2 Introduction

The quartz vein at Cnoc Dubh was first discovered by amateur archaeologist Mr James Crawford in connection with his reconstruction of a corbelled shieling north-east of the site. As Mr Crawford believed the vein to have been worked in prehistory, he reported it to Western Isles archaeologist Dr Mary MacLeod. She inspected the location with Mr Crawford and, as she agreed that the vein might have been exploited, she invited the author to assess the site in his capacity as a lithics specialist.

In January 2002 the author undertook a cursory examination of the vein and its surroundings and, as he was able to confirm that it had indeed been worked, a more thorough investigation was planned. A detailed assessment was carried out in September 2002 and, as part of this exercise, the vein was examined, measured, photographed and characterized. This work was accomplished with the generous funding of the Katherine Mackichan's Bursary Trust. The analysis of the Cnoc Dubh quartz vein forms part of the project *Quartz Technology in Scottish Prehistory* (Saville & Ballin 2000), the main aim of which is to explain quartz assemblage variability in Scotland. This project has previously received funding from Historic Scotland, the National Museums of Scotland and the Russell Trust.

It is a well-known fact that production of core rough-outs, blanks and tool preforms, or in some cases final tools, took place in the vicinity of prehistoric mines (cf. Ericson & Purdy 1984). As a consequence, Schneiderman-Fox & Pappalardo 1996 put forward a detailed model for the investigation of prehistoric quarry sites, emphasizing the following four activity areas:

- the quarry itself where material is extracted
- the tailing pile, just below the quarry face, containing blocks of quarried material
- the ore dressing, milling, or transition area, located below and within 50 m of the quarry face, where large blocks are broken down for transport, and
- the lithic reduction site above the quarry face or on a level terrace adjacent to the quarry face, where reduced blocks are further reduced into preforms or final tools

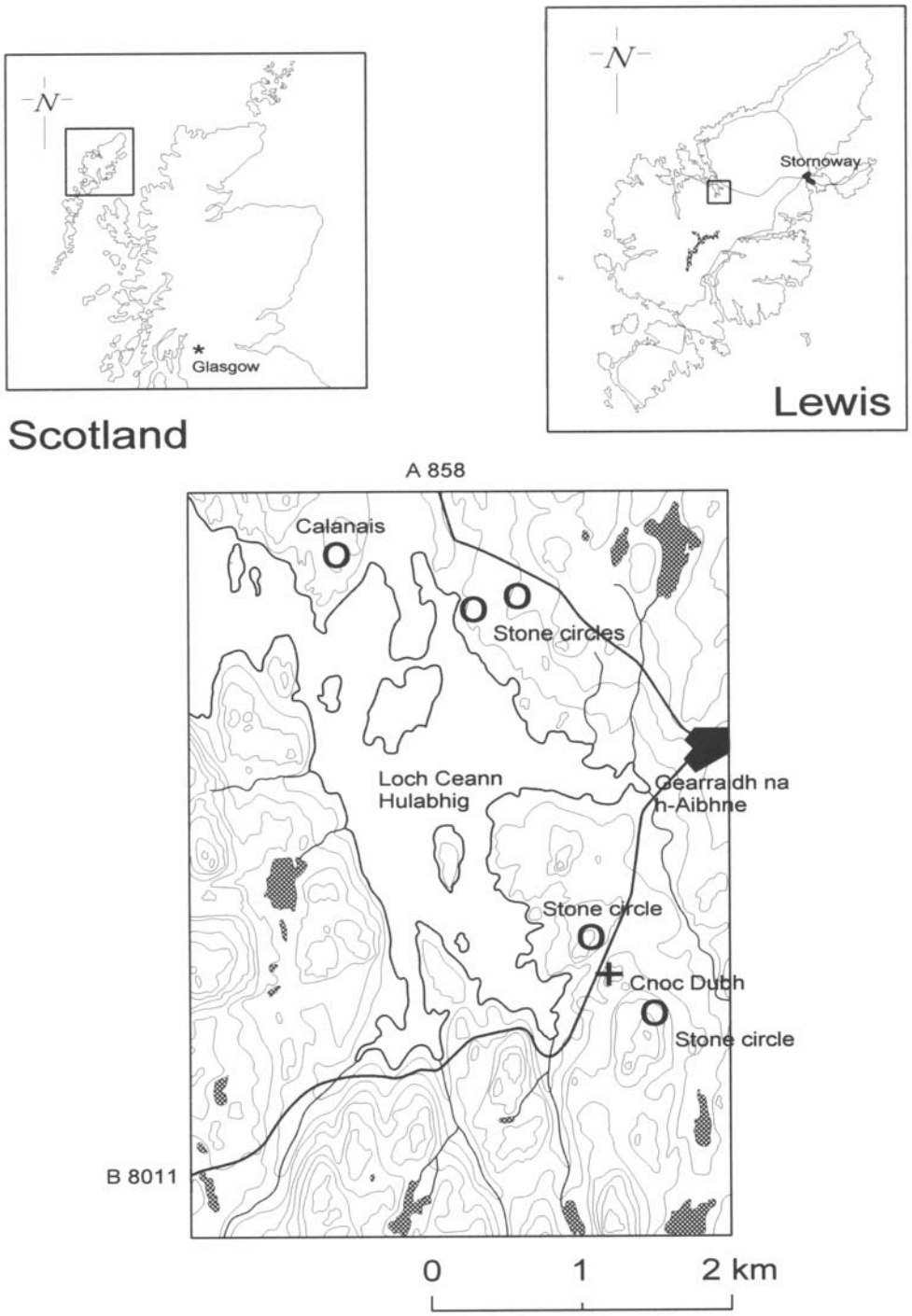
Examination of printed and Web-based papers demonstrates that archaeologists tend to focus on the latter three points, with the characterization of the actual quarry being much less detailed than the description of the associated activity areas (eg, most of the papers in Ericson & Purdy 1984) – if the quarry itself is not completely ignored. In Abbott *et al.* 2001 the authors suggest a number of specific research domains with regards to quartz and other silicate sources; one of these research domains is specified in the following way:

> 'The location and intensive investigation of more quartz and silicate quarries: Additional quarries need to be examined in order to compare procurement strategies, mining techniques, tools used to extract the raw materials, artifact assemblages, the quality of material being mined, estimates on labor investments, and transportation costs. In addition, feasibility studies should be undertaken to determine if it is possible to identify individual sources by trace elements or chemical composition. Data obtained from quarry sites serve as a baseline in which later production activities on other sites in the settlement system are measured. Without this basic level of information, lithic production models for specific populations will be suspect.'

Consequently, the aims of the present paper are to:

- characterize the actual Cnoc Dubh worked quartz vein in detail, and as part of this process, define attributes diagnostic of prehistoric exploitation
- obtain information on the physical exploitation of the vein, that is, the 'mining operations' by which quartz was procured
- compare the Cnoc Dubh quartz quarry with other lithic quarry sites and define how the extraction of quartz may relate to the extraction of other lithic raw materials, and
- discuss the ownership of, and access to, the Scottish quartz sources.

Examination and discussion of the Cnoc Dubh quarry's associated activity areas (as in Schneiderman-Fox & Pappalardo 1996's model, noted earlier) do not form part of this paper. When the sheep pen in front of the vein was constructed, no excavation was carried out. A slab of concrete was simply laid on top of rocks that had been dragged over to level off the ground (James Crawford *pers comm*). The tailing pile, just below the quarry face, may therefore still be intact, though presently inaccessible. During 2003/04 James Crawford carried out excavations around the Cnoc Dubh beehive structure, mainly to increase his understanding of the building's foundations. As part of this work, a small assemblage of lithic artefacts was recovered, supplemented by prehistoric and more recent pottery. The lithic assemblage includes: one crude single-platform core and one side-scraper in flint, 10 platform and bipolar flakes in quartz, one irregular quartz core, three end- and side-scrapers in quartz, one piercer in quartz, one scraper-piercer in



Illus 1 Location map. The Cnoc Dubh quartz quarry is marked by a cross, and the Calanais ritual complex, as well as the area's numerous stone circles, are marked by circles.

quartz, and one hammerstone/anvil in stone. This assemblage may relate to the quartz quarry, and possibly represents part of the associated activity areas where the quarried quartz was further reduced, or an actual settlement. The lithic debitage, cores and tools are quite plain, and the assemblage most likely represents a later prehistoric industry (post Early Bronze Age). Beverley Ballin Smith kindly examined the pottery which appears to be mainly middle and later Iron Age (some of it probably dating to the first millennium AD), supplemented by small amounts of more recent material.