

Approaches to reconstruction of early Celtic land-use in the central Neckar region in southwestern Germany

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Abstract. In four early Celtic settlements in the central Neckar region of Baden-Württemberg (Germany), 250 archaeobotanical samples were collected and studied for their plant macrofossils. *Hordeum vulgare* L. (hulled barley) and *Triticum spelta* L. (spelt wheat) could be recognized as the main crops, as well as *Panicum miliaceum* L. (millet) in some places. Legumes and *Linum usitatissimum* L. (flax) were important crops. Typical field weeds dominated the wild plant remains, but some present-day grassland taxa were abundantly and frequently found. The analysis of the data set of finds of the cereal remains, field weeds and grassland plants was done by Correspondence Analysis, but no significant differences between the various groups were found. Samples dominated by remains of grassland taxa, which could indicate that there were hay meadows, were absent. Consideration of plant macrofossil results as well as archaeological, osteological and pollen analytical data shows that there is likely to have been a land management system of arable fields and grassland. The densely settled fertile central Neckar region could therefore have been intensively utilised, using all available resources. Permanent grasslands in the form of pasture on river floodplains and on dry soils were certainly present. Hay meadows, on the other hand, were not identified. Cultivated plants such as *Ficus carica* L. (fig) and *Vicia ervilia* (L.) Willd. (bitter vetch) as well as some field weeds suggest connections with the Mediterranean lands.

Key words: Botanical macrofossils – Statistical analysis – Land-use reconstruction – Late Hallstatt/early La Tène – Southwest Germany

Introduction

Archaeological research has shown that the density of settlement in the central Neckar region was already great in the late Hallstatt and early La Tène periods (Menzel 1996). This fertile landscape was intensively utilised, but what did it look like?

Evidence available up to now offers unidentified crop plant remains from several villages and settlements (Piening 1982, 1983, 1988a,b; Stika 1996a,b) as well as from the burial mound of Hochdorf (Körber-Grohne 1985). Efforts have now been made to obtain more information, especially about wild plants which could give details of the conditions on the fields. Four early Celtic settlements were sampled for plant macrofossils. The search for sediments suitable for pollen analysis in the immediate surroundings of Iron Age settlements has remained largely unsuccessful, for the time period in question (Smettan 1991).

Was winter stalling and feeding with hay established by the early Celts, as was established for Fellbach-Schmiden from the archaeobotanical analysis of sediments from a well shaft of a late La Tène *Viereckschanze* (Körber-Grohne 1993)? Several of today's grassland taxa have been identified from archaeological find complexes of the pre-Roman Iron Age (cf. Körber-Grohne 1990), but it remains uncertain whether the many hay meadows which were established in the Roman period had also played an important role during the early Celtic period. May these taxa have derived from fields indicating an arable field and grassland management system?

The sites

The central Neckar region, between Heilbronn and Stuttgart, is distinguished by a wide-ranging loess landscape, around 200–350 m asl. It is surrounded by some Keuper hills which go up to 500 m asl. The Neckar and its tributaries have cut deeply into the shelly limestone in places, forming steep-walled valleys, which divide the flat or slightly undulating landscape into distinct areas.

Besides the generally fertile soils on the loess, there are also climatic conditions that are worth mentioning. The average annual temperature is about 10°C in the Neckar valley, and precipitation reaches 650–750 mm, evenly spread throughout the year without particularly dry periods (Klimaatlas Baden-Württemberg 1953). Grapevines are widely cultivated on south-facing slopes in the region.

This favourable land, with traces of occupation from the early Neolithic Linearbandkeramik onwards, was comparatively heavily settled during the late Hallstatt and early La Tène periods, during the 6th-4th centuries B.C. As well as a number of hillforts and undefended settlements near to burial mounds, there are mostly a number of small settlements. They mainly consist of farms which were occupied for a long time and are sometimes only 400 m apart (Menzel 1996). The archaeobotanical samples in the present paper were collected from the remains of four settlements in the central Neckar re-

gion (Fig. 1). While Hochdorf/Enz was probably laid out regularly, as an undefended settlement near the prince's burial mound at Hochdorf, the samples from Stuttgart-Mühlhausen, Freiberg a. N.-Beihingen and Heilbronn-Klingenbergr probably come from smaller settlements more like hamlets.

Methods

The four early Celtic settlements under investigation are not waterlogged, and so as the result of these preservation conditions, only charred and a few mineralised plant remains were found. The samples were collected from pits which were archaeologically interpreted as cellars or storage pits. Only in Hochdorf/Enz were three U-shaped ditches and six pit houses sampled. The archaeobotanical samples were floated and sieved, using meshes of 2.5 mm, 1.0 mm and 0.315 mm, partly in the field and partly in the laboratory. The analyses were done in Stuttgart-Hohenheim, using the methods of Körber-Grohne (1991).

The interpretation of the data from the identified plant taxa in the analysed samples has mainly been done based on an actualistic concept (cf. Stika 1996c). In addition, statistical methods have been used on these data to find patterns of the distribution of taxa, without the influence of a given scheme according to modern vegetation types. The huge amount of 250 samples containing 387 taxa/types also made it helpful to use statistical methods. This was done using the program MULVA-5 (Wild and Orloci 1996) for Cluster, Correspondence and Grid Analysis. The data set consists of the list of finds from the four early Celtic settlements, which is expressed in numbers of finds in the samples and taxa/types of remains.

Correspondence Analysis shows up patterns of difference and similarity in the data structure. Connections between taxa/types of remains and/or samples are calculated as axis coordinates by this multivariate process, and the results can be shown as dots in the coordinate system. Correspondence Analysis is applied as an inductive method to search for a pattern. The conclusions derived with the help of exploratory statistical analysis must be tested by other methods using the original data set. The interpretation of archaeobotanical data sets by Correspondence Analysis has been thoroughly discussed by Lange (1990), and the present interpretation of statistical results on the early Celts generally follows this work. In addition, Grid Analysis was done on the results first obtained from the Correspondence Analysis, to establish the groupings of the calculated groups of dots on a pure statistical basis.

Results

The identified macrofossils

The work from four early Celtic settlements studies 91268 closely identifiable plant remains from 250 samples. As well as nine cereal taxa, there were three oil seed plants, four legumes, five possible vegetable and salad plants, five possible herbs, 11 useful wild plants, two dye plants and one imported fruit (Table 1). Cereals were the most important crops found, mainly *Hordeum*

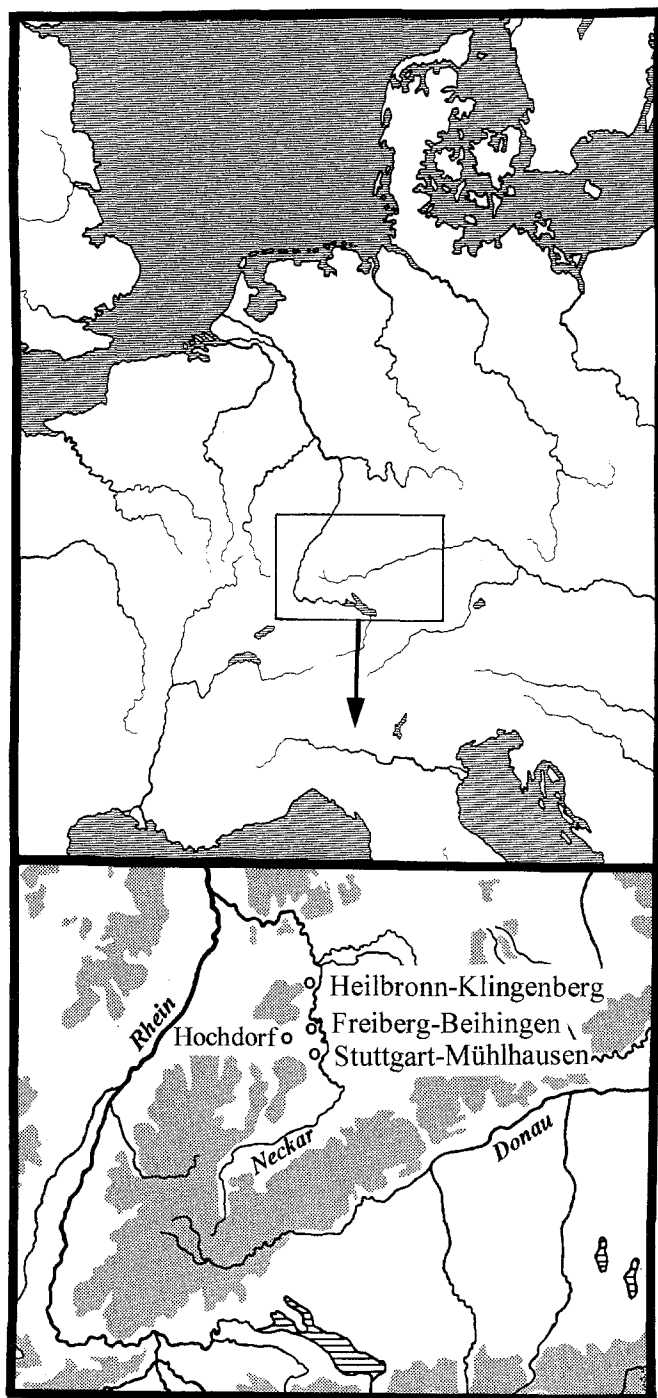


Fig. 1. Map showing the location of the investigated archaeological sites in the central Neckar region, southwest Germany