

## But Why: A Podcast for Curious Kids

### Are There Underground Cities?

January 5, 2018

[00:00:20] This is

[00:00:21] But Why: A Podcast For Curious Kids from Vermont Public Radio. On this show we take your questions on anything from science to art to history to ethics. And we find interesting people to help answer them.

[00:00:37] Sometimes we answer them ourselves and sometimes we get to go on field trips to answer your questions. That's my favorite. I'll tell you how to ask your own question at the end of the episode. I am actually outside right now and I am not going to stay outside for very long. I am in Montreal, in Canada, and it is minus 5 degrees out. That's Fahrenheit. If you live here in Canada you'd say it's minus 20 Celsius. I am freezing. My toes are froze. This is the kind of weather that freezes the little hairs inside your nostrils. So I'm going to go inside but that's perfect because that's where we need to go

[00:01:22] to answer today's question. My name is Wyatt and I live Los Angeles. And I am five years old.

[00:01:32] I want to know if there is underground cities? Well it just so happens I am standing outside a sign that says "Reseau" which in Montreal represents the underground city. Let's go in.

[00:01:49] Okay. I am now inside the McGill metro station. But this is more than a subway or a tube stop. This is part of the underground city here in Montreal. The Underground City was started in the 1960s and what it is is a network of underground tunnels and there are malls and hotels and places you can shop and eat. Wyatt, it's not quite what you think of as an underground city exactly but it's pretty close. And in fact it is the largest network of underground tunnels in the whole world. It covers 12 kilometers and it's all underneath the city here in Montreal. I just went down an escalator. Now I'm here on New Year's Day so it's pretty quiet. Most of the shops around here at the McGill Metro stop are closed but ordinarily as many as half a million people pass through these tunnels every day and it's particularly good on days like this when it's frigid, because this means people can get from their classes at McGill to a restaurant or a hotel or even to a place to see a hockey game, even to the library without ever having to leave the underground where it's warm. One thing though, Wyatt, that's different about this place than I think what you were thinking of is it's not really an underground city.

[00:03:16] There are not people who live here and it's dug underground but it feels sort of like a mall or you know it's not really like a tunnel like you'd think of. So we're going to visit some other places around the world today that feel like and in some cases are actual underground cities. All right. Well I could spend all day here and in fact I probably would if anything was open. There's not even a coffee shop open today because it's the first of 2018. Happy New Year. So let's head back to the studio and we'll talk about other places where there are underground cities.

[00:04:01] OK I'm back in Vermont but not for long. We're still going to travel around the

world today talking about underground cities.

[00:04:09] I want you to imagine something: you're in your basement. You're knocking down a wall. Maybe to do a little bit of extra reconstruction on your home or to add an addition. So you knock down a wall in your basement and you discover a vast underground network of caves. You step into the caves you keep going back you kind of want to see but maybe you're a little bit scared of what's in there. But you keep traveling deeper and deeper and deeper inside you find rooms upon rooms, all of a sudden you're in an underground city. That actually happened to a man in Turkey in 1963. He discovered the ancient city now known as Derinkuyu. Researchers think it was built between the years 780 and 1160 so a long, long time before that guy found it. It was a functional underground city with everything anyone could need to survive. Kitchens, schools, homes, common areas. The rooms were carved out of the rock. Historians and archaeologists think this city was built to keep out invaders and keep the people living there safe. As many as 20,000 people could shelter in the underground city and it was as many as 18 stories deep underground. Since then more underground cities have been discovered in the same region of Turkey. No one lives there now. But if you're ever in Turkey you can take tours of the underground cities.

[00:05:42] Now that's not the only place people have decided to live underground for safety. There have been times in the past and a lot of different countries where underground cities have been built in times of war or conflict where people have gone underground for safety and they've built kind of cities, I mean not always ones with very ornate structures or electricity but often places where people could eat or sleep. In some cases there were even hospital wings built into underground cities and underground tunnel networks so people could get treatment for medical issues or even have babies.

[00:06:15] Can you imagine being born in an underground city or underground tunnel? When we come back we'll pay a visit to Australia and learn about one town where half the people live in underground houses. First a message for the grownups. Thank you to the sponsor of this episode Burton Snowboards.

[00:06:33] Burton is outfitting the next generation with snowboards boots bindings and outerwear needs for winter adventures on and off the mountain. This is But Why: a podcast for curious kids from Vermont Public Radio. In this episode we're answering this question from Wyatt.

[00:06:58] Now I know if there is any underground cities? Hi Wyatt My name's Nick Troisi and the business owner of a Umoona Mine and Opal museum here in Coober Pedy and we have an underground complex with encases a museum a mine and accommodation for around 270 people all underground.

[00:07:19] That's right all underground. Coober Pedy, two words, is a small town in South Australia deep into the desert. The main attraction there is that most of their buildings are underground. I've been there. I slept in a hotel that's underground. It was nice and cool but it was a little bit strange not to have any windows.

[00:07:38] Here in Coober Pedy, we all live independently there's around three thousand five hundred people here in town and around 50 percent of us live underground. Now the reason why we live underground is because we live in the desert out here and so in winter it can get quite cold it can get to minus two minus three degrees and in summer it can get all the way up to 55 degrees in the shade.

[00:08:01] Let me break in here and say that he's saying 55 degrees Celsius that's about 131 degrees Fahrenheit. Think about the difference between those two temperature extremes when we were in Montreal at the beginning of the episode. It was minus 5 degrees Fahrenheit or minus 20 Celsius. Now we're talking about 55 degrees Celsius and 131 degrees Fahrenheit. Either way the temperature means that people don't really want to be outside.

[00:08:31] So it's very very extreme.

[00:08:32] And you can imagine being outside for all of that is quite uncomfortable. And that's why we live in what we call dugouts. Now there are underground homes dug into the sandstone around Coober Pedy. Now the reason we do that is when you live underground the underground temperature is between 21 and 24 degrees. So it's quite, quite nice.

[00:08:54] In winter it's like you've got a heated home and of course when it's very very hot outside, it's like in an air-conditioned home.

[00:09:01] Just to convert those temperatures again for our United States listeners the air temperature in the dugout stays at about 70 to 75 degrees Fahrenheit.

[00:09:10] Now the rest of the people that live in Coober Pedy, with the advent of air conditioning you can live above ground. But it is very expensive because we're in the middle of the desert we have very expensive power and water. Now what does Coober Pedy look like? Well there's not many trees around Coober Pedy due to lack of water and that's part of the desert environment. So when you look around Coober Pedy, there's mish-mashes of underground homes, above ground and above ground shops and underground shops. So it's a bit of an interesting place.

[00:09:46] You know we have lots of services. We have above ground drive-in cinemas underground art galleries, museums like mine and the grand hotels, pretty much everything that you can find in a normal city you'll have a variant underground. So it's quite interesting and the best thing about underground living is as soon as you close your door the outside world disappears. It's very, very quiet on the ground and that's what most of us allow. We love getting home, closing your door and the outside world disappears and you're into your underground cave so to speak. You don't have to clean windows, you don't have windows underground. Generally at the front of your dugout, you may have a couple of windows that lead into your kitchen or your bathroom. But generally speaking you don't have any windows, because you just dig straight into the hill. The benefits of that of course is that if you want to slightly enlargen your home you can you can just dig and make it as big as you'd like and the best bit about that is because Coober Pedy's famous for two things, underground living and opals, you might find opal while you're digging your home. Plenty of people have dug a home and found more opal than what it cost to dig their house. Some people are very lucky.

[00:11:02] Opal is a stone, something called a gemstone. Those are the really pretty stones often used in jewelery like rubies and diamonds and garnets. Opals come in all kinds of colors, white, black, blue, even orange. They all have swirly colors in them when you turn the stone it kind of glints and glitters in the light. Coober Pedy is famous for white opals with swirling colors. The town actually was settled around 1915. That's about a hundred years ago by miners looking for opals. Imagine digging out your home and finding a very valuable stone. If you would like to learn more about Coober Pedy or see some of

the dugout houses have an adult help you go to but why kids dot org. We'll have some links to some pictures. You can also find them on our Facebook page.

[00:11:53] People in Coober Pedy built houses underground because the temperature there doesn't change much and the outside temperature is not very comfortable for living in. There are other places all around the world where people have built houses into the ground to take advantage of that steady temperature either because it's very hot or very cold where they live and that brings us to another question that's sort of tangentially related.

[00:12:17] That means not totally related but it kind of works for this episode.

[00:12:21] My name's Camden and I live in Missoula, Montana. My question is why is underground so warm? Why is it so warm underground?

[00:12:32] Well Camden it's not necessarily that it's warm underground it's that the temperature is constant. That means it doesn't change much.

[00:12:40] Let me explain. The outer layers of the Earth known as the crust have a thermal energy stored in them that helps keep the temperatures constant and those outer layers are still underground so they're sheltered from the weather and air temperature and don't change much. They're warm not cold because the Earth has heat. Think of the earth a little bit like an onion with lots of different layers. The inner core is solid iron surrounded by an outer core that's molten rock called magma, very, very hot. The next layer is called the mantle and it's made of magma and rock. Finally there's the crust. It's 35 miles thick in some places and three to five miles thick under the ocean. All of those layers of rock are heated by that magma deep inside. In fact the rocks get hotter the deeper you go but the crust on the outside closest to the surface stays about 50 to 60 degrees Fahrenheit all year round. In fact some homes and businesses use that constant temperature to provide heating and cooling without being underground. They use a technology called geothermal heat pumps to heat and cool the buildings using the earth's temperature. I hope that helps Camden and that's it for this episode.

[00:13:55] But Why is produced by Melody Bodette and me, Jane Lindholm at Vermont Public Radio. Our theme music is by Luke Reynolds. If you have a question on anything have an adult record it and send it questions-at-but-why-kids dot org. You can use a smartphone's memo function for if you don't have an adult with a phone like that, have them e-mail us your question.

[00:14:18] We'll be back in two weeks with a whole new episode. Until then. Stay curious.