# PERSEPOLIS FORTIFICATION ARCHIVE PROJECT

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When we began to learn about the legal emergency that puts the Persepolis Fortification Archive in peril, a colleague couldn't resist quoting Samuel Johnson's old saw: "The prospect of hanging concentrates the mind wonderfully." The prospects of the Archive are still perilous, and the Persepolis Fortification Archive (PFA) Project's attention is still concentrated wonderfully on its emergency priorities: to make thorough records of the Archive and to distribute the records widely, freely, and continuously.

The PFA Project's collaboration with the West Semitic Research Project (WSRP) at the University of Southern California captures two sets of very high-resolution images of Persepolis Fortification tablets and fragments. One set is made with high-resolution BetterLight scanning backs and with polarized and filtered lighting (fig. 1); another set is made with polynomial texture mapping (PTM) technology and software that allows a viewer to manipulate the angle, intensity, and focus of the apparent lighting. A two-year grant from the Andrew W. Mellon
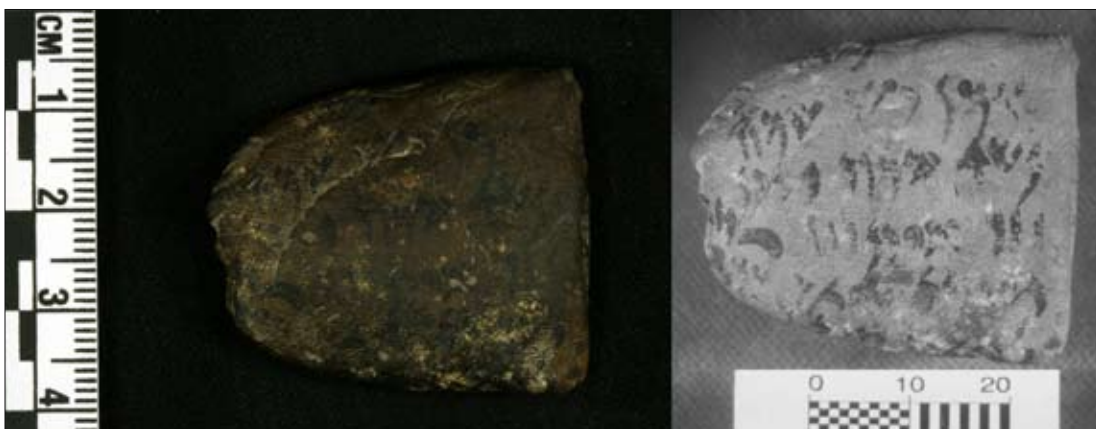
Figure 1. BetterLight scans of an Aramaic Persepolis Fortification tablet. Left, with natural light; right, with infrared filter

Figure 2. Miller Prosser (foreground) and Clinton Moyer process high-quality images of Persepolis Fortification tablets. Foreground: the new, larger PTM dome; middle: the veteran PTM dome; in alcove at rear: BetterLight scanning camera

Foundation supporting this work came to an end, but a second two-year Mellon grant keeps the work going, expands it, and accelerates it by adding another, larger PTM dome (fig. 2). Clinton Moyer (Ph.D. 2009, Cornell), Joseph Lam (Ph.D. candidate, NELC), Miller Prosser (Ph.D. candidate, NELC), and John Burnight (Ph.D. candidate, NELC) are now making these images. By mid-2009, this phase of the project has made images of about 660 monolingual Aramaic Fortification tablets, about 900 uninscribed, sealed Fortification tablets, and about 200 Elamite Fortification tablets. Now that almost all the Aramaic tablets are captured, the next targets are Aramaic epigraphs on Elamite cuneiform tablets (figs. 3 and 6), more uninscribed, sealed tablets, and selected Elamite cuneiform tablets.

Figure 3. BetterLight scans of an Aramaic epigraph on an Elamite Persepolis Fortification tablet. Left, with polarized light; right, with red filter

During 2008–2009, the crew capturing and editing conventional digital images of Elamite Fortification tablets included undergraduates Trevor Crowell, Fay Kelly, and Madison Krieger (all Classics), graduate students Lori Calabria, Paul Gauthier, Megaera Lorenz, Elise MacArthur, Tytus Mikolajczak (all NELC), and Glenn Garabrant and Gregory Hebda, often working five at a time (fig. 4). This phase of the project has also accelerated since Calabria partially automated the editorial process. As of mid-2009, digital photography of the more than 2,500 PF-NN tablets (that is, Elamite documents that the late Richard T. Hallock edited in preliminary form, but did not publish) is nearly complete, photographs of about 425 new Elamite Fortification tablets (Elamite documents that I have edited in preliminary form) is underway, and photography of the approximately 2,000 Elamite tablets that Hallock published in *Persepolis Fortification Tablets* (OIP 92 [1969]) will soon resume.
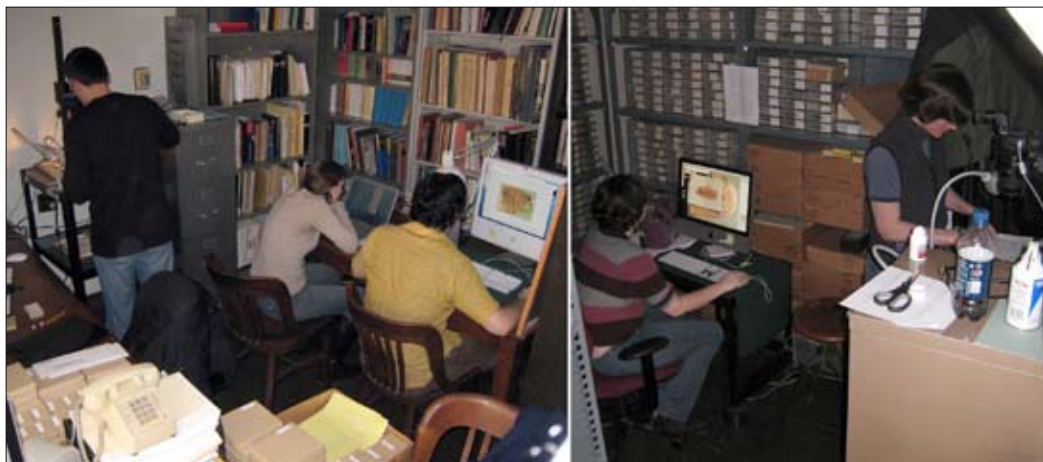
Figure 4. Working at two photography stations, two photo editing stations, and one station cataloging scans, all in a single Oriental Institute office, from left, Tytus Mikolajczak, Lise Truex, Glen Garabrant, Trevor Crowell, Lori Calabria. Background, right: storage boxes of still-unprocessed Persepolis Fortification tablets

We are providing the photographs of the Elamite tablets to our collaborators at the Cuneiform Digital Library Initiative (CDLI) at the University of California, Los Angeles, to supplement the fast flat-bed scans made for CDLI's online presentation, and the revised transliterations of the texts being completed by graduate students Andrew Dix, Seunghee Yie (both NELC), and Wayne Munsch (Divinity). (See http://cdli.ucla.edu/ ; click on "CDLI Search" and enter "OIP 092" in the form under "Primary Publication.") Edited images of all categories of Persepolis Fortification documents are being copied to a server at the Collège de France for release on Achemenet (http://www.achemenet.com) and its companion site, the Musée Achéménide (http://www.museum-achemenet.college-de-france.fr/).

Images, editions, and cataloging information all flow into the On-Line Cultural Heritage Research Evironment (OCHRE: http://ochre.lib.uchicago.edu), where PFA Project manager Dennis Campbell (Ph.D., NELC) coordinates, connects, and smoothes the data compiled by PFA Project editors, and prepares it for public release. Campbell and Internet Data Specialist Sandra Schloen have added many refinements to the PFA interface on OCHRE. Graduate students Seunghee Yie and Wayne Munsch are tagging and linking photographs to transliterations and the transliterations to the glossary and parser. As of mid-2009, OCHRE users can view about 750 Persepolis Fortification documents: about 500 Elamite Persepolis Fortification tablets, with interlinked transliterations, translations, notes, seal information, Elamite-English glossary, topical English-Elamite glossary, morphological parsing, and conventional digital images; about 30 Aramaic tablets, with interlinked transliterations, translations and notes, seal information, glossary, scans of the late Raymond Bowman's draft copies and editions, and selected high-resolution BetterLight scans, and live screen-resolution PTM images; a sample of 110 uninscribed, sealed Fortification tablets with interlinked seal catalog information, seal drawings, and live screen-resolution PTM images (fig. 5).

InscriptiFact (http://www.inscriptifact.com), the online application of the WSRP, makes the PFA Project's high-resolution images public with a very robust and user-friendly interface that allows viewers to manipulate, compare, and download them. As of mid-2009, InscriptiFact users can view almost 9,000 images of about 370 Persepolis Fortification documents (mostly Aramaic and uninscribed tablets and fragments). WSRP has developed an elegant stand-alone viewer
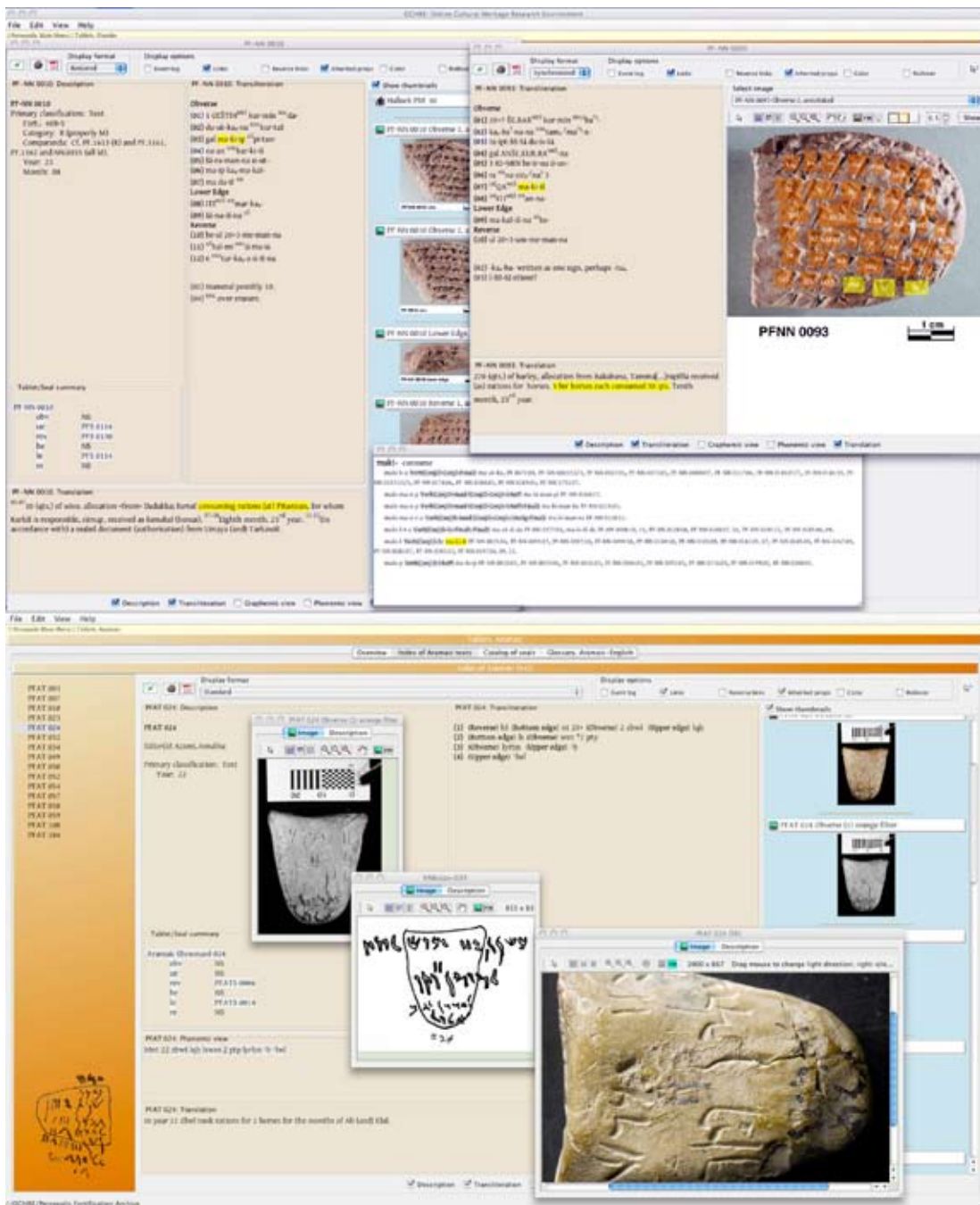
Figure 5. OCHRE views of Persepolis Fortification tablets. Top: Elamite document, showing transliteration, translation, seal information, glossary look-up, and another tablet opened from a reference in the glossary look-up, also with transliteration, translation, and tagged photograph, and highlighting the signs of the word found in the glossary. Bottom: Aramaic document with two texts, one incised and the other in ink, showing transliteration, translation, seal information, autographed copy by Raymond A. Bowman, BetterLight image (with orange-filtered lighing) and live PTM image

for PTM images that can be run as a Java application on PC or Macintosh computers, currently available to PFA Project staff and soon to be generally available (fig. 6). WSRP is testing an online version of this viewer to be incorporated into the InscriptiFact application. The capabilities, speed, design, ease of use, and platform independence of these viewers are a great advance over the previously available DOS-based viewer, allowing users to see and manipulate PTM imagery at a choice of resolutions, and to make side-by-side comparisons with high-resolution flat scans.

During three extended visits to the Oriental Institute in the past year, PFA Project editor Wouter Henkelman (Amsterdam and Paris) has prepared collated, revised, and annotated editions and translations of about 1,000 Elamite PF-NN documents. These are being brought online category by category in OCHRE, fully glossed and parsed, along with linked and tagged images. Revised editions of comparable previously published Elamite Fortification documents and preliminary editions of comparable newly recorded Elamite Fortification texts will accompany these releases.

During nine trips to the Oriental Institute in the past year, PFA Project editor Mark Garrison (Trinity University, San Antonio) has verified and revised identifications of seal impressions on about 850 of these PF-NN documents. He has set up an OCHRE-based catalog of about 1,150 seals identified from impressions on published Elamite Fortification tablets, incorporating collated drawings of those that he and Margaret Root have published in the first volume of their magisterial work on Persepolis Fortification tablet seals (*Images of Heroic Encounter* [OIP 117]; available for free download at http://oi.uchicago.edu/research/pubs/catalog/oip) and drawings of those to be published in succeeding volumes. He has added approximately 225 more distinct
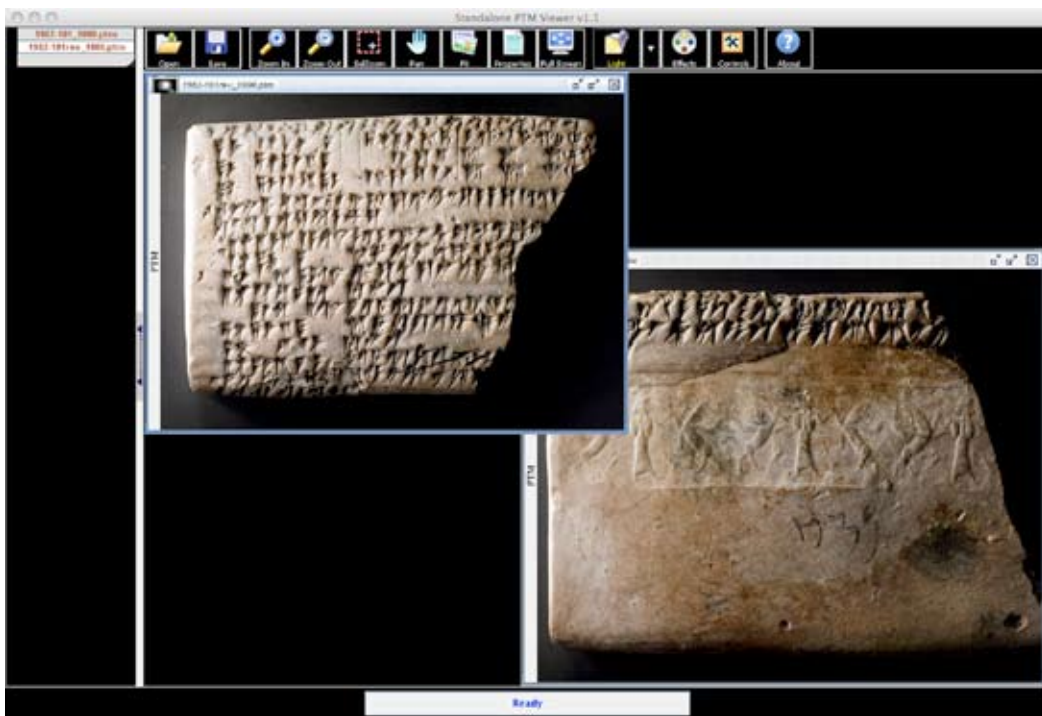
Figure 6. WSRP's stand-alone PTM viewer, showing obverse and reverse of a previously unedited Elamite Fortification tablet (the text is a summary accounting of grain stored and disbursed at one of the sub-stations around Persepolis during three years), with seal impression and Aramaic epigraph on the reverse

seals from impressions on new Elamite tablets and about 200 more distinct seals from impressions on uninscribed Fortification tablets, making working drawings of about 100 of them. Sabrina Maras (Ph.D., Berkeley), supported by a Levy Foundation postdoctoral fellowship, now works with Garrison on seals on the uninscribed tablets. Garrison has systematically surveyed almost 30 percent of the storage boxes of previously unedited Fortification tablets and fragments, selecting, boxing, and labeling uninscribed tablets for high-quality imaging, cataloging, and study, building a sample that already amounts to about 1,400 items as of mid-2009.

During four trips to the Oriental Institute in the past year, PFA Project editor Annalisa Azzoni (Vanderbilt University, Nashville), after reviewing the approximately 680 monolingual Aramaic Fortification tablets and most of the about 180 Aramaic epigraphs on Elamite Fortification tablets, is populating OCHRE databases with cataloging and epigraphic information, and preparing advanced editions for release on OCHRE. PFA Project editor Elspeth Dusinberre (University of Colorado, Boulder) has processed more than 4,000 conventional digital images of the seals on the Aramaic tablets, uploaded them to the Project's server to be added to OCHRE displays of the tablets, and is populating a descriptive and analytical catalog of about 500 distinct seals on these tablets that she and Garrison set up on OCHRE.

I have suspended detailed cataloging of the boxes of unedited Fortification tablets in favor of selecting the best-preserved or most promising individual tablets and fragments for conservation and recording. By mid-2009, I have added preliminary editions of about 425 new Elamite texts to OCHRE. Project conservators Monica Hudak and Jeanne Mandel have cleaned and stabilized about 650 Fortification tablets, about 325 of them during the last year. The speed and results of their painstaking work improved markedly after the Compact Phoenix laser cleaning system (known to PFA Project staff as the "Death Ray") came on line in November 2008 (see *Oriental Institute News & Notes*, Winter 2008) (fig. 7).

Some Project work slowed or stopped in July/August 2008 while third-floor offices of the Oriental Institute received badly needed upgrades in electrical wiring and data connections. The hiatus provided an occasion for Wouter Henkelman, Mark Garrison, and student workers to put all the tablets that have been published and all those that are in process into new boxes and to file them in new storage cabinets, and an occasion for me to consolidate storage of the boxes of unprocessed tablets and fragments and to reorganize and enlarge Project work space in my office (fig. 4).

During the reorganization of tablet storage, we moved most of Richard Hallock's manuscripts, notes, and files on Persepolis materials to Humanities Division Research Computing to be scanned and made available to off-site project staff. Volunteer Greg Hebda and graduate student Lise Truex (NELC), working with Lec Maj at Humanities Computing, began to scan and catalog photographic negatives and prints of Persepolis

Figure 7. Conservator Monica Hudak cleans a Persepolis Fortification tablet with the Compact Phoenix laser, a.k.a. the "Death Ray"

Fortification tablets made in 1940–41 under a grant from Works Progress Administration (WPA). We expect to display these pictures eventually online, alongside modern digital images of the same tablets and fragments.

When floods of data produced by the various parts of the PFA Project overwhelmed the hospitable resources of Humanities Division Computing, the Oriental Institute acquired a dedicated server for the Project, still maintained and managed by Lec Maj and his colleagues at Humanities Computing. In addition to holding raw data in process, finished files, working databases, scanned documents, and online tools — sixteen terabytes of material in live storage so far — the server shares data with collaborating projects elsewhere. Information capture still outstrips information processing, and many Project participants rely on direct access to fresh raw data, so even the current 22.5 terabyte capacity of this server will be a tight fit for some time ahead.

Despite stressful economic times, supporters of the PFA Project have continued to step up to meet the emergency. The Andrew W. Mellon Foundation awarded a second two-year grant, larger than the first, to support expanded high-resolution imaging work. An award from the Iran Heritage Foundation of London made it possible to set up a computer for in-house post-processing of the PTM image sets. The generous response to a fund-raiser in Los Angeles, organized by the Farhang Foundation (Iranian-American Heritage Foundation of Southern California), made possible an award that supports conservation of Persepolis tablets.

We try to convey to wider audiences the unique importance of the PFA and to describe the accomplishments and aspirations of the PFA Project. I discussed the Archive and the Project in lectures at the University of Vienna, Harvard, Tufts, Yale, and New York University, in presentations to the Visiting Committee of the Oriental Institute and to the docents and volunteers of the Oriental Institute Museum, and in remarks at fund-raisers for the National Iranian-American Council in Washington and New York. Oriental Institute Director Gil Stein and I described the Archive, the Project, and the emergency in which we operate at a panel discussion in Chicago organized by the Iranian-American Bar Association. Mark Garrison lectured on the Fortification seal impressions at the University of Michigan; Elspeth Dusinberre spoke on the seals on Aramaic tablets at the Archaeology Day of the Boulder and Denver societies of the Archaeological Institute of America.

The situation of the PFA also attracts continuing journalistic attention. An article by Gwenda Blair in the December 2008 issue of *Chicago Magazine* describes the progress and current status of the lawsuit (available online at http://www.chicagomag.com/Chicago-Magazine/December-2008/Paying-with-the-Past/index.php?cparticle=7&siarticle=6#artanc). N. Beintema interviewed Wouter Henkelman on the circumstances of the Archive and the Project for the science and research section of the leading Dutch newspaper *NRC Handelsblad*. The article by Marlene Belilos in the French online journal *Rue89* connected the circumstances of the PFA with the legal travails of recent museum exhibitions (online at http://www.rue89.com/2009/06/24/indemniser-les-victimes-dattentats-en-vendant-de-lart). Sharon Cohen's article for the Associated Press was widely published (for example, in the *Chicago Tribune*, the *Philadelphia Enquirer*, the *San Francisco Examiner*, and *Le Nouvel Observateur*; see http://www.heraldnews.com/opinions/x1658751189/FOCUS-Terrorism-impacting-archaeology-02-22-09), as was a release prepared by the University News Office (http://news.uchicago.edu/news.php?asset_id=1606; the accompanying video presentation has not gone viral on YouTube; see http://www.youtube.com/watch?v=FZOgkHGAkVo).

Most significant for the larger intellectual and cultural missions of the Oriental Institute is the note by Sebastian Heath and Glenn Schwartz in *American Journal of Archaeology* 113 (2009),

discussing the PFA in the broader context of recent legal troubles affecting museum exhibitions and cultural exchanges (see http://www.ajaonline.org/index.php?ptype=content&aid=3612).

Most of this information, along with many other articles about the PFA and about Achaemenid archaeology and epigraphy, can be followed through the PFA Project's Weblog (http://perse-polistablets.blogspot.com/, where readers can now sign up to receive e-mail notification of new postings). PFA Project editor Charles E. Jones (Institute for the Study of the Ancient World, New York) reports a substantial increase over last year's traffic: the blog has been viewed almost 20,000 times in the twelve months beginning July 1, 2008, by almost 12,500 distinct visitors, about 12,000 of whom made repeat visits. All told, the blog has been viewed more than 50,000 times since it debuted in October 2006.

This year saw the publication of the symposium on the PFA held in Paris near the beginning of the PFA Project, in 2006, where PFA Project editors discussed the early stages of research that is now bearing fruit, and other scholars discussed the broader context of the PFA.[1] The year also saw the publication of Henkelman's work on Achaemenid religion in light of the Persepolis Fortification texts, a landmark in the use of the PFA to expound complex historical phenomena, including the most up-to-date, most thorough, and most accurate description of the Archive to be found anywhere.[2] Forthcoming presentations of Project-related scholarly results include an article by Henkelman and Stolper on ethnic identity and labeling at Persepolis, a paper by Azzoni and Stolper first given at the annual meeting of the American Oriental Society on a recurrent Aramaic epigraph on the Elamite tablets, and an article by Garrison and Robert Ritner on the Egyptian-inscribed seal impressions on Fortification documents.

The greatest value of the PFA lies in its combination of integrity and complexity — integrity in that these tens of thousands of pieces were found together and fit together in meaningful ways; complexity in that the pieces take many forms bearing many kinds of information. The greatest value of the record that the PFA Project is struggling to make and distribute lies in the interconnections among the pieces, forming a structure of data and inference that grows steadily in scope, depth, and reliability. By now, most of the new data is of a familiar kind, so most of the thrills of fresh discovery are things that only real PFA nerds can appreciate — new bits of vocabulary, grammar, paleography, iconography, or new documents that fill in old gaps. Even so, as we sift the tablets and fragments, real surprises still appear from time to time. Most gratifying for me during the last year was an Elamite Fortification tablet with a text of a completely new type, though it refers clearly to known administrative procedures. Without the integrated context of the whole archive, it would have been all but incomprehensible. It records an internal investigation of some administrative activity in the years immediately before the oldest preserved texts of the Archive. It reminds us that although the structure of interconnected information that we are building looks static, like the mounted skeleton of an extinct creature, the ancient reality that it represents was dynamic. When it was a living archive, it changed constantly as information moved through the system, and the people who compiled and filed these records also consulted them, used them to investigate and assess their own circumstances.

Notes

[1] *L'archive des fortifications de Persépolis: État des questions et perspectives de recherches*, edited by P. Briant, W. Henkelman, and M. Stolper, Persika 12 (Paris: De Boccard, 2009); despite the title, most of the volume is in English.

[2] *Other Gods Who Are: Studies in Elamite-Iranian Acculturation Based on the Persepolis Fortification Texts*, Achaemenid History 14 (Leiden: Nederlands Instituut voor het Nabije Oosten, 2008); see especially "Chapter 2: The Fortification Archive," pp. 65–179.

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