Snakes in the grass: the misidentification of adders in Cambridgeshire

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The Adder (*Vipera berus*) is the most widely distributed snake in the UK (Inns, 2009), although in some counties the species is locally extinct or only persists in small, isolated populations. One of the main reasons for this is the loss of habitat such as heathland or open woodland that has been converted for agriculture or housing developments. With the local loss of suitable habitats, adder populations tend to decline. Recent research has shown that UK adder populations are in serious trouble and within the next two decades the species may be restricted to a much smaller number of sites in the country (Gardner *et al*., 2019). Without immediate action, we may be witnessing the loss of one of the UK's most charismatic species.

One of the underlying principles in ecology and conservation is determining a species' habitat and distribution so that important sites can be protected for it (and other) species. Uncountable numbers of man-hours have gone into recording Britain's wildlife over the past 150 years or so, with the effort increasing over time thanks to different recording schemes and the help from citizen scientists (McCaffrey, 2005). Aside from knowledge gaps getting smaller, this has revealed an alarming trend within Cambridgeshire that has been validated by professional surveys: the county is almost completely devoid of adders. There are only a handful of adder populations known in Cambridgeshire. Additionally these populations are only small, so are unlikely to persist if pressures persist. Despite the recording effort there are knowledge gaps and it is important to determine where other small populations occur so that they can be monitored and appropriate conservation action taken. Despite the small number of known populations, numerous people record adders throughout Cambridgeshire each year. The majority of these sightings are verified as Barred Grass Snake (*Natrix helvetica*) records. The purpose of this article is to discuss the reasons for people making such errors in identifying adders, in a bid to improve and encourage local recording of the species.

One thing to consider is that most members of the public will not have been exposed to snakes all that much in the UK. Barred grass snakes are relatively common (Inns, 2009) and most people are aware of the adder due to its infamous reputation. However as someone who studies snakes, when people are told that we have a third native species (the Smooth Snake, *Coronella austiaca*) and two introduced species, they are surprised. Perhaps because they are out of sight (like life within rivers and oceans) – snakes are out of mind. Adder identification is important in case of bites to humans or dogs (necessitating medical attention due to the snake's venomous bite), yet a lack of exposure and experience is leading to a huge degree of error in identification.

Adders are quite unmistakable in the UK: males are a silver-grey colour and females are copper-brown. They may be confused with smooth snakes, but as these do not occur in Cambridgeshire (Inns, 2009), this is very unlikely. In adders, both sexes have a characteristic zig-zag pattern down the back, orange-red eyes and a 'V' or 'X' marking behind the head (Speybroeck *et al*., 2016). Barred grass snakes are olive-green in colour with a yellow-white collar around the neck (Inns, 2009), although to complicate matters, some snakes lose this later in life. Barred grass snakes being mistaken for adders is a danger for both species. Adders are actively persecuted due to the fact some view them as 'dangerous' (or even 'evil') despite the fact that the harm or killing of our native snake species is illegal under the Wildlife and Countryside Act (1981). In the past, grass snakes have unfortunately been confused as adders in the gardens of Robinson College (Brown, 2014).

Another reason that members of the public confuse grass snakes with adders may be linked to their size. Adders are quite short and squat, usually growing to around 65 cm in length, whereas barred grass snakes may be over 150 cm in length (Speybroeck *et al*., 2016). There seems to be an intrinsic link in the minds of many between the overall length of a snake and how deadly it is to people or pets. Most encounters with snakes are also very brief, with the observer not always able to see the whole body of the animal thus leading to an over-estimation to the snake's size. The only adequate way of confirming snake records, given the mixed information usually accompanying such reports, is with photos. These do not need to be of professional standard: a quick snap of a snake is often sufficient to aid identification in terms of colour and form (which in most cases leads to the individual being identified as a barred grass snake).

The underbelly pattern of a grass snake can resemble that of an adder, with a black and white checker or zig-zag pattern (Inns, 2009), sometimes leading to confusion, if for example a snake has been crushed on a road. In this case, one tends to expect the top of the snake to be facing up but instead, the ventral surface of the snake is being observed. Barred grass snakes also feign death, in that when they feel threatened they act as if they have just spontaneously died (Inns, 2009). This often includes the excretion of a foul-smelling and foul-tasting musk: a party trick to be envied. During such an event of thanatosis, a barred grass snake may expose its belly, which can then be mistaken as the dorsal surface of the snake.

Barred grass snakes feed primarily on amphibians, whereas adders are known to feed on small mammals and birds (Inns, 2009). Despite this, barred grass snakes may take other prey items if the opportunity arises, as will adders. This means that people often encounter barred grass snakes when walking along rivers, when fishing or when looking in garden ponds. This swimming behaviour almost certainly rules out the observed snake being an adder, which are proficient swimmers but are averse to open water bodies. There have been reports of adders swimming across lakes or rivers but usually in response to dens or refuges flooding following heavy rains.

Both grass snakes and adders tend to be very calm, and adders won't bite unless they feel threatened. Even if bitten, you may not have been envenomated. Most adder 'bites' that are experienced by dogs throughout the country occur in the first few days of spring (extending into June) after adders have just emerged from hibernation (Sutton *et al*., 2011). This is when they tend to be most defensive as they focus on getting their core body temperature up to operational levels to produce venom and more importantly, sperm (Inns, 2009). A snake would not wish to waste a valuable resource such as venom on a potential predator such as a dog if it can slither away. It is more likely that 'snake-bitten' dogs (often with a swelling) have actually been stung by solitary bees or wasps in the undergrowth. Dogs should be kept on leads in areas where adders are known to live, for both the dog's and the adder's sake.

With all of the points above in mind, it is easy to see why some people mistake barred grass snakes for adders. A combination of factors lead to the misidentification of a snake which may have only been seen for a split-second before it slithered into the undergrowth. With populations of much of our once-common wildlife declining - including snakes and toads (Petrovan & Schmidt, 2016) - it has never been more important to collect accurate species distribution records so that we can try to track declines both spatially and temporally. It may also be the time to move away from the 'single species concept' in conservation and take a more holistic approach. Snakes currently suffer an image problem and the sooner we can educate people about the benefits of native wildlife such as adders, hopefully the sooner this issue will be reversed.

Left: Adder (*Vipera berus*)

Below: Barred Grass Snake (*Natrix helvetica*)

In the past, potential records of adders have been investigated with follow up surveys, often resulting in no sign of the snakes. However, other reptiles, such as barred grass snakes and slow-worms (*Anguis fragilis*), have been found on such surveys, sometimes in areas where reptiles haven't been recorded before. This means that the efforts of surveyors have not been completely wasted. Whilst I suspect that incorrect snake identifications will still be submitted to the Record Pool, iRecord and other such recording platforms, my hope is that through time we can increase the accuracy and reliability of such records, by better informing the public on the features and behaviours to use when identifying Cambridgeshire's snake species.

This unfamiliarity with snakes, and the fear over size and deadliness really comes to the fore when an escapee reptile brings media attention. Such was the case in June 2019, when a Reticulated Python escaped and was not found for 5 days. The reticulated python is one of the world's largest species of snake, growing to almost ten metres in length (Das, 2010) although the individual that escaped in Cambridge was approximately 2.7 metres. The species is found throughout south-east Asia. Reticulated python prey is killed by constriction and the diet varies from small birds to deer, depending on the size of the snake (Das, 2010). With a large and potentially dangerous snake on the loose, a large amount of hysteria and panic was published by a number of tabloid newspapers. Fortunately, the snake posed no threat to people for a number of reasons. was reported as a potential man-eater. There have been historic and contemporary reports of large snakes consuming humans as prey, but this is a very rare occurrence, the snake either has to be extremely large or the person has to be small. The Cambridge python would have likely only have been a threat to small animals such as chickens and rabbits, depending on when it last fed. As a captive snake, the python would have never experienced life outside of a vivarium. It is quite possible that the python therefore experienced a sensory overload of new feelings, sounds and smells that it wasn't familiar with. Twinned with the low temperatures at the beginning of July, this might help to explain why the python was recovered within mere metres of where it had escaped. The whole sensationalism of this story highlights the image problem snakes have. In Western cultures, they have been the symbols of evil for centuries but elsewhere in the world, snakes were worshipped as gods. Despite the fact snakes are vital parts of the ecosystem, they've been given an undeserved bad rap. This image that snakes are 'evil' and 'out to kill you' has unfortunately impacted their conservation.akes around the world are persecuted because they're seen as a threat and a danger, in some places this may be the case. However with the correct mitigation and education, people and snakes can exist in harmony with one another. Unfortunately populations of our native snakes are slipping away before our eyes (Gardener *et al*., 2019) and sensationalist journalism surrounding events like this are only going to exacerbate those problems.

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