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SPATIAL ANALYSIS OF THE MESOLITHIC LEVELS

Anthony E. Martinez

INTRODUCTION

Abri du Pape is a rockshelter located at the base of the 100 meter Freyr cliff on the north bank of the Meuse River. Discovered by Philippe Lacroix in 1988, this site was excavated by the Université de Liège from 1989 to 1990. Excavations revealed a long series of periodic occupations ranging from the late Mesolithic through the Middle Ages.

Continued excavations by the University of New Mexico (UNM) and the Université de Liège (ULg) South Belgium Paleolithic Project during 1993 and 1994 revealed additional Mesolithic deposits dated by radiocarbon between 8,817 ± 85 BP and 7,843 ± 85 BP.

These Holocene occupations are associated with the remains of boar, roe and red deer, fox, otter, and a variety of fish remains. As no large carnivore remains are present, it is inferred that at least the macro-faunal remains present are the product of human hunting.

Chipped-stone implements characteristic of those found in the Mesolithic of the Ardennes region were recovered from these recent excavations and include simple scrapers, a few bladelets, triangles, microblade cores and many flakes. The high incidence of non-cortical materials and microdebitage suggests *in situ* tertiary knapping and tool maintenance, with only secondary and tertiary lithic reduction and resharpening activities occurring at this site.

The geomorphology of Abri du Pape presents many challenges. First, sediments at this site largely consist of loose, open-work cyroclastic spall. During excavation, it was observed that materials had a tendency to "drift" quickly into the matrix. As a result, piece-plotting of artifacts was difficult.

From the standpoint of the analysis of site structure, the nature of the deposit would seem to suggest that artifacts might be expected to have "wandered" up and down stratigraphically and that only a low degree of site integrity might be present. This chapter investigates what we can learn about the site integrity of Abri du Pape based upon an analysis of the spatial structure of this site. By extension, this chapter also explores what we can learn from less than ideal research contexts – namely a small site with potential geological re-working and stratigraphic mixing. Questions to be addressed by the proposed research include:

- What information can be learned about the human usage of the site based upon the relatively small area excavated (ca. fourteen square meters).

- The sediments at Abri du Pape are loose, open-work and cyroclastic, and contain large percentages of *éboulis* (spall) in the matrix. As a result, archaeological materials may have "drifted" in vertical space throughout the stratigraphic matrix. Given this, can any claims be made regarding the site integrity of Abri du Pape?

MATERIALS AND METHODS

Data collection and database construction

Field provenience data used in this study are of two types. Artifacts and teeth ≥ one centimeter and bones ≥ five centimeters in length were plotted in three dimensions relative to Cartesian space, while smaller finds were collected by arbitrary 5-8 centimeter levels (spits) and 50 x 50 centimeter sub-squares. Stratum, square meter excavation square, quarter-meter sub-square, and spit (vertical excavation unit) were recorded for all artifacts. For those few elongated items that were piece-plotted, orientation relative to magnetic North and inclination of primary (and sometimes secondary) axes relative to the horizontal plane were also recorded.

Following construction of a database containing field provenience and laboratory analysis information, data were re-coded into new variables using several criteria. First, lithic raw material types were collapsed into a new dataset containing probable source and material information was condensed into the following classes:

flints and cherts
phtanite
limestone
sandstone and siltstone
all other stones

Next, due to small sample sizes for some categories, a similar process was used to lump debris categories into the following major classes:

all microdebitage (≤ 1 centimeter)
non-cortical angular debris
cortical angular debris
non-cortical flakes
cortical flakes
non-cortical blades
cortical blades
bladelets
cores and platform renewal flakes
retouched tools

In order to utilize the full potential of the Abri du Pape dataset, non-piece-plotted artifacts were tested against a grid re-plot function. This function evaluates the relative departure of a given artifact's Cartesian coordinates relative to the scale of collection in horizontal and vertical dimensions against the size of the excavation or artifact scatter through comparison of spatial autocorrelation values across the entire site. Through this method, approximate Cartesian artifact locations may be interpolated from grid-collected data resulting in greater flexibility in data visualization and analysis (Martínez, in press). Thus, it should be noted that all maps present in this study represent a combination of data piece-plotted in the field and grid data collected to the nearest ½ meter to produce a uniform, comprehensive dataset that approximates the location of all finds within about a 10 centimeter horizontal and 5 centimeter vertical area.

RESULTS

Faunal distributions

For Stratum 20, two primary areas are indicated within faunal remains are distributed (Figure 1). These areas include the northwest corner of the excavated (squares K-L20) and the area immediately beneath the dripline (squares O20 and O21). As few teeth were found in stratum 20, no clear patterning is present that might differentiate bone and tooth distributions on the potential basis of preservation factors. It should be noted that the "blank" area in K20 is the result of its corresponding to a test pit dug by Lacroix in 1989-90.

Unlike stratum 20, the majority of faunal remains in stratum 21 (Figure 2) are found towards the rear of the shelter (squares L20 and K19-21). Furthermore, the overall frequency of faunal remains is noticeably lower in stratum 21. Again, there is no clear present that might differentiate between bone and tooth distributions.

The faunal distribution in stratum 22 (Figure 3) is quite similar to that found in stratum 20, with the northwest corner of the excavated area (squares K-L/20-21) and immediately beneath the dripline (squares O20 and O21) being the primary areas where faunal remains were located. Unlike stratum 20, however, significant numbers of bones extend toward the rear of the shelter into J19. Again, few teeth were found in stratum 22, and no clear patterning is present to differentiate between bone and tooth distributions.

Despite the limited excavation area, distinct concentrations of faunal remains are present at Abri du Pape. While interstrata variations in the density and distribution of faunal remains are evident, a general trend is also present. In each stratum, concentrations of faunal remains can be found towards the cave rear. In stratum 20 and stratum 22, an additional cluster of bones is also present beneath the shelter dripline. This suggests that food processing and/or consumption was occurring in the same locations within the shelter through time. Furthermore, these activities apparently took place in the same locations at different times, despite the fact that strata 20-21 and strata 22 contained rather different occupation surfaces. Excavations data suggests that strata 20 and 21 were fairly level, with a moderate-grade talus sloping away from the cave rear (Straus, this volume). Stratum 22, however, contained a

fairly steep slope descending away from the cave rear down towards the Meuse. On the one hand, this is consistent with reuse of the shelter intermittently through a period by the same group of individuals and their descendants at a favorable campsite over an extended period of time. Perhaps this would be akin to a family picnic at a park, where a favorite tree is picked for the mealtime gathering through the generations. On the other hand, a more likely functional interpretation would posit that these areas were simply the best places to prepare and eat food based upon an established overhang and lateral scree cones, given periods of solar exposure and/or inclement weather. In either case, Abri du Pape saw the processing and consumption of food in roughly the same locations within the shelter through a period of roughly a thousand years.

Flaked-stone distributions

The flaked-stone distribution in stratum 20 is complex. A very high concentration of bladelets and non-cortical blades is present midway between the shelter rear and shelter dripline in squares L-N/21 (Figure 4). Interestingly, this same pattern mirrored in the core and microdebitage assemblage (Figure 5) and in general by non-cortical debitage and debris (Figure 6). By contrast, general cortical flakes and debris are best characterized by a lack of clustering in any particular part of the excavated shelter (Figures 7 and 8). Retouched tools in stratum 20 are largely concentrated toward the front of the shelter and are essentially the mirror of the cortical blade assemblage (Figure 9).

The overall sample size of the flaked-stone assemblage in stratum 21 is much lower, but a general trend does seem to be present. Blades and bladelets (Figure 10) appear to be concentrated in two areas, with midway across the excavated shelter (squares M-N/20-21) and shelter rear (squares K/19-21 and L21) being the primary distribution areas. This pattern is mirrored in the distribution of microdebitage (Figure 11). As in stratum 20, cortical flakes are noticeably random in their distribution (Figures 12 and 13). Only five retouched tools (Figure 15) are present in stratum 21, with the locations of them matching the two primary concentrations of other flaked stone in this level (Figure 12).

The flaked-stone distribution in stratum 22 stands out from the other Mesolithic levels at Abri du Pape in that the distribution of all materials --- blades, flakes, microdebitage, and retouched tools --- appears essentially to be the same, trending diagonally from the shelter rear in J19 to the shelter dripline in N21 (Figures 16-21).

Burned artifacts

As many of the faunal remains and flaked-stone exhibited signs of burning, such as calcination, potlids, discoloration and heat fractures or crazing, plots of thermally altered materials were also inspected.

Strong clustering of burned materials is seen in stratum 20 (Figure 22), where burned bone is tightly concentrated toward the shelter rear in K21 and burned lithics are clustered in the shelter midway between the rear and dripline (squares L20-21/M21). Also noteworthy in stratum 20 is the co-occurrence of fire-cracked rock with burned flaked-stone.

By contrast with both stratum 20 and stratum 22, stratum 21 contains relatively few burned artifacts (Figure 23). Those present however, are largely spatially separated in the excavated portion of the shelter by artifact class. All burned cobbles in stratum 21 are located towards the rear of the shelter in J19. Virtually all the flaked-stone is located in the middle of the shelter in L21 and nearly all the burned bone was found either midway between the front and rear of the shelter in L21 or in the shelter rear in K19.

Stratum 22 exhibits strong clustering of burned materials. Bone in this level is concentrated in two primary areas, the front of the shelter beneath the dripline (O21-21) and diagonally across the shelter rear (L21-J19). Interestingly, this diagonal pattern is mirrored by the lithic distribution with respect to the shelter rear but not the front of the shelter, i.e., few burned lithics are found beneath the dripline (Figure 24). Also of note in stratum 22 is the concentration of burned cobbles midway between the dripline and shelter rear (M20-21/L21).

DISCUSSION

Despite the fact that Abri du Pape is a small shelter with a limited excavation area and an open-work cryoclasitc sedimentary in-filling, distinct patterns are present within the site that shed some light on the activities of Mesolithic occupants. While reoccupation of the site clearly resulted in use of areas of the shelter in similar ways through time, differences are present that suggests some variation in the use of space.

The strongest spatial patterns present in the Mesolithic levels excavated at Abri du Pape are in stratum 20. Bone is clearly separated in this level from flaked-stone and is distributed in the shelter rear and along the shelter talus. In contrast, blades and bladelets as well as cores and microdebitage are found in the middle of the shelter before the talus begins to drop off. This suggests the presence of remnant activity areas within stratum 20, with food processing and discard taking place along possible hearths in the shelter rear and along the talus, while tool maintenance and manufacture activities were done midway between the rear of the shelter and the talus. Furthermore, the strong distinctions present between burned and unburned artifacts, as well as the artifact classes themselves is consistent with a hypothesis of a high degree of site integrity being present within stratum 20.

In contrast, stratum 21 exhibits a much smaller degree of spatial separation of artifact classes, with the exception of the distribution of burned materials in the shelter rear as well a slight differentiation of bladelets and microdebitage between the shelter rear and shelter talus. Burned items in stratum 21 are clearly clustered, however the sample size present suggests that these items may be result of trampling of earlier occupation surfaces within the shelter. Based upon this, inferences about either site integrity or human behavior are difficult to draw from the lack of any clear activity areas.

Stratum 22 also stands apart from the later Mesolithic levels at Abri du Pape in that all artifact classes have essentially the same artifact distribution --- trending diagonally from the talus to the shelter rear parallel to the shelter rock face itself. On the one hand, this might suggest some artifact mixing and a possible lack of geomorphological integrity. On the other hand, however, burned artifacts are clearly clustered in the level based upon find type.

Multiple remnant surfaces are indicated by this distinction. It is posited that this contradiction is consistent with an hypothesis of a palimpsest being present within stratum 22, where tool maintenance activities took place in the shelter rear, while processing and discard of bone was done in the rear of the shelter and along the talus. The separation of burned cobbles from other materials in this level is also curious, and may represent the use of these items in the context of food preparation.

In summary, stratum 20 appears to be highly intact and contains clearly distinct activity areas representing food processing and discard, as well as lithic artifact maintainance and reduction areas. Stratum 21 is less clear, with the analysis done here shedding little light on either the integrity or the human activities performed within this Mesolithic level. Stratum 22 contains little differentiation in the distribution of any general artifact classes, except those that are burned.

Most importantly, however, the analysis of site structure at Abri du Pape demonstrates that a surprisingly high degree of site integrity IS present. The continued presence of clear artifact clusters and activity areas indicates that even highly cyroclastic sites such as this may yield important information about human behavior in the past.

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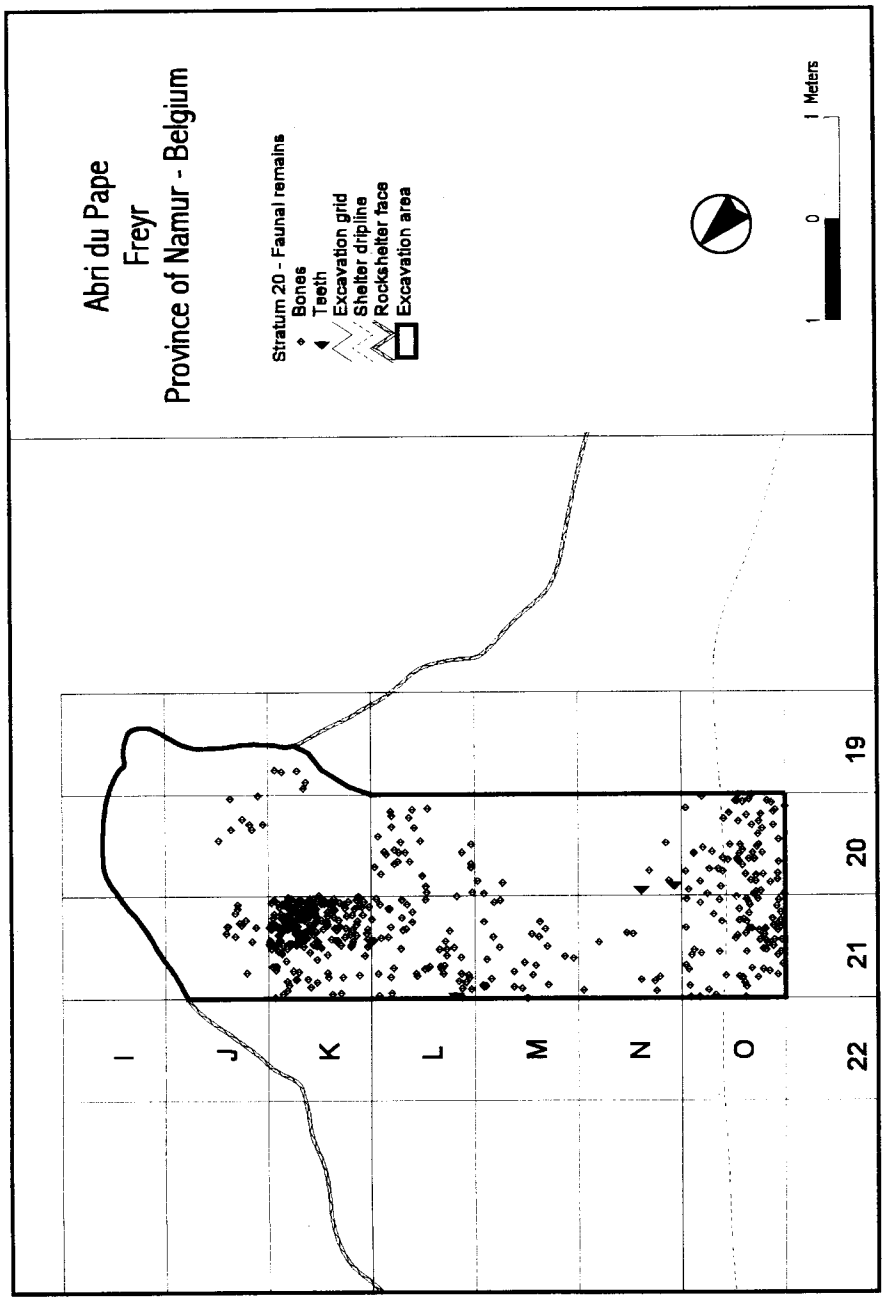
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Stratum 20 - Faunal remains
Bones
Teeth
Excavation grid
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Rockshelter face
Excavation area
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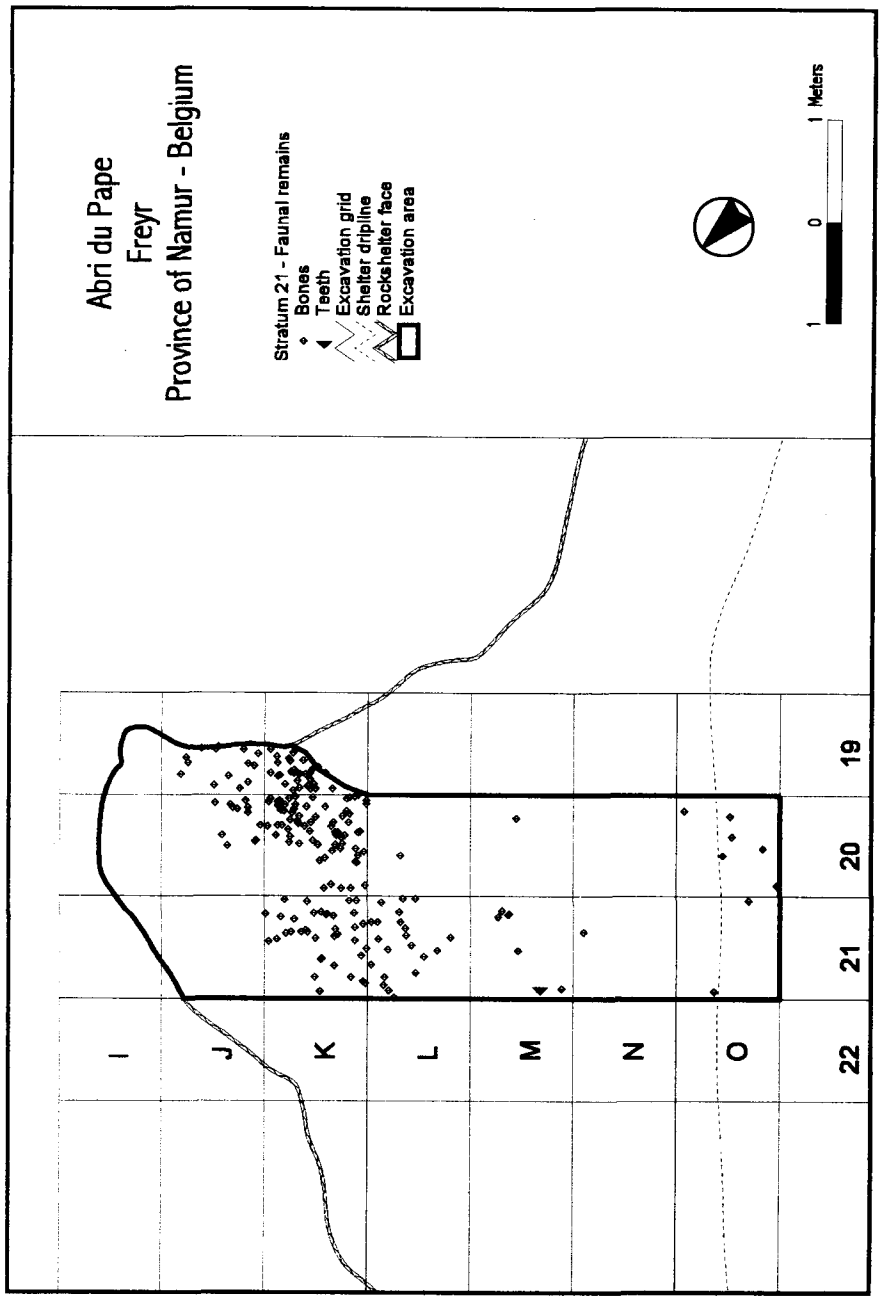
Figure 1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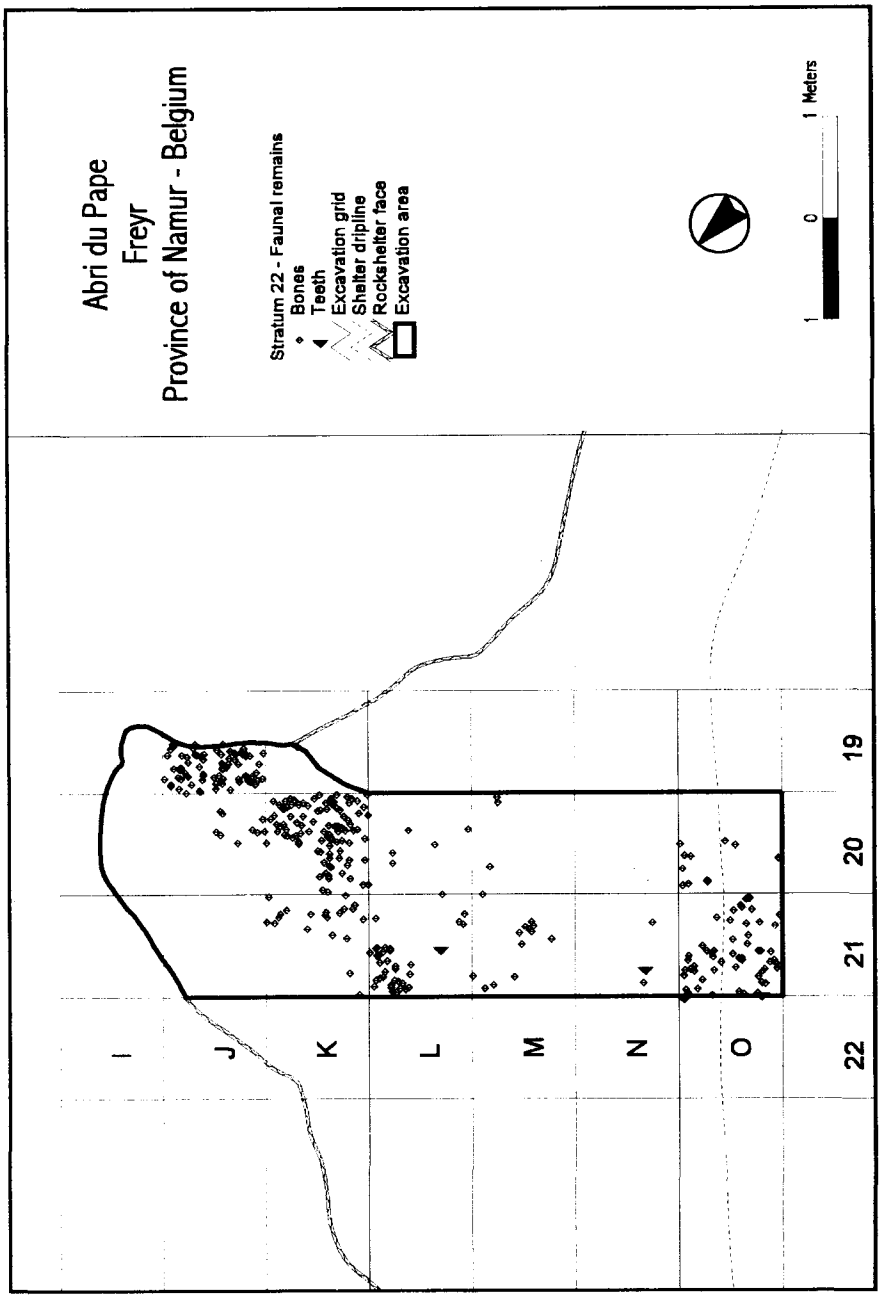
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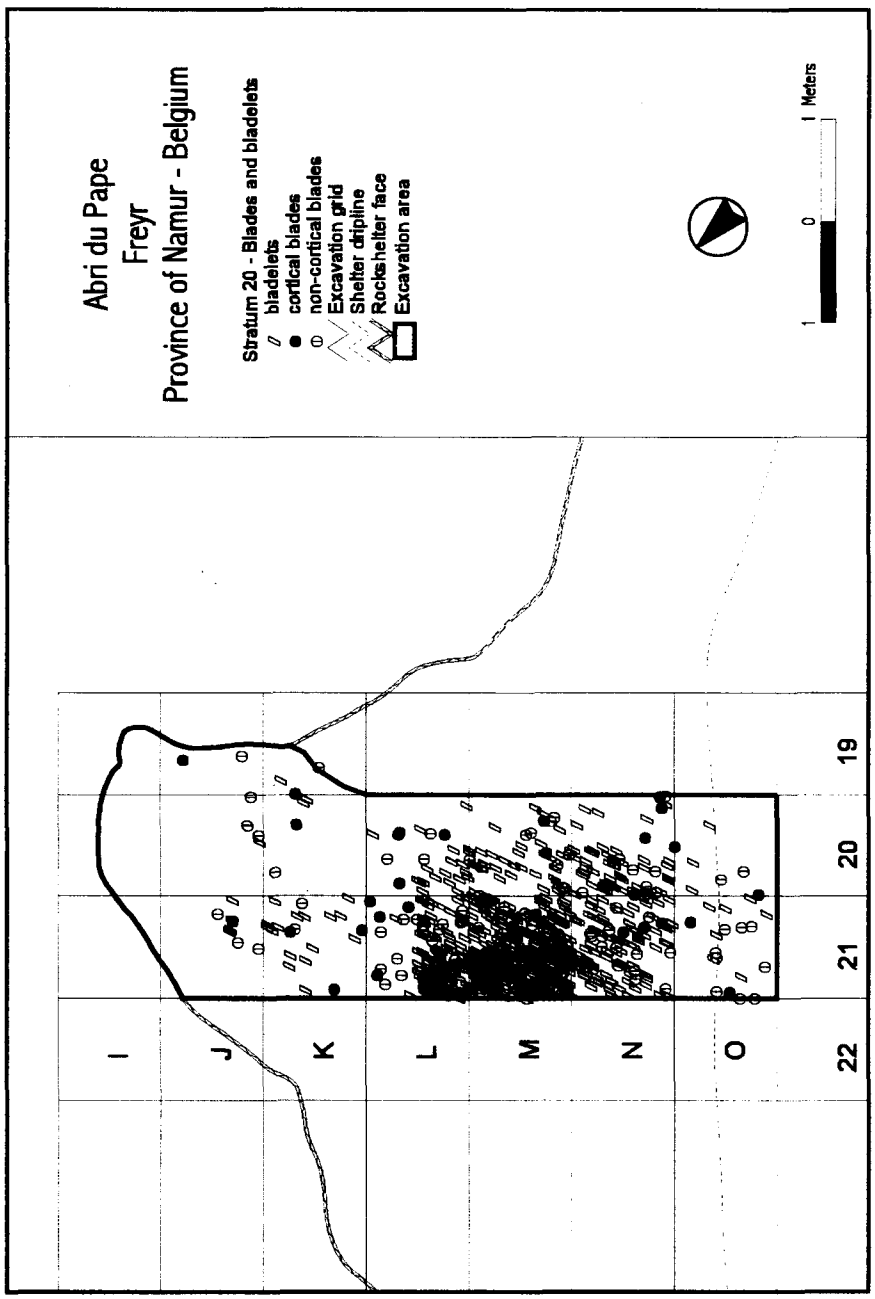
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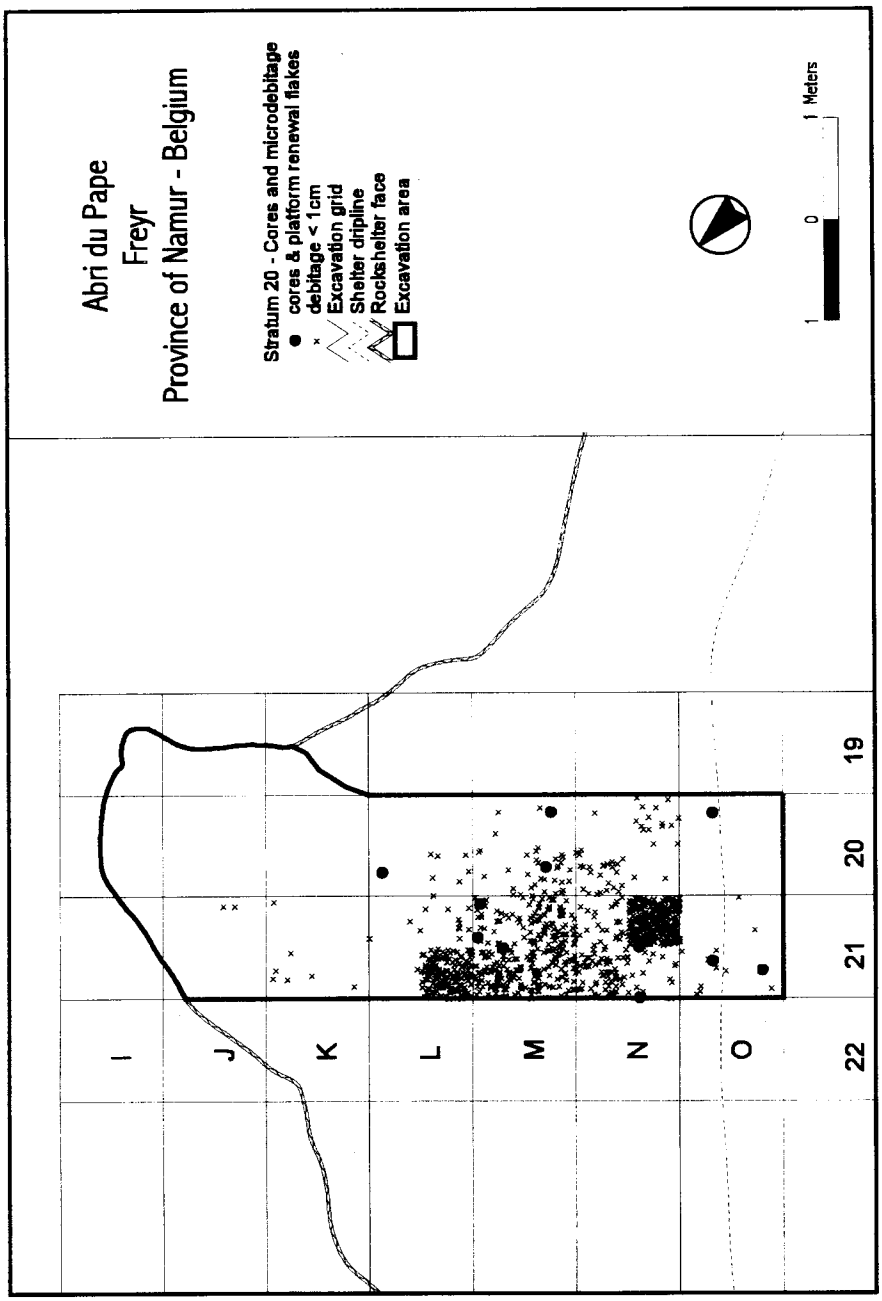
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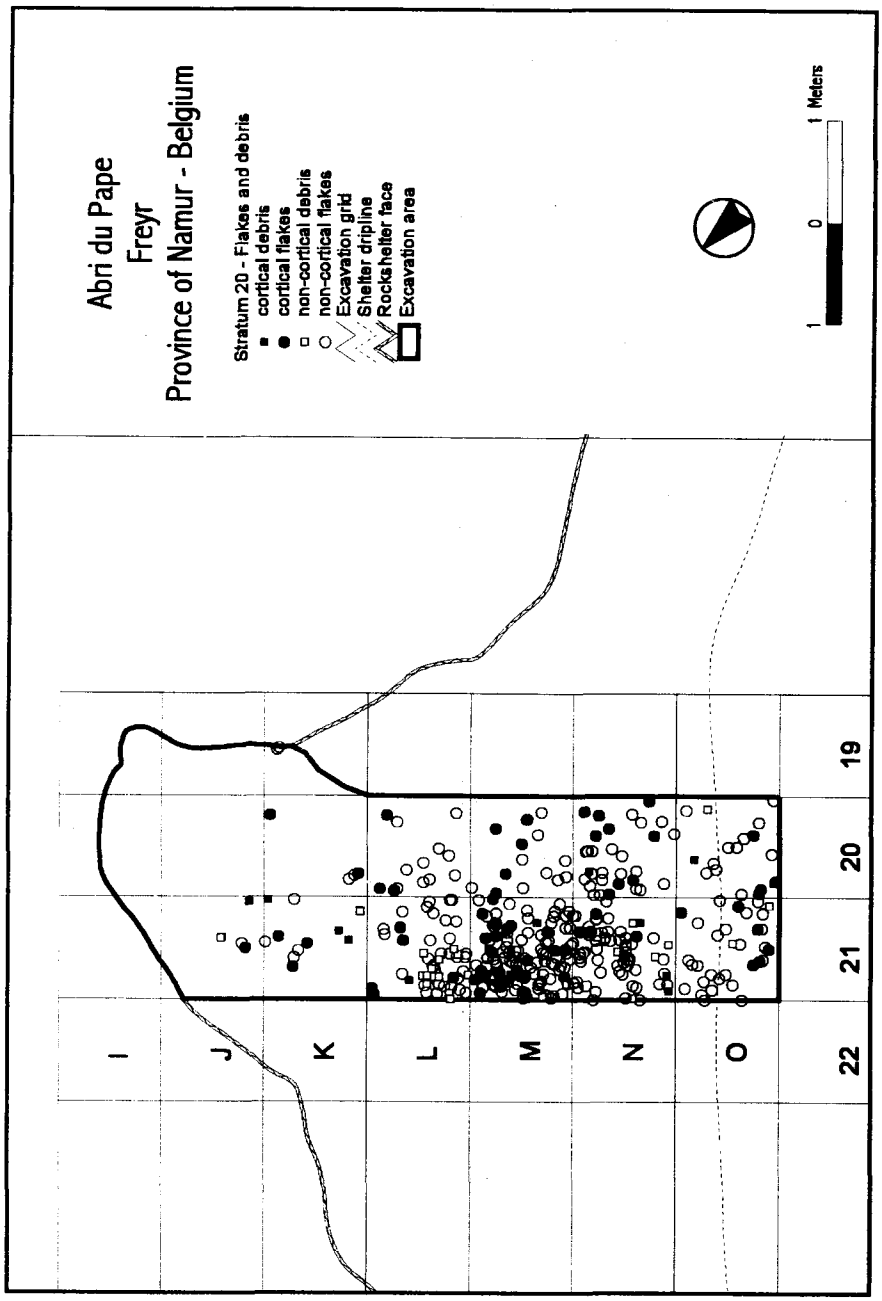
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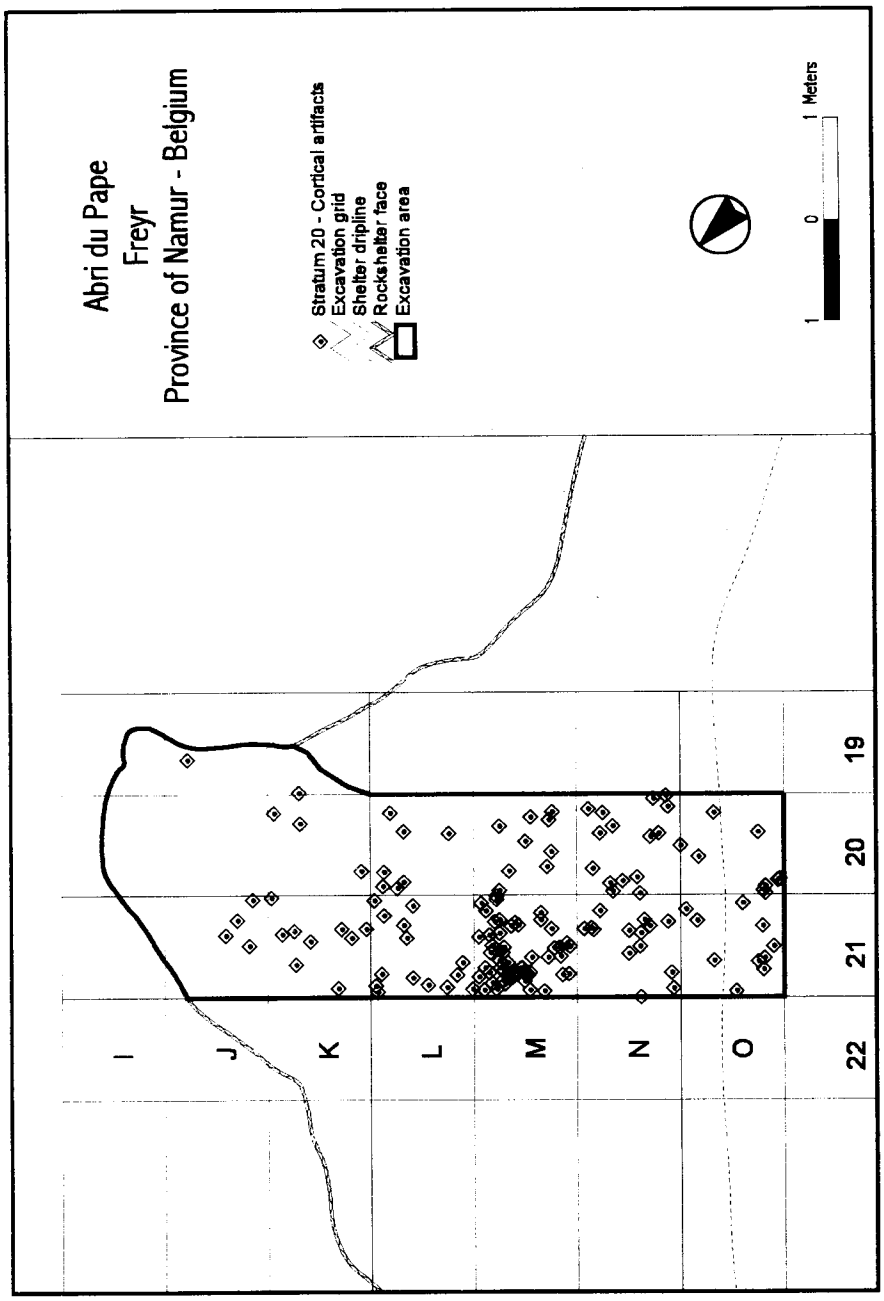
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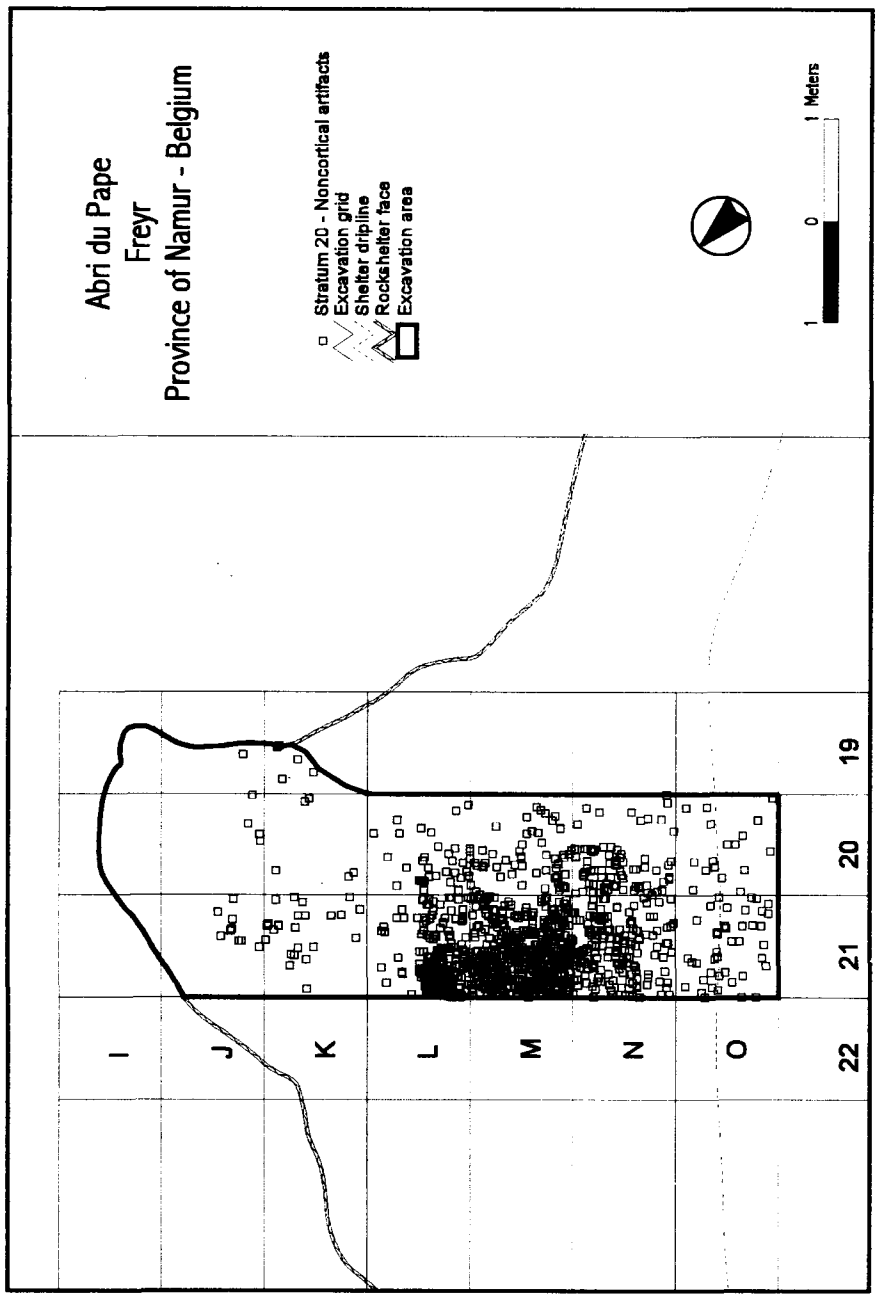
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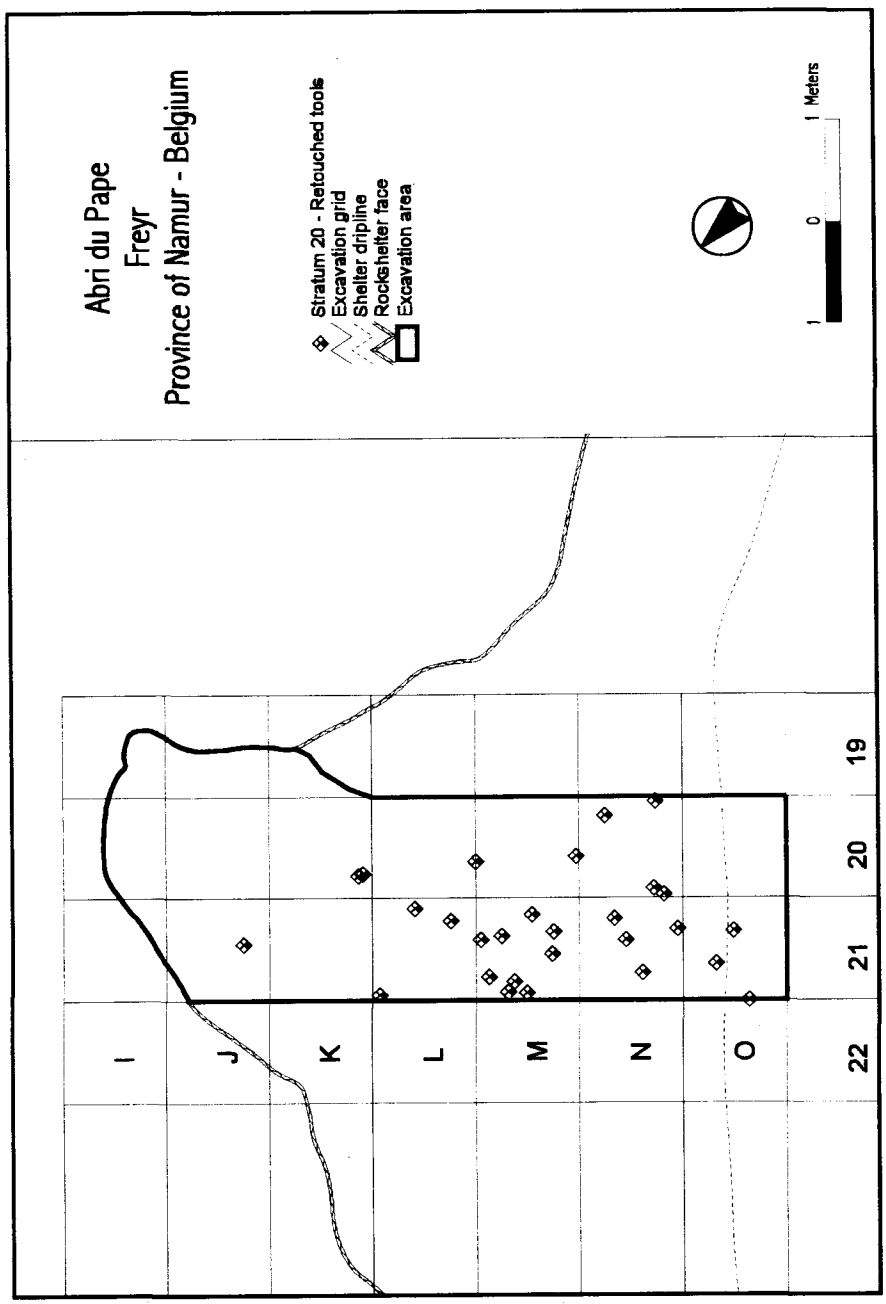
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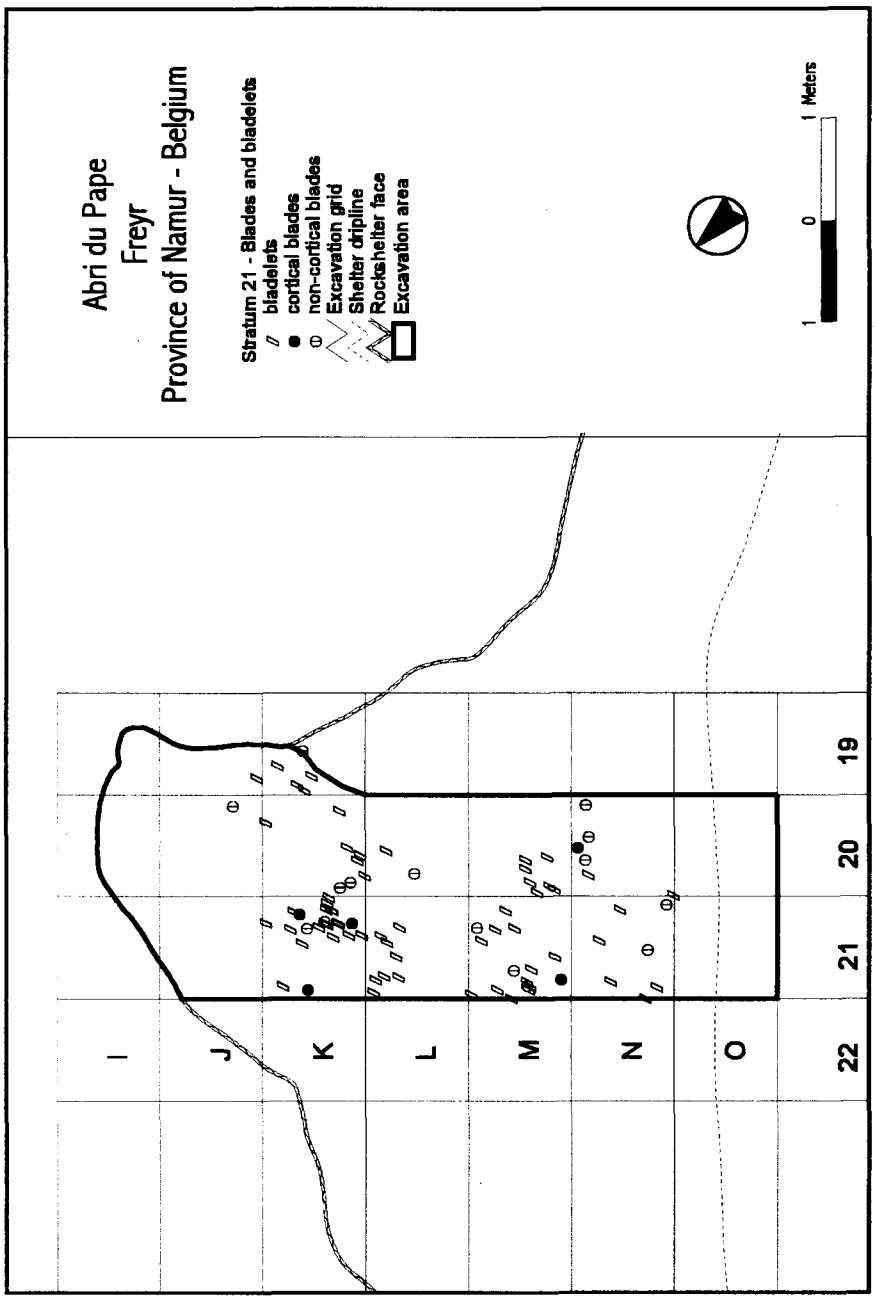
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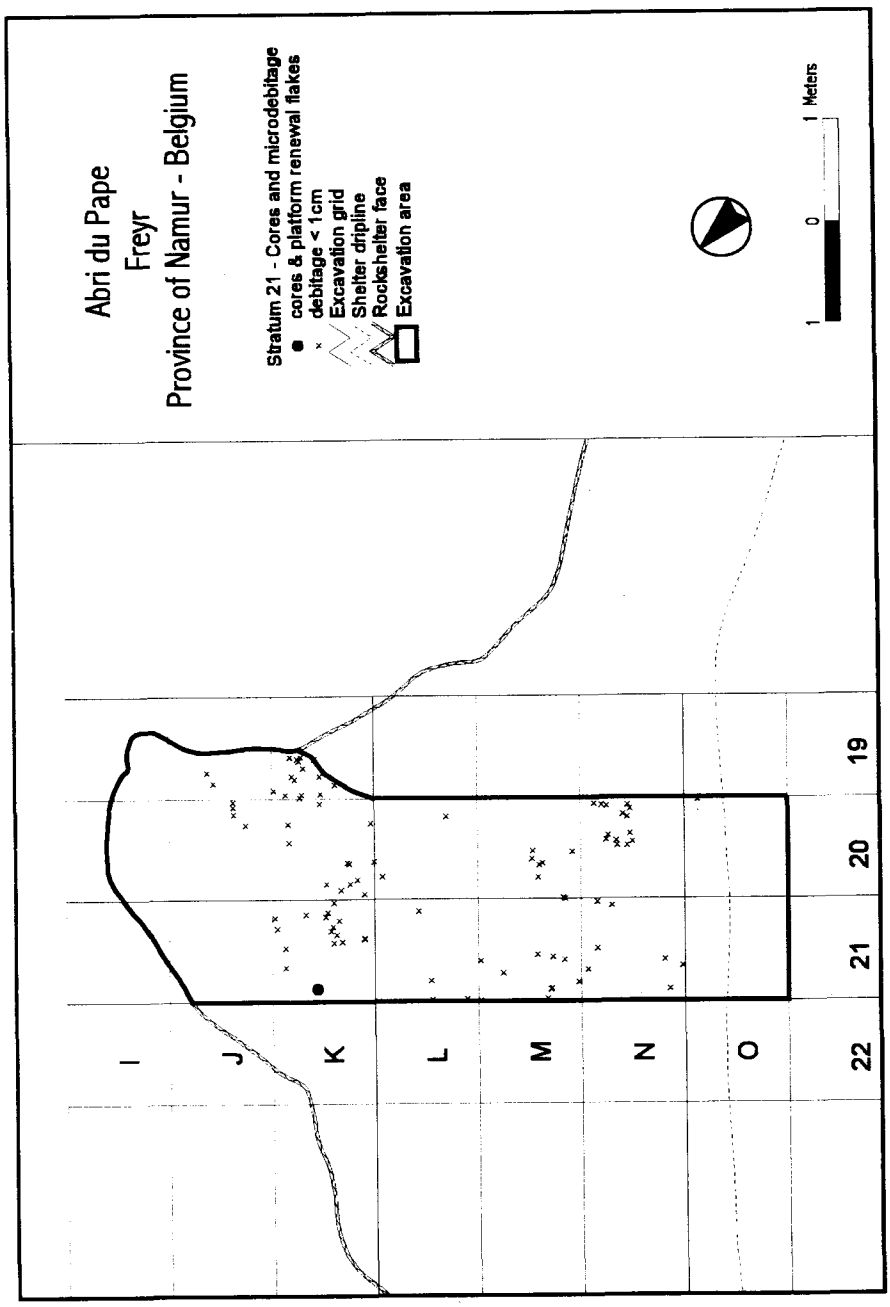
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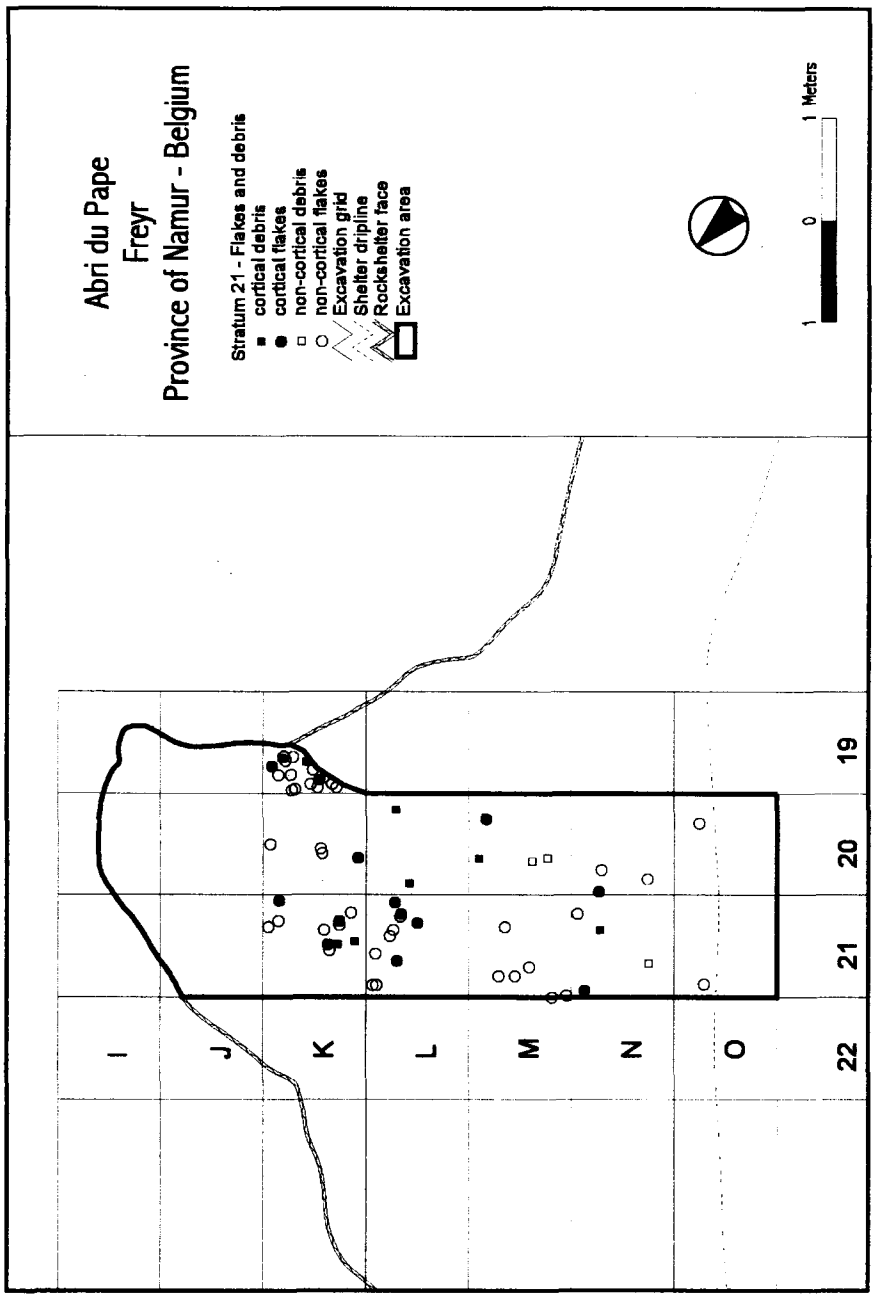
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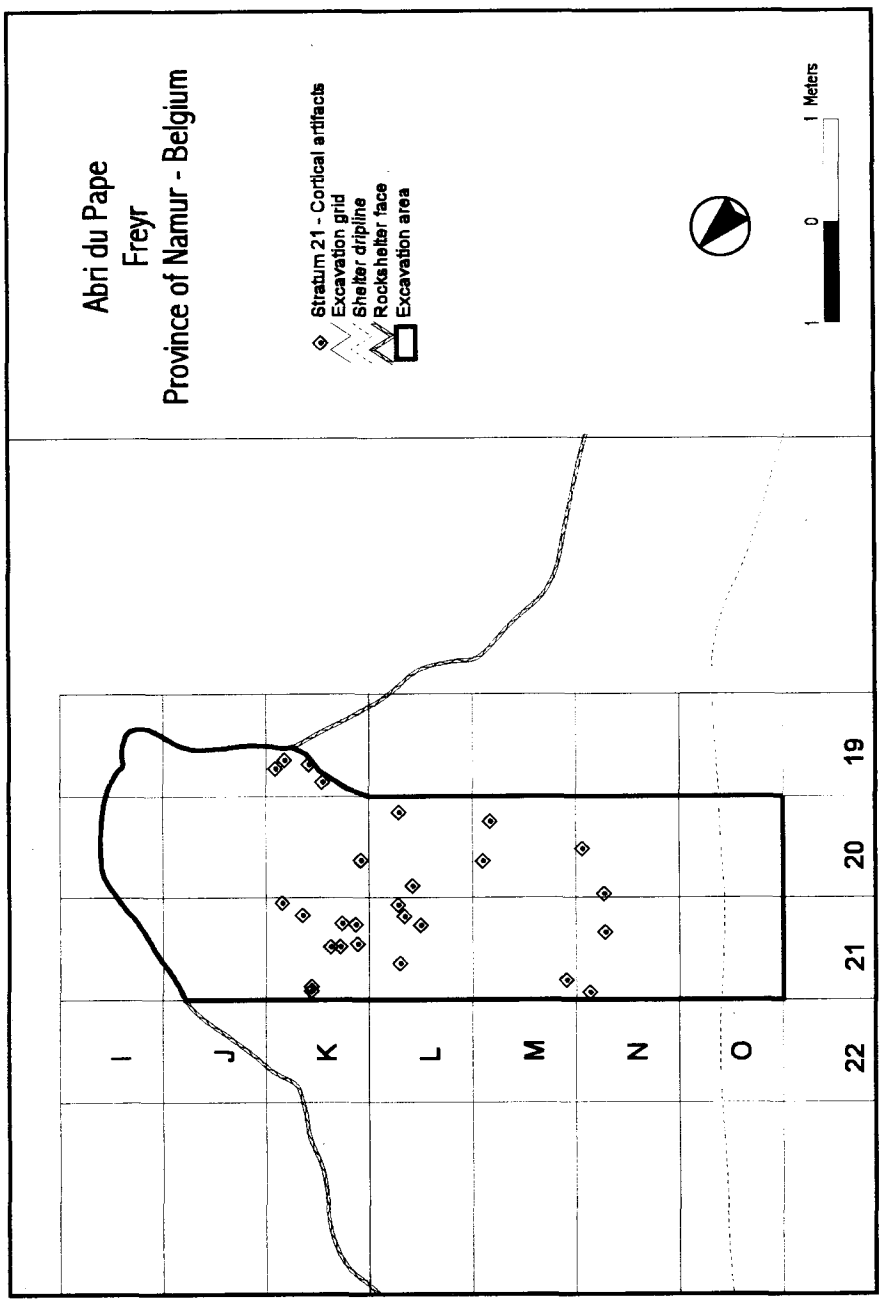
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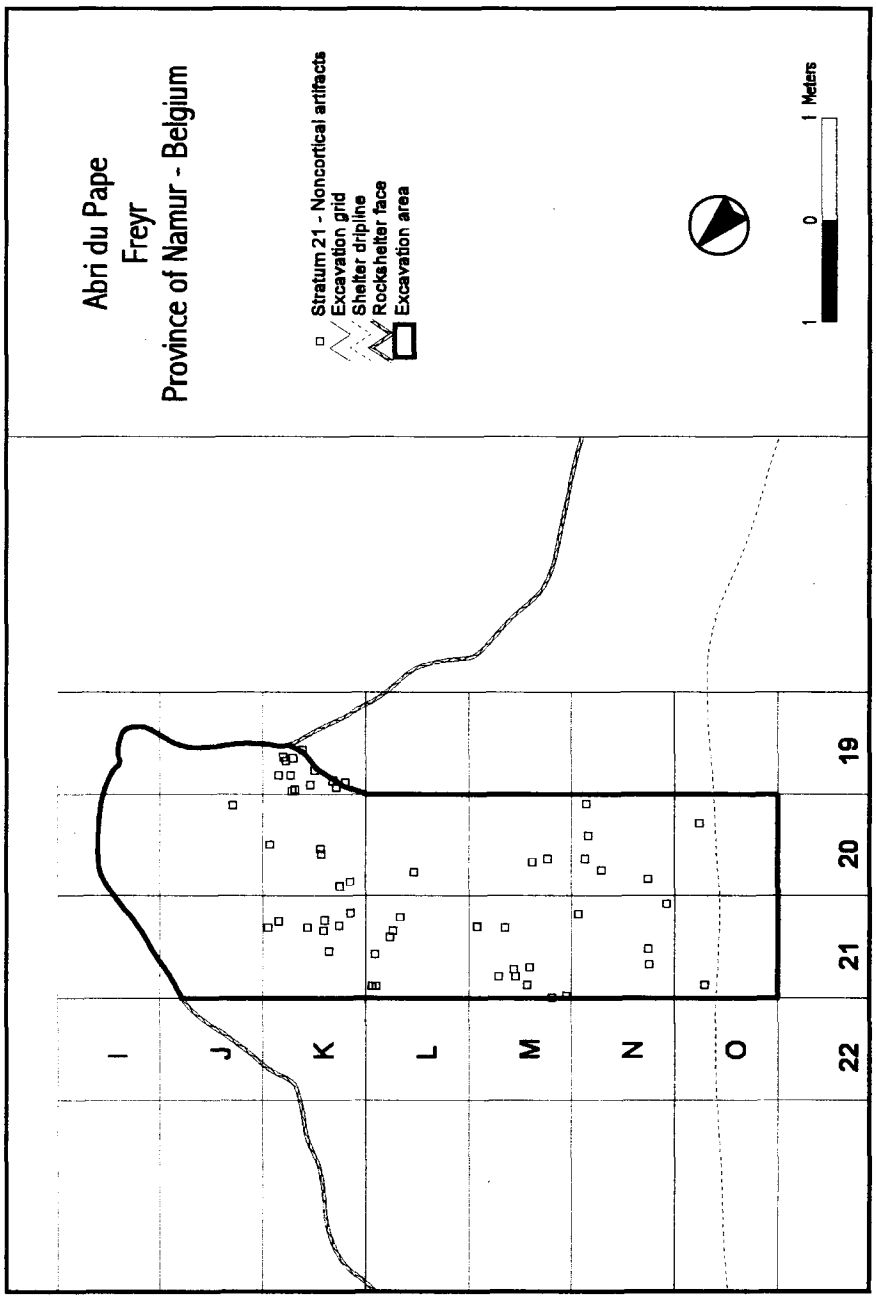
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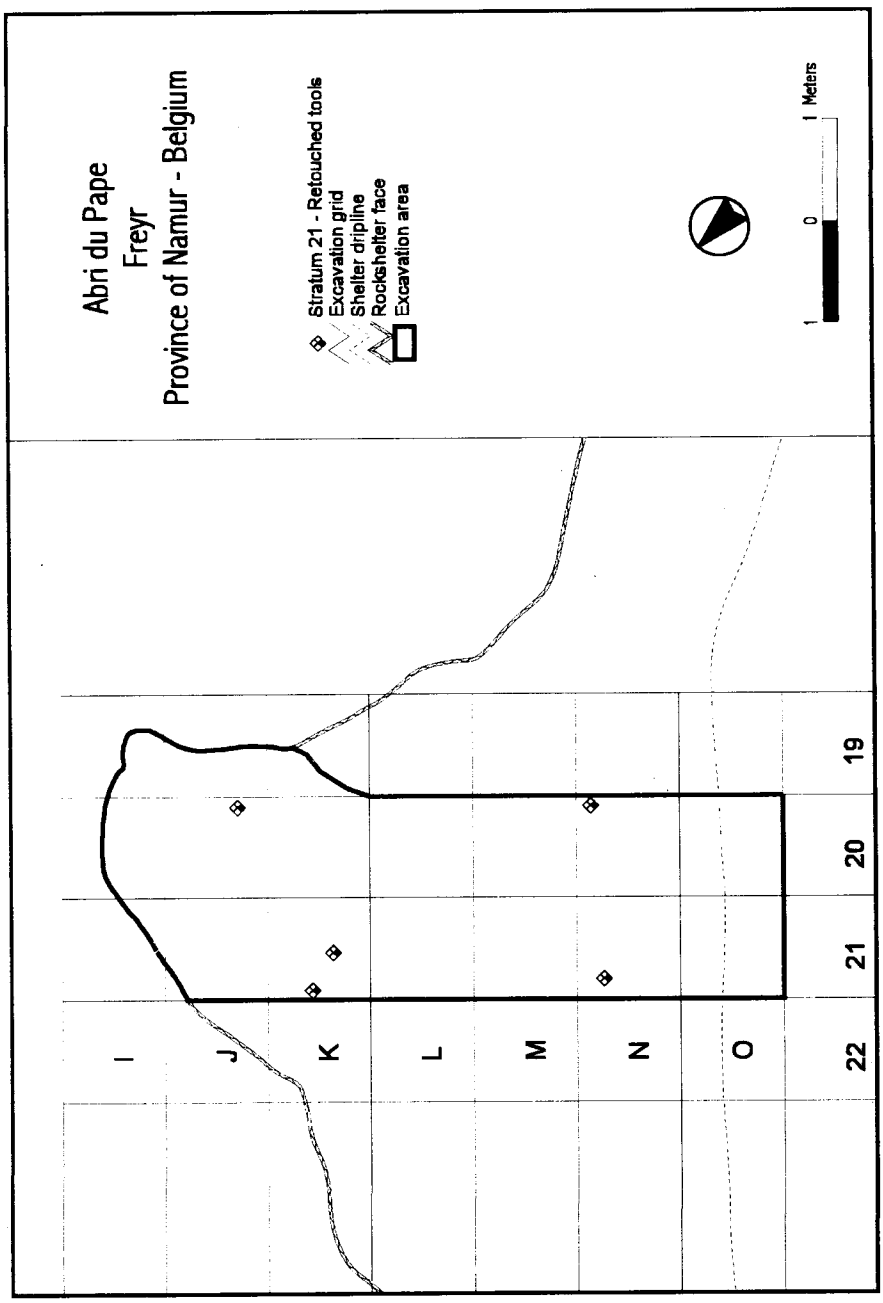
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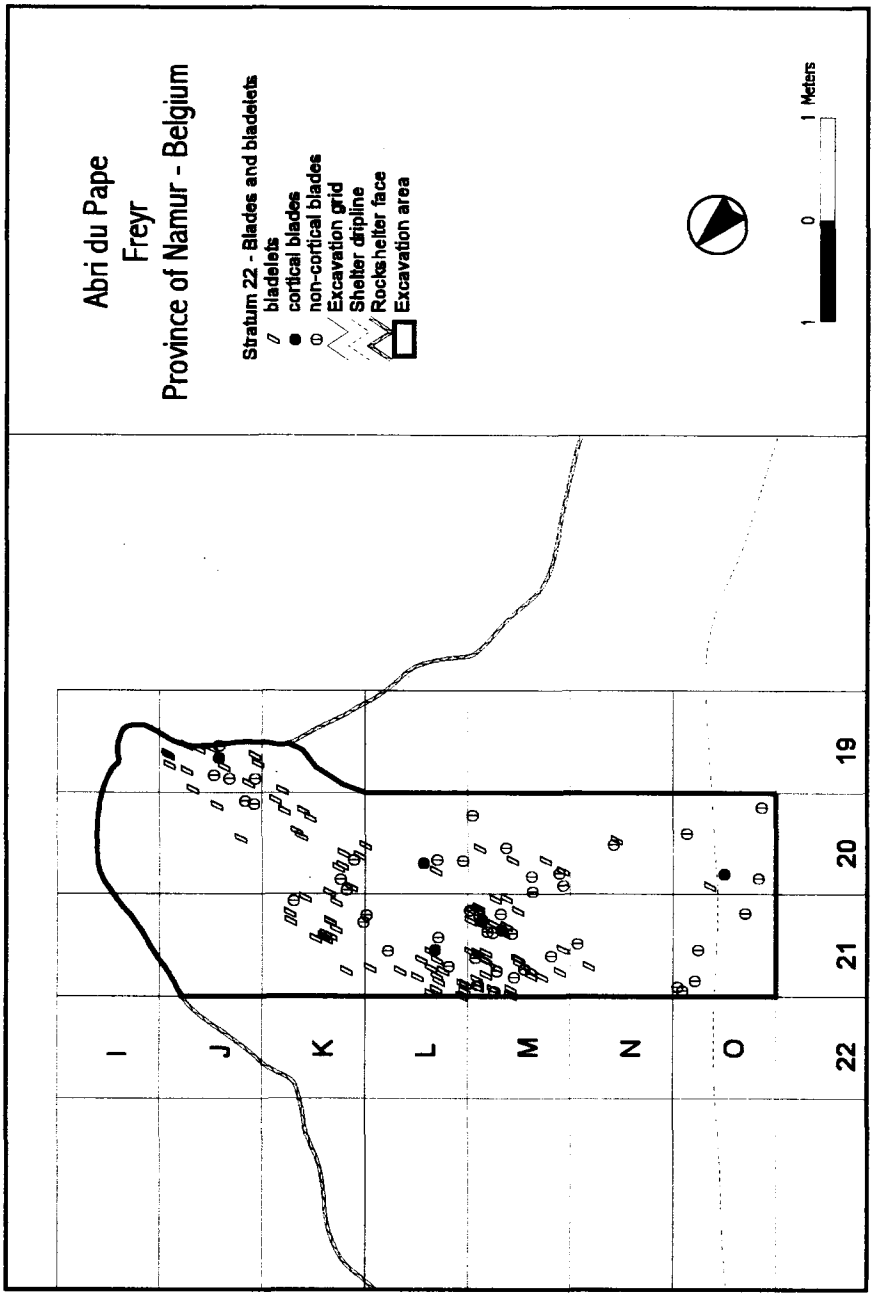
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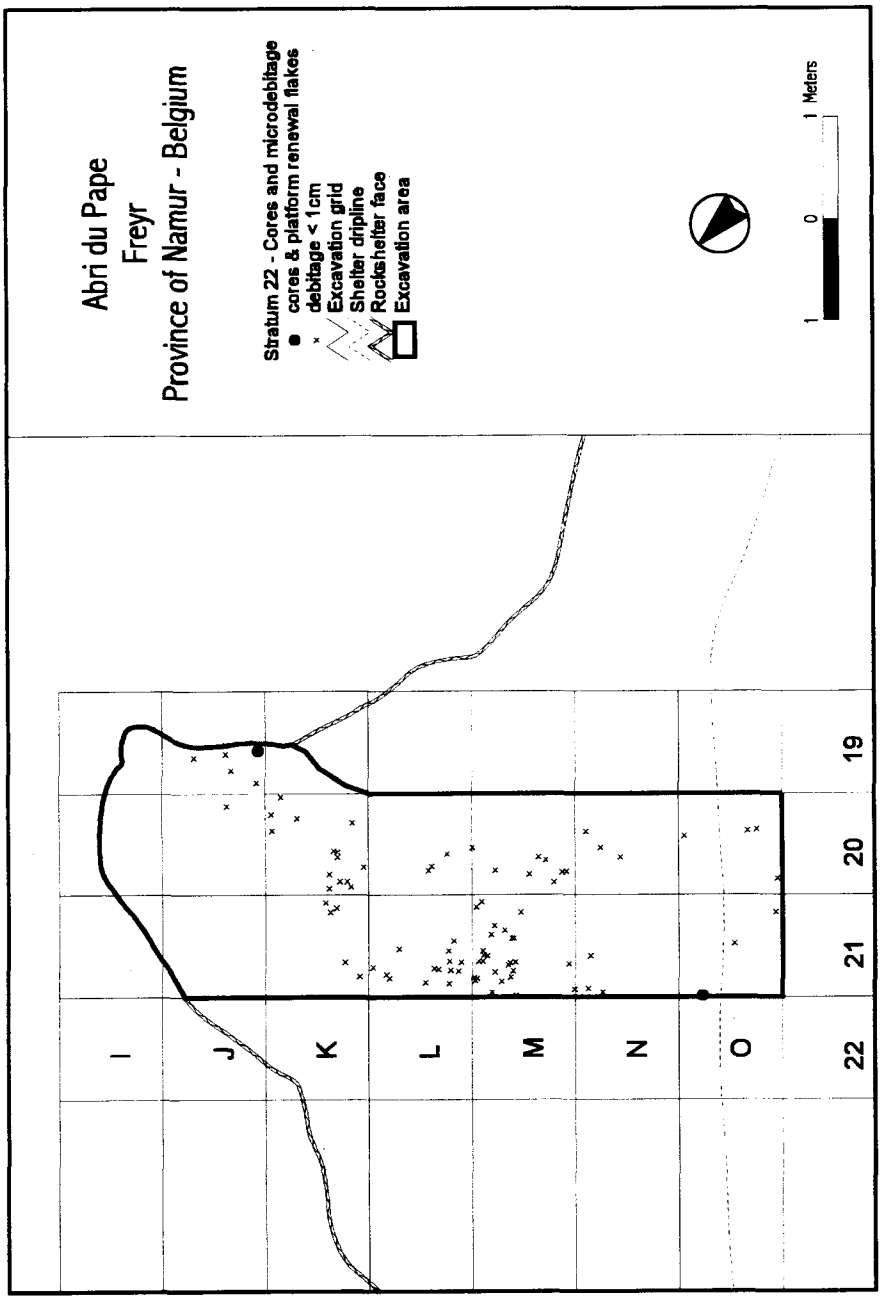
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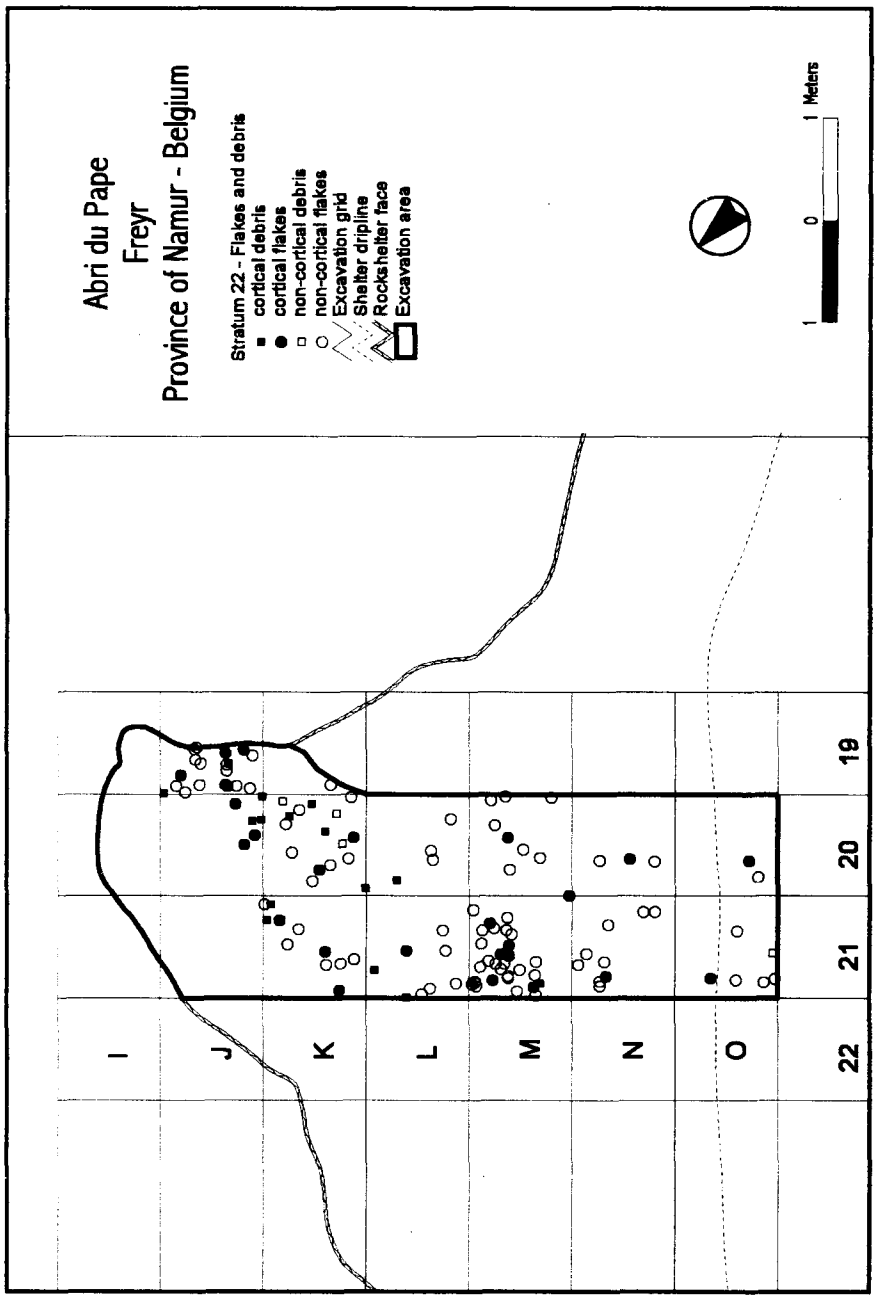
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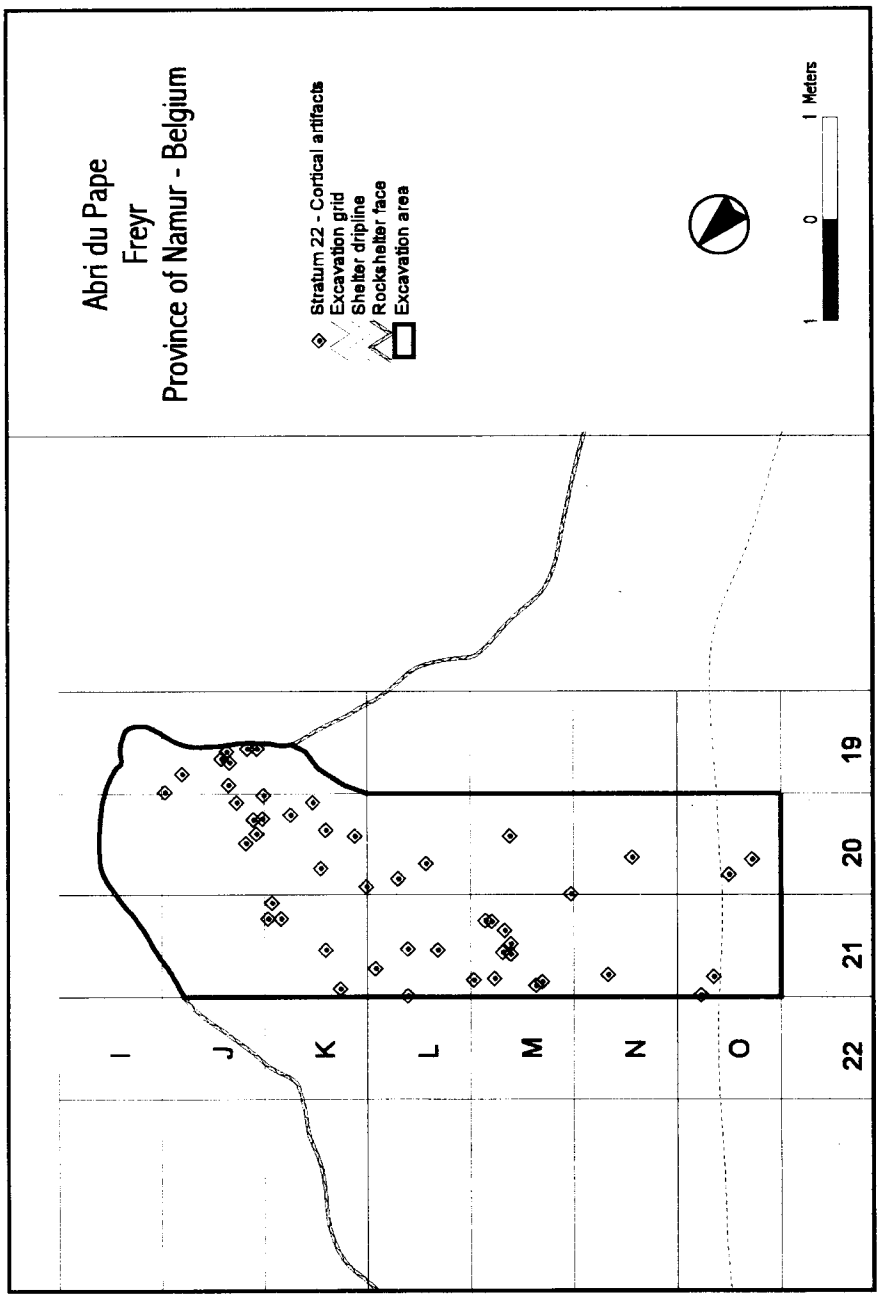
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22

Figure 19

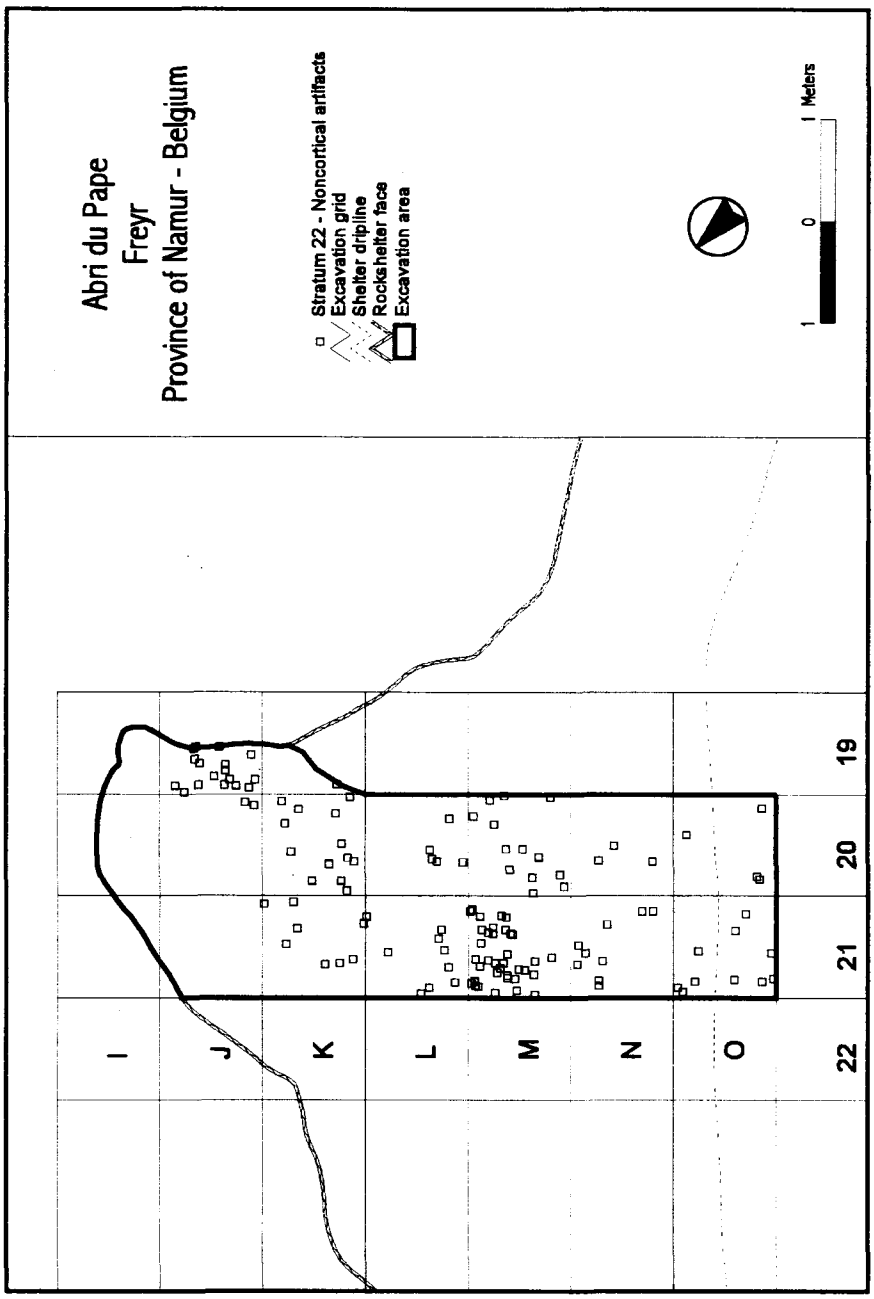
Abri du Pape
Freyr
Province of Namur - Belgium
Stratum 22 - Noncortical artifacts
Excavation grid
Shelter dripline
Rockshelter face
Excavation area
1 Meters
0
1
I
J
K
L
M
N
O
19
20
21
22

Figure 20

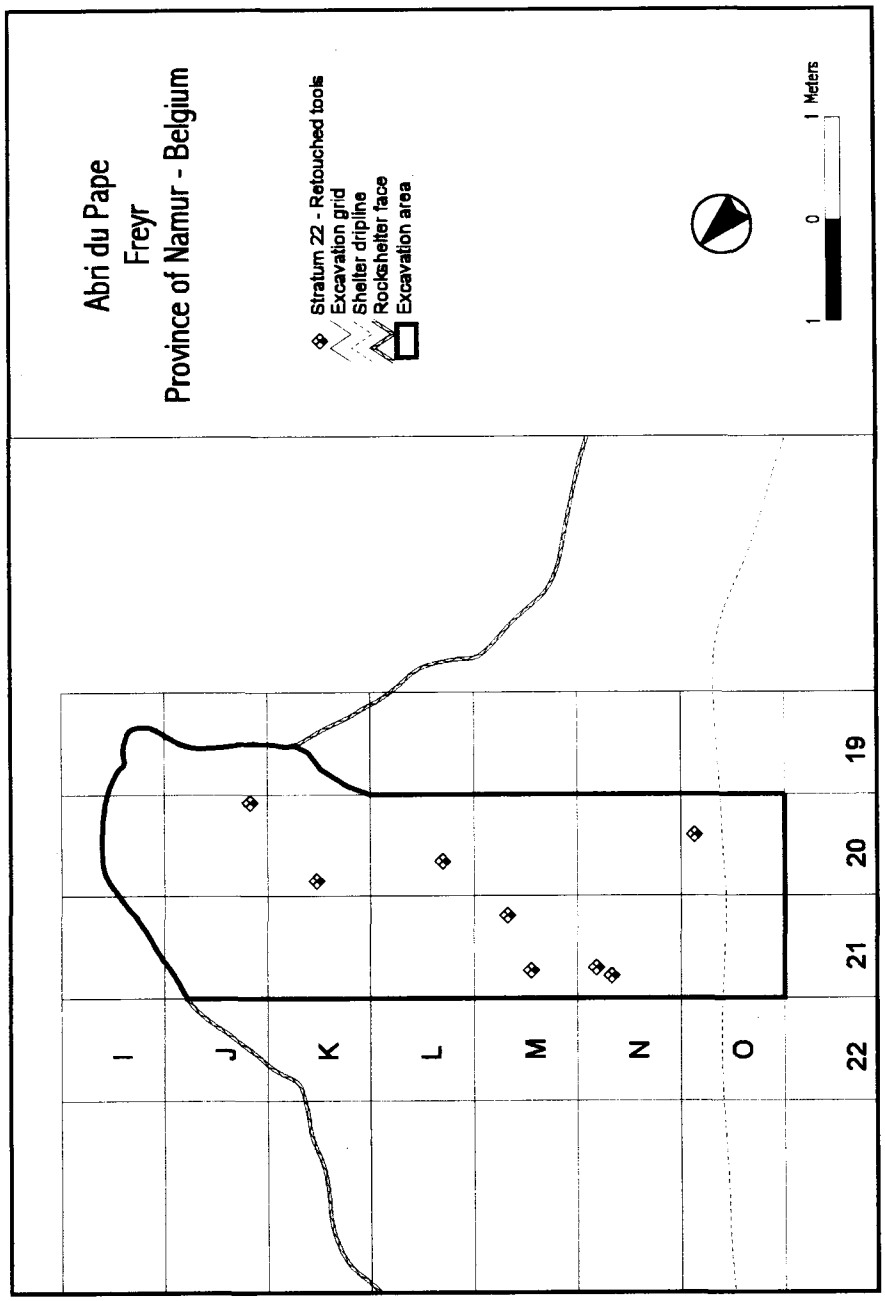
Abri du Pape
Freyr
Province of Namur - Belgium
Stratum 22 - Retouched tools
Excavation grid
Shelter dripline
Rockshelter face
Excavation area
1 Meters
0
1
I
J
K
L
M
N
O
19
20
21
22

Figure 21

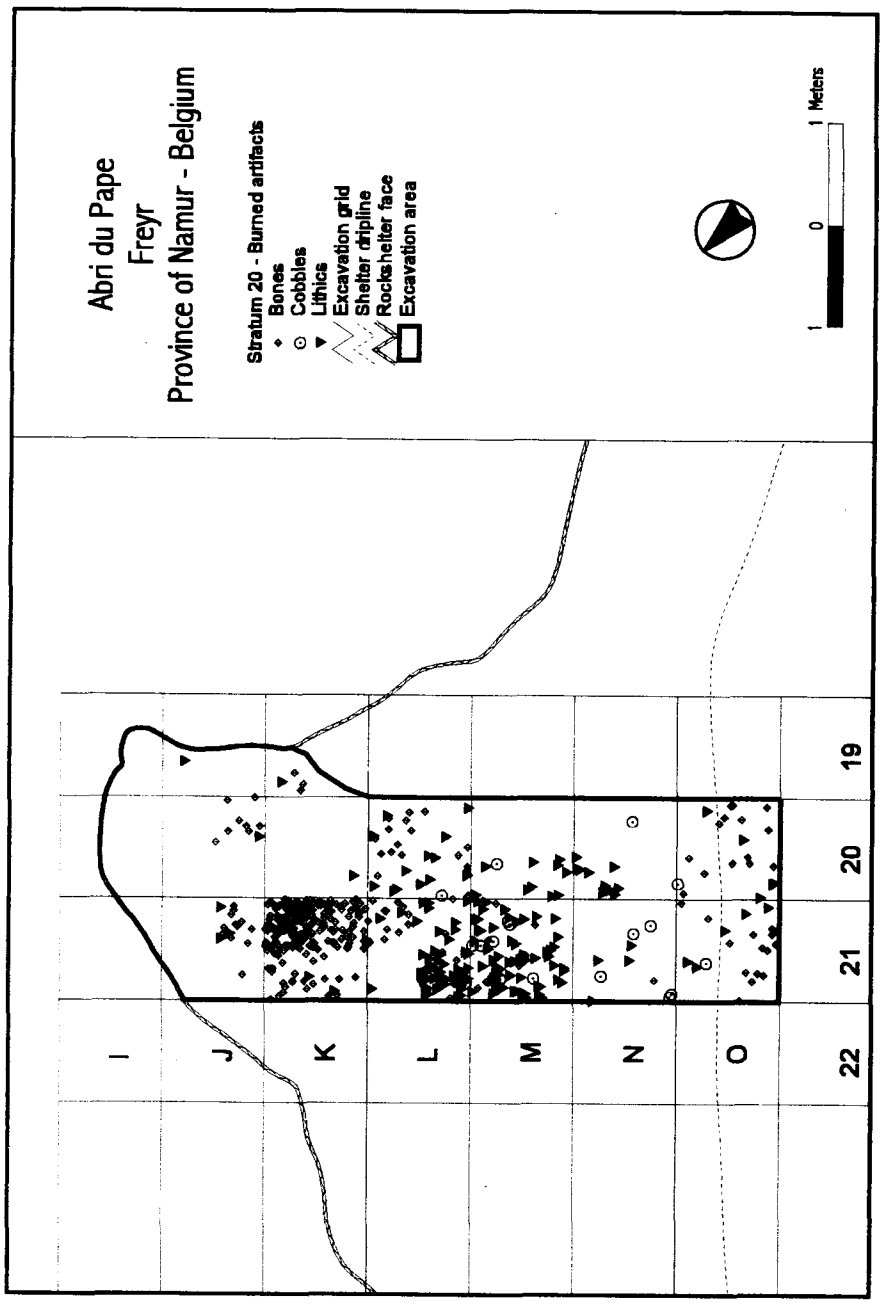
Abri du Pape
Freyr
Province of Namur - Belgium
Stratum 20 - Burned artifacts
Bones
Cobbles
Lithics
Excavation grid
Shelter dripline
Rockshelter face
Excavation area
1 Meters
0
1
I
J
K
L
M
N
O
19
20
21
22

Figure 22

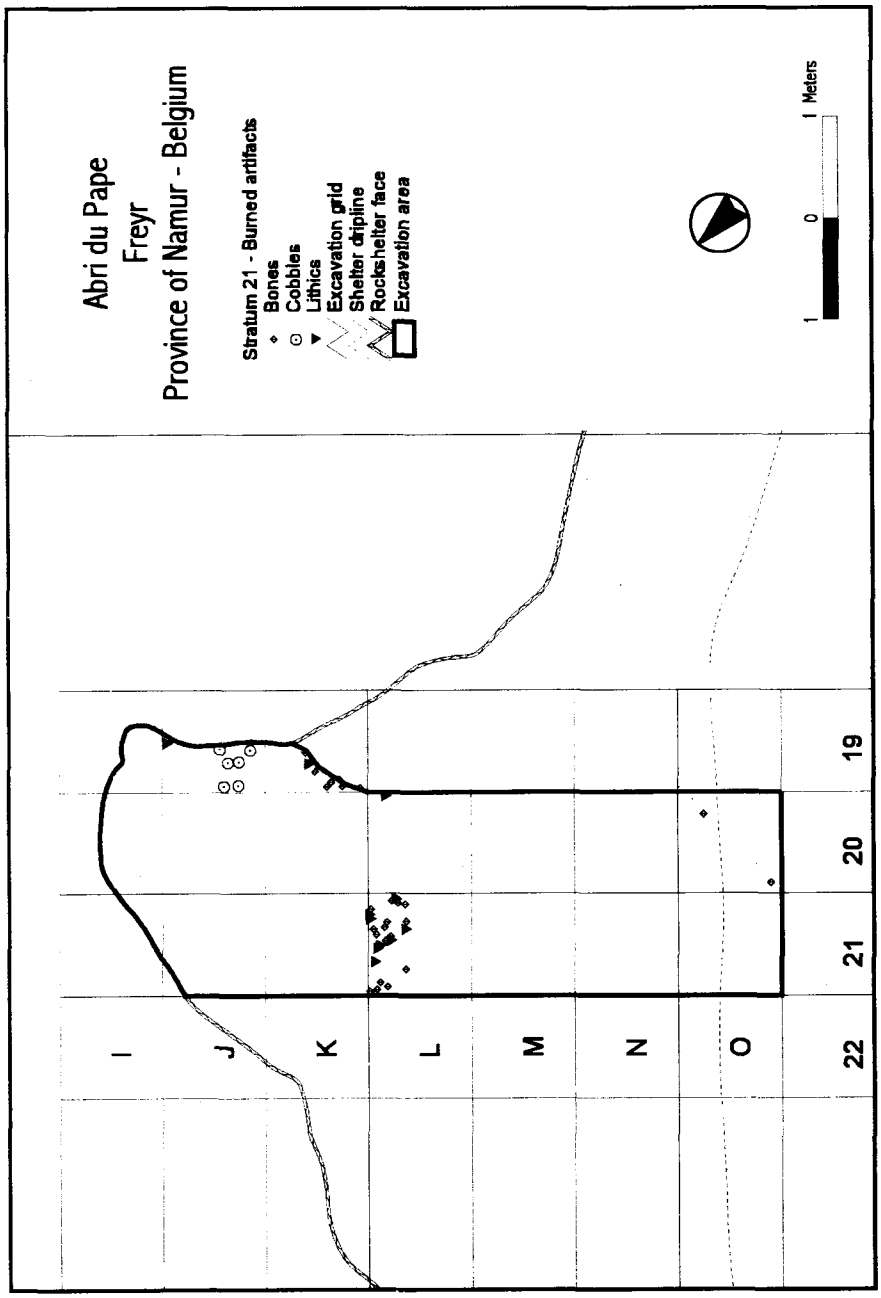
Abri du Pape
Freyr
Province of Namur - Belgium
Stratum 21 - Burned artifacts
Bones
Cobbles
Lithics
Excavation grid
Shelter dripline
Rockshelter face
Excavation area
1 Meters
0
1
I
J
K
L
M
N
O
19
20
21
22

Figure 23

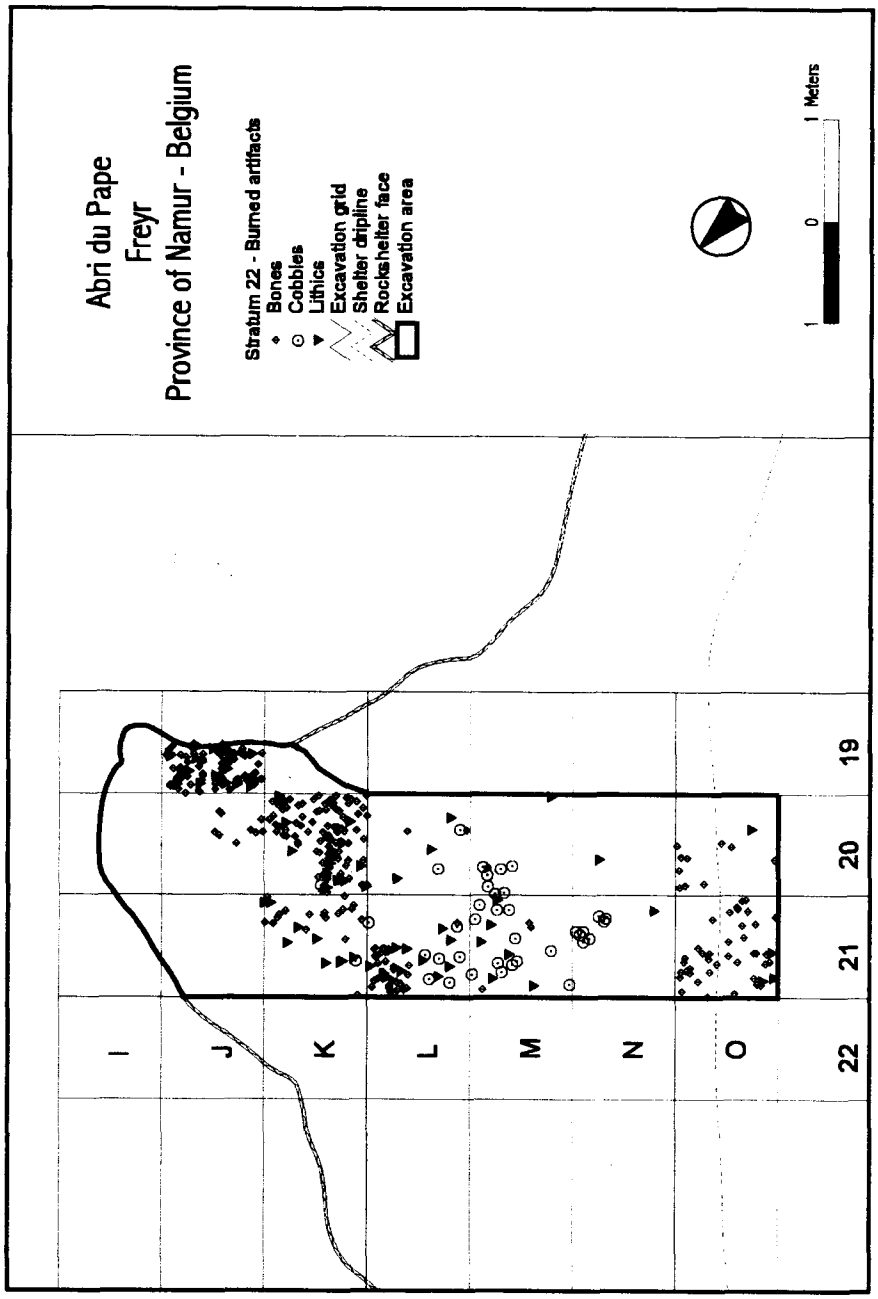
Abri du Pape
Freyr
Province of Namur - Belgium
Stratum 22 - Burned artifacts
Bones
Cobbles
Lithics
Excavation grid
Shelter dripline
Rockshelter face
Excavation area
1 Meters
0
1
I
J
K
L
M
N
O
19
20
21
22

Figure 24