

Efforts to Manufacture "Dream Silk"

Okamoto Corporation Announces Research Results on Spider Silk

Nara Prefectural New Public Hall, Nara, Japan

December 6, 2007

On December 6, 2007 at Nara Prefectural New Public Hall, Okamoto Corporation (Headquarters: Koryo-cho, Nara Prefecture; President: Tetsuji Okamoto), the largest wholesaling manufacturer of socks in Japan by sales volume, announced the results of its research on spider silk, the "dream silk," that it has conducted in an industry-university collaboration with Shinshu University.

Okamoto carries out research on various materials in order to produce socks of high quality for consumers. Gossamer, the fiber spun by spiders, has remarkable properties and it is highly likely that these properties can be applied in various fields. For this reason, many countries have embarked on research, but none has yet come close to commercial practicality. By genetically modifying the silkworm, Shinshu University Professor Masao Nakagaki succeeded in producing silk containing a large amount of the spider fiber material. Picking up on the success of Professor Nakagaki's research, Okamoto is pursuing it further through a collaboration with Shinshu University. The development of spider silk has the potential to revitalize Japan's silk-raising industry and greatly impact Japan's textile industry. Through this news release, Okamoto wishes to offer a message to the world from the city of Nara, the terminus of the Silk Road.

Spider Silk (thread spun by genetically modified silkworms)

The Arrival of Spider Silk:

- (1) Has the potential for use in materials for cosmetics, medical applications, industrial and aeronautic applications, and other fields in addition to clothing.
- (2) Can be used to create new biocompatible, environmental materials that are biodegradable.
- (3) Will revitalize Japan's silk-raising industry and help Japan's textile industry to expand.



Profile of Professor Masao Nakagaki, Shinshu University, Faculty of Textile Science and Technology

1972: Graduated Shinshu University, Faculty of Textile Science and Technology

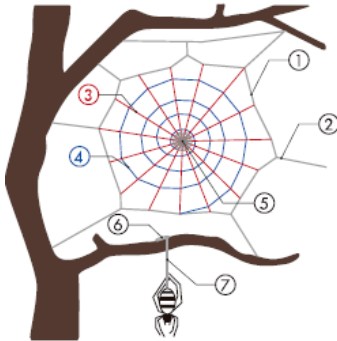
1979: Nagoya University Graduate School, Division of Agriculture, Doctoral Program (left after earning credits in the program)

Doctor of Agriculture In present position since 1999. Fields of specialization: insect molecular biology, insect genetics, insect pathology

Has continued pursuing research on silkworm variety improvement and diseases since his college days, and became interested in spider thread about 8 years ago.

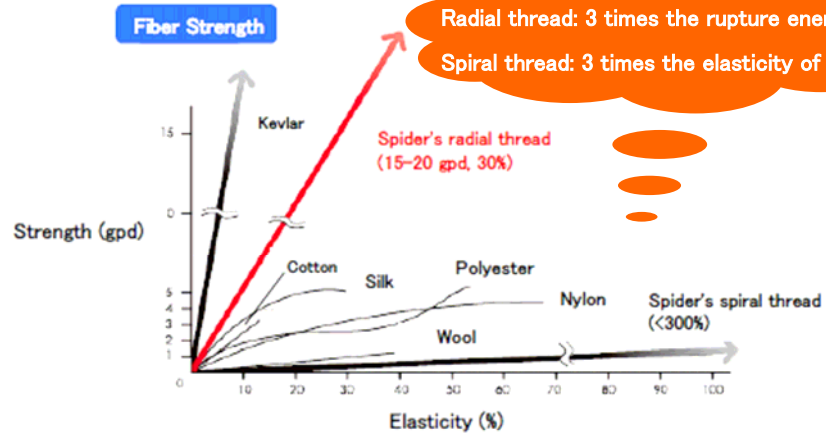
Spider Thread

Spiders have the ability to produce thread with various properties according to their use.



The Configuration of an Orb Web

1. Frame thread
2. Support thread
3. Radial thread
4. Spiral thread
5. Hub
6. Adhesive disk
7. Dragline thread



Obtaining Spider Thread

- To obtain 500 grams of thread requires 27,000 medium-sized spiders.
- Large-scale breeding of spiders/thread harvesting is difficult. (Spiders only feed on live prey; they are cannibalistic; very little thread can be obtained from a single spider; the spider's situation determines what type of thread it produces)

Spider Silk Research

- ① Clarification of the amino acid sequence of spider thread protein
- ↓
- ② Injection of spider silk gene into silkworm eggs using a micro-injection system
- ↓
- ③ Gene delivery using a transposon-derived vector
- ↓
- ④ Birth of a new type of silkworm through hybridization with commercial variety

Advantages of a Silkworm that Secretes Spider Silk

- Sixty to seventy percent of the solid matter that constitutes the silkworm's body is transferred to the cocoon filament as silk protein.
- The silkworm produces silk at room temperature, so no artificial energy is required.

Thread Performance Research Results

Compared to conventional raw silk, spider silk is:

- (1) Stronger
- (2) Softer, with a different texture

Because of these differences, it is considered a different type of thread (cocoon)

The Potential of Spider Silk

- ① Can be used in materials for cosmetics, medical applications, industrial and aeronautic applications, and other fields in addition to clothing.
- ② Can be used to create new biocompatible, environmental materials that are biodegradable.
- ③ Will revitalize Japan's silk-raising industry and help Japan's textile industry to expand.