

Identification of hair sample of an unknown mammal species using Electron microscopy and DNA sequencing

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ABSTRACT

We received a sample of a tuft of animal hair trapped in the wooden plank of the boardwalk from Fakahatchee Strand Preserve State Park Naples, Florida. This poses a threat to pedestrians who use the boardwalk everyday. Based on the claw marks and the hair sample color and size we confirmed the animal to be a mammal. We will analyze the hair sample using electron microscopy and DNA sequencing. By comparing the microscopy and DNA sequencing data with all possible mammals present in the State Park area we will be able to identify this animal species.

INTRODUCTION

Fakahatchee Strand Preserve State Park is one of the largest state parks located in Naples, Florida with a variety of unique plant and animal species. This park is divided into four main areas one of which is the Big Cypress Bend boardwalk which is 2,500 ft long and encompasses a part of the Fakahatchee strand swamp leading to the alligator pond. This is a great place for visitors to have access to this natural preserve and is considered as one of the National Natural Landmarks. We have recently received a sample of a tuft of animal hair stuck in the wooden planks of the boardwalk from Fakahatchee Strand Preserve State Park Naples, Florida. This park covers approximately 85,000 acres of wilderness and swamp. Visitors can hike on trails, drive or bike 11 miles on the park roads, go paddling in the east river and stroll along the boardwalk. The hair sample was recovered from a partially damaged wooden rail with claw marks from the boardwalk. Recently panther markings were also discovered in this area. The boardwalk gets a lot of traffic each year, for example 73,665 people visited the boardwalk in 2018, with 12,198 visitors in December alone. With the abundance of Florida’s wildlife there a few can pose a threat to humans that would be enjoying a harmless walk through the swamp boardwalk. Alligators, black bears, panthers, bobcats and wild hogs are a few of the most dangerous animal species present in this area.

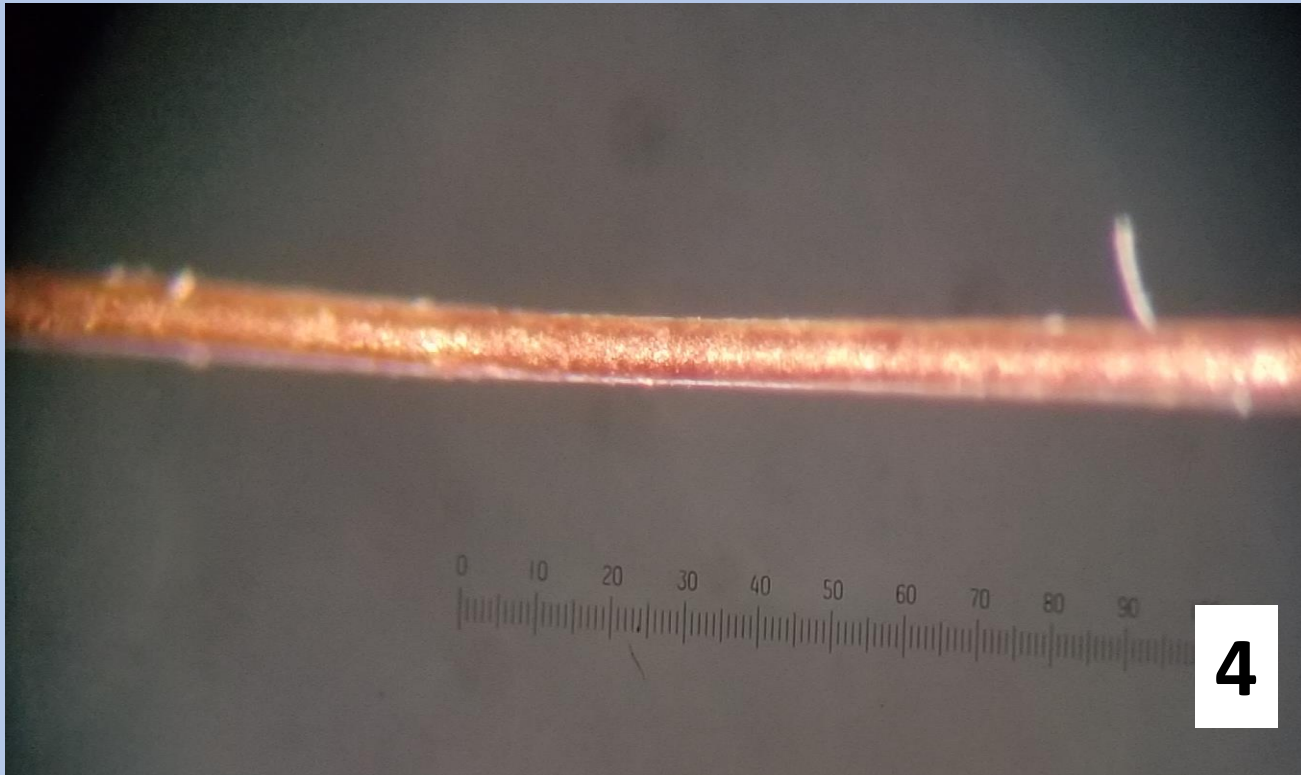
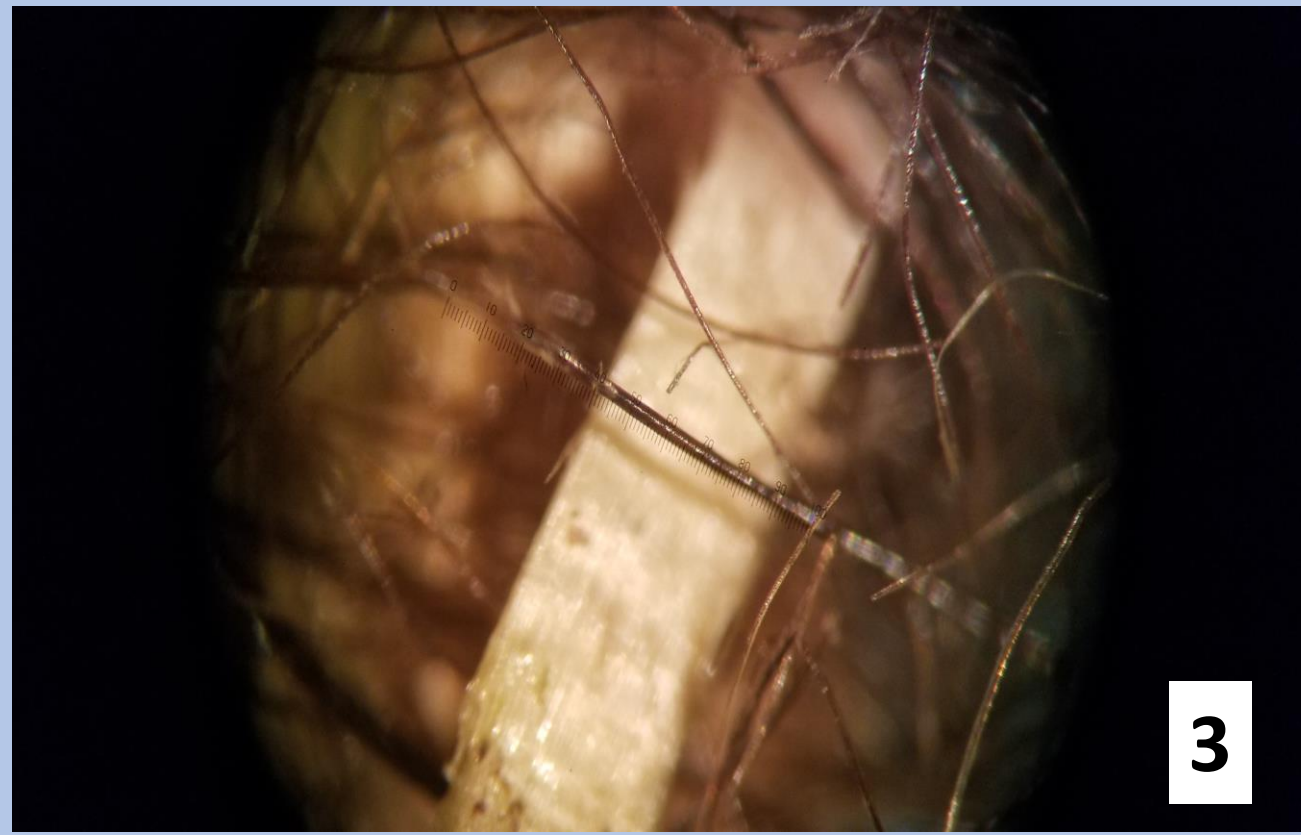
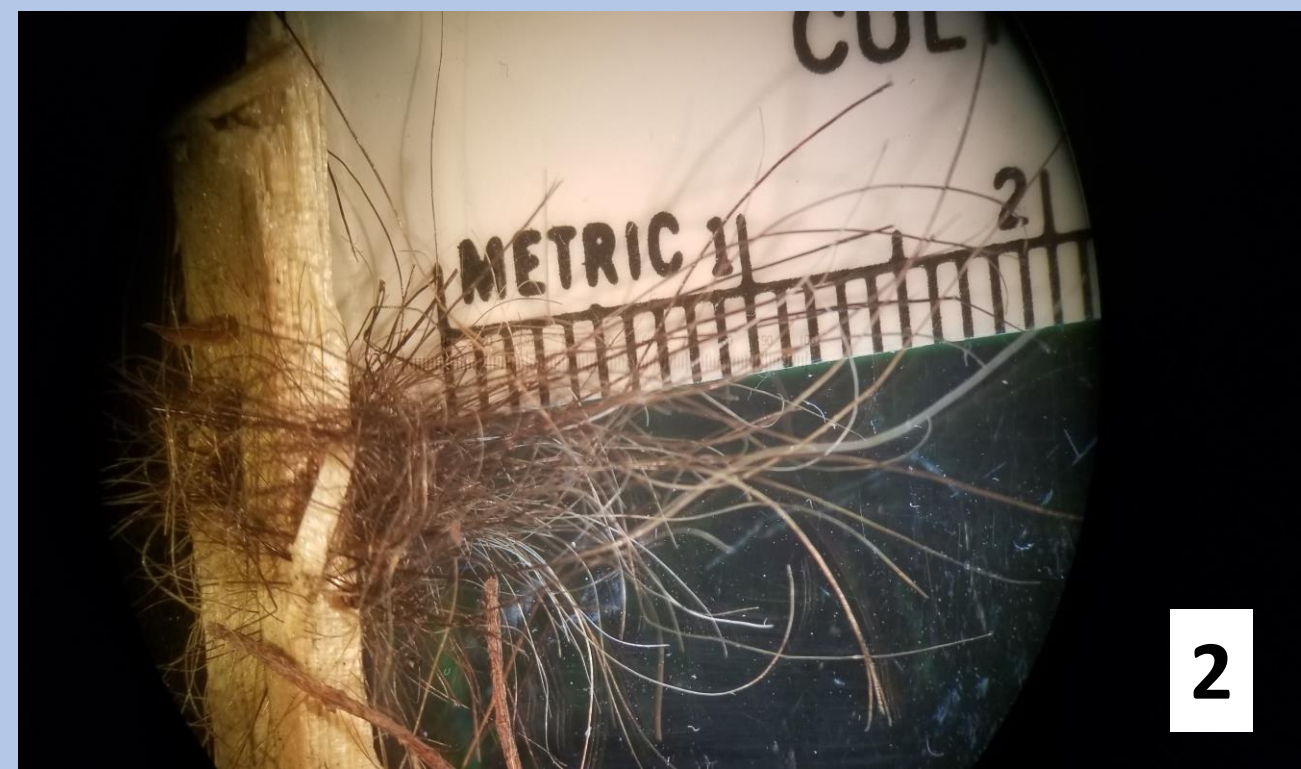


Figure 2: Unknown hair sample at 10x; Figure 3: 40x Figure 4: 200 x magnification dissection microscope.



Figure 1: Damage on the boardwalk and trapped animal hair

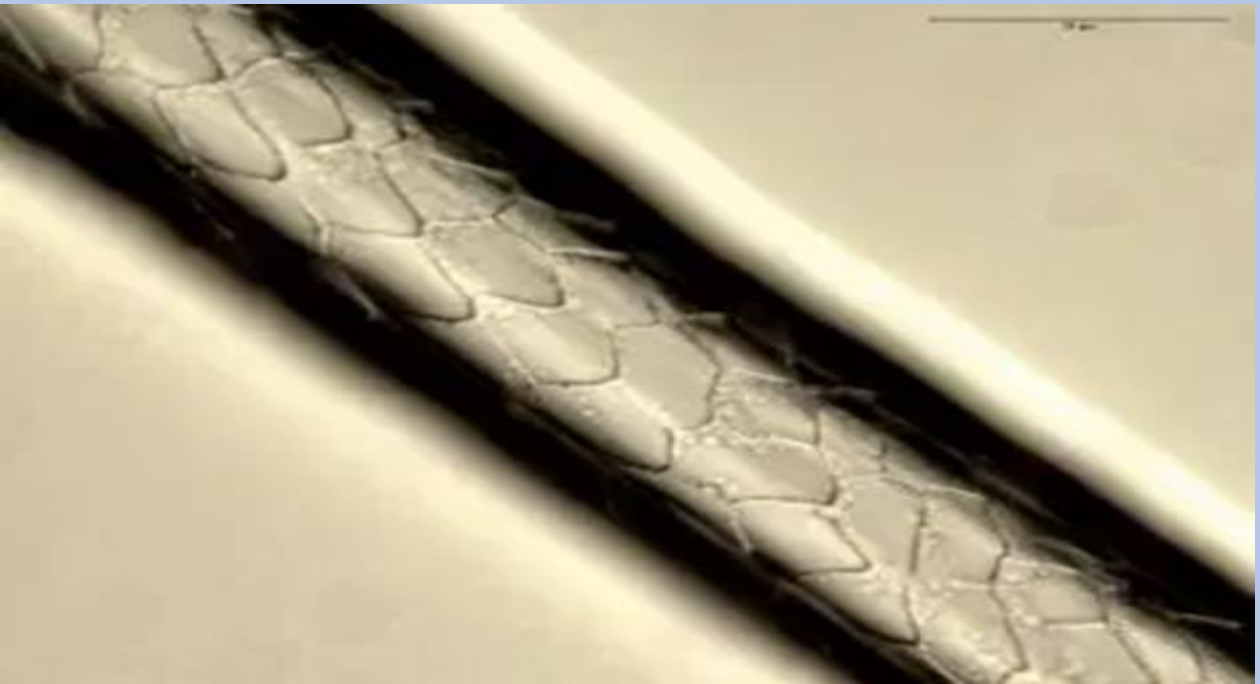


Figure 5: Black bear hair at 400x magnification (SEM)

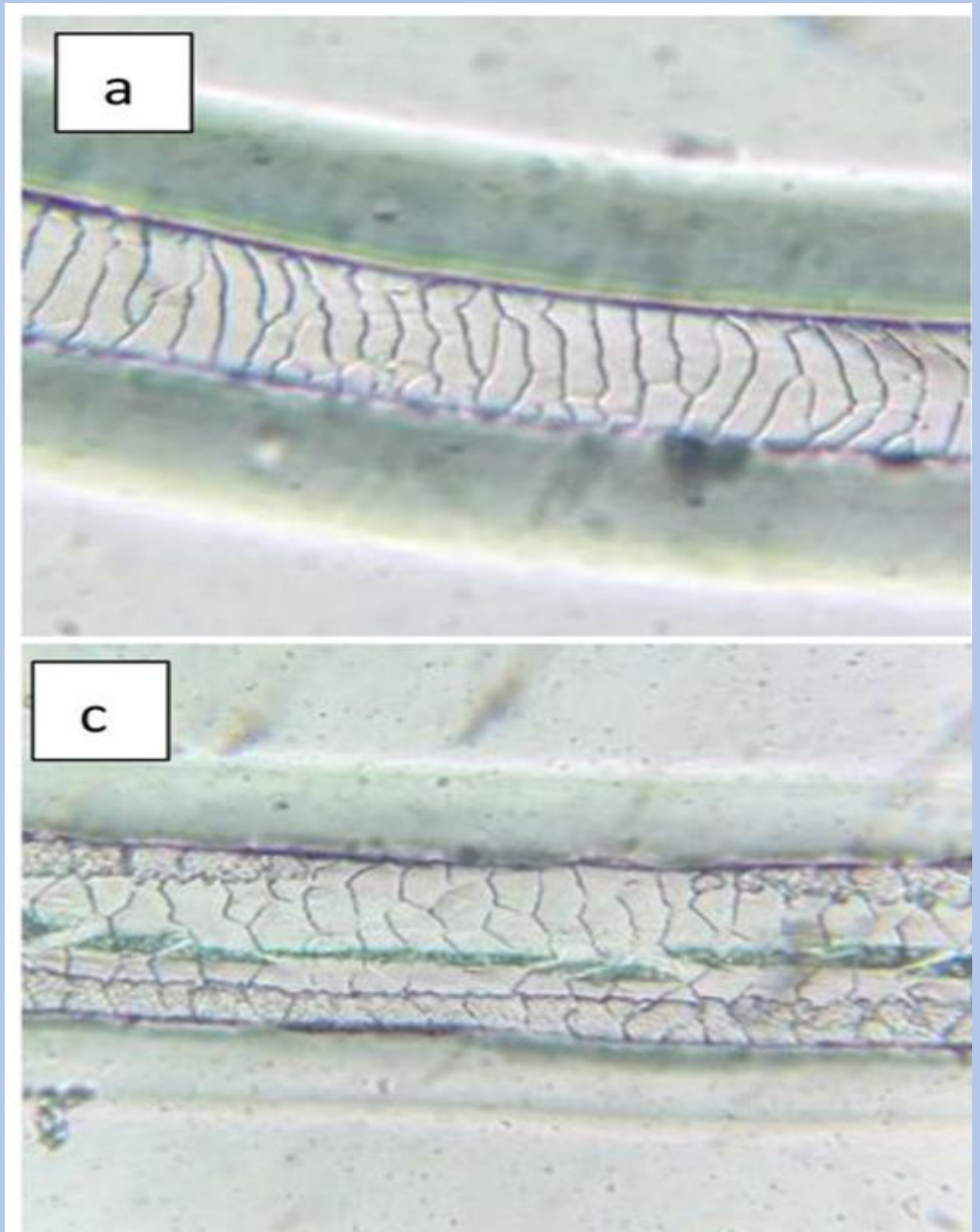


Figure 6: Puma hair at 400x magnification (SEM)

METHODS

We have used an **Olympus SLZ** dissecting microscope to study the scales of the hair sample at 10x, 40x and 200 x magnification. We have also studied the behavioral evidence (the damage done to the wooden plank and claw marks) from the scene to help identify the animal species. We are going to use the **Amray 1810** Scanning Electron Microscope (SEM) to study the gross and molecular structure of the scale pattern for identification of the species. We will further confirm our findings by **DNA sequencing** of the hair sample and comparing the data with known sequences of other animal species hair DNA to confirm what animal did the damage to the boardwalk.

RESULTS

From the preliminary image data from the dissection microscope we can see a block pattern on the scale similar to the Black bear hair in (Fig. 5). The image of the damage on the boardwalk (Fig. 1) also gives some insight. We can see that the animals has claws and was able to remove chunks of the wood. From this information we can presume that the animal is a black bear. A large cat would not have used the horizontal post but would prefer a vertical plank to scratch on. Also by studying the color of the hair we see that it is black; while the puma and lynx usually have very little black hair. So the preliminary data indicates that the animal could be a black bear. Once we can use the Scanning Electron Microscope (SEM) to study the hair sample; we will be able to conclude the species identity of the animal and then further confirm the results using DNA sequencing.

CONCLUSION

From our preliminary studies we are predicting this animal to be a Black Bear. Though we can’t rule out all the other possible animals found in that area we are able to put them in a list of most to least likely.

Once we confirm the identity of this species this information will be useful to the people who visit the boardwalk for recreation as well as for those work in the park. The animal can be dangerous to people and may cause major and life-threatening injury. With this information officials can take action to try to relocate the animal or at least deter it from visiting the boardwalk area. We want to prevent the option to terminate any animal after it causes injury to human as most of these animals are endangered and this will have significant impact in the ecosystem.

ACKNOWLEDGEMENT:

We thank Dave Boesche (Fakahatchee State Park, FL) for the hair sample and pictures of the scene; Dr. David Taylor for providing us with his valuable technical expertise using Dissection and SEM microscopes

