

**Chapter 5**  
**Web Text Box 1**

**Why basset hounds have short legs:  
a processed pseudogene that is not pseudo at all**



**A basset hound-spaniel cross that has inherited  
the short legged trait from its basset hound parent**

We describe (book page 78) how mRNA molecules can sometimes be copied back into DNA by viral reverse transcriptase. The resulting sequences, or retrogenes, have usually been assumed to be inactive pseudogenes since they lack promoter sequences and therefore would not be expected to be transcribed. However a retrogene may by chance be inserted downstream of an existing promoter and be expressed in tissues and at times specified by that promoter.

Fibroblast growth factor (FGF) (book page 277) has a wide range of effects in the body. One effect is to slow and then stop the growth of long bones in the limbs. Recently it was discovered that the short legged trait in dogs such as dachshunds, corgis and basset hounds is the consequence of a retrogene for FGF. The retrogene contains all the exons of the parent FGF gene but none of the introns. It finishes with a poly-A repeat, further proof that it originated as processed mRNA. The retrogene is expressed

in the growth plates of the leg bones and generates FGF that acts to stop growth, causing the short legs characteristic of these breeds.

To read more see Kaessmann. 2009. *Science*, 325:958 and Parker. 2009. *Science*, 325:995.