DAN AND JACK: *Brains On!* Sleeping!

DAN: Shower, brush teeth, TV, nightly bathroom trip. My name is Dan, age seven.

JACK: My name is Jack, age five.

DAN: We're brothers.

JACK: I go to sleep before him.

DAN: He'll go to sleep, like, a few minutes after we get into bed.

JACK: I first cuddle up with my sort of [? di-animals. ?] It's like, after my eyes get tired, I go to bed. So pretty good time, me going to bed. And then I'm out.

DAN: He passes out. That's my happy moment. I like to draw before I go to bed because my favorite activity is drawing. You're looking at a sheet of monsters. Grasshopper spider, weird worm thing, ghost creature, ghost with sharp teeth, and some weird head creature.

JACK: Good night.

KID 1: Is it time yet?

[MUSIC PLAYING]

KID 2: Any second now.

KID 3: Almost here.

KID 4: Prepare yourselves.

KID 5: Can't wait.

[MUSIC PLAYING]

AUTUMN HAGUE: You're listening to *Brains On!*

MOLLY BLOOM: A show featuring awesome kids and the stuff that makes kids awesome. Today, we're exploring sleep.

AUTUMN HAGUE: We have some questions.

MOLLY BLOOM: It's OK to stay up late, right?

AUTUMN HAGUE: Is it possible to control your dreams?

MOLLY BLOOM: Do all animals sleep?

AUTUMN HAGUE: Why do we have to sleep, anyway?

MOLLY BLOOM: We'll answer all these questions and more. Keep listening.

KIDS: (SINGING) It's time to get our brains on. We're going to get a [? smart ?] [? time. ?] Fire up your neurons. It's time, it's time, it's time, it's time, it's time. *Brains On!*

MOLLY BLOOM: I'm Molly Bloom, and today, my co-host is Autumn Hague. Hi, Autumn.

AUTUMN HAGUE: Hi, Molly.

MOLLY BLOOM: So can you tell us a little bit about yourself?

AUTUMN HAGUE: Well, I'm eight years old. I go to Eagle Creek Elementary school in Shakopee, Minnesota, 55379. I'm in third grade.

MOLLY BLOOM: So would you say, in general, do you like sleeping or not like sleeping?

AUTUMN HAGUE: I love sleeping.

MOLLY BLOOM: Why?

AUTUMN HAGUE: Because my bed is so comfortable.

MOLLY BLOOM: So when your parents say, oh, it's time to go to bed, you're like, awesome.

AUTUMN HAGUE: Sometimes, if I'm like playing late, I'm like, oh, I want to play a wee more. Sometimes I have lots of energy. Like on the weekends, I love to go to bed. But in the week, I don't like to go to bed.

MOLLY BLOOM: What time do you go to bed?

AUTUMN HAGUE: 8:00

MOLLY BLOOM: Is that the same every night?

AUTUMN HAGUE: Sometimes it's 8:20. My mom comes in, and sometimes my dad will do it. And they will come in and tuck my covers under my mattress because I like it like that, like the hotels always do.

And then they turn off the lights. And then sometimes I'm like, wait. I forgot. I need more water in my water bottle. Or wait mom, I need my light on so I can get my lotion on, or something like that.

MOLLY BLOOM: So you try to stay up as long as possible but kind of-- are you making up these reasons, or are you just kind of?

AUTUMN HAGUE: It's kind of a routine.

MOLLY BLOOM: This leads to the question, why do we need to sleep?

AUTUMN HAGUE: So we can store up our energy and so we're not crabby during the day?

MOLLY BLOOM: I think that's an excellent hypothesis. Let's see what a scientist had to say.

[GUITAR CHORD]

CREW: Sleep science!

KID: With Dr. Avidan.

SANDEN TOTTEN: Meet Dr. Alon Avidan.

ALON AVIDAN: Well, I always like sleeping as a doctor.

SANDEN TOTTEN: Dr. Avidan studies sleep at a school called University of California, Los Angeles. He's a sleep expert. Dr. Avidan says scientists don't know why we sleep, but they do have some guesses, or theories.

One theory is, sleep is a chance for your brain to do some cleaning.

ALON AVIDAN: As we go through our day, there are a lot of memories that we don't really need.

SANDEN TOTTEN: Memories like what you ate for lunch, or the color of your friend's shirt, or how many holes are in your socks.

ALON AVIDAN: Going to sleep is probably a mechanism, a way for the brain to sort of filter out the useful information and get rid of the stuff we don't need, and making space for better and newer memories so you can function better the next day.

SANDEN TOTTEN: Think of it like deleting pictures or music from your computer to free up more space for new pictures and music. When you sleep, your brain seems to be doing the same thing.

CREW: Sleep science!

SANDEN TOTTEN: What if you don't want to go to sleep? What if you want to stay up all night, or pull an all-nighter? Dr. Avidan says, when you do that, bad things start to happen to your body and your mind.

ALON AVIDAN: When you pull an all-nighter, you know, I know a lot of kids pull all-nighters to study for exams, they're more likely to have pimples on their faces the next day.

SANDEN TOTTEN: Wait. So you're telling me if I stay up all night, I might wake up the next day with pimples?

CREW: Probably.

ALON AVIDAN: In people who have, who go on for several days without sleeping, eventually they become more moody. They become irritable. They're more likely to be in fights, just because the lack of sleep makes us very irritable.

SANDEN TOTTEN: Wow. You need sleep not just to keep your body healthy, but so you're not a jerk.

ALON AVIDAN: So your mind is healthy as well, exactly.

CREW: Sleep science.

MOLLY BLOOM: So are you feeling awake?

AUTUMN HAGUE: Yes.

MOLLY BLOOM: All right, I have a challenge for you.

AUTUMN HAGUE: OK.

MOLLY BLOOM: It's time for the mystery sound.

[RANDOM SOUNDS]

KID: Mystery sound.

MOLLY BLOOM: Here we go.

[HIGH-PITCHED WHIRRING]

Any guesses?

AUTUMN HAGUE: Is it one of those snoring machines?

MOLLY BLOOM: No, it's a good guess, though. I'll give you a hint. Do you want a clue?

AUTUMN HAGUE: Mm-hmm.

MOLLY BLOOM: OK, here's the hint.

GARY HEVEL: They're not that obvious. They're on bushes, and you hear them sing.

AUTUMN HAGUE: So they're on bushes. And they make noise?

MOLLY BLOOM: Mm-hmm.

AUTUMN HAGUE: Bats?

MOLLY BLOOM: Another good guess, but not quite. While you're puzzling over that clue, groove on this.

[CRICKETS CHIRPING]

SUZANNE PEKOW: (SINGING) Do you ever have a hard time sleeping when you're snuggled in your bed? The lights are off, and your eyes are closed but the thoughts race around in your head.

Well, here's something for you to think about when you don't know what else to do. Every animal alive on Earth has to get some sleep just like you.

Lie and sleep near each other. Lion cubs sleep with their mothers. Monkeys sleep in colonies. Orangutans sleep on beds in the trees.

Horses don't really need much sleep. Only a couple hours a day. Sometimes they sleep standing up. And sometimes they lie down in the hay.

Everybody sleeps. Everybody sleeps. It's part of being alive. From the chimpanzees to the squirrels in the trees to the bees buzzing in their hives.

Whales and dolphins and other sea creatures have brains with some unique features. When they get tired and need some sleep, only half of their brain navigates the deep.

Mallard ducks sleep in groups of four, floating all in a row. The ducks on the ends keep one eye open, watching for predators to show.

Everybody sleeps. Everybody sleeps. It's part of being alive. From the chimpanzees to the squirrels in the trees to the bees buzzing in their hives.

Everybody sleeps. Everybody sleeps. It's part of being alive. From the chimpanzees to the squirrels in the trees to the bees buzzing in their hives. To the bees buzzing in their hives.

[ALARM CLOCK RINGS]

KID: Wake up!

MOLLY BLOOM: As Suzanne Pekow's song explains, every animal sleeps in some sense. But even though we need a good amount of sleep, not every creature needs as much as we do.

AUTUMN HAGUE: Giraffes only need one hour of sleep.

MOLLY BLOOM: And at the other end of the spectrum are brown bats. They sleep for 20 hours a day.

AUTUMN HAGUE: And although every animal goes through cycles of rest and activity, their version of sleep may not look like ours.

MOLLY BLOOM: Dolphins, for example, only sleep with half of their brains at a time. So let's go back to that mystery sound, since it fits in with what we're talking about right now. Let's hear it again.

[HIGH-PITCHED WHIRRING]

Any new guesses?

AUTUMN HAGUE: Umm?

MOLLY BLOOM: OK, so here's another clue. That man who gave us our first clue, Gary Hevel, he's an entomologist.

AUTUMN HAGUE: And is it somebody that studies animals that are nocturnal?

MOLLY BLOOM: That is a really good guess. It's actually someone who studies insects. So does that give you a new guess?

AUTUMN HAGUE: No.

MOLLY BLOOM: All right, I'm just going to tell you the answer. Are you ready?

AUTUMN HAGUE: OK.

MOLLY BLOOM: It's a cicada.

AUTUMN HAGUE: What's a cicada?

MOLLY BLOOM: That's a good question. Let's find out.

GARY HEVEL: They have wingspans from maybe an inch or two to quite a few inches. And their body is generally, I guess we could call it, a small cigar shape. Very large eyes for insects. And they are a sucking insect. They suck juices out of plants, and that's their livelihood.

MOLLY BLOOM: So you're probably wondering what this has to do with sleeping. Well, here in Minnesota, we have cicadas. They're known as dog day cicadas because they're around every summer. But the most famous kind of cicada is the 17-year cicada.

GARY HEVEL: And their fame in the Northern states is that they're underground about 16 years, and then every 17th year, they emerge as adults.

MOLLY BLOOM: So a lot of people might think they're sleeping that whole time, sort of an insect version of Rip Van Winkle. But in actuality, they're just moving really slowly, hanging out, sucking sap out of tree roots. And once they get to be big enough, they emerge from the ground, millions at once.

GARY HEVEL: Always very impressive and wonderful for entomologists and a little headache for other people because people have fears of things they don't know about.

MOLLY BLOOM: So imagine, one day, no cicadas flying around, and the next day, millions of them. They're everywhere. So the ones that don't get eaten by dogs or birds or end up smashed on windshields, they hang out on tree branches, making this noise.

[HIGH-PITCHED WHIRRING]

And the reason the male cicadas make that noise is because they're looking for mates. So the females lay their eggs on small branches, and then after a couple of weeks, they hatch.

GARY HEVEL: The nymphs, the very tiny, immature cicadas, without wings, of course, fall from there to the ground.

MOLLY BLOOM: Then they burrow into the ground, and it starts all over again. So the entomologist that we talked to, to him, he thinks that sound sounds like the word "farroa."

GARY HEVEL: Fa-ro-ah, something like that.

MOLLY BLOOM: What do you think?

AUTUMN HAGUE: I have another one.

MOLLY BLOOM: What?

[HIGH-PITCHED WHIRRING]

AUTUMN HAGUE: Oh, no. Oh, no.

KID: Oh, no.

[GUITAR CHORD]

CREW: Sleep science!

KID: With Dr. Avidan.

SANDEN TOTTEN: So what's his professional opinion on naps?

ALON AVIDAN: Naps are good. As long as they are about 15 or 20 minutes, they're very useful. The problem is, a lot of people take more than 15 minutes. They usually take a two-hour nap. And believe it or not, if you wake up after a two-hour nap, you're more likely to be more sleepy than having a 15-minute nap.

SANDEN TOTTEN: Wait, so a shorter nap will give you more energy, but a longer nap makes you even sleepier? Why is that?

ALON AVIDAN: A shorter nap, you can get enough light sleep that can be very restorative. It can really give you the energy you need. Unfortunately, if you get a longer nap, you're more likely to go into dream sleep. You're more likely to feel groggy when waking up after a two-hour nap.

SANDEN TOTTEN: I guess dreams are exhausting.

ALON AVIDAN: They are.

CREW: Sleep science!

MOLLY BLOOM: So anything that surprised you about that or that you found particularly interesting?

AUTUMN HAGUE: I was surprised and interested that shorter naps give you more energy and longer naps make you more tired.

MOLLY BLOOM: Right. It seems like it might be the opposite.

AUTUMN HAGUE: Yeah, that's what I've always thought, and my parents, I guess.

[LULLABY MUSIC]

MOLLY BLOOM: As Dr. Avidan mentioned, when you are napping for a long time, you're more likely to dream. Our pal Sanden, who talked to all the doctors for this episode, spoke with Deirdre Barrett from Harvard about the science of dreams.

SANDEN TOTTEN: How many dreams do we have every night?

DEIRDRE BARRETT: We have about five dreams a night. About every hour and a half, we start dreaming through the night. So your brain is much quieter during most of your sleep. And then, about an hour and a half in, it gets very active, and all the sorts of stories that go on and dreams happen. And then you go back into a much quieter part of sleep, and then another dream comes along.

If you don't wake up right after a dream, it's forgotten forever. And so it's often the last dream of the night that's remembered. Or if you wake up in the middle of the night because of a noise, you're likelier to remember a dream. But we're dreaming a lot more than we remember.

SANDEN TOTTEN: Can we control our dreams?

DEIRDRE BARRETT: Yes. Not perfectly all the time, but if just as you're falling asleep you remind yourself of a kind of dream that you like to have and picture that person or that place or your favorite movie character or whatever you want to dream about, you make it a lot likelier that you'll dream about whatever that is that night.

SANDEN TOTTEN: So if I wanted to dream about, say, being a Jedi, how would I do that?

DEIRDRE BARRETT: You would picture being a Jedi as you're falling asleep. You would kind of play and imagine that as you're falling asleep, while sort of saying to yourself, I want to dream, I want to dream I'm a Jedi tonight. And it doesn't happen every single night that someone tries it.

But it happens a lot, if people ask their dreams just as they're falling asleep, to be on a particular topic. And especially if you picture it, because dreams have so many pictures in them. They kind of respond to a request that's already got a picture associated with it.

SANDEN TOTTEN: I'm going to dream that I'm a Jedi. I'm going to dream that I'm a Jedi. I'm going to dream that I'm a Jedi.

[YAWNING]

I'm going to dream that I'm a Jedi. I'm going to dream--

[HEAVY BREATHING]

[LIGHT SABER WHIRRING]

MOLLY BLOOM: So you did an experiment for us--

AUTUMN HAGUE: Mm-hmm.

MOLLY BLOOM: --where we asked you to see if you could control your dreams following the instructions of Deirdre Barrett.

AUTUMN HAGUE: Yep.

MOLLY BLOOM: So tell me, how did it go? What did you try to dream about?

AUTUMN HAGUE: I tried to dream about frogs. And then I said to myself, I want to dream about frogs, I want to dream about frogs. And then I did that for, like, 30 times, 30 or 50, I can't remember.

MOLLY BLOOM: Right as you were falling asleep?

AUTUMN HAGUE: Mm-hmm. I was just in my bed, and I just kept doing that until I fell asleep. And then it didn't work for me the first time, but it worked for me the second time. And it didn't work for me the third time, so it only worked for me once. And my dream was about a frog trying to jump on somebody's head. So it was really funny.

MOLLY BLOOM: You said that controlling your dream worked the second night, but not the first or third night. Is there anything that you did different on that second night?

AUTUMN HAGUE: I said I wanted to dream about frogs. And then in my mind, I thought, frogs, frogs. And then I said, I want to dream about frogs. And then in my mind, I went frogs, frogs, and so on.

MOLLY BLOOM: And so that was different than the other nights?

AUTUMN HAGUE: On the first night, I went like, I want to dream about frogs, I want to dream about frogs, I want to dream about frogs, I want to dream about frogs. That's all I did. I didn't say anything in my mind. And then on the third night, I only said frogs, frogs, frogs. I want to dream about frogs, frogs, frogs.

MOLLY BLOOM: So it was more powerful to do it inside your mind.

AUTUMN HAGUE: Actually, it was both of them.

MOLLY BLOOM: Oh, so the combination of the two is the most powerful?

AUTUMN HAGUE: For me, it was.

MOLLY BLOOM: Very interesting.

[LULLABY MUSIC]

[FROGS CROAKING]

AUTUMN HAGUE: Molly, Molly, wake up.

MOLLY BLOOM: What? I was dreaming about frogs. It was awesome.

AUTUMN HAGUE: Looks like it's time for your nap, so let's wrap this up.

MOLLY BLOOM: OK, I'm really sleepy so I think you should do the credits.

AUTUMN HAGUE: Sure. This episode was produced by Marc Sanchez, Sanden Totten, and Molly Bloom. Many thanks to Mike Hague, Tammy [? Delkey, ?] Peter Clowney, Kristin Mueller, Suzanne Pekow, Sam Keenan, and John Mueller. Thanks for listening.

[MUSIC PLAYING]

KIDS: *Brains On!*

MOLLY BLOOM: Head on over to brainson.org for more episodes and other fun stuff.

[CHEERING]