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Abstracts

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CARBONIFEROUS	Pennsylvanian	Upper	Gzhelian
			Kasimovian
		Middle	Moscovian
		Lower	Bashkirian
	Mississippian	Upper	Serpukhovian
			Visean
		Lower	Tournaisian
	PERMIAN	Lopingian	Changhsingian
			Wuchiapingian
Guadalupian		Capitanian	
		Wordian	
		Roadian	
Cisuralian		Kungurian	
		Artinskian	
		Sakmarian	
		Asselian	

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Deep-water brachiopods at the Devonian-Carboniferous Boundary (Hangenberg Crisis): the Thuringian data (Germany)

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Worldwide, the mostly rare Famennian and basal Tournaisian (Hastarian) brachiopods of aphotic zones (cephalopod limestones, entomozoid ostracod shales) remain poorly known. MOTTEQUIN et al. (2019)'s recent study of the brachiopods from the Famennian and Hastarian Gleitsch Formation, which outcrops in several sections located in the Saale valley to the southeast of Saalfeld (Schwarzburg Anticlinorium, SE Thuringia), highlighted the evolution of their diversity during this critical period for the whole biosphere.

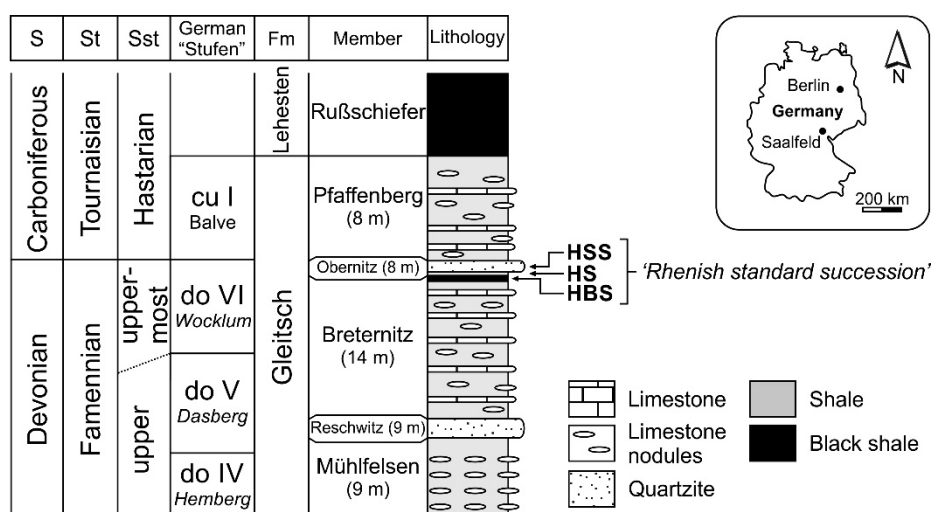


Fig. 1: Famennian and basal Tournaisian lithostratigraphy (with indication of thickness for each member) in the basinal facies developed on the southeastern flank of the Schwarzburg Anticlinorium in Thuringia (Saalfeld area) (BARTZSCH et al. 2008) and correlation with the "Rhenish standard succession" (KAISER et al. 2016). Abbreviations: Fm = Formation, HBS = Hangenberg Black Shale, HS = Hangenberg Shale, HSS = Hangenberg Sandstone, S = System, St = Stage, Sst = Substage.

The Gleitsch Formation (Fig. 1) corresponds to shales with levels of nodular limestones which yielded, besides brachiopods, a rich pelagic and benthic fauna (e.g., bivalves, cephalopods, trilobites). The environment was generally quiet with some periods of agitation and bottom currents, reflected notably by the presence of millimetric silty and sandy layers, crinoidal lenses and accumulations of dissociated valves of posidoniid bivalves (*Guerichia*) and fragments of trilobites (WEYER 1979). At least ten brachiopod species are recognized within the Breternitz Member (late and latest Famennian; Fig. 1) (MOTTEQUIN et al. 2019). The smooth or poorly ornamented rhynchonellids (e.g., *Hadyrhyncha*, *Novaplatisrostrum*, *Rozmanaria*) (Fig. 2.1–6) are clearly predominant (40 % of the whole assemblage) as is the case elsewhere in similar and contemporaneous facies from the southern margin of Laurussia and the northern margin of Gondwana. In contrast, spire-bearers (Athyriridida, Spiriferida) are scarce and the presence of terebratulids within the Breternitz Member is noteworthy. The onset of the Hangenberg Crisis is marked by an anoxic black shale horizon at the top of the Breternitz Member (equivalent to the Hangenberg Black Shale) followed by the

Obernitz Member mostly consisting of turbiditic sandstones (equivalent to the Hangenberg Shale and the Hangenberg Sandstone); both horizons did not yield brachiopods. The Hastarian Pfaffenberg Member yielded at least 15 species of brachiopods which are of smaller size (width rarely exceeding 10 mm) than those from the Breternitz Member (MOTTEQUIN et al. 2019). Productids and spiriferids (Figs. 2.7–8; 2.11–12) represent almost 50 % of the whole assemblage whereas the rhynchonellids (Fig. 2.9–10) are scarce. In Thuringia, a probable complete turnover is recorded among the rhynchonelliform brachiopods at the base of the Hastarian with a rapid post-Hangenberg recovery including species belonging to pre-existing genera and to new ones. Based on PÉREZ-HUERTA & SHELTON (2006)'s discussion, the nutrient availability, the water oxygenation, and the depth are most probably the biotic and physicochemical factors that played the most important roles in controlling the size of brachiopods in the Thuringian deep-water environments. The small size of the Tournaisian species reflects environmental conditions that were as stressful as previously during the first steps of the post-Hangenberg Crisis and could result from heterochronic processes. Nonetheless, these aphotic environments are colonized from now on by a more diverse brachiopod panel because of the dramatic decline of the rhynchonellids which were so abundant during the Late Devonian. Although the brachiopod faunas from the contemporaneous succession of the Rhenish Mountains have not been studied in detail, small collections tend to show that the faunas from Thuringia and the Rhenish Mountains share great similarities from the generic viewpoint.

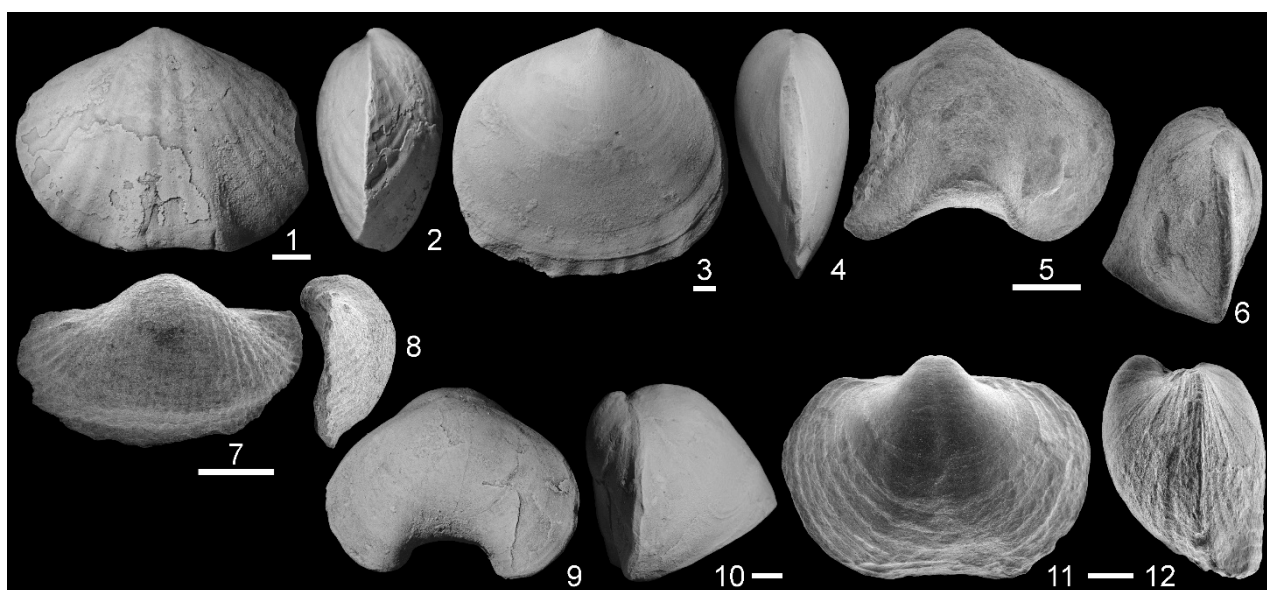


Fig. 2: Devonian (Breternitz Member, Famennian, 1–6) and Carboniferous (Pfaffenberg Member, Tournaisian, 7–12) brachiopods (in ventral and lateral views) from SE Thuringia (modified from MOTTEQUIN et al. 2019). 1–2. *Hadyrhyncha hadyensis*. 3–4. *Novaplatisrostrum* cf. *fibrosissimum*. 5–6. *Rozmanaria equitans* (SEM). 7–8. *Productina saalfeldensis*. 9–10. *Thuringorhynchus pseudoequitans*. 11–12. *Crassumbo germanicus* (SEM). Scale bars: 2 mm.

BARTZSCH, K., BLUMENSTENGEL, H. & WEYER, D. (2008): Oberdevon des Thüringischen Schiefergebirges. – Schriftenreihe der Deutschen Gesellschaft für Geowissenschaften, **52**: 59–87.

KAISER, S.I., ARETZ, M. & BECKER, R.T. (2016): The global Hangenberg Crisis (Devonian–Carboniferous transition): review of a first-order mass extinction. – Geological Society London, Special Publications, **423**: 387–437.

MOTTEQUIN, B., BARTZSCH, K., SIMON, E. & WEYER, D. (2019): Brachiopod faunas from the basinal facies of southeastern Thuringia (Germany) before and after the Hangenberg Crisis (Devonian–Carboniferous boundary). – Palaeontologia Electronica, **22.1.23A**: 1–54.

PÉREZ-HUERTA, A. & SHELTON, N.D. (2006): Pennsylvanian sea level cycles, nutrient availability and brachiopod paleoecology. – Palaeogeography, Palaeoclimatology, Palaeoecology, **230**: 264–279.

WEYER, D. (1979): Biostratigraphy of the Devonian–Carboniferous boundary in the German Democratic Republic. – Comptes Rendus du 8^e Congrès International de Stratigraphie du Carbonifère (Moscow 1975), **3**: 97–104.