

Chanterellevution 2016

by Michael Hopping

Mushroomers have long known that some of the scientific names attached to North American chanterelles belong to European species resembling things we collect but might be different. We dreaded the day when a batch of new names would drop like a sack of coal. Well, Merry Christmas. In a series of papers published this fall, Bart Buyck, the oracle on genus *Cantharellus*, reorganized our chanterelles.

The genomics revolution

The tool Buyck used to do it was a comparison of similarities in particular sections of mushroom DNA—think of DNA as a cell’s in-house library of “how to” information. Many of the instructions contained in each chromosome (book) are composed of genes (long sentences) written in a four-letter chemical alphabet symbolized by the letters A, C, G, and T. Today, lab scientists have the equipment to search a specimen’s genetic library, select a predetermined sentence and read the sequence of letters. This readout may then be compared with the “spelling” of that same sentence in the library of any other organism. When spellings are identical, 100% similar, they’re highly likely to be from individuals of the same species. For mushrooms, similarity below about 97% suggests that two or more species could be involved. If similarity is less than some lower threshold value, the possibility of more than one genus should be considered. Increasing levels of disagreement may indicate different families, etc.

To complicate matters, variations in spelling don’t always occur in the same location within the sentence. A sausage pizza and a hot pocket might both be 95% similar to a ham sandwich, but they also differ from each other. How are the three related? This is where heavy-duty statistical software earns its keep. The researcher feeds her batch of sequence readouts into a computer. It crunches numbers and spits out family tree diagrams of greater or lesser probability. All other things being equal, the researcher selects the tree deemed most probable, reattaches the scientific names to any specimens that had them, then adjusts those names as necessary to fit the family tree. Not so bad after all, right?

Chameleons, lookalikes, an imposter, and other surprises

So what hath Bart wrought? I’m saddened to report that I found a small yellow chanterelle with pink false gills that contributed to overturning the proverbial peach basket. But the fate of *Cantharellus cibarius* is probably a more pressing issue. As we feared, it stayed home in Europe. Buyck and his co-workers tell us that golden chanterelles in the southeastern U. S. can be sorted into multiple species. While the exact number has yet to be clarified, most cluster around an American **Golden Chanterelle**, *Cantharellus tenuithrix*, a species he named in 2011. The egg yellow to bright orange cap is 4-7 cm wide, with a short 1.8-2.5 cm long stalk that is frequently paler in color, perhaps even white at first. False gills are yellow throughout development. If the false gills of a young golden chanterelle are whitish and only turn yellow at maturity, the genetics are a bit different. Buyck thinks it likely that these mushrooms segregate into the **Ghost Chanterelle**, *Cantharellus phasmatis* and *C. deceptivus*, but genetic testing is required to tell the two apart. The southeast is also home to *Cantharellus septentrionalis* (at one time Buyck named it *C. altipes*), a leggy and genetically very distinct species of golden chanterelle. Caps are up to 5.5 cm wide. In contrast to *Cantharellus tenuithrix*, the stalk of a mature *C. septentrionalis* can be as long as the cap is wide. This species might or might not occur in the mountains.



Cantharellus phasmatis, Ghost Chanterelle

species claimed. When mistakes are made, as happened in 2003 with a sequence misidentified as *Cantharellus persicinus*, the error can ripple indefinitely through field guides and the mycological community at large. In this instance it didn't help that Ron Peterson's original description of *Cantharellus persicinus* was published in *Nova Hedwigia*, a relatively inaccessible journal. The mushroom announced there, prior to the DNA era, had a cap diameter seldom exceeding 3 cm though the spores were big for the genus. The mislabeled sequence data belongs to a large chanterelle with smaller spores. That imposter, not Peterson's little guy, is what we've mistakenly known as *Cantharellus persicinus* ever since. But the *Nova Hedwigia* description matches the mushrooms I sent Bart. Working from that material he discovered that a small species recently named *Cantharellus spectaculus* is also *C. persicinus*. Let's call *Cantharellus persicinus* the **Little Peach Chanterelle**.



Cantharellus velutinus (pink form), Peach Chanterelle

Before discussing what became of the smooth chanterelle, it's necessary to return to my little yellow unknown with the pink false gills. I sent dried specimens and photos of it to Bart in complete innocence. What happened next exposed (again) a weakness in the genetic testing system. Researchers share data. They preserve dried mushroom specimens at facilities called herbaria. Genetic sequence readouts are labeled with the herbarium specimen number and species name, if known, then sent to GenBank, a centralized archive of molecular data. This system works great when sequences were obtained from the



Cantharellus persicinus, Little Peach Chanterelle

Thanks a bunch, Bart. How should we refer to the **Peach Chanterelle** we've been eating all these years? He says that's the pink form of his newly described *Cantharellus velutinus*, one of three species of Smooth Chanterelle native to our area. At the risk of sounding mystical I can add that *Cantharellus velutinus* comes in three forms: the pink one commonly known as the Peach Chanterelle, a "cibarioid" form that looks like a Golden Chanterelle with mildly sanded false gills, and a "lateritius-like" form with a strongly sanded to nearly flat false gill surface similar

to some varieties of the typically more gregarious **Smooth Chanterelle**, *Cantharellus lateritius*. Another new smooth species, *Cantharellus flavolateritius*, has a comparatively chunky build. Smooth chanterelles with multiple caps rising from the same base are no longer considered a distinct species (RIP *Cantharellus confluens*). But we have ventured deep enough into the weeds. Suffice it to say that Peach Chanterelles and other smoothish species taste the same as always.



Cantharellus lateritius, Smooth Chanterelle



Cantharellus flavolateritius

In other news, multiple species of reddish orange chanterelles have been described but, to date, only the **Cinnabar Chanterelle**, *Cantharellus cinnabarinus* has been seen around here. *Cantharellus appalachiensis* and *Cantharellus odoratus* survive unscathed. Last and not least, the teeny yellow chanterelle, *Cantharellus minor*, is still *C. minor*.

We now resume our regular programming. Fingers crossed for 2017.

Buyck's 2016 chanterelle papers are accessible at https://www.researchgate.net/profile/Bart_Buyck/publications. I suggest that you don't try to join ResearchGate. Any but legit researchers or students are likely to be denied. Simply click on the paper you want to read and download the PDF. Buyck's 2011 paper describing *Cantharellus tenuithrix* and *C. altipes* is not downloadable from the site.