alone. Restrictions imposed by specific fabrication processes, whether technological or biological, can be an important factor in shaping a mechanical structure. Such restrictions were not included in Aage and colleagues' study. The architectures of natural materials are also known for their remarkable fracture toughness[7] (a measure of resistance to crack propagation), but this is not yet a commonly used criterion in computational design. Another future challenge will be to enhance the authors' high-resolution framework with capabilities to handle design problems involving, for example, time-dependent behaviour, which requires additional computational effort.

The design of Aage and colleagues' aircraft wing involved 8,000 computer processors used over several days. Few people will have access to such resources in the foreseeable future. Therefore, to enable a wider community to reap the benefits of the authors' work, it is imperative to find ways to more efficiently produce high-resolution designs. For example, the fact that very small structures were seen only in specific areas of the designed wing could allow for adaptive adjustment of resolution, which would reduce computational cost. Nevertheless, the authors' work represents a leap forward in the capabilities of computational design. Without doubt, its unprecedented resolution provides the foundation for further discoveries. ■

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ECOLOGY

A matter of time for tropical diversity

There is a species–diversity gradient on Earth, with the greatest diversity found near the Equator. Analysis of forest data now reveals a mechanism aiding species coexistence in the tropics that might underlie this phenomenon. SEE LETTER P.105

GARY G. MITTELBACH

The tropics teem with a diversity of life that is much richer than elsewhere on the planet. For example, there are 1,175 tree species in half a square kilometre of forest in Borneo, a greater number than the estimated 1,166 tree species in all the temperate forests of Europe, North America and Asia combined[1]. The striking increase in species number moving from the poles to the Equator, known as the latitudinal diversity gradient, is Earth's most striking biodiversity pattern. Yet its underlying causes have mystified biologists for more than a century, leading the ecologist Robert Ricklefs to famously state[2] that this pattern "mocks our ignorance". Usinowicz *et al.*[3] reveal on page 105 how an ecological theory[4,5] that models species coexistence might illuminate the latitudinal diversity gradient of trees.

Understanding this diversity phenomenon requires a grasp of processes that generate biodiversity on large spatial scales, including speciation, extinction and migration, as well as processes that allow multiple species to coexist within a community. Various evolutionary processes might promote higher rates of speciation or lower rates of extinction in tropical rather than temperate environments[6], thereby generating greater regional diversity in the tropics over evolutionary time. But how is this diversity maintained locally within a given forest? Usinowicz and colleagues show that species coexistence is promoted in tropical forests because species there have greater negative effects (through processes such as competition) on members of their own species than they do on members of other species.

"The coexistence of tree species may be enhanced at lower latitudes because of stronger intraspecific competition at the seedling stage."

Usinowicz *et al.* assembled a multi-year data set of annual seed production and seedling survival (an estimate of the annual 'recruitment' to a species' population) for well-sampled tree species in ten forests distributed from near the Equator to a latitude of 65° N in Alaska.

50 Years Ago

The British preoccupation with the need to persuade young people into science and engineering, but particularly the latter, was continued last week by the Research and Development Society … Adults, at least, are prepared to take the subject seriously … the British educational system is designed to produce "cultured gentlemen", with the result that trained scientists consider that collaboration is a kind of cheating, that engineering is inferior and that the profit motive is even worse. Yet teamwork, technology and business sense are essential for the survival of the British economy. But what if you cannot even bring the horse to the water, let alone persuade him to drink properly? … One of these days something may be done about it.
From *Nature* 7 October 1967

100 Years Ago

I have spent a good many hours lately in a Devonshire garden in which there was a border of massed mauve asters which was a great attraction to butterflies … The object of my letter is to describe to your readers two "scraps" which I witnessed between tortoiseshell butterflies and wasps, in each of which the butterfly was victorious … The butterfly sprang on to the back of the wasp, the head of each being towards the tail of the other, and a furious rough-and-tumble took place some 6 ft. from the ground. The wasp was unable to use its sting, as the butterfly was on its back, and at the end of perhaps five seconds the butterfly, which had been buffeting the wasp with its wings, dropped to within a foot of the grass, relaxed the hold which it had exerted, and allowed its enemy to drop breathless and beaten on to the lawn. Nature had taught the butterfly to adopt the same tactics … which enabled G. Carpentier to win his fight with Bombardier Wells.
From *Nature* 4 October 1917