neurological structure involved in smell. The relative size of the olfactory bulb in birds was also found to correlate with ecological adaptations, including habitat association (e.g., water birds), type of nesting strategy, and diet. For example, birds of prey, including vultures and seabirds, hunt and recognize food by smell, and have relatively large olfactory bulbs, whereas song birds that rely more on cognitive abilities helpful in tool making, vocal learning, and feeding innovations have reduced olfactory bulb sizes.

Overall, the role of ecological adaptation in shaping the OR gene families has been found to be consistent in both birds and mammals, indicating the importance of a sense of smell to an animal’s fitness, survival, and niche.

### Of Skin and Teeth: Identifying Key Differences in Asians

Marques et al. (2016) have found key differences in a suite of genes important for skin and bone development that may have bestowed specific advantages among Asians.

They focused on the human kallikrein cluster (KLK), a suite of fifteen genes clustered on the long arm of chromosome 19 that play a key role in human adaptation and reproductive biology. The genes function as molecular scissors called serine proteases, which target and clip other proteins involved in semen function, teeth development, skin, and blood pressure maintenance, and even cancer.

The team undertook a large study to identify 1,419 DNA differences in the KLK genomic cluster among Eastern Asian (Han Chinese and Japanese), African and European populations by using new DNA data from the 1000 Genomes project.

The most striking differences were narrowed down to two regions near the KLK4 gene, which were found to severely hamper the activity of KLK4 only in Asian populations. This may contribute to dental traits typically found in Asians and important in controlling skin conditions like eczema, which is much more prevalent in northern Europe than in Asia.

"We further predict many effects related to male biology and other physiological functions with possible outcomes in human complex diseases, said Seixas. "KLK4 is a pervasive protease, expressed in a wide range of tissues, and frequently over-expressed in prostate, ovarian, and breast cancers, where it is thought to play a role in tumor progression and metastasis.

"We are only at the tip of the iceberg, but one very exciting possibility is that the same differences may confer a selective advantage to offering a reduced risk to several cancer types with lower incidences in East-Asia."

### Knee-Deep in Spider Leg Evolution

Turetzek et al. (2016) have identified the driving force behind the evolution of a leg novelty first found in spiders: knees.

With eight hairy legs and seven joints on each—that’s a lot of knees to account for and coordinate just for a spider to take a single step. Prpic’s research team honed in on a gene called dachshund (dac). The gene was first discovered in fruit flies, and humorously named for the missing leg segments and shortened legs that result from dac mutant flies.

But arachnids are different than flies and other arthropods, possessing a second dac gene. And the dac2 gene is made only in the kneecap, or patella, during spider development.

When the research group used RNA interference experiments to specifically deactivate dac2, the kneecap fuses to the tibia into a single leg segment. The force behind knees first appearing on the spider evolutionary scene was a result of ancient gene duplication in the