996; Stöckli 2009
Gäufelden-Tailfingen	Germany	Hd-11811	3483	19	Human bone	Grave 1 (sample 2)	Inhumation	Becker et al. 1989; Krause 1996; Stöckli 2009
Gäufelden-Tailfingen	Germany	Hd-11854	3509	20	Human bone	Grave 3	Inhumation	Becker et al. 1989; Krause 1996; Stöckli 2009
Ingolstadt-Mailing, MIBA-Gelände	Germany	Erl-9622	3484	42	Human bone	Grave 3	Inhumation	Massy 2018
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21593	3563	28	Human bone	Grave 56	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21569	3560	28	Human bone	Grave 6	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 23738	3554	24	Human bone	Grave 28,3	Inhumation	Massy 2018
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21568	3552	27	Human bone	Grave 14	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21584	3548	34	Human bone	Grave 28,1	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21573	3531	34	Human bone	Grave 15,2	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21583	3508	34	Human bone	Grave 40	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21575	3504	33	Human bone	Grave 22	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21564	3493	28	Human bone	Grave 4	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21574	3492	33	Human bone	Grave 17	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21580	3489	34	Human bone	Grave 26	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21590	3489	28	Human bone	Grave 48	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21571	3486	27	Human bone	Grave 21	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21587	3480	34	Human bone	Grave 35	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21577	3478	33	Human bone	Grave 24,2	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21562	3477	28	Human bone	Grave 3	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 24586	3474	34	Human bone	Grave 29	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21594	3470	27	Human bone	Grave 37	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21570	3469	28	Human bone	Grave 10	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21585	3469	35	Human bone	Grave 28,2	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21576	3459	34	Human bone	Grave 24,1	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21578	3456	34	Human bone	Grave 43,1	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21565	3454	28	Human bone	Grave 12	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21588	3433	28	Human bone	Grave 34	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21591	3422	28	Human bone	Grave 60,1	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21595	3417	27	Human bone	Grave 38	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21592	3370	27	Human bone	Grave 47	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21566	3364	28	Human bone	Grave 9	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21579	3329	35	Human bone	Grave 43,2	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21581	3294	34	Human bone	Grave 23	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21589	3292	28	Human bone	Grave 62	Inhumation	Stockhammer et al. 2015
Kleinaitingen, Gewerbegebiet Nord	Germany	MAMS 21572	3505	33	Human bone	Grave 13	Inhumation	Stockhammer et al. 2015
Kleinprüfening „Buchschlag“	Germany	Utc-11339	3107	45	Human bone	Grave 1	Inhumation	Müller & Lohrke 2009
Künzing-Ost	Germany	BM-3024	2740	40	Animal bone	Grave 141, pig bone and sheep/goat bone	Cremation	Schopper 1995; Ambers & Bowman 2003
Künzing-Ost	Germany	BM-3027	2840	50	Animal bone	Grave 220, pig bone	Cremation	Schopper 1995; Ambers & Bowman 2003
Künzing-Ost	Germany	BM-3046	2770	45	Animal bone	Grave 95, pig bone	Cremation	Schopper 1995; Ambers & Bowman 2003
Künzing-Ost	Germany	BM-2992	2610	50	Animal bone	Grave 199, pig bone	Cremation	Schopper 1995; Ambers & Bowman 2003
Künzing-Ost	Germany	BM-3025	2790	50	Animal bone	Grave 140, pig bone	Cremation	Schopper 1995; Ambers & Bowman 2003
Künzing-Ost	Germany	BM-3026	2670	60	Animal bone	Grave 8, sheep/goat and deer bone	Cremation	Schopper 1995; Ambers & Bowman 2003
Künzing-Ost	Germany	BM-3047	2760	50	Animal bone	Grave 114, pig bone	Cremation	Schopper 1995; Ambers & Bowman 2003
Künzing-Ost	Germany	BM-3048	2560	45	Animal bone	Grave 187, pig bone	Cremation	Schopper 1995; Ambers & Bowman 2003
Künzing-Ost	Germany	BM-3049	2810	60	Animal bone	Grave 115, pig bone	Cremation	Schopper 1995; Ambers & Bowman 2003
Mehrstetten „Oberes Häule“ Hügel 2	Germany	Erl-4668	3132	55	Human bone	Grave 6	Inhumation	Müller & Lohrke 2009
Nersingen-Leibi, Steinegert	Germany	Utc-11341	2914	41	Human bone	Grave 3	Inhumation	Müller & Lohrke 2009
Nersingen-Leibi, Steinegert	Germany	Utc-11342	3230	42	Human bone	Grave 5	Inhumation	Müller & Lohrke 2009
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21558	3449	72	Human bone	Grave 27	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21555	3370	38	Human bone	Grave 25,1	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21550	3360	37	Human bone	Grave 5	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21561	3349	29	Human bone	Grave 30	Inhumation	Stockhammer et al. 2015

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Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21544	3324	34	Human bone	Grave 1	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21548	3310	37	Human bone	Grave 18	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21554	3309	37	Human bone	Grave 21	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21553	3296	36	Human bone	Grave 26,2	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21557	3295	28	Human bone	Grave 28	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21556	3288	27	Human bone	Grave 25,2	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21552	3288	27	Human bone	Grave 26,1	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21543	3283	32	Human bone	Grave 17	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21560	3282	28	Human bone	Grave 29	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21559	3241	28	Human bone	Grave 31	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21541	3227	33	Human bone	Grave 14	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21549	3225	36	Human bone	Grave 9	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21551	3207	37	Human bone	Grave 7	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21546	3132	42	Human bone	Grave 2	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS 21547	3124	36	Human bone	Grave 12	Inhumation	Stockhammer et al. 2015
Oberottmarshausen, Kiesgrube Lauter	Germany	MAMS_21545	3075	41	Human bone	Grave 3	Inhumation	Stockhammer et al. 2015
Remseck-Aldingen	Germany	Hd-13744	3515	35	Human bone	Grave 15	Inhumation	Krause 1996; Stöckli 2009
Rottenburg am Néckar, Rottenburg	Germany	ETH-9556	3540	65	Human bone	Grave 2	Inhumation	Krause 1996; Stöckli 2009
Rottenburg am Néckar, Rottenburg	Germany	ETH-9559	3510	80	Human bone	Grave 5	Inhumation	Krause 1996; Stöckli 2009
Rottenburg am Néckar, Rottenburg	Germany	ETH-9561	3505	60	Human bone	Grave 7	Inhumation	Krause 1996; Stöckli 2009
Rottenburg am Néckar, Rottenburg	Germany	ETH-9563	3550	65	Human bone	Grave 10	Inhumation	Krause 1996; Stöckli 2009
Schwabmünchen-Mittelstetten	Germany	MAMS 24813 & MAMS 24814	3540	20	Human bone	Grave 1	Inhumation	Stockhammer et al. 2015
Schwabmünchen-Mittelstetten	Germany	MAMS 24812	3527	24	Human bone	Grave 2	Inhumation	Stockhammer et al. 2015
Schwabmünchen-Mittelstetten	Germany	MAMS 24811	3512	23	Human bone	Grave 3	Inhumation	Stockhammer et al. 2015
Straubing, Kagers	Germany	BM-2991	2720	45	Animal bone	Grave 48	Cremation	Schopper 1993; Ambers & Bowman 2003
Tiengen „Eidöre / Auf dem Buck“ Hügel A	Germany	Erl-4663	3261	61	Human bone	Grave 1	Inhumation	Müller & Lohrke 2009
Unterbrunnham „Wagenau“ Hügel 16	Germany	Utc-11338	3149	37	Human bone	Grave 1	Inhumation	Müller & Lohrke 2009
Untermeitingen	Germany	Utc-11340	3249	41	Human bone	Grave 1	Inhumation	Müller & Lohrke 2009
Upflamör „Lautrieb“ Hügel 11	Germany	Erl-4665	3200	65	Human bone	Grave 4	Inhumation	Müller & Lohrke 2009
Upflamör „Lautrieb“ Hügel 11	Germany	Erl-4666	3083	57	Human bone	Grave 5	Inhumation	Müller & Lohrke 2009
Wehringen, Hexenbergle	Germany	UZ-3556	2790	70	Wood	Tumulus 8	Cremation	Hennig 1995
Wehringen, Hexenbergle	Germany	KN-4237	2785	60	Wood	Tumulus 8	Cremation	Hennig 1995
Alba, Borgo Moretta	Italy	OZE-036	3346	33	Human bone	Pit G	Inhumation	Venturino Gambari 1995; Zoppi et al. 2001
Alba, Corso Europa	Italy	OZE-029	3012	47	Human bone	Grave	Inhumation	Venturino et al. 2018
Alba, Corso Piave-proprietà Mokafé	Italy	OZE-929	3152	38	Human bone	Grave 2	Inhumation	Venturino Gambari 1995, 2004; Venturino et al. 2018
Alba, San Cassiano	Italy	OZG-039	3534	39	Human bone	Grave 2	Inhumation	Venturino Gambari et al. 2004
Barbiano, Ex Casa di Ricovero	Italy	ETH-25266	2960	45	Charcoal	Pit	Cremation	Dal Ri & Tecchiati 2004
Dolcé, Riparo di Peri	Italy	LTL-1056A	3521	30	Human bone	Burial rock shelter, area 2, trench A, SU 5a	Inhumation	Valzolgher & Quarta 2009
Dolcé, Riparo di Peri	Italy	LTL-1376A	3465	45	Human bone	Burial rock shelter, area 2, trench A, SU 5a	Inhumation	Valzolgher & Quarta 2009
Dolcé, Riparo di Peri	Italy	LTL-1057A(1)	3420	45	Human bone	Burial rock shelter, area 2, trench A, SU 3base-4	Inhumation	Valzolgher & Quarta 2009
Dolcé, Riparo di Peri	Italy	LTL-1057A(2)	3470	50	Human bone	Burial rock shelter, area 2, trench A, SU 3base-4	Inhumation	Valzolgher & Quarta 2009
Finale Ligure, Caverna dell'Acqua o del Morto	Italy	GrA-5181	3530	60	Human bone	Burial cave, adult indvidual	Inhumation	Del Lucchese 1984; Del Lucchese & Odetti 1996
Finale Ligure, Caverna dell'Acqua o del Morto	Italy	GrA-5182	3510	50	Human bone	Burial cave, nonadult indvidual	Inhumation	Del Lucchese 1984; Del Lucchese & Odetti 1996
Formigine, Casinalbo	Italy	LTL-5103A	3033	45	Cremated human bone	Grave 126	Cremation	Cardarelli 2014
Formigine, Casinalbo	Italy	LTL-5095A	2958	45	Cremated human bone	Grave 182	Cremation	Cardarelli 2014
Formigine, Casinalbo	Italy	LTL-6129A	3004	45	Cremated human bone	Grave 186	Cremation	Cardarelli 2014
Formigine, Casinalbo	Italy	LTL-5096A	2989	25	Cremated human bone	Grave 207	Cremation	Cardarelli 2014
Formigine, Casinalbo	Italy	LTL-5100A	3102	45	Cremated human bone	Grave 217	Cremation	Cardarelli 2014
Formigine, Casinalbo	Italy	LTL-5099A	2916	60	Cremated human bone	Grave 221	Cremation	Cardarelli 2014
Formigine, Casinalbo	Italy	LTL-5101A	3072	45	Cremated human bone	Grave 226	Cremation	Cardarelli 2014
Formigine, Casinalbo	Italy	LTL-5102A	3078	45	Cremated human bone	Grave 236	Cremation	Cardarelli 2014
Formigine, Casinalbo	Italy	LTL-5097A	3002	45	Cremated human bone	Grave 353	Cremation	Cardarelli 2014
Gradisca di Sedegliano	Italy	Beta-205639	3320	40	Human bone	Grave 1/2004	Inhumation	Càssola Guida & Corazza 2004, 2005, 2006
Gradisca di Sedegliano	Italy	Beta-216472	3530	40	Human bone	Grave 3/2005	Inhumation	Càssola Guida & Corazza 2004, 2005, 2006
Gradisca di Sedegliano	Italy	Beta-216473	3340	40	Human bone	Grave 4/2005	Inhumation	Càssola Guida & Corazza 2004, 2005, 2006
Illasi, Arano	Italy	LTL-4481A	3547	45	Human bone	Grave 28, Fifth left metatarsal from a mature adult	Inhumation	Valzolgher et al. 2012
Illasi, Arano	Italy	LTL-4477A	3546	45	Human bone	Grave 16, Right femur (shaft fragment) from a matu	Inhumation	Valzolgher et al. 2012
Illasi, Arano	Italy	LTL-4931A	3525	40	Human bone	Grave 4, Second (?) left metacarpal from an adult m	Inhumation	Valzolgher et al. 2012

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Illasi, Arano	Italy	LTL-2898A	3505	40	Human bone	Grave 66, Rib fragments from a mature adult male	Inhumation	Valzolgher et al. 2012
Illasi, Arano	Italy	LTL-4930A	3501	45	Human bone	Grave 3, First right metacarpal [Individual 3b]	Inhumation	Valzolgher et al. 2012
Illasi, Arano	Italy	LTL-4482A	3479	45	Human bone	Grave 68, Fourth right metacarpal from a young ad	Inhumation	Valzolgher et al. 2012
Illasi, Arano	Italy	LTL-4935A	3475	45	Human bone	Grave 44, Third right metacarpal	Inhumation	Valzolgher et al. 2012
Illasi, Arano	Italy	LTL-4938A	3427	45	Human bone	Grave 62, Fourth left metacarpal from an adult mal	Inhumation	Valzolgher et al. 2012
Illasi, Arano	Italy	LTL-2897A	3350	55	Human bone	Grave 67, Rib fragments from a 3–4-yr-old child	Inhumation	Valzolgher et al. 2012
Illasi, Arano	Italy	OxA-24137	3542	28	Human bone	Grave 67, Right tibia or fibula fragment from a 3–4	Inhumation	Valzolgher et al. 2012
Lecco, Paradiso di Laorca	Italy	CRG-?	3445	90	Charcoal	Burial rock shelter, SU 15	Inhumation	De Marinis 1994; Ronco 1994
Pozzuolo	Italy	UD-58	2700	100	Charcoal	Grave n. 2	Cremation	Candussio 1980; Càssola 1980; Barbina et al. 1984
Siusi-Castelrotto	Italy	ETH-27295	3188	55	Human bone	Grave 1	Inhumation	Tecchiati 2011
Talele-Silandro	Italy	LTL-12276A	3333	45	Human bone	Grave	Inhumation	Stener et al. 2017
Triora, Arma della Gastea	Italy	Beta-183491	3240	40	Human bone	Burial cave	Inhumation	Ricci 1998; Del Lucchese 2004
Volano, San Rocco	Italy	KIA-12445	2804	49	Animal bone	Pit, Bovidae	Inhumation	Adami et al. 2005
Volano, San Rocco	Italy	KIA-12444	2791	38	Human bone	Pit, individual	Inhumation	Adami et al. 2005
Agullana, Can Bech de Baix	Spain	CSIC-242	2770	60	Cristalized resin	Urn 15 of C.4 (grave 389)	Cremation	Toledo & de Palol 2006
Alcolea de Cinca, La Codera	Spain	GrN-26966	2610	40	Cremated human bone	Tumulus 6	Cremation	Montón 2002
Arbeca, Els Vilars	Spain	Beta-92278	2580	50	Human bone	Vilars 0; VIL '93 SU 4448 (child burial in pit EN 2	Inhumation	Agustí et al. 2000
Baix Pallars, Dolmen de la Foleda	Spain	Beta-334393	3200	30	Human bone (tooth)	Dolmen, Fol 12A	Inhumation	Rafel & Arilla 2015
Baix Pallars, Dolmen de la Foleda	Spain	LTL-2856A	2655	50	Human bone (tooth)	Dolmen, Fol 12B	Inhumation	Rafel & Arilla 2015
Barcelona, Carrer Riereta	Spain	Beta-227675	3530	40	Human bone	Hypogeum E-31, SU 1159	Inhumation	Carlús & Gonzalez 2008
Barcelona, Plaça de la Gardunya	Spain	Beta-403156	3350	30	Human bone	Hypogeum 3-4, individual SU 4390	Inhumation	Gómez Bach et al. 2015
Bassella, Vinya del Corb	Spain	Beta-257040	3270	40	Human bone	Hypogeum E-2	Inhumation	Piera Teixidó 2016
Besalú, Can Barraca	Spain	Beta-216832	2570	40	Charcoal	Tumulus 1, inside the urn	Cremation	Martín Machín 2006
Besalú, Can Barraca	Spain	Beta-216833	2620	40	Charcoal	Urn grave 7	Cremation	Martín Machín 2006
Bigüezál, Abrigo del Padre Areso	Spain	GrN-14597	3020	35	Not determined	Burial rock shelter	Inhumation	García Gazólaz 2001; Peñalver 2005
Biurrun-Olcoz, Aparrea	Spain	Not determined	3170	70	Not determined	Pit 3	Inhumation	Sesma & García 1995-1996; Sesma et al. 2007, 2009
Biurrun-Olcoz, Aparrea	Spain	Not determined	3080	50	Not determined	Pit 3	Inhumation	Sesma & García 1995-1996; Sesma et al. 2007, 2009
Cáseda, La Saga	Spain	Ua-17796	3330	75	Bone?	Pit	Inhumation	García Gazólaz et al. 2001; Sesma et al. 2007; Sesma et al. 2009
Cáseda, La Saga	Spain	Ua-17797	3245	75	Bone?	Pit	Inhumation	García Gazólaz et al. 2001; Sesma et al. 2007; Sesma et al. 2009
Castellar de la Ribera, Dolmen de Clará	Spain	UBAR-838	2685	40	Human bone	DC-04	Inhumation	Fàbregas 2008.
Coll de Nargó, Cova de Montanissell	Spain	Beta-213102	3180	40	Human bone	Burial cave, CM05-101, E-1	Inhumation	López et al. 2005; Armentano et al. 2006
Coll de Nargó, Cova de Montanissell	Spain	Beta-213103	3190	40	Human bone	Burial cave, CM05-201, E-2	Inhumation	López et al. 2005; Armentano et al. 2006
Coll de Nargó, Cova de Montanissell	Spain	Beta-213105	3200	40	Human bone	Burial cave, CM05-501, E-5	Inhumation	López et al. 2005; Armentano et al. 2006
Coll de Nargó, Cova de Montanissell	Spain	Beta-213106	3180	40	Human bone	Burial cave, CM05-701, E-7	Inhumation	López et al. 2005; Armentano et al. 2006
Coll de Nargó, Cova de Montanissell	Spain	Beta-213107	3180	40	Human bone	Burial cave, CM05-801, E-8	Inhumation	López et al. 2005; Armentano et al. 2006
Coll de Nargó, Cova de Montanissell	Spain	Beta-213110	3140	40	Human bone	Burial cave, CM05-1101, E-11	Inhumation	López et al. 2005; Armentano et al. 2006
Coll de Nargó, Cova de Montanissell	Spain	Beta-230404	3240	40	Human bone	Burial cave, CM05-901	Inhumation	López et al. 2005; Armentano et al. 2006
Coll de Nargó, Cova de Montanissell	Spain	Beta-230405	3260	40	Human bone	Burial cave, CM05-1001	Inhumation	López et al. 2005; Armentano et al. 2006
Conca de Dalt-Pont de Suert, Turó de la Capsera	Spain	UBAR-667	2835	55	Charcoal	Tumulus 20, SU 2015	Cremation	Medina Morales et al. 2012
Cortézubi, Cueva de Kobaederra	Spain	AA-29109	3545	60	Human bone	Burial cave, layer II	Inhumation	Arias et al. 1999, Cubas et al. 2012
Cova d'Aigües Vives	Spain	ETH-23907	3265	60	Human bone	Rock shelter, paradolmen	Inhumation	Pedro 2008
Deba, Cueva de Urtiaga	Spain	Ua-426	3475	120	Human bone	Burial cave, layer B, craneum B1	Inhumation	Altuna & De La Rua 1989; Mariezkurrena 1990
Deba, Cueva de Urtiaga	Spain	Ua-506	3445	110	Human bone	Burial cave, layer B, craneum B1	Inhumation	Altuna & De La Rua 1989; Mariezkurrena 1990
Deba, Cueva de Urtiaga	Spain	Ua-505	3430	110	Human bone	Burial cave, layer B, craneum A1	Inhumation	Altuna & De La Rua 1989; Mariezkurrena 1990
Dolmen de Aizibita	Spain	GrN-21297	3460	50	Not determined	Dolmen	Inhumation	Peñalver 2005
El Molar, El Calvari	Spain	GrA-23435	2615	40	Cremated human bone	Grave 94	Cremation	Vilaseca 1943; Castro 1994; Rafel & Armada 2008
El Molar, El Calvari	Spain	Beta-202389	2950	40	Cremated human bone	Grave 155	Cremation	Vilaseca 1943; Castro 1994; Rafel & Armada 2008
El Molar, El Calvari	Spain	GrA-23436	2375	40	Cremated human bone	Grave 155	Cremation	Vilaseca 1943; Castro 1994; Rafel & Armada 2008
El Molar, El Calvari	Spain	Beta-202388	2420	40	Cremated human bone	Grave 94	Cremation	Vilaseca 1943; Castro 1994; Rafel & Armada 2008
Elvillar, Chabola de la Hechicera	Spain	Not determined	3170	130	Human bone	Dolmen	Inhumation	Apellaniz & Fernandez Medrano 1978; Mariezkurrena 1990
Elvillar, Chabola de la Hechicera	Spain	Beta-288936	3280	40	Human bone	Dolmen	Inhumation	Apellaniz & Fernandez Medrano 1978; Mariezkurrena 1990
Flix, Sebes	Spain	Poz-25319	2550	35	Cremated human bone	Tumulus, Grave 8, SU 10026, urn	Cremation	Belarte et al. 2013
Flix, Sebes	Spain	Poz-25320	2490	35	Cremated human bone	SU 10048	Cremation	Belarte et al. 2013
Flix, Sebes	Spain	Poz-35366	2705	35	Cremated human bone	Tumulus, Grave 32, SU 10116	Cremation	Belarte et al. 2013
Fraga, Vincamet	Spain	Beta-164905	2810	40	Human bone	SU 1251, burial EN-58	Inhumation	Moya et al. 2005
Gandesa, Coll de Moro	Spain	GrA-23646	2630	50	Cremated human bone	Grave T42, tumulus with cist	Cremation	Rafel 1991; Rafel & Armada 2008
Girona, C/Emili Grahit - C/Ullastret	Spain	UBAR-769	3540	70	Charcoal	Pit E-1, layer 3	Inhumation	Terrats & Palomo 2002
Ispáster, Kobeaga	Spain	I-2290	2690	100	Not determined	Burial cave, most recent layer of the central stratigr	Inhumation and cremation	Apellaniz et al. 1966; Mariezkurrena 1979
Juneda, Minferri	Spain	Beta-164178	3330	60	Human bone	Pit/silos SJ-95, EN-135	Inhumation	Marín et al. 2017

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Juneda, Minferri	Spain	Beta-181657	3360	50	Human bone	Pit/silos SJ-296, SU 858	Inhumation	Marín et al. 2017
Juneda, Minferri	Spain	Beta-181658	2960	40	Human bone	Pit/silos SJ-296, SU 857	Inhumation	Marín et al. 2017
Juneda, Minferri	Spain	Beta-318369	3370	30	Human bone	Pit/silos SJ-405	Inhumation	Marín et al. 2017
Juneda, Minferri	Spain	Beta-318371	3380	30	Animal bone	Pit/silos SJ-405	Inhumation	Nieto et al. 2014
Juneda, Minferri	Spain	Beta-92280	3410	90	Animal bone	Pit/silos SJ-88, SU 2121	Inhumation	Equip Minferri 1997; Martín Cólliga & Mestres Torres 2002
Juneda, Minferri	Spain	UBAR-550	3450	50	Human bone	Pit/silos SJ-54	Inhumation	Marín et al. 2017
Laguardia, El Sotillo	Spain	Beta-299308	2740	30	Human bone	Tumulus	Inhumation	Barandiarán et al. 1964; Fernández-Eraso & Mujika-Alustiza 2013
Laguardia, El Sotillo	Spain	Beta-299303	3120	30	Human bone	Tumulus	Inhumation	Barandiarán et al. 1964; Fernández-Eraso & Mujika-Alustiza 2013
Laguardia, El Sotillo	Spain	Beta-299307	3160	30	Human bone	Tumulus	Inhumation	Barandiarán et al. 1964; Fernández-Eraso & Mujika-Alustiza 2013
Laguardia, El Sotillo	Spain	Beta-299309	3320	30	Human bone	Tumulus	Inhumation	Barandiarán et al. 1964; Fernández-Eraso & Mujika-Alustiza 2013
Laguardia, El Sotillo	Spain	Beta-299302	3360	30	Human bone	Tumulus	Inhumation	Barandiarán et al. 1964; Fernández-Eraso & Mujika-Alustiza 2013
Laguardia, El Sotillo	Spain	Beta-299312	3360	30	Human bone	Tumulus	Inhumation	Barandiarán et al. 1964; Fernández-Eraso & Mujika-Alustiza 2013
Laguardia, El Sotillo	Spain	Beta-299311	3380	30	Human bone	Tumulus	Inhumation	Barandiarán et al. 1964; Fernández-Eraso & Mujika-Alustiza 2013
Laguardia, El Sotillo	Spain	Beta-299101	3430	30	Human bone	Tumulus	Inhumation	Barandiarán et al. 1964; Fernández-Eraso & Mujika-Alustiza 2013
Laguardia, El Sotillo	Spain	Beta-299310	3550	30	Human bone	Tumulus	Inhumation	Barandiarán et al. 1964; Fernández-Eraso & Mujika-Alustiza 2013
Llardecans, Vall de Miarnau	Spain	UBAR-633	3520	50	Human bone	Cist burial	Inhumation	Morán et al. 2002
Llinars del Vallès, El Coll	Spain	Poz-10475	2480	35	Cremated human bone	Grave E1	Cremation	Muñoz Rufo 2006
Llobera, Torre dels Moros de Llanera	Spain	MC-1113	2550	90	Charcoal	Tumulus, -1.3 m.	Inhumation	Cura et al. 1975
Los Arcos, Cortecampo II	Spain	Not determined	3025	40	Human bone	Pit 9, SU 20	Inhumation	Ramos Aguirre 2007; Sesma et al. 2009
Mequinenza, Castellets II	Spain	GrN-13977	3040	140	Charcoal	Tumulus T-14	Inhumation	Maya 1992
Mequinenza, Castellets II	Spain	GrN-14084	2755	30	Human bone	Tumulus T-2, phase A	Inhumation	Royo 1986a, 1986b, 1987, 1991, 1992, 1996; Royo & Ferreruela 1983
Mequinenza, Castellets II	Spain	GrN-14083	2820	30	Human bone	Tumulus T-2, phase B	Inhumation	Royo 1986a, 1986b, 1987, 1991, 1992, 1996; Royo & Ferreruela 1983
Mequinenza, Castellets II	Spain	GrN-14085	2780	35	Human bone	Tumulus T-3	Inhumation	Royo 1986a, 1986b, 1987, 1991, 1992, 1996; Royo & Ferreruela 1983
Mequinenza, Castellets II	Spain	GrN-17274	2560	70	Charcoal	Tumulus 32, layer 1A	Cremation	Royo 1986a, 1986b, 1987, 1991, 1992, 1996; Royo & Ferreruela 1983
Mequinenza, Riols I	Spain	GrN-14081	3280	60	Charcoal	Grave 2	Inhumation	Gómez et al. 1992; Maya 1992
Olèrdola, Pou Nou II	Spain	UBAR-464A/B	3515	40	Charred seeds	Pit E-3/N-II	Inhumation	Nadal et al. 1994; Senabre et al. 1994
Orozco, Cueva de Urratxa III	Spain	Not determined	3405	70	Human bone	Burial cave	Inhumation	Muñoz Salvatierra & Berganza 1997
Orozco, Cueva de Urratxa III	Spain	Not determined	3365	80	Human bone	Burial cave	Inhumation	Muñoz Salvatierra & Berganza 1997
Orozco, Cueva de Urratxa III	Spain	Not determined	3475	80	Human bone	Burial cave	Inhumation	Muñoz Salvatierra & Berganza 1997
Pacs del Penedès, Mas d'en Boixos 1	Spain	OxA-9091	3095	50	Human bone	Hypogeum E35	Inhumation	Esteve 2002
Pacs del Penedès, Mas d'en Boixos 1	Spain	OxA-9092	3265	70	Human bone	Silos E82	Inhumation	Esteve 2002
Pacs del Penedès, Mas d'en Boixos 1	Spain	UBAR-771	3350	60	Human bone	Hypogeum E35, individual 21	Inhumation	Esteve 2002
Pinell, Camp dels Moros de la Codina	Spain	Poz-18861	2885	35	Animal bone	Pit	Inhumation	Martínez Rodríguez et al. 2010
Pinell, Camp dels Moros de la Codina	Spain	Poz-18862	2850	30	Animal bone	Pit	Inhumation	Martínez Rodríguez et al. 2010
Pinós, Dolmen de la Pera d'Ardèvol	Spain	UBAR-264	2880	60	Human bone	Dolmen	Inhumation	Castany & Guerrero 1985; Martín Cólliga & Mestres Torres 2002
Riner, Forat de la Tuta	Spain	LTL-4236A	3335	45	Human bone	Metallurgist's grave	Inhumation	Sorano Llops 2011
Rubí, La Serreta	Spain	UBAR-624	3505	50	Human bone	Pit, layer LS-41	Inhumation	Diaz & Villafruela 1997; Martín Cólliga & Mestres Torres 2002
Rubió, Les Maioles	Spain	UBAR-558	3475	50	Human bone	Dolmen, individual A	Inhumation	Clop & Faura 1995, 2002
Rubió, Les Maioles	Spain	UBAR-559	3465	50	Human bone	Dolmen, individual B	Inhumation	Clop & Faura 1995, 2002
Rubió, Les Maioles	Spain	UBAR-560	3495	50	Human bone	Dolmen, individual E	Inhumation	Clop & Faura 1995, 2002
Sabadell, Can Gambús 2	Spain	UBAR-852	2560	55	Charcoal	Pit 319, SU 393, layer V	Inhumation	Artigues et al. 2006
Sabadell, Can Piteu-Can Roqueta	Spain	KIA-24835	2755	30	Cremated human bone	Urn 294-34B	Cremation	Carlús et al. 2007, 2008
Sabadell, Can Piteu-Can Roqueta	Spain	KIA-24838	2520	30	Cremated human bone	Urn 340-2A	Cremation	Carlús et al. 2007, 2008
Sabadell, Can Piteu-Can Roqueta	Spain	KIA-24836	2620	35	Cremated human bone	Urn 466-1A	Cremation	Carlús et al. 2007, 2008
Sabadell, Can Roqueta II	Spain	Beta 449091	2460	30	Human bone	Pit 107	Inhumation	Capuzzo & López Cachero 2017
Sabadell, Can Roqueta II	Spain	Beta 449092	2460	30	Human bone	Pit 765	Inhumation	Capuzzo & López Cachero 2017
Sabadell, Can Roqueta II	Spain	UBAR-670	3370	50	Human bone	Hypogeum 70B, layer 2	Inhumation	Carlús et al. 2008
Sabadell, Can Roqueta II	Spain	UBAR-671	3310	55	Human bone	Hypogeum 222B (niche), layer 2	Inhumation	Carlús et al. 2008
Sabadell, Can Roqueta II	Spain	UBAR-675	2530	45	Charcoal	Pit 193, layer 5	Inhumation	Carlús et al. 2008
Sabadell, Can Roqueta II	Spain	UBAR-697	3465	60	Animal bone	Hypogeum 459A, layer 3	Inhumation	Carlús et al. 2008
Sabadell, Can Roqueta II	Spain	UBAR-800	3360	70	Animal bone	Pit 36, layer 4	Inhumation	Carlús et al. 2008
Sabadell, Can Roqueta II	Spain	UBAR-797	3500	45	Animal bone	Pit CRII-481	Inhumation	Carlús et al. 2008
Sabadell, Can Roqueta II	Spain	UBAR-698	3590	90	Animal bone	Pit with niche CRII-463A, layer 3	Inhumation	Carlús et al. 2008
Sabadell, Can Roqueta II	Spain	UBAR-673	3370	65	Charcoal	Pit CRII-634, layers 3, 4, and 5	Inhumation	Carlús et al. 2008
Sabadell, Can Roqueta II	Spain	UBAR-699	2615	55	Charcoal	Silos 718, layer IV	Cremation	Carlús et al. 2008
Sabadell, Can Roqueta-Can Revella	Spain	Beta-449093	2510	30	Human bone	Pit 110	Inhumation	Capuzzo & López Cachero 2017
Sabadell, Can Roqueta-Torre Romeu	Spain	UBAR-863	3530	40	Human bone	Hypogeum CRTR-151, individual 3, layer 1	Inhumation	Carlús et al. 2008
Sabadell, Can Roqueta-Torre Romeu	Spain	UBAR-864	3370	70	Human bone	Pit CRTR-10, individual 3, layer 2	Inhumation	Carlús et al. 2008
Sabadell, Can Roqueta-Torre Romeu	Spain	UBAR-865	3040	40	Human bone	Pit CRTR-191, individual 3, layer 2	Inhumation	Carlús et al. 2008

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Salàs de Pallars, Llirians del Mas	Spain	UBAR-1017	3080	40	Human bone	Structure SR 1, SU 44, individual 1	Inhumation	Piera Teixidó et al. 2013
Salàs de Pallars, Llirians del Mas	Spain	UBAR-1170	3110	35	Human bone	Structure SR 1, SU 44, individual 5	Inhumation	Piera Teixidó et al. 2013
Sant Cugat del Vallès, Can Castellví de les Planes	Spain	CSIC-32	3470	120	Human bone	Pit	Inhumation	Muñoz 1971, 1972; Martín Cólliga & Mestres Torres 2002
Sant Esteve de la Sarga, Cova del Mort	Spain	Beta-255958	3080	40	Human bone (tooth)	Burial cave, CM-H27-9-D75	Inhumation	Pedro et al. 2015
Sant Quirze del Vallès, Bòbila Madurell	Spain	UBAR-87	3350	90	Charcoal	Pit D-38	Inhumation	Martín Cólliga & Mestres Torres 2002
Sant Quirze del Vallès, Bòbila Madurell	Spain	UBAR-273	3310	60	Charcoal	Pit D-18	Inhumation	Martín Cólliga & Mestres Torres 2002
Santa Perpètua de Mogoda, Can Filuà	Spain	UBAR-555	3500	50	Human bone	Pit, layer A	Inhumation	Buch et al. 1992; Martí et al. 1995; Martín Cólliga & Mestres Torres 2002
Santa Perpètua de Mogoda, Can Filuà	Spain	UBAR-556	3500	50	Human bone	Pit, layer B	Inhumation	Buch et al. 1992; Martí et al. 1995; Martín Cólliga & Mestres Torres 2002
Serinyà, Cova d'en Pau	Spain	UGRA-155	3450	150	Charred seeds	Burial cave, Pau IV, layer 1, sector A-1	Inhumation	Tarrús et al. 1985; Tarrús & Bosch 1990
Serinyà, Cova d'en Pau	Spain	Gif-6926	3340	60	Charred seeds	Burial cave, Pau IV, layer 1, sector A-1	Inhumation	Tarrús & Bosch 1990; Martín Cólliga & Mestres Torres 2002
Seròs, Pedrós	Spain	OxA-13565	2657	37	Charcoal	Tumulus	Cremation	Higham et al. 2007
Sierra de Encía, Chromlech de Mendiluce	Spain	CSIC-694	2700	60	Charcoal	Cromlech, inside the cist	Cremation	Vegas 1988; Mariezkurrena 1990
Sitges, Cova del Gegant	Spain	Beta-312860	3270	30	Human bone (tooth)	Burial cave, Individual 17, layer XXV	Inhumation	Daura et al. 2017
Sitges, Cova del Gegant	Spain	Beta-312861	3200	30	Human bone (tooth)	Burial cave, Individuos 18-19, nivel I	Inhumation	Daura et al. 2017
Sitges, Cova del Gegant	Spain	OxA-29612	3225	27	Human bone (tooth)	Burial cave, Individuos 5-7, nivel XXV	Inhumation	Daura et al. 2017
Terrassa, Can Ballarà	Spain	UBAR-557	3460	60	Human bone	Pit, layer II	Inhumation	Carlús & Diaz 1995; Martín Cólliga & Mestres Torres 2002
Terrassa, Can Missert	Spain	KIA-36268	2795	30	Cremated human bone	Urn Museo de Terrassa 2107	Cremation	Pérez Conill 2009
Terrassa, Can Missert	Spain	KIA-362669	2760	30	Cremated human bone	Urn Museo de Terrassa 2120	Cremation	Pérez Conill 2009
Terrassa, Can Missert	Spain	KIA-35577	2815	30	Cremated human bone	Urn Museo Episcopal de Vic 3581	Cremation	Pérez Conill 2009
Terrassa, Miquel Vives 69-73	Spain	KIK/KIA-4710/35362	3310	35	Human bone	Pit	Inhumation	Capuzzo & López Cachero 2017
Torrelles de Foix, Cova de la Pesseta	Spain	LTL-3896A	3298	40	Human bone	Burial cave, 3-IIIA2-N2	Inhumation	Balaguer et al. 2011
Ventalló, Paradolmen de Tafania	Spain	UBAR-246	3300	50	Human bone	Dolmen	Inhumation	Bosch et al. 1993; Martín Cólliga & Mestres Torres 2002
Vidreres, Pi de la Lliura	Spain	Beta-136241	2850	40	Charcoal	Urn E-15	Cremation	Pons & Solés 2002, 2008
Vidreres, Pi de la Lliura	Spain	Beta-224358	2630	40	Charcoal	Urn E-53	Cremation	Pons & Solés 2002, 2008
Vidreres, Pi de la Lliura	Spain	Beta-224357	2530	40	Charcoal	Urn E-51	Cremation	Pons & Solés 2002, 2008
Vidreres, Pi de la Lliura	Spain	Beta-210739	2580	40	Charcoal	Urn E-28	Cremation	Pons & Solés 2002, 2008
Vidreres, Pi de la Lliura	Spain	Beta-237093	2730	40	Charcoal	Urn E-59	Cremation	Pons & Solés 2002, 2008
Vilafranca del Penedès, Camp Cinzano	Spain	LTL-2451A	3333	35	Human bone	Pit/silos E-7, SU 706	Inhumation	Soriano & Amorós Guerrera 2014
Vilafranca del Penedès, Camp Cinzano	Spain	UBAR-1007	3505	40	Human bone	Pit/silos E-18, SU 1801	Inhumation	Soriano & Amorós Guerrera 2014
Vilafranca del Penedès, Cinc Ponts	Spain	UBAR-1374	3350	30	Human bone	Silos (SU 159), E-27	Inhumation	Capuzzo & López Cachero 2017
Vinallop, Cova Cervereta	Spain	UBAR-503	3540	130	Human bone	Burial cave	Inhumation	Forcadell & Villalbí 1991; Martín Cólliga & Mestres Torres 2002
Bex VD-les Mûriers	Switzerland	B-5124	3080	90	Charcoal	Rock shelter, Structure 3, layer 2	Inhumation	David-Elbiali 1990
Birmensdorf-Rameren	Switzerland	ETH-28488	3505	50	Charcoal	Grave 2	Inhumation	Mäder 2008
Birmensdorf-Rameren	Switzerland	ETH-28828	3285	50	Charcoal	Grave 2	Inhumation	Mäder 2008
Birmensdorf-Rameren	Switzerland	ETH-33140	3415	50	Charcoal	Grave 2	Inhumation	Mäder 2008
Birmensdorf-Rameren	Switzerland	ETH-28829	3085	50	Charcoal	Grave 10, tumulus	Inhumation and cremation	Mäder 2008
Birmensdorf-Rameren	Switzerland	ETH-28491	3125	50	Charcoal	Grave 9	Cremation	Mäder 2008
Bulle, Le Terraillet	Switzerland	Ua-24629	2950	40	Charcoal	Tumulus	Cremation	Mauvilly et al. 2006
Chables/Les Biolleyres	Switzerland	Ua-17892	3170	65	Charcoal	Structure FA 51	Inhumation	Duvanel et al. 2018
Chables/Les Biolleyres	Switzerland	Ua-17891	3195	70	Charcoal	Structure FA 8.2	Inhumation	Duvanel et al. 2018
Chables/Les Biolleyres	Switzerland	Ua-17889	3235	70	Charcoal	Structure FA 9.1	Inhumation	Duvanel et al. 2018
Chables/Les Biolleyres	Switzerland	Ua-17897	3505	75	Charcoal	Structure FA 111	Cremation	Duvanel et al. 2018
Chables/Les Biolleyres	Switzerland	Ua-20644	3460	45	Charcoal	Structure FA 8.3	Inhumation	Duvanel et al. 2018
Chables/Les Biolleyres	Switzerland	Ua-17890	3275	70	Charcoal	Structure FA 4.4	Inhumation	Duvanel et al. 2018
Chables/Les Biolleyres	Switzerland	Ua-17888	3100	75	Charcoal	Structure FA 19	Cremation	Duvanel et al. 2018
Chables/Les Biolleyres	Switzerland	Ua-20647	3100	45	Charcoal	Structure FA 4.1	Inhumation and cremation	Duvanel et al. 2018
Chables/Les Biolleyres	Switzerland	Ua-17895	3090	70	Charcoal	Structure FA 2	Cremation	Duvanel et al. 2018
Chables/Les Biolleyres	Switzerland	Ua-12521	3075	50	Charcoal	Structure FA 2	Cremation	Duvanel et al. 2018
Chables/Les Biolleyres	Switzerland	Ua-17894	3065	60	Charcoal	Structure FA 8.1	Cremation	Duvanel et al. 2018
Chables/Les Biolleyres	Switzerland	Ua-17882	3055	70	Charcoal	Structure FA 6.1	Inhumation	Duvanel et al. 2018
Chables/Les Biolleyres	Switzerland	Ua-20643	3040	40	Charcoal	Structure FA 4.3	Inhumation	Duvanel et al. 2018
Chables/Les Biolleyres	Switzerland	Ua-17896	2910	70	Charcoal	Structure FA 1.1	Inhumation	Duvanel et al. 2018
Chables/Les Biolleyres	Switzerland	Ua-12520	2685	50	Charcoal	Structure FA 19	Cremation	Duvanel et al. 2018
Chables/Les Biolleyres	Switzerland	Ua-17898	2655	70	Charcoal	Structure FA 14	Cremation	Duvanel et al. 2018
Collombey-Muraz, Barmaz I	Switzerland	CRG-1330	3266	82	Human bone	Grave 50, SU 2a	Inhumation	Guélat et al. 1995
Donath, Sursés	Switzerland	BE-6712.1.1	3323	45	Human bone	Grave 2B	Inhumation	Brunner et al. 2020
Donath, Sursés	Switzerland	BE-6713.1.1	3270	37	Human bone	Grave 2B	Inhumation	Brunner et al. 2020
Donath, Sursés	Switzerland	BE-6714.1.1	3326	34	Human bone	Grave 2A	Inhumation	Brunner et al. 2020
Donath, Sursés	Switzerland	BE-6715.1.1	3290	20	Human bone	Grave 2A	Inhumation	Brunner et al. 2020

Site	Country	Lab code	14C Age BP	±σ	Material	Archaeological context	Funerary rite	References
Donath, Sursés	Switzerland	BE-6716.1.1	3437	21	Human bone	Grave 2E	Inhumation	Brunner et al. 2020
Donath, Sursés	Switzerland	BE-6717.1.1	3371	42	Human bone	Grave 2E	Inhumation	Brunner et al. 2020
Donath, Sursés	Switzerland	BE-6718.1.1	3289	36	Human bone	Grave 3A	Inhumation	Brunner et al. 2020
Donath, Sursés	Switzerland	BE-6719.1.1	3358	36	Human bone	Grave 3A	Inhumation	Brunner et al. 2020
Donath, Sursés	Switzerland	BE-6722.1.1	3294	36	Human bone	Grave 3B	Inhumation	Brunner et al. 2020
Donath, Sursés	Switzerland	BE-6723.1.1	3352	35	Human bone	Grave 3B	Inhumation	Brunner et al. 2020
Düdingen, Birch	Switzerland	Ua-20702	2610	45	Human bone	Tumulus 3, grave 3.12	Inhumation	Ruffieux & Mauvilly 2003
Enney, Le Bugnon	Switzerland	BE-6982.1.1	3474	19	Human bone	Grave	Inhumation	Brunner et al. 2020
Fällanden-Fröschbach	Switzerland	UZ-3910	3400	60	Charcoal	Grave 12, among the cremated bones	Cremation	Fischer 1997
Fällanden-Fröschbach	Switzerland	UZ-3809	3120	60	Charcoal	Grave 11, above the cremated bones	Cremation	Fischer 1997
Koppigen, Usserfeld	Switzerland	ETH-26775/UZ-4914	3020	55	Charcoal	Grave 1	Cremation	Ramstein 2005; Ramstein & Cueni 2005
Laax-Salums 1979_Zone E II_A	Switzerland	BE-6913.1.1	3242	19	Human bone	E II A	Inhumation	Brunner et al. 2020
Laax-Salums 1979_Zone E II_B	Switzerland	BE-6914.1.1	3180	33	Human bone	E II B	Inhumation	Brunner et al. 2020
Murten-Löwenberg	Switzerland	B-4992	2760	50	Animal bone	Tumulus 3, grave 11N.2, maxilla of a bovidae	Inhumation	Bouyer & Boisaubert 1992; Fischer 1997
Murten-Löwenberg	Switzerland	B-4994	3380	50	Charcoal	Tumulus 3, grave 11N.3	Cremation	Bouyer & Boisaubert 1992; Fischer 1997
Murten-Löwenberg	Switzerland	B-4995	3320	50	Charcoal	Tumulus 3, grave 5N.1	Cremation	Bouyer & Boisaubert 1992; Fischer 1997
Murten-Löwenberg	Switzerland	B-4996	3240	40	Charcoal	Grave 5b/c.1	Cremation	Bouyer & Boisaubert 1992; Fischer 1997
Murten-Löwenberg	Switzerland	B-4998	3140	40	Charcoal	Tumulus 5, Grave 8S.2	Cremation	Bouyer & Boisaubert 1992; Fischer 1997
Neftenbach I (Steinmöri)	Switzerland	UZ-2715	3080	60	Charcoal	Grave 18, oak	Cremation	Della Casa & Fischer 1997; Fischer 1997
Neftenbach I (Steinmöri)	Switzerland	UZ-2717	2940	60	Charcoal	Grave 22, oak	Cremation	Della Casa & Fischer 1997; Fischer 1997
Neftenbach II (Zürichstrasse 55)	Switzerland	UZ-3707	3140	60	Charcoal	Grave 4, oak	Cremation	Della Casa & Fischer 1997; Fischer 1997
Neftenbach II (Zürichstrasse 55)	Switzerland	KIA-11173	3165	32	Charcoal	Grave 8, sample 81	Cremation	Mäder 2009
Neftenbach II (Zürichstrasse 55)	Switzerland	KIA-11175	2988	29	Charcoal	Grave 9, sample 52	Cremation	Mäder 2009
Neftenbach II (Zürichstrasse 55)	Switzerland	KIA-11172	2963	28	Cremated human bone	Grave 9, sample 102	Cremation	Mäder 2009
Plateau de Diesse, Prêles	Switzerland	BE-8432.1.1	3204	21	Birch tar	Grave (FN 149902)	Inhumation	Schaer 2019
Plateau de Diesse, Prêles	Switzerland	BE-9382.1.1	3108	20	Human bone	Grave (FN 152758)	Inhumation	Schaer 2019
Posieux, Bois de Châtillon	Switzerland	BE-6983.1.1	3528	18	Human bone	Grave 10/1990"	Inhumation	Brunner et al. 2020
Rüthi, Hirschensprung	Switzerland	UZ-4750/ETH-25606	3410	45	Human bone	Grave 1	Inhumation	Brunner et al. 2020
Rüthi, Hirschensprung	Switzerland	UZ-4751/ETH-25607	3205	55	Human bone	Grave 2	Inhumation	Brunner et al. 2020
Sion VS Petit-Chasseur I	Switzerland	B-3063	2920	80	Bone	MXI deposit 1, femur individual 5	Inhumation	David-Elbiali 2000
Sion VS, Petit-Chasseur III	Switzerland	CRG-973	3510	120	Charcoal	PCIII, dolmen MXII, layer 4e	Inhumation	Gallay 1995
Sion VS, Petit-Chasseur III	Switzerland	CRG-970	3205	75	Charcoal	PCIII, dolmen MXII, layer 4d	Inhumation	Gallay 1995
Spiez-Einigen, Holleeweg 3	Switzerland	ETH-36588/UZ-5649	3135	50	Human bone	Grave 2008.1, femur	Inhumation	Gubler 2010
Spiez-Einigen, Holleeweg 3	Switzerland	ETH-39465/UZ-5770	3390	35	Human bone	Grave 2008.1, femur	Inhumation	Gubler 2010
Spiez-Einigen, Holleeweg 3	Switzerland	ETH-36589/UZ-5650	3185	50	Human bone	Grave 2008.2	Inhumation	Gubler 2010
Spiez-Einigen, Holleeweg 3	Switzerland	ETH-38654/UZ-5761	3310	25	Human bone	Grave 2008.2	Inhumation	Gubler 2010
Spiez-Einigen, Holleeweg 3	Switzerland	ETH-36682	3525	35	Charcoal	Grave 2008.2, infill	Inhumation	Gubler 2010
Spiez-Einigen, Holleeweg 3	Switzerland	ETH-36683	3455	55	Charcoal	Grave 2008.4, infill	Inhumation	Gubler 2010
Spiez-Einigen, Holleeweg 3	Switzerland	ETH-15179/UZ-3881	3455	55	Human bone	Grave 1970.1	Inhumation	Gubler 2010
Spiez-Einigen, Holleeweg 3	Switzerland	ETH-15180b/UZ-3882b	3475	55	Human bone	Grave 1970.2.1	Inhumation	Gubler 2010
Spiez-Einigen, Holleeweg 3	Switzerland	ETH-15181/UZ-3883	3325	55	Human bone	Grave 1970.2.2	Inhumation	Gubler 2010
Spiez-Einigen, Holleeweg 3	Switzerland	ETH-38655/UZ-5762	3360	25	Human bone	Grave 1970.2.2	Inhumation	Gubler 2010
Tafers, Kiesgrube Zelgli	Switzerland	BE-6981.1.1	3424	18	Human bone	Grave	Inhumation	Brunner et al. 2020
Thun-Wiler	Switzerland	ETH-15186/UZ-3888	3385	55	Human bone	Grave 8	Inhumation	Hafner & Suter 1998
Triesen, Fürst-Johann-Strasse 40	Switzerland	ETH-43878	3320	25	Human bone	Grave	Inhumation	Brunner et al. 2020
Vidy (Lausanne VD)	Switzerland	CRG-655	2870	70	Not determined	Grave 2	Cremation	Kaenel & Klausener 1990; David-Elbiali & Moinat 2005
Vidy (Lausanne VD)	Switzerland	CRG-809	2630	50	Not determined	Grave 4	Cremation	Kaenel & Klausener 1990; David-Elbiali & Moinat 2005
Vidy (Lausanne VD)	Switzerland	ETH-3182	2645	65	Not determined	Grave 9	Cremation	Kaenel & Klausener 1990; David-Elbiali & Moinat 2005
Vufflens-la Ville VD, En Sency	Switzerland	ETH-15757	3285	55	Human bone	Tumulus, structure 1, central grave	Inhumation	Mariéthoz & Moinat 1995, 1996; Mariéthoz 1997
Vufflens-la Ville VD, En Sency	Switzerland	ETH-15758	3120	60	Human bone	Pit 4, latest burial	Inhumation	Mariéthoz & Moinat 1995, 1996; Mariéthoz 1997
Vufflens-la Ville VD, En Sency	Switzerland	ETH-15759	3125	55	Human bone	Tumulus, structure 10	Inhumation	Mariéthoz & Moinat 1995, 1996; Mariéthoz 1997