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Meeting with Dr. Langer on July 9

Concerning Analytical Analysis of Talc

On Friday, July 9, I visited Dr. Arthur Langer, Mt. Sinai School of Environmental Science. The expressed purpose of this visit was to observe the preparation of tissue sections (from Tenovus Institute) for electron microscope examination. However, the subject of "asbestos" in JOHNSON'S* Baby Powder from Dr. Langer's point of view was also explored.

Analysis of the Tenovus Tissue Samples

Only the tissue labeled 34907 11 Uterus 1 Surface submitted by us was of sufficient size to be prepared for electron microscopy. The tissue was sectioned and prepared by the method of Dr. F. Pooley. This method involved removal of the wax embedding medium, ashing away the majority of the organic matter in a 450°C muffle furnace, casting a polyvinyl alcohol (PVA) film on the ashed section, carbon coating the section held in the hardened PVA film, and transferring the section to an electron microscope grid by floatation on hot water. This technique if properly executed leaves sufficient relic of the tissue so that the trained eye can tell where in the tissue an observed particle is located. As no replication step is involved, ambiguities in the final preparation related to this step are removed.

viewing the grids prepared on Friday at about 11,000X in the electron microscope, we were unable to find any particles which could obviously be identified as talc, however, fibrous structures were observed under higher magnification (30,000X and up) these fibers were identified by Dr. Langer as chrysotile. His method of identification is based on his experiences in observing the fibers of "pure" chrysotile under similar experimental conditions. The characteristic density profile across the diameter of the fibers is observed at high magnification, and indicates the presence of tubular chrysotile. Evidence such as this was observed in at least one other field in the one sample which was examined.

Light and Electron Microscopy of JOHNSON'S* Baby Powder

Dr. Langer demonstrated his technique for observing "fibrous minerals" in JOHNSON'S* Baby Powder. He shook a small amount of the talc from the container onto a glass slide, applied a drop of immersion liquid (index of refraction in the neighborhood of 1.52) and a cover slip. After examining the sample in the light microscope for a short time he stated that he could pick up some non plate particles that could be amphiboles other asbestos forms, or fibrous

talc (or, in my opinion, talc plate fragments). He said he estimates the amount in this sample to be on the order of one or two percent. He indicated that he has observed the amount of "fibrous" content to vary from sample to sample. He had examined a JOHNSON'S* Baby Powder sample and that of a competitor (which resulted in Kretchmers press release) by the method stated above. In Johnson's ~~Product he estimated 5%,~~ in the other 25% of the particles to be fibroic of which some could be "asbestos". I stress that he makes no attempt to actually count the particles or to identify the fibers at this level of magnification.

Using electron microscopy Dr. Langer has demonstrated to me the presence of some very fine fibers at moderately high magnification which he identifies as chrysotile asbestos by the typical tubular appearance of the fiber. ~~Photographs taken during the session at which I was present are appended~~.

The JOHNSON'S* Baby Powder sample was prepared for electron microscopy by sonifying a small portion of the powder in an excess of water (maybe 25 to 1) for ten minutes. The sonification served to break up aglomerated particles and to disperse the talc. A drop of the suspension was placed on an electron microscope grid and allowed to dry.

In addition to the observation of the tubular structures as an indication of chrysotile Dr. Langer also pointed out the typical thermal behavior of the fiber which is initiated by the heat generated at the sample by the electron beam. The mineral dehydroxylates and the surface of the fibers become amorphous. This process is observed as a slowly altering pattern of density in the microscope image. Eventually the crystal is so deformed by the heat that the fiber may appear to be segmented (~~see Figure 3~~). Although we did not perform selected area electron diffraction on Friday, Dr. Langer has observed these patterns from chrysotile fibers found in JOHNSON'S Baby Powder. Selected area diffraction patterns, though not necessarily specific for a mineral, do allow one to distinguish mineral fibers from non-crystalline artifact. It must again be stressed that Dr. Langer has, to my knowledge, made no particle counts with this technique either.

Summary

1. In the uterus sample from Tenovus, chrysotile rather than talc was found.
2. Chrysotile is identified in the electron microscope by its characteristic tubular appearance (at high magnification).

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Summary

1. In the uterus sample from Tenovus, chrysotile rather than talc was found.
2. Chrysotile is identified in the electron microscope by its characteristic tubular appearance (at high magnification).

3. Light microscopy of JOHNSON'S* Baby Powder indicates the presence of fibrous minerals of which, according to Dr. Langer, some could be "asbestos". Neither true quantitative or qualitative analysis was performed.

4. Electron microscopy at high magnification shows a few fibers to be present in JOHNSON'S* Baby Powder which can be identified with chrysotile asbestos according to Dr. Langer. No quantitation was performed.