Re-Designing PIDBA (The Paleoindian Database of the Americas): Enhancing the Accessibility of Information and the User Experience

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Abstract:
PIDBA is a two decade-long project to compile Paleoindian data from multiple sources. One goal of the project is to provide archaeologists a resource to conduct original research with raw data. PIDBA has been continuously growing over the past two decades, as new data is compiled, analyzed, and presented to users of PIDBA.org. PIDBA contains attribute data of Paleoindian points, maps of geographic distribution, radiocarbon dates, and images of artifacts. This presentation unveils the new design and features of PIDBA, to illustrate the information that is accessible at the site, and how the website is becoming more accessible to researchers.

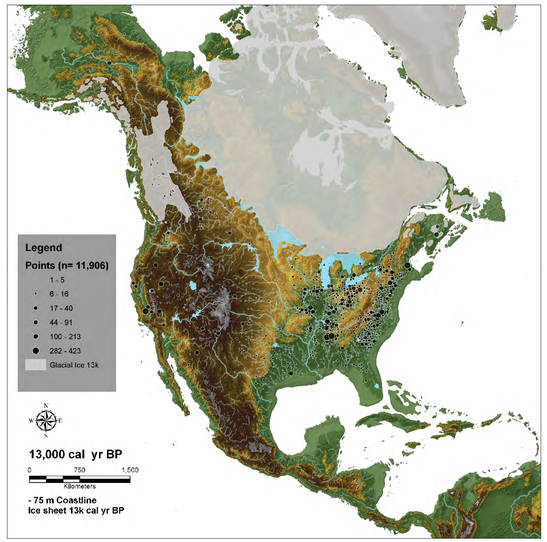
Accessing PIDBA is easy!

PIDBA could not exist without the work of many experts in the field who have produced the state and province level surveys of Paleoindian materials. Objects found both in museums and curation facilities as well as in private collections have been examined and included through the patience and perseverance of these dedicated researchers.

Our job at PIDBA has been to take these data and bring them together for understanding larger regional and continental scale patterns, and to provide a gateway to other researchers to work with the raw data.

This project, which started over two decades ago, has been sharing data through whatever digital means available. One of the strengths of PIDBA has been that it is a research group formed and maintained for the love of the record, and without a major funding source. Indeed, PIDBA has been an entirely voluntary effort to date. PIDBA has as a goal making Paleoindian datasets available electronically. Many of these originally appeared in research notes and a variety of publications, texts, and dissertations. The data have always been maintained in spreadsheet and image formats, arranged in file folders by state or province. It is a simple way to communicate information, however, and easily digested by archaeologists (even those who aren't "computer savvy").

Several key changes are being made in the delivery of information from PIDBA: First, images and drawings of individual lithic projectiles are presented in a new friendlier way to facilitate browsing and downloading. Secondly, the detailed point attribute data are moving to a standard format that is more compatible with statistical programs and less prone to data integrity errors. Finally, the PIDBA data have been linked to topographic data in a GIS to facilitate map output. These data include shoreline, ice sheet, and pluvial lake boundaries at various times in the past, specifically during the late Pleistocene and early Holocene eras.



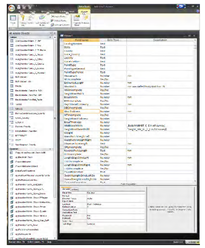
The PIDBA base map data are derived from publicly accessible datasets:
ETOPO1 global digital elevation (Amante and Eakins 2009)
Ice Sheet data from the Geological Survey of Canada (Dyke et al. 2003)
North American Rivers and Streams (National Atlas ® 2008)

The compilation and dissemination of primary data from multiple sources and across large areas in electronic form is one of the major challenges facing the archaeological profession in the twenty-first century. The Paleoindian Database of the Americas (PIDBA), available on-line at http://pidba.utk.edu, integrates database and GIS technology to make available locational data on >30,000 projectile points, attribute data on >15,000 artifacts, and image data on >7,500 points from across North America.

To explore the site, simply Google 'PIDBA' … we have made a lot of changes recently!

Enhancing Accessibility: PIDBA Information Management

Over the last few years, the primary attribute data that have been delivered as spreadsheets are being transformed into a relational database with standardized attributes to encompass all the point surveys. This allows for more functional joins to GIS files, and the data more easily export to formats native to statistical packages. Data integrity is increased, redundancy reduced, and errors associated with data entry are reduced. This combined data set contains primary attribute data on over 10,000 points.



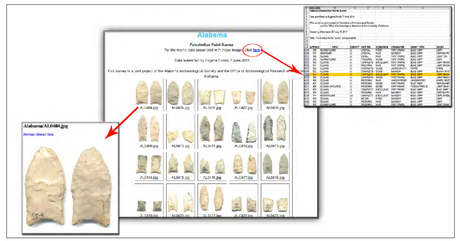
Screen shot showing database implementation in Microsoft Access

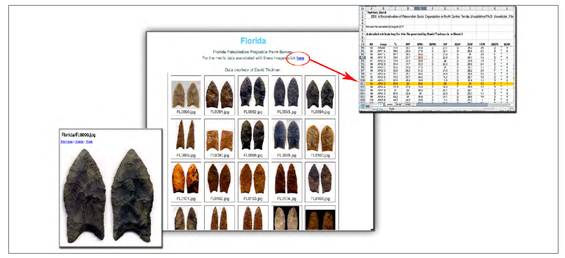
Database entry/edit form

Form for viewing images (joined on survey number)

Enhancing Accessibility: PIDBA Images

Since 2009, images of Paleoindian artifacts begun to be uploaded into PIDBA. Initially, artifacts could be viewed one at a time, and were obtained by entering the artifact number for the state survey in question. This proved cumbersome, so in 2011 a new method of presentation was devised, whereby all the artifact images were displayed at once. Clicking on the artifact gave access to a high resolution picture.





Photographs, measurements, references and GIS layers can be connected or joined through survey numbers, state, county, and in some cases even more detailed provenience.

All data are referenced to the original reports from which they are derived. In the new database structure, points reference a key number that is associated with a report, or published survey, or unpublished survey. This way when information is retrieved from the database a list of appropriate references can be generated automatically.

The right hand panel shows some of the many ways PIDBA has been utilized by researchers to develop and challenge Paleoindian settlement models.

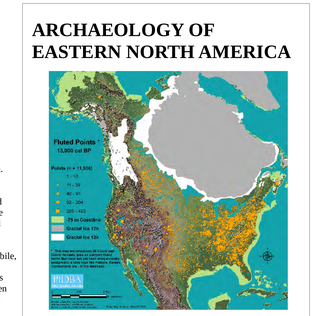
Using PIDBA Data to Develop Paleoindian Settlement Models

The first application of information that became the PIDBA database came in 1990, when Anderson made use of fluted point distributional data from across Eastern North America to develop his 'staging area' colonization and settlement model, and at the same called for data to go into what he then called a 'North American Paleoindian Projectile Point Database' from which PIDBA has evolved over the intervening two decades (Anderson 1990a, 1990b). The distribution maps indicated that the occurrence of Clovis artifacts and sites was not uniform, but characterized by concentrations indicating some areas were highly favored, particularly along the major rivers of the midcontinent, as well as portions of the Atlantic seaboard and Florida. These, settings rich in exploitable resources, were hypothesized to have been staging areas, where initial populations settled and grew, providing a stable social environment from which the exploration and settlement of the larger region could occur, and groups return to in the event they lost members or were unable to find mates or other critical resources (Anderson 1990a). This "place-oriented" model is an alternative to the "technology-oriented" perspective of authors such as Kelly and Todd (1988) that views Clovis populations as highly mobile, and dependent on their technology rather than settling into particular places. The staging area model was based on fluted point distributions and general landscape characteristics, the evaluation of which has been superseded by more sophisticated GIS-based analyses (Anderson and Sassaman 2012:50-51).

Smallwood (2011, 2012), in a test of these staging area models, demonstrated differences in Clovis projectile point manufacturing in different parts of the region, an expectation of the original model, although she noted that more precise dating will be needed to determine whether this reflected a temporal distinction or diversity due to drift.

Thulman (2006, 2009) identified distinctive clusters of Clovis and immediate post-Clovis points in different portions of north-central Florida that he thought represented discrete group ranges, and possibly change over time. The differences between areas arose in part, he argued, to small copying errors in the transmission of manufacturing procedures among populations somewhat isolated from one another by the irregular occurrence of surface water. Thulman graciously provided all of his data to PIDBA, and the illustrations of over 1000 Florida points on PIDBA images come from his work

Using data from PIDBA, Miller used an approach derived from complex systems theory to examine the distribution of Clovis bifaces in the southeastern United States. In particular, he found that the counties with the highest density of bifaces are near the intersection of major rivers, physiographic boundaries and lithic raw material sources. He argued that these represent static, highly accessible locations which are consistent with areas used by ethnographic hunter-gatherers for aggregation loci in boreal and temperate contexts. Moreover, like many models for the colonization of North America (e.g. Anderson and Gillam 2000; Beaton 1991; Meltzer 2004), one of the key constraints may have been the ability to maintain a social network under conditions of low population density. However, rather than proactively addressing this problem at strategic level, an alternative explanation would be that Clovis groups, or their predecessors, inadvertently solved this problem at a much more local level. Specifically, the intersection of rivers, topographic relief, and chert sources provided places that were initially easy to locate, describe and re-locate. This may have led to a preferential attachment, or "snowball" effect, where these locations were repeatedly occupied over time by increasingly larger groups of individuals, emerging as something identifiable archaeologically as potential aggregation loci. Consequently, rather than people repeatedly occupying these spots because of some ecological advantage, Miller argues that they came to these spots because at certain periods there would be a higher probability of interacting with others. Instead of optimally foraging for resources, the defining characteristics of the landscape may have helped foster a context which made it easier to optimally forage for encounters with other individuals in an emerging social network.



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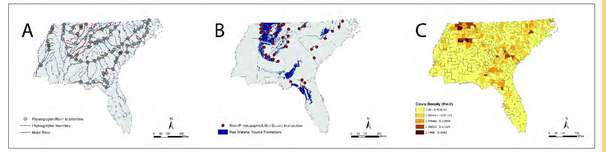
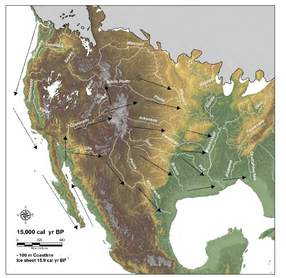
PIDBA is described in detail in a recent paper in Archaeology of Eastern North America (Anderson et al. 2010)

Figure: Paleoindian projectile Point Stylistic Zones in North Florida as Determined by Thulman (2006, 2009).
Image courtesy David Thulman.



PIDBA data has also inspired consideration of various colonization routes into the Americas (Anderson and Gillam 2000). When peoples moving down the west coast reached the end of the Baja California peninsula, and land literally ran out, unless they had watercraft capable of making the crossing to Mexico (an open water gap of about 100 km at 15,000 cal yr BP), and were even aware of the possibility, they would have had to turn back to the north. Moving north along the east side of Baja, unless they island hopped over to Sonora near the northern end of the Gulf in the vicinity of Isla Ángel de la Guarda and Tiburón Island, they would have encountered the mouth of the Colorado River. Some populations may have chosen to follow this mammoth waterway into the interior, while others, continuing on down the western coast of Sonora, would have eventually reached Central and South America. Some of the earliest populations in the interior of North America may have been in places within or easily reached from the Colorado River Basin. The Debra L. Friedkin site in Texas is one such possibility (e.g., Waters et al. 2011). We must thus consider the possibility that Eastern North America, with its remarkable fluted point tradition, could have been initially settled from the southwest (Anderson 2012).



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