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Jabberwocky Sequence Alignment

This is a popular exercise which demonstrates how a long DNA sequence can be deciphered from smaller fragments. In this activity, students will perform sequence alignment with parts of a poem much in the same way DNA alignment programs function.

Preparation: instructor should cut each line of the sequence into smaller, uneven fragments (not too small). The fragments of each line should be cut to different sizes so overlap is possible. Each team receives the fragments of 3-5 copies of each sequence, scrambled, in an envelope. Students should not see the full sequences before doing the exercise.

Materials:

- 3-5 copies of each “sequence” per team. Different sequences in different envelopes.
- Sheet of paper on which to arrange sequences
- Glue, for sticking fragments to paper

Instructions:

Writing involves a specific sequence of letters and spaces in the same way that a gene is a specific sequence of nucleotides.

You have fragments from multiple copies of a poem in English (“Jabberwocky”, Lewis Carroll; Sequence 1), a poem in High Elvish (“Galadriel’s Warning”, J.R.R. Tolkien; Sequence 2), in Japanese (“Tale of Heike”; Sequence 3), and finally, a sequence of *Homo neanderthalis* mitochondrial DNA (Sequence 4).

By aligning similar segments, you should find overlaps that will help you decipher the rest of the sequence. Determine the correct order of the fragments for each sequence and glue them to a piece of paper.

Sequence 1:

Twas Brillig and the slithy toves did gyre and gimble in the wabe. All mimsy were the borogroves and the mome raths outgrabe!

Twas Brillig and the slithy toves did gyre and gimble in the wabe. All mimsy were the borogroves and the mome raths outgrabe!

Twas Brillig and the slithy toves did gyre and gimble in the wabe. All mimsy were the borogroves and the mome raths outgrabe!

Sequence 2:

Dorthol ui nu 'aladh Legolas Vi glass: avo anglenno i aear! Ae lastathach ganed 'wael o falas Gûr lín ú-eritha hîdh bor vi taur

Dorthol ui nu 'aladh Legolas Vi glass: avo anglenno i aear! Ae lastathach ganed 'wael o falas Gûr lín ú-eritha hîdh bor vi taur.

Dorthol ui nu 'aladh Legolas Vi glass: avo anglenno i aear! Ae lastathach ganed 'wael o falas Gûr lín ú-eritha hîdh bor vi taur.

Sequence 3

祇園精舎の鐘の聲, 諸行無常の響あり。娑羅雙樹の花の色、盛者必衰のことわりをあらはす。おごれる人も久しからず、唯春の夜の夢のごとし。

祇園精舎の鐘の聲, 諸行無常の響あり。娑羅雙樹の花の色、盛者必衰のことわりをあらはす。おごれる人も久しからず、唯春の夜の夢のごとし。

祇園精舎の鐘の聲, 諸行無常の響あり。娑羅雙樹の花の色、盛者必衰のことわりをあらはす。おごれる人も久しからず、唯春の夜の夢のごとし。

Sequence 4

gttctttcatgggggagcagatttggtacaccaagtattgactcacccatcagcaaccgctatgtatttcgtacattactgccagccaccatgaatattgtacagtagcaccataaattacttgactacct

gttctttcatgggggagcagatttggtacaccaagtattgactcacccatcagcaaccgctatgtatttcgtacattactgccagccaccatgaatattgtacagtagcaccataaattacttgactacct

gttctttcatgggggagcagatttggtacaccaagtattgactcacccatcagcaaccgctatgtatttcgtacattactgccagccaccatgaatattgtacagtagcaccataaattacttgactacct