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EDITORIAL

Urban natural history

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This is the first part of a new volume of *The Glasgow Naturalist*. An outstanding feature of this issue is the supplement consisting of 14 articles based on presentations at the GNHS Brownfield Biodiversity Conference held in the Graham Kerr Building, University of Glasgow on 4th June 2022. Downie *et al.* (2023) contribute a detailed overview of this conference, which includes the programme and abstracts of contributions that were not written up as articles.

The brownfield articles provide a powerful illustration of the capacity of organisms to recolonise, and restore biodiversity to, previously industrialised land. It is a cause for great optimism that ecosystems can develop once again, even without human assistance, in such apparently inhospitable environments as a former municipal landfill site (Weir & McLaren, 2023) and the location of what had been largest explosives factory in the world (Philp, 2023). Brownfield sites have been described as "oases of urban biodiversity" (Macadam & Bairner, 2012) and are one reason why cities can play a key role in halting and reversing biodiversity loss, which is a theme of the ambitious £10.2M-funded GALLANT project ("Glasgow as a Living Lab Accelerating Novel Transformation") outlined by Dominic McCafferty in Downie *et al.* (2023).

This issue of *The Glasgow Naturalist* is very much dominated by urban natural history: as well as the 14 brownfield articles, seven of the 13 others deal with the wildlife of Scottish cities. The study of urban natural history in Scotland and the rest of the U.K. began in earnest from the middle of the 19th century when an astonishing number of new societies was founded in the rapidly expanding towns and cities: Aberdeen Natural History Association, 1845; Natural History Society of Glasgow, 1851; Edinburgh Naturalists' Field Club, 1869; Dundee Naturalists' Society, 1874; Stirling Field Club, 1878; Belfast Naturalists' Field Club, 1863; Cardiff Naturalists' Society, 1867; Haggerstone Entomological Society, 1858 (which became the London Natural History Society in 1913); and societies in Birmingham, Bristol, Liverpool and Manchester in the 1850s and 1860s (sources listed after *References*). While these societies were responsible for organising the systematic recording of the fauna and flora across the whole of their respective geographical regions, because they were based in towns and cities, this included a wealth of information about nature in urban environments (Goode *et al.*, 2021). This is attested by publications such as *Handbook of the Natural History of Glasgow and the West of Scotland* (Elliot *et al.*, 1901) in which it is acknowledged that the species lists are largely the work of the members of the Natural History Society of Glasgow and the Andersonian Society.

The study of urban natural history has been important in demonstrating how ecosystems and individual species are affected by, and can adapt to, human-induced environmental change. This is typified by the fortunes of the peppered moth (*Biston betularia*). A melanic form of this moth was first discovered in 1848 near the centre of Manchester by R.S. Edleston (1819-1872) - an amateur naturalist and "business man engaged in calico printing" (Cook, 2015). Being better camouflaged on the dark bark of sooty tree-trunks and therefore less vulnerable to bird predation, this form more or less replaced the original lighter form by the end of the 19th century, providing what has been confirmed to be a classic demonstration of natural selection in action (Cook & Saccheri, 2013; McGhie, 2016). Many other examples of urbanisation-driven microevolution have been subsequently identified and investigated (Lambert *et al.*, 2020; Szulkin *et al.*, 2020).

The study of urban natural history has also revealed how human activities can bring about faunistic and floristic change in unexpected ways. The lichen *Lecanora conizaeoides* provides a good example of this. It is suspected that the original habitat of this lichen is the acidic bark of dwarf mountain pines (*Pinus mugo*) growing in Central European bogs (Massara *et al.*, 2009). It was very rare or not present in Britain before the middle of the 19th century. The first British records are from England - Epping Forest, New Forest and Derbyshire (Crombie, 1885). Thereafter, it spread throughout the industrialised regions of the British Isles, becoming abundant, and often the only lichen, in urbanised areas, including Glasgow. This success resulted from the ability of *L. conizaeoides* to thrive on substrates acidified by the then dominant air pollutant - sulphur dioxide - and take advantage of the lack of

competition that followed the elimination of sulphur dioxide-sensitive lichens. However, over the past 20-30 years it has declined dramatically across the U.K. and Europe and is now rare in Glasgow (Wilkie, 2021). This has been attributed to an increase in bark pH due to a combination of the reduction in sulphur dioxide emissions that followed the Clean Air Act of 1956 and rising emissions of ammonia originating from the catalytic convertors of road vehicles (Bates *et al.*, 2001; Massara *et al.*, 2009).

It has been estimated that around 3% of the world's total land area is already urbanised (in the broad sense that includes vegetated areas such as parks and gardens) (Liu *et al.*, 2014). Seto *et al.* (2011) calculated that the average annual urban expansion growth rate ranges from 2.5% (Europe) to 7.5% (China), which may result in the global total amount of urban land increasing by a factor of 2-6 over the 21st century (Gao & O'Neill, 2020). Urban natural history can only become increasingly relevant with time.

For those wanting to learn more about the subject, I can recommend Shirley (1996; still available via online purchase) as a general introduction and Sutcliffe (2010), which includes succinct accounts of wildlife sites within the Glasgow boundary.

This issue of *The Glasgow Naturalist* includes the obituary of Peter Meadows written by Roger Downie. Peter Meadows was co-editor (with Azra Meadows) of the journal from 2002 to 2007, during which time the four parts of Volume 24 were published. I first encountered Peter Meadows when I was a second-year B.Sc. Zoology undergraduate at the University of Glasgow and attended his course on "Invertebrate phyla" in which he covered the full spectrum from Protozoa to Chordata. This being 1969-70, there were no handouts, and we all assiduously copied his many blackboard drawings, some quite elaborate; my notes are peppered with references to page numbers in E.J.W. Barrington's (1967) *Invertebrate Structure and Function*, although I neglected to record his anecdotes about Jamaica, from where he had recently returned after a sabbatical. I am indebted to him for stimulating an interest in invertebrates, which developed into a research obsession that continues undiminished to this day.

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SOURCES OF INFORMATION ON NATURAL HISTORY SOCIETIES

(All accessed 2nd April 2023.)

Aberdeen	https://discovery.nationalarchives.gov.uk/details/c/F97040
Dundee	https://dundeenaturalists.org.uk/
Edinburgh	http://www.edinburghnaturalhistorysociety.org.uk/about.php
Glasgow	https://www.glasgownaturalhistory.org.uk/history.html
Stirling	https://www.stirling-lhs.org/11th-november-1878.html
Belfast	http://www.bnfc.org.uk/
Cardiff	https://cardiffnaturalists.org.uk/htmfiles/history.htm
Haggerstone	https://www.lnhs.org.uk/index.php/about-us/history
Birmingham	http://bnhsoc.org.uk/
Bristol	https://bristolnats.org.uk/
Liverpool	https://www.liverpoolmuseums.org.uk/artifact/liverpool-naturalists-field-club
Manchester	http://www.manchestermicroscopical.org.uk/mmshist.html