Nephrite from the Mur river (Styria, Austria) – Geological, mineralogical and archaeological remarks

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Introduction

The occurrence of nephrites in gravel bars of the Mur river (Styria/Austria) has been acknowledged since the late 19th century. Major efforts to locate sources of this distinct raw material were subsequently undertaken since the discovery of large nephrite specimens used for the production of Late Neolithic flat axe heads. Until today, several nephrite artifacts produced from Styrian nephrite were recovered, reigniting questions concerning the importance of this lithic resource and possible primary sources of the river gravels. The current research intends to revive this topic by investigating one Neolithic nephrite axe head in comparison with nephrite raw material samples.

Research history

In the year 1880 a lively discussion concerning the provenance of nephrite axe heads that were abundantly recovered from Neolithic contexts throughout Middle Europe was raised. This was mainly due to the fact that only sources situated outside Europe were known at that time (Berwerth 1890). In the same year, Fischer (1880) argued in support of an Asian origin for the European nephrite artifacts.

Shortly before the identification of primary nephrite sources at Jordansmühle/Silesia (1884) and of primary jadeite sources in Liguria (1906), the discovery of Styrian nephrites from river gravels attracted international attention. During a 25 year period, over 1100 Styrian nephrites were found in the course of construction work, river control projects and gravel quarrying in the lower course of the Mur river. Nearly 800 specimens were recovered in the city limits of Graz due to gravel quarrying and intensive constructing activities at the turn of the century (Berwerth 1898; Teppner 1913; Hilber 1922). Some of the specimens yielded a weight of over 800 g (Sigmund 1909). The "*Nephritfrage*" (=nephrite-problem) was rekindled in the years 1997/98 when a great number of nephrites was recovered from pleistocene and/or holocene Mur-gravels in the course of the construction of a power station north of Graz (Hiden 2001; **Fig. 1**).

Mineralogy & geology
Prior to the present study, no modern mineralogical analysis methods have been applied to the nephrite gravels stored at the Joanneum in Graz. Previous investigations were confined to purely macroscopic descriptions, involving colour, texture and shape (Sigmund 1909; Teppner 1913 and Hilber 1922). The current investigations aim at the characterisation of selected nephrite objects applying scientific analysis methods, e.g. XRD, SEM-EDX and LA-ICP-MS. The results will form the foundation for comparative studies for nephrite raw material and artifacts of different origins.

The archaeological object investigated in the course of our initial studies is a nephrite axe head from St. Michael (Styria) **(Fig. 2**). A small sample was taken from the area of an earlier thin section (no results are known from this investigation; see arrow at **Fig. 2**) and analysed using XRD.

Since primary deposits are lacking in the catchment area of the Styrian nephrite find spots to date, the investigations will also focus on elucidating the primary sources of the nephrite gravels. Several possibilities for primary nephrite deposits in northern Styria have been proposed. Recently, Niedermayr (1985) considered an unknown deposit located in the vicinity of Zederhaus as the most likely source area of the nephrite gravels found in the area of Graz.

Archaeology
Due to its toughness, Mur nephrite was a sought raw material for the production of axe heads and adzes in Neolithic times. To date, six axe heads / adzes from nephrite are known from Styrian Late Neolithic settlement contexts or as stray finds. One specimen that was found in the 1910s in the area around St. Michael near Leoben is completely preserved. It represents a symmetrical, flat axe head with secondary use-wear traces on the cutting edge indicating hammering / battering. No other primary or secondary traces are found on the object, proving that the use of this artifact was exclusive to the primary cutting edge. The avoidance of surface damaging of any kind (as is usually observed on secondarily reused axe heads of different raw materials) may indicate the value assigned to this object.

Fig. 1: Nephrite gravels from the Mur river recovered in the course of the construction of a power station north of Graz, Styria (Austria). Photo: D. Jakely and G. Hauer, Graz.

Fig. 2: Nephrite axe head from St. Michael/Styria (Austria).
The arrows indicates the sampled area. Photo: D. Modl.

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