

Chromosome Clues Worksheet

Background

In all cells about to divide, their chromosomes shorten and thicken. When such cells are stopped at a certain point in this process and stained with a special dye, each chromosome reveals a unique pattern of light and dark bands. These banding patterns on a complete set of chromosomes are as unique to a species as fingerprints are to a person.

In addition, when different species are compared, detailed studies show that any identical chromosomes found amount to clear evidence of common ancestry, and any very similar matches suggests close relationship.

Procedure

Working in pairs, follow directions on the diagram sheet, then answer Discussion Questions.

Discussion Questions

1. If you see any **identical** chromosomes, record their number and two letters. (For example: 20 BC.)
2. If you see any **nearly identical** chromosomes (identical except for one tiny difference), record them in the same way.
3. Do you see any cases where the only (or main) difference between two chromosomes is simply that a small portion of one chromosome is **upside down** when compared to the same region of its otherwise identical counterpart? The easiest way to find these is to look for cases where the centromere (the constricted region) of one chromosome is higher or lower on the other chromosome, and the pattern of bands going **down** a little bit from that constriction on one chromosome is **identical** to the pattern going **up** from the constriction in the other chromosome, and vice versa. These are called **inversions**, and the process which causes this is normal, and has been observed many times. This seldom results in any problems, and if this is the only difference, the two chromosomes being compared are functionally identical. Record below the number and two letters of any chromosomes where inversions were found.
4. Do you find any cases where there is just a dark tip on one or both ends of one chromosome, but lacking in its counterpart? This is also a functionally minor difference, so the chromosomes involved are essentially identical if that is their only difference. Record below the number and two letters of any chromosomes with only this minor difference.
5. After all these comparisons, which two sets of chromosomes seem to be most alike (with most identical matches and most very similar matches)? A) A & B; B) B & C; C) A & C
6. Species B and C are both classified in the same family (the Pongidae), based mainly on anatomical similarities. Based on chromosome clues, how would you classify species A:
A) same species as B or C (the one it's most like); B) same genus as B or C (the one it's most like);
C) same family as B and C; D) different family, but still very closely related; E) totally unrelated.
7. After you have recorded your answers to questions #5 and #6 above, ask your teacher to reveal the identities of each species. While you are waiting for that information, you and your partner can speculate on their identity, and include your reasons for your guesses. Record them below.