Introduction

The *Bibliography of the Neuropterida* project (BotN or Bibliography below) is an on-going effort to comprehensively catalogue, annotate and provide shared access to the global literature on the insect orders Neuroptera (lacewings, antlions, owlflies and their allies), Megaloptera (fishflies and Dobsonflies), Raphidioptera (snakeflies) and Glosselytrodea—collectively the superorder Neuropterida. As a bibliography, the BotN currently documents and synthesizes data on 15,100+ distinct works spanning more than 1400 years (see *Temporal Scope* below). As a digital library, the BotN contains links to 16,000+ digital documents (links displayed where permissible), representing 8700+ distinct works and 135,000+ unique pages of neuropterid-related text and illustrations. As a literature annotation resource, the BotN contains 136,300+ annotations in several categories (see *Annotations* below). For additional information on the scope and development of the BotN see below and the Version History page.

Using the Bibliography

To access the principal pages of the BotN web site, make a selection from the Bibliography menu bar, which is displayed at the bottom of all BotN pages. The Simple Search and Advanced Search pages provide gateways to all of the detailed content of the Bibliography—including basic citation data, citation notes, links to digital files and citation annotations. For detailed information on the organization, content and presentation of Bibliography pages and data, and for tips on how to most effectively use BotN features, select Help from the Bibliography menu bar, then navigate to the page or page element of interest.

Presentation

The Bibliography is presented here as an interactive web-based module of the *Lacewing Digital Library* (LDL) web portal. This implementation is will support and enable its continued integration with other developing digital resources for the Neuropterida.

Taxonomic Scope

The BotN has been developed primarily as a research tool to provide bibliographic and related literature support for studies of neuropterid insects. Thus, its primary taxonomic emphasis is on the literature pertaining to extant and extinct insect taxa that are currently placed in the orders Neuroptera, Megaloptera, Raphidioptera and Glosselytrodea. To further aid historical and nomenclatural research on these groups, the Bibliography also contains citations to a substantial number of works that treat: (1) extant and extinct taxa that were formerly, but are not currently, placed in the orders Neuroptera, Megaloptera, Raphidioptera and Glosselytrodea (i.e., "Neuroptera sensu lato" references), (2) extant and extinct taxa that are nomenclatural homonyms of neuropterid taxa (original publications only); and (3) extant and extinct "taxa" based on unavailable names that belong to, or appear to belong to, the orders Neuroptera, Megaloptera, Raphidioptera and Glosselytrodea.

Subject Matter Scope

The BotN cites works containing information on all aspects of taxa in the superorder Neuropterida, including, but not restricted to: agriculture, biological control, biology, ecology, faunistics, history, morphology, paleontology, phylogeny, physiology, parasites, predators, systematics and taxonomy. The neuropterid-related content of a work may be minor and may not be reflected in its title. Citations to several classes of works that do not contain direct neuropterid content, but which are important or useful for neuropterid studies are also included, e.g., selected bibliographic and biographic reference works, works containing information useful for dating neuropterid publications, general nomenclatural works, and works documenting the chrono- and lithostratigraphic characteristics of fossil localities.

Temporal Scope

No temporal limitations have been imposed on works included in the BotN. Most content development, however, has focused on the documentation of works published on or after 1758, the year from which formal zoological nomenclature begins. The earliest work cited in the Bibliography dates from 580 AD. The approximate distribution of cited works by century is: 21st (2000's), 20%; 20th (1900's), 68%; 19th (1800's), 10%; 18th (1700's), 1%; pre-18th (1600's and before), 0.1%.

Language Considerations

The BotN is worldwide in scope and strives to include works written in all languages. The approximate distribution of cited works by primary text language is: English, 54%; German, 14%; French, 8%; Spanish, 7%; Russian, 4%; Italian, 3%; Chinese, 2%; Japanese, 2%; other languages (all less than 1.5% each), 6%. The current version of the Bibliography cites works published in at least 41 languages. The titles of works written in languages that utilize the Roman alphabet are preferentially cited in the language of the primary title or main text language. Where they occur in the original works themselves, diacritical marks used in the most common languages of western Europe (particularly German, French, Spanish and Italian) have generally been preserved in Bibliography citations. Beginning with version 9.0, efforts have been increased to retain a wider range of diacritical marks used in citations to works in other languages. Citations to works published in languages that do not use the Roman alphabet are generally included in the Bibliography when a Romanized translation or transliteration of at least part of the citation becomes available. Transliterations and translations have been derived from a variety of sources. Where both transliterated and translated bibliographic data are available, both are commonly reported (in the same Bibliographic Record), particularly for works written in Russian, Chinese and Japanese. Beginning with version 10.0, non-Roman character data have been included in the citations of some works that were originally published in non-Roman scripts (primarily works written in Cyrillic script). Roman-character-language translations of serial articles that were originally published in non-Roman-character languages (e.g., English translations published in the journal Entomological Review, which mirrors the Russian-language journal Entomologicheskoe Obozrenie) are not given separate bibliographic records. Instead, the main Bibliographic Record cites the original work, and information on any known translations are provided in the General Notes field of the main record. Consequently, digital representations of translations are linked through the Bibliographic Record pages of their original works.

Included Works

The citation content of the BotN is strongly focused on works published in the primary scientific literature—primarily scholarly journal articles, books and book chapters. The current version of the Bibliography contains citations to works published in 2400+ serial publications. Manuscripts (particularly theses and dissertations) and informal, popular and secondary works—in print or fixed-digital formats—are documented (at the discretion of the author) where considered noteworthy, as are selected web-native works (i.e., non-fixed digital works).

Excluded Works

Citations to neuropterid-related text and/or illustrations appearing in several classes of secondary and ephemeral sources are included or excluded at the discretion of the author, based on a subjective assessment of the value of the information that they contain. This applies to information contained in newspaper articles, paper ephemera (e.g., pamphlets), abstracts of papers presented at scientific meetings (oral or poster, published or unpublished), dictionary and encyclopedia articles, treatments in general works on entomology (e.g., textbooks), and other similar works. Although the BotN contains citations to many abstracts of neuropterid-related presentations, no attempt is made to include all such works, and, in recent years, most abstracts have been actively excluded as a low development priority for the Bibliography citation set. The Bibliography does not cite abstracts of papers published in abstracting journals (e.g., Biological Abstracts, Dissertation Abstracts); the original works are cited instead.

Navás Works

(1852-1938), who published more than 1000 papers in a wide range of journals around the world over the course of 40 years, the Bibliography contains citations to all of the works known to have been published by this author, including works that do not contain neuropterid content. The portion of the Bibliography devoted to this author, who published on a wide range of religious and natural history topics, is quite comprehensive. Particular attention has been devoted in the Bibliography to documenting information concerning the serial and separate publications of this author. Many of the Bibliographic Records treating Navás works contain detailed notes on their dates of publication and the character of their separates. Navás published many of his works in series, using a single title and differentiating successive papers numerically. Several of these series ran for many years and spanned multiple journals. Complete collations of many of these series have been compiled for the first time in the Bibliography and can be found in the General Notes field of the Bibliographic Record of the first paper in each series.

Strengths and Weaknesses

The BotN is particularly complete with respect to literature treating the systematics, taxonomy, morphology and phylogeny of the Neuropterida. The Bibliography may be regarded as essentially complete with regard to publications of taxonomic and nomenclatural importance for the Neuropterida as of any version release date, apart from undiscovered papers published near the release date. Although works in most other subject areas of neuropterology are also well represented, the BotN is not as exhaustive as it might be in areas such as general paleontology, agriculture-related topics, physiology, local and regional faunistics, and works written in languages using non-Roman scripts. The assistance of individuals with special expertise or knowledge in the neuropterid-related literature of these areas is invited to help further the development of the Bibliography in these fields.

Annotations

The BotN provides access to a substantial volume of original research data, produced or edited by the author, that are presented in the form of annotations to individual Bibliographic Records. Several of the more important classes of annotation information that are provided for many records are noted below.

Dates of Publication (1500+ works). A considerable amount of original and secondary bibliographic research is incorporated into the BotN in the form of information on the detailed dates of appearance of individual works, or parts of works. This includes research into the true year (versus imprint year) and sub-year (month and/or day) publication dates of 1500+ works, which are important for applications in scientific nomenclature. Where the 'Imprint Year' and 'Publication Date' fields of a work's Bibliographic Record differ, the source(s) used in determining the publication date are (in nearly all cases) documented in the 'Dating Notes' field of the same record.

Biographical Data (3000+ first authors). Basic biographical information (i.e., some combination of full name, title, year of birth, year of death, sex, nationality and occupation/interests) is provided for 3000+ first authors of works. These data have been derived from a wide variety of sources. For living authors, most of the data have been obtained through personal contacts with individual authors; for deceased authors, the following references have been particularly useful and informative sources of relevant information: Evenhuis (1997), Gaedike (1985), Gilbert (1977) and Groll (2006). E-mail contact information is provided for 640+ living first authors.

Taxon Annotations (50,500+ annotations for 2600+ works). This class of annotations documents the primary neuropterid taxa cited in each work, and, for each cited taxon, indicates the general type(s) of information included in the work. For papers that treat multiple taxa (revisions, catalogues, faunas, etc.), each taxon is annotated separately. For many taxonomic works, synonymial listings are displayed as treated by the author of the work. Taxon annotations can be used to restrict literature searches to display only papers containing information on particular taxa (for papers where these data have been captured). Taxon annotation lists can be printed to provide a list of the taxa and/or synonymy treated/used in each work.

Figure Annotations (75,600+ annotations for 3100+ works). This class of annotations documents individual figures contained in specific works, and provides basic information about each illustration (e.g., page, plate, and figure numbers, life stage, sex, cited name, current name, figure subject and view). Figure annotations can be used to restrict literature searches to display only papers containing illustrations on particular taxa or particular subject matter. Figure annotation lists can be printed to provide alternate figure captions, with standardized subject headings and updated taxon nomenclature, for all of the neuropterid-related figures in each documented work.

Separates and Reprints (3300+ works). The Bibliography provides separately-recorded data on the pagination (and sometimes other data) of the printed separates of 3300+ works. For works published in multiple states (e.g., as a journal/serial article and as an independently printed 'separate' or 'reprint'), as many 19th and early 20th works were, these data may be consulted to establish the correct original citation for taxonomic or other data.

Miscellaneous (2400+ works). Miscellaneous notes are provided in the General Notes field of the Bibliographic Record page for 2400+ works. These notes contain information on a wide variety of subjects, including correction of miscellaneous errors, cross references among works with related subject matter, collations of publications issued as series, detailed information on printed separates, and information about the neuropterid content of larger works that were not devoted primarily to the Neuropterida.

Content Development

Bibliographic content for the BotN has been derived from a wide variety of sources, including: (1) standard abstracting journals (particularly the Zoological Record [1864-present]), (2) the 'references cited' portions of published scientific papers, (3) manuscript reference lists compiled and provided by colleagues, (4) original journal runs, (5) collections of printed separates held by individuals and museums, (6) printed separates and digital files sent by colleagues, (7) correspondence with colleagues, and (8) a wide variety of original print and digital sources. Citations to works new to the Bibliography are added to the working copy of the database underlying the BotN as they are discovered. The working copy of the database is not linked directly to the on-line version of the Bibliography. Citations become available on-line when they are episodically uploaded to the on-line Bibliography. New data uploads may occur in conjunction with a documented version update of the Bibliography, or as part of an undocumented data update to an existing Bibliography version. Citations may be incomplete when initially uploaded to the BotN. Citation records are updated with additions and corrections in the working copy of the BotN database as new information becomes available. Updated citation data are made public with the next data update to the on-line Bibliography. The basic bibliographic data (i.e., author, imprint year, title, name of publisher or serial, and pagination) of ca. 65% of the works cited in the BotN have been personally verified by the author through the examination of one or more forms of the work (i.e., print or digital originals, facsimile copies, or print or digital separates). The Verified field of a work's Bibliographic Record indicates whether it's basic bibliographic data have been verified. The WorldCat database (WorldCat 1971) has been used extensively to check and update citation data for books and serial publications.

A major developmental focus of recent versions of the Bibliography has been to enable direct access to the dispersed literature on the Neuropterida by providing links to digital representations of cited works. The digital content linked through the Bibliography can be divided into two general classes. First, links to content managed directly by the Bibliography project (currently 99+% of BotN links); and second, links to web-based content that is managed external to the Bibliography project (<1% of links). While project-managed content currently predominates, it is expected that the number and variety of external links will continue to grow in the future as a percentage of total links. Project-managed content consists of discrete, generally downloadable, files—primarily PDFs, but also smaller numbers of files in other formats (e.g., manuscript Word documents, archived htm/html files)—that have been derived from a variety of sources. The vast majority of PDF files served through the BotN are original scans of the historical printed literature that have been produced by an active scanning program maintained as part of the Bibliography project. These files can be identified, when open, by the "Bibliography of the Neuropterida" page that is appended to the end of each file. Most project-produced scans are available in two PDF versions: a larger, non-searchable, master ("m") file, and a smaller searchable ("s") file. Because of their larger size and higher quality, master files are recommended for printing hard copies of particular works. Searchable files have been processed with an optical character recognition algorithm and are searchable with free PDF reader software, though search accuracy is highly dependent upon the character and quality of the underlying scan. Master and searchable files can be differentiated in downloads by the lower-case letter "m" or "s" following the reference number in the filename. Additional digital files have been provided by numerous colleagues and organizations. Links to digital content that is not maintained directly by the Bibliography project are primarily links to external web sites that contain substantive neuropterid content, and links to neuropterid-related digital files that are hosted by web sites managed by other organizations or individuals.

Versioning

Summary data on the various documented versions of the Bibliography that have been produced to date, including information on data sets, release dates, delivery formats and functionality changes, can be found on the Version History page. In versions of the Bibliography up to and including the initial release of version 9.0, essentially all new content (e.g., new and updated citations, and links to new digital files) was first made available in conjunction with a fully documented release of a new Bibliography version. However, continuing efforts to integrate Bibliography-associated data with other current and future modules of the *Lacewing Digital Library* have rendered that update model impracticable. In order to ensure the cross-compatibility of datasets serving multiple LDL modules, versions 9.0 and later of the Bibliography may be augmented with undocumented data updates. To continue tracking the growth and development of the Bibliography, documented and incremented versions of the Bibliography will continue to be produced episodically—particularly where data updates are contemporaneous with interface improvements or the addition of new classes of data to the Bibliography. However, from version 9.0 on, the numerical data associated with documented versions of the Bibliography (e.g., on the Version History and other information pages) pertain only to the initial release of that documented version, and do not include information about unannounced or otherwise undocumented data updates made between documented versions.

User Assistance

Users of the BotN are invited to report missing works and incorrect or incomplete data on included works so that the Bibliography may be continually improved. Relevant contact information is provided on the Contacts page.

New reference materials that may contribute to improving the Bibliography—such as specialized lists of neuropterid-related references, publication lists of individual authors, printed and/or digital separates of published papers, and scans of printed literature—are requested from BotN users. These will be gratefully received and will be used to check and improve the Bibliography's completeness and accuracy.

Users who possess digital files of works not currently linked through the Bibliography are invited to forward copies of those files to the author for incorporation, as may be appropriate, into future versions of the BotN.

Citation Requested

Where a researcher believes that the information resources obtained from the BotN have been of substantial value in facilitating a research project, the researcher is requested to cite the BotN in the "References Cited" section of any publications resulting from that research project. Recommended formats for citing the Bibliography are given on the Citation page.

Uses and Restrictions

The permitted uses of the *Bibliography of the Neuropterida* are identified below. All other uses and rights are reserved by the author.

1. The BotN may be used by researchers as a tool to aid in the location of literature relevant to their studies.
2. The BotN may be used by researchers for on-line viewing or downloading of linked digital files for personal use. The BotN owns no copyrights to any linked files. Files linked as PDFs are made open access through the BotN: (1) after appropriate permissions have been obtained, (2) where the original works are believed to no longer be covered by copyright restrictions, or (3) when appropriate permission grantors are believed to no longer be extant (e.g., author(s) deceased, journal-sponsoring organization defunct and without a successor). A BotN information page containing a complete reference citation is added to the end of all pdf files produced specifically for the BotN project. Because these pages sometimes contain information required by the permission grants of publishers or authors, these pages, where present, must remain attached to the digital files downloaded from the BotN.
3. The BotN may be used by researchers as a reference source for bibliographic data to be included in the "References Cited" portion of manuscripts being developed for publication (except as in 4. below). Authors may find the 'Copyable Citation' field provided in the Bibliographic Record of cited works useful for copying and pasting citation data into manuscripts.
4. The author reserves the right to publish the Bibliography, in full or in part, in all media. Except as noted above, neither individuals nor organizations may not use BotN data as the basis for the production or publication (in any medium) of other bibliographies, without the author's permission. This includes the production of "sub-bibliographies" for individual neuropterid taxa or specialized subject areas, and the inclusion of BotN data as a part of bibliographies of more extensive scope. Anyone wishing to use data from the BotN to produce more restrictive or more extensive bibliographies should contact the author.