“夢のシルク”づくりに挑戦
岡本株式会社がスパイダーシルクに関する研究成果を発表

～2007年12月6日　奈良県新公会堂(奈良市)にて～

販売数量国内最大の靴下製造卸・岡本株式会社（本社：奈良県広陵町/代表取締役社長：岡本哲治）は国立大学法人信州大学と産学協同で行っている“夢のシルク”スパイダーシルクの研究成果について、2007年12月6日奈良県新公会堂にて発表致します。
弊社はお客様に上質な靴下をお届けするため、様々な素材について研究しています。クモの糸は優れた特性を持ち色々な分野への応用が有力視されているため、各国が研究に着手していますが実用化への目処は立っておりません。カイコの遺伝子を組替えすることにより、クモの糸の成分を多く含んだシルクをつくり出すことに成功した中垣教授の研究を受け、この研究を信州大学と弊社が産学協同で進めています。スパイダーシルクの開発は、日本の養蚕業の活性化や繊維産業の発展に大きく貢献できる可能性を秘めています。この発表を、シルクロードの終着駅である奈良から世界へ向けての、メッセージにしたいと思います。

Spider Silk　(※クモの糸の遺伝子を組み込んだカイコに吐かせた糸)

奈良新聞 3面

国産靴下の未来託す
「スパイダーシルク」実用化研究
岡本、新素材に意欲
医療、航空産業に応用も
ポーツ支援

2007年12月7日
奈良新聞 1面

クモ糸遺伝子を持つ蚕
世界初、信州大の中垣教授
強くしなやか「スパイダーシルク」
広陵の岡本が共同研究
福井氏

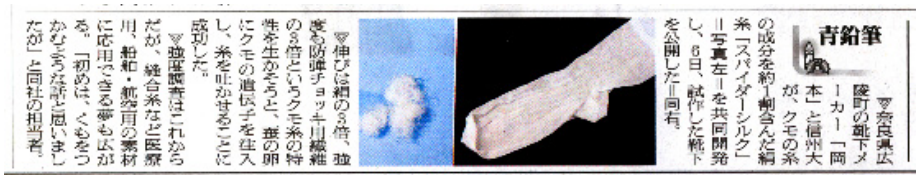
2007年12月7日
信濃毎日新聞 1面

信大と奈良の会社 共同開発
クモ糸成分で柔らかい靴下
紙面から

2007年12月7日
奈良日々新聞 7面

夢の超繊維クモ糸で靴下
岡本が世界初の製品化
強度　鉄繊維の3倍

2007年12月7日　朝日新聞(全国版) 35面


青鉛筆
奈良県広陵町の靴下メーカー「岡本」と信州大が、クモの糸の成分を約一割含んだ絹糸「スパイダーシルク」＝写真左＝を共同開発し、6日、試作した靴下を公開した＝同有。
伸びは絹の5倍、強度も防弾チョッキ用繊維の3倍というクモ糸の特性を生かそうと、蚕の卵にクモの遺伝子を注入し、糸を吐かせることに成功した。
独創的素材はこれからだが、綿合糸など医療用、船舶・航空用の素材に応用できる夢もふくらむ。「初めは、くもをつかむようだと思いました」と同社の担当者。

2007年12月7日
毎日新聞(全国版) 31面

雑記帳
人手の岡本（奈良県広陵町）は、中垣雅雄・信州大教授と共同開発した蚕の卵に、クモの糸の遺伝子を組み込み、絹糸をはかせる技術を開発した。
◇井川町ノ介の小説に出てくるクモの糸は、人間の約100倍の強さ。人造人間が「スパイダーシルク」で創作の業績を伸ばす勇者の糸に、と同じ。
◇伸びは絹の5倍、強度は鉄の3倍も伸びる
というクモの糸の特性に目を付け、中垣雅雄・信州大教授と共同開発＝蚕の卵に…

2007年12月7日
読売新聞(全国版) 39面

クモ糸シルク 強度2倍
蚕に遺伝子注入 奈良の会社など製品化へ

THE TIMES

(Page 33)

December.10.2007

Coming soon – spider socks (in packs of 8)

Richard Lloyd Parry Tokyo

It is a miracle substance — lighter than feathers, stronger than steel, one of the toughest fibres found in nature. Now scientists in Japan have found a way of harnessing the remarkable power of spiders' webs to make anything from tights and fishing nets to bulletproof vests.

Researchers at Shinshu University have succeeded in injecting spider genes into silkworms to create a thread that is stronger, softer and more durable than conventional silk. A Japanese manufacturer is already experimenting with the thread, and spider socks, stockings and even fishing lines are expected to appear on the market within a few years.

The team, based in the city of Nagano and led by Masao Nakagaki, a professor of insect genetics, has beaten rival scientists from around the world in devising a way of mass-producing spider silk.

Conventional "farming" of spiders proved impossible because of their territorial and cannibalistic nature. Five years ago American geneticists devised a bizarre means of generating spider silk by extruding it from the udders of female goats. But Professor Nakagaki's technique employs a much more manageable creature — the silkworm, whose shimmering fibres have been used to create cloth for more than 5,000 years.

Silkworm eggs are injected with the genes of *Nephila clavata*, the golden orb spider, known in Japanese as the courtesan spider because its striking yellow, black and red colouring resembles the gorgeous kimono of an upmarket prostitute. The silkworm caterpillars that emerge from the eggs weave cocoons, of which 10 per cent consist of spider proteins. These are spun into silk. Professor Nakagaki hopes to increase the proportion of spider thread material to 50 per cent.

"Dragline silk", which spiders use to raise and lower themselves and to construct the spokes of their webs, has one of the highest tensile strengths of any natural substance — five times that of a thread of steel of the same thickness. In terms of its ability to absorb impact, it is superior to Kevlar, the plastic fibre used for anti-stab vests and body armour.

800

the length in metres of a single continuous strand of silk, produced by a silkworm at 15cm a minute

Source: Landfood.ubc.ca

Other applications include tennis rackets and fishing line and nets — unlike nylon thread, which pollutes beaches and threatens sea birds, spider silk will degrade naturally over time. Spider thread could also be used by microsurgeons as sutures after operations. The only company developing commercial applications for the spider silk is Okamoto, a business based in Nara, central Japan, which plans to release extra-thin and durable spider socks by about 2010.

Other cultures have found uses for cobwebs. Polynesian fishermen used the threads of the golden orb spider to make fishing line and communities in Papua New Guinea put webs on their heads to keep off the sun's rays. During the Second World War, threads from black widow spiders were used as hairs in telescopic gun sights.

21

REUTERS

LATEST NEWS HEZBOLLAH APPOINTS SUCCESSOR TO SLAIN COMMANDER

Japanese spider socks for toe-wriggling pleasure

Mon Dec 10, 2007 7:13am EST

Email | Print | Share | Reprints | Single Page | Recommend (0) [-] Text [+]

Full Size

Featured Broker sponsored link

GFT GET A FREE TRIAL NOW

Learn to Trade with a #1 IG Guide

TOKYO (Reuters Life!) - It might be just the thing to ease your arachnophobia: Japanese researchers have created a pair of comfortable yet durable socks from spider thread and silk.

"By genetically modifying silkworms, I thought it might be possible to create good spider silk," said Masao Nakagaki, a professor at Shinshu University in central Japan who developed the fiber after 10 years of research.

"I think it is better for the environment to replace artificial fibers that use up precious oil with natural recyclable fibers," he told Reuters on Monday.

Nakagaki succeeded in creating spider silk consisting of 10 percent spider proteins and 90 percent silk by injecting genes from a golden orb weaving spider into silkworms.

Spiders produce at least seven different types of thread, ranging from tough ones that hold up the web to elastic ones encircling it.

Experts say these threads are stronger than steel and lighter than existing artificial fibers such as Kevlar, used for bullet-proof vests. But spider fibers are difficult to mass-produce due to the limited amount that spiders can make.

The developers of the spider socks aim to revitalize both the wearers' feet with possible anti-ageing effects and Japan's waning silk and socks industry.

"These Japanese industries have sunk, overwhelmed by Chinese manufacturers. We want to distinguish ourselves with our unique efforts," Yoshiyuki Ueda of Okamoto Corp said, adding customers can expect to find their dream socks in stores around 2010.

(Reporting by Yoko Kubota, editing by Miral Fahmy)

BBC BRASIL.com

Japoneses criam 'super fibra' de bicho-da-seda com gene de aranha

Geraldo Ribeiro
Do Tóquio

Cientistas japoneses conseguiram implantar genes da aranha em bichos-da-seda para a criação de uma fibra duas vezes mais resistente que a seda comum - e que será usada na fabricação de meias especiais.

A nova fibra é duas vezes mais resistente que a seda comum

O novo produto, desenvolvido pelos pesquisadores da Universidade Shinshu, da província japonesa de Nagano, foi apresentado como sendo ultra-resistente. A fibra produzida pelo bicho-da-seda geneticamente alterado é composta de cerca de 10% de seda de aranha e 90% da seda que a larva produz para criar seu casulo.

A fabricante de meias japonesa Okamoto é uma das patrocinadoras da pesquisa e planeja usar a nova fibra na fabricação de meias mais fortes e mais elásticas.

Os vários tipos de seda produzidos pelas aranhas para construir suas teias são conhecidos pela resistência. Apesar disso, não é possível usar aranhas para produzir seda, como se faz com o bicho-da-seda, por causa do comportamento agressivo da aranha.

Segundo Masao Nakagaki, que lidera a pesquisa, o novo método acrescenta às qualidades de leveza e brilho, naturais da seda, a resistência e flexibilidade da seda de aranha.

Resistência

O professor Nakagaki declarou à BBC Brasil que um dos tipos de fibra resultantes do novo processo é tão forte quanto a fibra sintética Kevlar, utilizada na confecção de coletes à prova de balas.

Para Nakagaki, o próximo passo da pesquisa é aumentar a proporção de seda de aranha na fibra ultra-resistente dos atuais 10% para 20% ou 30%. "Não será fácil, mas acreditamos que seja possível com muito esforço", concluí.

Além da fabricação de meias, o novo fio poderá ser usado na fabricação de outros produtos não têxteis, como fios cirúrgicos e linhas de pesca.

O lançamento das meias feitas a partir da nova seda está previsto para 2010.

NOTÍCIAS RELACIONADAS

LINKS EXTERNOS

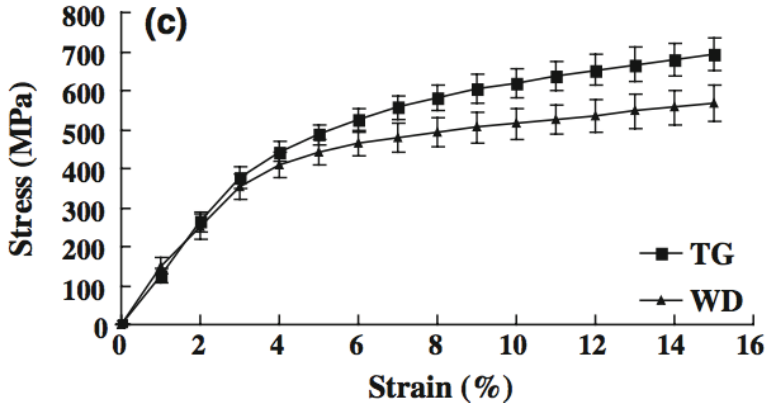
ÚLTIMAS NOTÍCIAS

22

ベクタープラスミドとヘルパープラスミドを一緒に蚕の卵に注入

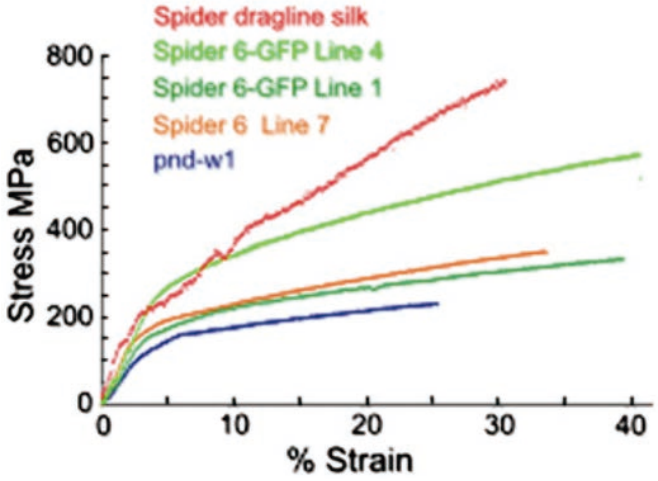
23

Wen H, Lan X, Zhang Y, Zhao T, Wang Y, Kajiura Z, Nakagaki M:
Transgenic silkworms (Bombyx mori) produce recombinant spider dragline silk in cocoons.
Mol Biol Rep, 37(4), pp.1815-1821, **2010年**.
信州大（中垣研究室）

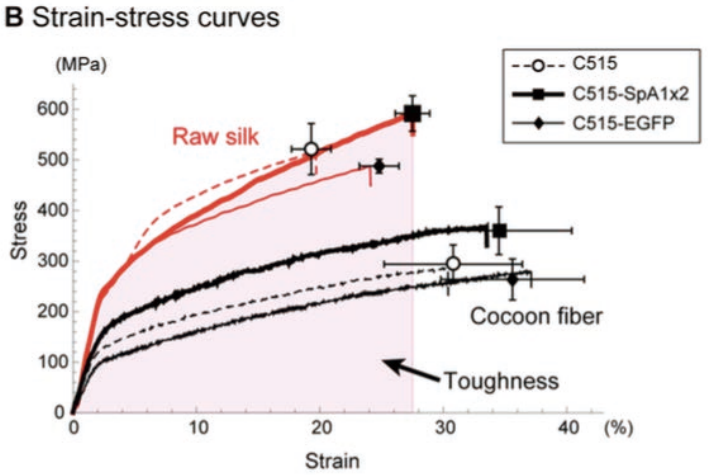


24

Toule F, Miao YG, Sohn BH, Kim YS, Hull JJ, Fraser MJ, Lewis RV, Jarvis DL:
Silkworm transformed with chimeric silkworm/spider silk genes spin composite silk fibers with improved mechanical properties.
PNAS, 109(3), pp.923-928, **2012年**.
ワイオミング大、浙江大、ノートルダム大 → Kraig Biokraft Labs.(ベンチャー企業。米国)



Kuwana K, Sezutsu H, Nakajima K, Tamada Y, Kojima K:
High-Toughness silk produced by a transgenic silkworm expressing spider (Araneus ventricosus) dragline silk protein
Plos One, 9(8), pp.1-11, **2014年**.
農生研(農研機構)、信州大(玉田研究室)



独自ブランドのスパイダーシルク

作出される糸の性質は、研究者のアイデアによって、千差万別。

どのクモ糸(クモの種類、糸の種類)を利用するか？
その導入する遺伝子をどのようにデザインするか？
どのようにして、生糸中のクモ糸タンパク質の含量を増やすか？
・・・・・などなど
独自ブランド(商標登録)のスパイダーシルクとして、付加価値を高め、売り出すことが出来る。

信州大学
SHINSHU UNIVERSITY

信州大学と駒ヶ根市が包括連携協定を締結

17年03月21日

信州大学と駒ヶ根市は、平成29年3月14日(火)駒ヶ根市役所において、「包括的連携に関する協定」を締結しました。本協定は、包括的な連携のもと、文化、産業、医療、教育、学術研究等の分野で相互に協力し、地域の発展と人材の育成に寄与することを目的として締結されたものです。

協定に基づく連携事項は以下のとおりです。
(1)地域文化の振興に関すること。
(2)地域産業の振興に関すること。
(3)地域医療・福祉に関すること。
(4)教育・人材育成に関すること。
(5)まちづくりに関すること。
(6)自然・環境に関すること。
(7)学術研究に関すること。
(8)その他両者が必要と認める事項。

濱田 州博 信州大学長(左)と杉本 幸治 駒ヶ根市長

駒ヶ根市とは、平成25年5月に本学農学部との間で協定を締結しており、ごま優良系統の選抜・育種と評価や伊那谷アグリイノベーション推進機構への参画など、既に盛んな連携がなされていますが、全学として協定を締結することで、駒ヶ根シルクミュージアムの充実や中央アルプスジオパーク構想の策定など、農学部以外の学部でも相互に連携・協力していく足がかりにしたいと考えております。

駒ヶ根シルクミュージアムの紹介

駒ヶ根シルクミュージアムの紹介