ASK THE EXPERT: MIKE SWEET, POLYGIENE

In this new feature series, **Ask The Expert**, we will aim to answer readers' questions on a list of hot topics in the world of textile innovation for sports and outdoor applications.
The six subjects Ask The Expert will cover in the course of 2011 are: antimicrobial properties in textiles; seamless technology; compression garments; developments in moisture management; combining comfort and performance and, finally, new fibres and fabrics.

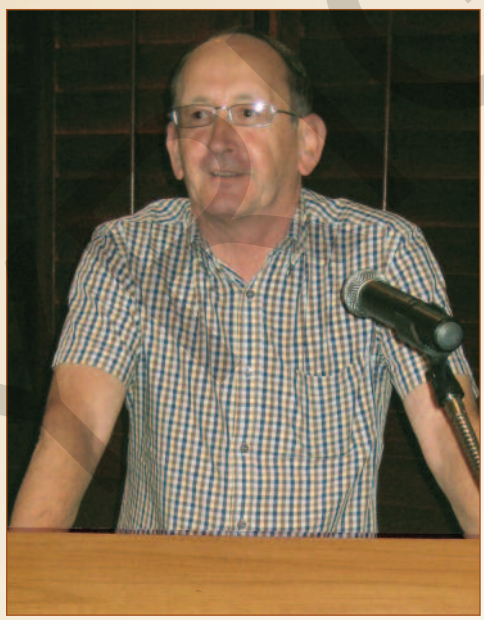
Antimicrobial treatment in textiles and apparel

For the first in the series, Ask The Expert is concentrating on antimicrobial properties in textiles and we are delighted to present Mike Sweet, director of technical development at Swedish antimicrobial technology provider Polygiene, as the person who has kindly agreed to use his knowledge of the subject and industry experience to help answer questions on this subject.

Question: What are the primary methods used to create a harsh environment for microbes? Which is most effective, which is most environmentally sound?
Progressive Sports Technologies, Loughborough, UK.

Answer: I am going to assume that by 'harsh environment' you mean minimal population growth. Firstly we should clarify that 'microbes' is an umbrella heading which covers bacteria, fungi, and yeasts. In textile odour control we are only concerned with controlling a population of bacteria on the textile, and even then only a specific few are responsible for odour generation. These tend to be of the Gram-positive type.

Bacteria, perhaps unfortunately, thrive in the same climatic conditions that we do. That is, to survive they need warmth, moisture, and a food source, all of which are to be found in clothing worn next to the human body, the food source in this case being our own perspiration. So in theory removing or controlling any one of the three would lead to population decline. The practical implications of this are that clothing worn for sedentary pursuits often smell much less than those worn for demanding physical exercise, leading to lower heat, lower humidity, less food.



Expert:	Mike Sweet
Company:	Polygiene
Website:	www.polygiene.com
Position:	Director of technical development
Subject:	Antimicrobial properties in textiles

The design and structure of all aspects of a garment can of course play a role here. Tightly twisted yarns and closely woven or knitted fabrics can create a barrier to moisture evaporation and trap heat. Application or creation of moisture wicking or comfort finishes can help control humidity and temperature, which in turn reduces perspiration, but they alone cannot prevent odour formation.

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Regarding the question of effectiveness this is a little more difficult to quantify. In absolute terms there are many chemistries that will kill bacteria 100% such as chlorinated bleaches, Ozone and of course high washing temperatures (above 71°C). This approach has at least two downsides: you could not wear such chemistry next to the skin and they offer no long-term protection. Yes, they will likely give 100% kill, but the textile rapidly becomes repopulated.

It should be noted here that for odour control we do not have to eliminate the bacteria, achievement of bio-stasis is all that is required, that is a situation in which the bacterial colony is not growing.

For successful, and safe odour control in apparel we have several criteria to meet:

- Non-migratory–the product stays on the textile article and does not migrate to the skin
- Skin Safe–the natural flora and fauna of the skin must not be disturbed
- Safe to use, both in the mill and in wear
- Bluesign-approved
- Controls odour.

There are several chemical types on the market today that can fulfil these requirements, and it is not for me to give commercial names here, but perhaps the most dominant technology is the use of silver ions. Possible reasons for this include performance in the field, and by this I mean not just relying on laboratory data, but actual physical use. The fact that silver is not a laboratory synthesised chemical but its life cycle can be recovered and recycled are amongst the convincing arguments.

Q: I just found this out about a statement from the Federal Trade Commission in the US warning parents that hemp and bamboo products don't live up to the antimicrobial and biodegradable claims some manufacturers make. What naturally antimicrobial options are out there for parents of young children who are trying to live greener with less impact on our planet? What would you say to reassure us about non-natural antimicrobial treatments in clothes and textiles?

Melissa Phinney, sapsmama.blogspot.com, US.

A: Here we have three questions in one, so let's break them down for ease of response. Hemp was probably one of the first fibres ever to be cultivated, mainly grown in China. It grows rapidly and produces a strong but coarse fibre which found use mainly to produce ropes and cords rather than apparel; used alone it would be like sack cloth to wear. Following the decline in its natural markets–carpet backing, ropes and so on being replaced by synthetic



The use of a suitable antimicrobial for odour control can bring benefits to the environment by reducing washing frequency and wash temperatures, and by allowing consumers to use garments for a longer time.

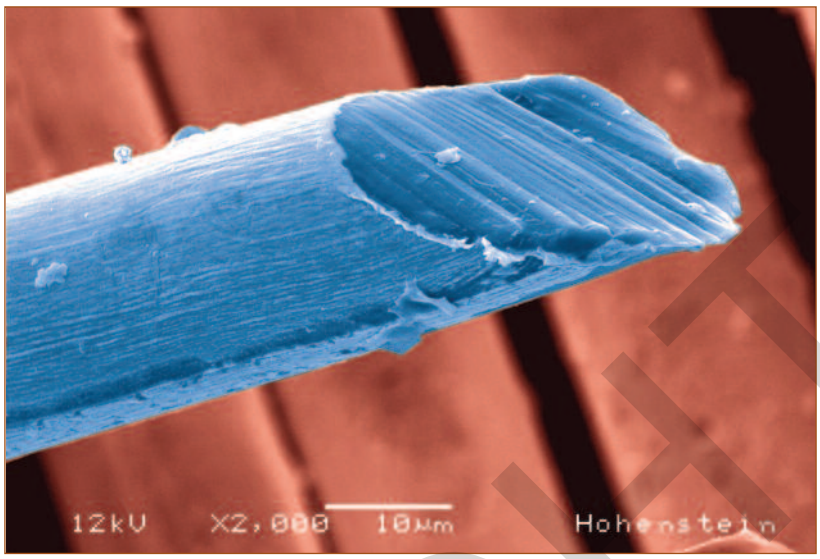
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fibres, growers tried to find uses for it in apparel again, mainly by incorporating it as a minor percentage in blends with other softer fibres such as cotton. I do not know of any claims that hemp is antimicrobial, but being a so-called cellulosic fibre (cotton family) it will be naturally biodegradable.

Bamboo is yet another cellulosic fibre, again rapid growing, with rather stiff woody fibres. Claims are made that bamboo is antimicrobial but unfortunately a lot of the bamboo clothing in the market contains fibre that has been processed by the so-called rayon process in order to give fabrics that are suitable for intimate apparel. The rayon process is probably the most environmentally polluting fibre production method, producing large quantities of sulphur and alkali. After the rayon process the bamboo is indistinguishable from the usual rayon based on wood from managed forests, with any antimicrobial properties lost in this conversion process. Rayon again retains its biodegradable properties.

Naturally occurring antimicrobials for textile application are few and far between. Natural does not necessarily mean safe and suitable for purpose. The only two I can think of would be product based on either Chitosan–but this has some technical drawbacks for the textile mill–or silver-based products. The use of a suitable antimicrobial for odour control can bring benefits to the environment by reducing washing frequency, use of lower wash temperatures, and the knock-on of both of these is that garments can also last longer.



Close-up. The amount of silver on correctly treated textiles will cause no harm to the skin.

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All textile antimicrobial finishes, either natural or synthetic, are controlled by any number of authorities such as the Biocides Directive in Europe, the EPA and FDA in the US, and globally with independent schemes such as bluesign.



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Q: What about the certification from medical and health agencies versus the testing that is supported with only intent to sell?
Doug Hoschek, author & consultant on technical textiles, US.

A: I think it a little cynical to say that all the test data that can be provided by a reputable supplier to support their product is simply an intent to sell. I would rather view it as the ability to supply extensive product knowledge, safety data, and proof of concept in order to support their sales arguments. The only true proof of an odour control agent is actual use in the field; the laboratory test data simply supports the fact that the product will perform in this arena.

The medical and health care sector cannot be, nor should it be, aligned to the use of antimicrobials for odour control in apparel. Antimicrobials should never be viewed as first line of defence in this sector, they cannot replace good hygiene and management practice. Having said this I do believe they have a place in improving patients' quality of life during their hospital stay. Many trials are being conducted with suppliers of hospital bed linen that have shown that the judicious use of an antimicrobial can help break the transmission path of bacterial infections. Reduction of urine odour in homes for the elderly has also been reported.

One of the major reasons for there not being much certification from the healthcare sector, is that the textile product changes from being a textile article with certain positive attributes of odour control to that of a medical device.

Q: Is the inclusion of silver detrimental because of the potential for skin ingestion.
Alex, Switzerland.

A: There is no evidence to show that silver can pass through the human skin. Any silver ingested by mouth or through an open wound is disposed of by the body through the usual routes. Silver is used in hospitals to treat open wounds, especially burns, where modern synthetic antibiotics have no effect. The amount of silver present on a correctly treated textile, will not cause any damage to the skin.

Next time
In the March-April issue of *WSA*, an expert will answer questions on the subject of **seamless technology**. All readers are welcome to send questions in. Please write to asktheexpert@sportstextiles.com.



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