

Alaska brown, polar bears may be close relatives

by Ned Rozell

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There's something different about the brown bears of Southeast Alaska's ABC islands.

They look like your average Alaska grizzly: milk-chocolate colored fur, a humped back, and a size and reputation that gives humans something to fear when walking the wilds of Alaska.

The difference in the brown bears of the ABC (Admiralty, Baranof and Chichagof) islands isn't visible. It's in their DNA. Researchers found the bears are more closely related to polar bears than they are to other brown bears.

The bears' baffling background was discovered when Gerald Shields and Sandra Talbot of the University of Alaska Fairbanks Institute of Arctic Biology began analyzing the DNA of brown bears from around the world. Talbot, a graduate student, extracted DNA (deoxyribonucleic acid, the genetic information warehouse in the chromosomes of every living cell) from hundreds of Alaska brown bears. Starting with slivers of kid-

ney or muscle tissue attained from hunting guides, Talbot used a process called polymerase chain reaction to copy tiny fragments of DNA millions of times.

When the DNA was in a readable form, Shields, a molecular evolutionary biologist, saw the DNA from brown bears on the ABC islands was unique when compared to brown bears anywhere else on the planet. Their closest relative is an unlikely one – the polar bear.

A polar bear's white coat, meat-only diet, and preference to live near and on sea ice make it hard to mistake for a brown bear. But Alaska's two largest bear species are closely related – so closely that brown and polar bears have mated in zoos and the union has resulted in fertile offspring. According to the Alaska Department of Fish and Game's Wildlife Notebook Series, both types of bear had a common ancestor that was neither brown nor polar bear. As each adapted to different environments, the bears developed enough unique characteristics that they looked and acted like separate species.

With DNA evidence, Shields and his colleagues have launched a new hypothesis – brown bears may have appeared first; polar bears may have arisen from brown bears that wandered north, and over thousands of years, began to sprout white fur and teeth that were better for ripping apart seals than munching berries.

Shields and students Jackie Weicker and Scott Williamson are now working

on a test that should tell them whether the polar bear sprung from brown bear lineage. When Shields and Talbot performed the initial study, they used bear DNA from mitochondria (energy-producing globules within a cell). In bears, however, as in people, mitochondrial DNA is passed from mother to baby, not father to baby.

Using mitochondrial DNA left the researchers with two possibilities: polar bears could have indeed evolved from brown bears, or a female brown bear may have at one time mated with a male polar bear. The result of that hybridization could have given the brown bears on the ABC islands their polar bear genes.

In the new study, the researchers will study cell nuclei DNA, which young animals inherit from both parents. If the nuclear DNA gives the same results as the mitochondrial DNA, it proves that the polar bear is indeed the ancient offspring of the brown bear. If not, the two species mingled at least once in their distant past, which would also explain the ABC

islands bears' unique genetic fingerprint.

How can brown bears living 900 miles south of the nearest polar bear provide so much information about the origin of both species? In a paper written by Talbot, Shields and Timothy Heaton, of the University of South Dakota, the authors claim polar bears could have evolved from a coastal form of brown bear in northeastern Siberia. These ancient brown bears may have migrated to Alaska about 40,000 years ago.

As time passed, the brown bear that spawned the polar bear died everywhere in Alaska but the ABC islands, which served as a refuge during the last glacial period. When the last ice age ended about 10,000 years ago, brown bears from farther south in North America slowly expanded their range to Alaska, but they neglected to swim the waters of the Indian Passage and mix with brown bears of the ABC islands. Good thing. Now we have a chance to find out whether polar bears owe their existence to brown bears.