



## Malformed spores and pollen across the Triassic–Jurassic boundary

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Under specific circumstances, the reproductive cycle in terrestrial plants can be interrupted or disturbed resulting in increased amounts of abnormal spores and/or pollen. Disturbances can include natural environmental stress due to sudden changes related to weather conditions, e.g. drought, water logging, temperature changes, in which case the environmental stress is seasonal and may only affect parts of a population. If abnormal spore/pollen formation occurs on a wider scale it can be related to severe pollution of the atmosphere and soils, leading not only to prematurely aborted spores, retained tetrads, or naturally occurring polyploids, but also to mutagenic changes to the mother plants and the reproductive cells. Previous studies have noted increased abundances of aberrant spores and pollen during extinction events linked to flood basalt volcanism, and these have mainly been suggested to be the result of mutagenic effects of a thinned ozone layer (Visscher et al., 2004; Foster and Afonin, 2005; Filipiak and Racki, 2010; Kürschner et al. 2015). One recent study discussed volcanic pollution from the Siberian Traps as a cause for the occurrence of aberrant spores and pollen across the Permian–Triassic transition (Hochuli et al. 2017), but did not explore the teratology in detail. Here, we show detailed examples of spore/pollen teratology from several localities across NW Europe (Denmark, Sweden, Germany, UK, Luxemburg) spanning the Rhaetian to Hettangian and discuss the repeated occurrence of teratogenic forms and their possible causalities.

### References

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