

A Quick Guide To EMBOSS

<http://www.emboss.org>

This is a Quick reference Guide for EMBOSS version 2.8.0



Rice, P. Longden, I. and Bleasby, A. (2000) "EMBOSS: The European Molecular Biology Open Software Suite". *Trends in Genetics* 16(6):276-277.

Introduction

EMBOSS (European Molecular Biology Open Software Suite) is a freely available suite of programs and libraries for sequence analysis. It incorporates many tools originating from the EGGC package created in 1988. All EMBOS programs are designed to run on a UNIX command-line or behind graphical interfaces (e.g. Jemboss, wEMBOSS).

Obtaining EMBOSS

To install EMBOSS: download the current version from <ftp://ftp.uk.embnnet.org/pub/EMBOSS/EMBOSS-2.8.0.tar.gz>, then follow the instructions at: <http://www.rfcgr.mrc.ac.uk/software/EMBOSS/download.html>

Graphical User Interfaces

There are a number of graphical interfaces to EMBOSS: <http://www.rfcgr.mrc.ac.uk/Software/EMBOSS/interfaces.html>

Jemboss is a java interface and is distributed with EMBOSS. If you are installing with the Jemboss interface you should use the installation script in the `EMBOSS-x.x.x/jemboss/utills` directory. Instructions for Jemboss installation are given at: <http://www.rfcgr.mrc.ac.uk/Software/EMBOSS/Jemboss>

Support and Mailing lists

The mailing list emboss@embnet.org is used for discussions of user problems. To subscribe to this list, send a mail to majordomo@embnet.org with the message text: `subscribe emboss`. The mailing list archive is: <http://www.rfcgr.mrc.ac.uk/Emboss/HYPERMAIL/emboss>

Please send bug reports to emboss-bug@embnet.org

Help on a program

A program can be found using a keyword search of the description of all the programs by running the EMBOSS application `wosname`.
`wosname keyword`
displays list of all programs with keyword in description

`wosname -alphabetical -auto` displays a list of all programs
`programname -help` gives the available parameters for the `programname`
`tfm programname` displays the documentation of `programname`
Documentation is also given online at:
<http://www.rfcgr.mrc.ac.uk/Software/EMBOSS/Apps>

Sequence formats

Sequences are stored in databases or in files as simple text. EMBOSS does not support sequences in word-processor files! The default sequence file format is **fasta**. This format has an initial title line consisting of a "`>`" followed by the sequence description on the first line. The second and subsequent lines contain the sequence, e.g.:

```
>fa0 Human FAU gene fragment
GACCGCCAGGAAACGGCATGTAGCCTCACTGGAGGCATTCGCCCGGA
AGATCAAGT
```

EMBOSS currently supports 42 formats, including: **Clustal**, **EMBL**, **GCG**, **Genbank**, **PIR**, **MSF**, **Phylip**, **SwissProt**, **Text (raw)**.

The default output can be altered for all programs by an environment setting:
`setenv EMBOSS_OUTFORMAT format`

Alignment Formats

Several formats have been written or adopted for EMBOSS output.

Multiple Alignment

`simple` Displays names, positions and sequences, markup line underneath [default]
`fasta` Standard fasta display. Gaps displayed as "`-`"
`msf` Standard MSF format. Gaps displayed as "`.".` for intrinsic and for terminal ones
`srs` Similar to simple. No markup line
`trace` Verbose form for de-bugging

Pairwise Alignment

`pair` Simple format for pairwise output [default]
`markx` Standard output from FASTA program suite
`srspair` Similar to pair format
`score` Score output. No sequence display

Any program derived from Bill Pearson FASTA suite of programs has a `markx` default format.

`-aformat` Alters output format
`-awidth` Displays alignment width
`-ausashow` Displays the full USA (see below) in the alignment

Feature Formats

`gff` General Feature format defined by the Sanger Institute [default]
`embl` Feature table used by EMBL database (em)
`swissprot` Feature table used by SwissProt database (swiss) (sw)
`-ufo` UFO (uniform features object) features
`-fformat` Opens features format

These flags can be applied to the output by using "`o`" as a prefix, e.g. `-oufo`

`-fbegin` Specifies first position
`-fend` Specifies final position
`-freverse` Reverses features (DNA only)

Graphic Formats

`-graph` Static graphics using PLP plot. Output as X11 [default], PNG, ps, tektronics amongst others

Sequence Databases

Your local EMBOS installation may have many sequence databases set up. The program `showdb` will indicate the available databases.

Uniform Sequence Address (USA)

A USA is an unambiguous means of specifying sequences in EMBOS. It has the following syntax:

`format::database:entry`

Only raw (text) or IntelliGenetics format need to be specified. EMBOS identifies the rest automatically.

You may also use:

`filename` all sequences in a file
`filename:entry` an entry in a file
`@listfilename` a list file (see below)
`asis::ACGACTGACGG` a specific short sequence

The entry can include `*` characters for wildcard matches of several entries and sequence may be specified by adding `[start:end:rev]` positions to the USA. The rev keyword will reverse complement a DNA sequence. Command lines using these characters must be encased in double quotes :

e.g. seqret "embL:hs**"

A part of the sequence can be specified by adding the range:

e.g. seqret "embL:hsfau[1:57]"

The last 100 bases of a sequence can be specified by a negative start:

e.g. seqret "embL:hsfau[-100:]"

List Files

A list file contains a list of USAs (one per line). The list file input is @listfile. A list file may be read in wherever a program can read multiple sequences. Blank lines and USAs starting with a '#' character are ignored. There is no limit on different sequence formats within one list file.

Format Conversion

The format of an output sequence file can be specified. seqret can read in sequences in one format and write them in the other format, for example to convert a sequence to GCG format:

```
seqret in.seq gcg::out.seq
```

The command line and parameters

EMBOSS programs are designed to be run from the command-line, as well as within scripts. To customise their behaviour, each has a distinct set of parameters, also known as options or flags.

There are 3 classes of parameters: *standard*, *additional*, *advanced*. Information on allowable flags for each program is given in the help files.

If values for *standard* (mandatory) parameters are not specified, the programs will prompt for them.

If *additional* (optional) parameters are missed out, default values will be used unless you put options (or opt) on the command line.

EMBOSS programs never prompt for *advanced* parameters; these must be explicitly specified. They are defined in the program documentation.

General qualifiers

These can be used with any program:

- auto Turns off prompts and descriptions. Used when in running programs scripts
- stdout Writes to standard output (screen) by default
- filter Reads from standard input (keyboard), writes to standard output (screen) by default
- options Prompts for all required and additional values
- debug Writes debug output to the file *programname.dbg*
- help Reports command line options. Or help verbose for more information on associated and general qualifiers
- warning Reports warnings
- error Reports errors

- fatal Reports fatal errors
- die Reports deaths

Each of these can be prefixed with 'no' to negate the action.

e.g. -nowarning

- sbegin States the first position of the sequence
- send States the final position of the sequence

Some major programs

EMBOSS currently offers approximately 200 applications. Use wosname to see them all together with below a selection of interesting tools:

TOOLS (examples)

- seqret Reads and writes (returns) sequences
 - est2genome Aligns EST and genomic DNA sequences
 - needle Needleman-Wunsch global alignment
 - water Smith-Waterman local alignment
 - dotmatcher Displays a thresholded dotplot of two sequences
 - renap Displays a sequence with restriction cut sites, translation etc
 - prettyplot Displays aligned sequences, with colouring and boxing
 - extractseq Extracts regions from a sequence
 - reverseq Reverses and complements a sequence
 - plotorf Plots potential open reading frames
- and many other*

UTILS MISC

- embosdata Finds or fetches the data files read in by the EMBOSS programs
- embosversion Writes the current EMBOSS version number

This document was written and designed by Lisa Mullian from the UK EMBnet node and being distributed by P&PR Publications Committee of EMBnet.

EMBnet - European Molecular Biology Network - is a bioinformatics support network of bioinformatics support centers situated primarily in Europe. Most countries have a national node which can provide training courses and other forms of help for users of bioinformatics software.

You can find information about your national node from the EMBnet site:

<http://www.embnet.org/>

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