

## Dermocystid-like skin lesions in a European common frog (*Rana temporaria*)

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**Key words:** amphibian, anuran, dermocystid infection.

**RESUMEN:** un ejemplar de *Rana temporaria* hallado muerto en un pequeño curso de agua en el Parque Natural Saja-Besaya (Cantabria) presentaba numerosas lesiones nodulares cerradas en la piel. Las lesiones ( $N = 22$ ), de sección circular y con un diámetro de entre 1 y 3,5 mm, aparecían distribuidas tanto por el cuerpo como por la cabeza y las extremidades del animal, siendo más abundantes en las extremidades y en la región ventral; dos de ellas presentaban una coloración marrón oscura, las veinte restantes eran negras. Las lesiones tenían el aspecto comúnmente atribuido a *Dermocystidium*.

A dead European common frog (*Rana temporaria*) was found in a shallow stream at the Natural Park of Saja-Besaya (Cantabria, northern Spain; 43°14'N / 4°9'W; 408 masl) on 24 June 2023. The animal had a body length of 48,9 mm (Figure 1).

Numerous closed nodular cutaneous lesions were present on its body, head, and limbs (Figure 1). They were approximately circular in shape, and black except two that were dark brown. Most nodular lesions were ventrally located (binomial test;  $P = 0.026$ ; Table 1) and most of them in the limbs (Chi-square test;  $\chi^2 = 6.64$ ; 2 *df*;  $P < 0.05$ ; Table 1).

These skin lesions exhibited distinctive traits consistent with those induced by der-

mocystid infections (Duffus & Cunningham, 2010). The presence of dermocystid mesomycetozoans has been observed in anurans (Guyénot & Naville, 1922; Broz & Privora, 1952; Pascolini *et al.*, 2003; Pereira *et al.*, 2005) and urodeles (Pérez, 1907, 1913; González-Hernández *et al.*, 2010; Diego-Rasilla, 2017; Fiegna *et al.*, 2017; Galán & Dopereiro, 2017; Martínez-Silvestre *et al.*, 2017), often accompanied by the development of nodular-type skin lesions, and being reported as a significant cause of morbidity or mortality (Pascolini *et al.*, 2003; Pereira *et al.*, 2005; Feldman *et al.*, 2005; Duffus & Cunningham, 2010).

These pathogens are spore-forming organisms found within cysts, typically situated in the ventral dermis (Pascolini *et al.*, 2003;

**Figure 1:** A dead European common frog (*Rana temporaria*), as it was found in a shallow stream at the Natural Park of Saja-Besaya. Detailed view of some of the nodular-type ventral skin lesions at the upper left corner.

**Figura 1:** Una rana bermeja (*Rana temporaria*) muerta, tal como fue encontrada en un arroyo poco profundo en el Parque Natural de Saja-Besaya. Vista detallada de algunas de las lesiones cutáneas ventrales de tipo nodular en la esquina superior izquierda.



Photos F.J. Diego-Rasilla

Densmore & Green, 2007), as in the case reported here (Table 1). In the absence of histological or PCR evidence, the attribution of observed lesions cannot be confirmed 100%, therefore they have been regarded as being caused by a *Dermocystidium*-like aetiological agent. These tests are crucial because coinfections of dermocystid with chytrid fungi and ranavirus pathogens have been documented, compromising the carrier animal to the extent of mortality (Poynton & Whitaker, 2001; Ayres *et al.*, 2020; Sachs *et al.*, 2020). However, this cannot be confirmed in the present case. Usually, these infections tend to be self-limiting and nonfatal, healing within four to eight weeks following the onset of clinical symptoms (Densmore & Green, 2007). However, elevated mortality rates in certain populations of *Notophthalmus viridescens* have been linked to infections caused by mesomycetozoans (Raffel *et al.*, 2008). Apart from these lesions, the European common frog specimen found

**Table 1:** Number, mean diameter of lesions and distribution.

**Tabla 1:** Número, diámetro medio de las lesiones y distribución.

Localization	Mean	Standard deviation	N
Ventral Head	1.15	0.21	2
Body	1.82	0.62	5
Limbs	1.87	0.89	9
Dorsal Head	3.05	0.21	2
Limbs	2.13	0.43	4

dead did not present any other macroscopical signs that could be related to its death; however, the involvement of these lesions in its death is an option that remains unresolved as complementary diagnostic tests have not been carried out.

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## REFERENCES

- Ayres, C., Acevedo, I., Monsalve-Carcaño, C., Thumsova, B. & Bosch, J. 2020. Triple dermocystid-chytrid fungus-ranavirus co-infection in a *Lissotriton helveticus*. *European Journal of Wildlife Research*, 66: 41.
- Broz, O. & Privora, M. 1952. Two skin parasites of *Rana temporaria*: *Dermocystidium ranae* Guyénot & Naville and *Dermosporidium granulosum* n.sp. *Parasitology*, 42: 65–69.
- Densmore, C.L. & Green, D.E. 2007. Diseases of amphibians. *ILAR Journal*, 48: 235–254.
- Diego-Rasilla, F.J. 2017. Parasitic dermic cyst in *Mesotriton alpestris* (Caudata: Salamandridae). *Boletín la Asociación Herpetológica Española*, 28: 56–57.
- Duffus, A.L.J. & Cunningham, A.A. 2010. Major disease threats to European amphibians. *Herpetological Journal*, 20: 117–127.
- Feldman, S.H., Wimsatt, J.H. & Green, D.E. 2005. Phylogenetic classification of the frog pathogen *Amphibiothecum* (*Dermosporidium*) *penneri* based on small ribosomal subunit sequencing. *Journal of Wildlife Diseases*, 41: 701–706.
- Fiegna, C., Clark, C.L., Shaw, D.J., Baily, J.L., Clare, F.C., Gray, A. *et al.* 2017. Pathological and phylogenetic characterization of *Amphibiothecum* sp. infection in an isolated amphibian (*Lissotriton helveticus*) population on the island of Rum (Scotland). *Parasitology*, 144: 484–496.
- Galán P. & Dopereiro, D. 2017. Infección por dermocistidios (*Dermocystida*) en una población de *Lissotriton helveticus* de A Limia (Ourense, Galicia). *Boletín de la Asociación Herpetológica Española*, 28: 74–77.
- González-Hernández, M., Denoël, M., Duffus, A.J.L., Garner, T.W.J., Cunningham, A.A. & Acevedo-Whitehouse, K. 2010. Dermocystid infection and associated skin lesions in free-living palmate newts (*Lissotriton helveticus*) from Southern France. *Parasitology International*, 59: 344–350.
- Guyénot, E. & Naville, A. 1922. Un nouveau Protiste, du genre *Dermocystidium*, parasite de la grenouille, *Dermocystidium ranae* nov. spec. *Revue Suisse de Zoologie*, 29: 133–145.
- Martínez-Silvestre, A., Fernandez-Guiberteau, D., Perez-Sorribes, L. & Velarde, R. 2017. Infección por dermocistidios en *Lissotriton helveticus* en Cataluña: nuevos datos y apuntes sobre su diagnóstico. *Boletín de la Asociación Herpetológica Española*, 28: 66–70.
- Pascolini, R., Daszak, P., Cunningham, A.A., Tei, S., Vagnetti, D., Bucci, S. *et al.* 2003. Parasitism by *Dermocystidium ranae* in a population of *Rana esculenta* complex in Central Italy and description of *Amphibiocystidium* n. gen. *Diseases of aquatic organisms*, 56: 65–74.

- Pereira, C.N., Di Rosa, I., Fagotti, A., Simoncelli, F., Pascolini, R. & Mendoza, L. 2005. The pathogen of frogs *Amphibiocystidium ranae* is a member of the order Dermocystida in the class Mesomycetozoa. *Journal of Clinical Microbiology*, 43: 192–198.
- Pérez, C. 1907. *Dermocystidium pusula*, organisme nouveau parasite de la peau des tritons. *Comptes Rendus de Seances de Societe de Biologie*, 63: 445–446.
- Pérez, C. 1913. *Dermocystidium pusula*: parasite de la peau des tritons. *Archives de Zoologie Experimentale et Generale*, 52: 343–357.
- Poynton, S.L. & Whitaker, B.R. 2001. Protozoa and metazoa infecting amphibians. 193–221. In: Wright, K.M. & Whitaker, B.R. (eds.), *Amphibian medicine and captive husbandry*. Krieger Publishing Company. Malabar. Florida. USA.
- Raffel, T.R., Bommarito, T., Barry, D.S., Witiak, S.M. & Shackelton, L.A. 2008. Widespread infection of the Eastern red-spotted newt (*Notophthalmus viridescens*) by a new species of *Amphibiocystidium*, a genus of fungus-like mesomycetozoan parasites not previously reported in North America. *Parasitology*, 135: 203–215.
- Sachs, M., Schulckebier, R., Poll, K., Schulz, V., Sabino-Pinto, J., Schmidt, E. et al. 2020. Evidence of *Batrachochytrium dendrobatidis* and other amphibian parasites in the Green toad (*Bufo viridis*), syntopic amphibians and environment in the Cologne Bay, Germany. *Salamandra*, 56(3): 275–284.