

Frontier Analysis, Ltd

TECHNICAL SERVICE RESPONSE NO.: UT018

Subject: Analysis of a White Fibrous Material Observed Floating from the Sky in The California Sierras (November 9, 2001)

Date: February 3, 2002

Requested By: Ed Gehrman
Quincy, California

Reported By: P. A. Budinger
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Background/Objective: Following is the background regarding a white fibrous material observed floating from the sky. It is in Ed Gehrman's words. "I was driving from Quincy CA (hwy 70) in the northern Sierras to my daughter's home in Ukiah. A few minutes before 3:00 p.m. (11-9-01), I began to notice cobweb-like filaments floating in the air around me. I immediately began to realize that the air was full of this strange material. Some of the strands were as long as twelve feet and seemed quite large while in the air, but when they landed, they seemed to come together and lose mass. Some of the material landed on my car and attached itself to the antenna. But then I noticed the most amazing thing. The long filaments were swinging in the air a good nine feet behind my car and would not come off the antenna, even at speeds of 70 mph. All this took place between Butte City (hwy 162), 15 miles as the crow flies, through Princeton, then west again to I-5, then continues down I-5 until Williams and then on for two miles west of Williams on hwy 20." This event is typical of other, similar phenomena which have been observed in the past and designated by many as "angel hair falls". Two samples were submitted: one from the truck mirror; and the other from a rest stop. (See sample description in procedure section.) The object is to identify this material in order to elucidate its source.

Conclusions:

- 1) The truck mirror "angel hair" appears primarily as bundles of fine strands combined in rope-like fashion. Some single fine strands are also observed. These have very fine droplets adhering to the surface. The strands are identified as a polymer containing secondary protein amide linkages typical of a protein structure. It is probable that a biological source is involved in its manufacture. However, at this point the specific source remains unidentified. The spectral data are close to that of silk made by caterpillars.

- 2) The rest stop sample is similar in appearance to the truck mirror sample. However, it is composed of at least three components. Prominent is the same protein type strands identified in the mirror sample. Some cellulosidal material is also present, i.e. plant derived material such as cotton, paper, wood etc. This component is speculated to be contamination picked up by the sticky protein "angel hair". Additionally, a small amount of ester, which could be a natural ester, is detected.
- 3) The protein fibrous material compares to that from "angel hair" falls in Los Gatos, California (October 19-20, 1977), Shenandoah, Iowa (October 4, 1981), Sacramento, California (November 11, 1999), and Burlington, West Virginia (September 19, 2000) which were also analyzed by this laboratory.
- 4) It should be noted that the suggestion the material is from a biological origin does not rule out a possible "intelligent" influence. The "jury is still out" on the specific source of this material until further research is completed.

Procedure:

Two samples were submitted with the following information. "One sample came from the rest stop 5 miles north of Williams on I-5 going south, and the other was collected from the antenna of my truck, after I returned home to Quincy. ... It is almost indestructible, but if you try to touch it with your hands it seems to decompose before your eyes. It's impossible to collect a sample with your bare hands. I had to wrap it very carefully around a large piece of aluminum foil and even then it was close to impossible for my daughter and me to get a sample in a closed container because it stuck to everything. The two samples I have are wrapped around toothpicks and there is a good amount. The samples have been sealed since collection, and I have not noticed an iota of change since I sealed them up in jars 20 and 16 days ago."

Several infrared spectra were obtained from each of the two samples using the Harrick SplitPea® cell on the Nicolet Avatar 360 spectrometer. Microscope photographs were obtained using the Leika GZ6 stereomicroscope interfaced to a Kodak Digital Science MDS 120 camera.

Results:

The detailed results of the two samples follow. These results are summarized in the conclusions section of this report.

Truck Mirror “Angel Hair”: A microscope photograph is shown of the fibrous material under low magnification ‘as received’ on the toothpick. It has a white web-like appearance and adheres well to the wood.

Low Mag Mirror “Angel Hair” on Toothpick



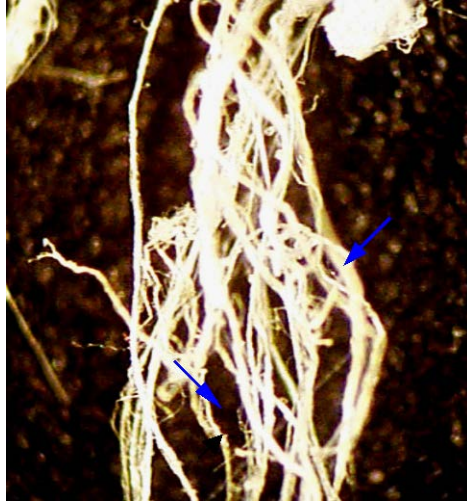
High magnification photographs of the fibrous material removed from the toothpick show it is made up of extremely fine strands¹. Most fibers are bundled rope-like fashion, with a few single strands also observed. There are very tiny droplets on the fibers that are similar to the droplets observed on silk derived from spiders and caterpillars. They are more obvious by eye-view through the microscope than in these photographs. These are observed more easily on single strands. Blue arrows on a few of the selected single strands show the area of some of the droplets. The photographs were taken at 60x magnification which is the maximum for this microscope.

High Mag Mirror “Angel Hair” Photo 1



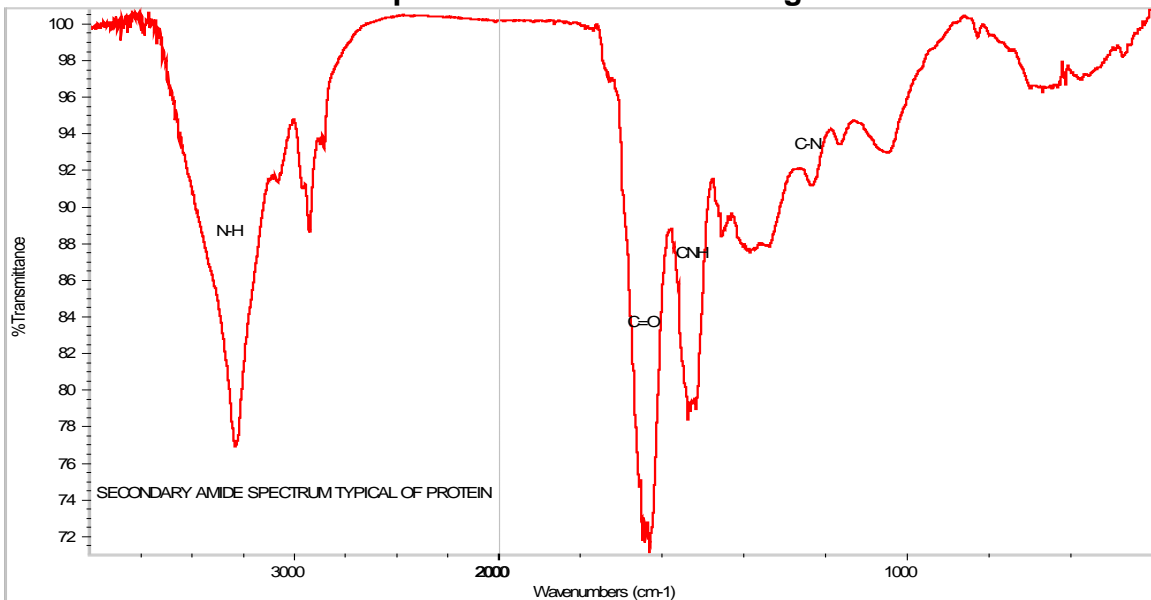
¹ SEM microscope analysis of “angel hair” fibers from the Los Gatos, California fall show fibers were <1 micron (0.017 – 0.27 μ). (T.S.R. No.: 002)

High Mag Rest Stop “Angel Hair” Photo2

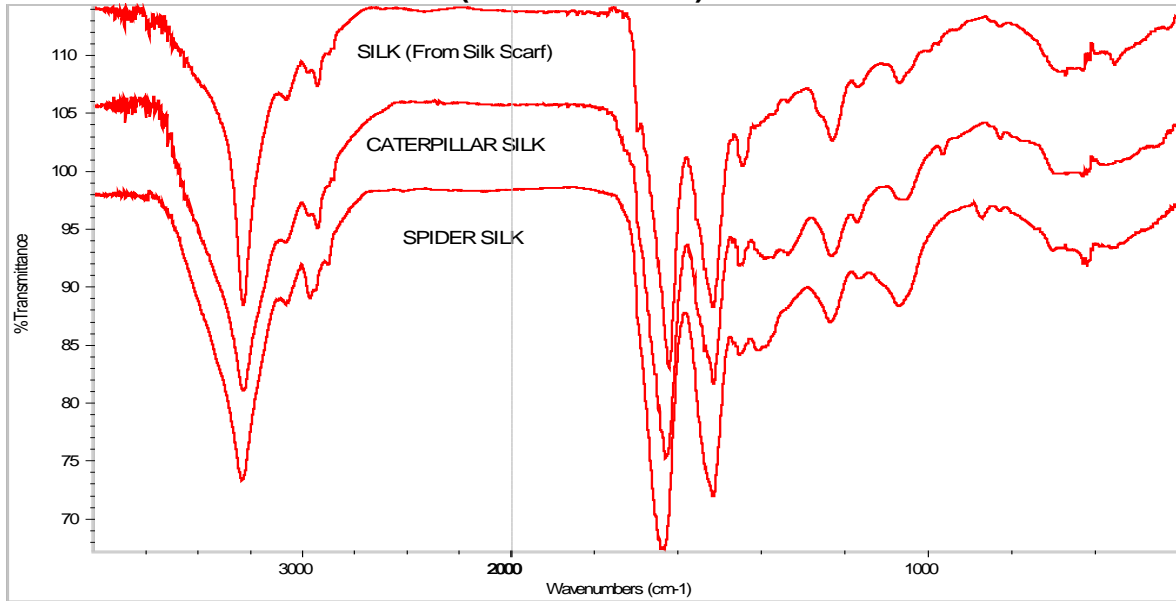


Several infrared spectra were obtained from the ‘mirror’ white fiber. All spectra were similar to each other. This analysis shows prominent absorption bands due to N-H ($3700 - 3000 \text{ cm}^{-1}$), secondary amide C=O ($1650 - 1600 \text{ cm}^{-1}$) and CNH ($1580 - 1470 \text{ cm}^{-1}$). These, along with other weak to moderate bands, identify the strands as a protein material. The spectra are most similar to that of caterpillar silk and silk from silkworms. It suggests that the sample source is from a biological origin, i.e. animal, which would include webs from caterpillars. The spectra of the fibrous material from this fall are also similar to those from other “angel hair” falls examined by this laboratory. Following is a representative spectrum from various runs typical of the mirror fiber. Also following, for comparison, are spectra of references of ‘silkworm’ silk, tent caterpillar silk, and spider silk, as well as some selected spectra of “angel hair” from other events.

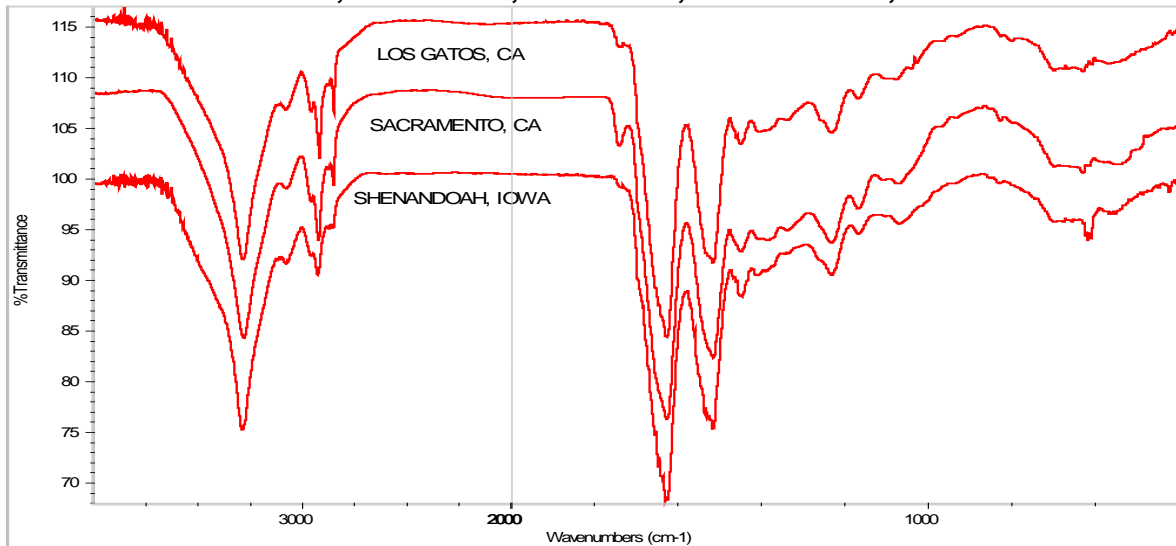
Infrared Spectrum Truck Mirror “Angel Hair”



Reference Infrared Spectra of Spider Silk, Tent Caterpillar Silk, and Silk (from Silk Scarf)



Infrared Spectra of "Angel Hair" from other events: Sacramento, California; Los Gatos, California; Shenandoah, Iowa



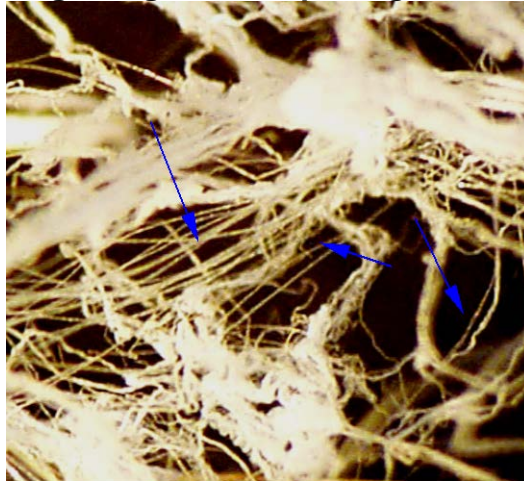
Rest Stop "Angel Hair": A low magnification microscope photograph of the "as received angel hair" on a toothpick is similar to that of the mirror fiber. It also is tightly bonded to the wood due to its adhesive nature.

Low Mag Rest Stop “Angel Hair” on Toothpick



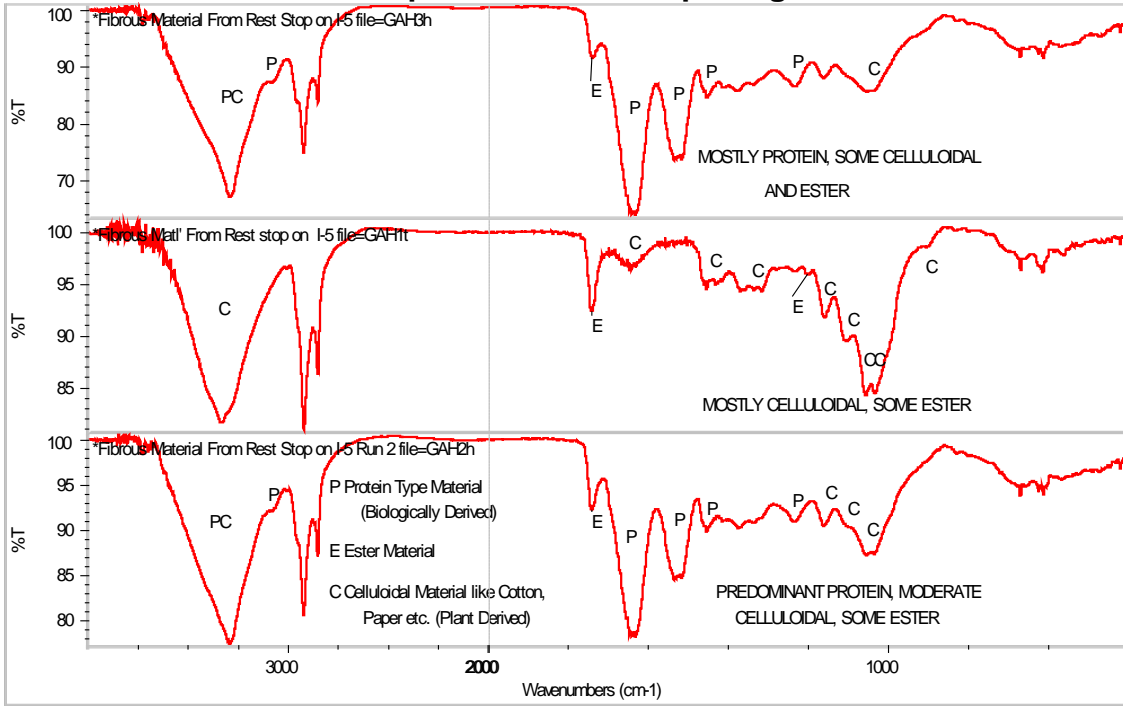
A high magnification (60x) microscope photograph of the isolated fiber is also similar to the mirror fiber. For the most part, fine strands are bundled in rope-like fashion, and there are some single strands. On the single strands tiny droplets are more easily observed. Also like the mirror sample, they are not as obvious in the photograph. Blue arrows indicate areas where some of the droplets (of many) were observed by eye-view through the microscope. There are also a few thicker white filaments, which infrared identifies as celluloidal material. (See infrared analysis below.) Following is the photograph.

High Mag Rest Stop “Angel Hair”

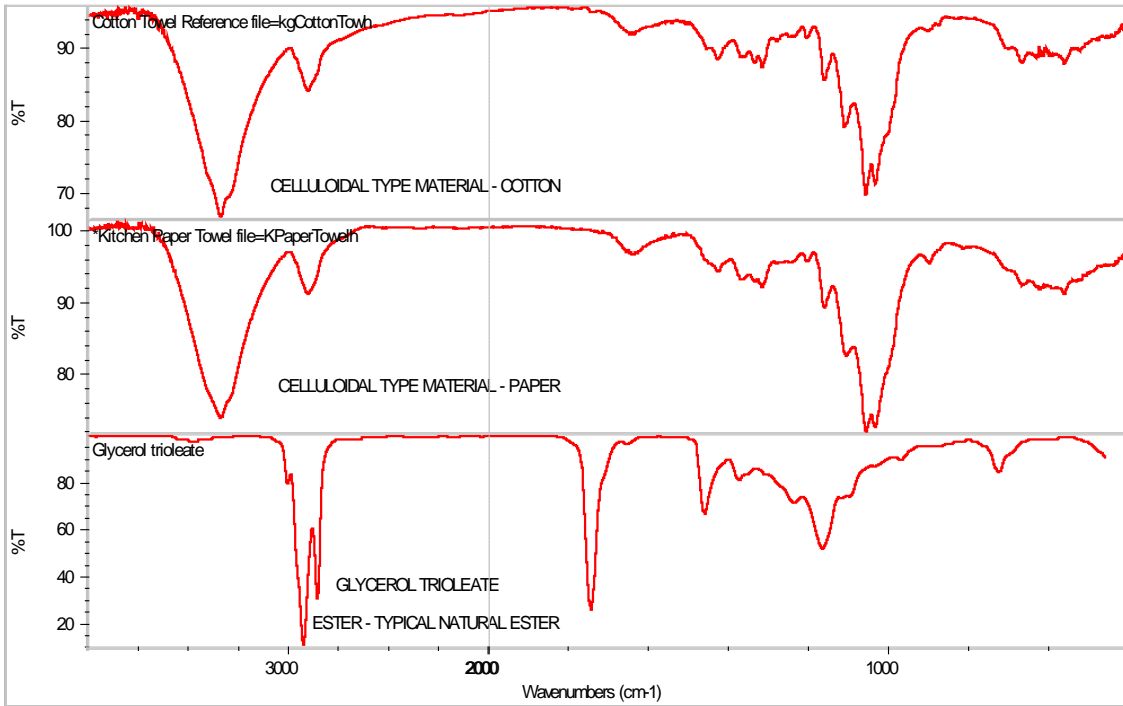


Infrared analysis of this sample shows it is comprised to at least three components. Spectra from various portions of the sample are different. Most spectra show predominant bands which are typical of the same protein material observed on the truck mirror. (See above.) These bands compare closest to ‘silk’ from caterpillars or silkworms. (Also see the above spectral references of these materials in the ‘mirror’ sample discussion.) Other additional bands are noted in some spectra which are characteristic celluloidal material, that is, material derived from plants such as paper, cotton, wood, etc. Also noted is absorption typical of a natural ester. Three spectra from the rest stop sample are shown below with pertinent bands labeled. Also included are reference spectra of celluloidal types of material (cotton, paper) and a natural ester.

Infrared Spectra of Rest Stop "Angel Hair"



Infrared Reference Spectra of Celluloidal (Plant Derived) Material and an Ester



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