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## Biogenic iron liberated during decay initializes highly detailed soft tissue pyritization in Burgess Shale-type biotas

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During the last decade, experimental taphonomists have explained enigmatic structures in fossils from Burgess Shale-type biotas (BSTs) based on patterns of animal decay in laboratory aquariums. For instance, the fast decay of some features such as nervous systems contrasts with their discovery in Palaeozoic BST fossils. Given that many of the enigmatic structures are pyritized, or consist of an association of both pyrite and organic matter, we explored pyrite and organic matter distributions using Raman spectroscopy in unweathered sediments with soft-tissue BST preservation. Our investigations suggest that a highly reactive biogenic iron source may have played a role in initiating pyritization, as soon as decay started, independently from abiotic iron in the sediment. The model we propose suggests that little morphological information is lost from iron-rich tissues even if these structures are the most prone to decay. Based on chemical signatures of biological tissues, we hypothesize that extensive decay may lead, counterintuitively, to exquisite morphological preservation in some BSTs. It also resolves the apparent discordance between experimental taphonomy and descriptive palaeontology on the affinities of pyritized features in fossils from Burgess Shale-type biotas.

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## Untangling the fossil record of Rhinocerotidae

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Extant rhinoceros species represent but a vestige of the great diversity that the Family Rhinocerotidae attained during the Cenozoic. Recent taxonomic reviews permit an updated compilation of the first and last appearance data in order to estimate net diversity and turnover rates. Our results show several taxonomic replacements along seven main faunal turnovers have been described in detail, showing an episodic pattern of strong turnover pulses. Overall net diversity rates in Rhinocerotidae differ from continental results thus outlining different ecological and regional scenarios.