

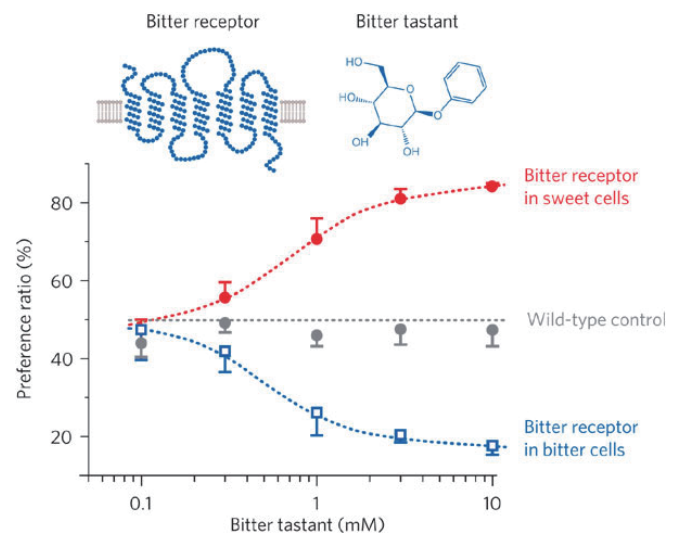
**Figure 3: Sweet, umami, bitter and sour are mediated by specific receptors and cells.**

The traces show recordings of tastant-induced activity in nerves innervating the tongue in wild-type and various gene-knockout (KO) mice or cell ablation studies (Pkd2l1-DTA). T1R1+3 functions as the umami receptor, T1R2+3 is the sweet receptor, T2Rs are bitter receptors (T2R5 is a high-affinity cycloheximide receptor), PKD2L1 is a candidate sour receptor, and PLC-beta2 is the effector and TRPM5 the transduction channel of sweet, umami and bitter pathways. Note the extraordinarily specific taste deficits (red traces) in each genetically altered mouse line. Pkd2l1-DTA refers to animals expressing diphtheria toxin in PKD2L1 cells. (*Nature* 444, 288-294 (2006))

Mammalian taste receptors and cells				
Umami	Sweet	Bitter	Sodium	Sour and carbonation cells
<b>T1R1+T1R3</b> L-glutamate L-amino acids glycine L-AP4  Nucleotide enhancers IMP, GMP, AMP	<b>T1R2+T1R3</b> Sugars Sucrose, fructose, glucose  Artificial sweeteners saccharin, acesulfame K, aspartame, cyclamate  D-amino acids D-alanine, D-serine, D-phenylalanine  Glycine  Sweet proteins Monellin, thaumatin	<b>~30 T2Rs</b> Cycloheximide (mT2R5)  Denatonium (mT2R8, hT2R4)  Salicin (hT2R16)  PTC (hT2R38)  Saccharin (hT2R43, hT2R44)  Quinine strychnine atropine	<b>ENaC</b> Low NaCl Sodium salts	<b>PKD2L1</b> Acids Citric acid Tartaric acid HCl  <b>CA IV</b> Carbonated drinks

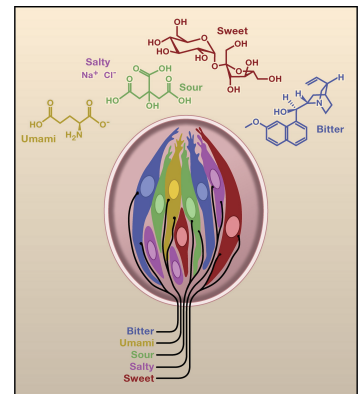
**Figure 2. Mammalian Taste Receptors, Cells, and Ligands**

Detection of the gustatory world is mediated by several distinct classes of taste receptors and taste receptor cells. Sweet and umami compounds are sensed by T1R heterodimers (Nelson et al., 2001, Nelson et al., 2002 and Li et al., 2002), while bitter compounds activate T2R receptors (Chandrashekar et al., 2000, Mueller et al., 2005 and Meyerhof et al., 2005). Salt is detected via several mechanisms, one of which is thought to rely on the sodium channel ENaC (Heck et al., 1984). Sour-sensing cells are defined by the expression of PKD2L1 (Huang et al., 2006), whereas gustatory responses to carbonation are mediated by the membrane-tethered carbonic anhydrase CA IV (Chandrashekar et al., 2009). (*Cell* 139,1234-244 (2009))



**FIGURE 5. Behavioural attraction and aversion are mediated by dedicated taste-receptor cells.**

Targeted expression of a novel bitter receptor to bitter (T2R-expressing) cells results in dose-dependent aversion to the specific bitter tastant (open blue squares). In marked contrast, directing expression of the same receptor to sweet cells produces animals that are strongly attracted to this bitter tastant (filled red circles). Control animals lacking the receptor (filled grey circles) are indifferent to the tastant. (*Nature* 444, 288-294 (2006))



**Figure 3. Labeled Lines Mediate Taste Sensation**

It is now known that tastes to sweet (red), bitter (blue), sour (green), umami (yellow), and sodium (purple) are mediated by separate populations of selectively tuned taste receptor cells. Notably, taste buds from all regions of the oral cavity contain cells that respond to the five basic modalities. Thus, contrary to popular belief, there is no topographic map (i.e., a tongue map) of taste qualities on the tongue. (*Cell* 139,1234-244 (2009))