



Encyclopedia of Life

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## Tulips Podcast

*Tulipa clusiana; Tulipa kolbintsevi*

When you think of the tools of the modern geneticist, the lowly razor blade probably don't come to mind. But this low-tech tool is essential to the work of Dutch geneticist and passionate gardener Ben Zonneveld, who is using it to tease apart the genetic secrets of the flower whose spectacular genetic variation caused "tulip mania" in the 1600s and has made it a star in the genetics lab in the twenty-first century.

### Transcript

**Ari:** From the Encyclopedia of Life, this is One Species at a Time. I'm Ari Daniel Shapiro. Ben Zonneveld hauls out a pail of used razor blades – 40 pounds worth – and gives it a shake.

**Ari:** Oh my gosh, look at all those blades.

**Ari:** Zonneveld holds onto this bucket of blades as physical evidence of the progress he's made. Progress, that is, on telling tulips apart – both wild and cultivated. He's based at the herbarium at Leiden University, in the Netherlands – probably the country best known for tulips. In the springtime, bright stripes of color streak the Dutch landscape as tulips bloom before they're cut and sold. But Zonneveld isn't concerned with the colorful petals. He cares about tulip DNA. He's a geneticist.

**Zonneveld:** What I do is measuring the total amount of DNA in a nucleus.

**Ari:** Different tulip species have different amounts of DNA. Anywhere from three to seven times as much in each of their cells compared to human cells.

**Zonneveld:** The amount of DNA is not related to the complexity of the organism.

**Ari:** Why do tulips have so much more DNA than we do?

**Zonneveld:** I don't know. Nobody knows.

**Ari:** Regardless, Zonneveld can use all that DNA inside the cell nucleus to distinguish one type of tulip from another. And that's where all those razor blades come in. Zonneveld places a leaf in a petri dish and starts slicing it up. <cutting sounds>

**Zonneveld:** All organisms are built from cells, plants and animals. Each cell contains a nucleus, so I need the nucleus so I have to cut up the cells. For me, it's very convenient that I'm not left- or right-handed, but I can do it with both hands.

**Ari:** When Zonneveld stops, the leaf's been reduced to a droplet of green slurry. The next step would be to add a fluorescent dye. The more DNA there is, the more it glows. Zonneveld used this technique to distinguish between 87 kinds of tulips – more than any previous classification attempt. Everything from the pink and white *Tulipa clusiana*...

**Zonneveld:** A very elegant tulip.

**Ari:** ...to wild tulips growing in the Middle East and central Asia. It took four or five years for all the samples to trickle in. And after he catalogued and published the 87 types, he discovered an 88th – a new tulip. He holds up a dried specimen – the flower's white and yellow.

**Zonneveld:** This is the picture of the new tulip.

**Ari:** What's the name of it?

**Zonneveld:** *Kolbintsevii*.

**Ari:** Zonneveld named *Tulipa kolbintsevii* after Victor Kolbintsev – the nature guide in Kazakhstan who introduced him to the tulip. Zonneveld subjected its leaves to the razor blade treatment as well. But Zonneveld doesn't just tear plants apart. He also puts new ones together. When he's not in the lab, he's usually at home, in his garden. Zonneveld holds open the door to his tiny backyard greenhouse and leads me inside. He loves it in here.

**Zonneveld:** It is, well, rather packed with plants.

**Ari:** This is really beautiful – I mean, it's like a little forest in here.

**Zonneveld:** Yeah, yeah.

**Ari:** The potted plants are tucked into this room like a tight jigsaw. There's absolutely no space to move around.

**Zonneveld:** I think just here I have 2000 different plants.

**Ari:** 2000 in this little room?

**Zonneveld:** Yes, and there's not a single one is here twice because I don't have the space. Each one is unique.

**Ari:** Most of the plants in here are new varieties, or crosses, that Zonneveld made. They don't exist anywhere else in the world except in this greenhouse.

**Zonneveld:** I can show you how you make a cross, if you want. You take a flower.

**Ari:** You just took a little pink blossom.

Zonneveld peels the petals back. He would then dab the pollen from this flower onto the female organ of the flower of a different species. Half the time it doesn't work. But the other half – Zonneveld gets seeds.

**Zonneveld:** You don't know, if you make a cross, what to expect. That's the nice thing, that you cannot predict what you get out. Each and every plant has a story.

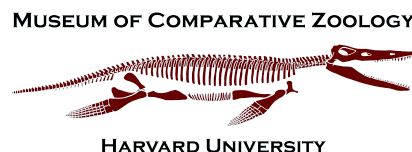
**Ari:** He points out plant after plant, and tells me the stories – how they came to be. How he's mixed colors and sizes and shapes, and produced something new over and over again. And he has even more time for his hobby now...because he's 71, and retired.

**Zonneveld:** My wife says I have too much plants, and I cannot part with any one because most of these I have quite a lot of work involved. I had to grow them up, wait until they flower, make the crosses, sow the seed, grow the seedlings up.

**Ari:** They're like your children.

**Zonneveld:** Yes, yes, more or less.

**Ari:** Check out [eol.org](http://eol.org) to see photos from my trip to Leiden, and to Keukenhof – the world's largest flower garden with over 7 million bulbs. That's right – 7 million. Our series, One Species at a Time, is produced by Atlantic Public Media in Woods Hole, Massachusetts. I'm Ari Daniel Shapiro.



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