**Hot, Hot, Hot or just Bloody Hot!**

Languages are a means of communication and the complexity of the language and subtleness of the words reflect its origins and environment. Some words have many meanings based on a range of criteria. To someone in the UK bush means a small to medium shrub where as to an Aussie also means the wild country forests that surround our towns. Other words can be quite subjective. For a Darwin resident ‘cold’ means 5 C whereas to a resident of Lonyearbyen in Norway (av summer temperature is 7 C) cold is -29C and hot is 20 C.

Hot is a relative term when we talk about weather but it also has a range of other perspectives. For a seventeen year old male hot might refer to an attractive scantily dressed young woman. To a jazz aficionado in New Orleans it might refer to a 12 string blues solo. To a staff member at a local pawn shop it could describe the laptop he has just received. All these things are hot but have no relation to heat.

Last month we looked at the science of flavour and how we understand it. This month we are looking at the concept of heat. As mentioned above it has several meanings that bear no real relationship to actual temperature. When we come to food there is the standard ‘hot’ food being a measure of the actual food temperature and there is the ‘hot’ in the flavour.

In food flavour there are three distinct forms of heat. Each one has a very specific origin and is registered in a particular way. There is often confusion between them and sometimes ‘spicy’ foods which are also called hot. Spicy refers to pungent foods with a complex range of tastes from a wide mix of herbs and spices. They may be hot if the mix includes chilli or pepper but are usually just intense.

Chilli heat is the most widely known and is probably the ‘hottest’ of the three forms. This heat is caused by the chemical ‘capsaicin’ and its effects on receptors in the mammalian body. It has a wide range and is measured in Scoville Heat Units. The scale was developed a hundred years ago by an American pharmacist and uses known concentration of sugars to determine unknown levels of capsaicin. This concentration then becomes the SHU. It is a subjective measure and has since been replaced by more objective methods which measure a wider range of chemicals and the reading is then converted to SHUs.

Capsaicin is a particular type of chemical called a capsaicinoid. It bonds directly with very specific receptors found on our skin. The number and sensitivity of these receptors determine how hot we feel a food is. The number is quite variable across the community and explains why some people are able to eat food with much higher levels or are sensitive to items with quite low levels. In binding to the receptors it sends an electrical signal to the brain which in turn ‘feels’ like there is an intense heat source. It then inflames the tissues around the point of contact so that they look like they have been burned.

The second heat is what we call the ‘pepper’ heat and it comes from the chemical ‘piperine’ which is produced in the fruit of the subtropical vine *Piper nigrum*. It is an akaloid that is believed to stimulate the same sensory receptors as capsaicin. Where as capsaicin binds to the receptors it seems that piperine stimulates them in a similar but lesser way. Pepper and piperine have been in our diets and folk medicine for hundreds of years.

When eating food with a large level of piperine the ‘heat’ slowly builds. Pepper has several layers of flavour based on a range of chemicals like linalool, cineole and limonene. White pepper is the internal seed left after the black skin has been removed from the dried pepper fruit. It has a lower level of complexity and slightly higher levels of heat. Pepper is the most widely traded and used spice in the world.

The third heat is that of the mustard group. This is a wide and quite varied group. It includes the strong flavours from traditional Mustard, Wasabi and Horseradish. All unrelated plants with a very common ‘heat’. It also includes the very mild herbs like radish, water cress, mustard greens and rocket. Although they come from different Families they are all related in the order Brassicales (cruciferous vegetables).

Like the chilli and pepper heat the ‘warm’ effect is caused by particular chemicals. In this case the active ingredient is a group called isothyocyanates which are organic chemicals with a particular molecule containing a ring with a double bonded Nitrogen, Carbon and Sulphur link. This group doesn’t occur in the vegetables but are produced by the rapid breakdown of glucosinolates by physical actions. In some plants (like horseradish) they are quite easy to produce and very little activity (chewing, rubbing) is needed for them to appear. In others like wasabi and mustard, a greater level of physical activity (grating, grinding etc) is required to produce the same flavour.

The three ‘heats’ all stimulate the brain through the same neuro pathway which is why they are all recognised as heat. How we ‘feel’ them is different and quite specific. Chilli is that almost instant sharp and sometimes painful severe burn, particularly at the front of the mouth. Pepper is the warm to hot sensation at the back of the mouth and throat. Rarely painful and usually short lived. It stimulates the senses and partners with the layers of flavour in the seed. The mustard heat is that super sharp, nose clearing blast that moves up the back of the throat and into the nasal passage. In low levels it is pleasant and in high levels it is clenches the muscles but is only short lived.

This is a real brief summary of what hot food is and how the heat is produced. So remember ‘hot ain’t just hot’.