



In the recent White Paper, Government support was announced for the Big Wildlife Garden website, now operated jointly by the Wildlife Trusts and the Royal Horticultural Society. This is happening rather swiftly, and on Friday 19th August there will be a formal launch of the new Defra sponsored Big Wildlife Garden Competition, alongside the England Biodiversity Strategy. The Forum will be represented at the launch, and in the next issue of the newsletter there will be coverage of the event and the competition.

Garden bird disease spreads to new parts of the UK

A virus severely affecting great tits is spreading in the UK and is believed to be a new and more severe strain of a disease that has affected other bird species for several decades. It was first found in south-east England in 2006, but has now spread further north and west.

Researchers at the Zoological Society of London (ZSL) want help from the public to help track the spread of the disease. Dr Becki Lawson, from ZSL, said:

“What's different about this avian pox in this species is that the lesions can be very severe. It's not unusual for several birds to be affected at one site. Initially the reports were restricted to south-east England, chiefly in Surrey, Sussex and Kent. Over the last year we've seen the geographical range of this disease spread quite significantly, as far west as Wiltshire and as far north as Staffordshire. We're very keen to track further spread of the disease this year as we progress into the months where we'd expect to see a peak in the numbers of reports, in the late summer and early autumn.”



Avian pox can be spread through contaminated bird feeders, via biting insects and through direct contact between birds. It has been known in species including dunnock, woodpigeons and house sparrows for many years. The disease causes lesions, often around the eyes and beak.

Infected great tit

In the most severe cases the lesions caused by the virus in great tits can prevent the birds from feeding or flying and makes them more vulnerable to predators.

ZSL has been working with Oxford University, the British Trust for Ornithology and the RSPB. Researchers now want help from the public to monitor suspected cases of the disease.

If you have spotted what appear to be diseased birds in your garden, contact the project through www.rspb.org.uk/advice/helpingbirds/health/sickbirds/avianpox.aspx or via the BTO at www.surveymonkey.com/s/disease_in_birds

Become a bee landlord - keep solitary bees says Roots and Shoots

The tenants of Trellick Tower are buzzing with health, a year after setting up home across the river from Kensington. The splendid bee hotel in Roots and Shoots' award winning wild garden has seen resident numbers leap from 15 last year to over 200 and rising. Now the Lambeth environment and education charity is calling for us all to become bee hoteliers.



Clockwise from top left: Trellick Bee Tower; summer meadow on Fitzalan Open Space in front of Roots and Shoots ecobuilding; Mason bee excavating; Leafcutter bee.

The place to start is the Capital Bee London Honey Festival on the Southbank on 21 August, where beekeepers will gather to celebrate all things bee and choose this season's tastiest honey.

Hoping to fight off challengers will be Roots and Shoots, 2010 holders of the London's best

tasting honey award, but at the same time education and environment manager David Perkins (*a stalwart of the Forum - Ed.*) will be putting the spotlight on solitary bees, which can be encouraged into any garden and take care of themselves. David is an enthusiastic and knowledgeable advocate of solitary bees and their critical role in urban biodiversity and will be on hand with tips, advice and a powerful microscope to get up close. David knows his bees and his biodiversity – he recently accepted the 2011 UNESCO UK Man and the Biosphere Urban Wildlife Award for Excellence, and Roots and Shoots is also HQ of the London Beekeepers' Association

After some difficult years, David feels cautious optimism on the state of London's bees. He reports that the mixed spring and summer weather has provided good nesting and feeding conditions for many of the bees in Roots and Shoots acclaimed half acre wild garden.

“The dry sunny weather in early spring helped the Red Mason bee (*Osmia rufa*) females – giving them a long period of uninterrupted building weather. Dry early spring weather combined with an ample supply of mud for sealing nests from the new pond created ideal nest building conditions. The bees took advantage of the paw prints left by the fox as it patrolled the edge of the pond at night – going deep into them and

excavating the damp mud with their specially adapted jaws. Some of the paw prints ended up as long, deep mud mines.”

The showery summer has also suited solitary bees. Sunny breaks have allowed plenty of nest building time and regular rain has kept nectar supplies plentiful. As a result two species of leafcutter bees are active, as well as wood carder bees and some of the smaller mason bee species. After a slow start, the social bees have also caught up. Although the early dry spring meant there were fewer bumble bees around than last year, and the honey bee colonies didn't build up quickly through lack of nectar, they seem fine now.

For more information about solitary bees, biodiversity and bee evolution and a chance to see some fascinating bees up close and large under the microscope, David Perkins will have a stall at the Royal Festival Hall Honey Festival on Sunday 21st August. Tickets are free and can be booked at <http://ticketing.southbankcentre.co.uk/find/learning-participation/tickets/the-london-honey-festival-60380>

The New York environment, aliens, pollution and rapid evolution

It is easy to get rather provincial in Britain, and be unaware of new ideas appearing in Europe or across the Atlantic. The following account of work in New York is adapted from the New York Times, www.nytimes.com/2011/07/26/science/26evolve.html?_r=1

Cities attract only a small fraction of evolutionary biologists, who often work in lush places like the Amazon. But urban evolution is attracting more research these days, because cities are fast-growing, and the urban environment is quickly taking over large areas of the Earth's surface.

Modern cities like New York have brought swift changes to the environment. European settlers cut down most of New York's original forest; towns grew and then merged into a sprawling metropolitan region. The chemical environment changed as well, as factories dumped chemical pollution into the water and soil.

As a major point of entry to the United States, New York is where many of North America's invasive species first arrived. Some introductions were intentional. Starlings were brought to Central Park in 1890, for instance, as part of a project to bring every bird mentioned in Shakespeare to the United States. But most introduced species slipped in quietly.

Many non-native species quickly died out, but some fit comfortably into the city's wildlife, and others wreaked havoc — first in New York and then beyond. New York was the port of entry for Dutch elm disease, chestnut blight, Asian longhorned beetles and other threats to trees across the country.

As the invaders adapted to New York, they put extra pressure on native species, competing with them for space and food. In the Brooklyn Botanic Garden, for instance, American bittersweet vines are dwindling away, outcompeted by Oriental bittersweet. At the same time, the two species are interbreeding, producing hybrids. “It's a double-whammy,” said James D. Lewis, a plant ecologist at Fordham University.

Biologists find a mixture of native and non-native in all the life forms they study in New York, from the trees in Central Park to the birds of Jamaica Bay. The biodiversity of New York today is the result of extinctions, invasions and adaptations. Manhattan was once home to 21 native species of orchids; today they're all gone. A team of scientists led by Richard P. Duncan surveyed plant biodiversity in New York and 10 other cities. They found that 401 native plant species have vanished from New York since 1624, while 1,159 remain¹. New York's native flora is vulnerable to extinction today in part because it was well adapted to the closed forests that once stood where the city is now.

To counter a declining native floral biodiversity, evidence is growing that urban centres can be an evolutionary hot-bed. White-footed mice live today in forests from Canada to Mexico. They arrived in the New York City region after ice age glaciers retreated 12,000 years ago. In the past few centuries, as their forest home became a city, they survived in New York's patches of woods. Research by Dr. Jason Munshi-South suggests that New York's white-footed mice, which occupy isolated patches, are adapting to life in the city.



Since 2008 Dr Munshi-South and colleagues have studied urban biological evolution in small parks in New York, looking at the ways white-footed mice, stranded on isolated urban islands, are evolving to adapt to urban stress, by analysing their DNA². He's been surprised to find that the populations of mice in each park are genetically distinct from the mice in others. "The amount of differences you see among populations of mice in the same borough is similar to what you'd see across the whole south-eastern United States," he said

White-footed mouse.

Dr Munshi-South's colleague Stephen Harris recently presented new data on white-footed mice at the annual meeting of the Society for the Study of Evolution.³ He has identified mutations in more than 1,000 genes that are present in all New York City mice, but missing from mice in Harriman State Park, 45 miles north of the city.

The scientists are investigating whether these mutations have helped the mice adapt to life in New York City. Clues that some of them do are found in the functions of the mutated genes. Many of the genes are involved in fighting bacteria, while others are for reproduction, and still others for coping with stress from exposure to chemicals. It's possible that these new mutations are spreading independently in each of the parks in the city. "The idea is that the urban pressures are the same everywhere, and they're all adapting," said Mr. Harris.

Evolution has also run in the opposite direction as government agencies cleaned up some of the pollution around New York. In 1989, Jeffrey Levinton of Stony Brook University and his

1 *Global Ecology and Biogeography* 20:509–519, July 2011

2 *Molecular Ecology* 19:4242–4254, October 2010

3 www.evolutionmeeting.org/engine/search/index.php?func=detail&aid=69

colleagues discovered that a population of mud-dwelling worms in the Hudson had evolved resistance to cadmium.⁴ They lived in a place called Foundry Cove near a battery factory. Dr. Levinton and his colleagues found that the worms produced huge amounts of a protein that binds cadmium and prevents it from doing harm.

In the early 1990s, the federal Environmental Protection Agency hauled away most of the cadmium-laced sediment from Foundry Cove. Over nine generations, the Foundry Cove worm populations became vulnerable again⁵. This shift occurred, Dr. Levinton and his colleagues reported last year, as worms from less contaminated parts of the river moved back in, because the cadmium threat was no longer present. They are interbreeding with the resident worms, and the resistant mutations are becoming rarer.

Dr James Danoff-Burg and Rob Dunn have been studying the narrow Broadway median on the Upper West Side. In this context, a “median” is the dividing central strip between opposing lanes of traffic on a major road. They are using a variety of trapping techniques to survey the median for species of ants to help understand how human activity alters biodiversity. There is no New York environment more artificial than these medians, which sit on fill that was poured on top of subway tunnels. The scientists have found a blend of ant species, some that have been here since before the city existed, and others that have arrived



more recently, hitching rides on ships, planes and trucks. The most common encountered is the pavement ant (*Tetramorium caespitum*), which came from somewhere in Europe.

Tetramorium caespitum

Dr. Danoff-Burg and Dr. Dunn were surprised to find that 9 out of the 13 ant species living in Broadway’s medians are native. Once the medians were built, the native species rushed in along with the invaders and created an ecosystem. The scientists are trying to figure out what controls the balance of native and new species in New York. They don’t understand why some medians have more biodiversity than others, for example. On natural islands, biodiversity tends to increase with the size of the islands, but no such correlation was found in the medians on Broadway. It will be important to determine how native species of ants are coexisting in such close quarters with invasive species.

⁴ *Biol Bull* **176**: 135-141.

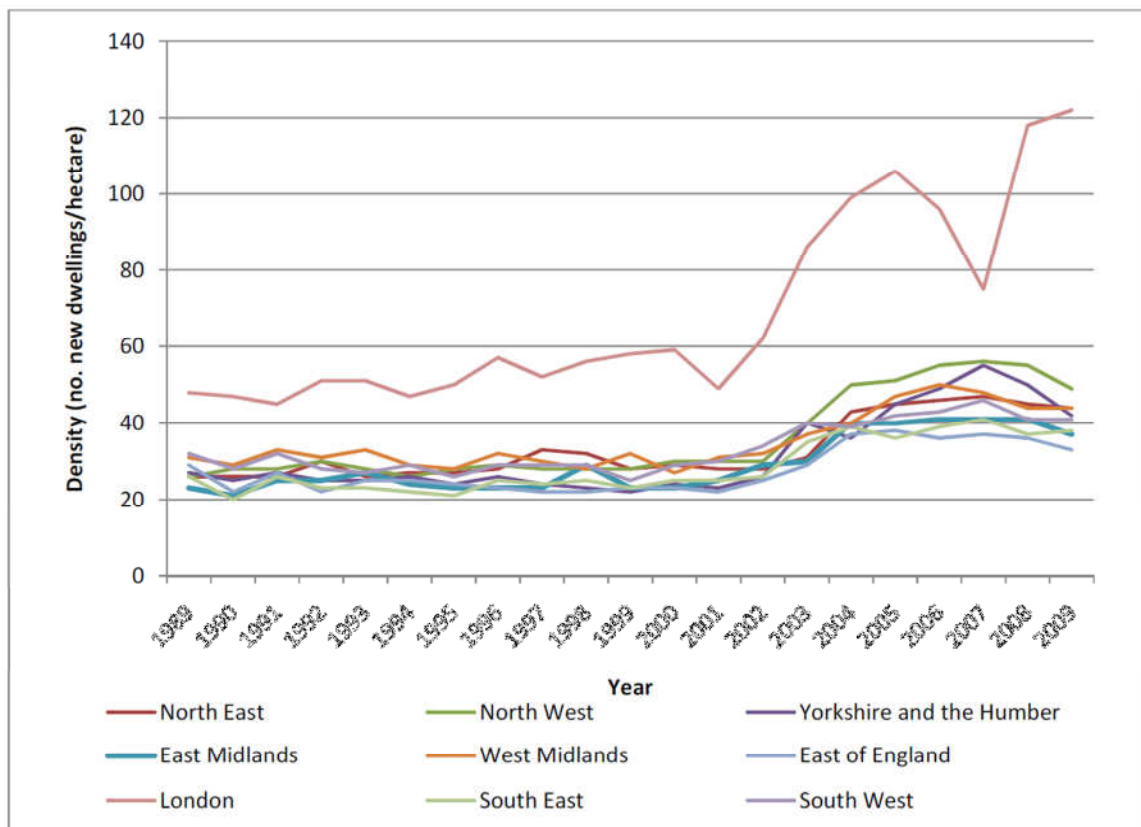
⁵ *Evolution* **64**: 152–165, January 2010

UK National Ecosystem Assessment

This massive compendium is in the process of publication. It can be accessed via <http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx> . In the Introduction, Lord Selborne says:

“The UK National Ecosystem Assessment (UK NEA) provides a comprehensive overview of the state of the natural environment in the UK and a new way of estimating our national wealth. It shows how we have under-valued our natural resources. Valuing them properly will enable better decision making, more certain investment, new avenues to wealth creation and jobs, and greater human well-being in changing times ahead.”

There are 27 chapters, some over 100 pages long, and many are still in the process of type-setting, and currently only accessible as drafts. The Urban Habitat (Chapter 10) is one of the big ones, and even in its draft state, is packed with statistics, data, references and information. Here for example is Figure 10.2



Density of new dwellings (per hectare) built on Previously Developed Land in the English regions from 1989 to 2009. Source: data from Land Use Change Statistics and Communities and Local Government Housing Statistics

This dramatically shows the increasing density of dwellings (especially in London and the South East) within the last ten years, in large part due to the increasing development of flats. I have not had time to go through the report in any proper manner, but I am sure there will be many important facts relevant to understanding the pressures on garden biodiversity.

The table below summarises the key findings from the Urban chapter. Each key finding has been assigned a level of scientific certainty, based on a 4-box model and complimented, where possible, with a likelihood scale. Superscript numbers indicate the uncertainty term assigned to each finding. These uncertainties are indications where research may be needed, by the Forum or some of its specialist partners.

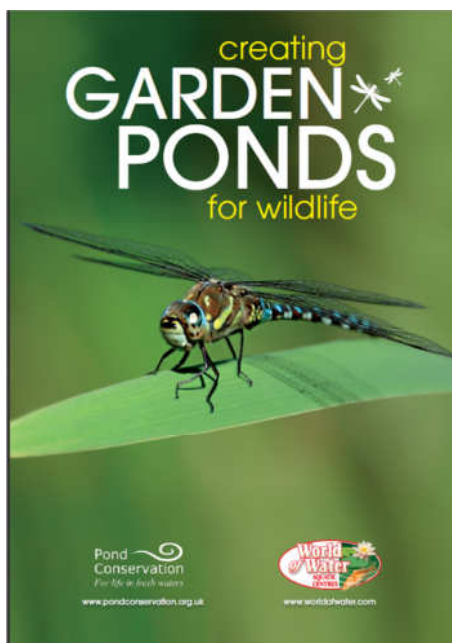
<p>The ecosystem goods and services that could potentially be derived from Urban greenspace are substantial. In the past, the importance of these areas for the health and general well-being of society was not appreciated and their potential not realised². It is not just the limited extent and variable quality of greenspaces, but also their spatial distribution, connectivity, functionality and accessibility that currently create barriers to their optimisation.</p>	<p>²established but incomplete evidence</p>
<p>Access to Urban greenspace is essential for good mental and physical health, childhood development, social cohesion and other important cultural services¹. More than 6.8% of the UK's land area is now classified as 'urban', with more than 10% of England, 1.9% of Scotland, 3.6% of Northern Ireland and 4.1% of Wales contributing to this habitat. About 80% of the population resides in these areas, where the amount of mean accessible greenspace is 2 hectares (ha) per 1,000 people in England and 16 ha per 1,000 people in Scotland². Deprived areas systematically fare worse in terms of quantity and quality of greenspace.</p>	<p>¹well established ²established but incomplete evidence</p>
<p>During the last three decades of the 20th Century, there was a decline in the condition and accessibility of Urban greenspace in the UK². It is likely that the reduction in funding for public parks, the absence of any statutory parks services, and the sale of playing fields (approximately 10,000 between 1979 and 1997) and allotments (estimated at below 10% of peak levels) have all contributed to this decline. Evidence suggests that there has been some improvement since the work of the Urban Task Force. Local authorities, public bodies and over 4,000 community groups, many with National Lottery funding, have contributed to the refurbishment and renewal of many of these areas.</p>	<p>²established but incomplete evidence</p>
<p>Greenspace within urban areas is not systematically monitored. Without such basic data the ecosystem services cannot be quantified². There is no regular collection of data or centrally coordinated Urban greenspace database. Responsibilities are spread across a range of organisations, from different government departments and agencies to charities and private sector organisations, which collect extensive amounts of information but often using inconsistent typology at different temporal and spatial scales.</p>	<p>²established but incomplete evidence</p>
<p>Provisioning services are limited and the majority of goods are imported; but there is evidence of changing attitudes towards urban food production². In the early 1940s, gardens (covering 4% of England) and allotments, over half of which were in urban areas, provided 10% of all food production in the UK (1.3 million tonnes). Today, there is increasing interest in domestic production, with 33% of people now saying they grow their own food¹. Per household, savings</p>	<p>²established but incomplete evidence</p>

exceeding £1,000 per annum have been reported from allotments.	
Many of the supporting and regulating functions that Urban soil could provide have been reduced and restricted¹. Widespread sealing and degradation have resulted in Urban soil losing function and resilience, and has led to major hazards such as flooding. In London alone, it is currently estimated that 3,200 ha of front gardens have been paved, and, in Leeds, an estimated 75% of the increase in impervious surfaces that has occurred from 1971 to 2004 is attributed to the paving of residential front gardens ²	¹ well established ² established but incomplete evidence
Urban air quality has significantly changed over the last 60 years with consequences for clean air that extend far beyond the urban boundary¹. Improvements in air quality arising from the national decline of sulphur dioxide and black smoke emissions (both have declined by more than 95% in London since 1962) are attributed to good regulation and enforcement, together with cleaner fuels. The growing significance in recent decades of nitrogen oxides, fine particles (PM10 and PM2.5) and background ozone have largely been driven by changes in energy production and the rise in vehicle ownership.	¹ well established
Species respond differently to increasing urbanisation of a landscape and the form of that urbanisation². Overall, the species that tend to disappear with urbanisation include habitat specialists, more area-demanding species (the patch size of greenspace tends to decline with urbanisation) and species typically associated with more complex vegetation structures such as forests. The species that tend to remain or increase in richness are more likely to be habitat generalists, less area-demanding species and edge specialists.	² established but incomplete evidence
Urban ecosystem services could be significantly enhanced to improve climate mitigation and adaptation. Temperatures in cities are higher than in rural areas with consequences for human wellbeing and the environment². London's maximum daytime and nocturnal Urban Heat Intensity can reach 8.0°C and 7.0°C respectively ² . The process of urbanisation and development alters the natural energy balance, mainly due to the loss of cooling from vegetated surfaces when they are replaced by impervious materials used in construction of buildings and roads.	² established but incomplete evidence
Trade-offs and synergies in ecosystem goods and services are complex, with scale a major issue in decision-making. As yet, they have not been widely investigated in the urban environment. For example, increasing vegetation cover in urban areas could reduce surface water runoff, decrease peak temperatures and the temperature-dependent formation of ozone and volatile organic compounds (VOCs) ² . Conversely, increasing vegetation cover incurs maintenance costs, requires watering, is vulnerable to disease, can produce VOCs and would be expensive in city centres, the place where it would be likely to deliver high levels of ecosystem services and benefits.	² established but incomplete evidence

Urban Greenspace is fundamental to sustaining urban life and, therefore, should be integral to the way in which it is planned and managed¹. For example, the Thames Gateway Green Grid Network in South East England demonstrates the effectiveness of integrating multifunctional land use, connectivity and accessibility using an ecosystem services approach early in the planning process. While in Scotland, sustainable drainage systems (SuDS), which can substantially enhance ecosystem goods and services delivery, have already been incorporated into an estimated 80–90% of all new developments.

¹well established

New Garden Pond Guide



Pond Conservation's new garden pond booklet, published with support from World of Water, is now available from:

[www.pondconservation.org.uk/Resources/Pond Conservation/Documents/Creating Garden Ponds for Wildlife.pdf](http://www.pondconservation.org.uk/Resources/Pond%20Conservation/Documents/Creating%20Garden%20Ponds%20for%20Wildlife.pdf)

The 31 page guide is simply and clearly written, and mercifully free of smiley-faced cartoon amphibians.

The sections include:

- Why Ponds Are Important
- Creating a Garden Pond
- Planting Wildlife Ponds
- Managing Your Pond
- What's Living In Your Pond
- Attracting Amphibians and Reptiles
- Finding Out More

There are good basic instructions on pond creation, the importance of water quality, and managing ponds through the seasons. It is also good that the (short) section on pond invertebrates shows the stages found *IN* ponds, rather than the adult stage found flying above them. It is a good idea to read the guide alongside further information on pond creation on the website www.pondconservation.org.uk/advice/Making+Ponds+for+Wildlife and the technical advice under the Million Pond Project, at www.pondconservation.org.uk/millionponds/pondcreationtoolkit

I have a limited number of printed copies of the booklet if you contact me at wlgf@stephenmhead.com. However, I will be bringing them to the next Forum Conference on 23rd November, so you could collect one then.

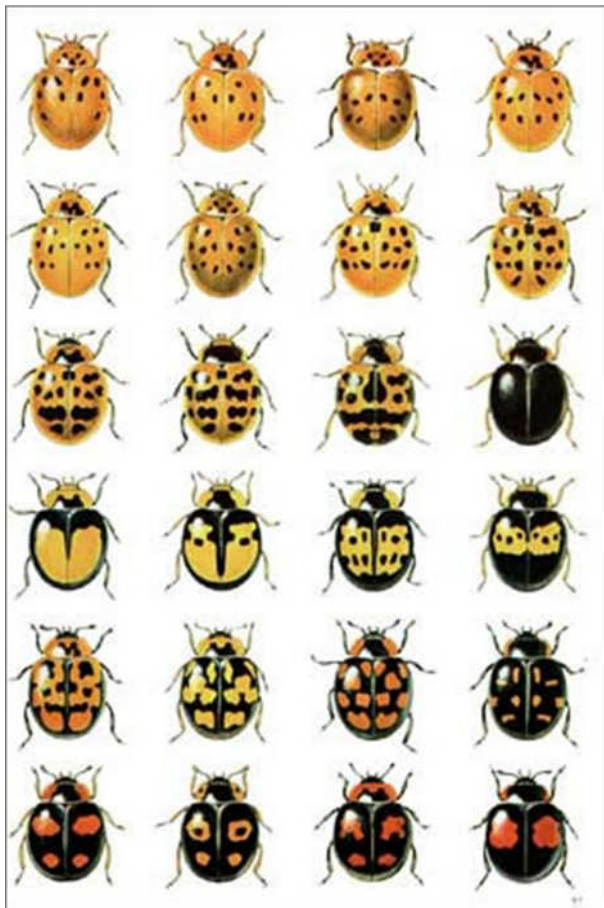
And Finally: Learning evolution from the Harlequin Ladybird

This is adapted from Ken Thompson's typically beautifully written piece in the Daily Telegraph on 15th June. The original is at www.telegraph.co.uk/gardening/8572994/The-harlequin-ladybird-is-coming.html

The invading Asian harlequin ladybird *Harmonia axyridis* was first recorded in Britain in 2004 and can now be found almost everywhere, although it's still uncommon in Wales, and rare in Scotland and the far north of England. But how did it get here, and why is it so successful?

Given its native range of China Japan and the far east of Russia, you could be forgiven for assuming the harlequin came here from Asia. It didn't – it came from the United States, but it was far from an overnight success there, or anywhere else for that matter. It was introduced to the US as a biological control for insect pests from 1916 onwards. Unsuccessful attempts were made to introduce it to Europe and South America from 1982.

However, suddenly, in 1988, a thriving population was discovered in Louisiana, from where it quickly spread to the rest of the US and soon most of the rest of the world too. US harlequins turned up in Europe and South America in 2001, South Africa in 2004. The rest is history – it's already the most widespread ladybird in North America and looks set to become Britain's commonest ladybird. Clearly something happened to the harlequin in the south-eastern US in the 1980's, and whatever it was, it had much the same effect as a radioactive-spider bite had on Peter Parker: the harlequin went into Louisiana a wimp and came out bent on world domination.



Most introductions of animals to new habitats fail. Introduced populations always start out small, and a big problem for small populations is inbreeding; because there are so few of them, they end up mating with close relatives. Inbreeding in small populations brings together deleterious recessive mutations causing malformation, disease and death. But there's a twist – geneticists figured out that small populations might go through a process called **purging**, in which the harmful mutations that make inbreeding so dangerous are lost completely. Any population that successfully negotiates this process emerges not only immune to the detrimental effects of inbreeding, but fitter, faster and better all around. Because the conditions under which purging is supposed to occur are so restrictive, it has remained merely a theoretical curiosity – until now.

The harlequin is as variable as its name implies. Here are some varieties from the harlequin survey website at www.harlequin-survey.org

Work by a combined team of US and French biologists has shown that the Louisiana harlequins were successfully purged of their bad mutations and now grow faster and have more offspring than native Asian harlequins. They're also completely immune to inbreeding so even offspring of matings between siblings show no ill effects at all, they can now establish from even a tiny starting population. Indeed, we are in the bizarre situation where US harlequins could even be invasive back in their native range, potentially able to brush aside the very population from which they evolved.

What this means for British gardeners is that the harlequin is going to take over whether we like it or not, and however you feel about that, you should resist the temptation to interfere. If you try to squash any harlequins you see, you may kill native ladybirds by mistake, and in any case the harlequin is now so common and well-established that nothing you do can possibly have any effect on its numbers. As I write (says Ken), harlequins are out there right now, Hoovering up the aphids on my gooseberries. If they can only develop a taste for gooseberry sawflies, I'll forgive them anything.

(I was amused to find the following headline in that source of all journalistic moderation The Daily Mail “Vile-smelling foreign ladybirds set to invade homes this winter”)

Please send all your news, events, and questions for discussion in the next newsletter to wlgf@stephenmhead.com