Top
Mary Bowman

Centre left
Susan Mulsman

Centre right
Alan Fogarty

Bottom left
Jan Tribizan

Bottom right
Iain MacDonald

Those taking part were

Mary Bowman
partner, Gustafson Porter

Theresa Dowling
chair and FX editor

Alan Fogarty
sustainability partner, Cundall Engineering

Jane Lawrence design consultant, Knight Dragon

Iain MacDonald
director, Scott Brownrigg

Dr Susan Mossman
senior exhibition manager, The Science Museum

Justin Nicholls founding partner, Fathom Architects

Joe Perry director, global marketing, Universal Fibers

Cherril Scheer
director USA Associates 3D

Jan Tribizan
associate, Squire and Partners

Sean Weston
director, ASTUDIO

ANYONE WORKING IN interior design will be all too aware that 'going back to nature' is an integral part of the current trend landscape, but in most cases this is trifling decoration. FX got together with some of the best brains to discuss the implications and ramifications of biomimicry in our industry.

Firstly the panel tackled some of the broader context of why it's important. Sean Weston, director at architecture firm Astudio, said: 'As an architecture practice we've considered what we want to do and how we want to go about doing it. We've embedded research and development into everything we do.

'In the late Sixties, American architect and author Buckminster Fuller described planet Earth as a spaceship. If you're on a spaceship, you've got to be self-sufficient, with everything onboard that you need to survive. That's exactly what we have on Earth, and if we don't look after it then we'll ultimately disappear.'

He added that initiatives such as the Kyoto Protocol underline a wider awareness of the importance of these issues today and a willingness to meet tough targets for reducing carbon emissions in the long term: 'Biomimicry is one of those things that is going to help us achieve this.' It was also commented that by studying nature's behaviour, there is no telling what significant impact developments could have on interior projects, architecture, engineering and product design.

Perhaps one of the most successful nature-inspired inventions is the ubiquitous Velcro, a material patented by Swiss engineer George de Mestral in 1955 after he removed burrs from his dog and decided to take a closer look at how they worked. The small hooks found at the end of the burr needles inspired him to create the now universally used product.

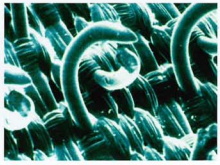
Justin Nicholls, founding partner at Fathom Architects, suggested that taking such direct inspiration from nature could become an even bigger part of the design process as technology develops: 'Unlike in previous years, today some of the more complex shapes presented by nature are relatively easy to make using 3D printing, for example. It raises the question of whether we should consider going back to nature now that there are potentially no manufacturing boundaries and it is much more possible to achieve.'

Jan Tvbizan, associate at Squire and Partners, said: 'This is a very valid point and I connect with it at a personal and professional level. When you are considering biomimicry as a form of art or a form of tech, you often find that the source of inspiration that you draw from nature leads you into pure aesthetics on one extreme, or a functional solution on the other. Is something that combines the two the holy grail of analysing and speaking biomimicry?'

Iain MacDonald, director at Scott Brownrigg, suggested that architects and designers need to keep biomimicry in some sort of broader context as a source of ideas for extracting function rather than something to aim for as an ultimate solution: 'It's a step in the right direction, but not necessarily the end game.'

Jane Lawrence, design consultant at Knight Dragon, suggested that a change of mindset is what's required: 'It's interesting that we tend not to start out thinking about nature. Instead, the starting point has often been the Industrial Revolution and straight lines rather than other more organic forms. It's only now that we're starting to think about the ways that nature has been doing things so well for millions of years. It may well be that ›

Perhaps one of the most successful example of biomimicry invention, Velcro was patented by Swiss engineer George de Mestral in 1955 after he removed burrs from his dog's coat and decided to take a closer look at how they worked. The small hooks found at the end of the burr needles inspired him to create the now universally-used hook and loop product



biomimicry is just a step in the process, but as it stands we haven't really explored it yet.'

Alan Fogarty, sustainability partner at Cundall Engineering, added: 'We have nature integrated into buildings in the form of just having plants there but we don't really do very much with them. We know people like them and that it makes them feel better having them there, but now we're starting to realise that the bond between people and plants is actually really important and that it can change the way people perform and behave in those buildings.

'It's strange that as engineers we understand that plants create oxygen and remove carbon dioxide from these environments and yet we don't really use this process effectively in buildings. Why don't we have better integration in buildings?'

But FX editorial director Theresa Dowling asked the panel whether there was not an element of serendipity about the biomimicry discoveries so far; a sense that some of nature's most clever physical and functional properties are being discovered more by chance than anything else.

Jane Lawrence said: 'I think it's quite amazing that we have not thought more about nature. It's one thing to stop and ask the question "how would nature do it?" but that's not the way that architects and designers have thought before, so up to now biomimicry has really been quite ad hoc.'

Dr Susan Mossman, senior exhibition manager at the Science Museum, said: 'There have been whole departments at the University of Bath and the University of Reading dedicated to such research. For example, they've had research students studying the florescent qualities of butterfly wings and considering how a similarly iridescent surface could have an architectural application, for example. There are other examples too that have moved even further along, such as in aeronautics, the wing rib of the Airbus a380 which is based on the structure of an eagle's wing. So people are looking at nature and actively researching ways in which natural properties can be harnessed in other ways.' Sean Weston, director at AStudio, said: 'Academia is perhaps leading the way with this, and so maybe it's something other industries, such as ours, should be linking into?'

> 'Somewhere there needs to be a driver for all of this. If there's a passion for biomimicry and for all these smart ideas, somehow and someplace there needs to be value, and there needs to be demand for this type of thinking'
> **Joe Parry**

A LEAP OF FAITH

So what will be required to take biomimicry development on to the next phase? Is the onus on manufacturers to get on board with some of the research being undertaken? Susan Mossman said: 'Unfortunately, it's not always the one who has the idea that also has the entrepreneurship to take it forward. There are some isolated cases where people have talents in both fields. Quite often though the academics will have the dream but will need to find the people in industry to make it happen.'

Alan Fogarty added: 'It's a question of funding, as much as anything. Being able ›

Squire and Partners used extensive planting at its National Library project in Ljubljana, Slovenia

The term 'Biomimicry' was brought into wider use by biologist and author Janine Benyus as the title of her 1997 book, Biomimicry: Innovation Inspired by Nature. Co-founder of the Biomimicry Institute, she identified what she believed to be a need to strive for a systematic way of capturing nature's creativity. Benyus said: 'Learning about the natural world is one thing. Learning from the natural world – that's the switch. That's the profound switch.'

Top left
Theresa Dowling

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Sean Weston

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Katrin Nicholls

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Joe Parry

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Jane Lawrence

to get a new idea and bring it to fruition often requires quite a lot of capital investment.'

Iain Macdonald pointed out that it is important to also look at things from the other perspective – not just what it is possible to create and then find an application for that, but to identify the business need and create a solution for that specific requirement.

An example of an emerging material that generates its fair share of science and engineering excitement is graphene, a structure consisting of a thin layer of pure carbon. Its attributes are considerable. According to the University of Manchester, it is ultra-light yet immensely tough. 200 times stronger than steel, it is still extremely flexible, being the thinnest material possible according to academics. Its potential use is being touted for all sorts of functions, from developing water purification technology, to energy storage and wearable technology.

But 'potential use' is still the operative phrase. Susan Mossman said: 'Right now, it's a material without application. There are great hopes for it to have far-reaching and very broad uses, but the challenge is how to convey that and enable people to grasp the potential significance it may have in the future. Will it actually fulfil its potential? Lots of new materials are put forward as the next big thing, but the difficulty for investors is in understanding which will truly go on to have a big impact.'

Alan Fogarty added: 'Around 75 per cent of the patents that have been taken out on graphene have been in China and other parts of the world even though as a material it was invented in Manchester. Maybe the UK has just been really slow off the mark in terms of getting out there and using it.'

Justin Nicholls, of Fathom Architects, agrees that the slow pace of adoption – and a reluctance to share information that is potentially commercially sensitive – can hinder: 'We have been talking to a company about the production of transparent photovoltaics that can be sandwiched between two sheets of glass to create energy. They came to us about four years ago and managed to get their research funding, and have been working on proof of concept, all before going into manufacturing.

'First of all, they didn't know who they should be trying to sell this to – should they go to automotive, architectural construction? – even though this is really a far more 'obvious' product with clear benefits than an altogether concept such as graphene. Even so, it's taken more than five years to get a product like this from idea to even small-scale production.'

THE ENVIRONMENTAL DRIVER

Jane Lawrence said: 'Most of the argument around biomimicry seems to be around "saving the planet". It suggests that we as architects, designers or engineers can only really develop this if there is a real appetite to embrace this environmental angle.'Sean Weston of ASTUDIO added that there is a cost to embracing such innovation but said: 'We've taken the decision to take this approach and are prepared to take some of our profit to reinvest in this way.'

Jan Trbizan countered: 'By way of devil's advocate, if we have the positions of aesthetic sympathy and functional sympathy plus the academic angle, we can gain from biometics. But perhaps the reason we should be implementing it more is not so much because we want to save the planet, but because we want to improve the construction industry, to capitalise on the lessons we're learning, and to optimise the building processes. ›

Among the projects by landscape architecture practice Gustafson Porter that have brought natural properties into the core function of a development is Marina One Green in Singapore, one of the first developments of its type to integrate soft landscape into the fabric of the building

'What can we do to drive capital into this and ensure that we can create buildings that can embrace and benefit from these ideas? In the past, we have presented revolutionary ideas to clients only for them to turn around and say "great, but what does it cost?" The discussion shouldn't end there – if that client baulks at the cost, we should be looking at how that idea could perhaps be implemented in another project instead, or look at other ways of developing it further.'

Alan Fogarty said: 'A practical example that has been developing for years is looking at how plants can impact on the air quality in buildings. There's lots of information out there to suggest that if you can get the air to go through the roots of plants then you can use the microbes to break down many of the nasty impurities in the air and act as a filter. We wanted to implement this idea into a project so we came up with a winter garden that worked on circulating air using "living walls" on either side. Unfortunately, there are no hard-and-fast guidelines in existence yet on how much living wall you need per cubic metre of air.

'We talked to a UK manufacturer of living walls and explained our idea, but were very protective of their product, so were not keen to share their product drawings with us to work on developing the idea for the project further.

'The upshot was that the living wall got "value engineered" out of the project because we didn't have the specific design information to say "this is the specific area of wall needed for this space". The living wall product is great for growing plants but not so good for getting air through the roots, so we bought one ourselves and are looking at it to develop the idea further, linking with Reading University to test it. Hopefully the end point will be a proper research paper on how these things work.'

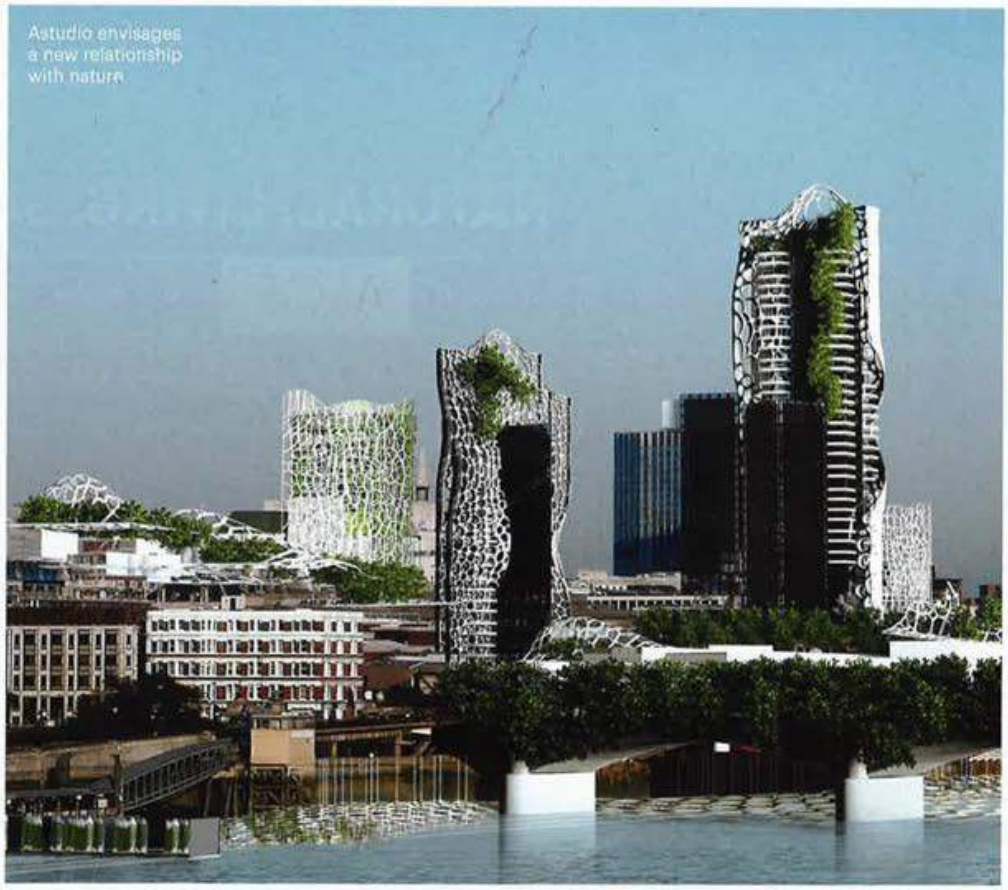
> 'Now we're starting to realise that the bond between people and plants is actually really important and that it can change the way people perform and behave in those buildings.'
> **Alan Forgarty**

BUILDING TRUST

Susan Mossmann suggested that creating strong partnerships and sharing knowledge will be key to future progress: 'It's about building trust and partnerships. It needs an interdisciplinary approach but it will only work if those involved trust each other.' Iain Macdonald added: 'Cross-pollination with other industries is what is needed.'

Justin Nicholls mentioned work currently being undertaken by Siemens to develop 3D ›

Astudio's Bacteria Bioluminescence research with biologist Dr Simon F Park and Brunel University. The research is studying the luminescence of photobacterium phosphoreum with a view to ultimately develop a marketable mood-lighting product



Astudio envisages a new relationship with nature

Cundall Engineering's new offices in the City of London. The practice were unable to source suitable products so it 'invented' new products in-house, turning the office into a 'living lab to test new materials and find out how they behave in controlled circumstances.

DIRK LINDER

spider-like robots capable of building things in a similar style to existing 3D printers, only on a larger scale and with the possibility of being able to work collaboratively to scale up, and find new ways of constructing certain projects.

Jan Trbizan said: 'The computational power that can be used to drive development at this point in time is phenomenal and will only get better over the next year, three years, and beyond. I would love in my lifetime to be able to propose to a client that we will build their project using 3D spider robots, that the materials will have all the heating and other functions embedded, and that it will save you seven per cent on the overall construction package. To an extent, the fact that we're not yet close to this is because of a self-imposed limit – you know that if you go to a client with these ideas today, they'd no-doubt thing you're a bit crazy and politely ask to speak with someone else from the practice instead!'

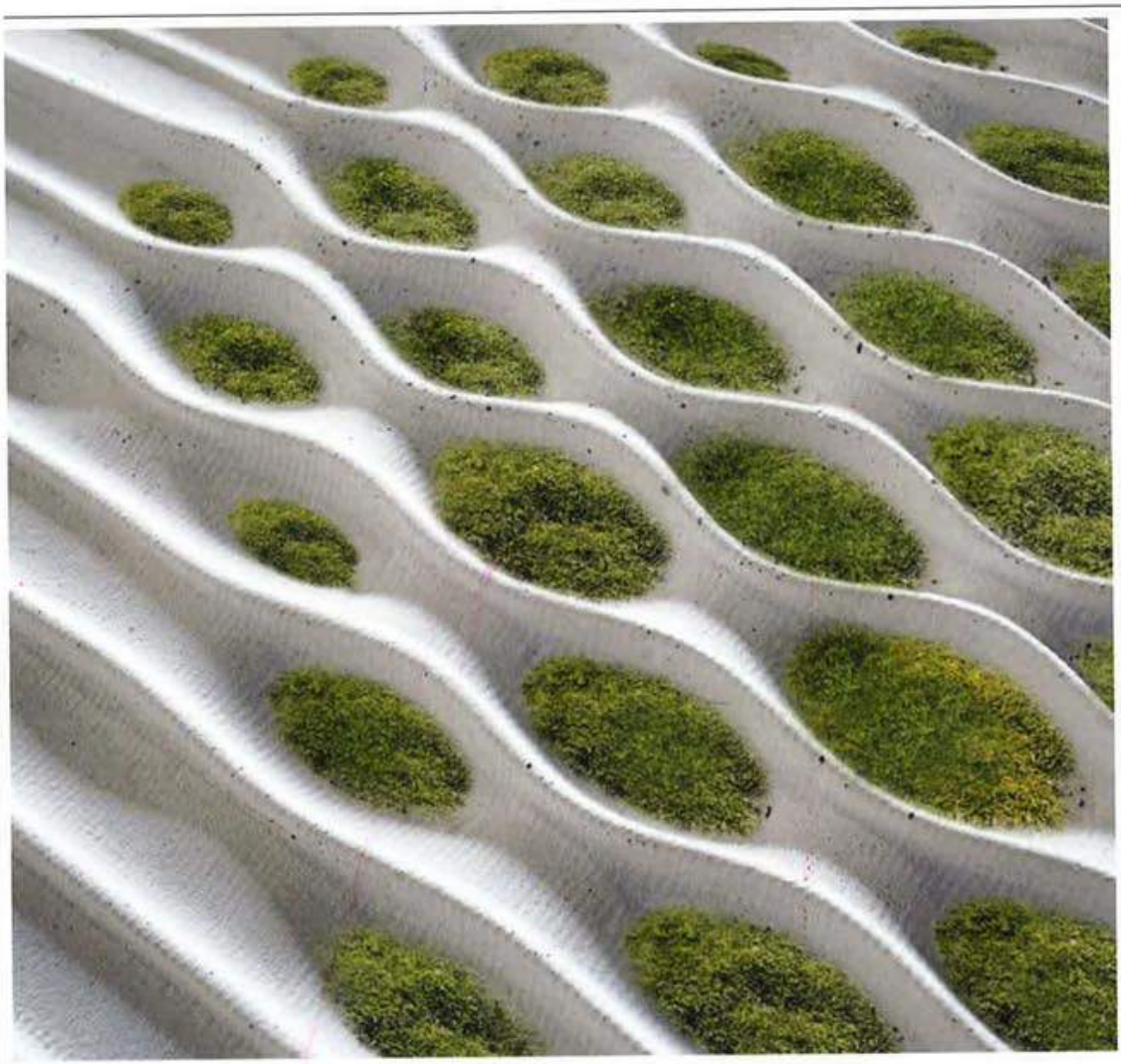
Mary Bowman, partner at Gustafson Porter, asked whether there is a danger of overcomplicating some of the potential benefits that are there to be gained from adopting some of natures attributes: "Everything that we've been talking about – all the technological advancements that are in development – is everyone convinced that this is the way forward? Is the better solution to consider a more low-tech version, which is to work with nature rather than look to develop high-tech versions of it?"

Theresa Dowling mentioned the Nils Torpe's landmark building design for British Airways, Waterside almost 30 years ago in Harmondsworth, West London, as an example of a headline-grabbing building that incorporates some of these simple-yet-effective strategies for integrating nature. The building was completed in June 1998 and includes six sections backing onto a 175m glazed atrium street, each section representing a continent served by British Airways. Each section has a different theme based on the continent, with cherry trees planted in the Asia-themed section, Eucalyptus trees are planted in the Australia-themed section, Birch saplings planted in the Europe section, and Hardwood saplings are planted in the North America-themed section.

Justin Nicholls said: 'I was there the other day actually and noticed that even the floor of the atrium undulates, giving the feeling that you're walking in the countryside and not in some urban office complex. It's a really simple change that has a big impact on the senses.'

Sean Weston added: 'It echo's Mary's really valid point, about whether it should be about complex biomimicry, or whether we should be focusing on using nature better.'

Alan Fogarty suggested: 'Whether this is about technology or going back to nature depends on a number of things, but perhaps the pragmatic question is how do you link nature and money? There is a growing ›



Fathom Architects co-founder Justin Nicholls is passionate about the potential of biomimicry in the architectural sector and believes there is much to be learned from natural materials and forms

realisation that people's health and wellbeing in a building is really important. The most expensive resource for most organisations is its people, so if they are prepared to invest more in rent or fit-out of their business premises in order to create a better working environment for staff then perhaps that's going to be one of the biggest drivers for this kind of research."

Jan Trbizan added that some developers have looked to nature for inspiration on how to help solve the chronic lack of city dwelling space, creating housing for professionals that is pared right back to basics and arranged in a similar honeycomb structure that you might find in a beehive. But, of course, there is a question of demand. Great ideas are one thing, but do people and organisations like what they hear? Joe Parry, director of global marketing for Universal Fibers that sponsored this FX Design Seminar, said: 'Somewhere there needs to be a driver for all of this. If there's a passion for biomimicry and for all these smart ideas, somehow and someplace there needs to be value, and there needs to be demand for this type of thinking.

'Maybe it begins with our clients. The aesthetic qualities are really important, and there's something about nature that we're all drawn too – most of the time subconsciously – whether it's something that feels like water, or living life forms. We can get to the high-tech stuff, and as exciting as that is, it's getting really abstract. But if there's "people demand" for this kind of thinking, it probably comes back to the matter of aesthetics.'

PILOT PROJECTS

Jane Lawrence said: 'I don't think you can just take a subject such as housing and say let's all get our heads together on this in a biometric way to make housing work. I think you need pockets of inspiration, pockets of innovative projects, that all then spark a different way of thinking across the construction industry as a whole once they spot that there are different products out there and a different way of thinking is emerging, although it should be said that there is already a momentum in biomimicry that wasn't there two years ago. Everything is vicarious, nothing is linear in terms of how these things actually happen. You need to have the "geysers" of stuff that someone else then picks up on and feeds into and informs the industry.'

One things for sure, there will be no shortage of future incentives to look to new ideas and solutions for solving the big problems of years to come. Sean Weston said: 'It's the slowly-slowly approach. That's an inevitable part of the process: to do what we need to do in making things better, and to do things in a different way requires a real mind shift.' **FX**

FX would like to thank Squire and Partners for hosting this design seminar at its own-design staff canteen at its King's Cross offices at St Chad's Place, London WC1