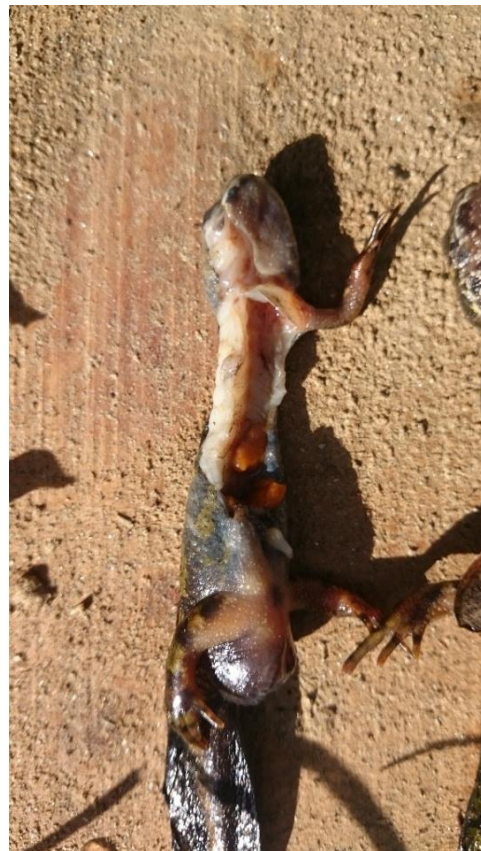


THE DESCRIPTION AND PECULIAR DETAILS ON THE MORTALITY OF OVER ONE-HUNDRED MARBLED NEWTS



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Introduction & disclaimer

The present short document is an attempt at describing the accessible details, including the immediate spatial characteristics of the two most relevant locales, on which around eighty-five (counted) adult marbled newts, *Triturus marmoratus*, probably exceeding one-hundred individuals total, were seemingly all eviscerated, then apparently left under even stranger circumstances in the course of, at least, four weeks – from 28/01/20016 to 26/02/2016. The purpose of its content is to inform those who might eventually be interested in speculating, generating and suggesting an explanation to an event that, at the time of writing (29/02/2016), has not been found to have a similar – except for an already speculative comparison with the case of the massive mortality of another amphibian, to be mentioned here.

The author claims no authority on any subject and has produced this content as a lay person. All photographic material used was created by the author *in situ* and is available for download below.

For personal inquiry, suggestions, mistakes and fact correction please use luis.santos.fo@gmail.com; addressing to Luís Santos.

Location, setting & context

The incident and descriptions reported here took place at the Monastery of Tibães, a state-owned complex with museum and touristic characteristics, with a forest area reaching forty hectares – located in Braga, Portugal. The sites to be mentioned are supposed to be off-limits to everyone when the complex is closed, a point that is relevant considering human action. Five sites within the area will be shortly described, with two of these being the main focus and a third recalled to at times.

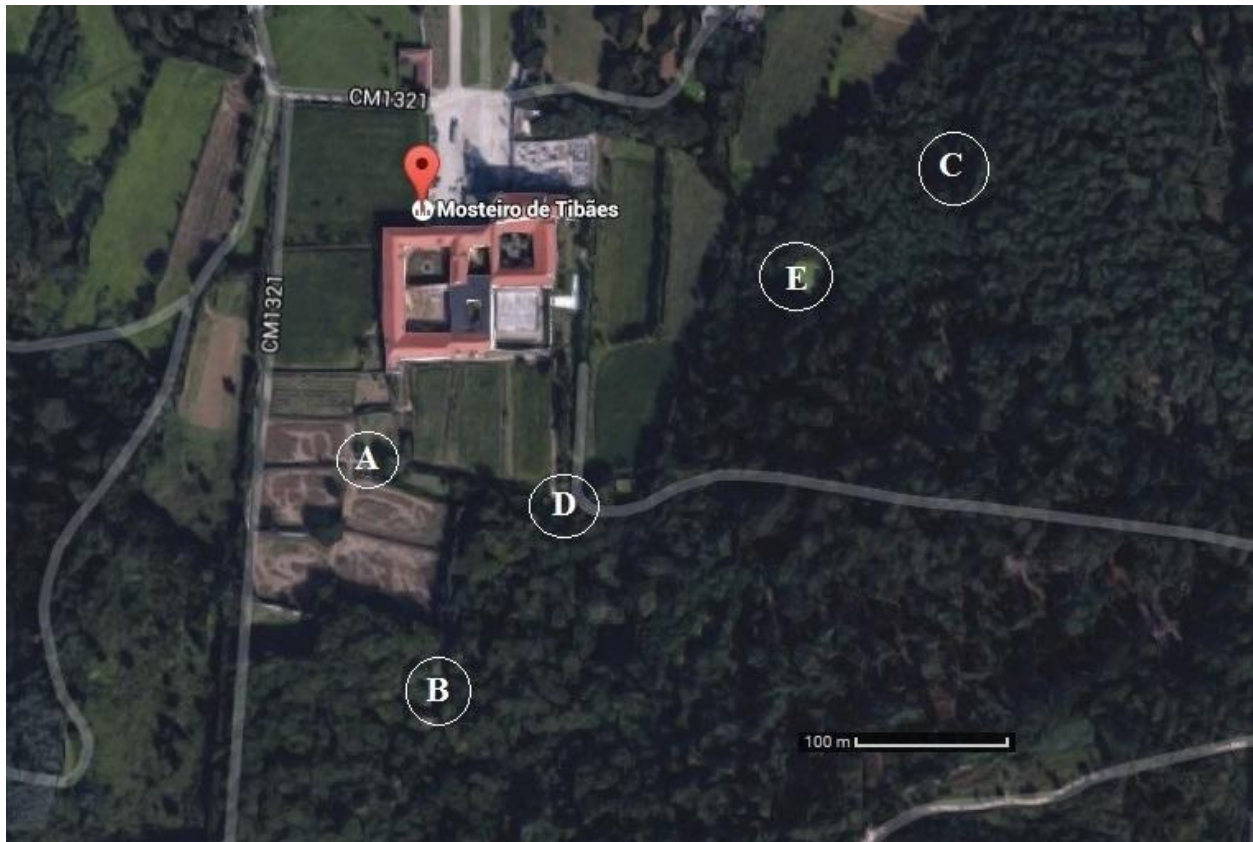
The author was one of the two people most involved with spotting and gathering the bodies of the newts, but under particular circumstances. These two people, being tourism students in a professional context at the monastery for only two days per week, namely Thursdays and Fridays, have an obviously skewed vision of what might have happened in the six-day span between each week. This also obviously influences speculation.

No local or national action has been taken, at this time, other than presenting the photographs produced to the one responsible for the author's professional context course tutor; an employee at the monastery.

Two initial (international) requests for help in interpreting the case were sent to two individuals; one, Paolo Mazzei (Amphibians and Reptiles of Europe), replied and forwarded the small details then given to other people through different platforms, opening a discussion. This document is also to aid those who were initially exposed to the little available information; now, hopefully, more complete.

Describing the sites

Five sites will shortly be described here; three pools and two ponds. It is considered important to visually represent them because they create a much needed context in terms of size, location, access and isolation. A sixth, large body of water was left out because it's much too deep for salamandrids; the use of its water having once been directed to powering the instruments of the now gone monks. Sites were indicated on an edited print-screen of Google maps to allow the reader/reviewer to evaluate the distances between sites; the same medium can be used to explore further. Photographs were not taken on the central days of the events to be described below.



Site A

This, like Site B, is a stone tank that is fed by covered water springs from higher ground. It is most accessible on two sides, bordered by a small wall and *Buxus* sp. on two others. The locale can be seen from some points of the monastery building, making it the most exposed site between Sites A, B and C. The depth of the tank is over fifty centimeters. It possesses a central area of higher depth; a rectangle cut structure supposedly used to impede water stagnation.

Photos (taken February 26th):





Site B

Deeper than the tank on Site A, the depth exceeds seventy centimeters. Being higher and not at the level of the ground, it is imaginably harder for marbled newts to enter or exit. It can directly be viewed from higher ground. Like the other tank (Site A) it has a central area of a higher depth.

Photos (taken February 26th):



Site C

A pond, and the most distant body of water from the central area of the monastery, this site is also the most covered (in surrounding trees) and not part of the walking spots for those visiting the monastery, at all.

Photos (taken February 19th):



Site D

The smallest tank and pool of the three, here no marbled newts were found dead. The tank is exposed and the higher wall that runs on its back can be viewed from the monastery. Rather than causing confusion over the absence of dead marbled newts, it has been presumed that the water flow is simply too great for them to be present in the first place. Immature salamandrids are easily observable.

Photos (taken February 25th):



Site E

Another pond, but artificial. State of the marbled newt here is unknown. Might have contact with cesspool water. No photos taken.

Describing the events

Throughout the text, unless otherwise noted, “newt” refers specifically to *T. marmoratus*.

February 11th

On February 11th 2016, Thursday, the author and colleague were alerted by their tutor to the worrying fact that several marbled newts were seen dead at the bottom of the tank (Site A). This was important because the monastery produces visits for various types of students regarding biodiversity, with marbled newts and other amphibians being at times focused on. Site A is usually the most visited as it is closer to the monastery building, with Site B much less so. There were immediate concerns with the quality of the water. However, several salamandrid larvae and adults of *Lissotriton* sp(p). appeared quite fine.

On checking the tank (Site A) to spot the bodies, one could see their conspicuous whiteness as the newts lied immobile, mostly belly down. Their defensive secretions must have mixed with the water, forming a film that covered most of their bodies. Nothing seemed stranger than their number, around ten or so.

The other tank (Site B) was checked to see if the same thing could be observed, and it could. One newt was removed from the bottom for a trivial check, a ventral cut stood out and the newt seemed to have been gutted open and empty. One after the other, all newts shared this characteristic. When a sense of confusion heightened the attention, newts were also quickly spotted on the edge of the tank (Site B), and just down from it. More often than not, those in these latter circumstances were the ones with the worst shape, sometimes featuring torn limbs – always frontal and related to the apparent tearing put on the bodies. Individuals had some differences on the levels of missing viscera.

Photos: different levels of evisceration and mutilation.





One of the most peculiar instances was that of a newt that was vertically hanging on to the vegetation at the corner of the tank (Site B) – no photo was taken. A similar thing would be seen again a week later, this time photographed. Details such as these hinted at the capability of movement after the newts were eviscerated, however that might have happened. Another body was recovered, but a small unidentified rodent – no connection was made. Nineteen bodies were collected, separated only by sex to photograph.

Photos: the eleven males followed by the eight females.





After collecting every spotted body at Site B, the same action was repeated at the initial place, Site A, where a total of twenty-five bodies were counted. Peculiar instances include several bodies on a single corner inside the tank. Outside, again, some bodies lied (separated) on the edges and over and down, with one newt seemingly pressed into the joining slabs of stone that line the main frame of the tank with the lower edges, raising confusion as to whether it was trying to hide or had been pressed into it. Some were on the immediate vegetation, never over a few centimeters away from the tank. As before, there were different levels of evisceration; sometimes organs were present, but, far more commonly, the bodies appeared completely hollow. There were perhaps only three or four exceptions to the ventral cut, instead presenting a lateral one above one of the frontal limbs.

Photo: four dead newts in a corner followed by Site A dead newt count.





Photos: different levels of evisceration and mutilation.





A total of forty-four bodies were collected on this day, no adult *T. marmoratus* were seen alive. Photographs taken on this day were forwarded to the tutor, its use or further recipient unknown.

Photo: all the collected bodies on February 11th.



No bodies were left preserved in any environment for later observation. Autopsies and other such analysis thus made impossible.

February 12th

No more dead marbled newts were taken from the tanks, as none were spotted. Again, no living adults could be found. Heavy rain impeded proper checking. On this day, an individual from a wild-life institution took notice of the collected bodies with a few photographs. There was no further inquiry made to the author or colleague in this context.

February 18th

A week elapsed (as explained above) since the bodies had been collected; now rotting fast as they were carelessly left in a permanent, cool shade high in moisture, accelerating decomposition.

The same routine was repeated as several dead newts were spotted in the same circumstances once more. Body collecting began at Site B. Immediate attention was focused on the viscera that could be seen, almost glistening in the sun, at the edge of the tank. Four distinct parts could be observed: an egg mass, a part of a digestive tract, another part of a digestive tract with an ingested snail, and a dark, liver-like organ.

Photos: the parts described above.



Again, several bodies lied on the bottom. This time, other than marbled newts, another amphibian was found at the bottom, an adult fire salamander, *Salamandra salamandra*; swollen up, but intact – a presumed drowning. Supposedly drowned fire salamanders had been collected on Site B the month before. Throughout this report, no relationship between these deaths is established. At this site and elsewhere, fire salamander deaths in pools were and are considered accidental.

Photos: dead fire salamander, intact.



Two or more newts were found on the vegetation by the tank, in noticeable decomposition. Unlikely to not have been spotted on the 11th, these perhaps died that following weekend already. The eviscerations for these confirmed every time. Ten bodies were collected.

Photo: the ten collected bodies.



At Site A, two particularly peculiar instances were noticed and photographed. The first concerned the gathering-like position of five newts on one of the inner corners, where a bit of water goes over the edge. These were positioned as if having moved there on their own, to die right after. The second oddity was another vertically hanging newt on a corner, similar to the one which had been seen the week before – now photographed before removal. This time more bodies were found on the immediate vegetation (just over the tank on an inner side), but perhaps simply because they were missed the week before. Some individuals had the tip of their tail slowly wriggling. A dead salamandrid larva was found as well, heavily disfigured, as if chewed – no photo was taken. Thirty-one bodies were collected.

Photos: the two particularly odd instances.



A total of forty-one bodies were collected on this day, amounting to an grand total of eighty-five adult individuals, all exhibiting the same characteristics with varying degree.

Photo: total from both sites (A and B) for February 18th.



February 19th

No more newts were collected from Sites A or B. More bodies were suspected on the bottom of the tanks, but these might have been covered with bottom debris, making them older possible cases instead of new ones. Each tank on Sites A and B did however reveal more bodies from certain angles (higher ground and avoidance of reflection) in their deeper, central sections; these bodies were inaccessible for manual collecting as they were too far away from the margin and too deep. The number on each tank (Sites A and B) was around five bodies each, raising the number to nearly one-hundred deaths. Again, no live adult newts were observed.

While thinking of what confluence of events could have caused this mortality, the author and colleague recalled a case of a dead newt from the month before, on January 28th. While walking by Site C, something wriggling was spotted in the water, near the margin. A marbled newt could be discerned, while the jerking seemed to be made by a leech. Once removed from the water, two leeches were seen; one of them well inside the body of the newt, apparently through a tear on its underside. Other than the curious circumstance of seeing the two animals in that setting, nothing more was thought of it. But now, rethinking it, it seemed clear that this newt had a ventral cut too, and that's what allowed the leeches to feed on it. Since photographs were taken, it was easy to confirm the similarity.

Photos: possibly the first newt with a ventral cut to be spotted – taken January 28th.



Recalling this, a walk was taken (on February 19th) to Site C to see if any newts could easily be spotted on the margin. Five newts were found in less than ten minutes or so, on a small part of the margin - the rest of the area is of less easy access. Ventral/lateral tearing was observed in all. Whatever had caused these deaths seemed to have likely happened on all three sites at around the same time, starting the month before.

Photos: the five newts quickly spotted at Site C.



February 25th and 26th

On these two days no further deaths were noticed. One body was spotted on the bottom of each tank (Sites A and B) but these were not collected. The absence of any more bodies or live adults was obviously thought of as caused by the rapid cull on the local population. The opportunity to witness anything more unfolding seemed to have passed.

Tanks (Site A and B) were checked again, as well as a covered water spring (within the circle of Site A on the map); larvae could be spotted in both and abounded in the latter, apparently fine.

Photos: circled salamandrid larvae at Site A – taken February 25th.



Photos: circled salamandrid larvae at a covered water spring – taken February 26th.



Two other short instances are considered relevant for these two days; they are mentioned below when discussing predators.

Additional information & speculation

Since the moment a large number of newts were noticed dead on the 11th, as written above, the quality or contamination of the water was thought of, even though live amphibians could clearly be seen. Because some of the bodies exhibited such obvious tearing and dismemberment, predators quickly became very suggestive, with a clear emphasis on birds for their ability to, imaginatively, puncture the skin in such a consecutive fashion. A number of reasons, gathering different causes, are perhaps needed for a full explanation.

Water contamination and microbiological pathology

Neither the author nor anyone present throughout had any kind of power of observation other than the conventional one; so that water contamination, bacterial and viral agents responsible for any part of the incident could not possibly be discerned. As stated above, no water analysis was or has been made; autopsies or other analysis of the cadavers have become impossible with decomposition.

Considering predators

The eurasian jay, *Garrulus glandarius*, was speculated upon the most because it is the only corvid thought to be resident in the area. The author speculates so on the observation that (some) corvid populations exclude populations of other species, or otherwise impose territorial constraints – and the jay seems ubiquitously present in the monastery area to the apparent exclusion of any other corvid. The ability of this bird to manifest this behavior raises understandable doubt, let alone as to how so many newts were hunted successfully and then *dropped* in the odd manners described, if one is to assume this species as the sole reason for the entirety of the observations. Here, the example of the impressively opportunistic and novel behavior of carrion crows, *Corvus corone*, was initially applied to jays – more on the origin of this comparison below.

The second suspect bird (no purpose to this enumeration) was the grey heron, *Ardea cinerea*. An individual of this species has been seldom spotted fleeing from Site C by the author's colleague, and was supposedly once seen (not around the time of the events in question) at Site A by a worker at the monastery. The ability of a heron to selectively pierce an animal as small as a newt is entirely doubtful, this, despite having a much longer reach. Grey herons might predate upon newts, but not in this way.

The third bird brought up was the common kingfisher, *Alcedo atthis*, this bird has been spotted in Site C, also seldom. Its ability to perform such a feat is also entirely doubtful, despite also predated upon newts, but larvae only.

Ducks, *Anas platyrhynchos*, are seen more commonly – always only one or two individuals. The moorhen, *Gallinula chloropus*, has also seldom been spotted. Both at Site C. Both, again, very doubtfully the cause.

The most commonly sighted bird of prey is the buzzard, *Buteo buteo*. The presence of the eurasian sparrowhawk, *Accipiter nisus*, is strongly suspected. None of the birds were even considered.

Small mammals were thought of, particularly to aid in imagining how several newts could be left as they were on a corner. But also to account for the heavy tearing on some bodies; perhaps suggestive of a mouth pulling on it while secure on paws. No credible examples were suggested.

No feathers, fur or any type of excrement were noticed on the tanks' (Site A and B) edges or nearby.

A horse sometimes comes in contact with the water (to drink) in Sites A and C.

The special case of crows

Whatever cause could have driven the newts to behave oddly – grossly speculating a reason to provide *easy* access to them, presuming it's needed – could have allowed the particular bird mentioned above (*C. corone*) to act and thus be thought of as the most likely culprit for the consumption of organs (and presumably a few limbs.) The analogous behavior here is drawn from the events in Hamburg, Germany (ca. 2005), also reported in Denmark, where the crows were responsible for over a thousand exploding-toad deaths. The toads, *Bufo bufo*, had their livers removed without any further damage, causing the toad to explode due to their defensive buffing posture combined with the anatomical anomaly caused by the missing organ.

A similar case involving deadly problem-solving for toads by crows happens in northern Australia where the crows have learned to eat the highly invasive cane toads by mostly flipping them around and puncturing their undersides. This behavior is also exhibited by (australian) magpies (presumably *Cracticus tibicen*, not a corvid.) Both these novel behaviors are apparently restricted to toads.

Toads are, obviously, not newts. Newts thus seem to be a bit of a stretch. However, marbled newts can hypothetically be caught entering or exiting bodies of water at specific times, like toads; a moment when predation by such an improvising predator could occur. And they share the toad's ability to produce dorsal defensive secretions.

The crows on the 25th

As if to stimulate the idea of possibility, or actually provide some skewed *evidence*, late in the morning, a small murder of crows, at least seven (a large enough group for the Braga region), were shortly observed on binoculars less than one kilometer away to the east. Increasingly louder cawing called attention to their position as they sped away; moments later, these, or part of these, individuals flew fast northwest, thus crossing below the horizon. Judging the cawing and apparent size of the birds, the raven (*C. corax*) is mostly excluded as possibly causing confusion.

Short questions on the 26th

After sighting the crows, the idea of jays emulating such behavior was put mostly aside. A few short questions were posed to the worker mentioned above, which, having spent twenty-six years performing outdoor work there and being the first to generally see the fields and the woods in the morning, and to notice animal activity, was thought to have relevant input. This worker, like everyone else there, reported that nothing like such deaths of newts was ever seen; or at the very least, one presumes, not on that scale. When asked about sighting crows, or whatever large black bird (corvid), the worker denied ever noticing (hearing or sighting) their presence anywhere around. This person is thought to have a fair enough ability of distinction of what's what in the air and on the ground, in broad terms at least. In any case, this could invite different extrapolations. As far as crows are concerned, it simply means they weren't observed by this individual – observations by other workers were not enquired, as they did not show interest in the incident.

Thinking of crows as perpetrators is here then considered the most likely avian cause, not the most likely cause per definition.

Human action

Human action was imagined, but the circumstances of this seem even stranger and harder to account for. One of the oddest things to explain is the disposition of the bodies on Sites A and B; not just the several newts at the corners, but the way in which they were scattered around at the bottom, including on the central depths of the tanks – something supposedly hard for a predator to do; and not necessarily easy for a human being. When applied to Site C, the access and opportunity to even catch newts in the water seems doubtful; it's easier to imagine the bodies were dropped there, brought from somewhere else, rather than found and killed.

As long as speculation remains open, human action is included as a possibility, or part of.

Conclusion

The author hopes the information that has been provided allows for a better degree of visualization of the sites, and their immediate surroundings, where this (or these) incident unfolded, and as such assists the resolution of the enigma.

Further deaths of newts, or anything remotely related, will be kept an eye on over the next few weeks. A pool (another tank at perhaps 400m from the central monastery building) might be checked when the opportunity arises; because it's both outside the monastery area and near enough – there's eagerness and curiosity to know how far the phenomenon reaches; at least if it has happened anywhere else. It is, of course, exciting to think that something like another crowish breakthrough might have started around this area. However, harder to interpret instances might of course be involved, perhaps requiring specific expertise to notice.

Downloading photographic material

All photographic material used here, along with the rest which amounts to about 177 photographs, can be downloaded singly or as a folder from the Google Drive link given here. The folder has individual photos of every collected newt body. All files were reasonably resized to accommodate a quick download.

Navigable Google Drive folder:

https://drive.google.com/folderview?id=0B37K_G9FbxeyaWN0YV84WUNOWIU&usp=sharing

In case there's trouble with file browsing, a zip folder download can be used:

https://drive.google.com/file/d/0B37K_G9FbxeydGhTRGFNSFR4dJA/view?usp=sharing

Versions

In the event this document needs to be updated for minor or gross, writing or factual errors, subsequent versions will be registered.

Version 1 – February 29th 2016