TRIBOLOGY AND WINE: WHAT'S THE CONNECTION?

Nicholas D. Spencer, DipSWET
nicholas.spencer@mat.ethz.ch
ETH Zürich, Switzerland & Imperial College, United Kingdom

Our bodies encounter friction and lubrication phenomena continuously, and we are used to the fact that we fall over if our feet have insufficient friction against the floor. Many of us who are contact-lens wearers are all-too familiar with the discomfort associated with insufficient lubrication/excessive friction between our eyes and eyelids. The key element that links tribology and wine is...saliva! Saliva is the lubricant in our mouths, and if we think of our mouths as tribometers, the mechanoreceptors embedded in the oral tissue are the force sensors. Mouthfeel is an important part of the enjoyment of wine, and can largely be attributed to changes in the friction sensed in the mouth, as various foods or drinks pass through it.

One of the most important components of mouthfeel in wine is astringency, often perceived as a drying, rough, or puckering sensation in the mouth. The main components of wine responsible for this sensation are tannins and, to a lesser extent, the acidity. Recent work from groups in Australia has described an elegant series of experiments, in which the friction between saliva-coated model surfaces was measured, before and after adding model wines containing varying amounts of tannins and acidity. Not only was the effect of these components very noticeable in the friction measurements, but the tribological results correlated impressively with specific descriptors provided by a taste panel, presented with the same set of model wines.

Current research, in which I am involved, is aiming to extend this work by fabricating more realistic saliva-covered model surfaces, using the tools of surface chemistry, and to explore the mouthfeel deficiencies that currently make many low- or no-alcohol wines less than pleasant to consume.