

# New cell component important to tea and wine-making

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Scientists have discovered where plants build tannins, complex chemicals used by plants for defence and protection. The source is the tannosome, a newly discovered organelle that is found in most land plants.

All living things are made from cells; whether they are single-celled organisms like amoeba, or enormous entities like Giant Redwoods (in which millions of cells make up the body of the organism). Although cells may become specialised for particular roles in an organism, they each undertake many different tasks. Internally each cell is furnished with a range of smaller bodies – termed [organelles](#) – that perform those various essential functions; e.g. chloroplasts in plant cells which are involved in [photosynthesis](#), [mitochondria](#) in both animal and plant cells engaged in [respiration](#), and [ribosomes](#) that are essential for [protein synthesis](#). Each organelle also produces a range of chemicals for the cell. The scientists were examining the organelles in the cell, and almost overlooked some of them.

Geneviève Conéjéro said: "When we purified for the first time the tannosomes (unknown objects at this time), we thought we had obtained chloroplasts and rejected them as rubbish artifacts. After several trials, we considered that chloroplasts were not the only green objects in plants."

The international team, headquartered at INRA in Montpellier, used a number of techniques to examine the cells in action. In some cases they

fixed cells into place, in others they introduced dyes and in more samples they examined spectra, light signatures of chemicals. What they found was that these strange organelles were producing tannins. Until now, no one has known exactly where in the cell tannins have been made. People could see them stored in the vacuole, another organelle in the [plant cell](#), but couldn't work out how they got there.

Geneviève Conéjéro said: "Tannins, also called condensed tannins or proanthocyanidins, are thought to play diverse roles such as defense against [herbivores](#) and pathogens or ultraviolet protection. They give feeling of pungency in the mouth, the feel of a cat's tongue licking your hand. Common sense associates tannins with immature unripe fruit, and people ironically say 'this fruit is too green'. More seriously, plant tannins have been used since the Neolithic times to prevent spoilage of animal skins, and therefore first to manufacture leather laces and soles protecting feet of rough ground."

The result was unexpected and was checked and rechecked. Conéjéro added: "To come to that conclusion and propose a somewhat revolutionary model, we needed a multidisciplinary approach associating several microscopy and biochemistry techniques. The most intriguing finding from this study is the very close proximity of the tannin polymerization system and the photosynthesis supercomplexes."

Aside from their protective roles in plants, tannins are also important in making tea and red wine taste the way they do. It isn't every day that a new organelle is identified, but this goes to show that something as commonplace and seemingly familiar as the cell still has secrets to be discovered. Something to think about the next time you have a cuppa or glass of merlot?

**More information:** Brillouet J-M., Romieu C., Schoefs B., Solymosi K., Cheynier V., Fulcrand H., Verdeil J-L. and Conéjéro G. (2013) 'The

tannosome is an organelle forming condensed tannins in the chlorophyllous organs of Tracheophyta', *Annals of Botany* 112 (6). DOI: [10.1093/aob/mct168](https://doi.org/10.1093/aob/mct168)

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