**The identification of non-binary gender minorities in prehistoric burials**

**SI1)** General description of sites included in the analysis, including details regarding the ways in which sex- and gender-data were generated.

**Aiterhofen-Ödmühle (Germany)**

**Location**: Kreis Straubing-Bogen, Bavaria.

**Excavation**: 1975-1980 (U. Osterhaus and L. Breinl, BLfD Regensburg).

**Chronology**: Early Neolithic.

**Material culture**: Linear Potter Culture (LBK).

**Use duration**: From c. the later Flomborn/*Notenkopf-*phase to the early phase of the late LBK (Meier-Arendt Phase III-IV). Hofmann *et al.* (2013) indicate (based on Nieszery 1995) that three cremations, one double cremation and one inhumation are argued to be of possible Middle Neolithic date.

**Preservation**: The burial site was extensively excavated, although several graves may have been missed or destroyed during quarrying or by later settlements. Nieszery (1995) does not inform regarding the skeletal preservation. Baum (1990, 158) indicates that of 160 inhumed individuals, 109 individuals featured a sufficient state of preservation for osteological analyses – it is not clear, however, whether the author refers to the preservation of teeth or to the complete skeletal units.

**Burial structures**: 229 burial structures, according to the numeration of Nieszery’s inventory of burials (1995).

**Burial practice**: Nieszery (1995) mentions 160 inhumations and 69 cremations. Hofmann *et al.* (2013, 219) mention 163 inhumations (incl. 3 double burials), 74 cremations (incl. 9 double cremations) and further nine individuals represented by isolated bones only.

**Minimum number of individuals**: The MNI varies according to the indications of different authors. Hofmann *et al.* (2013, 219) count a total of 240 individuals, excluding three cremations, one double cremation and one inhumation and these are argued to potentially be of Middle Neolithic date. Baum (1990, 158) indicates a total of 235 individuals.

**Anthropologist(s)**: R. Lantermann examined the inhumation burials no. 1-153 in the scope of an unpublished thesis (Lantermann 1980), and subsequently the inhumation burials no. 154-160 as well as the cremation burials no. 161-229 (accessible to Nieszery in an unpublished letter to the *Bayerisches Landesamt für Denkmalpflege*, *Außenstelle Regensburg* of 29.4.1990). Since the archaeological gender-determinations and Lantermann’s osteological sex-determinations resulted in several contradictions, N. Nieszery commissioned P. Schröter to review the allegedly insecure osteological determinations. Nieszery indicates that Schröter was able to confirm some of these ‘problematic’ determinations and to reject others. The archaeologist finally privileged Schröter’s revised determinations over Lantermann’s (i.e. for the burials no. 21, 26a, 36, 57, 64, 141, 149). Baum’s (1990) published paleodontological study (incl. a small inventory with raw data) featured osteological age and sex-determinations of the deceased individuals of Aiterhofen-Ödmühle. Finally, M. Schultz, who was charged with the paleopathological examination of the skeletal remains, also carried out sex and age estimations, however only of a part of the skeletal collection, as some individuals had gone missing in spring of 1990 (Nieszery 1995, 91).

**Sex-determination methods:** The sex-determination methods applied to the skeletal collection by R. Lantermann, P. Schröter and M. Schultz are not indicated. N. Baum (1990, 175-181) determined the sex of individuals based on the size of the dental crown and the petrous bones (based on e.g. Wahl & Henke 1980) of both, adult and non-adult individuals. Baum (1990, 176) further refers to the presence of archaeological objects or object combinations that could be considered masculine or feminine attributes. Baum (1990, 179, tab. 5) compares the reliability of sex-determinations achieved with the Aiterhofen-population by means of different methods: ‘morphological-anthropological’ sex-estimation (87.0%), odontological sex-estimation (87.1%), sex-estimation based on petrous bones (84.6%), and archaeological ‘sex’ estimation (97.4%). It is not clear on what these figures are based.

**Osteological data-analyses**: Nieszery indicates the existing osteological sex estimates (Lantermann, Baum and Schultz) in the description of the single burials within an inventory. Except for a short annex section (Carli-Thiele, W.-R. Teegen and M. Schultz in Nieszery 1995, 235-239) regarding the pathological analyses of the skeletal collection, none of the osteological analyses and raw data are accessible. N. Baum’s analyses and raw data are elaborated in a separate publication (1990). Given the new odontological sex-determination method (used by N. Baum) had not been sufficiently tested on broader skeletal series, Nieszery did not take these data into account in the analyses (Nieszery 1995, 91). While Nieszery mainly uses Lantermann’s data (revised by Schröter), the study by Hofmann et al. (2013, 222-229, focussing on stable isotope analyses) uses all available determinations according to a ‘priority list’: they first use Lantermann’s data; if Lantermann did not provide a determination for a certain individuals, they use Baum and Schultz’s. Hofmann et al. further partially combine the existing estimates by adjusting their reliability categories. Burial no. 76 is a good example for this procedure: Lantermann’s sex-determination resulted in ‘indeterminate’, Baum’s in ‘female’, Schultz’s in ‘woman??’, and Hofmann et al. indicate ‘F?’ (Hofmann *et al.* 2013, 224).

**Gender-determination methods**: Seriations of objects (Nieszery 1995: fig. 63, 64) associated with sexed individuals resulted in Nieszery’s (1995: 110) observation that ‘*specific objects are characteristic of one sex only and that they are not evidenced in burials of the other sex*’[[1]](#footnote-1). As archaeological gender-determinations are considered a cross-validation for sex-determinations, individuals of indeterminate sex associated with objects were sexed according to the archaeological gender (circular argumentation).

**Gender-data analyses:** Based on seriation analyses of objects and osteological sex-estimates, Nieszery (1995, 110-115, 262) defines the following significant masculine attributes: adzes, v-shaped *spondylus* shells (considered a belt element), *spondylus* armrings, silex blades, silex arrowheads, antler toggles (dt. *Geweihknebel*), firelighting kits (incl. pyrite or manganese and tools, i.e. flint/bone awl), bone rods (dt. *Knochenstäbe*), animal bones (considered food offerings), fox mandibles and ochre. Nieszery further considers silex flakes, silex blade fragments and silex hammerstones ‘rather masculine’-attributes. A round, double perforated *spondylus* shell (interpreted as belt element) represents, according to Nieszery, the only secure feminine attribute as it is never found in combination with secure masculine attributes. Grinding stones, green stone beads, antler combs and ceramic are associated with both sexes and therefore cannot serve as archaeological gender indicators. As a rule, the presence of a single significant masculine or feminine attribute justifies the archeological gender-determination (Nieszery 1995, 112). The number of grave goods and their position in the grave may be further indicators of archaeological gender, as biologically male burials tend to feature more objects, while elaborate headdresses made of snail shells are more frequently associated with biologically female individuals. Nieszery admits that a total of six biologically female burials (he refers specifically to the burials no. 19a, 55, 137, 139, 158 and 159) are indeed associated with ‘secure’ masculine attributes. Given the sex-determinations of these individuals were categorized ‘rather female’, therefore insecure determinations, Nieszery doubts the validity of the former. The indications in the grave inventory, however, feature ‘secure’ female determinations. It is therefore unclear based on what indication the author decided to classify these burials as ‘rather female’. A supra-regional comparison of contemporaneous burials would, in the author’s view, finally support the argumentation and allow the latter to reject the osteological determinations of the ‘mismatches’. While statistics are recurrently referred to in order to argue the mentioned 6 female osteological and male archaeological ‘mismatches’ as determination errors, the reverse case of the snail shell headdresses, with which 8 biological female and 2 (albeit) secure male individuals were associated, leads the author to the conclusion that headdresses may rather not be a secure indicator of feminine archaeological gender. Nonetheless, in the case the osteological determinations were, in the end, correct, the author cautiously takes other possibilities into consideration, e.g. cases of intersexuality, bisexuality, transvestism, transsexuality and androgyny, which are frequently associated with shamanism among ‘primitive people’. Based on combined ‘archaeo-anthropological’ analyses, Nieszery (1995, 112) states that the number of male individuals in Aiterhofen predominates that of female individuals.

**Data use and reconstruction for this article:** The collected gender-data is based on Nieszery’s indications, which are either indicated in the grave inventories (1995, 264-296, under the section “*archäo-anthropologischer Befund*”) or in the seriation table (1995, 110-111, fig. 63). The collected sex/age-data is based on all datasets generated by three different anthropologists (Lantermann, Baum and Schultz). Lantermann’s determinations were applied whenever other osteological results are indeterminate or non-existent. In the case of contradictions between the datasets, the principle of ‘the majority wins’ was applied.

**Sex and gender associations:** match (n) = 35, opposite (n) = 10, partial (n) = 71, no data (n) = 57.

**General site references:** Nieszery 1995; Baum 1990; Hofmann *et al.* 2013, 219-241.

**Trebur ‘Im Rühchen’ (Germany)**

**Location**: Kreis Groß-Gerau, Hessia.

**Excavation**: 1939-1940 (graves 1-4), 1971, 1975 (graves 5-9), complete excavation: 1988-1989 (graves 10-137; H. Göldner, Landesamt für Denkmalpflege Hessen, with the support of R. Klausmann).

**Chronology**: Middle Neolithic (corresponding to the German *Mittelneolithikum: c.* first half of the 5th millennium BC).

**Material culture**: Hinkelstein Culture and Großgartach Culture.

**Use duration**: Hinkelstein phase I-II and older phase of Großgartach Culture (mGG A after Spatz 1999).

**Preservation**: Many of the graves may have been disturbed by plowing activities, as they lie within or just below the plough-horizon. The skeletal preservation is considered relatively good, likely due to the calcareous soil of the region. Some bones had occasionally fused in calcified blocks, which needed to be isolated before the analyses. Lime crusts further impeded e.g. on the assessment of the endocranial sutures.

**Burial structures**: 137

**Burial practice**: 131 inhumations, 3 cremations, 3 ‘cenotaphs’.

**Minimum number of individuals**: 129, of which 78 individuals are considered affiliated with the Hinkelstein Culture and 51 individuals affiliated with the Großgartach Culture.

**Anthropologists**: B. Jacobshagen and M. Kunter.

**Sex-determination methods:** Based on ‘conventional morphological methods’ with reference to Sjovold (1988), which includes the assessment hip bones, cranium and the robusticity markers of the remaining skeletal elements. Whenever present, the assessment of the hip bones was prioritized. Discriminant analytical methods were not applied, as the anthropologists consider using modern reference data for the analysis of Neolithic skeletal series problematic (Jacobshagen and Kunter in Spatz 1999, 282).

**Osteological data-analyses**: The overall methods and results of the osteological analyses (incl. the general osteological analyses, the precise dental age-determinations, and dental pathologies) are presented in the scope of three separate sections at the end of the text part of the main publication (Jacobshagen and Kunter in Spatz 1999, 281-332, Jacobshagen in Spatz 1999, 333-348, Kunter and Reiber in Spatz 1999, 349-353). A total of 109 (of which 94 adult individuals, 46 female and 48 male) out of 229 skeletons were osteologically sex-determined. A summary table (Jacobshagen and Kunter in Spatz 1999, 295-299) informs us broadly in terms of sex (i.e. male/female, rather male/rather female, tendentially male/female, indeterminate) and age determination results, three different body height calculations, the skeletal preservation for the assessment of metric data (categorized by cranium/post-cranium), pathologies, and specificities (i.e. cremation, neonates, supplementary bones of further adult individuals, extreme robusticity). The raw data, in particular of the morphological sex-determinations, are not indicated. Non-adult individuals (including most juvenile individuals) were not sex-determined. Although tooth metrics show a slight discrepancy between the two sexes (male teeth are tending to larger measures than female teeth), the differences in tooth mass, the presence of tartar and cavities are insignificant and could be due to age differences (Kunter and Reiber in Spatz 1999, 351).

**Gender-determination methods**: Spatz seriated the objects included in the burials with the osteological sex-determinations. Based on the differentiation of (secure) masculine and (secure) feminine archaeological determinations, Spatz sees the possibility to correct insecure osteological sex-determinations or complete the determination of individuals of indeterminate osteological sex (Spatz 1999, 177-178).

**Gender-data analyses**: All burials excavated at the site of Trebur included objects. As the Hinkelstein and Großgartach material cultures represented in this burial site are not contemporaneous (Hinkelstein is older than Großgartach), Spatz assesses the objects associated with the two cultures separately. According to the seriation-results, Spatz (1999, 177-198) categorizes polished stone adzes and axes, silex hammerstones, pyrite, arrow shaft polishers, abraders for stone adzes and axes, silex tools, antler and bone artefacts as (significant) masculine attributes of the Hinkelstein burials. The author considers quern stones and other sandstone artefacts (excluding arrow shaft polishers and abraders for polished stone adzes and axes) significant feminine attributes of the Hinkelstein burials. Ceramics are generally indifferent attributes, yet decorated and stemmed bowls (dt. *Fußschale*) are more frequently associated with male individuals while coarse, undecorated bowl-shaped vessels (dt. *napfförmige Töpfe*) are more frequently associated with female individuals. The combination of quern stones and coarse vessels support the author’s assumption that female individuals were involved in food preparation activities (Spatz 1999, 178). Objects qualifying as jewelry or parures are generally indifferent, as they are associated with biologically male and female individuals. However, the author observes that exclusively female individuals feature deer tooth pendants or perforated river shells at height of the hip, which could indicate the use of the latter as belt components of a feminine dress. Animal bones or oxen meat cuts are considered an indifferent attribute. Masculine attributes of the Großgartach Culture include polished stone adzes and axes, hematite or iron ore, silex hammerstones and bone artefacts. The association of silex tools with male individuals of the Großgartach Culture is, by comparison to those of the Hinkelstein Culture, rare. Two secure female individuals are further associated with silex artefacts, this object category therefore cannot serve as archaeological gender indicator. Feminine attributes of the Großgartach Culture are foremost determined based on the lack of characteristic masculine assemblages: sandstone runners and other sandstone artefacts, double perforated shells (‘buttons’) and perforated river shells. These objects are, however, rarely represented. Ceramic stemmed bowls are slightly more frequently associated with male (7 out of 12 vs. 3 out of 14 individuals) then female individuals, while lug-handled vessels (dt. *Ösenbecher*) are more frequently associated with female individuals (5 vs. 1 individual).

**Data use and reconstruction for this article:** The sex/age-data used is based on the indications of table 5 (Jacobshagen and Kunter in Spatz 1999, 295-299). The gender-data is based on the tables 72-74, 76-78 (Spatz 1999, 178-198).

**Sex and gender associations:** match (n) = 94, opposite (n) = 4, partial (n) = 27, no data (n) = 11.

**General site references**: Spatz 1999.

**Ostorf-Tannenwerder (Germany)**

**Location**: Kreis Schwerin, Lake Ostorf, Island of Tannenwerder, Mecklenburg-Western Pomerania.

**Excavation**: 1904 (May 21st, September 10th and 14th; R. Beltz; burials 1-22), 1935 (July 8th-21st; W. Bastian; burials I-VI), 1961 (August 7th-23rd; E. Schuldt; burials 1-10).

**Chronology**: Based on AMS-dating and object typologies, the site is mainly occupied in the Nordic Middle Neolithic, between c. 3200-2900 BCE. Based on object typologies and site comparisons, one grave may be dated to the Early Funnel Beaker Culture of the Nordic Early Neolithic (c. 3800-3600 BCE; Lübke *et al.* 2007).

**Material culture**: Funnel Beaker Culture (mainly the younger phase).

**Use duration**: Mainly the younger Funnel Beaker Culture (MN II-IV). An earlier occupation may be attested through one grave.

**Preservation**: A total of eight burials were destroyed between 1877 and 1879, one grave in 1934, and likely further burials in the eastern part of the island due to horticultural activities. According to Patolla and Henke, nine structures contained no osteological remains, or sparse/severely fragmented human bones, which are anyway lost today. A total of five crania are not attributable to burial structures. In general, 25% of the skeletons are nearly complete, 10% fairly well preserved (i.e. feature more than 70% of the skeletal elements), and 45% of the individuals are represented by single bones only. Most of the last mentioned individuals were not determinable in regards to age and sex (Patolla & Henke 2007, 354).

**Burial structures**: 42 according to Schuldt (1961, 33), 33 according to Patolla and Henke (2007, 354), and 38 according to Schiesberg (2013).

**Burial practice**: Inhumations only. Secondary burial practices are argued for the site of Ostorf based on Patolla’s osteological re-evaluation of the site (Schiesberg 2013).

**Minimum number of individuals**: Previous assessments (Schuldt 1961) resulted in a total of 42 burials and 51 assumed single burials. More recent analyses (taking all cranial and postcranial skeletal elements into account) have resulted in a minimum number of 74 individuals from a total of 33 graves (Patolla & Henke 2007). The new bone count shows that several graves contained well-preserved individuals (clearly identifiable as primary burials, associated with objects) together with sparse bone elements pertaining to more individuals. Schiesberg (2013) underlines that this observation cannot be the result of disturbed or subsequently intermixed burials, but is rather to be understood in the general FBC context of secondary burial practices.

**Anthropologists:** G. Asmus (1939), H. Grimm (1965), and the more recent osteological re-evaluation of the bone collection seems to have involved E. Becker, N. Nass, W. Henke (the authors of an unpublished report from 2002 mentioned in Patolla & Henke 2007), and M. Patolla (in the scope of an unpublished M.A.-thesis in 2006).

**Sex-determination methods:** Asmus (1939, 31-42) estimated the sex based on metrical and morphological aspects of a total of 16 crania and mandibles from the areas of the burial site of Ostorf-Tannwerder excavated in 1904 and 1935. Grimm (1965: 59-64) estimated the sex of the individuals excavated in the scope of Schuldt’s excavation in 1961 foremost based on morphological and metrical aspects of the crania and mandibles, and partially on metrics of femora as well as body heights. Patolla (Patolla & Henke 2007, 355-356) re-determined all individuals’ sexes by means of osteometric methods (following Martin 1928; Bräuer 1988), further by means of morphognostic methods (on pelvis and mandible, following Ascádi & Nemeskéri 1970; Phenice 1969), by means of morphometrical methods (based on humerus, femur and clavicle, following Stewart 1979; Ubelaker 1974), and by means of the discriminant function analysis (based on patella, talus, calcaneus and long bones, following Introna *et al.* 1998; Steel 1962; Steele 1975). Further features of the internal acoustic meatus have been considered (following Wahl 1981). The sexing of non-adult individuals was also attempted by means of morphognostic and discriminant function analytical procedures (following Schutkowski 1989).

**Osteological data-analyses**: The osteological data generated by Asmus (1939) and Grimm (1965) are indicated in their respective publications. Grimm (1965, 59-61) discusses problematic estimates in further detail (i.e. of individuals 1961/5, 1961/9 and 1961/7). Patolla’s general results are only accessible in a published overview-article (Patolla & Henke 2007). The author’s extensive descriptions of the Ostorf-individuals’ sex and age determinations are, however, not figured in the latter. Nevertheless, the single, final estimates and their attribution to ‘main’ and ‘secondary’ burials are nonetheless accessible in Schiesberg’s article (2013, tables 2 and 4).

**Gender-determination methods**: Gender is, throughout the various single publications of this site, never explicitly mentioned and, since sex and gender are used to cross-validate each other, they are generally confounded. The time lag between the analyses, focused on either the archaeological or the anthropological aspect of the site, further hampers the understanding of the interrelation of sex and gender: All authors seriate the objects associated with sexed burials, however these seriations are based on different data: Bastian’s (1961) interpretations are based on the excavated burials of 1904 and 1935 (and those of comparable sites of e.g. Tangermünde, Germany and Västerbjers, Sweden) and the osteological results of Asmus (1939). Schuldt’s (1961) interpretations includes the former and Grimm’s (1965) determinations of the 1961-individuals. Schiesberg (2013, 201 and fig. 6) also does not generally focus on the question of gender, but nonetheless features a revised seriation of selected burials of which the osteological determinations had been revised by M. Patolla. The integrity of the information relevant to the gender-determinations are accessible in the main site publications (Bastian 1961; Schuldt 1961). Both publications include detailed inventories of each burial. If existent, osteological sex-determinations of 1939 and 1961 are included. Archaeological gender-determinations are, by contrast, rarely indicated. Some of these may follow the results of mentioned seriations, others appear, however, more intuitive as they are not consistently applied to other burials containing comparable objects (e.g. burial 1904/5; Bastian 1961, 21: "This determination is further supported by the set of four flint blades"[[2]](#footnote-2)).

Following Bastian (1961, 77-106), masculine attributes include polished stone and flint axes, as well as transversal arrowheads. Given their scarcity, or their rare association with osteological females, fish hooks, crescent-shaped and regular flint blades, wild boar tusks, as well as perforated animal teeth foremost found at hip-height are considered ‘rather’ masculine attributes. Textile tools (e.g. bone awls and ‘spindle whorls’) are considered a feminine attribute and rich head gears consisting of perforated animal teeth rather feminine. Schuldt (1961, 172-175) follows the previous archaeological gender-criteria, and further underlines the association of amber pendants and fish hooks with male individuals. Schiesberg’s small seriation of 11 burials (2013, 202, fig. 6), which includes more osteological female individuals than previously determined, could imply that perforated animal teeth, flint artefacts (other than axes and arrowheads), ceramic vessels and bone/antler tools are associated with both sexes and are therefore ‘indifferent attributes’. The author’s figure could also confirm the previous general masculine attributes of axes, arrowheads, hammerstones, and amber artefacts. However, the categories used are broader than the ones used by the site excavators, and such interpretations regarding ‘gendered attributes’ are not addressed in the article, which was focused on the practice of secondary burial rites. Finally, Ostorf-Tannenwerder is a site which has been frequently questioned regarding neolithization processes in Northern Europe (Bastian 1961, 109; Lübke *et al.* 2007; Schiesberg 2013), as it has yielded numerous objects related to hunting activities (e.g. arrowheads, animal bones/teeth). The ‘Man-the-Hunter’-theme is therefore implicit throughout the site-publications.

**Data use and reconstruction for this article:** The ‘old’ sex-data is based on Asmus’ and Grimm’s results, which are indicated in their respective publications and in the grave inventories of Bastian and Schuldt. The gender-data is based on the occasional indications in the grave inventories (Bastian 1961; Schuldt 1961). In the case burials are associated with objects considered masculine or feminine attributes in the interpretations of ‘gendered’ burial practices (Bastian 1961, 77-106; Schuldt 1961, 172-175) and a gender-determination was not made explicit by the authors, the gender-determination was completed. The ‘new’ sex-data is based on Patolla’s results (accessible in Schiesberg 2013) and the gender on the ‘old’ dataset, in lack of a thorough re-evaluation of the site including both, archaeological and osteological aspects.

**Sex and gender associations:** Associations including the ‘old’ sex-data (total n = 39): match (n) = 14, opposite (n) = 4, partial (n) = 7, no data (n) = 14. Associations including the ‘new’ sex-data (total n = 70): match (n) = 11, opposite (n) = 8, partial (n) = 24, no data (n) = 27. This ‘new’ count includes a minimum number of 31 individuals, which were only retrospectively identified as skeletal remains of secondary burials.

**General site references:** Asmus 1939; Bastian 1961; Grimm 1965; Lübke *et al.* 2007; Patolla & Henke 2007; Schiesberg 2013; Schuldt 1961.

**Lauda-Königshofen ‘Wöllerspfad’ (Germany)**

**Location**: Main-Tauber-Kreis, Baden-Württemberg, Germany.

**Excavation**: 1998-2000 (rescue-excavation; C. Oeftiger).

**Chronology**: Final Neolithic (1st half of the third millennium BC).

**Material culture**: (Early) Coarded Ware Culture.

**Use duration**: c. 2800/2700 – 2500 BCE.

**Preservation**: S. Ortolf sporadically mentions variable preservation states on site: Single burials or object categories (e.g. canine teeth) are qualified as poorly preserved. According to M. Trautmann (2012, 307) nearly 60% of the skeletons are moderately to poorly preserved. The author considers taphonomic processes rather than anthropogenic disturbances as the cause of the poor preservation state of the bones. For 27 skeletal units only c. 30%, and for 53 skeletal units less than 30% of the bone elements are preserved. The bone remains of 20 individuals of indeterminate sex further did not qualify for aDNA-typing. Although paleogenetic methods are mentioned, no paleogenetic study of the site was published.

**Burial structures**: 69

**Burial practice**: Inhumation burials, of which 58 single burials, 5 double burials, 9 multiple burials (incl. 3 or 4 individuals).

**Minimum number of individuals**: 88 (of which 54 non-adult individuals, incl. 25 *infans I*-individuals, 32 adult individuals and 2 individuals of indeterminate age).

**Anthropologist:** M. Trautmann [previously M. Menninger].

**Sex-determination methods:** Trautmann follows the standard methods of Ferembach et al. (1979), A. Czarnetzki (no reference), and J. Wahl (no reference). Further sex estimation methods based on the angle of the *meaticus acusticus internus* were applied mainly to non-adult individuals (following Wahl 1981; Wahl & Graw 2001). The size of specific permanent teeth (following Alt *et al.* 1998; Ellendt 1993; Fritz 1994; Starp 1990) also served for sex estimation, in particular for non-adult skeletal remains or for burials featuring tooth remains only (Trautmann 2012, 313-314).

**Osteological data-analyses**: Trautmanns’ PhD manuscript is accessible online (Menninger 2008). The latter contains all analyses, incl. the raw osteological data of the single individuals and, among others, the indications regarding which skeletal portions were used for the sex-determinations. The same author’s final publication (Trautmann 2012) includes the analyses, yet not the raw data. S. Ortolf (2014) summarizes the osteological analyses in the general publication of the archaeological site (excl. the raw data). Of a total of 88 adult and non-adult individuals, 28 individuals were generally determined female (1 ‘overly’ female, 11 female, 26 rather female), 29 individuals male (1 ‘overly’ male, 10 male, 18 rather male), 1 individual indifferent, and 20 individuals are of indeterminate sex. Trautmann (2012, 312) warns of the reliability of determinations obtained by means of osteological methods.

**Gender-determination methods**: Publications of other sites are mentioned, incl. previous results regarding osteological and archaeological sex and gender estimates. Ortolf’s archaeological gender-determinations are nonetheless based on the quantification of objects associated with the osteological sex (and age) determinations of the deceased individuals – clear archaeological gender-determinations, however, are not indicated individually (Ortolf 2014, 446-464). Trautmann (2012, 288-290) refers to Ortolf’s (at that time unpublished) preliminary archaeological determinations, and suggests to use the archaeological gender-determination whenever a determination cannot be achieved by means of anthropology.

**Gender-data analyses**: The object finds include ceramic vessels, polished stone tools, silex and bone artefacts, and meat offerings. A total of 20 burials did not include objects, of which only 1 adult individual. Multiple burials were excluded from the seriation process. According to Ortolf’s analyses (2014, 446-464), (adult) feminine attributes include ceramic vessels and (adult) masculine attributes include polished stone axes and adzes. However, it is mentioned that 6 male burials did include ceramic vessels, and that two (non-adult) female individuals were associated with axes. Silex and bone artefacts, as well as food offerings are indifferent to either (biological) sexes. Animal tooth jewelry is generally considered indifferent to the sexes, however, based on the comparison to contemporary burial sites in Central Germany (Petzold 2005), long necklaces out of dog canines are considered a feminine attribute. The association of a biologically male individual with such a necklace is left uncommented. Trautmann (2012, 291) evokes up to 18 contradictory sex/gender-determinations, of which 5 female and 13 male individuals. The gender-determinations evoked, however, are mostly based on sex-typical body orientation and position common for the Corded Ware Culture. The author further narrows down the contradictions to 5 individuals (of which 4 male and 1 female individual), as the latter considers sex estimates of non-adults and badly preserved individuals too insecure. These contradictory observations are not further considered in Ortolf’s archaeological study, as the author states that body orientation and position in Lauda-Königshofen are generally deviant from the Corded Ware Culture burial practices and seemingly gender-neutral (Ortolf 2014, 467-468).

**Data use and reconstruction for this article:** The sex/age-data is based on Trautmann’s results (2012, 450-453, tab. 75/1). The gender-determinations are not made explicit in the single burial descriptions, they were therefore reconstructed based on Ortolf’s interpretational results (2014, 446-464). The archaeological gender-determinations ‘rules’ apply to adult individuals only.

**Sex and gender associations:** match (n) = 18, opposite (n) = 1, partial (n) = 53, no data (n) = 21.

**General site references:** Ortolf 2014; Trautmann 2012; Menninger 2008.

**Gemeinlebarn, Nekropole F (Austria)**

**Location**: St. Pölten, Lower Austria.

**Excavation**: 1973-1981 (J.-W. Neugebauer, in collaboration with A. Gattringer).

**Chronology**: Late phase of the Early Bronze Age (“Gemeinlebarn III”).

**Material culture**: Únětice, Gemeinlebarn phase III.

**Use duration**: 80-100 years.

**Preservation**: Skeletal remains are relatively poorly preserved, and a strong rarefication of compact bone segments is mentioned. Based on the finding of dislocated skeletal portions or skeletal elements, most grave contexts were disturbed at different stages of the bodily decomposition and marked at variable degrees by ancient looting activities .

**Burial structures**: 258

**Burial practice**: 1 cremation and 224 inhumations.

**Minimum number of individuals**: 225

**Anthropologists**: W. Heinrich and M. Teschler-Nicola.

**Sex-determination methods:** The osteological analyses were carried out following ‘among others’ the methods presented by Martin and Saller (1957), Krogman (1962), Brothwell (1965), and in particular following the recommendations of Ferembach *et al.* (1979).

**Osteological data-analyses**: The analyses and results are described in a separate section at the end of the book (Heinrich and Teschler-Nicola in Neugebauer 1991: 222-262).

**Gender-determination methods**: General reference to Primas (1977), who compared burial practices and structures in Copper and Bronze Age burial sites of southern Central Europe. Besides the application of existing ‘gender rules’, objects are seriated with sexed individuals (Neugebauer 1991, 90, tab. 15; 92, tab. 16; 96, tab. 17a/b).

**Gender-data analyses**: Seriations of objects associated mainly with (sexed) individuals resulted in 23 (archaeological) masculine individuals (of which 2 of indeterminate age and sex) and 40 (archaeological) feminine individuals (of which 3 of indeterminate age and sex; see Neugebauer 1991, 90, tab. 15 and 92, tab. 16). According to Neugebauer (1991, 89-93), masculine attributes include (battle) axes, daggers (or their remaining studs), bronze belt hooks andparures, of which one single bronze garment pin (foremost the perforated sphere-headed pin; dt. *Kugelkopfnadel*). Feminine attributes include mainly jewelry objects: leather caps evidenced by sheet metal stripes, *tutuli* or wire ornaments, golden or bronze hair spirals, earrings, one to two arm and ankle bracelets or greaves (dt. *Bergen*), trumpet-shaped *tutuli*, and one pair of pins. The more jewelry is found in a burial, the more secure the archaeological feminine determination. Daggers found in osteological female burials, which are not found in close body association or in combination with belt hooks, are considered likely to function as knives for food votives rather than as weapons. Looting activities are considered additional, potential sources of biases, as objects in looted graves may not be present anymore (e.g. one versus two pins; abundance of jewelry).

**Data use and reconstruction for this article:** The sex/age-data used are based on Heinrich’s and Teschler-Nicola’s determinations (in Neugebauer 1991, 224-228, tab. 1). The gender-data are based on Neugebauer’s seriation tables 15, 16, 17a/b (1991, 90-96).

**Sex and gender associations:** match (n) = 42, opposite (n) = 3, partial (n) = 125, no data (n) = 95.

**General site references:** Neugebauer 1991.

**Olmo di Nogara (Italy)**

**Location**: Nogara, Verona, Veneto.

**Excavation**: 1936-1937 (discovery of graves by G. Bellani during construction works); 1987 (L. Salzani; Soprintendenza Archeologica del Veneto); 1990-1997, 2002, 2009 (L. Salzani; Padus company/Padana Archaeological Society).

**Chronology**: Middle Bronze Age phase (1)/2 to Recent Bronze Age phase 2.

**Material culture**: Terramare.

**Use duration**: c. 1600/1500-1200 BCE.

**Preservation**: All authors describe a good overall preservation of the skeletal collection. Canci *et al.* (2015, 329) mention 12 cases of looting with complete removal of grave goods and 3 cases of non-preserved grave goods due to corrosion induced by the chemical composition of the soil and/or the particular conditions of the location. Further burials were damaged by ploughing activities (Salzani 1988, 234).

**Burial structures**: 533 burial structures were excavated.

**Burial practice**: 62 cremations and 471 inhumations. Canci *et al.* (2015, 328-329) were not able to retrieve 54 of the published inhumations and 14 cremations in the scope of their osteological re-evaluation of the skeletal collection of Olmo. They further detected 5 additional, hitherto unidentified individuals based on their bone count.

**Minimum number of individuals**: 543

**Anthropologist(s):** C. Corrain, L. Meneghello, M. Capitanio examined the burials excavated between 1987 and 2002 and J. Rizzi those excavated in 2009. A. Canci, D. Contursi, G. Fornaciari further conducted preliminary paleopathological analyses, presented in the main site publication (Salzani 2005, 495-501). M. L. Pulcini conducted an osteological re-examination of the skeletal collection of Olmo di Nogara as part of an interdisciplinary project (including paleopathological and isotopic analyses of the bone collection) started in 2006 in cooperation with the Soprintendenza per i Beni Archeologici del Veneto and the Dipartimento dei Beni Culturali dell’Università di Padova (Canci *et al.* 2015).

**Sex-determination methods:** The general methods used for sex-determination of the Olmo individuals are not indicated in the main site publication (Salzani 2005). However, some of the osteological descriptions of the deceased individuals indicated respectively for each burial refer to single, published articles, which again include further information on the methods applied: Capitanio and Corrain (1996), for example, used morphometric sex-determination methods, and describe in great detail the statistically significant presence or absence of sex-markers on all cranial and post-cranial bones represented in the Olmo-collection (i.e. cranium, mandible, sacrum, sternum, clavicle, scapula, humerus, radius, pelvic girdle, femur, patella, tibia, fibula, talus, calcaneus and the general stature). The authors mention two broader methodological references in their bibliography: Martin and Saller (1957) and Olivier (1960). J. Rizzi (in Salzani *et al.* 2016, 207-209) determined the sex of the 10 individuals excavated in 2009 based on long bones, following Stewart (1979), and based on morphological aspects of crania and hip bones following among others Acsàdi and Nemeskéri (1970), Ferembach *et al.* (1979), Krogman and İşcan (1986), Bruzek (2002) and Canci and Minozzi (2005). M. L. Pulcini (2014, 28-31; Canci *et al.* 2015, 328) determined the sex of adult individuals only, as the author considers determinations of non-adult individuals too insecure. However, the latter still considers reliable the previous sex-determination of the juvenile individual no. 265. The determinations included analyses of hip bones and crania following Canci and Minozzi (2015), further following Byers (2002), Hager (1996), Phenice (1969), Sutherland and Suchey (1991), Houghton (1975) and in difficult cases Murail *et al.* (2005). The sex-determinations based on cranium and mandible followed the methods presented by Buikstra and Ubelaker (1994) and Krogman and İşcan (1986). In the case crania and hip bones were absent, sex-determination methods focused on metrics of long bones (i.e. femora and humeri) followed the methods presented by Ferembach *et al.* (1979).

**Osteological data-analyses**: The osteological analyses of C. Corrain, L. Meneghello and M. Capitanio are featured in the main site publication (Salzani 2005). Their osteological observations are described in detail following the archaeological descriptions of each burial. The sections mostly include information regarding the preservation state of the skeleton, age and sex-determinations and the arguments as to what the latter are based on. J. Rizzi describes their osteological observations and results within a separate section of the collective article focused on the 10 burials excavated in 2009 (Salzani *et al.* 2016, 209-213). Their descriptions of each inhumation include information regarding sex, age, pathologies and potential occupational markers of the deceased individuals. M. L. Pulcini (2014; of which the results are summarized in Canci *et al.* 2015) reconstructed the biological profile of each individual regarding sex, age at death, height, occupational markers, health conditions, traumatic lesions. The author further integrates the archaeological data (incl. grave goods that suggest social characteristics like age, sex and rank of the deceased individuals) in the consideration of the osteologicalstudies in order to outline the burial practices common to the Bronze Age Olmo di Nogara community, according to chronological phases. The author, as all other preceding authors, does not publish the single osteological measurements and observations. Solely the sex and age determinations which deviated from the previous ones are listed in two tables (Pulcini 2014, 52-53, 56-58) without any details regarding the basis on which the determinations were modified. Furthermore, single determinations, which also deviate from the former osteological assessment of the skeletal collection, are spread throughout the thesis (e.g. individual no. 145 – previously of indeterminate sex – is indicated as of female sex on p. 73, but not in the list of individuals of deviant sex-determinations on p. 52-53; and the same applies to individual no. 379 on p. 194, fig. 152, which is now considered of male sex).

**Gender-determination methods and data analyses**: None of the cited publications makes any distinction between the concepts of sex and gender. The absence of such a dichotomy creates some ambiguities in the interpretation. For example, in the main site publication (De Angelis in Salzani 2005, 449-487), some burials that were determined male by the anthropologists, but contained grave goods that were considered feminine by the archaeologists, were interpreted as female (?) in the final seriation. This apparent discrepancy between the osteological sex of the individuals and their expected archaeological gender seems to represent the main motivation behind the re-examination of the osteological data by Pulcini (2014).

In all publications, the authors follow the standard gendered scheme for the attribution of grave goods that is widely accepted for Bronze Age Europe. In general, weapons (swords, daggers, arrowheads) are considered masculine attributes, while elaborate parures (at least two pins, bronze hair spirals, amber beads and bone combs) are considered feminine attributes. The gendered attribution of some specific grave goods is defined following a bottom approach. For example, head gear and single pins are considered masculine because they only occur with osteologically-determined males.

**Data use and reconstruction for this article:** The ‘old’ sex-data is based on Corrain’s, Meneghello’s and Capitanio’s determinations, which are indicated for each burial in the main site publication (Salzani 2005), and Rizzi’s determinations indicated in Salzani *et al.* (2016, 207-213). The ‘new’ sex-data is based on Pulcini’s (2014) indications, both on the tables of deviating sex-determinations and on the indications spread throughout the research work. The gender-data are based on the attributes considered by the archaeologists (Salzani 2005; Canci *et al.* 2015, 328), which in turn correspond to the widely accepted scheme for Bronze Age Europe.

**Sex and gender associations:** Associations including the ‘old’ sex-data (total n = 465): match (n) = 105, opposite (n) = 14, partial (n) = 199, no data (n) = 147. Associations including the ‘new’ sex-data (total n = 465): match (n) = 124, opposite (n) = 1, partial (n) = 184, no data (n) = 156.

**General site references:** Salzani 2005; Salzani *et al.* 2016; Salzani 1988; Corrain & Meneghello 1988; Capitanio & Corrain 1996; Pulcini 2014; Canci *et al.* 2015.

**Neckarsulm, Trendpark Süd (Germany)**

**Location**: Neckarsulm, Baden-Württemberg.

**Excavation**: 2001 (4 months).

**Direction**: A. Neth.

**Chronology**: Late Bronze Age, Urnfield period, Hallstatt A1-period.

**Material culture**: Urnfield Culture.

**Use duration**: Hallstatt A1-period, approx. 50 years or 2 generations.

**Preservation**: Partial to severe disturbances are mentioned, due to the generally low depth of the grave structures, agricultural and (unsystematic) modern or ancient looting activities, and to a lesser degree to burrowing animals. Six burials were identified based on small bones fragments or burial structure outline only. A variable degree of skeletal preservation was noted and categorized: The existence of small bones and bigger skeletal portions is considered well preserved, while the remains of few bone fragments are considered poorly or not preserved.

**Burial structures**: 32

**Burial practice**: Inhumation.

**Minimum number of individuals**: 50

**Anthropologis**t: J. Wahl.

**Sex-determination methods:** Wahl follows conventional methods, of which those of (among others) Ferembach *et al.* (1979), Herrmann *et al.* (1990), Buikstra and Ubelaker (1994). The sex estimates were preferentially based on the hip girdle and the skull. In view of the poor preservation state of many individuals further bone features were taken into consideration, e.g. petrous bones, metric data, discriminant analyses of various skeletal elements, general proportions and height ratios, robusticity or gracility and muscle markers based on (among others) Bruzek (2002), Murail *et al.* (2005), Introna *et al.* (1997), Robling and Ubelaker (1997), Holman and Bennett (1991), Ditch and Rose (1972), Graw (2001). Out of nine aDNA-analyses, only one could confirm the morphological sex-determination of an individual (Ind. 18/1, Wahl in Knöpke 2009, 341, footnote 15). Body heights were assessed according to the reference tables of Breitinger (1937), Olivier *et al.* (1978), Rösing (1988), and Jacobs (1992).

**Osteological data-analyses**: The analyses are presented in a separate section at the end of the text part (Wahl in Knöpke 2009, 339-349). It is mentioned that the osteological analyses are not completed and that the latter shall be published separately (state of 2009). The final sex estimates feature male individuals only (following the reliability categories: male, rather male, male?) and are featured in a table by grave and individual, including age and body height estimates (Wahl in Knöpke 2009, 339, tab. 1). J. Wahl underlines, that of the 13 individuals of indeterminate sex, none may be considered female without a doubt. Of the 13 individuals, five did not allow for sex-determination due to the lack of bone preservation. The remaining eight individuals either do not feature (clear) sex dimorphisms (5 individuals) or may, due to gracility indexes, represent female individuals (3 individuals). The association of (archaeological) masculine attributes with two indeterminate individuals (Ind. 18/2 and 21/2) lead Wahl to the assumption that these would rather represent (biological) male individuals. In view of the sexual imbalance of the deceased population of Neckarsulm, Wahl supports the hypothesis of a ‘male-only’ burial site.

**Gender-determination methods**: Knöpke refers (with no specific indication of literature) to the general knowledge of gendered attributes that are common for the Urnfield period (Knöpke 2009, 45).

**Gender-data analyses:** According to this common knowledge, masculine attributes at the site of Neckarsulm include weapons (swords and razors) and parures (single pins). Feminine attributes would commonly include parures (pairs of pins, arm and leg-jewelry). No feminine attributes have, however, been recovered from the burial site of Neckarsulm. The archaeological gender is considered the cross-validation of osteological sex estimates. In the case of individuals of indeterminate osteological sex, archaeological gender is used. The final interpretation of the existence of a male burial site in Neckarsulm is finally based on the cross-validation of archaeological and osteological sex and gender, as well as on the lack of clear female osteological markers and archaeological attributes (Knöpke 2009, 45).

**Data use and reconstruction for this article:** The gender-data was reconstructed based on the criteria set by Knöpke (2009, 45). The sex/age-data used is based on those indicated by J. Wahl (in Knöpke 2009, 339, tab. 1).

**Sex and gender associations:** match (n) = 16, partial (n) = 26, no data (n) = 8.

**General site references:** Knöpke 2009.

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1. Dt.: „*dass bestimmte Gegenstände nur für ein Geschlecht typisch sind und in Gräbern mit Bestattungen des anderen Geschlechts nicht vorkommen*.“ [↑](#footnote-ref-1)
2. Dt. “*Diese Bestimmung wird durch den Satz von vier Klingen bekräftigt.*” [↑](#footnote-ref-2)