Chemists Can Detect the True Animal Source of Leather

By Alex Berezow, PhD — August 8, 2016

There is much money to be made selling counterfeit goods. The seafood industry is particularly hard hit by fraud. One study showed that what you think is tuna often isn't tuna nearly 60% of the time [2]. As we reported [3] in May, similar problems plague the cheese industry, which prompted chemists to crack down on faux Parmigiano-Reggiano.

Chemists, as it turns out, are hard to fool. Using standard laboratory equipment, they can detect chemical "fingerprints" that can indicate whether or not a particular good is authentic. Now, chemists have turned their gaze upon the $100 billion global market in leather goods.

Reporting in the Journal of Agriculture and Food Chemistry, a team of chemists led by Yuki Kumazawa demonstrated that they can identify the true animal source of leather goods by examining collagen, an abundant connective tissue protein found in skin.

Traditional ways of identifying the source of leather are difficult. Microscopy relies upon analyzing various structural features, which requires skill and experience. These structural features can also be destroyed by the manufacturing process. Similarly, DNA analysis can be hindered by tanning and other treatments that can destroy DNA. So, researchers chose to single out various peptides (protein fragments) of collagen, which remains undamaged by leather manufacturing.

The team extracted and chemically processed collagen from various samples of leather. The team identified six peptides (shown in six colors below) that they used to create unique collagen peptide "fingerprints" for each animal source. (See figure.)

[1] Goat purse? (Credit: Shutterstock)
Armed with these fingerprints, the team then analyzed 75 commercial samples of leather. They discovered that leather labeled as originating from cattle, horses, and pigs were properly labeled, but that leather labeled as coming from sheep, goat, and deer were sometimes mislabeled. The authors believe that different species of deer (which may possess collagen of differing compositions) may account for the discrepancy in leathers from this animal. One goat sample was mislabeled as originating from sheep, and one sheep sample was mislabeled as coming from a goat.

While the authors did not seem suspicious of fraud in the samples they analyzed, clearly their technique could be enormously useful for investigating cases in which counterfeit leather goods are suspected.