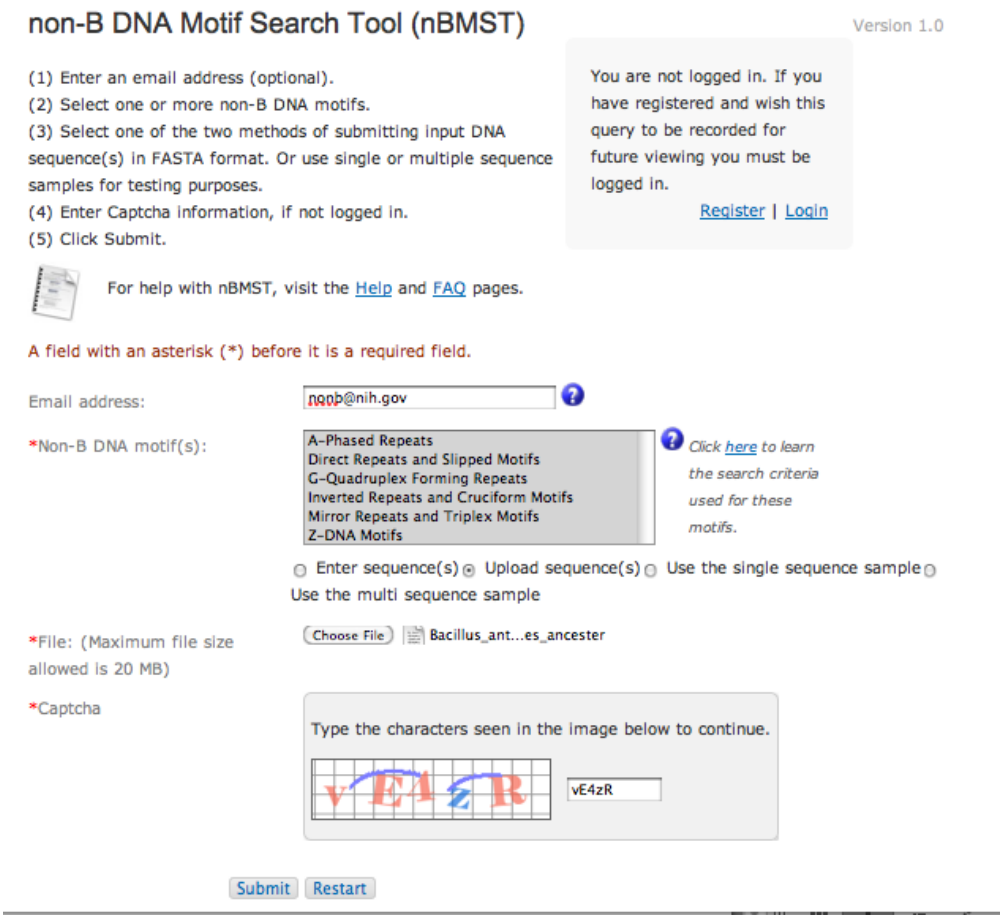
nBMST: the non-B DNA Motif Search Tool
Tutorial (*Version 1.1 - September 2011*)

Below is a step-by-step instruction on how to submit one or more DNA sequences to find potential non-B DNA motifs using non-B DNA Motif Search Tool (nBMST).

1) Go to non-B DNA Motif Search Tool (nBMST) at http://nonb.abcc.ncifcrf.gov/apps/nBMST/default/.

Figure 1 The graphical user interface of the Nbmst. Asequence is uploaded and all the non-B DNA motifs are selected.



2) Enter an email address. Although optional, if your input sequences are large, it is recommended that you provide us with your email address so that you may retrieve your results when you receive a notification email rather than waiting for the result.

> **Tip**: *Registered users who logged in do not need to enter email address.*

3) Select one or more or all non-B DNA motifs.

> **Tip**: *On Windows, use Ctrl or Shift key to select multiple motifs. On Mac, use Command*

4) There are the four different ways of submitting DNA sequences.

Option 1: In the text box for the "Enter sequence(s)" field, copy and paste one or more DNA sequences.
Option 2: Click on "Upload sequence(s)" and select a file containing one or more DNA sequences.
Option 3: Click on "Use the single sequence sample" to test a file with one DNA sequence only.
Option 4: Click on "Use the multi sequence sample" to test a file with more than one DNA sequence.

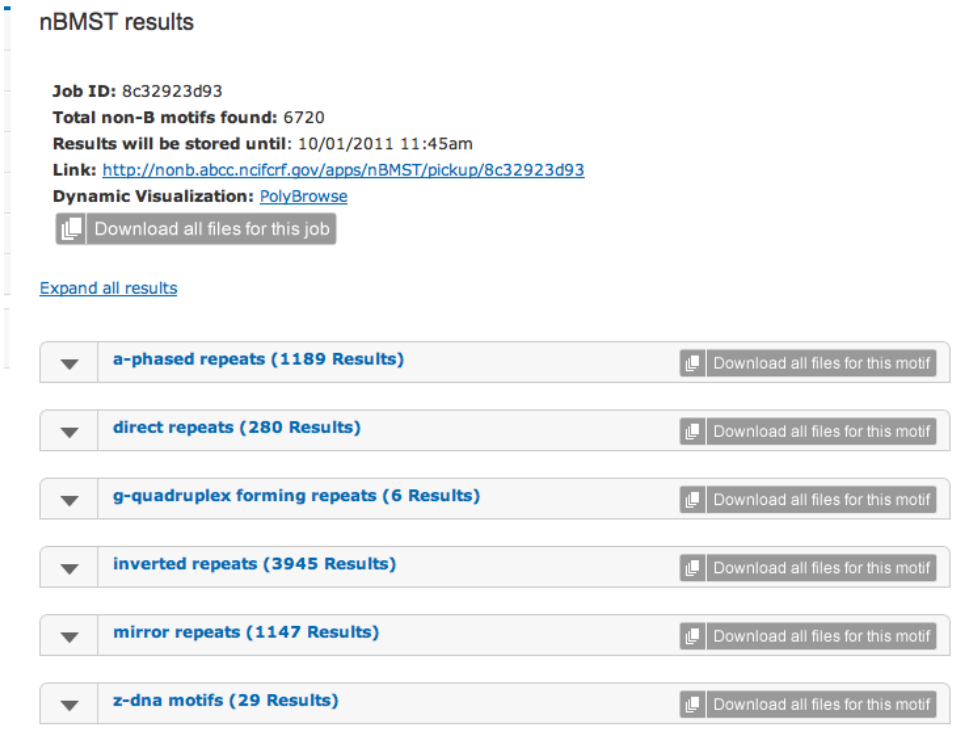
> **Tip**: The DNA sequences:
> - must be in FASTA format.
> - can contain only 'A','C','G','T', or 'N' in either uppercase or lowercase.
> - may contain spaces.
> - must be no larger than 20 megabytes (MB).
>
> ***For larger data, please contact us via the contact form or email at nonb@nih.gov.***

5) Enter captcha characters and hit *Submit*.

> **Tip**:*Logged in users do not need to enter this information.*
>
> *Turnaround time for results will vary depending on the size of the sequence(s) and the number and the type of non-B DNA motifs selected. In cases where input sequences are very large and/or if multiple motifs are selected, an email address is recommended to avoid waiting time as a notification email is sent when the job is completed.*

6) The nBMST result page contains in the upper section the unique *Job ID*, *Total non-B motifs found* in the sequence submitted, *Results will be stored until*, *Link* to access the result in the future if desired, Dynamic Visualization with a link to *PolyBrowse*, and the *Download all the files for this job* link. This is followed by lower section displaying the link to *Expand all results*, the number of motifs found in parentheses and the download link for each motif type.

Figure 2 displays a typical result page of nBMST.



7) To provide better visualization of the results, both static Portable Network Graphic (PNG) images and dynamic PolyBrowse link are provided.

- **Static PNG image**
  The top panel is a graphical representation of the position of the direct repeats across the submit-ted nucleotide sequence. The red arrow shows the size of the sequence submitted and the direct repeats are found across the genome.
  The bottom panel contains detailed information for each motif, including the start and stop coordinates, strand, length, structure, sequence composition and a note if the sequence can also be categorized as a short tandem repeat (STR).
- **Dynamic PolyBrowse**
  The PolyBrowse provides a way to view the non-B DNA-forming motifs interactively and is particularly useful when there are too many entries to be viewed in a static image.

8) The results can be downloaded in two ways.

- To download individual files for just one type of non-B DNA motif, click on **Download all files for this motif**. This will download GFF and tab delimited files.
- To download all the files for all the motifs you have selected, click on **Download all files for this job**. This comprehensive download includes all the GFF files, tab delimited files, and PNG images.

Figure 3 displays static visualization of nBMST.

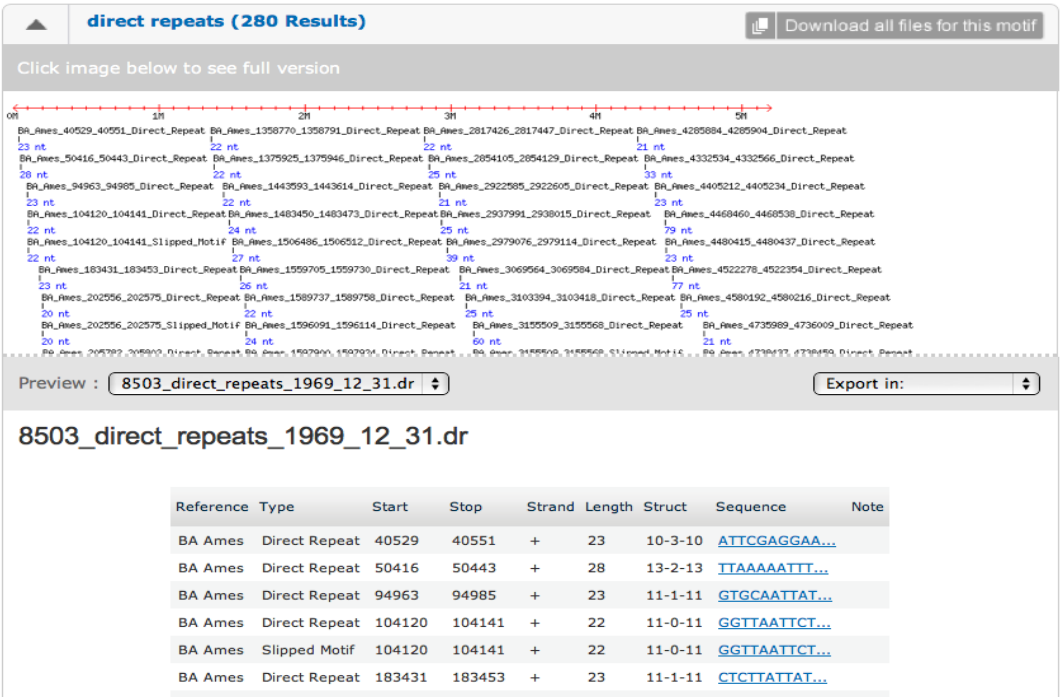
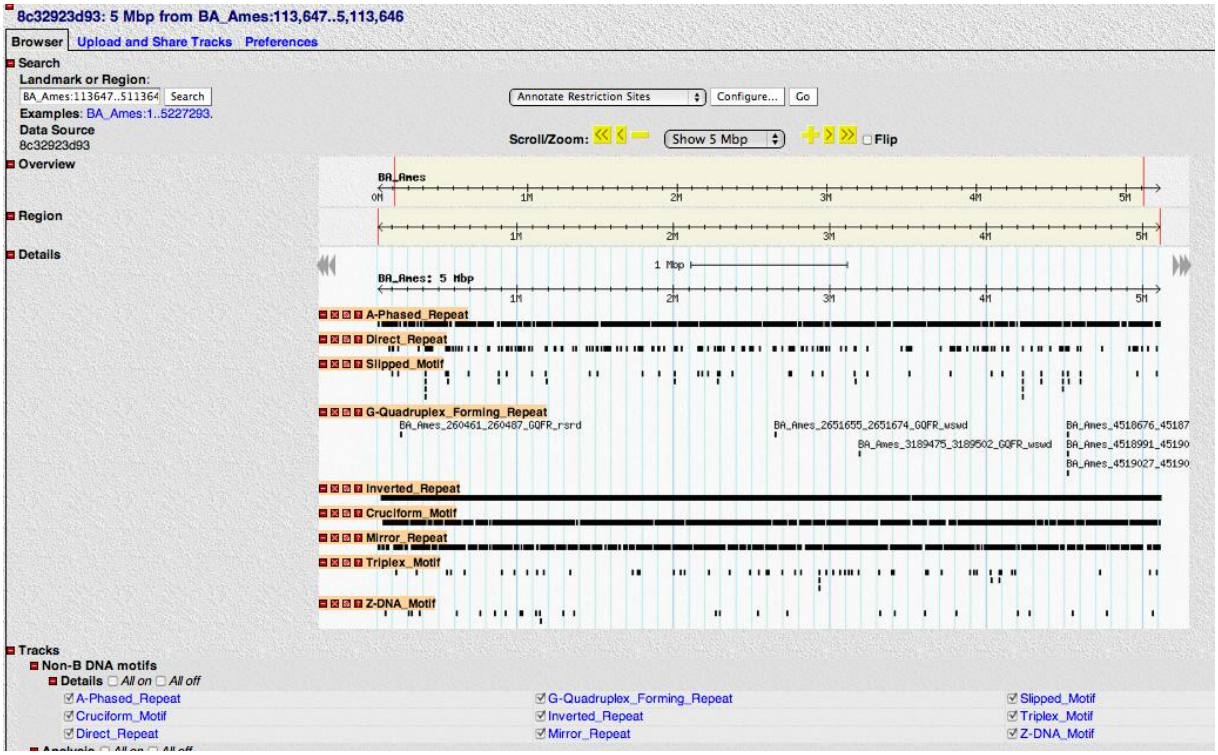



Figure 4 displays dynamic visualization of nBMST.