The Lithic Raw Material Assemblage at the University of Iowa's Office of the State Archaeologist: An Internet-based Framework for Lithic Analysis

www.uiowa.edu/~osa/lithics/

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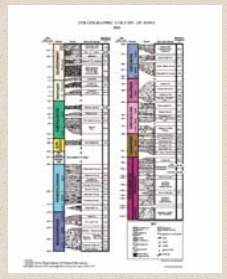
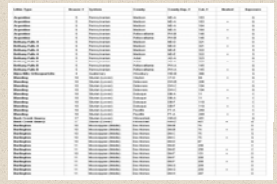
Geologic sourcing of chipped stone artifacts and lithic debitage is a routine part of archaeological analysis and report writing. In order to do this task, a comparative collection is obviously necessary, one with solid geologic associations and an expansive geographic selection. Iowa is well supplied with a variety of quality, knappable lithic raw materials from both primary and secondary sources. Identification of archaeological specimens with a specific raw material is primarily accomplished by macroscopic analysis techniques geared toward achieving a "best fit" results.

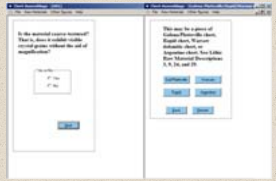
Microscopic viewing is sometimes applied in order to take a close-in look at surficial characteristics however, this is still a macroscopic technique. The University of Iowa's Office of the State Archaeologist (OSA) has an expansive lithic raw material assemblage, from within the state and 7 surrounding states, as well as 14 additional states. The assemblage has a 20+ year compilation history primarily operating on an "ad hoc" basis. Recent lithic raw material identification excursions have lead to the realization that the OSA collection was in need of revision and reorganization, on a structural level, in order to provide a more systematic and consistent approach to lithic source identification.

Presently, in-state samples number almost 318 while out of state samples number approximately 230. We created a new count of the lithic samples that compose the collection. Missing samples were replaced from the bulk samples when possible and mislabeled samples were corrected. Whenever necessary, bulk samples were reduced into flaking debris using stone and antler hammers. Revised inventory tables were created using Excel (far right). From this new inventory, we began a systematic program of heat treating exterior and interior flakes of all in-state samples. We used an 18 qt. Westinghouse Roaster Oven (bottom left) filled with river sand. The temp was ramped up to 500° F and the samples soaked at this temp for 6-8 hours. In 5½ weeks, we processed roughly 12 samples per day for a total of 318 samples treated to date.

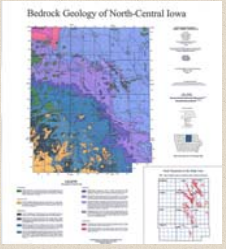


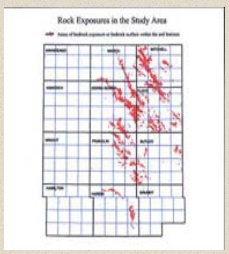
This was a cost and time effective method allowing us to use an inexpensive oven, available lab space, and be able to monitor and complete the cooking process of a single batch within one working day. The drawers (left center) are arranged to mirror the geologic column of Iowa (right center), beginning with the Quaternary system rocks at the top left hand side and ending with the Pre-Cambrian rocks at the lower right hand side. Within any given geologic system, the individual drawers are arranged to hold samples ordered alphabetically by county. This provides data for all samples on their geologic system, series, formation/group, and member as well as county identification and specific location within the county.



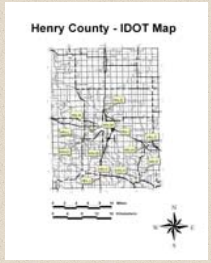


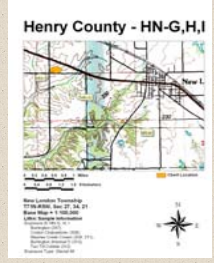
In 1994, Morrow published an article entitled, A Key to the Identification of Chipped-Stone Raw Materials Found on Archaeological Sites in Iowa, which serves as the basis for the Visual Basic Script program above. Included in the article is a state-wide map of chert bearing bedrock systems, definitions of lithic macroscopic attributes, descriptions for 35 of the most commonly occurring lithic raw material types in Iowa, and a logic diagram employing multiple macroscopic attributes to help correctly identify raw material. This macroscopic identification key has been the primary resource available for identifying chert samples and lithic characteristics in Iowa. The logic diagram asks a series of "yes / no" questions regarding macroscopic attributes such as texture, fossil content, grain size, mottling, transparency, and color which leads to an identification page complete with two sized pictures and accompanying written descriptions. Morrow 1994 In *Journal of the Iowa Archeology Society*, 41:108-129.

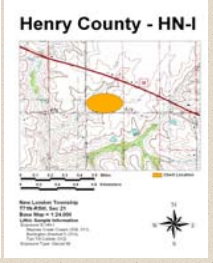




The 1998 bedrock map (far upper right) is also tied to individual regional bedrock maps currently under production by the Iowa Geological Survey (upper left). These maps afford a more detailed view of smaller regions and are accompanied by a thorough review of previous research and current understandings. Insets (lower left) identify shallowly buried and surface bedrock outcrops. All known lithic sources located on individual county maps have been digitized so this information can be coupled with the Excel lithic inventory for a GIS format. With the creation of a GIS for the Lithic Raw Material Assemblage, data can be use with a variety of base maps including state department of transportation maps (top right), 1:100,000 scale and 1:24,000 scale topographic maps (lower right). This has yielded a better picture of where our known lithic sources are. The state-wide landform regions map will also be integrated into the GIS format for additional analytic potential. The current assemblage is the result of opportunistic sampling, leaving areas of the state possibly under represented or not represented at all. Additional samples are constantly being acquired and incorporated into the assemblage.







Example: The Rummells-Maske site (13CD15) located in Cedar County, Iowa (right), is a cache of Clovis points made of two different chert types, Verdi and Burlington. We used the OSA revised lithic assemblage to search for a positive identification with a known Burlington chert source location and found a match, LA-B. This indicates that the Paleo-Indians responsible for the Clovis points recovered at 13CD15 likely traveled the 75 km of Cedar River between lithic source to site, which is consistent with current understanding of high mobility during that period. Additional questions to be investigated include: Are there any recorded Paleo-Indian sites in the vicinity of the identified lithic source? Are there other known Paleo-Indian artifacts made of the same lithic source material along this stretch of the Cedar River? And if so, what is their distribution? Additional anthropological questions for all prehistoric periods can potentially be addressed through better knowledge of lithic sourcing.

We are focusing on four main methods for future directions: geologic thin sectioning, ultraviolet florence, cathode-ray luminescence, and use of the University of Iowa's scanning electron microscope (UI-SEM). Thin sections and the UI-SEM would establish opportunities for basic microscopic analysis. All four of these methods are productive, relatively accessible, and very time and cost effective.

Macroscopic lithic analysis is a given in archaeological research and a collection of physical samples, geologically organized, and geographically well documented is a must. It is our belief that this assemblage will provide that resource. Since prehistoric artifact assemblages are so often dominated by lithic materials, a well developed comparative assemblage could afford researchers the opportunity to address a myriad of issues including but not limited to trade, the movement of people, and social interactions. The physical, geological, and geographical revision/reorganization of this assemblage are complete and housed at the OSA lab. The web-based manifestation makes the OSA Lithic Raw Material Assemblage accessible from any place, throughout the Midwest, or even world-wide, at www.uiowa.edu/~osa/lithics/