

Prime Meridian

(74) July 17, 2017



A Small Tortoiseshell (*Aglais urticae*) perches on a stinging nettle beside a field gate at Ash, Kent. May 21 2017.

According to UK Butterflies “*this butterfly has suffered a worrying decline, especially in the south, over the last few years.*” The cause is uncertain, but a warming climate may be encouraging the parasitic fly *Sturmia bella*. Its macabre stratagem is to lay its eggs on the same plants and its larvae enter and feed inside the bodies of the caterpillars. They leave vital organs intact, but death is inevitable. From the fields at Ash however, there is good news this summer: *A. urticae* was flourishing in profusion.

Frontiers of Survival - a series of free public talks

Why forests are so important in understanding the Earth, why we are looking for other forested planets and moons and what you can do to protect the woodlands on your doorstep.

The search for life beyond the Earth has focussed on two main areas. On the one hand, astrobiologists have focussed much of their attention on the environmental requirements for the hardiest organisms that we know on Earth and on the other, detecting radio signals emitted by other technological civilisations in our Galaxy.

The Ecospheres Project has launched an initiative to explore the intermediate ground, namely the requirements for planetary-scale ecosystems supporting complex life. In these talks, we explain why the habitability of the present day Earth for complex life cannot be discussed in meaningful terms without reference to forests. Forests modify the planetary environment in significant ways, they are where our primate ancestors evolved, and today, our civilisation remains closely dependent upon trees and forest products.

The series concludes with three special presentations. On September 14, 2017 Dr Laurance R. Doyle of the SETI Institute and NASA Kepler science team, one of the principal collaborators in the Ecospheres Project, will look at how forests may be the first life detected beyond the Earth. On September 21, wildlife experts will explain how you can contribute to safeguarding ecology in South London.

The search for other civilisations, we argue, should be pursued hand-in-hand with the search for the equivalent of Earth's highly productive and biodiverse forest biomes. Foreseeable advances could bring forested regions on the surfaces of terrestrial planets orbiting other stars within the ambit of observational technology. Forests are potentially a major focus of interest for the next generation of astrobiologists.

All welcome. No previous knowledge required.

When: August 3 to September 21, 2017. 7:30-9:30 pm.

**Where: London, UK. The Lodge, National Sports Centre,
Crystal Palace Park, SE19.**

Prime Meridian

This newsletter is published by the Ecospheres Project, a trans-Atlantic research and media collaboration. Prime Meridian follows global environmental issues alongside the cycle of the seasons in South East England. It steps back to look at the Earth in its astronomical context and it pursues the search for other habitable worlds.

Editor: Martin Heath.

Editorial assistance: Penelope Stanford & Laurance Doyle.

email: prime-meridian01@hotmail.com

Website: www.ecospheresproject.org

Prime Meridian is a not-for-profit publication. This newsletter may be copied and distributed freely by any organisation engaged in raising awareness of environmental issues or for general educational purposes. Our thanks to Dave Clark, Daniel Greenwood, Sam Bentley-Toon, Vinnie O'Connell, Helen O'Connell, Laura Elworthy & Angus Swanson for valuable assistance. Images in Prime Meridian are from M.J. Heath unless otherwise specified.

© M. J. Heath

Seasons in South East England May, 2017



Above: A rainbow after the rain for the first of May, 2017. Looking across the fields at Ash, Kent.

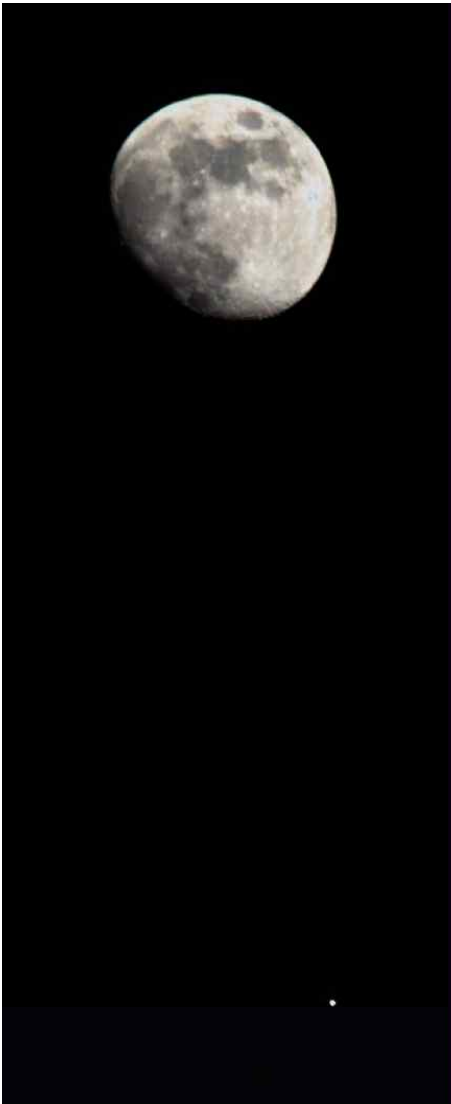
A warm May, despite average sunshine and a quarter more rain than normal.

With a UK mean temperature of 12.1°C (1.7°C above the 1981-2010 average) this was the UK's second warmest May in a record beginning in 1910 (2008 was warmest). England, also 1.7°C above its mean, saw its third warmest May. Meanwhile, the warmest part of the UK was East Anglia at 18.4°C (1.8°C above the mean). The Met Office region England SE and Central S was close behind at 18.2°C. This, however, was only 1.5°C above its mean.

May began with southern areas receiving showers from a weakening low pressure area. The Met Office reported: *"the first third of the month was settled with mainly easterly winds, warm and sunny in the north-west but often cool and cloudy in the south-east . . . "The second half was more changeable but mostly warm."*

Left: May 1, 2017. Sunshine hits greening hedgerows against a background of dark rain clouds. Ash, Kent. Bluebells were still flowering in the churchyard of St Peter and St Paul, Ash. A snail brought out by the rain glided over a damp path at New Ash Green.





Above: Rain clouds loom above a field of flowering oil seed beside Green Street Green Road, Kent. May 1, 2017.

The UK's coldest temperature for May (-5.1°C) was felt at Shap in Cumbria (NW England) on May 9. At Heathrow, in SE England, the temperature on that day never fell quite as low as plus 6°C . Heathrow's coldest temperature for the month, of around plus 5°C , was recorded on May 10.

Left: A gibbous Moon passes the bright planet Jupiter on May 7, 2017. On this occasion, the gas giant world lay at a distance of less than 4.6 AU from our planet (Astronomical Unit = the mean Earth-Sun distance of 149,597,870.700 km).



Left: Forget-me-nots (*Myosotis*) flower among the tombs in the churchyard of St Peter and St Paul, at Ash, Kent. May 6.

Below left: Holly (*Ilex aquifolium*) is perhaps best known for its bright red berries, which are traditionally associated with Christmas decorations. The flowers of holly are less well known. They are *dioecious*, with male and female flowers on different trees. The flowers shown here are male and have a dark centre, unlike the female flowers which have a green dome at their centre (destined to become the berry). Ash, Kent. May 6, 2017. Below right: Looking over Sydenham Hill Wood, South London, towards Canary Wharf. May 5.





Above: May 1 at New Ash Green, Kent. Rowan (*Sorbus aucuparia*) left and (right) a wayfaring tree (*Viburnum lantana*), whose floral display was now past its best. Right: A green wheat field at Ash, Kent on May 4, 2017,

A variety of galls are popularly described as oak apples. The UK Safari web site explains: “*They are home to the larvae of the oak apple gall wasp (Biorhiza pallida). The female lays her eggs in the leaf bud causing the oak tree to produce this apple-like growth . . . inside there are around thirty chambers each containing one wasp larvae.*” An Oak Apple Day (which was a former public holiday) on May 29, celebrated the restoration of Charles II (May, 1660). May 4, 2017, near Ash, Kent.

Below (from left): A brimstone butterfly (*Gonepteryx rhamni*) rests well camouflaged among ivy leaves along a hedgerow near West Kingsdown, Kent. May 5. A red admiral (*Vanessa atalanta*) settled on the white flowers of hawthorn (May 1, Ash, Kent). Bluebells (the display was early this year) were flowering in profusion on the floor of Saxten's & Cage's Wood, Kent. May 5.

Mid-month saw major rainfall. The Met Office reported: “*Very localised, temporary flooding and lightning impacts were reported, mainly across south and south-east England, during Wednesday 17th to Friday 19th.*” With about 33 mm each, May 16 and 17 were by far the rainiest days at Heathrow. May 18 saw about 9 mm.





Above: the Full Moon rises on May 10, partly concealed by layers of cloud that are catching the pink after-glow of sunset. Ash, Kent. Holly blue (*Celastrina argiolus* ssp. *britannica*) alighted on cow parsley (*Anthriscus sylvestris*) fringing a hedgerow at Ash, Kent. May 11.



Left: The flowers of blackthorn that had earlier brightened the hedgerows had ended their season, but the white flowers of common hawthorn (*Crataegus monogyna*) had taken over in dense displays.

Below: Catkins were hanging from oak trees. May 11, 2017. *Centaurea montana* (perennial cornflower; montane knapweed) flowers in the churchyard of St Peter and St Paul, Ash, Kent.

Monthly means for SE and central S England. Max. temp.: 18.2°C (1.5°C); min. temp.: 8.8°C (1.5°C). Hours of sunshine: 199.3 (99%). Rain: 69.2 mm (127%). Anomalies re. 1981-2010 norm in brackets. Date obtained from Met Office on-line monthly reports. Heathrow data from WeatherOnline.





Above: A wheat field at Ash, Kent. May 14, 2017.

Left: A flower spike of an early purple orchid (*Orchis mascula*) in a narrow, previously coppiced wood near Ash, Kent. May 14.

Right: Horse grazes in a buttercup-strewn meadow May 11, 2017.

Below: Newly-hatched garden spiders (*Araneus diadematus*) on the upper surface of a bramble leaf. Ecology area of Belair Park, South London. May 18.





Rainy weather on May 18. Above a gosling of the introduced Canada goose species (*Branta canadensis*) swims through falling rain on the lake at Belair Park, South London. Rain droplets on the leaves of yellow flag (*Iris pseudacorus*) in the ecology area at Belair Park. Left: Traffic makes its way through rain-drenched roads in NE Kent. Below: A mistle-thrush (*Turdus viscivorus*) seizes a worm from the rain-dampened soil beside a flower bed and makes off with it. Belair Park.



Following the wet spell, the later part of the month enjoyed a decidedly hot spell. This occurred between May 23 and 26 and on the latter date, the UK's highest temperature for the month (29.4°C) was noted, not, as is often the case, in our region, but far to the north, in Scotland, at Lossiemouth in Morayshire. SE England may not have set record, but May 26 was also Heathrow's warmest day, at around 28°C.

The days of hot weather were followed by thunderstorms in the UK from May 27 to May 29.





Above: May 21, 2017. After the rains, a blue sky filled with cumulus was mirrored in a large puddle on the hills above Ash, Kent. The Small White butterfly (*Pieris rapa*) is a very common butterfly, whose UK population includes both residents and migrants from Europe. It is one of the two butterflies commonly called “cabbage whites,” the Large White (*Pieris brassicae*), whose impact on agriculture is greater, is the other.

Right: As the tree canopy closes, the spring flower season comes to an end on the woodland floor. On May 21, The leaves of wood anemones were turning yellow, while the spear-shaped leaves of dog's mercury (*Mercurialis perennis*) remain green throughout the summer. It is indeed a flowering plant of the woodland floor, but it possesses only very small green flowers (male and female flowers occur on different plants) and these do not create the visual impact of bluebells, anemones, lesser celandine or primroses. May 22 concluded with a spectacular sunset at Ash in Kent.

Below: Along a hedgerow dividing fields near West Kingsdown, roses were in full flower on May 22 and elder (*Sambucus nigra*) flowers were opening in force on May 24.





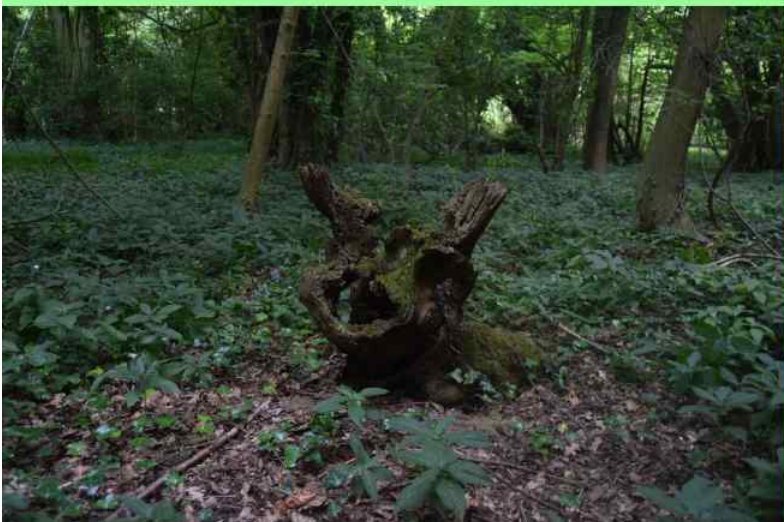
Above: Bumble bee approaches flowers of comfrey (*Symphytum officinale*). May 28, 2017. In the evening of May 28, a crescent Moon displayed a ragged line between light and darkness (stark on our airless natural satellite). The dark side of the Moon was lit faintly, but perceptibly, by sunlight reflected from the Earth.



Left: Caterpillars of the small tortoiseshell butterfly (*Aglais urticae*), whose Latin name reflects its association with stinging nettles (*Urtica dioica*) sprawl across the nettle patch where their eggs were laid. May 28. This picture was taken along the eastern side of a lengthy hedgerow near Ash in Kent, where small tortoiseshells were so abundant in the weeks that followed that it was impossible to take a walk without seeing numerous specimens on the wing or alighting and rising up from plants or the path ahead. It was good to see no sign of the “worrying decline” noted by UK Butterflies.



Looking across the valley at West Kingsdown, on the final day of May, trees are seen to be in full leaf and the woodland canopy closed. The views below were taken in woodland near West Kingsdown (left) and near Ash, Kent (right) on May 31.

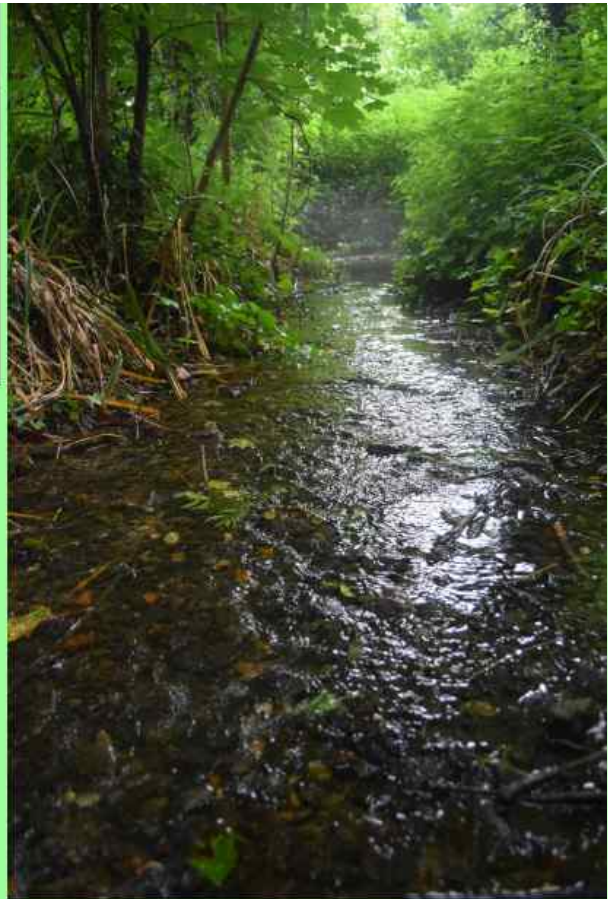




Above: A lightning flash splits the sky over New Ash Green Kent. Early hours of May 29, 2017.

According to the Met Office: *“heavy rain and lightning mainly affected southeast England during the morning of the 29th. Kent Fire and Rescue Services reported a house roof fire following a lightning strike near Maidstone, with a number of other reports of lightning strikes on buildings. Localised road and rail flooding was also reported.”* Modest rainfall of 4 mm was received at Heathrow on May 28, but 8 mm on May 29.

Right: A small, but rain-swollen stream at West Malling, May 29.



On the final day of May, 2017, dark clouds loomed behind sunlit buildings in this view across South London to the Canary Wharf area beside the River Thames.

Below: A tangle of roses, clematis and wayfaring tree in a hedgerow near West Kingsdown, Kent. May 31, 2017.



Global climate: May 2017 was the third warmest May on record.

Once again, monthly temperatures have come out near the top of the 138 year historical record, providing further evidence for the well-established long-term warming trend. The USA's National Oceanic and Atmospheric Administration has reported that the global temperature was 0.83°C higher than the 20th Century mean of 14.8°C. The anomalies for 2015 and 2016 were 0.86°C and 0.89°C respectively. All the anomalies quoted below are positive.

Globally, the oceans were $0.71 \pm 0.14^\circ\text{C}$ above the mean (3rd with 2016 as warmest) and land areas ($1.15 \pm 0.12^\circ\text{C}$), the 7th warmest on record (2012 was the warmest). In the Northern Hemisphere, the combined mean temperature for land and ocean was $0.91 \pm 0.14^\circ\text{C}$ above the mean, the 3rd highest on record with 2015 as warmest. The oceans were $0.76 \pm 0.14^\circ\text{C}$ above the norm (3rd warmest, with 2015 and 2016 as joint warmest), while the land ($1.15 \pm 0.11^\circ\text{C}$) above the mean, was its 8th warmest (2012 was warmest). In the S. Hemisphere, the mean combined land and ocean temperature was $0.76 \pm 0.14^\circ\text{C}$ above the mean (2nd warmest after 2016). The oceans were $0.69 \pm 0.15^\circ\text{C}$ (2nd warmest after 2016) and the land was $1.16 \pm 0.15^\circ\text{C}$ above the norm (2nd warmest after 2014).



Source: NOAA National Climatic Data Center, *State of the Climate: Global Analysis for May 2017*. Published online. Data is provisional.

Above right: Planet Earth on May 9 at 12:08:37 GMT. DSCOVR mission. NASA/NOAA.

Dust plume sweeps out from West Africa.

Right: A closer view of the Earth at almost the same time as the DSCOVR view above (12:10 UT, effectively GMT) on May 9. This natural-colour image was obtained by NASA's Terra satellite, with the Moderate Resolution Imaging Spectrometer (MODIS). The plume, which extended beyond the Cabo Verde Islands, is clearly visible in the image above.

Dust from the Sahara crosses the Atlantic in huge quantities and provides nutrients for the Amazon rainforest (see PM 28, July 19, 2014). A later study by Hongbin Yu of the University of Maryland and NASA Goddard Space Flight Center and colleagues published in 2015 found a 7-year average of 28 (8 - 48) Tg per year or 29 (8 - 50) kg per ha per year of dust reaches the Amazon Basin. This includes 0.022 (0.006 - 0.037) Tg of the vital nutrient phosphorus or 23 (7 - 39) g P per ha - comparable to the amount of P washed away every year, "suggesting an important role of African dust in preventing phosphorus depletion on time scales of decades to centuries."

