Scope and Access

The NCBI Books database, also known as Bookshelf, is a searchable collection of online biomedical textbooks and other literature. In addition to some classic biology and medical textbooks and monographs, it also includes books and reports/documents produced by the National Library of Medicine (NLM) and the National Center for Biotechnology Information (NCBI). Currently, the Books database contains over several hundred titles. Contents of the Books database are directly accessible from the Books homepage at: www.ncbi.nlm.nih.gov/books/. Details on how to use the Books database are provided in the Bookshelf help document: www.ncbi.nlm.nih.gov/books/NBK3833/.

Books Homepage

On the Books homepage, entering a query term and clicking the Search button (A) performs a search against all contents in the database. The Using Bookshelf section (B) contains links to help documents. The complete list of available titles is accessed through the Browse Titles link (C). Specific information for publishers interested in submitting their titles to Books is available through the Authors and Publishers link (D). Titles under the New & Updated and Featured Titles sections link (E) to the Table of Content pages of these titles.

Searching

Searching the entire bookshelf should be started from the Books homepage. The example (right) displays matches found for “mutL homolog” (F), which lists matches organized by titles (G), with section under the “Top results for this book” (H). More topic specific searches can be conducted using the Advanced page (I). There indexed fields and terms indexed under a field can be selected and viewed using the pull-down menu (J) and the “Show index list” (K), respectively. A selected term is entered in the field-limited form automatically (L).
Browsing and Filtering Available Titles Using the Browse Titles Link

The complete list of available titles is available through the “Browse Titles” page linked from the Books homepage. Here, titles can be narrowed down using a combination of existing filters on Subjects, Types and Publishers (A). Custom terms can also be entered (B) to filter the list of titles to locate more specific entries. Clicking the “More” link (C) brings out the complete list of options for that category. The example (D) is a result from filtering with Book, Cell Biology from all publishers.

Browsing and Searching the Content of a Title

It is often more productive to browse and/or search the contents in a title-specific manner. Clicking a icon or its text title located in the Browse Title page opens the main page for that entry (shown below left). For books with copyright restrictions, a note is placed at the top (E) to indicate that its content cannot be browsed chapter by chapter. Sections for such entries are not linked within the book (F). Searching with terms of interest is the only way to access the content from such books (G).

For books without such a restriction, such as the help manuals for different NCBI resources, items under Contents (H) are hyperlinked to the actual chapter/section for browsing within a web browser window.
Searching for Contents Specific to a Subject Within a Book Title

Contents specific to a subject within a book title can be searched by entering relevant terms in the search box as shown by the example (A or B). Clicking on a section (C) opens its full display.

Books Record Display

The full display of books (D) links key terms to their definition, which is viewable upon mouseover (E). Scrolling to a subsection can be done using the anchor links in the "In this page" section of the right hand column (F) or the popup menu under the "Go to" link (G). The example below is for the marked subsection (H).

To facilitate reading, tables and figures are linked instead being shown within the full display. Clicking a link, such as the one for Figure 5.23 (I), brings out the full figure along with its legend in a popup window shown to the right.

**A Strand-directed Mismatch Repair System Removes Replication Errors That Escape from the Replication Machine**

As stated previously, bacteria such as *E. coli* are capable of dividing once every 30 minutes, making it easy to screen large populations to find a rare mutant cell that is altered in a specific process. One such class of mutants contains alterations in so-called mutator genes, which greatly increase the rate of mutations when they are inactivated. Not surprisingly, one such mutant makes a defective form of the proofreading exonuclease that is a part of the DNA polymerase enzyme (see Figures 5.9 and 5.19). In activity is defective, the DNA polymerase no longer proofreads effectively, and many replication errors otherwise have been removed accumulate in the DNA.

The study of other *E. coli* mutants exhibiting abnormally high mutation rates has uncovered another proofreading system that removes replication errors made by the polymerase that have been missed by the proofreading exonuclease. This *strand directed mismatch repair* system detects the potential for distortion in the helix that results from the mispairing of noncomplementary base pairs. But if the proofreading system recognizes a mismatch in newly replicated DNA and randomly corrects one of the two mismatched nucleotides, it would mistakenly "correct" the original template strand to match the error exactly but thereby failing to lower the overall error rate. To be effective, such a proofreading system must be able to distinguish and remove the mismatched nucleotide only on the newly synthesized strand, where the error occurred.

In eucaryotes, the mechanism for distinguishing the newly synthesized strand from the parental template at the site of its mismatch does not depend on DNA methylation. Indeed, some eucaryotes—including *Drosophila*—do not methylate any of their DNA. New synthesized strands are known to be preferentially nicked, and biochemical experiments reveal that such nicks (also called single strands) provide the signal that directs the mismatch proofreading system to the appropriate strand in a eucaryote. (Figure 5.22)

**Figure 5.23**

*A model for strand-directed mismatch repair in eucaryotes* (A) The two proteins shown are present in both bacteria and eucaryotic cells. MutS binds specifically to a mismatched base pair, while MMR scans the nearby DNA for a nick.
NCBI Help Manuals from the Books Database

A comprehensive set of help documents on NCBI resources is available through the Books database. The content is organized under a single master entry, which can be located using the “Browse Titles” page by filtering available titles with “NCBI help manual” (A). Clicking the title of that master entry (B) displays a list of individual help manuals, each links to a resource-specific help document.

Clicking the title of an entry, such as Entrez Programming Utilities Help (C), opens the document with section headings (D) linking to additional details. The right-hand column provides links to alternative display formats (E) and subsection titles (F) for navigating among different sub-sections.