fluoresced, or to swim or release chemicals to communicate with nearby cells.

The system could be useful one day for the design of biohybrid devices such as biosensors, the authors say.
Nature Commun. 8, **14030 (2017)**

CANCER

Chromosome total affects therapy

The immune system is less likely to attack tumours that have an abnormal number of chromosomes, which could be one reason why cancer immunotherapies work well in only a fraction of people.

Many types of tumour have too many or too few chromosomes — a condition called aneuploidy. Stephen Elledge at Harvard Medical School in Boston, Massachusetts, and his colleagues looked into whether abnormal numbers of chromosomes and chromosome fragments can predict response to drugs called checkpoint inhibitors, which can unleash an immune response against cancer.

A search through genome sequences from more than 5,000 human tumours representing 12 cancer types showed that those with a high degree of aneuploidy tended to contain fewer immune cells. Data from two clinical trials also showed that people with melanoma were less likely to respond to checkpoint inhibitors if their tumours had higher levels of aneuploidy.
Science 355, **eaaf8399 (2017)**

ANIMAL BEHAVIOUR

How ants navigate backwards

Ants can find their way home even when forced to walk backwards while carrying food, showing that they are capable of complex navigational behaviour.

Ants of many species walk forwards when carrying small items of food, but move backwards to drag larger items behind them. Antoine Wystrach at the University of Paul Sabatier in Toulouse, France, and his colleagues studied this behaviour in the desert ant *Cataglyphis velox*. During field experiments, forward-walking ants adjusted their course as they moved by recognizing the view of the surrounding scenery, but backward-walking ants did not. Instead, about one-third of these ants made occasional stops to peek forward, then corrected their direction on the basis of visual information. The ants were able to translate their forward view into an internal compass bearing, and maintain this direction in any body orientation.

This complex and flexible behaviour may require communication between at least two regions of the ant brain, the authors suggest.
Curr. Biol. **http://doi.org/bxj6 (2017)**

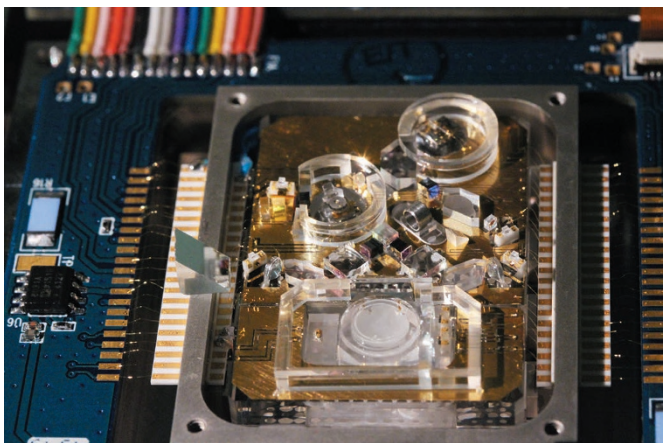
OPTICS

Mini light gyroscope made

The smallest optical gyroscope yet made fits onto a computer chip (**pictured**).

Optical gyroscopes are widely used in vehicle navigation. They use laser beams in a fibre-optic loop, and the beams produce interference when the device's orientation changes. Optical devices are more accurate than their mechanical counterparts, but are hard to miniaturize. Andrey Matsko and his colleagues at OEwaves in Pasadena, California, have made one with a volume of just 15 cubic centimetres. Instead of producing interference in a large fibre-optic loop, the light resonates inside a minuscule crystalline cavity. The gyroscope drifts by only three degrees per hour, an order of magnitude better than previous efforts.

Future versions could be used on small moving devices such as robots or drones.
Optica 4, **114–117 (2017)**



W. LIANG *ET AL./ OPTICA*

EVOLUTION

Warming may shift mate choices

Warming of the spring breeding season may have reversed the direction of natural selection in a bird species.

Male collared flycatchers (*Ficedula albicollis*; **pictured**) have a conspicuous white patch on their foreheads and females tend to mate with those with larger patches. Simon Evans and Lars Gustafsson at Uppsala University in Sweden measured the forehead patches of males breeding in nest boxes on Gotland, an island in the Baltic Sea, from 1981 to 2014.

They found that patch size declined notably during the 34-year study. Statistical models showed that selection switched from favouring

JOHAN TRÄFF/S. R. EVANS *ET AL./ NATURE ECOL. EVOL.*

larger patches to smaller ones during the 1990s. This reversal coincided with a 1.5 °C rise in average temperatures during the spring breeding season over the course of the study.

The males may be trading off their ornamentation against other traits that improve survival in a changing climate, the authors suggest.
Nature Ecol. Evol. 1, **0039 (2017)**

ASTROPHYSICS

Odd dwarf star is a pulsar

Strongly magnetized stars that shoot beams of radiation from their poles, called pulsars, have previously always been identified as dense neutron stars. But researchers now report the discovery of a pulsar that is a white dwarf — the spent remnant of a star like the Sun.

In 2016, astronomers reported that AR Scorpii is not a single star, as they had thought, but comprises two stars orbiting each other: a red dwarf and a larger white dwarf. David Buckley of the South African Astronomical Observatory in Cape Town and his collaborators have since measured the polarization of the light from the system and showed that it is produced by focused beams similar to those of pulsars. It is not clear why such systems seem to be so rare, Buckley says.
Nature Astron. 1, **0029 (2017)**