

Why does shape matter?

I told you shape mattered in the very beginning, but why does it matter?

Isn't it just important to know what the chemistry is and not the actual shape?

Why does the shape matter?

And so I thought I would give you an example of that with smell.

And yeah, right?

Exactly.

And actually, I think we should do this more often.

You know, I feel like this is inspiring.

We talk about stopping and smelling the flowers, but do we actually do it?

And look at that.

They've got one arm around the other.

This is a moment.

You can't share this moment on Instagram.

You have to put your phone down and be there to have this moment.

And I highly encourage you to be inspired by this.

Now, smell and taste are actually related.

And smell is, you know, it's actually a fascinating thing.

We can smell about 10,000 different smells.

It's remarkable.

A dog can smell between 10 and 100,000 times more.

Right, so if you do the analogy that people do with vision, we can see a third of a mile.

A dog can see about 3,000 miles.

Right, that's pretty cool.

But the question is why do we smell?

How do we smell?

How do we taste?

And it turns out that the way that we distinguish from one smell and one taste and another has to do with the shape of the molecule.

And so just like a key right, with a key, it's all of the same material.

It's the same chemistry in the key.

But the shape is different that can unlock the door or not.

That is literally how our receptor cells work for taste and smell.

This is a cartoon I found that I kind of like.

See, OK, shapes, circles, squares, right.

OK, and some shapes come in, and they make happiness, happiness, flowers and stuff.

I don't know.

Is cheese happy?

It looks neutral.

I would get happy with cheese.

But anyway, fish for some reason, but you know, it depends.

But it's shape dependent.

Now the thing is, taste works that way, too.

So this is what's happening in your tongue.

You've got these taste buds.

We've all heard the word taste bud, right?

But what is really going on?

What is really going on is a combination of chemistry and shape recognition.

So the taste bud, if you look at the taste bud, that's inside of the little pores inside your tongue.

There's a blow up of it.

And so this is what the surface of your tongue looks like.

And there's a little pore.

And there's little filters in there that helps certain molecules kind of get in there.

And what happens when they get in there.

Well, what happens is you've got these taste receptor cells that are like lock key pairs.

They actually only look at like the circle or the diamond, and they can tell you which one is which.

And that's a major part of how we distinguish from one shape to another, and it's actually so-- it goes back a long way.

Why?

Because shape and smell are literally survival.

They are literally like you can-- if you taste something, and it tastes poisonous, don't eat it.

You live.

Right?

So it is a very emotional thing to smell and taste, because it is actually coupled to your very survival.

And Democritus himself, Democritus, our friend Democritus, said that shape must be involved.

He thought that because things that taste bitter are sharp that the bitter molecules were sharp.

They must have sharpness to them, like shards of glass.

That's how he imagined.

And the sweet molecules were sort of the soft, fluffy spheres.

That's not that far off from being sort of what happens a little bit.

But when we look at it like, you know, glucose and quinine, we say, OK, those are very different chemistries.

So it might not be as obvious why one of them taste so different than the other.

But check out this example.

This is the same molecule, the carvone molecule that is called an enantiomer, which means that it has handedness.

It's the exact same chemical formula and the exact same structure, except for one is like this, and one is like that.

That's handedness.

Right.

And that difference makes one of them taste and smell like spearmint and the other like caraway seeds, right?

It's incredible.

It means that in our tongues in our noses we must have chiral, the ability to determine the chirality.

It's pretty cool.

Right.

So shape is critical, and this is one example of why.

This is one example of why.

OK.