

Name: _____ Date: _____

"What Darwin Never Knew"

1. How many species are there of birds? _____ Of beetles? _____ Total living species? _____
 2. According to evolutionary biologists, what type of animal is the common ancestor of all 4-limbed animals? _____
 3. What two professions did Darwin attempt before becoming a naturalist? _____, _____
 4. Darwin was offered a position on the _____ whose mission was to survey the waters around South America.
 5. Where did Darwin make his first important discovery? _____
What did he find there? _____ of extinct mammals.
 6. Name three unusual animals Darwin saw in the Galapagos Islands: _____
 7. What animal was Sean Carroll most excited to see? _____
 8. The _____ of the giant tortoises differed depending upon which island they lived.
 9. All the birds Darwin collected were different types of _____
 10. The Galapagos finches differed in the type of _____ they had, depending on the island.
 11. Darwin realized, for some reason, that species _____. [[about 18 min]]
 12. What kind of animal has rudimentary legs as embryos but no legs as adults? _____
 13. What kind of animal has rudimentary teeth as embryos but no teeth as adults? _____
 14. What clue in embryos led scientists to hypothesize that we had fish as ancestors? _____
 15. Darwin studied dog breeders and how specific traits were selected. Darwin then wondered if _____ selection could be going on in life.
 16. The pattern in nature that Darwin saw was that the creatures that survived were those best adapted to the specific _____ in which they lived.
 17. The Galapagos finches have different beaks because the finches used their beaks as _____.
 18. Darwin realized that _____ was the start of change in nature.
 19. Over many generations, tiny variations allow the fit to get fitter and the unfit to vanish.
This is evolution by _____. It is the key to how **new species** are formed.
 20. In 1859 Darwin published _____.
- **** This is about 31 minutes in, covering what Darwin knew. Now on to what he never knew*****
- [33 minutes: Rock Pocket Mice]
21. Many genes get translated into _____.
 22. DNA has one other vital quality. It doesn't stay _____.
 23. Without _____, everything would stay constant, generation after generation. We can now find the genes that are responsible for evolutionary change.
 24. A researcher looked at mouse DNA for mutations. How many mutations did he find between the light and dark mice? _____
 25. Humans have _____ genes. The same numbers as a _____ and less than _____. Many of our key genes are similar to those other animals.
 26. How do you get all these differences if you have the same number of genes? The first clues are from the study of _____. They are the platform of diversity and all use the same basic genes.
 27. It's not the genes you have that count, it's how _____.
 28. _____ percent of DNA doesn't code for proteins.
 29. A piece of DNA called a _____ is not a gene, but it turns "on" or "off" genes.

30. What is the revolutionary significance of Dr. Carroll's experiments with fruit fly "paintbrush" genes and switches?

[54 min: Switches, Legs, and Sticklebacks]

31. Ocean stickleback have _____. Lake fish do not. Why haven't the spikes been turned on in the lake fish?

32. What is the evidence that sticklebacks, whales, snakes, and manatees used switches to adapt by losing legs?

33. Finch beak development happens in the _____

34. What explains the differences in beak size of finches?

35. What is special about the body plan gene? It throws _____ and tells the "stuff genes" what to do and when. This is how all forms of life are related, but evolved to become completely different.

[1:05 Great Transformations]

36. Dinosaurs share a common ancestor with _____. _____ share a common ancestor of all four-legged forms.

37. The Archaeopteryx fossil had features of both birds and _____.

38. The bones of the human inner ear have developed from fish _____.

39. Fossils show that creatures with legs appeared _____ million years ago. Before that, they were only fish.

40. Tiktaalik is a perfect transitional form: the body of a fish with scales, but also the _____ structure that is seen in every four-legged forms.

41. The body plan genes called _____ genes are found in all complex animals from 600 million year worms to humans.

42. The genes needed for arms and legs were in pre-historic fish. All they needed was a few _____ to change the order of what genes are turned on and off.

43. There is a ___ percentage difference in the DNA of humans and chimps.

44. The two signature organs of humankind are the _____ and the _____.

45. A mutation in the human _____ muscle allows the skull to keep expanding into adulthood, creating a bigger space for the _____.

46. There are ___ different mutations responsible for microcephaly.

47. A study of human and chimp DNA sequences show that the differences weren't in the actual genes, but in the _____ that direct the genes. More than half of these switches are near a gene that involves the _____. That gene was different in 2 letters between the chimp and the chicken, but different in ___ letters when compared to humans.

48. DNA works in many different ways --- through genes that make the stuff of our bodies, through _____ that turn those genes on and off, and through sequences of the DNA that throw those switches. This shows how small differences in ___ can generate enormous change.