Architectural terracottas from Akragas : investigating monumental roofs from the Archaic and Classical period

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6 DISCUSSION

The revised typology proposed in chapter 5 incorporates both published and previously unpublished material. It also includes not only the decorated roof edges, but also the undecorated elements such as ridge tiles, which means previously excluded types of terracotta elements are now incorporated into the various roofs. The revised typology is formulated based on decoration, profile, fabric, methods of production, and the chemical composition of the various fragments; furthermore, it considers aspects related to the architectural context. As such, it now provides the opportunity to discuss the terracotta roofs from Akragas in a comprehensive manner. The relation between the city and its wider context no longer has to rely on stylistic comparisons alone, but takes also the *chaîne opératoire* as well as the technical architectural details into account, to name but a few examples. Therefore, while the revised typology is one of the major outcomes of this thesis, it is also an essential component in addressing the other research goals and questions raised in section 2.3.

6.1 STYLISTIC ANALYSIS

6.1.1 THE CANONICAL SICILIAN ROOFS

By the end of the first quarter of the 6th century BC the canonical Sicilian roof system is already well defined and in common use in colonies such as Selinus, Syracuse, Naxos, and Gela (section 2.2.1.1). Thus it is already established in Sicily by the time that the first such terracotta roofs appear in Akragas around the middle of the 6th century. Knowledge of the decoration and profile for roof elements in this system therefore had to be brought to Akragas in order for these roofs to be manufactured in this location. As already discussed, one of the traditional concerns in the investigation of the architectural terracottas from Akragas is the identification of other colonies or cities which had a significant stylistic impact on the material from Akragas. There are a number of different theories as to where the strongest influences originated from. De Miro views the architectural terracotta from Gela as the most important stylistic precedent for the canonical Sicilian roofs from Akragas.[1] It is true that in a number of aspects Gela is especially close to Akragas, it is the *metropolis* of Akragas, and in terms of distance it is also one of the nearest neighbours. But already in chapter 4.1 it was found that while the canonical Sicilian roofs from Gela and Akragas show many similarities, the roofs from Akragas also incorporate decorative aspects seen in other colonies, including Syracuse, Naxos, and Selinus.

In terms of the profile, Shoe concluded that Akragas looked further towards Selinus for inspiration. After a detailed study of the profiles of Western Greek architectural elements, she found the base astragal, or bottom roll, of the sima to be a Selinuntine invention.[2] A review of recent publications on architectural terracottas from Sicily concludes that the bottom roll on the canonical sima is a relatively rare element. For instance, the first known example is revetment A from Naxos, which is dated to the first quarter of the 6th century.[3] The first known example from Selinus is revetment C, which Conti calls roof 14, and which is dated to the last quarter of the 6th century.[4] While the earliest object appears first in Naxos, it is not found in subsequent roofs at this colony from the mid-6th century onwards. In comparison, a relatively large number of early roofs from Akragas have a bottom roll (roof 1, 2, and 4), and all date to the middle of the 6th century. This means the first example from Selinus occurs chronologically after the majority of examples from Akragas and thus does not support Shoe's hypothesis. It therefore appears that while this profile element might not have originated in

1 De Miro 1965, p. 51.

2 Shoe 1952, pp. 10, 25.

3 Lang 2010, pp. 119-120, fig. 18.8; Lentini & Pakkanen 2011, p. 419, fig. 8.

4 Conti 2012, pp. 113-127, roof 14, fig. 108; Lang 2010, pp. 131-132, Seli 3, fig. 28.6-8.

Akragas, during the middle of the 6th century it was one of the first and few cities in Sicily which incorporated this element into its sima profiles. In terms of the profile and the painted decoration the workshops of Akragas did not look towards a single stylistic template from a single colony for their own roofs but instead drew from a rich canon of decorative elements already established and in wider use in Sicily.

The horse rider acroteria, which are popular in Sicily until the beginning of the 5th century, are associated with the canonical Sicilian sima roof types.[5] Marconi described horse rider fragments in association with roof 1 (section 5.2.1.1)[6] and Gàbrici mentioned figurative elements found to the South-East of temple B.[7] Until recently both these groups of objects were thought lost and some scholars were no longer certain about the presence of such figures in Akragas.[8] But the new discovery of fragments from Gàbrici's excavation has made it possible to investigate the horse rider acroteria at least from roof 2 (section 5.2.1.2). Similar figures are known from Gela, Himera, Kamarina, Naxos, Selinus, Morgantina, and Syracuse.[9] There is considerable variation within these examples in terms of size and execution. While significant portions of the figure from Akragas are not preserved, it appears similar to the ones from Selinus based on the moulding of the horse's mane.

Another popular feature in combination with the canonical Sicilian sima roof is the gorgoneion pediment decoration in Sicily during the first three quarters of the 6th century.[10] There are three objects which appear to come from such large gorgoneion plaques (section 4.1.42-43). While these fragments represent only a small section of the original decoration they show stylistic similarities with gorgoneion pedimental plaques from Gela.[11] Unfortunately, the state of preservation does not allow for a reconstruction of these objects and at this point it is not possible to assign them to a specific roof or roofs.

6.1.2 ANTHEMION ROOFS

According to the work by Wikander, Winter, Lang, and Mertens-Horn, the last developmental stage of Sicilian terracotta roofs is characterized by a perforated anthemion sima on the eaves. In general, this development is dated to the second half of the 6th century. Within this roof type there are two different anthemion patterns in use: one associated with three roofs from Selinus, and another with three friezes from Naxos (section 2.2.1.1). For the Selinuntine anthemion roof there are six known examples in Sicily. Three are from Selinus itself, namely, the roofs traditionally associated with temple E1, C, and Y.[12] Then there are a fragment from Leontini,[13] and an isolated fragment in secondary use found in Akrai.[14] The last example of this anthemion roof type is roof 6 from Akragas. In terms of the profile and decoration in relief it resembles roof 20 from Selinus which was previously associated with temple Y. Furthermore, the lion-headed waterspout from Akragas is associated with roof 6. Apart from this example from Akragas, Mertens-Horn identifies another five examples of terracotta lion-headed waterspouts which are also associated with the anthemion roof system in Sicily; a fragment from temple A or B from Megara Hyblaea, three from

5 Danner 1996, pp. 100-102; Darsow 1938, p. 67; Marconi 2007, p. 45; Szeliga 1986, pp. 80-87.

6 Marconi 1929, p. 158.

7 Gàbrici 1925, p. 141.

8 Danner 1996, p. 89; De Miro 1965, p. 40; Szeliga 1986, p. 39.

9 Danner 1996, p. 103; Lentini 2006, pp. 417-422; Marconi 2007, p. 46.

10 Danner 2000, pp. 93-94.

11 Bernabò Brea 1949-1951, p. 72, fig. 69; Danner 2000, pp. 26, 30, fig. 5, 9.

12 Lang 2010, pp. 45-46; Winter 1993, p. 21.

13 Monterosso 2009, p. 434, fig. 14.

14 Ciurcina 1997, p. 42, fig. 7-8.

Selinus,[15] and one from Leontini.[16]

Moreover, Akragas is so far the only other location with terracotta roofs similar to the anthemion roofs from Naxos. These examples incorporate three friezes, series A-C, which are associated with building B and are thought to have been in use until the 5th century.[17] Roof 7, series A-C from Akragas have direct parallels with these three roofs from Naxos. Roof 7, series D and ridge tile antefix 1 (section 5.2.2.5-6) both resemble material from Naxos which is also interpreted as part of anthemion roofs.

In conclusion, taking into consideration not only the revetments, but also lion-headed waterspouts and ridge tile antefixes, the anthemion sima roof appears to be represented only in Akragas, Selinus, Naxos, and Leontini. While examples from Megara Hyblaea and Akrai also exist, the presence of anthemion roofs in these locations have not yet been conclusively confirmed. The distribution and occurrence of this roof type compared to the canonical Sicilian sima and the antefix roof are therefore considerably less. Akragas stands out in this regard because it presents a number of anthemion roofs of different designs.

6.1.3 CORINTHIAN ROOFS

The roof systems of Sicily have traditionally been thought to consist of flat pan tiles combined with curved, Laconian style, cover tiles.[18] Conti finds a strong Corinthian influence in numerous roofs from second half of the 6th century. This includes the anthemion roof E1 which is seen as the prototype for the later anthemion sima roofs from Selinus. Conti attributes the Corinthian influence on the decorated roofs, acroteria and sculpture to the strong economic and cultural ties between Selinus and Corinth at this time.[19] While undecorated roof tiles did not receive a lot of attention in earlier publications, a number of recent studies are expanding on these traditional views. Roofs found in current excavations in Selinus and Naxos have revealed cover and ridge tiles with a polygonal shape similar to Corinthian roofs. The examples from Selinus are generally dated to the classical period,[20] the one from Naxos to the second half of the 5th century.[21] Pentagonal cover tiles and a curved ridge tile with an opening on one sides to accommodate a pentagonal shaped cover tile have been found at the ongoing S. Anna excavation, indicating that the presence of Corinthian cover and ridge tiles also at Akragas (section 4.1.58-59).

A second group of objects is also related to the Corinthian roof system. Three types of ridge palmettes have been reconstructed from numerous fragments found predominantly around the urban sanctuary. While palmette type 4 (section 5.2.4.3) does not have any known Sicilian counterparts, palmette type 2 and 3 (section 5.2.4.1-2) show strong stylistic parallels to examples found over a wide area of Selinus and dated by Conti to the first half of the 5th century BC.[22] A similar palmette has also been found at Gela in the excavations around Molino di Pietro and is dated by Orlandini already to the 6th century.[23] From the fractures at the base of all three palmette types from Akragas it is clear that the palmette sat on a polygonal shaped ridge tile.

To date only ridge tile palmettes and cover tiles in the Corinthian system have been found in Akragas. Antefixes, such as the ones from Selinus,[24] have not yet been discovered, with the possible exception of VIN 607 (section 4.1.32). Conti dates

15 Mertens-Horn 1988, pp. 183-184, tab. 18b.c, 19.a.b.c.

16 Monterosso 2009, p. 433, fig. 13.

17 Pelagatti & Lentini 2011, p. 392, fig. 2-6.

18 Winter 1993, p. 273.

19 Conti 2012, pp. 316-317.

20 Jonasch 2009, p. 4.

21 Lentini et al. 2008, pp. 322-323.

22 Conti 2012, pp. 273-279.

23 Panvini 1998, p. 47.

24 Conti 2012, pp. 130-132.

the examples of Corinthian type roofs from Selinus to second half of the 6th century. But the material from Akragas appears to date only to the start of the 5th century. The initial indications are therefore that Corinthian style roofs reached Akragas slightly later than the city of Selinus. The volume of both decorated and undecorated objects indicate that Corinthian style objects where much more prevalent at Akragas than previously recognized.

6.1.4 ANTEFIX ROOFS

Based on overall decorative and profile characteristics it is possible to distinguish three main types of antefixes found in Akragas. The largest group of objects depict a smiling gorgon in relief. As already mentioned in chapter 2 and 4.1, the mythological creature is a very popular motive in Sicilian architecture from the beginning of the 6th century onwards.[25] Of the eight gorgoneion antefixes known from Akragas, only two are the same in terms of style and profile and thus likely belong to one type (antefix type 5, section 5.2.3.6). The other six fragments come from a variety of locations including the extra-urban sanctuary at S. Anna (antefix type 1, section 5.2.3.2), the urban sanctuary (antefix G) and the vicinity of temple A (antefix type 3, section 5.2.3.4); they are all different in terms of the stylistic execution, depth of relief, and shape. While there are some stylistic similarities between the various antefixes from Akragas and other examples from Sicily, there does not appear to be any direct stylistic connections. The majority of gorgoneion antefixes from Sicily dating to the second half of the 6th and early 5th century contains additional decorative elements. These include the snakes in the gorgon's hair, as seen in 5th century antefixes from Naxos.[26] Or a diadem that range from plain to elaborate, including antefix type A and B from Selinus dated to the first half of the 5th century, a 6th century example from Megara Hyblaea and a number of different antefixes from Gela placed to the end of 6th century.[27] There are also gorgoneia combining both a diadem and snakes, such as an antefix from Himera from the end of the 6th or beginning of the 5th century.[28] It is therefore striking that all the recorded gorgoneion antefixes from Akragas have neither a diadem nor snakes.

Selinus antefixes were often used in combination with gorgoneion antefixes on Sicilian roofs. To date only two silenus type antefixes are known from Akragas. The first is a piece now housed in the Allard Pierson Museum in Amsterdam for which no detailed find information is available (antefix type 7, section 5.2.3.8). It is dated to the beginning of the 5th century based on style. The second silenus type antefix is dated to the end of the 5th century and comes probably from the area between temple A and the urban sanctuary (antefix type 6, section 5.2.3.7). It has not been possible to associate either of these two with a specific gorgoneion antefix.

The third group of antefixes consists of a flat plaque and a curved cover tile, which is connected at the top of the plaque along a curved top edge, while the bottom edge is straight. The decoration is painted directly on the plaque and consists of different variations of palmettes and volutes (roof 8, section 5.2.3.1). While this type of antefix does not appear in great numbers at other Sicilian sites, some examples are known, including a number of fragments found by Orsi during his excavations at the Athenaion of Syracuse.[29] Another comparison comes from the ship sheds of Naxos.[30] An antefix discovered at the acropolis area of Gela is similar to the Syracuse example mentioned and is dated to the second half of the 6th century.[31] According to Winter these objects are Eastern Greek in influence

25 De Miro 1965, p. 73; Lulof 2007, p. 41; Mertens-Horn 1997, pp. 244-245; Strazzulla 1997, p. 707; Winter 1993, p. 279.

26 Lentini et al. 2008, fig. 41.

27 Panvini 1998, pp. 33, 44.

28 Epifanio Vanni 1993, p. 40, fig. 5.

29 Orsi 1918, p. 673, fig. 247.

30 Lentini et al. 2008, pp. 347, 351, fig. 44.

31 Panvini 1998, p. 31, Inv. 35940.

and dated primarily to the second half of the 6th century BC.[32]

6.1.5 STYLISTIC INFLUENCES AND LOCAL ADAPTATIONS

Coming back to the question of stylistic impact, De Miro considered the architectural terracotta from Akragas to be principally influenced by those of Gela based on the similarities between the sima and geison revetments. But as discussed above it is evident that there was a larger sphere of influence at play and that the situation also underwent changes over time. While the canonical Sicilian sima roofs were indeed influenced by those of Gela, it appears that the craftsmen drew from wider regional traditions because the decoration also shows similarities with roofs from Syracuse, Naxos, and Selinus. In terms of the acroteria figures the influence of Selinus and Gela seems particularly strong. By the end of the 6th century the impact by Gela diminishes though, as the anthemion sima roofs are now principally influenced by roofs from Selinus and Naxos.

For the most part the terracotta roofs from Akragas follow the wider regional traditions already in place but there are details relating to the profile and decoration which point to local preferences. The use of a bottom roll on most of the canonical Sicilian simas sets the roofs from Akragas apart from contemporary roofs in Selinus and Gela. The gorgoneion and ridge tile antefixes from Akragas can also be differentiated from similar objects from the wider region by to a lack of snake like hair and diadems. These localized variations become less prevalent over time. The later anthemion sima roofs as well as the 5th century ridge tile palmettes show instead very little deviation from similar objects from Selinus and Naxos. The degree of resemblance between the sima and geison fragments from Akragas and Naxos led De Miro to suggest that some of these objects might even come from the same workshop.[33] This question will be addressed again in section 6.4.

Style in archaeology has played an important role in the study of social groupings and identity (section 3.2). While the theories of Wobst were instrumental in framing style as a way of transmitting information regarding social integration or differentiation, he later stressed that style is equally important in defining individuality.[34] In this regard, the fact that the architectural terracottas from Akragas conform to the wider Sicilian convention is an expression of inclusion in a wider architectural tradition. Furthermore, variation from the regional norm decreases from the Archaic to the Classical period which might either indicate a level of fluidity in the regional style or greater freedom on the part of the craftsmen during the earlier period. This topic will be discussed in greater detail section 6.6.

6.2 FABRIC AND PRODUCTION TECHNIQUES

For this investigation, as per many comparable ceramic studies, the attributes associated with raw materials as well as production techniques together form the basis from which to identify major fabric groups.[35] Both categories are interrelated and a reflection of the decisions made by the workmen during manufacture. In chapter 4.2 the various attributes are investigated and evaluated based on their diagnostic capacity. Attributes such as the colour of the fully oxidized clay matrix, type of temper, fabric density, and surface finish are then used for identifying objects with the same characteristics, which are then organized into fabric groups. Not all attributes are appropriate for diagnostic purposes. For example, the level of oxidation and the level of skill used for the painted decoration are influenced by the type of object itself. Due to the dependent nature of such

32 Winter 1993, p. 279.

33 De Miro 1965, p. 67.

34 Wobst 1977, 8, 17; Wobst 1999, 125.

35 Moody et al., 2003, p. 39; Orton & Hughes 2013, pp. 12, 14; Rye 1981, p. 2; Shepard 1956, p. 306.

attributes they are thus not used for identifying, but for describing the fabric of established groups of objects (section 5.1.3). Based on the results from chapter 4.2 and their application in chapter 5, a number of observations can be made regarding the raw materials and production techniques used in the manufacture of roof terracotta especially for Akragas.

Scholars including Moody have identified temper as one of the most distinctive aspects of a fabric, and within this study temper is also one of the key attributes which distinguishes different fabric groups (table 4.2-2, 5.1.1).[36] At Akragas the predominant temper type is a combination of grog and non-volcanic temper which is used for canonical Sicilian sima roofs (roofs 1-4), anthemion sima roofs (roof 6), antefix roofs (roof 8) as well as elements such as ridge tile palmettes (ridge tile palmettes 2-4). In comparison, the use of dark grained volcanic sand is less prevalent, it appears on one canonical Sicilian sima (roof 5) and one antefix type (antefix type E). It also is the main temper type for roof 7, series A-D, and ridge tile antefix 1. Volcanic temper does not appear in widespread use during the 5th century at Akragas. Architectural terracotta elements from this period, including undecorated roof tiles (pan tiles A-D) and ridge tile palmettes (ridge tile palmettes 2-4) contain non-volcanic temper. For the most part volcanic and non-volcanic temper is not used in combination. The possible exception is antefix type 3: here the antefix plaque consists of a fine fabric with grog while the cover tile contains volcanic temper. The two temper categories are present in different components which were connected before firing.

Another independent attribute of architectural terracotta is the different surface finishes (table 4.2-9). The most prevalent type is slip, followed by the application of painted decoration directly on the fabric surface. There are different types of slip layers; on roof 2 it is a thin layer of clay which is similar in colour to the main fabric and less than 0,5 mm thick. Another type consists of a layer of highly purified light yellow clay, mostly around 1 mm in thickness (e.g. roof 3), but it can be even thinner (e.g. roof 8). A clearly identifiable slip layer could not be recognized on fragments associated with a number of roofs (e.g. roof 1 and 6). Instead, the paint layer appears to be applied directly to the fabric. Another surface finish comprises an epidermis layer of levigated clay. This finish is used in combination with volcanic temper (fabric G) and is mostly restricted to objects from roof 7, series A. As part of fabric groups C and D the epidermis layer is combined with a thick slip layer (ridge palmettes 2 and 4).

The methods of production demonstrate a chronological development. The canonical Sicilian sima roofs show the highest level of incomplete firing conditions (table 5.1-2). The fabric associated with these roofs (fabric A and B) also have a higher density of small air cavities which is indicative of not as much refinement of the raw clay. And the painted decoration represents a higher number inconsistencies (table 5.1-4). In contrast, the anthemion roofs from the end of the 6th century show an improvement in production techniques as well as in the application of more ambitious surface finishes. While roof 6 is similar to roof 1 and 4 in terms of the raw material and production techniques, its clay matrix is fully oxidized and has a higher density. Roofs from this period also incorporate surface finishes which require greater technical expertise, such as the epidermis layer on roof 7, series A. Subsequently, objects dated to the 5th century make use of even more challenging production methods. Ridge palmette 1 and 3 consist of both a slip and an epidermis layer, at the same time the clay fabric is fully oxidized and uses non-volcanic material and grog as temper.

In conclusion, the roof terracottas from Akragas follow the established theory of increasing sophistication and refinement in manufacture for

36 Moody et al. 2003, p. 49.

the Archaic and Classical period. It is commonly accepted that firing techniques improved over time with temperatures of up to 1.000 °C being reached during the late Archaic and Classical period for Greek architectural terracotta.[37] The roofs from the middle of the 6th century show evidence of firing conditions which did not achieve the sustained temperatures required for full oxidation, but later roofs do. The methods used for finishing the decorated surfaces also progress over time, from a paint only finish on the first roofs, to a combination of slip and epidermis method on the 5th century ridge tile palmette. The preference for non-volcanic material and grog as temper is consistent throughout the entire period of investigation.

But while the chronological overview demonstrates improvements in production techniques over time, it also indicates variation during each period. Some of the variation might be attributed to differences in the technical requirements for different types of objects. For instance, the pan tiles of the 5th century are undecorated and therefore did not require the combination of epidermis and slip layer which was more suitable for the moulded ridge palmettes from the same period. But when the raw materials and techniques used for a single class of objects, such as the sima revetments from a specific period, are compared to each other, there is also variation. Simas associated with the canonical Sicilian roofs make use of different types of temper and surface finishes. It is possible that this variation is not related to functional requirements, but rather to the decisions made by the workmen.

Links between producer, characteristic raw materials, and production techniques have already been investigated by some scholars.[38] In regards to potters, Rye postulates that forming techniques are more stable and less subject to change when compared to style and shape.[39] It is reasonable to apply the same theory to the craftsmen manufacturing architectural terracotta due to the very similar material choices and production techniques. In a complex process involving many practical steps and different resources craftsmen are less likely to experiment with the procedure once a reliable and proven method has been established. Unless new technical innovations prove considerably advantageous or new styles require changes to the manufacturing process, it is reasonable to presume that a craftsman will continue to employ the methods of manufacture in which he was trained, even when moving to a new location.

In a recent publication Kenfield attempts to link the use of specific production techniques to different ethnic identities. According to him the use of a slip is associated with Italic sites, while the use of an epidermis layer with Greek sites.[40] In general, the presence of a slip layer is well attested in Italic sites, such as Satricum and Murlo.[41] However, it is not exclusively used by Italic cultures as it is also seen on Greek architectural terracottas including roofs from Delphi and Corinth.[42] Such links between ethnic or cultural groups and production techniques can therefore not be substantiated at this point, and in the present study of Akragas no evidence allows for linking architectural terracottas to specific people. But it is worth considering a second theory regarding production techniques, namely the identification of wider regional characteristics. According to Lulof, a particular craftsman or workshop can be recognized by its particular technical characteristics, therefore, the movement of said craftsmen or artists would be reflected in the archaeological record of locations spread over a wider region.[43] Observation of technical characteristics thus has the potential

37 Winter 1993, pp. 304-305.

38 Arnold 2000, p. 113.

39 Rye 1981, p. 5.

40 Kenfield 1997, p. 107.

41 Lulof 1991, p. 132.

42 Roebuck 1990, pp. 47, 56, 61; Winter 1993, pp. 304-305.

43 Lulof 1994, pp. 221-222.

to provide important information on both the movement of craftsmen as well as the distribution of technical innovations. As discussed in section 3.3, the theory that a specific style of production, or technical style, can be used for investigating social boundaries and cultural context was introduced in 1977 by Lechtman.[44] Technical style, as the reflection of a social and cultural context has been further developed by a number of influential scholars including Lemonnier, Ingolt, Schiffer and Skibo and within the study of architectural terracotta has influenced the work of Lulof and Wikander.[45] It essence it is defined as the culmination of all the techniques used and the decisions made by the craftsman during the entire production process. There are two aspects of particular relevance to this study, technical style as a reflection of social boundaries and social organization. The regional dimension is also explored by Lulof and Wikander.

In order to discuss technical styles and boundaries, it is important to first gain an overview of the raw materials and production techniques used in the production of architectural terracottas from other sites in Sicily. Canonical Sicilian sima and geison fragments dated to the beginning and middle of the 6th century from Selinus show the exclusive use of dark grained volcanic temper and a purified slip layer of 2-5 mm thick.[46] The ones from Gela, such as frieze A, also make use of volcanic temper and a thick slip layer of fine, light coloured clay.[47] While a small number make use of grog as a temper, such as an early sima from Himera,[48] but these are in the minority. The anthemion roofs from Selinus (roof 18-20 as identified by Conti) also contain lithic temper, and on roof 20, which is the closest to roof 6 from Akragas in terms of style, is finished with a slip layer of fine yellowish clay between 1-2 mm thick.[49] The fabric of the anthemion roofs from Naxos appear to also make use of dark grained volcanic sand as temper and for the objects associated with series A there is a well-defined epidermis layer as well.[50] Furthermore, on objects from Naxos, which are similar to roof 7, series B-D from Akragas, the painted decoration is applied directly to the fabric surface. The ridge palmettes from Selinus have light and dark coloured lithic inclusions as well as an epidermis layer and show stylistic parallels with ridge palmette 2 from Akragas.[51] The undecorated pan and cover tiles from Selinus associated with the 6th and 5th centuries also contain volcanic inclusions.[52]

Concluding, it appears that the predominant temper used in the wider region is dark grained lithic sand. In terms of surface finish, even earlier canonical Sicilian sima roofs apply a thicker slip layer of purified clay. The majority of objects from Akragas, however, does not correspond to the regional production traditions. The widespread use of grog and non-volcanic temper appears to be a preference which distinguished local production at Akragas. Another characteristic is the absence of a thick slip layer of purified, light coloured clay on the majority of the canonical Sicilian roofs, roof 6 from the anthemion sima phase, and a number of the antefix roofs. Most roof types from Akragas were thus produced in technical style(s) that appears specific to Akragas. This technical style is associated with canonical Sicilian roofs (roof 1, 2, and 4), and anthemion sima roof (roof 6) as well as an antefix roof (roof 8) that date from the middle of the 6th to the beginning of the 5th century BC. One exception is roofs 7, series A-C, which

44 Hegmon 1998, 266; Lechtmann 1977.

45 Arnold 2000, p. 113; Ingold 1988, 1990; Lemonnier 1986, 1992; Lulof 1994, p. 220; van der Leeuw 1993; Nielsen 1995; Schiffer & Skibo 1987, 1997; Sillar & Tite 2000; Wikander 1986, p. 26.

46 Conti 2012, pp. 36, 60.

47 Bernabò Brea 1952, p. 25.

48 Allegro 1976, p. 537, tab. LXXXVI.1 ; Lang 2010, p. 101, HIM 12.

49 Conti 2012, pp. 170-177, 185, 198.

50 Ciurcina 1993, pp. 34-35, fig. 14-16; Pelagatti & Lentini 2011, p. 292, fig. 2-3.

51 Conti 2012, pp. 276-267.

52 Conti 1998, p. 210; Jonasch 2009, p. 4.

resemble the same technical style as stylistically related roofs from Naxos. De Miro hypothesized that the very strong similarities in style and fabric between these objects might indicate that the objects were produced in Naxos itself, which will be considered in detail in section 6.4.[53] While the ridge tile palmettes from 5th century onwards make use of more sophisticated surface finishes, the temper used seems to follow the precedent set by earlier roofs. Objects of a similar style from Selinus and Gela make use of a different temper. It should be noted that many of the decisions made by a producer are subconscious.[54] The existence of a technical style particular to Akragas might therefore not be a deliberate attempt to differentiate local material from the wider region. After all, while there are some minor variations, the decoration and profile of these objects are within the regional stylistic traditions (section 6.2.5). Instead, the existence of a local technical style which is used for both canonical Sicilian and anthemion sima roofs, indicate that there was a sufficient amount of local production taking place over at least two generations for a local style to develop.

As demonstrated in section 4.2 and 5.1.3, the terracotta roofs demonstrate a variety of technical styles which differs from the technical style described above. For example, roof 3 has a defined slip layer and roof 5 makes use of dark lithic temper. Both these roofs are dated to the same time period. The use of different techniques demonstrates that production at Akragas was not homogenous. Even among the different roofs produced in the local technical style there are some variation. The level of skill demonstrated in the painted decoration on objects from roof 1 and roof 6, or the improvements in firing conditions are just some of the examples (section 5.1.3). Lemonnier defines technique as the combination of material, the sequence of actions and knowledge.[55] While Ingolt finds that skill and knowledge are intrinsically linked.[56] The roof terracottas from Akragas is therefore evidence of different materials, production techniques, skill levels and knowledge at play. This is an indication of variation within the producers active in the city. The second aspect related to technical style relevant to this work, as stated above, is that it is a reflection of the organization among participants. This topic will be explored further in section 6.6.

6.3 MATERIAL ANALYSIS

Ridge, pan and cover tiles as well as a selection of other architectural terracotta objects were analysed using archeometric methods in order to determine the material characteristics of these objects. A combination of thin section petrographic analysis, wave-length dispersive X-ray fluorescence (WD-XRF) and handheld X-ray fluorescence (HH-XRF) was applied. The first two methods are destructive, and as such could only be used for objects from the recent S. Anna excavation. As already explained, HH-XRF is not always a successful method for the study of terracotta objects and a number of questions regarding the optimal procedure to obtain quantified data have not yet been resolved in current scholarship (section 3.4). For this reason, a control group was analysed using all three methods, which consists of 15 roof tile samples from S. Anna. Stylistically this control group contains fragments associated with pan tile A, B, and C (4.1.62-64) and cover tile B (4.1.60). Three of the fragments fall out of stylistic groups due to a lack of diagnostic profile elements (VIN 426, 433-434).

The use of a control group allows for the evaluation of methods and results as well as for a more comprehensive understanding of the material composition of objects in general. A single archeometric method is normally limited in the range of information it can provide, which is why most studies of this nature apply multiple

53 De Miro 1965, pp. 68-70.

54 Lemonnier 1986, p. 155.

55 Lemonnier 1986, p. 154.

56 Ingold 2000, p. 300.

methods.[57] In both the petrographic and WD-XRF analysis of the control group, three main material groups are identified. In figure 4.3-6 it is clear that these three groups are composed of the same objects for both the petrographic and WD-XRF analysis, except for VIN 425, which while being placed in petrographic group A, has a similar chemical composition to objects from group B. VIN 425 is from pan tile group A, while the other three objects in petrographic group B are unassigned ridge and cover tile fragments and one object from pan tile group B (VIN 424). Furthermore, by means of the control group it is also possible to determine elements susceptible to local weathering conditions. An evaluation of the variance for each material element, according to the petrographic groups, is given as the relative standard deviation in table 4.3-5. Three elements have a very high variance of which Na_2O_3 and Ba are known to be affected by local weathering conditions.[58] The role of Nb is less well understood and is a less mobile element, but it shows a very high variance, too, that can potentially skew the data. It is probably that the variance is due to the quantification of peak areas which are situated just above the background signal. For this reason, the three elements are excluded from the statistical analysis of the data as their presence and composition are not related to the raw material sources used, but to depositional conditions.

One of the major concerns in the present study questions the results obtained through HH-XRF and their evaluation. As described in section 3.4, the use of this technology is not yet a widely accepted method of analysis for archaeological material. Scholars have raised a number of concerns, the most relevant to this study involves the calibration of spectrum readings into quantified data and the impact of a non-homogenous fabric matrix. As the recent study by Hunt and Speakman clearly demonstrates, the calibration files provided by the manufacturers of HH-XRF instruments are not appropriate for the analysis of archaeological ceramics.[59] It was therefore necessary to create a custom calibration based on the regression line between expected and measured values. The expected values are the known concentrations of elements from certified reference materials (CRM), for this study six clay and ceramic CRM were used. The detected values are the counts per second for CRM as measured with the HH-XRF. The regression equation is an expression of the relationship between the measured and expected values and can thus calculate the quantified concentrations of elements from the HH-XRF data. The accuracy of the custom calibration is expressed by comparing the calibrated values and the WD-XRF values for which the mentioned control group is used and therefore represents an essential and especially important part of the study (table 4.3-10). The majority of elements relevant to the investigation of terracotta objects (CaO, Fe_2O_3, MnO, SiO_2, TiO_2, and Y) show an improvement in the CRM calibrated data compared to the data calibrated according to the manufacturers' mud rock calibration file (GL2). In summary, the custom calibration data are closer to the known concentrations, as well as the data measured by WD-XRF, and also show less variance than the GL2 calibration data. Nevertheless, there are some exceptions. For strontium (Sr) and zirconium (Zr) the calibrated values are significantly lower than the WD-XRF results. One possible explanation for this discrepancy might be material conditions, due to difference in the grain sizes of the ground down samples used for WD-XRF and the coarse grains in the terracotta fabric measured by the HH-XRF. Unfortunately, the exact impact of the matrix effect on the HH-XRF data for non-homogenous material is not yet well investigated. While the exact reason for the discrepancy is not known, the measurements for these two elements

57 Aquilia et al. 2015; Barone et al. 2005; Barone et al. 2011; Belfiore et al. 2010.

58 Barone et al. 2005, p. 754.

59 Hunt & Speakman 2015.

are problematic and therefore excluded from the statistical analysis of the HH-XRF data.

In conclusion, the concentrations of a selected group of elements as obtained by custom calibration of HH-XRF data show a correspondence to the concentration and variance of the WD-XRF measurements for the same group of objects. As it is expected, the discrepancy between the HH-XRF and WD-XRF data, even with custom calibration, is still fairly high. The use of HH-XRF for in-situ analysis of terracotta objects, while appropriate for a limited application, does not produce reliable quantified data sufficient for provenance testing. It is thus applied in isolation and not directly comparable to quantified data obtained through other methods. Any conclusions derived from the HH-XRF data are preliminary unless it can be corroborated through other means as well. For example, the analysis of HH-XRF data shows that the architectural terracottas from the city of Akragas, dated to the 6th century BC (frieze A, G, and F), are clearly separated from the control group of mostly 5th century material from S. Anna (figure 5-1.2). They have a higher value of zinc and a lower concentration of silicon dioxide (SiO_2) compared to the control group. This separation is confirmed by the WD-XRF data which show that the architectural terracottas from the 6th century (frieze B3) are clearly separated from the 5th century pan tiles (pan tile A, B, C in figure 5-2.1) by high concentration of Zn and a low one of SiO_2, which indicates a lower quartz, or sand, content. The difference in material used for the manufacture of 6th century architectural terracotta and 5th century roof tiles is therefore substantiated by both the WD-XRF and HH-XRF data.

The petrographic, WD-XRF and HH-XRF data demonstrate that the roof terracottas from Akragas vary in the mineralogical and chemical composition of the material. This raises the question of provenance and technology. A difference in chemical composition might indicate the use of different, but local, clay sources or mixtures. However, it can also signify the presence of objects manufactured in a different location and moved to the city. A large body of published data on the chemical composition of Greek ceramic and terracotta objects from Sicily is taken into account in order to explore the question of provenance (section 4.3.4) and the principle components for objects known to come from Greek sites in Sicily are analysed (figure 4.3-13,14). This principle component analysis shows that the chemical composition of the roof tiles of the control group show some similarity with published roof tiles thought to have been manufactured in Akragas (figure 4.3-14). These objects are distinguishable from material from other Sicilian cities like Gela, Leontini, Syracuse, Messina, and the Alcantara river valley, which incorporates objects from Naxos, Taormina, and Francavilla (figure 4.3-12). The Akragas examples contain much higher concentrations of CaO, and Cr and low concentrations of K_2O, and MnO. The published data for objects from Akragas provide some indication in support of local production for the S. Anna material. This includes the undecorated pan, cover and ridge tiles as well as the architectural terracottas associated with roof 4.

The selected object collection from the urban area of Akragas was measured with HH-XRF, and is therefore not directly comparable with the published provenance data. But there are some indications to support the local production of the majority of material. As the HH-XRF data show a high degree of overlap for the chemical composition of architectural terracottas associated with roof 1 and 6 (figure 5.2-3) and these objects are similar in chemical terms to the locally produced fragments from roof 4, it seems more than probable to see here in general products of local manufacture. As discussed in section 5.2.2, the anthemion roof 7 from Akragas is strongly related to Naxos in terms of style and technology. This connection is so evident that the suggestion arose the objects

might have been produced in Naxos itself.[60] The HH-XRF data, however, demonstrates clearly that the fragments from roof 7, series A and C have a similar chemical composition to that of locally produced roof 1 and 6. The only exception is roof 7, series B, which is characterized by a higher level of CaO and lower concentrations of MnO, K_2O, TiO_2, Fe_2O_3, and Rb (figure 5-2). But still, this does not prove the attribution of roof 7, series B to a production area in the Alcantara river valley, which includes Naxos. As shown in figure 4.3-12, objects from this location are characterized by higher levels of SiO_2, K_2O, and MnO and lower levels of CaO, Sr, Zr, and Cr. In contrast, objects from roof 7, series B have higher level of CaO and lower concentrations of MnO and K_2O. Roof 7, series B compared to the objects of the area of Naxos. Based on the CaO, MnO and K_2O values in relation to the S. Anna as well as the Alcantara river valley objects, roof 7, series B differs and does definitely not have the same chemical composition as that of objects manufactured in Naxos. Despite stylistical and technical similarities the attribution of objects from the anthemion roofs from Akragas, and roof 7, series B in particular, to a production site at Naxos can be excluded; nevertheless, the question of their provenance remains partly unclear.

6.4 ARCHITECTURAL CONTEXT

The architectural terracotta roofs of the 6th and 5th century BC constitute an intricate system of interconnected parts. The various roof elements, such as the geison revetment, sima, ridge, and pan tiles, have complex profiles that are designed with overlapping joins that provide stability and protection against water seepage (section 5.3.4). The interlocking roof system also helps to keep individual elements in position with a minimum amount of nails (section 5.3.1). While the profile and position of most of the roof elements can be reconstructed based on the evidence from Akragas and from the wider region, some parts (e.g. the raking sima and horse rider acroteria) are more problematic. The archaeological and architectural remains suggest that roof 2, and possibly roof 1 as well, were in use for an extended period of time, maybe as much as a century or more (section 5.3.2). The long life span of at least some of the roofs is indicative of the quality of production and construction of these roofs.

By analysing the architectural context of the roof terracotta objects it becomes apparent that a fairly high level of specialized knowledge is required for the manufacture of the single parts of a complex structure. The various steps of production demand a clear understanding of how these objects will function later on as parts of a roof. The complex interlocking joins, the size of the elements, the painted construction marks, and the nail holes are all formed before the objects are fired and placed at the construction site. A number of the technical solutions employed at Akragas are already known elsewhere in Sicily. For example, stepped edges on the sides of canonical Sicilian sima pieces from Selinus which are dated to the beginning of the second quarter of the 6th century.[61] The method of fastening the terracotta roofs with nails fixed through pre-made holes also predates the first terracotta roofs from Akragas. It is seen in roof 3 from Selinus, dated to the middle of the first half of the 6th century.[62] And the use of painted construction marks on the back of canonical Sicilian sima pieces are documented for objects from Syracuse,[63] Gela,[64] and Selinus[65] (section 4.4.1). As a whole, the technical solutions described in section 4.4 and 5.3 are in widespread use in Sicily during the 6th and 5th century BC, and not particular to Akragas. It is important to note that, overall, these types of architectural techniques and

60 De Miro 1965, pp. 68-70.

61 Conti 2012, p. 63, fig.36.

62 Conti 2012, p. 63, fig. 20.

63 Ciurcina 1997, p. 36.

64 Bernabò Brea 1952, p. 56, fig. 43.

65 Conti 2012, pp. 197-198, fig. 181-3.

methods are not visible to the casual observer of a finished roof. Quite the contrary, knowledge of the architectural aspects of the roofs as well as the sequence of production and construction can only be gained through exposure to the entire manufacturing and construction process. The distribution of technical knowledge in Sicily will be further discussed in section 6.7.

Architectural terracottas are an integral part of the architecture of monumental buildings during the Archaic period. As such they provide additional information about the built environment of sanctuaries at Akragas. The largest of the terracotta simas studied is roof 2, measuring just above 400 mm high. Compared to canonical Sicilian simas from other locations in Sicily this is fairly modest. The early 6th century peristyle temple of Apollo at Syracuse measure 21.5 by 55.4 m and has a sima of 650 mm high.[66] Roof 3 from Selinus, dated to the middle of the first half of the 6th century BC, has a lateral sima which is 660 mm high.[67] From the second half of the 6th century, temple C from Selinus also has a peristyle and measures 23.9 by 63.8 m. An anthemion sima of between 460 and 490 mm high is associated with temple C.[68] The building remains associated with the canonical Sicilian roofs at Akragas are comparably smaller in their overall dimensions. These include the 6 x 12 m naiskos inside the foundations of temple G and the 7 x 14m naiskos to the South-East of temple B (section 5.3.2). Buildings dated to the second half of the 6th century are slightly larger, the naiskos to the East of gate V is over 15m long and the rectangular structure in the gardens of the Villa Aurea is around 30m in length (section 1.2). The first buildings which can compare to the temples at Selinus and Syracuse in size only appear at the beginning of the 5th century. While there is a debate about the start of construction on temple B, it seems likely to date before the battle of Himera, and the first peristyle temple (temple A) was also constructed at this time (section 1.2). Based on the size of both the terracotta roofs and building remains, it is therefore apparent that the monumental buildings at Akragas from the middle to the end of the 6th century were fairly modest in size compared to other cities in the region such as Syracuse and Selinus. The lack of monumental construction in the period of the founding of the city to the middle of the 6th century is attributed by De Miro and Mertens to lower economic prospects.[69] Based on the evidence discussed above, it appears that the period from the middle to the end of the 6th century saw economic improvements, but that the city was not yet the economic power it became at the beginning of the 5th century.

Revising the available information it is possible to reconstruct at least five roofs that can be placed in the first generation of decorated terracotta roofs (section 6.5). Isolated fragments point to the possible presence of more roofs dated to this period (e.g. antefix F and I), but these objects are too small to conclusively identify a specific roof. As seen in section 1.2 there are only three monumental buildings which are excavated and assigned to this period. These are the naiskos inside the foundations of temple G, the naiskos to the East of gate V, and the naiskos to the South-East of temple B. Subsequently, during the last quarter of the 6th century, between four and six roofs can be placed to the second generation. Again, the number of monumental buildings during this period is just three, the tempietto 1 in the urban sanctuary, the building at S. Anna, and the building in the gardens of the Villa Aurea. Therefore, during the second half of the 6th century the number of known roofs is almost double that of recorded monumental structures. It is possible that at least some of the

66 Mertens 2006, pp. 104-109; Wikander 1986, p. 47, fig. 13.

67 Conti 2012, p. 66; Wikander 1986, p. 40, fig. 11.

68 Mertens 2006, pp.118-125; Conti 2012, pp. 139-184.

69 Adornato 2012, pp. 485-486; De Miro 1992, p. 154; Mertens 2006, p. 194.

second generation roofs are replacements for earlier roofs, and it should also be mentioned that antefix roofs could have been used for buildings of a lesser stature.[70] But based on the number of identified terracotta roofs from both the first and second generation compared to the known building structures from the same period it is apparent that a number buildings dated to the period under investigation have not yet been discovered and identified. The architectural remains from the 6th century are not well preserved. Building activity during subsequent periods, starting with extensive activity during the Classical period had a significant impact. There are also areas within the urban sanctuaries that are inaccessible due to modern structures including the villa Aurea and a road. The architectural terracottas are therefore an important source of information regarding the sanctuary areas from this period.

6.5 CHRONOLOGY

As discussed in chapter 3, roof terracottas are dated primarily on stylistic considerations. In isolated cases it is possible to associate a roof with specific building remains, which can provide additional dating but in the case of the early naiskoi of Akragas, the building remains are actually dated according to the associated roof terracotta. Stylistically roofs 1-5 fall all within the same period, namely 570-530 BC. Their dating corresponds with the date of construction of the first sacred buildings in stone at Akragas (section 1.2) and, therefore, form chronologically the first generation of terracotta roofs from Akragas. This group might also include at least one antefix roof (antefix type 1), although it appears to be dated slightly later. The second generation of terracotta roofs is dated to the last third of the 6th century. These roofs include the anthemion style roofs 6-7 and some antefix roofs with gorgoneion antefixes (roof 8, antefix type 2, 3, and 5).

It is thought that the end of the Archaic period lead to the proliferation of monumental buildings with sima and geison elements in stone. This period is thus seen by some scholars as the end of decorated architectural terracotta roofs.[71] The evidence from Akragas, however, does not support the theory. While it is true that roofs with a decorated terracotta sima are no longer produced during the first half of the 5th century, there are still a number of roofs with ridge palmettes in terracotta (ridge palmette type 2 and 3). It is also possible that the antefix type 7 can be dated to this period. These examples represent the third generation of decorated terracotta roofs at Akragas. The very last generation of roofs includes ridge palmette type 4 and antefix type 6 dated to the second half of the 5th century, or even later. The large number of plain roof tiles from S. Anna dated to the 5th and 4th centuries BC (pan tile A and B) indicate that while decorated terracotta roofs might no longer have been a regular feature, undecorated roof tiles continue to be in widespread use.

6.6 PRODUCTION OF TERRACOTTA ROOFS AT AKRAGAS

Within the discussion on stylistic influences (section 6.1), production techniques (section 6.2) and architectural solutions (section 6.4) it has become apparent that the roof terracotta from Akragas follow well established regional traditions. The manner in which knowledge of these regional traditions were gained and then applied to production at Akragas warrants further consideration. Within the study of architectural terracottas the discussion has most often centred on the role of traveling workshops. The presence of itinerant workshops consisting of master craftsmen is attested in a number of locations including Latium and Campania as well as in

70 De Miro 1965, p. 73; Lulof 2007, p. 41; Mertens-Horn 1997, pp. 244-245; Strazzulla 1997, p. 707; Winter 1993, p. 279.

71 Strazzulla 1997, p. 708.

literary sources.[72] In Sicily, Kenfield hypothesizes the existence of a workshop which is active at Morgantina and Megara Hyblaia and possible even further afield at cities including Syracuse and Gela in the beginning of the 5th century.[73] However, Wikander argues that the quantity of architectural terracotta which is produced in Sicily during the archaic period is beyond the capacity of traveling workshops. She proposes that the quick and widespread distribution of a standard style is the results of interchange between the workshops of various locations.[74] In order to establish the presence of traveling workshops in Sicily it would be necessary to compare not only the decoration and profile of objects from different locations, but also the fabric, production techniques and architectural solutions. The exchange of objects between different locations, on the other hand, can only be confirmed through archaeomtric analysis. Such endeavours fall outside the scope of the present study. However, by redirecting the inquiry to the knowledge required to produce these objects at Akragas, it is possible to advance the debate on how new innovations in architectural terracottas were distributed.

The theoretical framework for the study of invention and the distribution of new innovations were significantly influenced by the work of Everett Rogers first published in 1962.[75] While this work is focussed on technology within a modern context, some of the theoretical principles have been applied within the archaeology of earlier periods.[76] According to these studies, the process of invention is divided into three stages; the initial discovery which is then followed by invention, or the application of the discovery, and lastly innovation, which is the diffusion of the invention. According to Rogers diffusion "is the process by which an innovation is communicated through certain channels over time among the members of a social system."[77] The diffusion of new innovations is dependent on persons, with those who play an active role in communicating with and persuading others called agents of change. Different persons also react with varying degrees of receptiveness or resistance during this process. A slightly different approach to the distribution on new innovation focusses on the process by which new production techniques are learned. Termed 'technological transfer', it makes a distinction between direct or indirect transfer and the possibility for reinterpretation or adaptation (section 3.3).[78]

The roof terracotta from Akragas demonstrate a thorough knowledge of the style and architectural solutions employed on a regional scale. The profiles of both decorated and undecorated objects follow regional precedents and demonstrate a clear understanding of how the various components of the roof are fitted together. Examples include the use of stepped joins and the presence of inscribed or painted construction marks on a number of roofs. A number of features necessary for construction, e.g. nail holes and construction marks, are made before the objects are fired. This indicates knowledge of not only the form of objects, but of the production and construction process (section 6.4). The person or persons who transferred the technical knowledge required for producing roof terracotta at Akragas therefore had direct contact with producers in other locations within Sicily and likely were directly involved in the production of roof terracotta at these locations. According to the diffusion of innovation theory, these persons would be described as agents of change. It should be noted that an agent of change can be a single

72 Knoop 1987; Knoop 1997, p. 51; Lulof 1991, p. 115, note 91; Lulof 1994, pp. 221-222; Lulof 1996, pp. 175-182.

73 Kenfield 1997, p. 109.

74 Wikander 1986, 29.

75 *Diffusion of Innovation* is now in its third edition (Rogers 1983); Shortland 2004, p. 5.

76 Shortland 2004.

77 Rogers 1983, p. 5.

78 Knappett & Kiriatzi, 2016, p. 8; Ownby, Giomi & Williams 2017, pp. 617, 623.

craftsmen and does not necessarily denote an entire traveling workshop. Agents of change are active not only during the first generation of roof terracottas at Akragas. The curved inner join on the geison of roof 6, and the epidermis layer on roof 7, series A demonstrate technical knowledge gained through involvement with production at both Selinus and Naxos.

By considering stylistic influences is possible to gain a better understanding of the locations where these agents of change gained the technical knowledge described above. The style and architectural solutions for roof 1, 2, and 4 from the canonical Sicilian sima roof type are not limited to a single colony for precedent, but instead make use of a combination of decorative schemas and technical features that are applied in many colonies including Selinus, Gela, Syracuse, and Naxos. It appears that this situation change over time. The second generation of roofs at Akragas, the anthemion sima roofs, shows stronger stylistic connections to only two specific locations, namely Selinus for roof 6 and Naxos for roof 7, series A-C. During the Classical period there is much greater standardization of forms and production techniques. The fact that the acroteria palmettes from Akragas have strong stylistic parallels with ones from both Selinus and Gela can therefore not be taken as an indication of knowledge transfer from these cities (section 6.1).

There is evidence for local adaptation within the decoration and profile of objects (section 6.1). From the middle of the 6th century to the Classical period there is a gradual decrease in the stylistic adaptation. This corresponds to a wider process of consolidation and standardization seen within Greek architecture. While the Archaic period was characterized by fluidity in the perception of identity and Greek culture, the beginning of the Classical period saw an increased awareness of a common Greek identity (section 1.1). The local adaptation of production processes and fabric, as exemplified by the local technical style identified in section 6.2, appears to correspond to different social influences than stylistic ones. It is possible that the absence of a separate finishing layer on roofs from the canonical Sicilian sima and the Anthemion sima types were influenced by economic considerations. By eliminating a finishing layer the production process is simplified which have time and cost benefits. As already discussed in section 6.4, the city did not have the same economic means as other Sicilian cities, as evidenced by the monumental architecture of the sanctuaries. The use of grog and non-volcanic temper is used for objects from both the Archaic and Classical periods. It is not clear if this is the due to availability, economic constraints or technical considerations. The use of dark grained lithic temper for objects from different time periods (e.g. roof 5 and roof 7) indicates that this temper type was available to producers at Akragas. The use of a different temper for the majority of roof terracotta from Akragas therefore appears to be based on local preference and the fact that it is used through different generations of roofs point to continuity in local production practises.

According to Lemonnier it is possible to study social organization through the investigation of technical style. He specifically considers the organization of specific groups while performing specific production processes.[79] Based on the evidence already discussed a number of observations in regards to the organization of roof terracotta producers at Akragas can now be made. In each generation of roofs at Akragas there is a mixture of different stylistic influences and technical styles. The differences in the profile, decoration and production techniques between roof 3, roof 5, and roof 1 and 2, during the middle of the 6th century, shows variation in the technical knowledge and choices made by producers. This is also seen during the last third of the 6th century with the differences in stylistic influence and

79 Lemonnier 1986, 147.

technical styles between roof 6 and roof 7. This indicates the presence of craftsmen who possess knowledge of different regional precedents and who have different preferences for material and production techniques. It is not clear if this translate to different workshops, or just different master craftsmen working in the same workshop. But it appears that some were more prolific than others. The distinctive technical style described in section 6.2 is present in a number of different roofs from different time periods, while the technical style which characterizes the production of roof 7 seems to be used only for this roof. There is also evidence for differences in skill levels (section 6.2). This indicates that not all the persons involved with the production of roof 1 had the extensive prior experience in the production of roof terracotta, especially during the first generation of production.

The discussion above reveal nuances within the production of terracotta roofs at Akragas which is not represented in previous debates on workshops. The evidence demonstrate a high level of mobility of craftsmen between different production centres in Sicily, while at the same time there is continuity in local production methods through different generations of roofs. The preliminary archaeometric results also suggest the presence of local production through different periods. The diffusion of technical knowledge is facilitated by craftsmen who gain experience in production at different locations within Sicily and then introducing this knowledge to craftsmen in Akragas. The inexperience demonstrated by the painted decoration of roof 1 is indicative of this learning process. There is evidence that this process is not one directional, but that local conditions and experience also influences the production process. Roof 6 is a good example. While the style of decoration and the profile indicate a direct transfer of technical knowledge from Selinus, the roof is produced in the local technical style.

In conclusion, the characteristics and complexities of architectural terracotta production at Akragas are revealed in the systematic analysis of various aspects including style, production techniques, and architectural solutions of the Archaic and Classical period. The transfer and adaptation of knowledge are illustrated by a number of examples drawn from the colonies of Gela, Selinus, Naxos, Syracuse, to name but a few. The influence of local production traditions is evident in terms of a 'technical style' particular to Akragas. The concluding discussion on all characteristics of architectural terracottas from Akragas is facilitated by the revised typology proposed by this thesis, and both will contribute to the architectural understanding of terracotta roof elements as well as to the overall study of Sicilian architectural terracottas.