

## November–December 2017

25 Genomes was funded by the Wellcome Trust Sanger Institute as part of their 25<sup>th</sup> Anniversary celebrations. In 2018, the Institute is going to decode the DNA of 25 UK species for the first time, five of which have been decided by the 25 Genomes public vote.

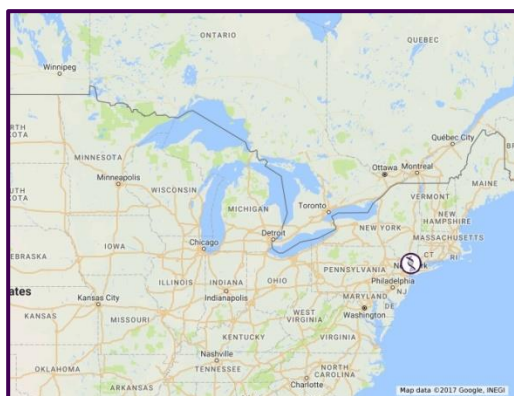
Over five weeks, scientists and wildlife experts championed species they thought deserved to have their entire DNA decoded. They competed for votes across five Zones from school students and the public, and answered questions about everything to do with their species and genome sequencing. A variety of different scientists took part, including some working at the Sanger Institute, scientists from the Natural History Museum, PhD researchers and conservation workers. Some species were championed by teams, such as the Asian Hornet whose team consisted of experts in the UK, France and Italy.

Schools all over the UK were involved, as well as schools in Ireland, Europe and the USA. Around 2,000 students took part in nearly 120 Live Chats with the Species Champions, as well as sending them 600 questions in the ASK section. As well as students, over 3,000 members of the public logged in to have their say, and many Species Champions campaigned for their species online resulting in Zones with a high number of public users. We also ran two drop-in Live Chats open for the public. In total, there were nearly 5,000 votes.

### Key figures from the zones

	CRYPTIC ZONE	DANGEROUS ZONE	FLOUNDERING ZONE	FLOURISHING ZONE	ICONIC ZONE	ZONE AVERAGE	EVENT TOTAL
<b>Page views</b>	29,771	31,100	25,941	14,801	25,347	<b>25,392</b>	<b>152,942</b>
<b>Public logged in</b>	-	-	-	-	-	-	<b>3,066</b>
<b>Students logged in</b>	418	382	368	368	399	<b>387</b>	<b>1,935</b>
<b>% Students active in ASK, CHAT, or VOTE</b>	87%	93%	85%	92%	93%	<b>90%</b>	<b>90%</b>
<b>Total votes</b>	1,127	1,374	979	542	955	<b>995</b>	<b>4,977</b>
...from students	293	305	271	260	322	290	1,451
...from public	834	1,069	708	282	633	705	3,526
<b>Total questions in ASK</b>	96	44	116	71	352	<b>94</b>	<b>468</b>
... from students (including duplicates)	91	39	88	66	351	127	635
... from public	5	5	27	5	1	9	43
<b>Answers given by species champions</b>	194	80	122	105	303	<b>161</b>	<b>804</b>
<b>Live chats</b>	23	23	25	24	23	<b>24</b>	<b>118</b>
<b>Comments</b>	33	13	2	12	19	<b>16</b>	<b>79</b>

## Map of schools that took part in a Live Chat session



School in New York, USA



Schools in Seville, Spain; Toulouse, France; and Isola d'Ischia, Italy



Schools in the UK and Ireland



Keywords from live chats in the event, size of the word represents its popularity



## Popular topics

Lots of students were interested in genome sequencing with students asking how the study of genetics has changed as technology has advanced. They asked whether it costs more and takes longer to sequence larger organisms and there were questions on the different sequencing methods, how they were developed, how long they take and how expensive they are.

Some students showed concern about ethics in the way DNA is extracted, and all of the Species Champions were good at explaining how the process is carried out as humanely as possible. They also wanted to know what happens to the sequenced data and whether it will be published for anyone to use for their own research.

Students took their votes seriously and often asked the Species Champions why they deserve their votes and about the possible benefits from sequencing if they won. They wanted to know if the genomes could help humanity or the environment, with lots of interest in whether sequencing the genome of an endangered species such as the Scottish wildcat could help increase its population.

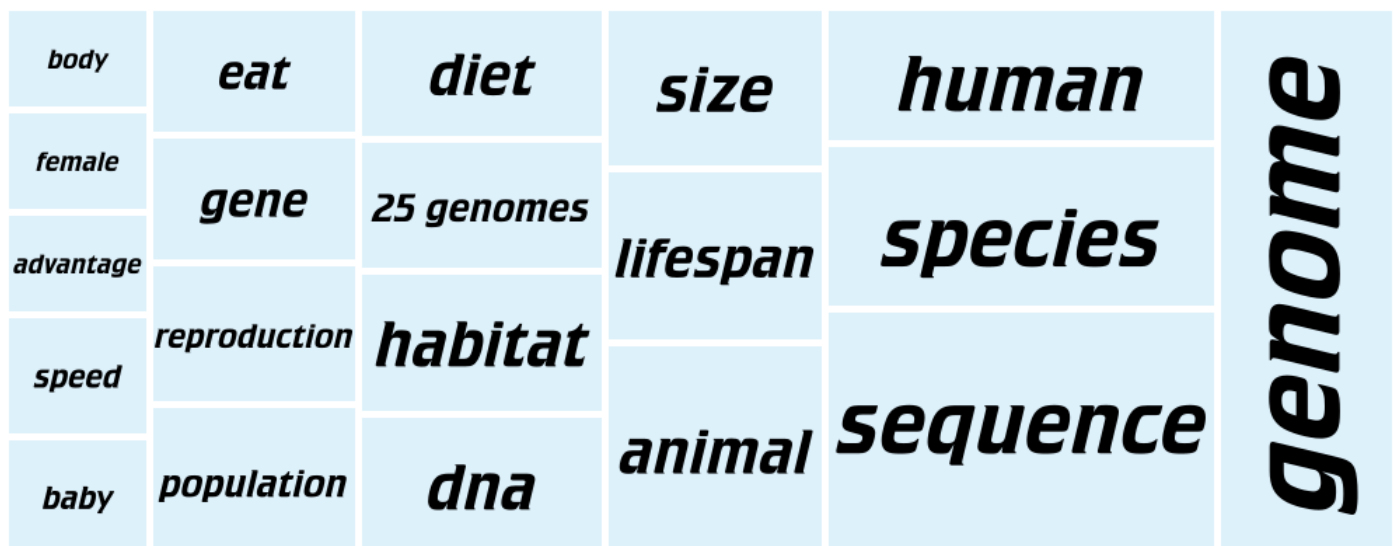
Many questions in both ASK and the Live Chats were about the individual species, especially from younger students, who wanted to know how big the species can get, what they eat, where they live and how they reproduce.

There was also interest in the Champions behind the species and asked them about their jobs and the reasons behind their passion for their species.



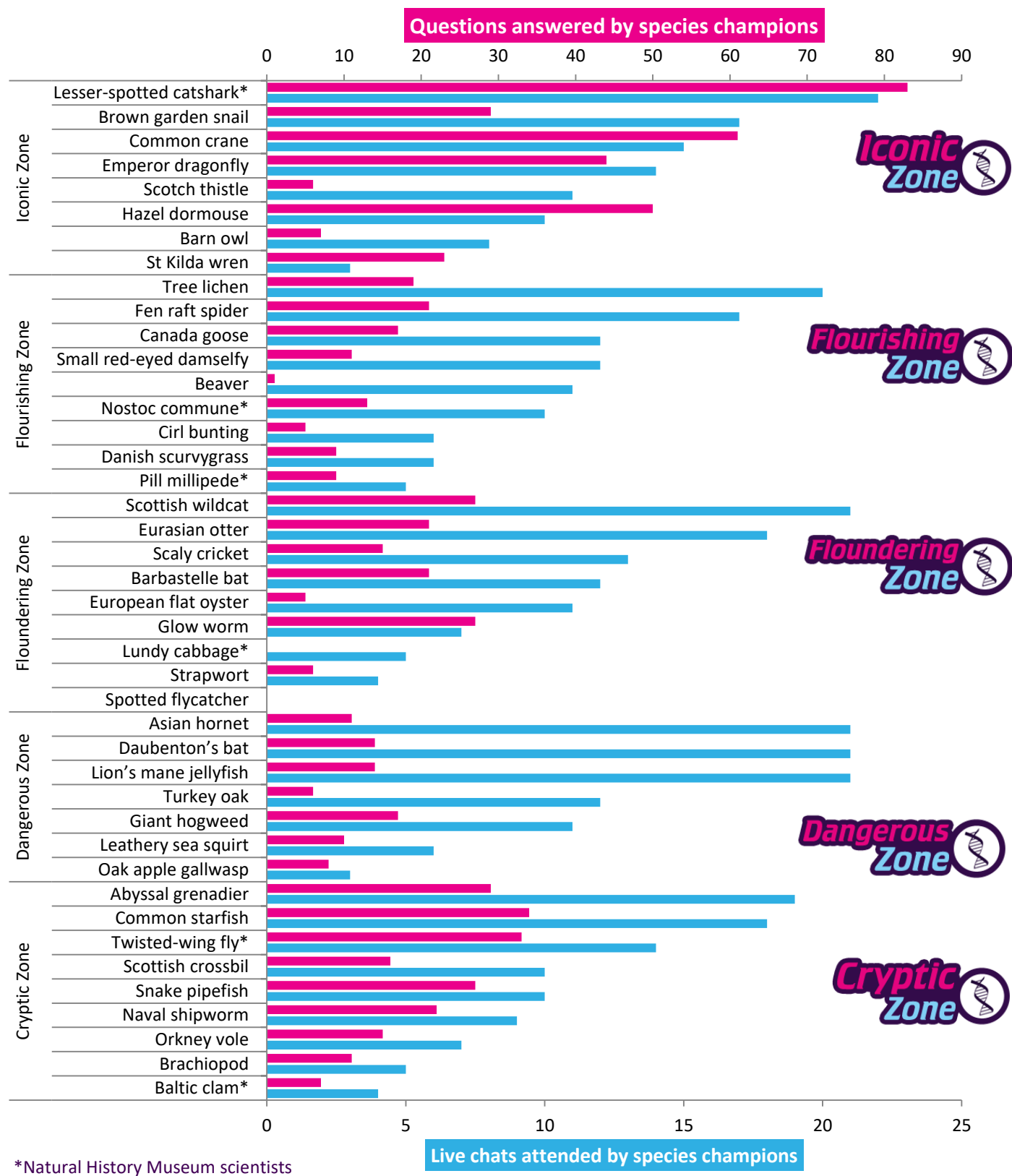
## Top Keywords of questions approved in the event

Area represents frequency of use



## Species

Nearly 100 scientists and wildlife experts took part in 25 *Genomes*, either championing their species by themselves or as part of a team. There were 42 species in total across the five Zones. Below is a breakdown of the number of questions answered and live chats attended by each species, ordered by activity.



## Example ASK questions from the event

Click to read

*"Would the individuals being sequenced come to any harm or distress?"*

Cryptic Zone

*"What is your most unique feature and why has it happened (what genes cause it)?"*

Cryptic Zone

*"What would be the next step after mapping the genomes?"*

Dangerous Zone

*"Would sequencing [the Daubenton's bat's] genome be useful for the development of rabies vaccines or cures?"*

Dangerous Zone

*"Is it possible to identify mutations and changes within the genes if you sequence the gene for a second time?"*

Floundering Zone

*"Once mapped do natural DNA sequences belong to someone?"*

Floundering Zone

*"What problems can arise from Canada Geese imprinting on other organisms?"*

Flourishing Zone

*"How are you adapted to your habitats?"*

Flourishing Zone

*"How can you tell which sequences code for specific traits of the species?"*

Iconic Zone

*"How does the catsharks 'regeneration' work?"*

Zone

## Examples of good engagement

Within the chats many students asked about the process behind DNA sequencing, wanting to know how it works and how expensive it is. The Species Champions were great at explaining complicated topics in simple terms that students could understand.

*"How long will it take to sequence the genome?" – Student*

*"It's getting quick these days - the sequencing can take a few weeks but the computational work of putting the data together can take months to get right! The process is called assembly and annotation - putting all the sequence data together in the right order and finding out what it all does – it's a big job!" – European Flat Oyster*

*"It's getting more and more efficient, but it's quite expensive, unfortunately :(" – Eurasian Otter*

*"A whole human genome can now be sequenced in almost 24 hours! It might take a bit longer species that haven't had their genome sequenced before. Putting it together will be the hard part!" – Scottish Wildcat*

*"As European Flat Oyster says, it can be quick to get the sequences, but assembling them into a complete genome can take a long time" – Scaly Cricket*

The Species Champions were great at advocating for their species and engaging the students with interesting facts they should consider before casting their vote:

*“Why should your genome be sequenced?” – Student*

*“So many reasons. How about so we can figure out how to infinitely regenerate teeth or repair cartilage damaged by osteoarthritis?” – Lesser Spotted Catshark*

*“How could we do that be sequencing your genomes?” – Student*

*“What we are planning to do (and have already started in fact) is to isolate the cells responsible for the infinite regeneration of teeth and cartilage repair in sharks, and compare what genes are expressed there but not elsewhere. That tells us what genes are playing a role in those processes. But we need the genome to be able to properly interpret this data.” – Lesser Spotted Catshark*

*“Why can't this be done with other species?” – Student*

*“This kind of investigation is done in many species but we are doing it in sharks because they are the best at regenerating teeth and growing cartilage. They produce a new tooth every 2 weeks or so and their cartilage grows throughout their whole lives. Unlike humans who get stuck at 2 generations of teeth and get a lot of 'wear and tear' in our knee joints in our 'old age' (I have some and I'm only 33!)” – Lesser Spotted Catshark*

## Feedback

We're still collecting feedback from teachers and Species Champions but here are a few of the comments made during the event...



**Otter Project**  
@Otter\_Project

Follow

Just had a great chat session with the [#25genomes](#) project by [@imascientist](#) and [@sangerinstitute](#) - answering lots of fun questions about otters and their genomes. [#voteotter](#) (picture (C) by [@ATJCagan](#))

“I just want to say how much I've enjoyed this - with the school groups but also with the other species champions. It's been really good fun & a great and engaging idea.” – **Cirl Bunting**

“It was great for my students to get involved and feel that they have an input in real science.” – **Teacher**



## Winners

### **Cryptic Zone: Common Starfish**

I should be sequenced because... "It will help scientists discover how I loose & re-grow my arms, am strong enough to open mussels and can do all this without a brain."

[Read the team's Thank You message here](#)



### **Dangerous Zone: Asian Hornet**

I should be sequenced because... "It will help develop methods to control invasive populations of the Asian hornet and also learn about the genes for social living."

[Read the team's Thank You message here](#)



### **Floundering Zone: Eurasian Otter**

I should be sequenced because... "Protecting otters, at the top of the food chain, helps us protect the whole freshwater system."

[Read the team's Thank You message here](#)



### **Flourishing Zone: Fen Raft Spider**

I should be sequenced because... "The fen raft spider genome will help us understand how spider silk and venom have evolved and help save this beautiful, endangered species."

[Read the team's Thank You message here](#)



### **Iconic Zone: Lesser Spotted Catshark**

I should be sequenced because... "We can reveal the genetic basis behind catshark superpowers including regeneration, electroreception, and fluorescence!"

[Read the team's Thank You message here](#)

