Frontier Analysis, Ltd

**TECHNICAL SERVICE RESPONSE NO.: UT002**

**Subject:** Analysis of Purported "Angel Hair" Collected October 19-20, 1977 (Los Gatos, California)

**Date:** February 27, 2002

**Requested By:** P. A. Budinger
J. Timmerman

**Reported By:** P. A. Budinger
Analytical Scientist

## Background/Objective:

Three stored "angel hair" samples were found November 1998 in the carport attic of John Timmerman, Lakeview, Ohio. They were preserved there for a number of years after closure of the CUFOS Chicago Office. All three samples seem to be from the same event, though documentation does not indicate any details of the event. One sample is clearly identified as originating from the late Paul Cerney[1] and has a handwritten note from him. This handwriting matches that from two other samples. And the information indicates all three samples were obtained at the same time (October 19–20, 1977) and location (Los Gatos, California). Two samples were very tightly sealed in glass jars and other was in an envelope. For many years this analyst has read tales of mysterious "angel hair" falls all over the globe and its purported unusual properties such as an ability to turn gelatinous and vanish (though not universally reported). John's discovery of these samples provided my first opportunity for analysis of this material.

## Conclusions:

1.) The white fibrous material in all three "angel hair" samples is composed of a polymer containing protein amide type linkages. This suggests that an animal/biological source is involved in its manufacture. Trace amounts of a long carbon chain ester and carboxylic acid are also detected. It is unknown if these are contaminants or components coating the fiber.

2.) The material definitely does not originate from spiders, i.e. spider webs. The amide type peptide linkages are more characteristic of silk from caterpillars such as silkworms, tent caterpillars etc.

[1] Paul Cerney, a well-known respected Ufologist, passed away November 27, 2000.

3.) There is no evidence for volatile decomposition products of the fiber. However, it should be noted that any volatiles probably dissipated after 22 years. The filaments are tacky/sticky and a large bundle easily compresses into a minute ball when rolled between one's fingers. The fact that the material easily balls up into virtually nothing could, in part, explain the purported disappearance of the material or volatilization reported by witnesses of angel hair falls.

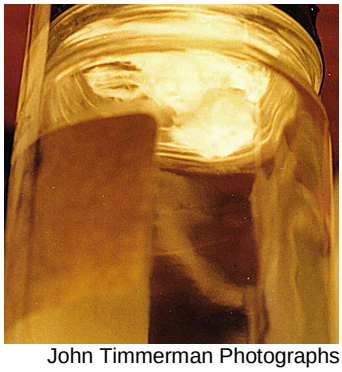
4.) The fact the material is of biological origin does not rule out an extraterrestrial source. Spider web/silk properties, especially strength, are desirable for many products and applications. According to a newspaper article, molecular engineers are trying to make spider silk out of goat's milk. The article indicates a single bundle of strands of spider silk the thickness of a pencil could stop a Boeing 747 in flight! This article can be found in the addendum[2].

5.) Should more "angel hair" falls occur this analysis could well used for comparison even though adequate documentation and details of the case are not available.

**Procedure:**

Samples:

•"Angel Hair" collected October 20, 1977 daytime. Received in a clear glass jar from Paul Cerney.



John Timmerman Photographs

•"Angel Hair" collected October 19, 1977 before dark. Received in a brown glass jar from Paul Cerney.

[2] The Cleveland Plain Dealer, August 22, 1999.

John Timmerman Photograph

•"Angel Hair" dated November 10, 1977 from Los Gatos California near San Jose, with a note indicating it was collected about a month prior. It probably relates to the above two samples. The sample is in a plastic envelope. It's from Paul Cerney.

John Timmerman Photograph

Headspace GC/MS analysis was done on the samples in the two sealed jars (10/19/77 before dark and 10/20/77 daytime). Infrared (FT-IR) spectra were obtained from all three samples on the Nicolet 560 spectrometer using the Harrick SplitPea® sampling accessory. Another spectrum was obtained of a chloroform extract of the "fresh" fiber on the Avatar 360 spectrometer also using the Harrick SplitPea® sampling accessory. SEM (scanning electron microscope) images and SEM/EDX data were acquired from one sample (10/20/77 daytime). Additionally, a reference FT-IR spectra and SEM images were obtained from assorted spider web samples.

## **Results**:

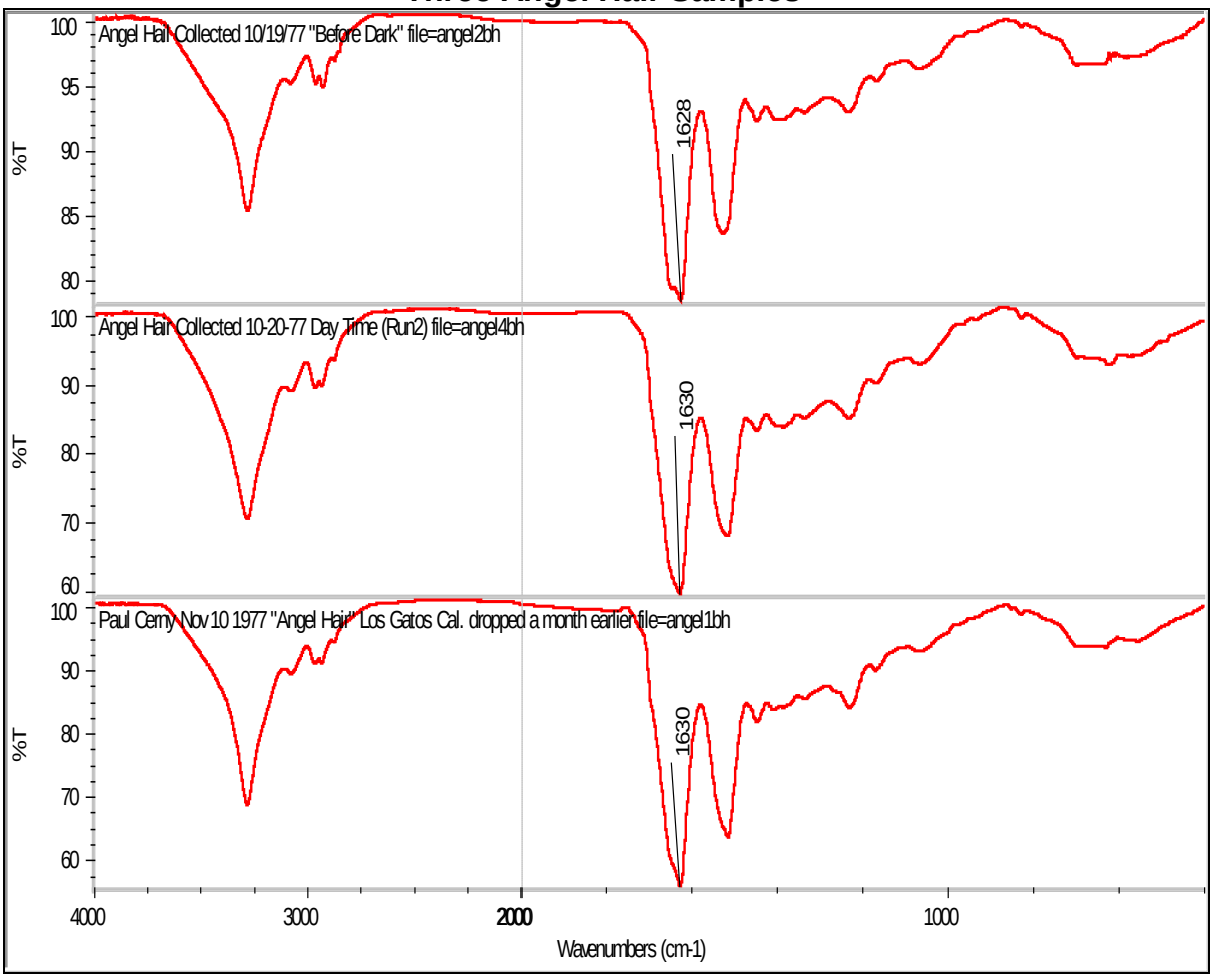
The results of the individual tests done on the three samples follow. These results are summarized in the conclusions section on the first page of this report.

**Headspace GC/MS Analysis:** The headspaces above the "angel hair" in the two sealed jars were very carefully examined before any outside air could be introduced.

No unusual components were detected. The samples compared to the reference analysis of outside air. It is probable that any volatile components, if present, were dissipated years ago.

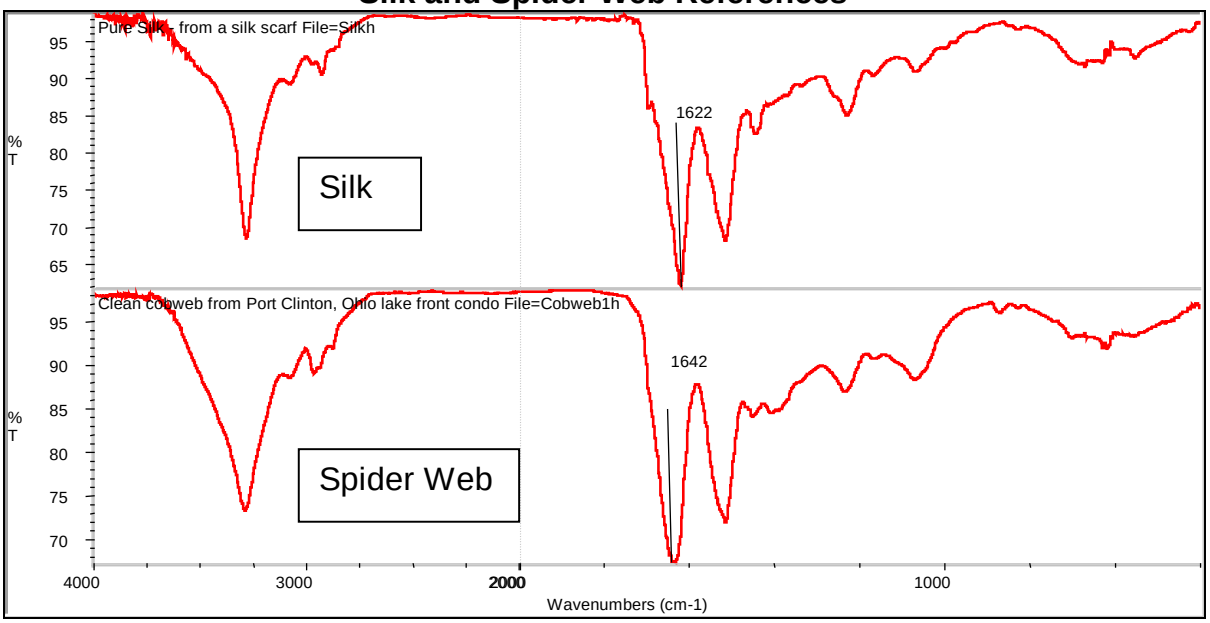
**FT-IR:** Infrared analysis shows the filaments of all three "angel hair" samples are identical. They are composed of a protein amide type material which compares closely to that of a silk reference. It shows the fiber is from animal origin akin to silk from the silkworm. It is very similar, but not a match, to reference spectra of spider webs. Subtle band ratio differences as well as a shift to lower frequency of the prominent secondary amide C=O band between 1650 -1600 cm $^{-1}$ provide conclusive evidence that the web material is not from spiders[3]. Following are the spectra of the three angel hair samples and references of silk and spider web for comparison.

**Three Angel Hair Samples**



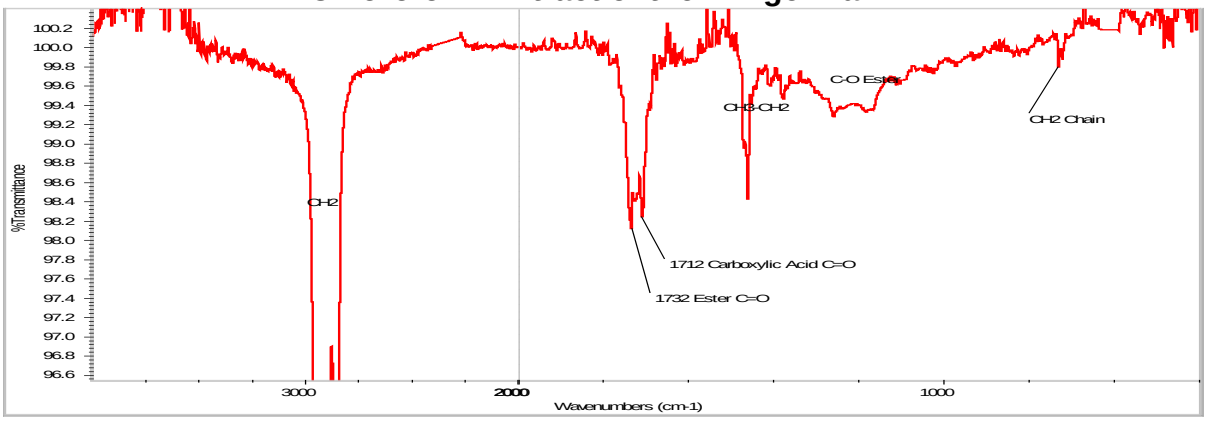

[3] The infrared spectra of spider webs from three difference locations were found to be identical. The three locations were Port Clinton, Ohio, Macedonia, Ohio, and Chagrin Falls, Ohio. Therefore, only the reference from Port Clinton is displayed.

## Silk and Spider Web References




Infrared analysis of a chloroform extract of the "angel hair" shows both weak ester and carboxylic acid carbonyls (C=O) and spectral patterns typical of a long carbon chain[4]. There were trace amounts of these materials and their low concentrations did not permit specific identifications. It is unknown if these components are contaminants or components coating the fiber. The spectrum follows.

## Chloroform Extract of the "Angel Hair"



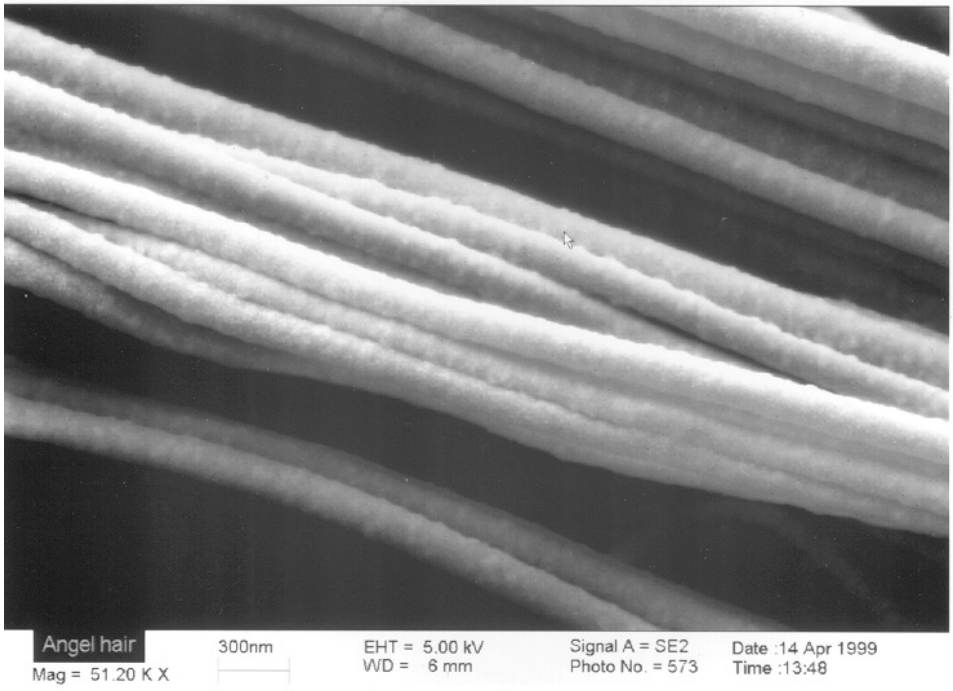

**SEM/EDX**: This analysis was run on only on the angel hair collected in the daytime, 10/20/77. It nicely supports the infrared data by showing major elements of carbon, nitrogen and oxygen. These elements and their concentrations fall within the range of protein amide biological substances. Very low levels of sodium, silicon, sulfur and possibly chlorine are also indicated. The latter elements are most likely due to trace contaminants. These data follow.

[4] The "angel hair" fiber is insoluble in chloroform.

**Atomic Concentration**

| C1s | N1s | O1s | Na1s | Si2p | S2p | Cl2p |
|---|---|---|---|---|---|---|
| 63.99 | 15.19 | 19.19 | 0.76 | 0.61 | 0.17 | 0.09 |

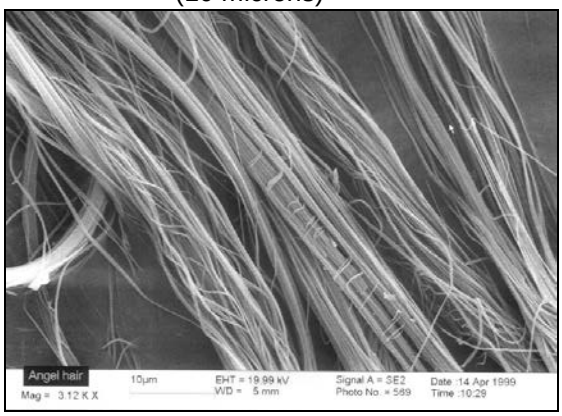
**Microscope (SEM):** Microscopic analysis shows the angel hair fibers appear as bundles of fibers rather than single stands like spider webs. This is dramatically apparent in the following photograph.



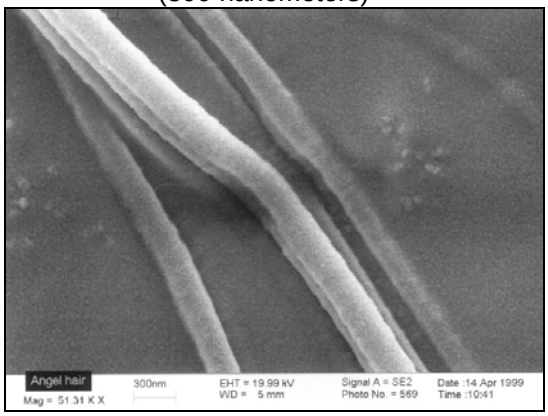

The individual strands are also thinner (170 - 270 nanometers; 0.17 - 0.27 microns) than spider web (370 – 640 nanometers; 0.37 - .64 microns). Additionally, the angel hair samples do not appear to have tiny adhesive droplets adorning the fiber which is common on most spider webs. Photographs of angel hair and spider web at 10 microns and 300 nanometers follow:

**Angel Hair**

(10 microns)

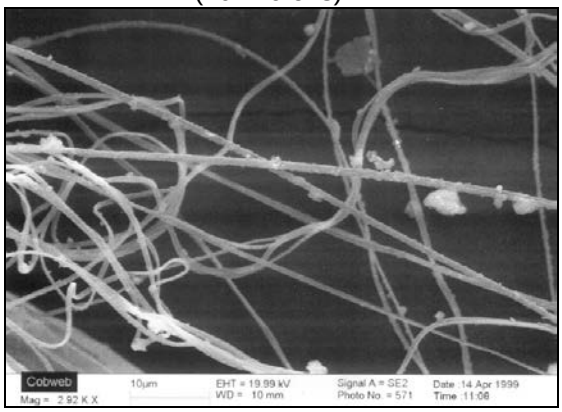



(300 nanometers)

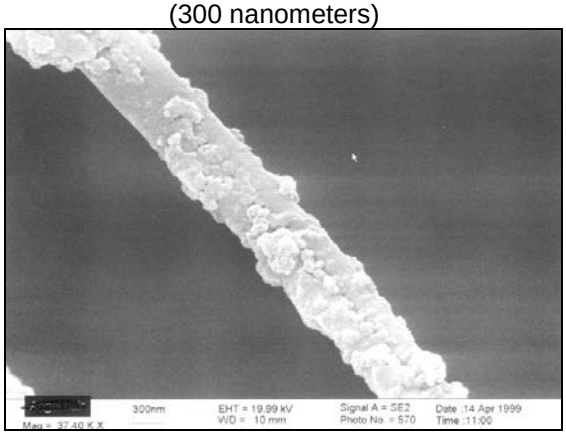



**Spider Web**

(10 microns)




(300 nanometers)

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# ADDENDUM

THE PLAIN DEALER • NATIONAL
• SUNDAY, AUGUST 22, 1999

# Engineers try to spin goat's milk into silk

By EDIE LAU
SACRAMENTO BEE

You've heard the old saying about making a silk purse out of a sow's ear? Well, molecular engineers are on the verge of making spider silk out of goat's milk.

The transformation may have no literary value, but the researchers at Nexia Biotechnologies Inc. in Canada expect their invention to have great commercial worth.

The strong, elastic, glossy, lightweight material could be useful for protective clothing and helmets, vehicle tires, surgical sutures, cable sheathing, even cosmetics, said Costas Karatzas, vice president of research and development at Nexia.

"It has been estimated that a single bundle of spider silk the thickness of a pencil could stop a Boeing 747 in flight!" Karatzas wrote in an abstract about the Nexia venture.

Karatzas described the spider silk project this week to an enthusiastic audience of fellow scientists at the Transgenic Animal Research Conference organized by the University of California, Davis.

"It's a marvelous idea," said Bob Wall, a livestock researcher at the U.S. Department of Agriculture in Beltsville, Md., one of 150 meeting participants. Most of the scientists attending specialize in making animals with foreign genes — so-called transgenic animals.

Using a couple of genetic engineering techniques — including nuclear transfer, the technique that gave rise to Dolly the sheep clone — Nexia scientists inserted the spider's silk-making gene into the DNA of goat ova. As the altered ova developed into embryos, they were placed into the wombs of surrogate goat mothers.

Karatzas said some goats are just now giving birth to what the company expects will be kids containing the spider gene. If the experiment works, the female goats eventually will produce milk containing the protein from which cobwebs are made. Then, the liquid protein will be extracted and purified, and coagulated under chemical solvents including acetone, which transforms the liquid into solid fibers.