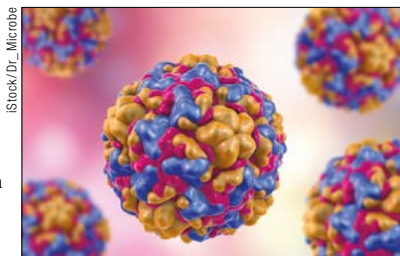


# Sciencewatch

COMPILED BY JOHN SWAIN, NORTHEASTERN UNIVERSITY

## Compound blocks rhinoviruses

Rhinoviruses (RVs), far from being just a seasonal nuisance causing common colds, can also lead to serious complications in conditions such as asthma and cystic fibrosis. The huge diversity of RVs precludes the development of a broad-spectrum vaccine, so new ideas are needed to tackle them. Working on human cells *in vitro*, Aurélie Mousnier from Imperial College London and colleagues have shown that a new chemical compound dubbed IMP-1088, which inhibits human proteins



iStock/Dr. Microbe

*A new chemical compound can block the viruses that cause the common cold.*

called NMTs, can prevent RV replication without being toxic to cells. At the nanomolar level, it is effective against multiple RV strains, poliovirus and foot-and-mouth disease, and protects cells from virus-induced killing.

### ● Further reading

A Mousnier *et al.* 2018 *Nat. Chem.* **10** 599.

## Quantum computing a nucleus

Quantum computing, which exploits quantum phenomena such as entanglement and superposition, is rapidly gaining ground. Now, Eugene Dumitrescu from Oak Ridge National Laboratory in Tennessee and colleagues have used quantum machines to calculate the binding energy of the deuteron to a few percent. The researchers used only publicly available software and two quantum processors accessed via cloud servers: IBM Q Experience and Rigetti 19Q. While the computation is relatively straightforward, involving a simple Hamiltonian, it clearly shows an interesting future for practical quantum computing with public software and cloud-based services.

### ● Further reading

E F Dumitrescu *et al.* 2018 *Phys. Rev. Lett.* **120** 210501.

## The slipperiness of ice

Conventional thinking has it that ice is slippery due to a thin film of liquid water created by actual melting or the pressure of objects such as skate blades. Using molecular dynamics simulations of the ice–air interface, Bart Weber of the University of Amsterdam and colleagues have now shown that the truth below freezing is a bit subtler. It appears that over the fairly limited subzero temperatures typical for skating, weakly hydrogen-bonded surface molecules diffuse over the surface in a rolling motion, their number and mobility increasing with increasing temperature. This effect indicates that the slipperiness of ice arises from the high mobility of the surface molecules rather than genuine melting.

### ● Further reading

B Weber *et al.* 2018 *J. Phys. Chem. Lett.* **9** 2838.

## Fish schooling revisited

The collective dynamics of fish schooling has traditionally been approached using simple behavioural rules, with little consideration of the flow of water induced by the fish. Audrey Filella of Aix-Marseille University in France and colleagues have now used computer simulations to show that fish in a school may use far-field fluid effects in interesting and nontrivial ways. Including such effects in the simulations leads to several outcomes, including fish swimming faster, a reduction in the energy needed to swim, and the emergence of a new “turning phase” in which fish turn together aided by the flow.

### ● Further reading

A Filella *et al.* 2018 *Phys. Rev. Lett.* **120** 198101.



*A study of fish schooling shows that fluid effects influence properties like swimming speed. (Credit: iStock/Tammy616.)*

## Long-lived biohybrid robot

Biohybrid robots, which are based on heart or skeletal muscle tissue formed on flexible substrates, have suffered from poor agility and durability owing to tissue shrinkage

and loss of function. Now, taking a cue from actual organisms, Yuya Morimoto of the University of Tokyo and colleagues have developed an “antagonistic” pair of skeletal muscle tissues, with one contracting and the other expanding, to make a biohybrid robot that overcomes these drawbacks. The device achieves about 90° of rotation of a joint through selective contractions of the tissues, and a lifetime of approximately a week, by balancing the tensions of the tissues to reduce tissue shrinkage. It can pick-and-place objects, and may lead to more life-like robots.

### ● Further reading

Y Morimoto *et al.* 2018 *Sci. Robot.* **3** eaat4440.

## Neural network speedup

Artificial neural networks may get a huge boost from analogue memory. Much of the time and energy that goes into training such networks is due to the need to transfer weight data between conventional digital memory and processors. Stefano Ambrogio of IBM Research–Almaden in San Jose, California, and colleagues have now demonstrated a fast and energy-efficient artificial neural network based on a type of analogue memory called phase-change memory, showing that it is as accurate as those based on digital memories. The network has an energy efficiency of 28,065 billion operations per second per watt and a throughput per area of 3.6 trillion operations per second per square millimetre. These values are two orders of magnitude better than those obtained using today's GPU memories.

### ● Further reading

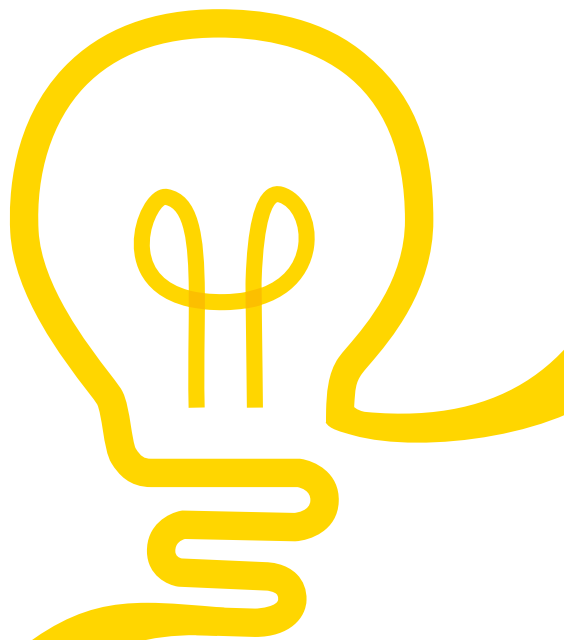
S Ambrogio *et al.* 2018 *Nature* **558** 60.



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