Before Class Begins

1. Print the images on the following pages.
   - Depending on groupings and class size, you may have to print multiple copies of pages 6-10.
2. Cut out each box
   - Do not separate the genetic information from the image for the samples on pages 2-8.
3. Tape the species cards around the room; they can be on desks or walls.
   - Carefully fold the card in half so that the genetic information behind the photo is not easily seen.
4. Place them so students can easily move around the room to observe the species and determine the source of the fecal sample.

Part 1: Without genetic information

1. Organize students into pairs (one group may have 3)
2. Distribute the student handouts
3. Distribute one fecal sample without genetic information to each student pair (pages 9-10).
   - It will be necessary to distribute duplicate samples. Depending on class size, two or more groups may receive the same fecal sample - this duplication contributes to class discussion.
4. Allow students to move around the room to “observe” the animals in the area (approximately 5 minutes).
   - After five minutes, instruct each pair to stand beside the animal they believe deposited the fecal sample.
5. Ask students to raise their hands if they are certain their sample belongs to the animal they selected.
6. Ask for volunteers (starting with those who raised their hands) to explain their decisions and facilitate discussions between student groups.
7. Give students 5-10 minutes to complete page 1 of their student handout.
8. Ask students what information could make the identification easier.
9. When students suggest genetic information (may require prompting), ask them to return to their seats, where they can exchange their fecal samples for the same fecal sample but with the genetic information included.

Part 2: With genetic information

1. Inform students that the DNA from the fecal sample was collected and amplified, generating a bar code found on their new fecal sample.
2. Inform students that the genomes of organisms known to be in the area have been collected and barcoded. The section of DNA and a barcode can be found on the back of animal cards.
3. Allow students to move around the room to compare the DNA collected from the fecal sample to the known bar codes of the animals in the area (approximately 5 minutes).
   - After five minutes, instruct each student group to stand beside the animal they believe deposited the fecal sample.
4. Ask students to raise their hands if they are certain their fecal sample belongs to the animal they selected.
5. Ask for volunteers (starting with those who raised their hands) to explain their decisions and facilitate discussions between student groups.
6. As groups share their results, students may fill in the photographs on their handouts to identify the sources of all nine samples.
7. Give students 5-10 minutes to complete page 2 of their student handout.
**Lontra canadensis**

- *Lontra canadensis* (American river otter)

**Lynx rufus**

- *Lynx rufus* (bobcat)

**Castor canadensis**

- *Castor canadensis* (American beaver)
**Ursus americanus**

Ursus americanus (American black bear)

TCTCTACCTTCTGTTCGGTGACAT
GAGCCGGAATAGTAGGTACTGC
TCTCAGCCTTTTTAATCCGTGACC
GAGCTAGGG

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**Mephitis mephitis**

Mephitis mephitis (striped skunk)

ACTCTTTATCTTTTTATTCCGGAGC
ATGGGCTGGAATAGCAGGAACCT
GCCCTTAGCTTATTAATTCGGG
CTGAGCTG

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**Vulpes vulpes**

Vulpes vulpes (red fox)

TTTATATTTTGTATTTCCGGGGCA
TGAGCCGCGTATAGTAGGCACCT
GCCCTAAGCCTCCTAATTCCGA
GCCGAATTGGG
Homo sapiens

CTATACCTATTATTCCGGCGCAT
GAGCTGGAGTCTAGGCACAG
CTCTAAGCCTCCTTTATTGCAGC
CGAGCTGGGC

Canis lupus familiaris

AACCGATGATTGTTCCTCCACTA
ATCACAAGGATATTGGTACTTT
ATACTTACTATTTGGAGCATGA
GCCGTTATA

Sylvilagus floridanus

GAGCAGAAGTCAACGCAG
GGACCTACTCAGAGACGATC
AGATCTATAATGTAATCGTTAC
AGCACATGCCT
**Odocoileus virginianus**

Gene sequence:

CCTATATTTACTATTTGGTGCT
TGAGCAGGTATAGGAACT
GCCTTAAGCCTACTAATCCGTG
CTGAACTGGG

**Canis latrans**

Gene sequence:

CCCGGTACTTTACTAGGCCGAC
GACCAAAATTATAATGTGTCG
TAAACCCGCCCATGCTTTTCGTAAT
AATCTTCTTC

**Procyon lotor**

Gene sequence:

TCTCAGCCTACTAATTCCGTGCT
GAGTTAGGTCAACGGGTACTT
TATTAGGAGATGATCAGATTTA
CAATGTAAAT
Amplified DNA Fragment

CCTATATTTACTATTTGGTGCTT
GACCAAATTTATAATGTCGTCG
TAACCGCCCATGCTTTTCGTAAT
AATCTTCTTCC

Amplified DNA Fragment

CCTATATTTACTATTTGGTGCTT
GACCAAATTTATAATGTCGTCG
TAACCGCCCATGCTTTTCGTAAT
AATCTTCTTCC

Amplified DNA Fragment

TCTCAGCCTACTAATTCCGTGC
TGAGTTAGGTCACCCGGGTTAC
TTTATTAGGAGATGATCAGATT
TACAATGTAAT
Amplified DNA Fragment

TTTATATTGCTATTCCGGG
ATGAGCCCGGTTATAGTAGGCA
CTGCCCTAAGGCTCTCCTAATTC
GAGCCGAATTGGG

Amplified DNA Fragment

TCTCTACCTTCTGTTCGGTGCAT
GAGCCGGAATAGTAGGTACTGC
TCTCAGCCTTTTAATCCGTGCC
GAGCTAGG

Amplified DNA Fragment

ACTCTTTATCTTTTATTCCGGAGC
ATGGGCTGGAATAGCAGGAACT
GCCCTTAGCTTATTAATTCGGG
CTGAGCTG
Amplified DNA Fragment

CTTGTTACCTTTTATTCGGTGCGT
GAGCTGGGAATGGTAGGAAGCTGC
CTTTAGCCTACTAATCCGAGCC
GAATTAGGG

Amplified DNA Fragment

TCTTTATCTTTCTATTCGGTGCTT
GGGCCGGTATGGTGGAAGCTGC
TCTTAGCCTACTAATCCGAGCG
GAATTAGGG

Amplified DNA Fragment

ACGCTGTACTTGATGTTCGGTG
CTTGAGCAGGGATAGTGGGAAC
CGCCCTAAGCCTACTAATTCGA
GCAGAGCTA