**Luke Howard and the Urban Heat Island.**

**A celebration of Luke Howard’s contribution to urban science on his 250th birthday**

Over the past summer, many will have become very familiar with the urban heat island (UHI) phenomenon, which describes the fact that cities are generally warmer than the surrounding natural landscape. The UHI is pronounced in clear and calm and dry conditions and is strongest in the centre of cities, where there is little green cover and buildings are taller and closer than suburban areas. During heatwave events when air temperatures are much higher than normal, the UHI elevates heat stress for residents and workers, which can have severe public health outcomes. In fact, much of the effort to green cities is designed to reduce the impact of heatwaves and the UHI by providing ‘cool’ outdoor spaces. What few realise is that the impact of cities on climate was first measured and analysed by Luke Howard.

Howard was the first person to conduct scientific observations on the climate of cities (urban climatology). Much of this is work is to be found in his monumental work on the *Climate of London*, which was published in three volumes between 1818 and 1833. The first volume provides his analysis of data and reports that are tabulated and organised in volumes 2&3. These data consisted of measured atmospheric properties recorded twice daily in Tottenham and Stratford, both described as near London, that is, in the ‘country’. The purpose of the Howard’s project was to record the climate where London was situated and much of the material in *Climate* includes his observations on the weather (in the UK and abroad) that accompanied his measurements.

As part of his analyses, he found that his observations differed from those recorded by the Royal Society in the city of London: he concludes that ‘*we find London always warmer than the country, the average excess of its temperature being 1.579°F* [0.88°C]’. In short, he was the first to measure the UHI. However, what sets his work apart is his analysis of the UHI phenomenon. He identifies the temporal pattern (concluding that it is mostly a night-time event), deduces that the magnitude must be greatest in the centre of the city and correctly identifies nearly all of the causes. It would be more than 150 years later before these insights could be tested by others with more sophisticated tools.

The genius of Howard’s cloud classification scheme is that it provides a visual description of cloud types that are universally recognisable and linked to underlying atmospheric process. The same intellect is evident in the pages of *Climate* where his rigorous approach to measurement and analysis revealed the UHI phenomenon and its causes. For this reason, Luke Howard is recognised by the International Association for Urban Climates (IAUC) as the father of urban climate science.

The weather on Howard’s birthday on November 28th 1817 as recorded in *Climate*.

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| Wind | Pressure  Max Min | | Temperature  Max Min | | Humidity  at 9am | Rain |
| SW | 30.06 in.  [1017.95 mb] | 29.92 in.  [1013.21 mb] | 49°F  [9.4°C] | 40°F  [4.4°C] | 67% | - |

Fair: somewhat windy, with Cirrostratus, &c.

Arianne Middel (President) & Gerald Mills

On behalf of the International Association for Urban Climates.