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1888 to 2018 – 130 years of provincial Roman archaeozoology in Cambodunum/Kempten

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(with 5 figures)

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Abstract

Continued archaeozoological research since 1888 turns *Cambodunum*/Kempten (district Swabia, Bavaria) into the most intensively studied Imperial Roman settlement in *Raetia*. Faunal analyses in different quarters of this large city provide the basis for the study presented here focusing on Kempten's socio-economy in Roman times. Similar to other urban centers such as *Augusta Raurica*/Augst, there is evidence for social differentiation between the groups inhabiting the different quarters of the settlement. Closely spaced chronological dates for the contexts yielding animal bone finds from the *"Kleine Thermen"* (small thermae) also allow us to document shifts in meat procurement during the early Imperial period. Our data suggest a mixed model of meat provisioning involving pig husbandry *intra muros* by Roman colonists on the one hand and a supply of cattle raised by local peasants on the other. We explain the heavier reliance on cattle in the course of site occupation with worsening conditions for pig husbandry, significant human population growth in the urban centers and changes in economic structures favoring the intensification of production in farmsteads located in the hinterlands.

Keywords: Cambodunum/Kempten, Roman animal breeding, meat provision, Romanization, history of research.

Zusammenfassung

Mit einer bis in das Jahr 1888 zurückreichenden Forschungstradition stellt *Cambodunum*/Kempten (Regierungsbezirk Schwaben, Bayern) die archäozoologisch am intensivsten erforschte kaiserzeitliche Siedlung Rätiens dar. Die Ergebnisse von Faunenanalysen aus verschiedenen Bereichen dieser großen Zivilsiedlung bilden die Grundlage für die in diesem Beitrag vorgestellten Resultate zur Sozioökonomie des römischen Kempten. Analog zu anderen Zentralorten wie *Augusta Raurica*/Augst ergaben sich Hinweise auf soziale Unterschiede zwischen den Bewohnern einzelner Stadtareale. Anhand der eng datierten Tierknochenfunde aus dem Bereich der Kleinen Thermen ist es zudem möglich, die Entwicklung der Fleischversorgung in der frühen

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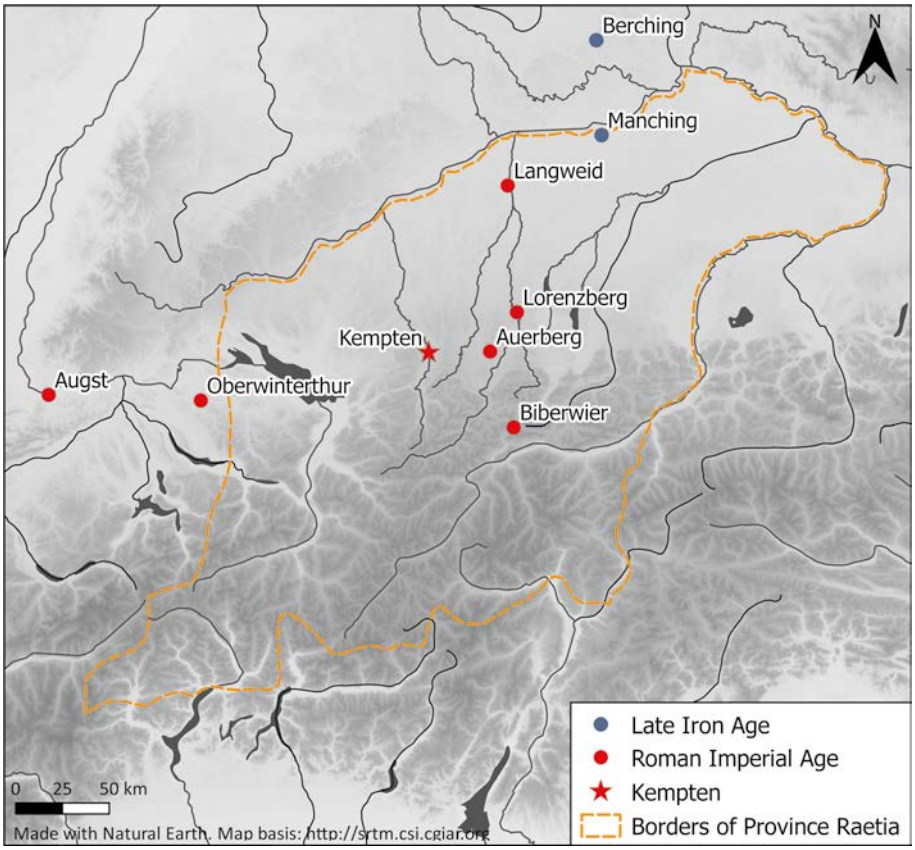

Fig. 1. Pre-Roman and Roman sites in *Raetia* and neighboring areas mentioned in the text. (Map basis: Natural earth, http://srtm.csi.cgiar.org).

Kaiserzeit aufzuzeichnen. Diese ist als ein gemischtes Modell zu sehen, das die Haltung von Schweinen *intra muros* durch die römischen Kolonisten einerseits und eine Belieferung mit Rindern durch die Bewohner autochthoner Siedlungen andererseits umfasst. Der im Laufe der Bewohnung zunehmende Rindfleischkonsum wird mit sich verschlechternden Bedingungen für die Schweinehaltung, einer Zunahme der Bevölkerung in den urbanen Zentren und einer Veränderung der wirtschaftlichen Strukturen im Sinne einer Stärkung produzierender landwirtschaftlicher Gehöfte im Umland in Verbindung gebracht.

Schlüsselwörter: *Cambodunum*/Kempten, Römische Tierhaltung, Fleischversorgung, Romanisierung, Forschungsgeschichte.

Introduction

In his paper entitled *"Ueber Säugethier- und Vogelreste aus den Ausgrabungen in Kempten stammend"* published in 1888, the palaeontologist Max SCHLOSSER (Fig. 2) was the first to report on Roman animal bones from the province *Raetia* (SCHLOSSER

Fig. 2. Max SCHLOSSER (*1854, †1932), pioneer ▶ of archaeozoological research in Bavaria. Source: Archive of the Bavarian Natural History Collections/Bavarian State Collection for Paleontology and Geology.

1888). Therefore, two anniversaries can be celebrated in 2018, namely the 65th birthday of our esteemed colleague Erich PUCHER, to whom this paper is dedicated, and 130 years of provincial Roman archaeology in *Raetia*. Numerous other papers dealing with Roman animal husbandry practices in the Danube, Inn and Eisack River valleys have followed SCHLOSSER's groundbreaking work (*e.g.*, BOESSNECK 1958, 1964, 1978; VON DEN DRIESCH 1994; PÖLLATH 2012; PUCHER 2006; STETTMER 1997; TRIXL *et al.* 2017). Roman Kempten (lat. *Cambodunum*), a large settlement where large amounts of archaeological faunal remains were recovered during extensive salvage excavations, especially between WWI and WWII and also after WWII, can be considered a major archaeozoological reference site (BOESSNECK 1957; MANHART 1998; SCHLOSSER 1888; TRIXL in prep.; TRIXL *et al.* 2017). The results presented here allow not only for an assessment of the economic and social history of *Cambodunum*, they also help gaining a better understanding of the early stages of Roman animal husbandry in *Raetia* (Fig. 1).

Cambodunum – An early Raetian center

Although in his *Geographika* (completed 20 AD) Strabon describes Kempten (*Kambodounon*) as the central settlement of a local tribe named *Estiones*, no evidence for a Celtic forerunner settlement could be detected so far (WEBER 2000a: pp. 18–19). Based on an inscription, Dietz argues that *Cambodunum* was established between 3 BC and 2 AD (DIETZ 1995: pp. 60–61). Notwithstanding a possible earlier occupation, the archaeological remains hitherto excavated suggest that the settlement was founded in late Augustan times, more precisely during the 2nd decade AD (SIELER 2009: p. 148). According to the material culture and burial customs in the earliest horizon, the site appeared essentially inhabited by civilian settlers exhibiting a Mediterranean lifestyle (MACKENSEN 1978: pp. 179–180). During the reign of Emperor Claudius (41–54 AD) representative buildings and other structures were for the first time erected in stone (WEBER 2000b). This is one of many arguments supporting the conclusion that *Cambodunum* (Fig. 3) hosted Raetia's first civil government and associated administration (SIELER 2009: pp. 154–155). Various features typical of Roman cities in the home

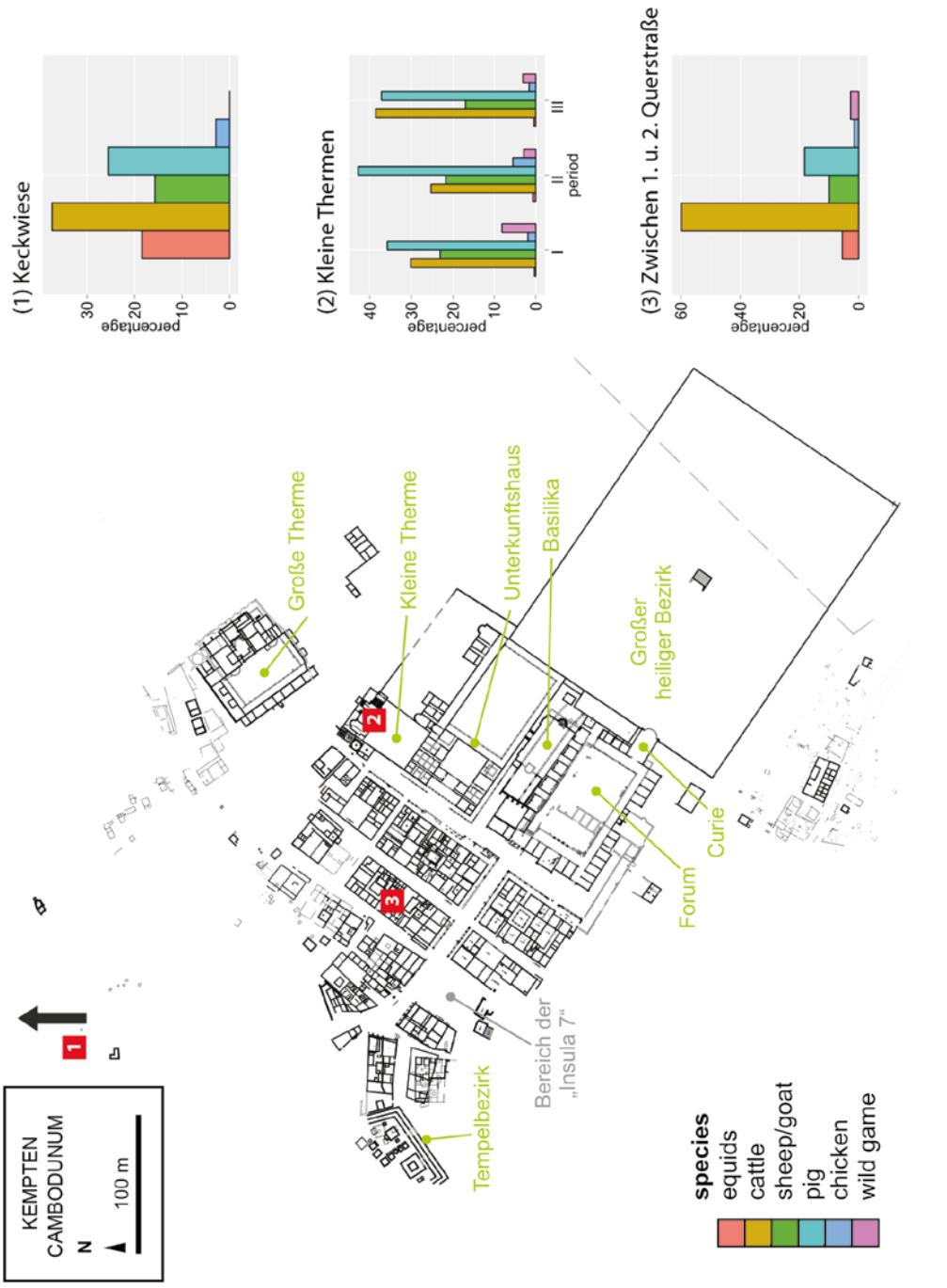

Fig. 3. Relative proportions of main livestock species in different districts of Roman *Cambodunum* based on NISP (Keckwiese: n=521; *“Kleine Thermen”* I: n=321; *“Kleine Thermen”* II: n=1,044; *“Kleine Thermen”* III: n=3,600; *“Zwischen 1. und 2. Querstraße”*: n=2,267). Map basis: Stadtarchäologie Kempten (Data: Boessneck 1957; Manhart 1998; Trixl in prep.).

country, such as an orthogonal street grid, insula type buildings and numerous thermae as well as a forum clearly point to an emulation of Italian design (WEBER 2000c). This layout remained largely unchanged until the site's abandonment in the 3rd century AD.

In retrospect: 130 years of archaeozoology in Kempten

The archaeozoological research tradition in Kempten started with the previously mentioned examination of faunal remains from the forum area conducted by Max SCHLOSSER (*1854, †1932) and published in 1888 in the *Correspondenzblatt der deutschen Gesellschaft für Anthropologie, Ethnologie und Urgeschichte* (SCHLOSSER 1888). A student of the geologist Karl von ZITTEL (*1839, †1904), SCHLOSSER's (Fig. 2) primary interests were in the fields of geology and palaeontology. Particularly his research dealing with the European Tertiary Period fauna brought him great recognition in these disciplines (MAYR 2007). In retrospect, his conclusions based on the Kempten material are remarkably astute and still partly valid today. Among others, Schlosser addressed the issue how the breeding of cattle by Roman colonists affected the phenotype of local populations. At that time few published Central European archaeofaunas excavated in the shore settlements on the Swiss lakes (RÜTIMEYER 1861) and Lake Starnberg (VON SCHWAB 1876: pp. 22–23) served as basis for comparison.

Excavations conducted by the *"Alterthumsverein Kempten"* since 1885 were taken over by the Heritage Office between 1912 and 1942 under the supervision of Paul REINECKE (*1872, †1958) and Ludwig OHLENROTH (*1892, †1959) (KATA 2000: pp. 8–10). However, nearly 70 years would pass since SCHLOSSER's pioneering work before *Cambodunum* would come again into the focus of archaeozoological research. In 1957 Joachim Boessneck, at that time assistant at the Institute for Veterinary Anatomy at the Ludwig-Maximilian University Munich (LMU Munich), published the results of his analysis of animal bones excavated in the area *"Zwischen der 1. und 2. Querstraße"* (BOESSNECK 1957). Of particular importance here is the fact that for the first time suitable bone specimens had been measured systematically, extending significantly our knowledge about the size of Roman Imperial cattle in the northern Alpine foreland.

In the following decades the Munich school remained the driving force behind archaeozoological research at *Cambodunum*. By 1967, a large portion of the cemetery at Kempten *"Keckwiese"* had been excavated and its material culture subsequently analyzed by Michael Mackensen (MACKENSEN 1978). An examination and identification of the many animal bones found comingled with the human cremations was provided by BOESSNECK (1978), since 1965 chairman of the Institute for Palaeoanatomy, Domestication Research and the History of Veterinary Medicine at LMU Munich. The detailed description and interpretation of these grave goods (MACKENSEN 1978: pp.172–177, 203–315) shed new light on the role of animals in mortuary practices in provincial Roman *Raetia*. Additional information concerning the necropolis, where excavations continued until 1991, was provided by Andrea Faber (FABER 1998). Her archaeological findings were complemented with a detailed analysis of the fauna by Henriette Manhart,

who examined the animal remains found in ditches associated with the burials as well as the refuse originating from butchering practices and meat consumption in settlement contexts dating to the 1st and 2nd centuries AD (Manhart 1998). Finally, the most recent faunal analysis considers exclusively the osseous remains recovered between 1983 and 1999 in the so-called *"Kleine Thermen"*. Analysis was carried out in the frame of a large DFG-funded research project entitled *"Population and livestock in the Rhaetian Alps and alpine foreland of the 1st century AD"* (Peters *et al.* 2017; Trixl in prep.; Trixl *et al.* 2017). The bone complex, which comprises over 7,000 individual finds, is for the most part associated with wood architecture and inhabited from the late Augustan Period till the middle of the 1st century AD. Based upon rich archaeological finds, Maike Sieler was able to detail settlement development in this quarter using short time intervals of one or two decades (Sieler 2009). Correspondingly, we are dealing with the first accurately dated animal remains originating from early Roman occupation. Among others, the fine-grained stratigraphy allowed us to documenting local socio-economic changes between wood architecture Phases I (late Augustan), II (after 25AD) and III (40ies of the 1st century AD).

Recent faunal research at *Cambodunum*

Differences in species composition and age structure of the animals found at *Cambodunum* provide information on the dietary habits of the inhabitants of the different quarters. Previous research at other sites in the *Imperium Romanum* had already reported topographic differences in meat consumption in urban centers and explained this phenomenon by social inequality. A prominent example of this is *Augusta Raurica*/Augst, where an increased proportion of pig, fowl and game remains in food refuse from the city center dating to the 1st and 2nd centuries AD is clearly indicative of an affluent population. Moreover, at Augst *Insula* 23 a proportionately high contribution of pig corresponds with opulent room architecture and rich furnishings (Deschler-Erb 1991: p. 375). Conversely, cattle and occasionally even horses were the primary source of meat in the town's periphery (Schibler & Furger 1988: pp. 156–171). Written sources such as the Diocletian price edict indicate that the kinds of meat consumed by the inhabitants of the city center were much more expensive than beef and therefore indicative of higher social status (Peters 1998: p. 41). Accordingly, the decrease in relative frequency of pig at the advantage of cattle in Augst during the 3rd century AD has been considered indicative of worsening living standards (Deschler-Erb 1991: p. 308). Evidence for differences in species composition indicating social inequality has also been reported from other Roman cities in the Northern provinces, *e.g.*, at *Calleva Atrebatum*/Silchester. Here, the bone assemblage retrieved from the city trenches at the outskirts of the city is clearly dominated by cattle, whereas in the city center pigs rank first (Grant 2004: pp. 376–377).

For the first time the fauna from *Cambodunum* provides evidence for a comparable situation in *Raetia* as well (Fig. 3). Despite variation in faunal composition between the

consecutive phases of habitation, the early Imperial faunal material from the *"Kleine Thermen"* underscores the numerical importance of pigs (35.8 % to 42.8 %). This contrasts with peripheral *"Keckwiese"*, where the most important species is cattle (25.5 %). At *"Keckwiese"* pigs are frequent too (25.5 %) but clearly less numerous than in each of the assemblages from the wood architecture Phases I to III at the *"Kleine Thermen"*. In both areas sheep and goat (15.5 %) are of minor economic importance. Game species including red deer and wild boar are evidenced in larger numbers in the central part of *Cambodunum* but almost absent in the faunal assemblage from *"Keckwiese"*. Analogous to the interpretation of the *Augusta Raurica*/Augst data, it is assumed that the food refuse retrieved from *Cambodunum*'s periphery mirrors a segment of the population with lower living standards compared to the city center inhabitants. In this respect, the relative frequency of chicken remains, another indicator of wealth, is somewhat contradictory since well-represented both in the city center and the periphery. However, taphonomic factors and excavation methods strongly influence bird bone preservation and recovery respectively, i. e. circumstances that may vary locally.

In the assemblage from the *"Kleine Thermen"* equid remains are extremely rare. This meets expectations since compared to other livestock species, horsemeat was seldom consumed in societies with primarily Mediterranean roots. Moreover, literary and archaeozoological evidence allow concluding that its consumption was restricted to times of economic crises and to socially underprivileged classes (Pöllath 2012: p. 202; Swegat 1976: pp. 106–107). In this respect, the proportion of horse bones retrieved from the 1st century AD garbage pits at *"Keckwiese"* in the settlement periphery is exceptionally high (18.4 %). Moreover, chop and cut marks imply that some of these carcasses had been roughly processed (Manhart 1998: p. 207); they might therefore represent food waste. Nonetheless, it is very likely that the high frequency of horse bones also relates to the fact that people used the settlement periphery to get rid of large animals that had fallen into disuse. A similar practice has been noted at other sites in the Roman provinces, *e. g.*, at Halbturn (Burgenland, Austria) (Kunst 2009: pp. 100–104).

Comparison of our data set with findings published earlier (Boessneck 1957; Schlosser 1888) is problematic for several reasons. Earlier excavations likely favored the recovery of large bone specimens, reflected by the large proportion of cattle bones in the assemblages studied by Schlosser (1888) and Boessneck (1957). Moreover, since the finds were not chronologically differentiated the issue of diachronic change in the relative frequencies of individual species during two centuries of site occupation cannot be addressed. That such shifts occurred, however, is suggested by the faunal results for the consecutive wood architecture Phases I to III at *"Kleine Thermen"*, where the proportion of the main food species varied significantly within few decades. As such, occupation Phase I is characterized by large amounts of pig bones and a relatively intense use of game animals. Accounting for 1.9 % of the identified remains, the contribution of the domestic chicken fits the values calculated for sites located in the Rhine-Danube Provinces (Peters 1998: p. 235). Starting with occupation Phase II, however, the proportion of game declines dramatically, whereas the importance of the pig as a main source

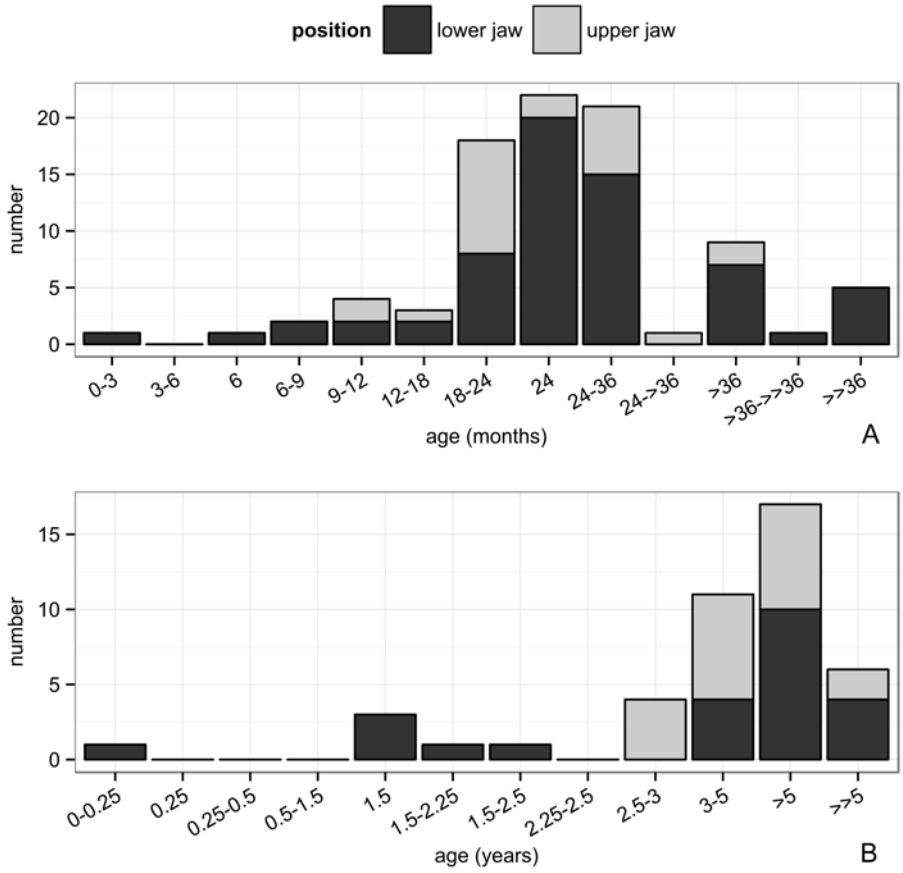

Fig. 4. A: Slaughter ages of pigs from *Cambodunum "Kleine Thermen"* based on maxillary and mandible teeth (n=88). B: Slaughter ages of cattle from *Cambodunum "Kleine Thermen"* based on maxillary and mandible teeth (n=44). (Data: TRIXL in prep.).

of meat increases, along with cattle. Parallel to this the consumption of chicken meat increases significantly too (5.5 %). During occupation Stage III some trends observed are reversed, with pigs becoming less important and chickens decreasing in numbers to approximately the level calculated for occupation Stage I. At the same time a marked increase in cattle bones is observed.

A look at the age and sex distribution of the animals allows tracing developments and practices of meat production characterizing early site occupation (Fig. 4A). Most pigs were slaughtered upon reaching optimal slaughtering weights or after they had been used for breeding. The consumption of tender meat of suckling pigs was an exception to the rule. Together with the relatively balanced ratio between boars and sows, this fact points to intentional farming of pigs within the settlement for meat production and to ensure population sustenance. The comparably high frequency of bones of fetal and/or newborn piglets dating to Period I to III (n = 23) strongly supports local breeding

efforts. We therefore conclude that in addition to a possible social component (see above), the high proportion of pigs can be explained best by their suitability for *intra muros* husbandry by people who are not primarily involved in agricultural production (*e.g.*, Müller-Scheessel & Trebsche 2007: pp. 71–72). A possible explanation for swine-keeping within the settlement is the necessity to partly supply oneself with meat because of limited meat production in the hinterland due to the absence of specialized farms (*villae rusticae*) at that time. The great importance attached to hunting in Period I may be connected with meat production shortages during early site occupation at *Cambodunum*. If so, the heavy reliance on venison should not be seen as an expression of social elite. As already said, the percentage of game dropped significantly in occupation Phase II.

As evidenced by the cattle bone finds, the early inhabitants of *Cambodunum* were by no means solely reliant upon domestic production to satisfy their meat demands. The heavy emphasis on adult cattle (Abb. 4B) with a predominance of cows shows that large stock was kept for breeding and milk production, a practice rooted in local late Iron Age farming. However, whether a human population of predominantly Mediterranean origin inhabiting an early Roman urban center would engage itself in dairy husbandry seems not very plausible. Another model postulated for Roman cities in the province Britannia is more probable here: according to Grant (1989: p. 139) the autochthonous inhabitants of the surrounding rural settlements delivered their old dairy cows to the urban centers. In the case of Kempten this model is supported by osteological evidence. Applying the *logarithmic size index* (Meadow 1999), a comparison of bone measurements from cattle populations originating from early Imperial Roman settlements with those from middle and late Latène Period settlements in the northern Alpine foreland (Fig. 5) reveals close phenotypic similarity. With time, increasing heterogeneity in early Imperial cattle is observed, which can be explained by the presence of larger-sized animals, mainly trek oxen used for heavy transport around the entire Mediterranean region. In addition, bulls were probably imported for improving local Iron Age cattle strains (*e.g.*, Peters & Manhart 2004; Peters *et al.* 2017; Trixl in prep.; Trixl *et al.* 2017). Interestingly, Schlosser reached a similar conclusion based on much less data 130 years ago. Regarding the Kempten cattle remains he reported: *"Nearly half of all the mammalian bones I examined belong to cattle and three types are distinguishable: A fairly small breed similar to the lake shore settlement's cattle, a very large breed of Primigenius, and a type that, based on size, is almost exactly between the two"* (Schlosser 1888: p. 19). According to Schlosser, the small breed probably represented the local cattle population, whereas the larger individuals belonged to breeds imported by the Romans. The intermediate forms were considered either the product of cross-breeding or autochthonous oxen (Schlosser 1888: pp. 19–20).

The combination of self-sufficiency and an external supply in meat production is not singular in *Raetia*. Archaeozoological findings from Auerberg near Bernbeuren (von den Driesch 1994) as well as Biberwier and Langweid a. Lech (Trixl in prep.) suggest a similar pattern of meat supply, which seems typical of early Imperial civil settlements of

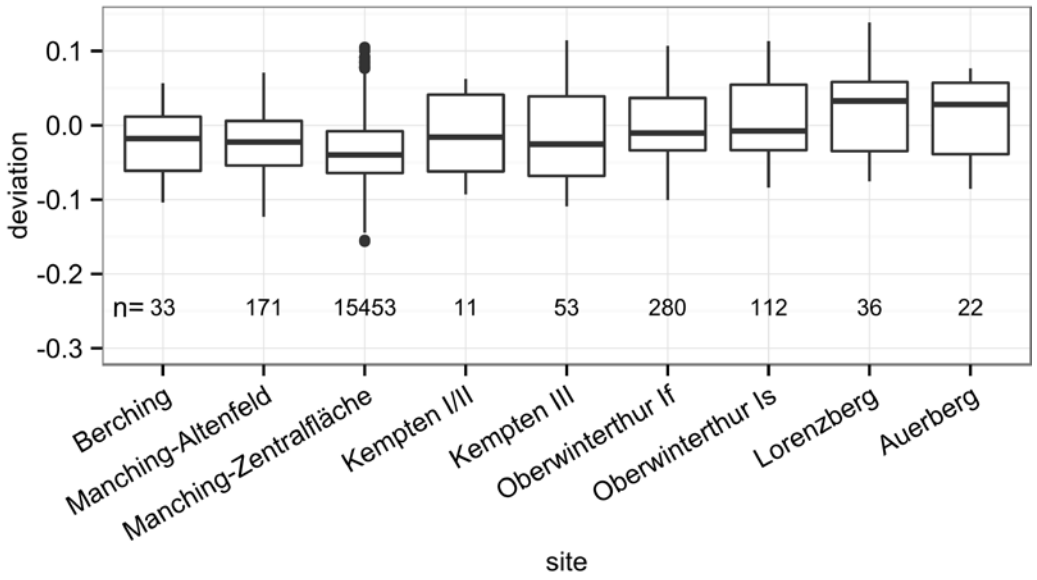

Fig. 5. LSI for cattle: Late Iron Age (Manching, Berching) and Early Roman Imperial Age (Kempten, Oberwinterthur If: 1st third of 1st century, Oberwinterthur Is: 2nd third of 1st century). In order to assure comparability, for the Roman Period only cattle populations dominated by females have been considered. (Data: Boessneck *et al.* 1971; von den Driesch 1984, 1994; Morel 1991; Obermaier 2013; Trixl in prep.).

Mediterranean character located in the northern Alpine foreland. In these urban centers, non-farming people involved in trade, handicraft or in administrative tasks obviously had to be supplied with meat. If our assumption holds true that higher percentages of pig remains imply local (and partly *intra muros*) swine husbandry, then the species' diachronic reduction in relative frequency would imply a heavier reliance on external *producer sites*, suggesting that in the course of the 1st and 2nd centuries Roman agricultural practice based on *villae rusticae* had been established.

As already mentioned for the transition of occupation Phase II to III, the decline in importance of pigs is paralleled by an increase in cattle. This appears a common phenomenon in the northwestern provinces and is considered the result of advancing Roman occupation. A possible explanation for this is the clearing of forests in the vicinity of the urban centers, with negative consequences for pig husbandry. Moreover, growing population size in economically important urban centers went along with higher demands for meat and heavier reliance on cattle (*e. g.*, Peters 1998: pp. 237–240). The need for slaughtering higher numbers of animals also implied more efficient ways of processing carcasses, which is reflected in the Romanization of butchery practices (*e. g.*, Lignereux & Peters 1996). Processing of the shoulder blade also followed a typical routine intended to trim this piece for smoking (*e. g.*, Deschler-Erb 2013). Preservation of meat may have been practiced at *Cambodunum* as well, considering the overrepresentation of scapulae in

contexts dating to occupation Phase II at the *"Kleine Thermen"* (TRIXL in prep.). Most notably, SCHLOSSER (1888: p. 20) already mentioned this phenomenon whilst studying the remains unearthed at the forum, stating *"that the shoulder blade is so much more frequent than any other extremity bone* […]".

Potential future research

Over the last 130 years archaeozoology has gained detailed insight into Roman animal husbandry north of the Alps, thanks also to the numerous findings from Kempten. The results hitherto obtained can be used to formulate new research questions that might be answered in the future with respect to the ever-increasing amount of faunal materials, provided they can be adequately stored. Faunal studies will also benefit from innovative methods for analyzing bone morphology, *e.g.*, geometric morphometrics, and ancient biomolecules, such as ancient DNA and stable isotope analyses. The latter method is also the conceptual focus of the Deutsche Forschungsgemeinschaft (DFG) Research Group 1670 "Transalpine Mobility and Culture Transfer" (*Transalpine Mobilität und Kulturtransfer*) hosted by the Ludwig-Maximilian University Munich. The initial step in this interdisciplinary project was to construct a reference map for isotopic values collected along some major Alpine passages and in the Alpine foreland regions (TONCALA *et al.* 2017). The various sub-projects involved address transalpine mobility from an archaeological, anthropological and archaeozoological perspective and cover a chronological period dating from the Bronze Age till Roman Imperial times (for a synopsis see GRUPE *et al.* 2015, 2017). Bone finds recovered from cemeteries and settlement sites play a central role as indicators for the mobility of humans and animals. Following a thorough morphological examination the bones, isotopic ratios of strontium (Sr) and lead (Pb) are currently analyzed in the project's second funding phase. A comparison with the reference map should allow for the identification of non-local humans and imported animals that recently migrated to the Alpine and Alpine foreland regions. Of significant importance for provincial Roman archaeozoology is also the following aspect: Extensive sampling and isotopic mapping of bone finds classified morphologically as non-local cattle, horse or mule should also help identifying animal imports to *Raetia*. Faunal remains from Early Imperial Roman sites including the *"Kleine Thermen"* in Kempten, Langweid a. Lech, Biberwier and the Auerberg near Bernbeuren are invaluable in this respect in view of their location in the catchment area of the *Via Claudia Augusta*.

In addition to this "supra-regional" aspect, the continual study of large bone assemblages originating from various Imperial Roman contexts such as civilian *vici*, urban centers, military stations and their associated villages as well as rural settlements with autochthonous roots will contribute to a better understanding of the complex economic network within the province. Finally, interactions between settling colonists and indigenous groups inhabiting *Raetia* seem a promising focus of future research as well (TRIXL in prep.; TRIXL *et al.* 2017).

Acknowledgments

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