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Ex Machina: Electronic Resources for the Classics

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Ex Machina: Electronic Resources for the Classics

BY BETH JUHL

If ever there was an academic discipline open to caricature, it is the field of Greek and Latin philology. What could be more hidebound or canonical than a profession devoted to dead languages and the *original* "dead white European males"? Over the past decade, however, many classical scholars and students have augmented their dusty lexica and Loeb Classical Library volumes with CD-ROM drives and Internet connections. In an ironic turn of events, one of the oldest and most traditional of humanities disciplines has become one of the first to adopt new technologies. The result has been a remarkable transformation of research methods and teaching techniques: the lexicographer can now search through the entire extant corpus of ancient Greek writings for a particular phrase or word form, and a beginning language student can move with the click of a mouse from a line in the *Iliad* in Greek to a grammatical analysis program to determine parts of speech or tenses, to definitions in a Greek-English lexicon, to an illustration of the line from a red-figure vase painting. These computer resources have proliferated so quickly and are intended for so many different audiences that it is difficult for librarians and faculty to select materials appropriate to their collections.

This essay aims to provide an overview of electronic resources for the study and teaching of classics—including Greek and Latin languages and literature, philosophy, religion, art and archaeology,

and ancient history—with particular emphasis on the tools most useful for a library collection serving an undergraduate clientele. Most of this discussion is devoted to CD-ROMs and other software that are available for purchase, lease, or subscription. A short section at the end of the essay summarizes resources available on the Internet. There are a great many ingenious and entertaining programs for language teaching and drill,

One of the oldest and most traditional of humanities disciplines has become one of the first to adopt new technologies.

and numerous customized Greek and Latin font and word-processing programs. These are better suited to a computer or language lab or an individual scholar's workstation than to a library collection and fall outside the scope of this article. Readers are encouraged to consult such useful guides as Rob Latousek's *Software Directory for the Classics* or *Word Processing for Classicists*, edited by Robert J. Rowland. Although the author has attempted evenhanded and complete coverage of products and categories, the frenetic pace and fragmentary documentation that are endemic to electronic publishing make comprehensive coverage elusive. The recommended articles and books listed in the annotated bibliography of print sources at the end of this essay will direct readers to additional in-depth and timely information.

Electronic Corpora and Concordances

Not so long ago, the phrase "humanities computing" summoned up the rather dreary image of machine-generated concordances, published with all the charm and production values of a bound Univac printout. Classics computing, too, began with a sort of concordance project, but one with a significant difference: rather than a static, printed word list, scholars envisioned electronic corpora that could provide quick access to the full text of Greek and Latin works, with multiple authors and texts searchable in multiple ways. More than 20 years ago, Theodore Brunner and others began work on the *Thesaurus Linguae Graecae*,¹ a project to digitize the entire extant corpus of Greek literature in untransliterated Greek. Initially, the *TLG* could only be accessed at the project's headquarters in Irvine, California. Scholars sent queries there to be run on the machines where the database resided. Today, more than 9,500 texts by some 3,500 authors dating from the 8th century BCE to the 6th century CE are available on one CD-ROM disc. Current inputting work will bring the database

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(with more than 75 million words) up to the end of the Byzantine Empire. Instant access to words and character strings across 15 centuries provides more than just an extremely powerful concordance; scholars are now able to consult earlier scholarship and answer in minutes queries that could have taken weeks, months, or even years. Graduate and even undergraduate students pose and investigate research problems that were logistically impossible to answer previously. The *TLG* has enlivened and expanded classical scholarship by democratizing access both to texts (providing scholars at smaller institutions with a full "library" of more obscure texts, such as Hesychius or Harpocration) and to ideas (providing students with the ability to collect and analyze all extant epithets to a particular deity, for example).

Although the *TLG* is the premier electronic resource for research in Greek literature and culture, it could be improved. Two frequent, related laments are the lack of a critical apparatus or variant readings, and the use of out-of-date or superseded editions of texts due to copyright restrictions. These shortcomings make the *TLG* more of an index to, rather than a replacement for, printed editions at this time. Undergraduates and graduate students with sufficient knowledge of Greek have fewer quibbles with these editorial limitations, and classicists are beginning to adapt what is primarily a research tool to teaching. A Barnard College instructor of Greek composition, for example, allows his undergraduate students credit for questionable constructions if they can locate at least one comparable usage on the *TLG*.

To verify which editions are included on the *TLG* disc, users can consult the print companion, Luci Berkowitz's *Thesaurus Linguae Graecae Canon of Greek Authors and Works*, which provides, in addition to text and edition information, birth and death or floruit dates, geographical locations, and genres for each author. Most software programs designed to search the *TLG* make use of

the *Canon* field tags so that users can search for words and phrases in a subset of the entire database (e.g., pre-Socratic philosophers from Ionia or historians from 5th- and 6th-century Attica). Search software must be purchased separately, and programs are available for most hardware platforms and budgets. The original hardware and software used to search the *TLG* CD-ROM was a machine called Ibycus, developed by philanthropist/classicist David Packard. The Ibycus was neither a Macintosh nor PC/DOS compatible platform and has

Students of the classics can find English translations of Aristotle, Demosthenes, Galen, Herodotus, Plutarch, and others.

since gone out of production, but it searched the disc very quickly and could display, print, and download Greek, Hebrew, Coptic, and Romans characters. Popular current software options are the *TLG/PHI Workplace 4.1*² and *Musaiois 1.0*,³ both for Windows, and *Pandora 2.5.2*,⁴ a Hypercard-based program for the Macintosh. (A *Musaiois* program for Macintosh is in the planning stage at this writing.) All three allow searches that combine words and word stems with Boolean and proximity operators (AND, OR, NOT, WITH, THEN); they also display, print, and download text. Speed and performance will vary according to the hardware and CD-ROM drive used. Novice users will find none of these programs to be "plug and play," but they can get lots of help from the software developers, all of whom provide conscientious fast phone and e-mail help.

Most of the *TLG* search programs will also search the *PHI CD-ROM*⁵ compilations from the Packard Humanities Institute. The first *PHI* disc, jointly

produced with the Center for Computer Analysis of Texts at the University of Pennsylvania, contained a potpourri of classical and historical texts, including a Coptic Bible and even a 19th-century American diary. The Packard Institute offers two current discs: *PHI CD-ROM #5.3* (familarly known as the "Latin disk") and *PHI Demonstration CD-ROM #6* (the "papyrus disk"). The Latin disk contains an approximate Latin equivalent to the *TLG*, with complete texts from most Latin authors up to 200 CE and biblical material in Hebrew, Greek, Latin, Coptic, and English. Less appropriate for an undergraduate collection, the papyrus disk contains the Duke Databank of Documentary Papyri—a digitized version of papyri published in the major collections and series—and approximately 50,000 Greek inscriptions (from sets such as the *Inscriptiones Graecae*), which were input in a project based at Cornell, Ohio State, and the Princeton Institute for Advanced Study. Anyone who has worked an especially tricky crossword puzzle can appreciate the usefulness of searching for character strings and generating possible matches to fragmentary papyrus and inscription texts.

Most students will not have the Greek or Latin skills necessary to make full use of the *TLG* or *PHI CD-ROMs*, but there are several collections of translated classical texts available in electronic format. The IntelLex Corporation has concentrated on doing one thing extremely well: publishing electronic versions of core philosophical texts "to order." Available in DOS, Macintosh, and (soon) Windows, their *Past Masters* series⁶ includes *Plato: Collected Dialogues* (Hamilton and Cairns and Jowett translations and Oxford University Press Greek edition in transliteration), *Aristotle: Complete Works* (Jonathan Barnes's English translation), and *Aquinas: Collected Works* (in Latin and English, various editors), among many other titles. Buyers request texts from among 18 full-text databases, and the publisher puts them on a single CD-

ROM. Most texts and search software can be purchased on either CD-ROM or floppy diskette. IntelLex's Folio View software allows users to search for words, phrases, or combinations of words; to create concordances; and to view, browse, edit, download, or print portions of text. The search interface is fairly sophisticated; most first-time users will need to study the accompanying manual and help screens before they can make full use of all the program's features. Texts are available in various combinations, and libraries that support strong philosophy programs may wish to consider purchasing the entire set of English-language editions, which includes the works of Machiavelli, Descartes, and Locke, among others.

Whereas IntelLex targets scholarly users, the World Library's *Library of the Future*⁷ CD-ROM is aimed at the home and school market. The third edition of *LOTF* provides full text, graphics, and even the occasional full-motion video for more than 1,750 works or collections of world literature. Along with Chaucer and Chinua Achebe, students of the classics can find English translations of Aristotle, Demosthenes, Galen, Herodotus, Plutarch, and others. The first and second editions of *LOTF* present smaller subsets of the third edition, offering 450 and 950 texts, respectively. World Library's Instant Access software allows users to search the entire database, browse a particular work, or define search parameters such as time period or country. The frustration for academics is the lack of textual or edition attribution and of keys to original page numbers. All of the classical texts included on *LOTF* are in the public domain (e.g., Samuel Butler's translation of the *Odyssey*) and, as a result of a cataloging project for electronic media at OCLC, users can verify editions with a search in the OCLC or WorldCat union catalog.

At the extreme end of the scholarly spectrum are Chadwyck-Healey's *Patrologia Latina Database*⁸ and the *CETEDOC Library of Christian Latin*

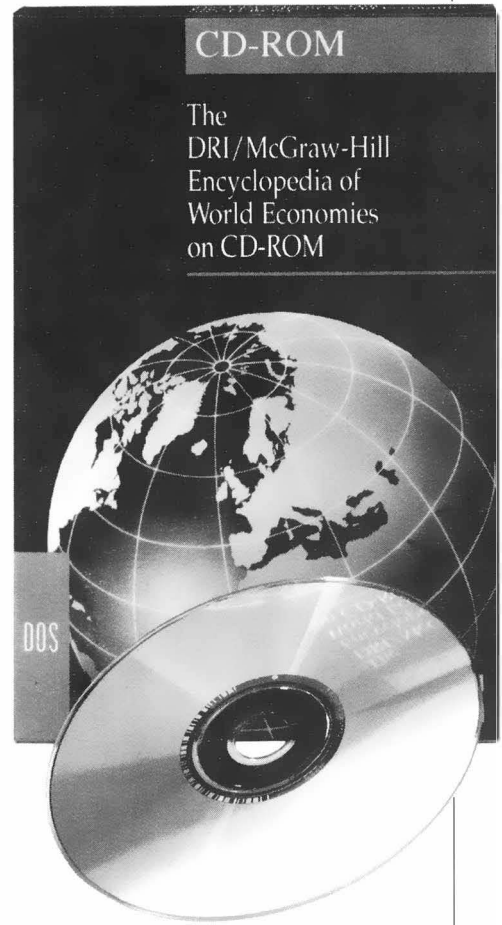
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*Texts*⁹ from Brepols. The *Patrologia Latina Database* is breathtaking in size, scope, and price: the completed database will include five CD-ROMs encompassing Jacques Paul Migne's monumental collection of ten centuries of patristic, theological, and philosophical Latin texts and commentaries. Now about 45 percent complete, the *PLD* already includes the writing of, lives of, and commentaries on such writers as Tertullian, Augustine,

and Cassiodorus. The interface searches Latin or Greek words and phrases in individual authors or combinations of authors; because the *PLD* works have been encoded in SGML (Standard Generalized Markup Language, the ISO text encoding standard), users can download and manipulate texts with a wide variety of software. The comparatively modest *CETEDOC* collection presents texts from Brepols's *Corpus Christian-*

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This CD-ROM on ancient Greece sets the standard for multimedia databases. Coming in mid-1995: Perseus 2.0.

*from a review of Perseus 1.0 in the Wall Street Journal

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orum publications *Series Latina* and *Continuatio Mediaevalis*, including the complete works of authors such as Jerome, Ausonius, and Prudentius. The *CETEDOC* corpus, though a fraction the size of the complete *Patrologia*, contains more modern and authoritative editions in many instances. A new, expanded edition, *CLCLT-2*, is forthcoming at this writing. Like the *PLD*, *CLCLT* allows searching of words, character strings, or phrases in one or multiple texts, but novice users will find the Latinate menus a bit intimidating. Either program would be a handsome, if expensive, addition to collections supporting graduate-level work in early Christianity, medieval history, or theology.

Finally, there are dozens of full-text compilations of electronic Biblical literature, including editions of the Vulgate and Septuagint, which are beyond the scope of this essay; for an introductory, though now outdated, review of biblical electronic texts, see Mark Stover's "Optical Bibles" in *Laserdisk Professional*.

Indexes and Abstracts to Secondary Literature

Unlike scholars in such humanities fields as modern history or modern literature, who have recourse to core indexing tools on CD-ROM or via on-line services, classicists currently have only two methods for locating current scholarship: cobble together citations from over half a dozen electronic sources that treat various aspects of classical studies or browse through the comprehensive, but dreadfully slow, print index *L'Année Philologique*. Sometime in 1995, that situation should be remedied by the publication of the *Database of Classical Bibliography*,¹⁰ a CD-ROM (for either Macintosh or Windows) covering volumes 47-58 (1976-86) of *L'Année* (future updates will extend coverage both forward and backward in time). Bibliographical entries for publications outside the usual scope of *L'Année* are also being added to the database. Until

the *DCB* arrives, there are several alternatives for electronic indexing to journal and monograph publications.

For undergraduate research, two indexes from the H.W. Wilson company provide excellent coverage of the core English-language literature. Both the *Art Index* (which covers more than 200 periodicals, including many in the areas of archaeology and architectural history) and the *Humanities Index* (which covers more than 300 journals in the fields of literature, language, history, religion, and philosophy) are available from 1984 on in a wide variety of electronic formats, including CD-ROMs from both Wilson and SilverPlatter and on-line files from Wilson, BRS (now CD Plus), and OCLC's end-user system, FirstSearch.¹¹ Wilson's use of standard Library of Congress subject headings and its concentration on the journal titles most core humanities collections are likely to own make them the perfect choice for term-paper season.

ISI's *Arts and Humanities Citation Index, Compact Disc Edition*¹² also offers the sort of interdisciplinary coverage suited to classical studies, but with a much more international and multilingual scope. *AHCI* provides bibliographic citations and cited references for articles in more than 1,100 journals, including many in the fields of classical philology, religion, philosophy, ancient history, and archaeology. Selected citations to articles from 5,000 more journals outside the humanities are also available. Annual discs cover from 1990 on, and one volume cumulates 1980-89. Searching is menu-driven, allowing access by author, title keywords, author's institution, journal name, cited author, and cited work. The contextual help screens and user guide, along with considerable one-on-one coaching and explanation, are necessary for first-time users, to whom the concepts, techniques, and nomenclature of citation searching may be terra incognita. One frequent confusion among novice database users concerns the difference between searching keywords from article titles and

searching a database with controlled subject headings; users of *AHCI* must search for all possible synonyms for their topic (for example, both Artemis and Diana, both temple and sanctuary). *AHCI* is available from on-line vendor Dialog and via OCLC's FirstSearch, but the CD-ROM offers the unique feature of automatically viewing "related records," those that share at least one cited reference with the current article. However, the *AHCI* CD-ROM is a bit expensive for all but the most comprehensive humanities collections; most libraries will rely on remote access.

For the fields of philosophy and religion, there are two comprehensive and reasonably priced indexes available on CD-ROM, both corresponding to the standard printed tools for their subject and covering several decades of scholarship. *Philosopher's Index*¹³ covers all areas and eras of philosophy, allowing users to search for citations to articles back to 1940 and to books, book chapters, and dissertations from 1969 on, with abstracts provided for most citations after 1969. The Dialog OnDisc software offers both a menu-driven and command-drive search mode; the menu mode is remarkably clear and easy to use, allowing users to select and combine keywords, subject headings, authors, and journals and to limit by adding additional search terms or by designating date and language parameters. *ATLA Religion Database on CD-ROM*¹⁴ includes all of the American Theological Library Association indexes, among them: *Religion Index One: Periodicals* (from 1949 on), *Religion Index Two: Multi-Author Works* (from 1970 on), and *Index to Book Reviews in Religion* (from 1949 on). The disconcerting lacuna from 1959 to 1970 has recently been filled. Although the majority of the publications indexed by ATLA treat Judeo-Christian and contemporary themes, classicists may be surprised at the number of citations to topics ranging from ancient and comparative religion and folklore to archaeology and papyrology. ATLA's CD Answer search and retrieval software

provides menu-driven searching by means of simple templates. ATLA also markets two subset disks: *Religion Indexes: RIO/RIT/IBRR 1975- on CD-ROM*, and the very moderately priced *Biblical Studies CD-ROM*, with more than 95,000 citations extracted from the parent ATLA database.

One highly specialized database for classicists is the *Electronic Bibliographie Papyrologique*,¹⁵ an electronic form of the index to all papyrological editions and literature issued on index cards since 1932. The current computer version covers 1976-90; updates through 1994 and retrospective coverage back to 1960 are forthcoming. Available for both PC/DOS and Macintosh platforms, the diskettes can be purchased with or without ProCite database management software. The *Electronic BP* is a quirky and somewhat erudite tool, using a numeric classification system for subject headings and useful only to a limited and elite audience in collections that support papyrological research. Scholars Press distributes another resource of interest to papyrologists, *Homer in the Papyri*,¹⁶ a Macintosh program with all known Homeric texts identified in surviving papyri fragments.

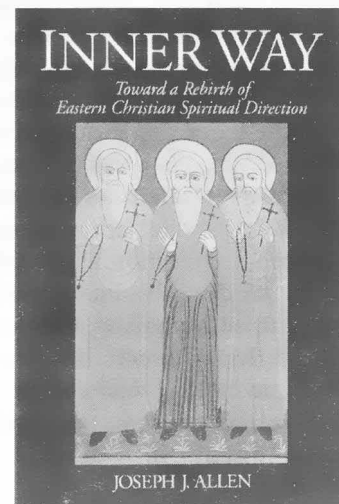
Italian publisher Bretschneider has recently announced the publication of *Project Herakles: Bibliographical DataBank on the Ancient World*,¹⁷ but it is not clear to this author whether the file is simply a computerized version of the publisher's "Bollettino Novita" catalog, indexing their many archaeological and other monograph series, or a more comprehensive source.

Guides to Literary Criticism

For beginning students of Greek and Latin literature, indexes to recent journal articles are usually not very helpful and can even prove frustrating. Presented with a centuries-old critical tradition on the one hand and up-to-the-minute theoretical trendiness on the other, many students just feel overwhelmed. Three

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recent CD-ROM products provide electronic access to standard biographical and critical information on world authors, and all treat a dozen or more classical authors. *Gale's Literary Index CD-ROM*,¹⁸ for a PC/DOS platform, lists more than 100,000 authors treated in the 32 different Gale reference series on literature, including *Classical and Medieval Literature Criticism* (1988-), an annual compilation of contemporary and historical critical essays on authors and texts. The index also includes Gale sets such as *Dictionary of Literary Biography* (1978-) and *Contemporary Authors* (1962-), which are invaluable for any reference collection. The CD-ROM allows searching by author name, work title, birth or death dates, nationality, and Gale series. However, since most students will be looking for information on a specific author or work, the printed Gale indexes should suffice for most libraries.

Both *DiscLit: World Authors*¹⁹ (PC/DOS) and the *Scribner Writers Series on CD-ROM*²⁰ (PC/DOS, Windows, Macintosh) provide the full text of critical essays from monographs and encyclopedias, respectively. *DiscLit: World Authors*, the third in a series of DiscLit CD-ROM products produced jointly by G.K. Hall and OCLC (see *DiscLit: American Authors*, CH, Jan'92; *DiscLit: British Authors*, CH, May'93), is really two separate databases: the complete text of 146 titles from the popular *Twayne's World Authors Series* (1966-)—including ten volumes covering the classical authors Aeschylus, Aristophanes, Aristotle, Augustine, Herodotus, Homer, Horace, Plutarch, Seneca, and Terence—and some 200,000 bibliographical records for works about those authors from the OCLC union catalog. Although the menus for "new and casual" users allow the researcher to move around and search the full text database fairly easily, even "experienced" users will need to know a little about OCLC database structure and field tags or will need to consult the hefty user manual to make good use of the bibliographic portion of the database. The

intended audience for this product is not clear. The Twayne series is geared to undergraduates, but those same undergraduates will not appreciate searching through the database for books on Aeschylus, only to be told that the campus library does not happen to own, for example, a 1912 German imprint or a recent video recording listed on a print-out. Unless a library wants to use this CD-ROM to fill gaps in its Twayne collection, lower-division students would be better served by a search of the local on-

Classical myths are a perfect candidate for hypertext publishing.

line or card catalog. More advanced scholars usually have access to the OCLC or RLIN union catalogs for comprehensive bibliographical information.

Of the three guides to criticism, the *Scribner Writers Series on CD-ROM* is the most handsome and the one that all undergraduate libraries should consider adding to their collections. The Scribner reference encyclopedias provide thoughtful and well-written signed articles with full bibliographies for further research. This CD-ROM contains 510 essays selected from nine Scribner titles, including the two-volume *Ancient Writers: Greece and Rome*, edited by T. James Luce (1982), and the 14-volume *European Writers*, edited by William T.H. Jackson and George Stade (vols. 1-2, CH, Jun'84). Fourteen classical authors are profiled on the CD-ROM, among them Euripides, Plutarch, and Thucydides. In the Windows version, users can choose between menu-driven searching (with options such as author name, genre, time period, and nationality) and keyword searching with Boolean operators, truncation, and flexible proximity parameters. Essays include hypertext links to critical bibliographies and other essays, allowing users to jump from the Homer essay to Vergil to Milton by

clicking on each author's name in the text. This reviewer only wishes that Scribner had included a larger portion of *Ancient Writers* and other Scribner encyclopedias on this excellent tool.

Guides to Classical Mythology

With their highly intertextual nature, variants in geographic and personal names, and complex family trees, classical myths are a perfect candidate for hypertext publishing, and two products have made attractive and creative use of the medium. *HyperMyth*,²¹ a Macintosh Hypercard stack developed as a course text by Professor Randall Stewart at the University of Utah, contains interactive texts, family trees, voiced pronunciations, images, and maps. Myths are organized in 13 sections on topics such as "Creation Myths," "The Theban Cycle," and "Roman Mythology." Each section consists of a menu offering related Hypercard stacks for categories such as "Ancient Texts," "Ancient Art," "Parallels," and "Constellations" and interactive self-tests on the unit. Easy to install and use, *HyperMyth* is accompanied by a printed textbook version of the database contents. A link between *HyperMyth* and the *Perseus* database (see below), which will allow instructors to make use of images, maps, and texts in both programs, is in development. Hermes Publishing also offers several clever Latin language instruction programs for the Macintosh, including *Carnifex*, a Latin version of the word game hangman, and the forthcoming *Electronic Odyssey*, an interactive version of Homer in prose translation.

*Athena: Classical Mythology on CD-ROM*²² provides material similar to *HyperMyth* in a DOS, Windows, or Macintosh environment. *Athena* contains more than 1,200 character profiles and myth summaries and almost 500 images, along with summaries and English prose translations or paraphrases for 20 mythological works. Most profiles include a brief biography, references to literary treatments, an explanation of

name pronunciation and etymology, Roman or Greek equivalent, and a genealogical table. Hypertext links embedded in the profiles and myth summaries (but not available in the family trees or full literary texts) allow users to move quickly from profiles of mythological characters to specific references in classical texts. Almost half of the profiles include uncredited black-and-white illustrations taken from later paintings or engravings or occasionally, as is the case with Achilles and Penthesilea, from a vase painting. The prose translations, which include the works of Ovid, Statius, Sophocles, Hesiod, and selections from Apuleius, Pindar, and the epic cycle, are also unattributed. A slick and attractive program, *Athena* provides easy point-and-click searching from an alphabetical key or table of contents, contextual help, and a search history that allows users to retrace their steps.

Though both *HyperMyth* and *Athena* are suitable for high school or college students, there is also a scholarly effort underway that will provide electronic indexing of the images and iconography of classical mythology. The Sibyl Project,²³ headed by Jocelyn Penny Small (art history, Rutgers), has created a database of the iconography of more than 13,000 classical objects, a tool intended to classify and catalog mythological characters and images in ancient art. Though far from complete, the Sibyl database will eventually allow the sorts of structured and keyword searches that are not possible even in comprehensive print collections such as the *Lexicon Iconographicum Mythologiae Classicae (LIMC)* (1981-).

Multimedia

The *TLG* and other electronic corpora have changed the present nature and future possibilities of classical research; the Perseus Project has transformed classics teaching. As a junior classics professor at Harvard, Gregory Crane was frustrated by the number and complexity of secondary materials stu-

dents had to consult before they could begin to understand or appreciate original works of Greek literature and art. Lexica, grammars, slides, atlases, encyclopedias, chronologies, and biographical dictionaries—all tools that should have supplemented classical studies—seemed to supplant the material and interrupt the immediacy and power of ancient Greece. Crane, now at Tufts, led a team of scholars and programmers in the creation of *Perseus*²⁴ in order to allow students to explore Greek culture and history by making effortless links between texts and images, commentaries and translations, all with the click of a Macintosh mouse. Their efforts resulted in what Elli Mylonas, also at Tufts and a longtime member of the Perseus Project team, has called “a classics sandbox,” an interactive environment that encourages students to play and explore.

Named for the explorer-hero from Greek mythology, *Perseus* consists of several distinct modules, organized and interconnected in Hypercard stacks. The CD-ROM provides the complete works of Homer, Aeschylus, Sophocles, Herodotus, and Thucydides, and selections from other authors, in parallel Greek and English versions. Texts are searchable and students can highlight a problem Greek word and obtain a grammatical analysis (e.g., passive, aorist, third person, singular), then look up the lemma for a definition and examples of use in an on-line Liddell-Scott *Intermediate Greek-English Lexicon*. Other reference tools on the CD-ROM include a black-and-white atlas that provides overview and regional maps of Greece and the Mediterranean, allowing users to plot specific sites; an outline history by Thomas Martin; archeological site plans; and an encyclopedia with short entries on topics, geographical locations, persons, and art forms.

The CD-ROM also serves as an index to the more than 7,000 color images on the videodisc, which includes still photographs of sculptures, coins, vases, buildings, and archaeological sites.

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The CD-ROM databases from the Thesaurus Linguae Graecae (TLG) and the Packard Humanities Institute (PHI) are essential for Classics, History and Religious Studies. The TLG & PHI Workplace programs provide the fastest searches, with the most features and the easiest to use programs for Microsoft Windows®.

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Images are indexed in several different ways, e.g., original location, genre or time period, museum collection, or iconographical or mythological elements (though not every image is accessible by all of these categories). Most of the vases (137) and sites (more than 800) are shot from several different angles and distances; several sites, e.g., Delphi and Sounion, are shown in full motion video, the camera panning over their dramatic landscapes.

Perseus is an exciting and unique tool to use in the classroom, and faculty have adopted it for a wide variety of nonclassics courses, from art history to Western civilization surveys. At the simplest level, faculty can assemble a slide show to accompany in-class lectures; at a more complex level, students can construct Hypercard "paths" on assigned topics, such as the Peloponnesian War or the Panathenaic festival, pulling together images of vase paintings, mythologies, history, maps, and archeological site plans and views in a sophisticated use of primary resources. However, users expecting an instant, seamless, virtual 5th-century Athens will be disappointed, because *Perseus* takes a significant investment of time and energy from faculty, librarians, and students if it is to be used to its fullest possible potential. In order for a student to tour Periclean Athens, for example, someone, either student or faculty member, must first build the Hypercard links from a passage in Thucydides, to a portrait of Pericles, to a zoom view of the Parthenon.

Knowledgeable users will be frustrated by the lack of certain core artworks or texts; the vagaries of funding, copyright, and permissions have caused the omission of both the Metropolitan Museum of Art's famous Euphronios vase and any plays by Euripides. *Perseus 2.0*, the next version, due in the Spring of 1995, promises four times the number of images and texts—including a color atlas, topographic maps, and satellite photographs—on four CD-ROM discs with a supplemental videodisc. A good

overview of *Perseus* is provided by *Perseus Project* (1992), a video recording edited by Gregory Crane and distributed by Yale University Press; those with Internet access can join the *Perseus* discussion list or browse the *Perseus* World Wide Web Server (see the section on Internet resources, which follows).

Similar multimedia projects are under way for cultures and eras other than ancient Greece. The Lambrakis Research Foundation in Athens, for example, has recently announced the forthcoming publication of *SOPHIA CD-ROM on Byzantine History and*

The Internet provides the perfect environment for small-scale, homegrown academic projects.

Art,²⁵ a multimedia compilation of Greek Byzantine texts, images, and sounds. Commercial publishers, too, are following suit. Microsoft's multimedia CD-ROM *Microsoft Ancient Lands*²⁶ for PC/DOS and Windows contains a visual, audio, and textual tour of Roman, Greek, and Egyptian civilizations. The production values for *Ancient Lands* are fabulous, and many classicists will enjoy the 1,000-plus colorful illustrations based on authentic artifacts (such as a griffin-headed rhyton and photographs of Heinrich and Sophie Schliemann). Although both accurate and amusing, *Ancient Lands* is something of a guilty pleasure for grown-ups, being much more akin to an interactive David Macaulay children's book or *Asterix* comic than a likely acquisition for college libraries.

Internet Resources

Any attempt to catalog or describe in a print publication electronic creatures as shape-shifting and fecund as those that reside on the Internet is an act of obvious hubris. However, the Internet provides

the perfect environment for small-scale, homegrown academic projects, journals, and conferences with limited audiences and funding. The Greeks referred to all non-Greek speakers as "barbarians," and to many novices the acronyms and technobabble of the Net sound like so much barbaric jargon. True scholarly gems can be found in cyberspace, but proficient navigation requires hours of study and exploration, in addition to hardware and connectivity. Readers who find that what follows sounds like absolute gibberish should consult one of the many printed guides to the Internet, for example Ed Krol's helpful, thorough, and uncondescending *The Whole Internet User's Guide & Catalog*.

World Wide Web and Gopher Sites

Classicists at the University of Michigan and at the Center for the Computer Analysis of Texts at Penn have provided their colleagues with two easy on-ramps for networked resources. The Classics and Mediterranean Archaeology World Wide Web Server,²⁷ maintained by the University of Michigan department of classical studies, provides directories of and hypertext links to text files, electronic journals, bibliographies, indexes, and graphic images all over the world. Using a text browser program such as Lynx or a graphics interface such as Mosaic, visitors to this server can browse directories of other Internet sites devoted to such topics as anthropology or military history or to such organizations as the American Philological Association or the Thesaurus Linguae Graecae project. Other resources available via the Michigan web server include electronic journals and discussion lists, text files such as the "Gods on File" dictionary and bibliography of mythology, and image-scanning projects such as the papyrus digitization project at the University of Michigan and the Pompeii project at the University of Virginia. Most of the resources discussed below can be accessed via the Michigan web server, which, for those with access

to World Wide Web (WWW) software, is the easiest jumping-off point for exploring classics on the Internet.

However, many institutions have not yet implemented WWW access, and so many users will find gopher a more readily available method to navigate the Internet. The Center for Computer Analysis of Texts at Penn has for several years maintained the Penn/CCAT gopher server,²⁸ which supplies information about and archives of electronic journals and discussion lists, in addition to text and software files for downloading via FTP (File Transfer Protocol, a method for transferring files from an Internet site to a microcomputer). The center is also in the process of constructing a WWW site with a series of remarkable demonstrations of technology used for classics teaching by James J. O'Donnell.²⁹

Electronic Journals

James O'Donnell is also the editor of one of the first scholarly electronic journals, the *Bryn Mawr Classical Review*.³⁰ Each month, *BMCR* publishes six to 12 reviews for subscribers, written by classicists from several dozen institutions, along with responses to previous reviews and general news and conference announcements of interest in the field. Reviews, which can be quite lengthy (ten or more screens of text is not uncommon), cover papers given at conferences or new publishing ventures, as well as recent academic imprints. The tone is serious, with frequent recourse to footnotes and references to related monographs or journal articles, but *BMCR* offers a conversational liveliness and timeliness that make it a pleasure to receive and to read. Responses to reviews are welcomed and debate is encouraged. Other electronic journals for the classics include *Electronic Antiquity: Communicating the Classics*³¹ and its sister publication, *Didaskalia: Ancient Theater Today*,³² both from the University of Tasmania; *Scholia*

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Reviews,³³ from the University of Natal; and *Classics Ireland*.³⁴

Discussion Lists and Electronic Conferences

One of the easiest ways to develop a good grasp of the kinds of resources available on the Internet and techniques for their use is to join and actively partici-

pate in (or passively lurk on) a topical discussion list. These electronic communities vary wildly in the amount of message traffic, level of discourse, and focus of purpose, so new users should join groups selectively to avoid megabytes of e-junkmail. For five years Linda Wright, a classics professor at the University of Washington, has provided a virtual salon for chattering classicists, the Classics Discussion List.³⁵ Recent topics consid-

ered have included translation and textual questions, the academic job market, classics on film, and course syllabi and textbooks. The number of messages on this list can be overwhelming (often 50-100 over a weekend) so only those who are diligent about reading e-mail or who are graced with large mailboxes should subscribe.

The several dozen other discussion lists of interest to classicists cover fields such as ancient history, numismatics, mythology, late antiquity, Latin literature and language, Thucydides, military history, and Aristotle's *Politics*. For addresses, readers should consult the *Directory of Electronic Journals, Newsletters and Academic Discussion Lists*, compiled by Michael Strangelove and Diane Kovacs and edited by Ann Okerson, or browse directories on most gopher servers.

Indexes and Tables of Contents Databases

Most librarians are familiar with CARL Corporation's UnCover, the table of contents and document delivery database for current journals in all disciplines. But they may not know that several classicists have been working at a volunteer indexing effort to provide a similar service for more obscure humanities journals. Robert Kallet Marx (University of California, Santa Barbara) and Phillippa Matheson (University of Toronto) have been coordinating indexing for the TOCS-IN: Tables of Contents of Journals of Interest to Classicists³⁶ database since 1992. TOCS-IN currently indexes more than 120 journals in all areas of classical philology and archaeology. Files are available via FTP, but users can also browse and read files on the Penn/CCAT gopher server.

Through its electronic journal project, Johns Hopkins University Press makes available tables of contents and abstracts for *Arethusa*, *American Journal of Philology*, and the *Journal of Early*

Christian Studies.³⁷ NESTOR,³⁸ a bibliography of preclassical archaeology that is ideal for students of Bronze Age and Homeric Greece, is also now distributed via FTP. As of this writing, volumes 13-20 (1986-93) and some earlier years were available.

Full Text Files

This essay began with a look at the TLG and other large electronic corpora available on CD-ROM, so it is appropriate that it end with full-text files available over the Internet. Many may wonder why a library or an individual would pay hundreds or even thousands of dollars for a CD-ROM version of a text that is free for the downloading on the Internet. The difference is the textual authority, editing, and data and search structure built into the commercially published editions, in addition to the choice of versions or translations available from vendors. Many texts available on the Net offer no edition, translator, or editor statement, making it difficult for humanists to know exactly what text they are consulting and if it has been proofread and corrected or is instead riddled with typos and errors. With these caveats in mind, students will find many interesting text archives on the Internet with copies of Greek and Latin texts in translation and even a few in the original Latin or encoded in SGML.

A new tool for searching out text files is Alex: A Catalogue of Electronic Texts on the Internet,³⁹ maintained at Oxford University. Through Alex, searchers can identify, locate, browse, and retrieve texts at sites such as Project Gutenberg, the Eris Project at Virginia Tech, and the Oxford Text Archive. A sampling of texts located with Alex includes English translations of Herodotus, Ovid, and Caesar and a Vulgate Bible. A text archive for works in Latin, Project Libellus,⁴⁰ is maintained by an undergraduate student at the University of Washington and offers the *Aeneid*, *Georgics*, and selections from Livy, Caesar, and Catullus.

Conclusion

Other electronic wonders rise, promising but sketchy, on the horizon like so many rosy-fingered dawns. James O'Donnell has conducted several virtual seminars with students all over the world; NeoLatinists can converse with one another, assume alternate identities, and wander through a succession of Roman rooms in the virtual environment LatinMOO⁴¹ (MOO is an acronym for Multiple User Dungeons and Dragons, Object Oriented, meaning a shared, user-created Internet environment available to multiple users simultaneously). Many libraries have been slow to explore electronic resources beyond CD-ROM or on-line indexes, which fit comfortably into the traditional array of reference tools. The successful integration of full-text or multimedia programs into library programs and services requires a consid-

Electronic publishing will provide future students with new windows on ancient worlds.

erable commitment of equipment, space, and staff. Less immediately apparent, but ultimately more important, are the planning, publicity, and subject skills librarians need to acquire and to utilize in order to partner the teaching faculty in their introduction of computer resources to the undergraduate curriculum. Innovative library programs, such as the awarding-winning Information Arcade at the University of Iowa or the electronic text centers at Columbia and Virginia, have demonstrated the benefits that the thoughtful and creative collection and administration of electronic resources can bring to both teaching and scholarship. However, none of these products is self-service: even though many are not more expensive than the typical academic imprint, all require a level of mediation, education, and advocacy that most librarians have never been called on to exert.

The effect is the same as if every new book added to a library's collection came in a different format (reading diagonally across the page or in columns bound from right to left, for example) and with a different set of rules and conditions for its use (this book can only be consulted at this kind of table, with this brand of lamp). As if, in fact, the codex format, mass literacy, and commercial publishing had not yet imposed any standards or order on the kinds of collections libraries develop and the sorts of services they offer to provide access to those collections. The great humanistic scholars and collectors of the Renaissance rescued, preserved, and printed the surviving manuscripts of Greek and Roman authors; electronic publishing will provide future students with new windows on ancient worlds.

Beth Juhl earned her BA in Greek from the University of Texas at Austin and her MS in Library Service from Columbia University. She is currently head of reference at the University of Arkansas Libraries.

Works Cited

Hardware and Software Requirements:

Following are *minimal* requirements for the products listed below. Readers should contact publishers for more detailed and up-to-date technical specifications.

PC/DOS: IBM or 100% compatible; hard disk drive; 386+ (+ indicates "or better") processor; 649K RAM; DOS 3.1+ (5.0+ recommended in most cases); VGA+ color monitor; for CD-ROM products, CD-ROM player with MSDOS Extensions 2.0+.

PC/Windows: IBM or 100% compatible; hard disk drive; 386+ (486+ recommended) processor; 4MB RAM (8MB recommended in some instances); DOS 3.1+; Windows 3.1+; VGA+ color monitor; mouse; for CD-ROM products, CD-ROM player and MS Extensions 2.0+.

Macintosh: LC+; 4MB RAM (8MB recommended in most instances); System 7+ (some products will work with System 6+); VGA+ monitor; mouse; for CD-ROM products, Apple compatible CD-ROM drive. Many Macintosh products also require Hypercard 2.1+.

¹**Thesaurus Linguae Graecae: CD-ROM #D.** TLG Project (Univ. of California Irvine, Irvine, CA 92717), 1992. *Price:* Available by lease arrangement only: individuals: \$500.00/5yrs.; institutions: \$850.00/5 yrs.; site license/network: \$3,500/5 yrs. *Note:* The Project maintains a gopher server with information on pricing, software, and corrections and additions to the *TLG Canon of Greek Authors and Works*; its Internet WWW URL is gopher://tlg.cwis.uci.edu:7011/1. *Contact:* (714) 824-7031; FAX: (714) 824-8434; e-mail: tlgi@uci.edu.

²**TLG/PHI Workplace 4.1.** Silver Mountain Software (1029 Tanglewood, Cedar Hill, TX 75104). *Price:* \$85.00. *Contact:* (214) 293-2920; FAX: (214) 293-6641; e-mail: jbaima@onramp.net.

³**Musaiois 1.0.** Darl J. Dumont/Randall Smith (15237 Sunset Boulevard, Suite 20, Pacific Palisades, CA 90272). *Price:* \$65.00. *Note:* Free evaluation version available via Internet anonymous FTP. *Contact:* FAX: (310) 454-4819; e-mail: ddumont1@cerf.net.

⁴**Pandora 2.5.2.** Scholars Press, GA. *Price:* \$50.00, new customers; \$30.00, upgrade. *Note:* Also available from Intellimation, P.O. Box 1530, 130 Cremona Dr., Santa Barbara, CA 93116, (805) 968-2291. *Contact:* (800) 437-6692; (404) 475-9245; FAX: (404) 442-5114; e-mail: elli@ikaros.harvard.edu.

⁵**PHI CD-ROM #5.3 and PHI Demonstration CD-ROM #6.** Packard Humanities Institute, 1991. *Price:* Available by lease arrangement only: \$50.00/disc/yr.; \$125.00/disc/3 yr. *Contact:* (415) 948-0150; FAX: (415) 948-5793; e-mail: 74754.2713@compuserv.com.

⁶**Past Masters CD-ROM. Full-text Humanities Databases.** Intellex Corporation, 1992 (CH, Oct '94). *Price:* Varies according to titles/formats, ranging from \$80.00 for DOS single-user license for *The Utilitarians* to \$1,250.00 for a Macintosh, two-simultaneous-user LAN license for *Nietzsches Werke*. *Past Masters* collection in English: \$1,460.00 for individuals; \$2,845.00 for institutions. *Contact:* (804) 979-5371; (414) 258-1264; FAX: (804) 979-5804; (414) 258-1284; e-mail: 71551.3222@compuserv.com; intellex@delphi.com.

⁷**Library of the Future.** 3rd edition. World Library, 1994. *Price:* \$149.95. *Contact:* (800) 443-0238; FAX: (714) 756-9511.

⁸**Patrologia Latina Database.** Chadwyck-

Healey, 1993. *Price:* \$45,000.00 one payment; installment arrangement also possible. Additional copies of the CD-ROM edition for use in the purchasing institution on a single site: \$2,400.00. *Contact:* (800) 752-0515; FAX: (703) 683-7589.

⁹**CETEDOC Library of Christian Latin Texts.** Brepols, 1991. *Price:* Depends on standing orders for the *Corpus Christianorum* series and exchange rates; *CLCLT*: c. \$3,100.00; *CLCLT-2* c. \$5,200.00. *Contact:* 32-10-473786; FAX: 32-10-472606; e-mail: tombreur@clat.ucl.ac.be.

¹⁰**Database of Classical Bibliography.** Scholars Press, GA. *Price:* Not set. *Contact:* (404) 727-2320; FAX: (404) 727-2348; e-mail: dclayman@bklyn.bitnet.

¹¹**Art Index and Humanities Index.**

H.W. Wilson—*Art Index* (1983-). *Price:* \$1,495.00 annual subscription, with quarterly updates until Sept. 1995, monthly thereafter. *Humanities Index* (1984-) *Price:* \$1,295.00 annual subscription, with quarterly updates. *Contact:* (800) 367-6770; (718) 588-8400; FAX: (718) 590-1617; e-mail: hwwmsg@info.hwilson.com.

SilverPlatter—*Art Index* (1994-). *Price:* \$1,720.00 single user; \$2,150.00 multiple user. *Humanities Index* (1994-). *Price:* \$1,490.00 single user \$1,860.00 multiple user. *Contact:* (800) 343-0064; (617) 769-2599; FAX: (617) 769-8763.

Note: Both indexes available from Wilson as data tapes, from Wilson and BRS (now CD Plus) as on-line files, and from OCLC's FirstSearch at a per-search charge.

¹²**Arts and Humanities Citation Index, Compact Disc Edition.** Institute for Scientific Information, 1992. *Price:* (1995) \$5,630.00 annual subscription, with quarterly updates; (1980-89 cumulation) \$14,950.00. *Note:* *AHCI* is also available as an on-line file from Dialog, Data-Star, and OCLC's FirstSearch. *Contact:* (800) 336-4474; (215) 386-0100; FAX: (215) 386-2911.

¹³**Philosopher's Index.** Dialog Information Services, 1990. *Price:* \$1,500.00 annual subscription for first-time single user; \$495.00 renewal; surcharges for networking range from 50% to 150%; quarterly updates. *Contact:* (800) 334-2564; FAX: (415) 254-8486.

¹⁴**ATLA Religion Database on CD-ROM.** American Theological Library Association, 1993. *Price:* \$1,600.00-\$1,700.00 annual subscription, plus a onetime retrospective fee based on customer purchase history. For 1-5 simultaneous users, add \$300.00 annually; semiannual cumulations. *Contact:* (708) 869-7788; FAX: (708) 869-8513; e-mail: ATLA@ATLA.COM.

Religion Indexes: RIO/RIT/IBRR 1975-on CD-ROM, 1993- . Price: \$1,175.00 annual

- subscription, plus \$300.00 annually for 1-5 simultaneous users; annual cumulations.
- Biblical Studies CD-ROM*, 1994- . Price: \$165.00 individuals; \$260.00 institutions, plus \$300.00 annually for 1-5 simultaneous users; annual cumulations.
- 15 *Electronic Bibliographie Papyrologique*. Scholars Press, GA, 1993. Price: \$85.00 bibliography only; \$130.00 with search-only version of ProCite; \$240.00 with full version of ProCite. Contact: (800) 437-6692; (404) 475-9245; FAX: (404) 442-5114; e-mail: bagnall@columbia.edu.
- 16 *Homer in the Papyri 1.0*. Scholars Press, GA. Price: \$30.00. Contact: (800) 437-6692; (404) 475-9245; FAX: (404) 442-5114.
- 17 *Project Herakles: Bibliographical DataBank on the Ancient World*. Contact: Bretschneider-Rome, Via Cassidoro, 19, Casella Post.6192, I-00193 Rome, Italy; phone/FAX: 066-879361.
- 18 *Gale's Literary Index CD-ROM*. Gale Research, 1993 (CH, Jul'94). Price: \$175.00 annually, single user; \$295.00 and up annually, network version. Contact: (800) 877-GALE; FAX: (800) 414-5043 (US and Canada).
- 19 *DiscLit: World Authors: Twayne's World Authors Series, and OCLC World Authors Series*. G.K. Hall/Macmillan, 1994. Price: \$995.00. Contact: (212) 702-6789; FAX: (212) 605-9350.
- 20 *The Scribner Writers Series on CD-ROM*. Scribner/Macmillan, 1994 (CH, Nov'94). Price: \$595.00 single user; \$695.00 network. Contact: (212) 702-9691; FAX: (212) 605-4932.
- 21 *HyperMyth: An Electronic Textbook of Classical Mythology with a Printed Component*. Hermes Publishing (180 South 300 West #201, Salt Lake City, UT 84101), 1994. Price: \$89.95. Contact: (801) 521-9349; FAX: (801) 521-9360; e-mail: hermpub@xmission.com.
- 22 *Athena: Classical Mythology on CD-ROM*. G.K. Hall/Macmillan, 1994. Price: \$295.00 single user; \$395.00 network. Contact: (212) 702-6789; FAX: (212) 605-9350.
- 23 *Sibyl Project*. Contact: Jocelyn Penny Small, Director, U.S. Center for the *Lexicon Iconographicum Mythologiae Classicae (LIMC)*, 220 Alexander Library, Rutgers University, 169 College Avenue, Brunswick, NJ 08903; (908) 932-7404; e-mail: jpsmall@gandalf.rutgers.edu.
- 24 *Perseus 1.0: Interactive Studies and Sources on Ancient Greece*. Yale, 1992 (CH, Jul'93). Price: \$350.00 single user; site license available; CD-ROM and videodisc can be purchased separately. Note: Current version includes 1 CD-ROM, 1 videodisc, and 1 user's guide. Most new purchasers will want to wait for *Perseus 2.0*, due out in 1995, which will encompass 4 CD-ROM discs and an optional videodisc. Perseus Project WWW server can be found at <http://medusa.perseus.tufts.edu/>. Contact: (203) 432-7620; FAX: (203) 432-2394; e-mail: yupmkt@yalevm.cis.yale.edu.
- 25 *SOPHIA CD-ROM on Byzantine History and Art*. Lambrakis Research Foundation (3 Paparigopoulou Street, 105 61 Athens, Greece), 1995. Price: Depends on exchange rate. Contact: 301 33.11.848-51; FAX: 301 32.30.668.
- 26 *Microsoft Ancient Lands*. Microsoft Corporation, 1994. Price: \$59.95. Contact: (206) 882-8080; (800) 426-9400; FAX: (206) 93-MSFAX.
- 27 *Classics and Mediterranean Archaeology World Wide Web Server*. URL (Internet address)=<http://rome.classics.lsa.umich.edu/welcome.html>. Contact: Sebastian Heath, sfsh@umich.edu.
- 28 *Penn/CCAT Gopher Server*. URL=gopher://ccat.sas.upenn.edu:100. Contact: Jay Treat, jtreat@ccat.sas.upenn.edu.
- 29 *James J. O'Donnell's teaching demos*. URL=<http://ccat.sas.upenn.edu/teach.demo>. Contact: James J. O'Donnell, jod@ccat.sas.upenn.edu.
- 30 *Bryn Mawr Classical Review*, ed. by James J. O'Donnell (Bryn Mawr College), 1990- . Subscription: e-mail listserv@cc.brynmawr.edu; message: subscribe bmrc-1 your name. Notes: Also available via the Penn/CCAT gopher. Paper subscriptions can be purchased for \$15.00/yr. through Thomas Library, Bryn Mawr College, Bryn Mawr, PA 19010. Contact: James J. O'Donnell, jod@ccat.sas.upenn.edu.
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- 34 *Classics Ireland*, ed. by Andrew Erskine (University College, Dublin), 1994- . Note: Also available via the Penn/CCAT gopher. Contact: Andrew Erskine, aerskin@macoll.amh.ucd.ie.
- 35 *Classics Discussion List*. Subscription: send e-mail to listproc@u.washington.edu; message: subscribe classics your name. Contact: Linda Wright, lwright@cac.washington.edu.
- 36 *TOCS-IN: Tables of Contents of Journals of Interest to Classicists*. 1992- . Note: Access via the Penn/CCAT gopher. Contact: Robert Kaller Marx, rkallet@humanities.ucsb.edu; P.M.W. Matheson, amphoras@epas.utoronto.edu.ca.
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- 38 *NESTOR*. Contact: K.D. Vitelli, Program in Classical Archaeology, Indiana University, Bloomington, IN 47405; e-mail: vitelli@indiana.edu or nestor@indiana.edu.
- 39 *Alex: A Catalogue of Electronic Texts on the Internet*. URL=gopher://rsl.ox.ac.uk:70/11/lib-corn/hunter. Contact: Hunter Monroe, econhkm@vax.ox.ac.uk.
- 40 *Project Libellus*. Contact: Konrad Schröder, peasant@u.washington.edu or libellus@u.washington.edu.
- 41 *LatinMOO, MUGIT: Multorum Utentium Gregi Interesse Transcribendo*. Contact: Linda Wright, lwright@cac.washington.edu.

■ Print Sources for Additional Information

General

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