Trade and use of raw material for neolithic querns in north-western Germany

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Zusammenfassung – In Nordwestdeutschland wurden im Neolithikum zwölf Gesteinsarten zur Mahlsteinherstellung verwendet. Die Lagerstätten sind in der Regel identifizierbar. So wurden Sandsteine und Granite aus Entfernungen von 5 und 60 km von den Lagerstätten zu den Siedlungen transportiert. In jeder der untersuchten Regionen wurde zumeist eine Gesteinsart – je nach den geologischen Verhältnissen – während des gesamten Neolithikums verwendet. Einzelne Gesteinsarten sind nur in wenigen Fällen als Mahlsteine ausgewählt worden. Der Rohmaterialbezug wurde von jeder Siedlung in Eigenregie durchgeführt. So zeigen Mahlsteine aus lagerstättennahen und -fernen Siedlungen keine signifikanten Unterschiede hinsichtlich der Form oder Größe. Abschläge von verwendeten Rohmaterialien aus ausgegrabenen Siedlungsinventaren zeugen von einer Produktion der Mahlsteine in bzw. bei den Häusern. Es wird allerdings deutlich, dass erste Zurichtungen bereits in den Lagerstätten erfolgten. Festzuhalten gilt, dass die geeigneten Materialien durch einen bergmännischen Abbau gewonnen wurden. Nur in Ausnahmefällen wurden Gesteine aus den Schottern der Flüsse aufgesammelt.

Schlüsselwörter – Nordwestdeutschland – Neolithikum – Mahlsteine – Distribution

Abstract – Abstract – The data of north-western Germany demonstrate that during the neolithic twelve different types of rock were used as raw materials for querns. In many cases it was possible to identify the raw material sources, so it is certain that sandstones and granites came to their final finding spots from deposits from about 5 to 60 km of distance. Each territory has its typical raw material which is related to the geological occurrence and which is mostly used during the neolithic. Some other types of rock are only once attested as querns.

The procurement of raw material was assured by each settlement itself. There are no differences in form or size of querns between settlements near sources and settlements apart. Small flakes of typical raw material from excavated settlements show that the production of querns took place at the houses. It has to be mentioned that the rocks were first examinated at the collection spot. The extraction of material for querns must have been done by mining. In some cases only rocks from riverbeds were collected.

Keywords – north-western Germany – neolithic – querns – distribution

Raw material

Basis for a successful grinding of cereals on querns is the raw material. Only a very limited range of rock types were used as querns. The quality of the rock is related to workability, durability and efficiency. The material has to be tightly cemented and the texture roughed with a fine or middle grain size (**fig. 1**).

In neolithic times sandstones, basalts, granites and limestones were used. The hardness of rocks like sandstone depends on the strength of the matrix (carbonate or silica) which sticks the grains like quartz together. Based on a strong wear during the use, it was sometimes necessary to roughen the surface of the querns using pebbles or hammer stones.

Since the geological occurrence of usable material is quite different, in some cases rocks were imported from other (= more distant) regions (Graefe 2004, 64-80).

By means of correct geological examination of thin sections it is often possible to identify the provenance of neolithic querns.

Investigation area

The investigation area consists of - as part of north-western Germany - the region between the river Weser and the river Rhein (**fig. 2**). Besides the courses of the rivers Ems, Elbe and Main are indicated, too. As topographical fix points the cities of Cologne, Hannoversch Münden, Münster and Frankfurt/Main are included. Within the investigation area there are morphological and geological differences, for example the low mountain range and the lowlands. Framed in thin lines the region of the master´s- thesis and in thick lines the one of the dissertation- thesis are indicated. The frontiers of the dissertation corresponds to the political border of Nordrhein-Westfalen. It is important to note that both regions are situated side by side.

All in all 1135 querns were examinated. **Fig. 3** shows that 21 % of the querns belongs to quern slabs, 13 % to quern slabs, secondary quern handstones, 37 % to quern handstones and 29 % to querns without certain surfaces as quern slabs or handstones. It is clear that 50 % of the querns

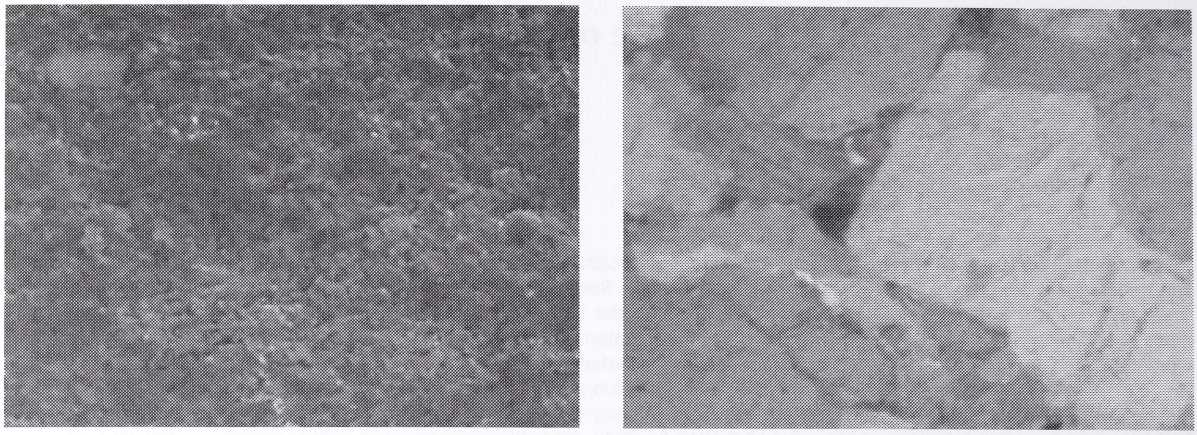

Fig. 1 Photo (left) and thin sections (right) of sandstones.

are primary or secondary quern handstones. This percentage shows that more handstones than slabs are needed. This is because of the wear and tear during the use as querns.

Master's - Thesis

Fig. 4 shows the investigation area. The main rivers are Fulda and Werra, who confluence to the Weser river at the municipal area of the town Hannoversch Münden, and the Leine river. Nearby the river Leine the town of Göttingen is situated.

A number of 405 querns from eight early neolithic (Linear Pottery culture) settlements were examinated (Graefe 2004, 44-55). Additionally 165 querns from the well known settlement Rosdorf "Mühlengrund", Landkreis Göttingen, - excavated between 1963 and 1970 - were investigated. The raw material has been mostly identified as triassic sandstones from different sources. Some of these sandstones has been also proved in early neolithic settlements of the Warburger Börde (Graefe 2008).

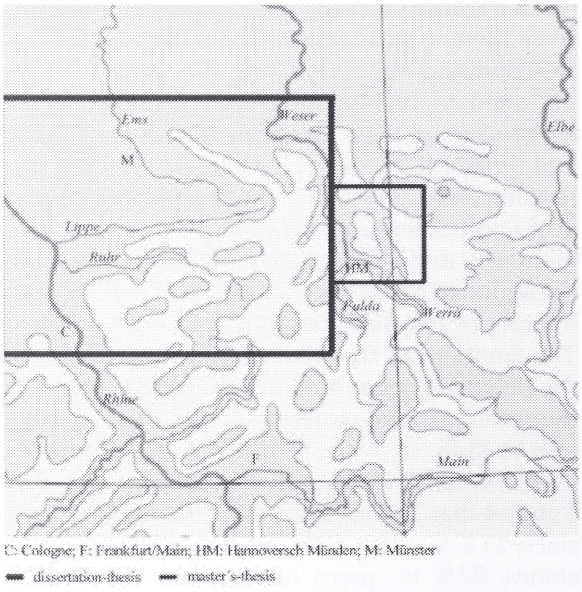

Fig. 2 Region of research of the MA- and doctoral dissertation's -Thesis.

243 – 21%	quern slabs
144 – 13%	quern slabs, sec. Handstones
422 – 37%	quern handstones
326 – 29%	querns without certain surface

Fig. 3 Number and percentage of quern slabs, quern slabs, secondary handstones, quern handstones and querns without certain surfaces (n=1135).

It was possible to identify a range of rock types which were used as querns. 28 % were identified as triassic sandstones variation "Hann. Münden", 60 % as triassic sandstones variation „Solling" and 8 % as triassic sandstones variation "Anstehender". The rest are querns of an unknown material, "Breccien", "Grauwacken" or triassic sandstone variation "Volpriehausen".

Based on the geological occurrence it was possible to identify the deposits of the sandstones of the variation "Hann. Münden" between the confluence of the Werra and Fulda rivers near the town of Hannoversch Münden. In medieval and modern times the raw material for millstones was collected by mining in some quarries in Hannoversch Münden (Graefe 2004, 65-70).

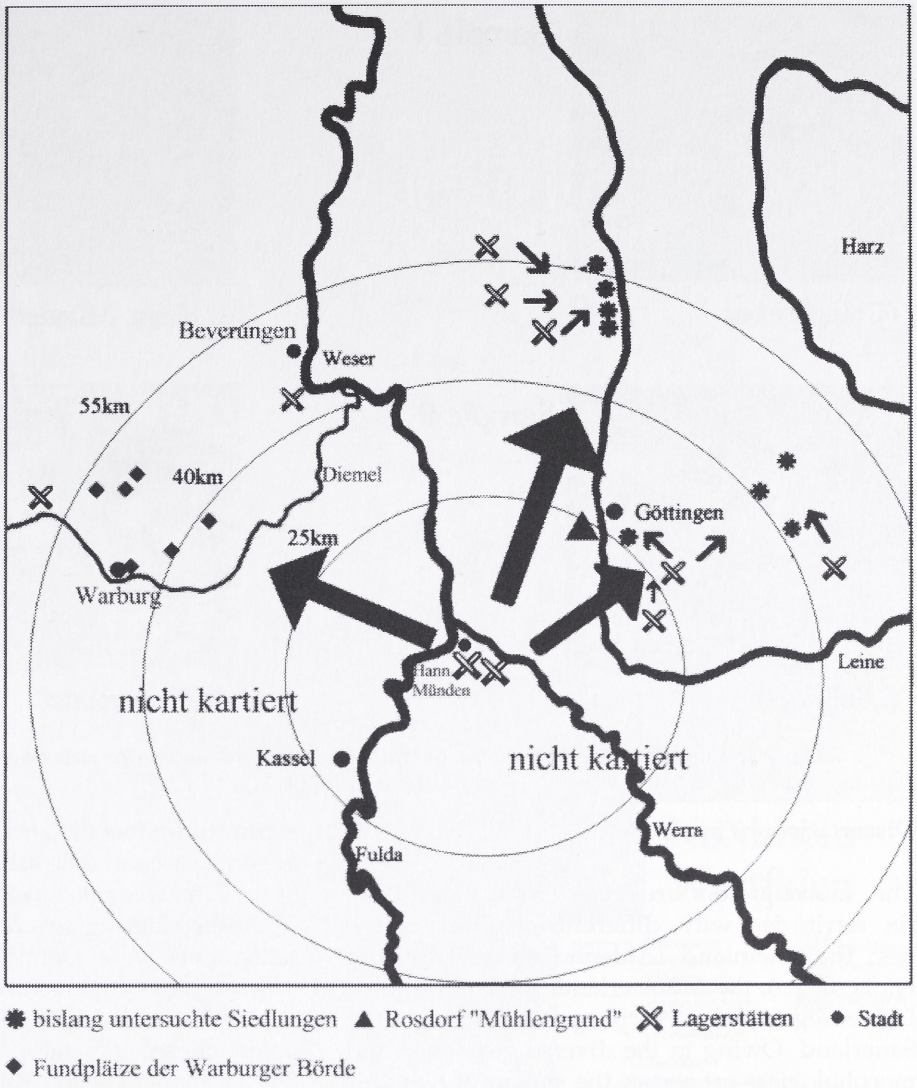

Fig. 4 Region of research of the MA-Thesis. Included are settlements of the Warburger Börde as part of the dissertation's -Thesis (modified after Graefe 2004, 77).

The composition of the material is visible in thin sections. Due to individual geological compositions of stones it is mostly possible to identify the area of origin.

From some querns of the region of research and some sandstones at the town of Hannoversch Münden samples were taken and thin sections made. Some of these samples are given at **fig. 5**.[1]

It is clear that the thin sections are quite different. The greatest similarities with regard to grain size, structure and mineral mixture exist between Sample 1 and 2. There are no similarities between Sample 1 and Sample 13. Based on differences between Sample 9 and 1 it is certain that sandstones of the variation "Solling" does not belong to the quarries at Hannoversch Münden.

The distribution of sandstones of the variation "Hann. Münden" as querns is traceable until 55 km to the north and east of the quarries (see **Fig. 4**). At this point it is important that the investigation area of the master´s- and dissertation- Thesis are situated side by side. The distribution of sandstones of the variation "Hann. Münden" as querns into the so called Warburger Börde is only proven for the Linear Pottery culture (early neolithic). The decorations of pots between settlements of the Warburger Börde, the south of Niedersachsen and Hessen show great similarities and connections. The region is part of the so called "Westfälisch-Niederhessischer-Schraffurstil" (Kneipp 1998, 158-160 Fig. 53).

Due to medieval and modern mining at the quarries of Hannoversch Münden no traces of neolithic mining are left. The medieval and modern quarries are located at the so called mines of "Kattenbühl", "Blümer Berg" and "Letzter Heller" (Graefe 2004, 68-69).

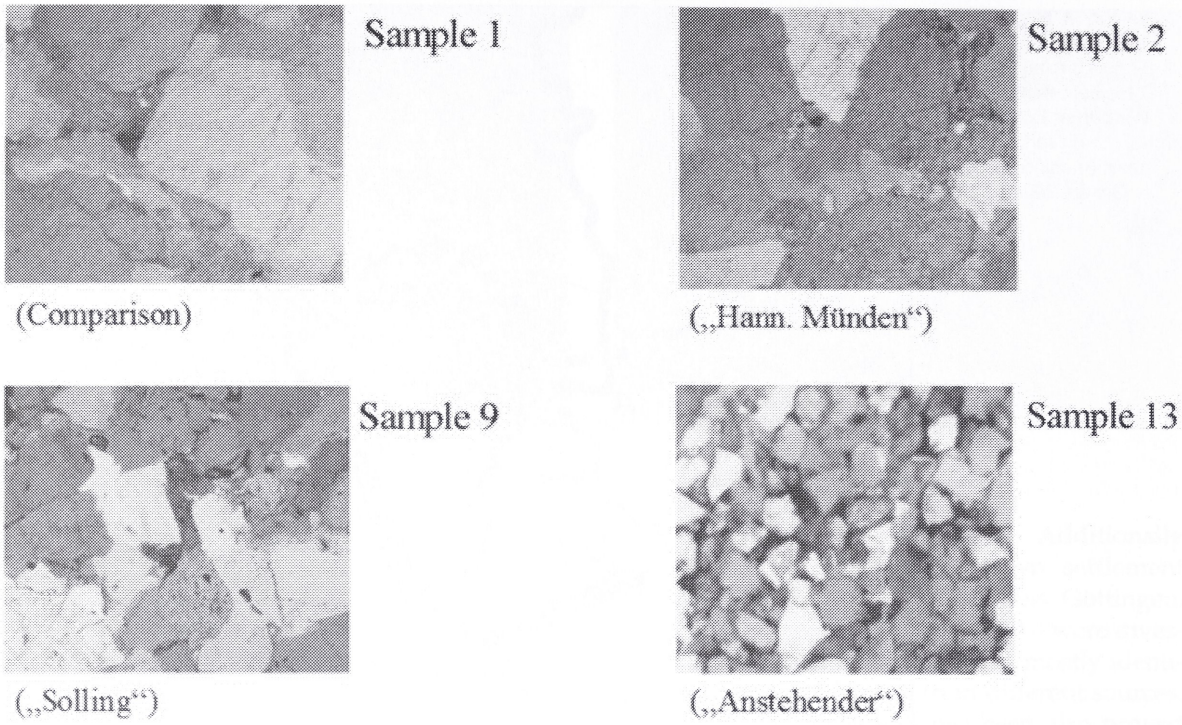

Fig. 5 Thin sections taken from querns in comparison to sandstones from the Hannoversch Münden region.

Dissertation – Thesis[2]

The investigation area can be divided into six territories with different neolithic activities: the Rheinland (Aldenhovener Platte and Niederrhein), the Münsterland, the Hellweg, the Lippe region, the Warburger Börde and the Sauerland. Owing to the diverse geological and morphological properties the spread of neolithic sites in these territories is quite different. In some of these areas a range of rocks, in other areas only one or two different rocks were used as raw material for querns (Graefe 2008).

Settlements of the first farmers of the Linear Pottery culture could only be identified in the Rheinland, the Hellweg and the Warburger Börde (**fig. 6**).

Well known settlements at the Aldenhovener Platte are Langweiler 8, Kreis Düren, and Köln-Lindenthal nearby the city of cologne, excavated in the 1930`s by Werner Buttler and Waldemar Haberey. Querns are attested as refuse at the houses and as burial objects at the cemeteries of Niedermerz 3, Inden-Altdorf and Bergheim-Zieverich.

The ordinary for querns used materials are sandstones from the Aachener Stolberg area, the so called "Eschenweiler-Kohlen-Sandstein". From here the transport of these sandstones as querns is proven up to a distance of 60 km. Additionally in some cases triassic sandstones from the north of the Eifel were also used.

At the Hellweg area only some early neolithic settlements were identified as yet. Due to the downstream of the river Ruhr from the east to west there are a lot of possibilities for collecting points of usable material. The rock can be identified as the so called "Ruhrsandstein". It has to be mentioned that the extraction must have been done by mining. In some cases only rocks from the river beds were collected.

The material used at the Warburger Börde has already been mentioned. Some of the querns can be identified as sandstones from deposits of the Hannoversch Münden region at the south of Niedersachsen. The distance amounts to 55 km. Additionally sandstones from local deposits were also used.

Middle neolithic (Großgartach and Rössen culture) sites with querns are known in the Rheinland, the Hellweg and in the Münsterland (**fig. 7**).

In principle the same types of rocks as during the early neolithic were applied: Eschenweiler-Kohlen-Sandstein in the Rheinland and Ruhrsandstein in the Hellweg region.

Ruhrsandstein as raw material for querns

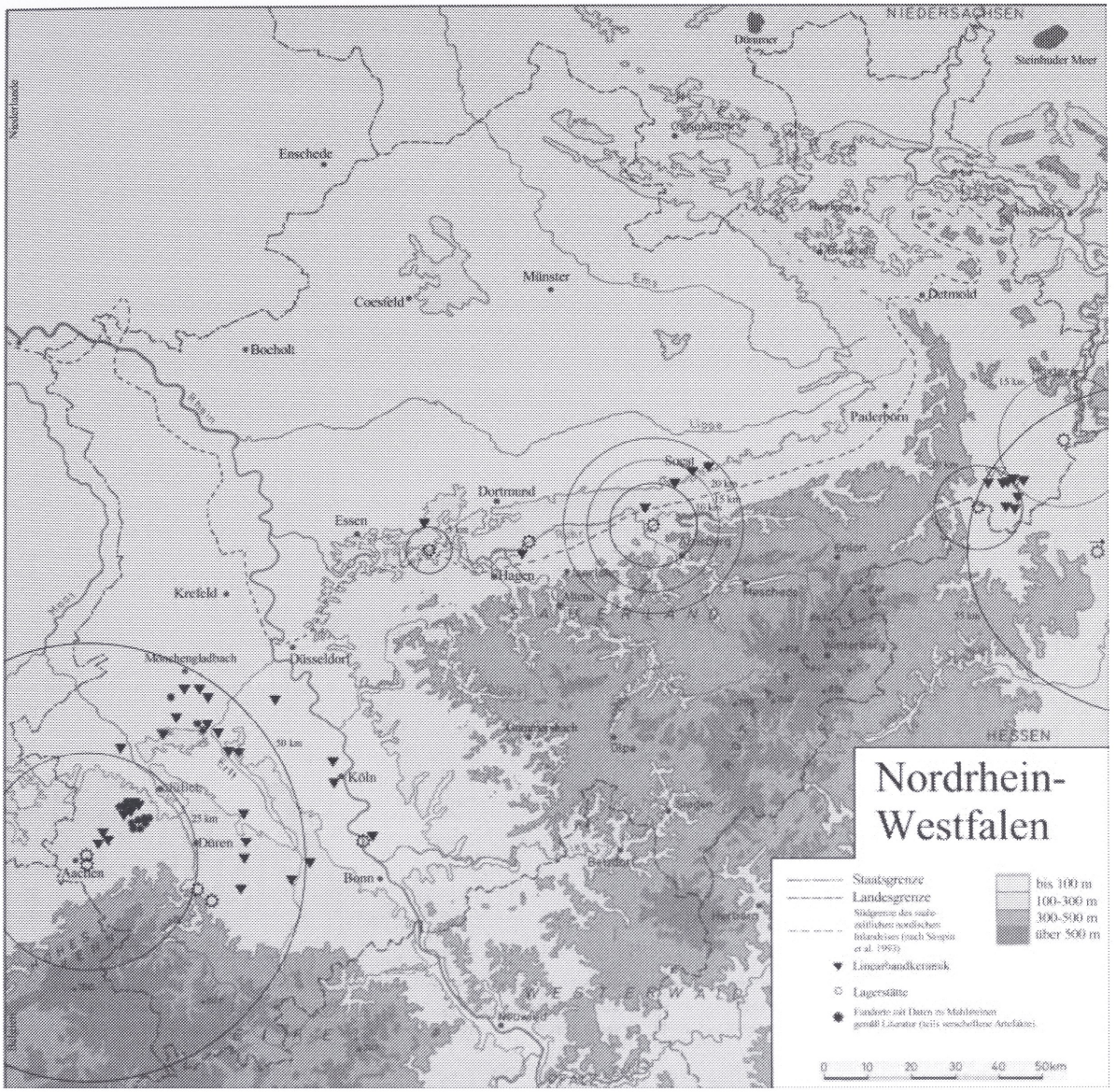

Fig. 6 Region of research during the early neolithic (Linear Pottery culture) (after GRAEFE 2008, Karte 2).

has been identified at the site of Nottuln, Kreis Coesfeld, in the Münsterland. Excavations of the University of Münster in summer 2007 (A. Jockenhövel/Chr. Grünewald/Chr. Groer) showed that the first colonization already occurred by settlers of the late Rössen culture. The distance between the settlement and the collecting spot of the Ruhrsandstein amounts to about 55 km.

The Warburger Börde has been part of the middle neolithic area of settlements, but it was not yet possible to identify querns.

A similar use and distribution of raw materials during the younger neolithic (Michelsberg culture) is shown at **fig. 8**.

Besides of the Rheinland, the Hellweg and the Warburger Börde, querns were examinated from settlements in the Münsterland and for the first time in the Sauerland.

Again the Eschenweiler-Kohlen-Sandstein, the Ruhrsandstein and local sandstones in the Warburger Börde were used.

The raw materials of querns from the Münsterland were now taken from granites. The geological occurrence of these granites are connected with the traces of the last ice age. It is not possible to identify the quarries. Rocks could be collected from many different places.

From the already mentioned site of Nottuln an

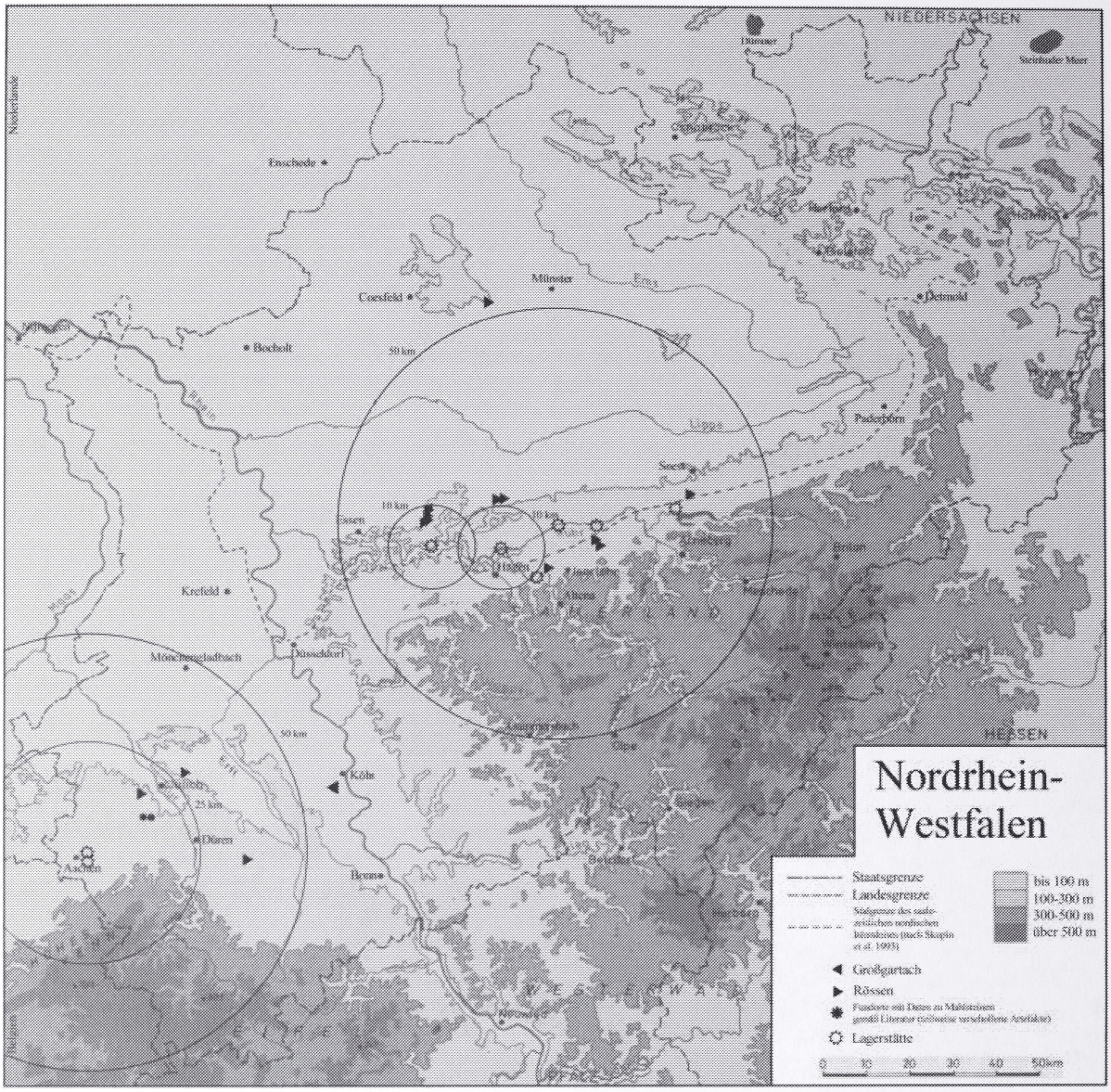

Fig. 7 Region of research during the middle neolithic (Großgartach and Rössen culture) (after GRAEFE 2008, Karte 3).

enclosure of the Michelsberg culture with querns as finds has also been examinated. Granites as raw materials were available near the enclosure.

In some cases only it was possible to identify late- and enneolithic querns in the Münsterland and in the Warburger Börde (**fig. 9**). The querns are made of rocks from local sources nearby the sites.

Within the investigation area the settlements expanded into new territories during the enneolithic period.

Additionally querns from sites which could not assigned to a neolithic culture were investigated. In theses cases the used rocks were taken from local quarries.

Two bronze age querns demonstrate that there are no differences in size, form and distribution of the raw material compared to neolithic querns in north-western Germany.

Deposits of querns

As already mentioned, in the Rheinland the typical raw material used for querns during the neolithic is the "Eschenweiler-Kohlen-Sandstein" or the "Gedauer Konglomerat". The quarries were located in the 1960´s nearby Aachen in the Solberg region by K. Rode (**fig. 10**). By reason of the geological occurrence there are different

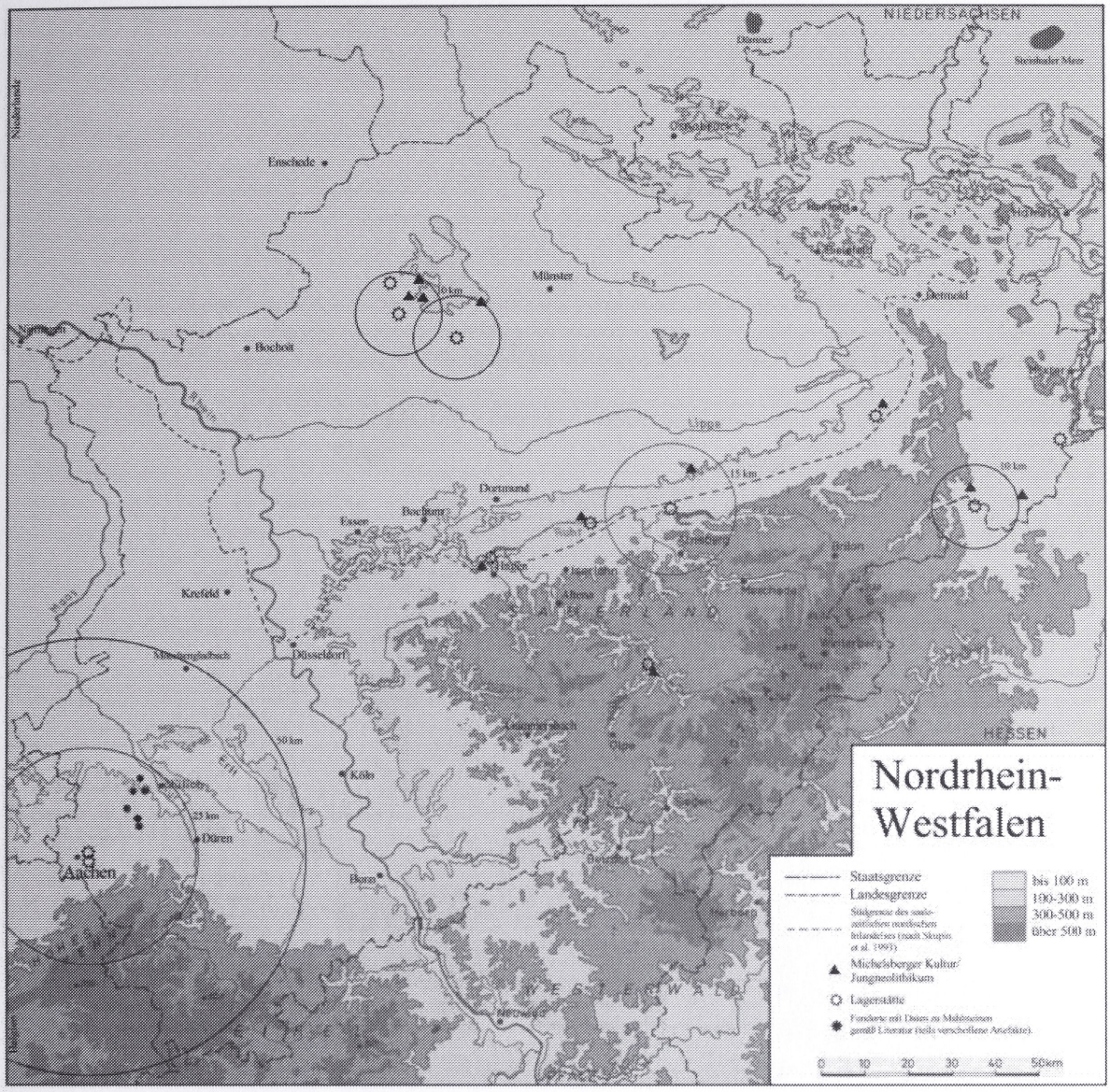

Fig. 8 Region of research during the younger neolithic (Michelsberg culture) (after GRAEFE 2008, Karte 4).

layers of sandstones with their own mineralogical composition, grain size and colour. On this account K. Rode, J. Weiner and J. Schalich identified fife different quarries for querns within a radius of 10 km (RODE 1961; WEINER/SCHALICH 2006, 205).

The extraction of material for querns must have been done by mining. In some cases only rocks from riverbeds were collected. The making of querns can be divided in several stages (**fig. 11**):

First of all, usable rocks were extracted or even collected. The basic form of querns is made by pecking and flaking. In order to finish the quern it is necessary to peck and polish the half-finished product. Some of theses half-finished products are found in settlements. Owing to the wear during the use it is necessary to re-peck or roughen the surface of querns from time to time. Finally the quern breaks and the fragments will be refused (LIDSTRÖM HOLMBERG 2004, 213; RAMMINGER 2007, 105).

One of the rare half-finished products has been found in Eschweiler-Weisweiler, Kreis Aachen. In a pit of this settlement, which is dated to the younger phase of the Linear Pottery culture, the half-finished product of a quern slab and a polishing stone were found (TUTLIES/WEINER 1999, 50-53).

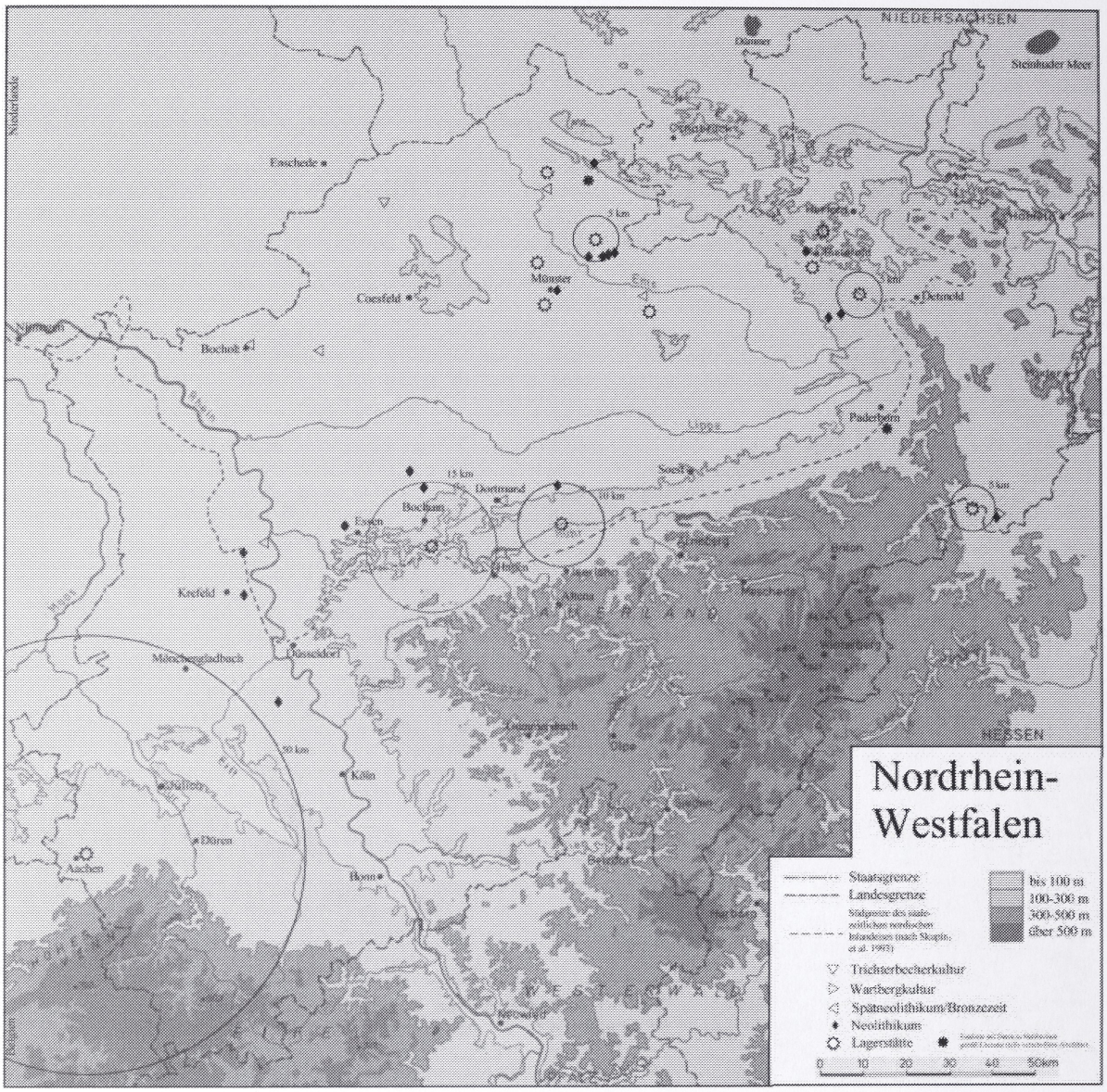

Fig. 9 Region of research during the younger neolithic (Funeral Beaker- and Wartberg Culture, the Enneolithic, Neolithic and bronze age) (after GRAEFE 2008, Karte 5).

It is visible that the quern slab got broken during the pecking in the settlement. The quern slab is refused, although it would have been possible to use the slab as a quern handstone. The raw material is identified as Eschenweiler-Kohlen-Sandstein. The quarries are situated near the settlement. Due to the proximity it was not necessary for the settlers to reuse the quern slab as a handstone. The polishing stone has a convex surface. Therefore it could not have been used as quern handstone. Traces of polishing prove that the stone was only used for polishing the quern slab.

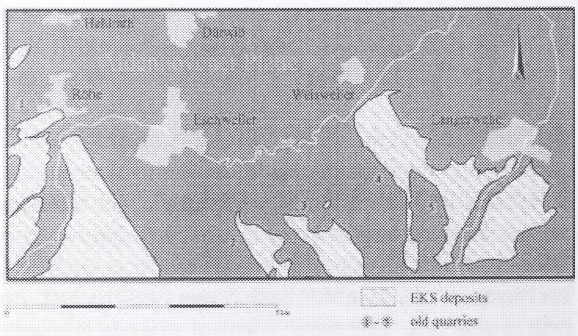

Fig. 10 Deposits of Eschenweiler-Kohlen-Sandsteins at the Aachener Stolberg region (after WEINER/Schalich 2006, 205).

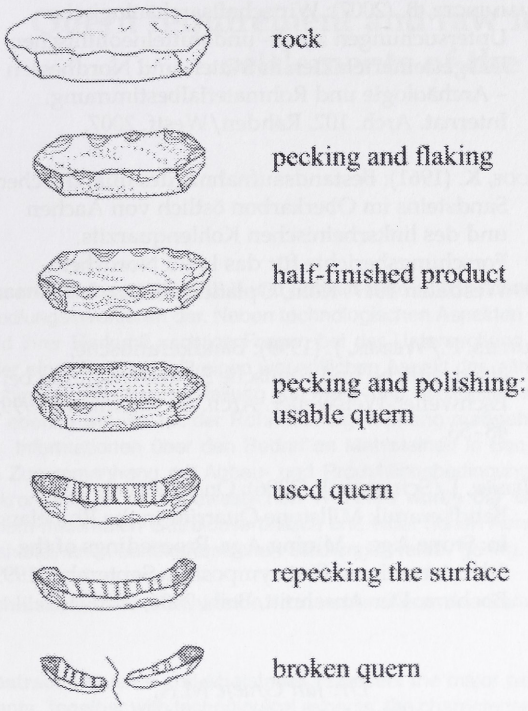

Fig. 11 Life stages of querns (modified after LIDSTRÖM HOLMBERG 2004, 213; RAMMINGER 2007, 105).

Trade? Transmission of raw materials

Models of the transmission of raw materials for querns have been proposed by N. Kegler-Graiewski and A. Zimmermann. The transmission of raw materials for querns are different to those of the transmission for flint (**fig. 12**).

There are no differences in form or size of querns between settlements near quarries and settlements apart. Small flakes of typical raw material from excavated settlements show that the production of querns took place at the houses. For settlements distant to the quarries the production of blanks might have been done at the quarries. The rocks were first examinated at the collection spot. The procurement of raw material was assured by each settlement itself.

Therefore the transmission of raw materials for querns was not done by trade.

(Footnotes)

[1] Sample 1 was taken out of a non-artificial sandstone nearby the quarries of Hannoversch Münden. Sample 2 was taken out of an artificial sandstone of the variation "Hann. Münden" from an early neolithic settlement. Sample 9 was taken out of an artificial sandstone of the variation "Solling" from an early neolithic settlement. Sample 13 was taken out of an artificial sandstone of the variation "Anstehender" from an early neolithic settlement.

[2] I would like to thank the Römisch-Germanisches Zentralmuseum Mainz for a grant of two years.

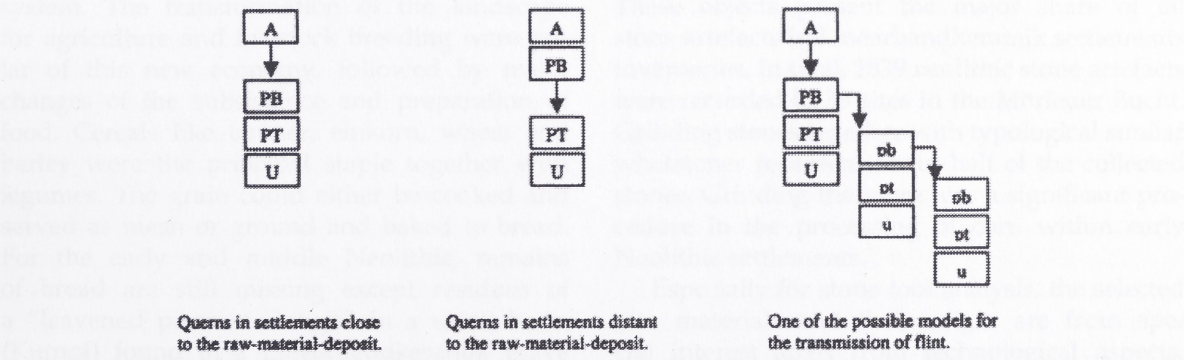

Fig. 12 Models for the transmission of raw materials (after KEGLER-GRAIEWSKI/ZIMMERMANN 2003, 34).

References

Graefe, J. (2004): Altneolithische Mahlsteine im südlichen Niedersachsen. Jahrbuch des Römisch-Germanischen Zentralmuseums 51/1, 2004, 25-92.

Graefe, J. (2008): Neolithische Mahlsteine zwischen Weserbergland und Niederrhein. Zur wirtschafts-archäologischen Aussagekraft einer Fundgruppe (unpubl. Dissertation at the Historisches Seminar, Abteilung für Ur- und Frühgeschichtliche Archäologie of the Westfälische Wilhelms-Universität Münster 2008).

Kegler-Graiewski, N./Zimmermann, A. (2003): Exchange systems of stone artefacts in the european neolithic. In: Burnez-Lanotte, L. (ed.), Production and Management of Lithic Materials in the European Linearbandkeramik. Gestion matériaux lithiques dans le Rubané européen. BAR Internat. Ser. 1200. Oxford 2003, 31-35.

Kneipp, J. (1998): Bandkeramik zwischen Rhein, Weser und Main. UPA 47. Bonn 1998.

Lidström Holmberg, C. (2004): Saddle Querns and Gendered Dynamics of the Early Neolithic in Mid Central Sweden. In: Knutsson, H. (ed.), Coast to Coast - Arrival. Proceedings of the Final Coast to Coast Conference 1-5 October 2002 in Falköping, Sweden. Uppsala 2004, 199-232.

Ramminger, B. (2007): Wirtschaftsarchäologische Untersuchungen zu alt- und mittelneolithischen Felsgesteinartefakten in Mittel- und Nordhessen - Archäologie und Rohmaterialbestimmung. Internat. Arch. 102. Rahden/Westf. 2007.

Rode, K. (1961): Bestandsaufnahme des quarzitischen Sandsteins im Oberkarbon östlich von Aachen und des linksrheinischen Kohlenquarzits. Forschungsberichte für das Land Nordrhein-Westfalen 1017. Köln, Opladen 1961.

Tutlies, P./Weiner, J. (1999): Bandkeramische, eisenzeitliche und römische Siedlungsspuren bei Eschweiler-Weisweiler. Arch. im Rheinland 1999, 48-53.

Weiner, J./Schalich, J. (2006): On potential Bandkeramik Millstone Quarries in the Rhineland. In: Stone Age - Mining Age. Proceedings of the 8th international flint symposium September 1999, Bochum. Der Anschnitt, Beih. 2006, 203-212.

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