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Insects from the Buntsandstein of Lower Franconia and Thuringia

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Abstract Upper Buntsandstein deposits (mainly *Myophoria* beds, Röt Formation, Early Anisian) in Lower Franconia and Thuringia have yielded a rather rich insect fauna comprising ca. 300 insect specimens assigned to ten orders: Archaeognatha (Dasyleptidae), Ephemeroptera, Blattodea, Grylloblattida, Orthoptera, Hemiptera, Glosselytrodea, Coleoptera, Mecoptera and Diptera. The systematic list of recorded insects is provided. Two species are identified as *Triassodotes vogesiacus* Sinitshenkova, Marchal-Papier, Grauvogel-Stamm et Gall, 2005 (Ephemeroptera: Misthodotidae) and *Pseudopolycentropus triasicus* Papier, Nel et Grauvogel-Stamm, 1996 (Mecoptera), which were previously described from the “Grès à Voltzia” Formation of the Vosges, the stratigraphically closest insect fauna. All grylloblattid specimens are identified as *Chauliodites picteti* Heer, 1864 (Chaulioditidae), known previously from the Middle Buntsandstein of Gödewitz, Saxony-Anhalt. The new genus and species

Hammephemera pulchra Sinitshenkova, gen. et sp. n. (Ephemeroptera: Sharephemeridae) is described.

Keywords Triassic insects · Coleoptera · Ephemeroptera · Grylloblattida · Mecoptera · Upper Buntsandstein · Lower Franconia · Thuringia

Kurzfassung Der Oberen Buntsandstein (hauptsächlich aus Myophorien-Schichten, Röt Formation, Unter-Anisium) in Unterfranken und Thüringen bringt ziemlich reiche Insektenfauna, in der ca. 300 Exemplare festgestellt wurden, die zu zehn Ordnungen gehören: Archaeognatha (Dasyleptidae), Ephemeroptera, Blattodea, Grylloblattida, Orthoptera, Hemiptera, Glosselytrodea, Coleoptera, Mecoptera und Diptera. Zwei Arten, *Triassodotes vogesiacus* Sinitshenkova, Marchal-Papier, Grauvogel-Stamm et Gall, 2005 (Ephemeroptera: Misthodotidae) und *Pseudopolycentropus triasicus* Papier, Nel et Grauvogel-Stamm, 1996 (Mecoptera) sind auch in der stratigraphisch nächsten Insektenfauna der “Grès à Voltzia” Formation der Vogesen verbreitet. Alle Grylloblattiden-Reste werden zu *Chauliodites picteti* Heer, 1864 (Chaulioditidae) gestellt. Neu aufgestellt werden eine neue Gattung und Art der Sharephemeridae (Ephemeroptera): *Hammephemera pulchra* Sinitshenkova, gen. et sp. n.

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Schlüsselwörter Triassische Insekten · Coleoptera · Ephemeroptera · Grylloblattida · Mecoptera · Oberer Buntsandstein · Unterfranken · Thüringen

Introduction

Brauckmann and Schlüter (1993) described the insect assemblage of Hammelburg, Unterfranken (Lower

Franconia), which is hitherto the richest occurrence from the European Buntsandstein except for the Vosges (“Grès à Voltzia” Formation of the Upper Buntsandstein, NE France; see for example Gall and Grauvogel-Stamm 2005). They mentioned 17 specimens from the *Myophoria* beds (uppermost Röt, Early Anisian), belonging to Blattodea (*Triasoblatta?* sp.), Coleoptera: Permosynidae (cf. *Ademosyne* sp., aff. *Meseumolpites* sp.), Hemiptera: Auchenorrhyncha (*Heseneuma hammelburgensis* Brauckmann et Schlüter, 1993; *Saaloscytina perreticulata* Brauckmann et Schlüter, 1993; Ipsviciidae gen. et sp. indet.), Hemiptera: Sternorrhyncha (*Dubiaphis curvata* Brauckmann et Schlüter, 1993), Heteroptera fam., gen. et sp. indet. and also Planipennia fam., gen. et sp. indet. The latter three are referred here to Diptera, Hemiptera indet. (determined by D.E. Shcherbakov), and Grylloblattida: *Chauliodites* Heer, 1864, respectively.

The number of fossil insects collected from Hammelburg to other Buntsandstein outcrops in Lower Franconia and Southern Thuringia has greatly increased in recent years owing to the activity of the working group “Mainfränkische Trias” from Markt Euerdorf, Unterfranken, headed by Jürgen Sell. This collection includes more than 300 specimens by now, assigned to ten orders: to the orders listed above, Ephemeroptera, Glosselytrodea, Orthoptera, Mecoptera, Diptera and Archaeognatha were added.

In addition, Ansoerge and Brauckmann (2008) recorded a grylloblattid insect from the “Strohgelbe Kalke” of Gambach am Main, one of the localities considered here, and identified it as *Chauliodites picteti* Heer, 1864. The total list of insects recorded from the Upper Buntsandstein of Lower Franconia and Southern Thuringia adjusted for the redefining of Brauckmann and Schlüter’s types is provided below.

Archaeognatha: Dasyleptidae: *Dasyleptus* sp.
 Ephemeroptera: Misthodotidae:
Triassodotes vogesiacus Sinitshenkova, Marchal-Papier, Grauvogel-Stamm et Gall, 2005
 Ephemeroptera: Sharephemeridae:
Hammephemera pulchra Sinitshenkova, gen. et sp. n.
 Blattodea: Mesoblattinidae: ?*Triasoblatta* sp.
 Grylloblattida: Chaulioditidae:
Chauliodites picteti Heer, 1864
 Orthoptera fam., gen. et sp. indet.
 Hemiptera: Auchenorrhyncha: Saaloscytinidae:
Saaloscytina perreticulata Brauckmann et Schlüter, 1993
 Hemiptera: Auchenorrhyncha incertae sedis:
Heseneuma hammelburgensis Brauckmann et Schlüter, 1993
 Hemiptera: Auchenorrhyncha: Ipsviciidae gen. et sp. indet.
 Coleoptera: ?Adephaga: Triaplidae: *Triaplus* sp.
 Coleoptera: Archostemata:

continued

Cupedidae: *Notocupes* sp.
 Tricoleidae indet.
 Permosynidae (formal taxa):
Ademosyne sp.
Ulomites sp.
 Schizocoleidae (formal taxa):
Polysitum sp.
Pseudohydrophilites sp.
Strongulites sp.
Tillyardiopsis sp.
Adikia sp.
Metriorhynchus sp.
Wollastonia sp.
Shepherdia sp.
Mesolobites sp.

Glosselytrodea: Jurinidae (s.l.) gen. et sp.

Mecoptera: Pseudopolycentropodidae:

Pseudopolycentropus triasicus Papier, Nel et Grauvogel-Stamm, 1996

Diptera:

Dubiaphis curvata Brauckmann et Schlüter, 1993

Diptera gen. et sp.

All the new specimens referred to as SMTE are stored in the collection “Sammlung Mainfränkische Trias” in Markt Euerdorf, Unterfranken. Specimen MHI 1486 is deposited in the Dr. Hans Hagdorn’s collection in the Muschelkalkmuseum Ingelfingen, Baden-Württemberg.

Geological and stratigraphical setting

After being classified as Formation s7, the Röt-Formation (Upper Buntsandstein), was divided into four subformations. Röt 4 Subformation (Table 1) consists of “Rötquarzschiefer,” “Obere Röttonsteine” and “Myophorienschichten,” and corresponds to the subformation s7–4 (resolution no. 61/66 of the Permian-Triassic Subcommission, 2006/2007).

“Rötquarzschiefer” are interpreted as having been developed in the tidal area (Geyer 2002) and correspond to the beginning of transgressive system tracts of Lower Muschelkalk (Aigner and Bachmann 1992).

The depositional environment of reddish silty clay marls of the “Obere Röttonsteine” is supposed to be similar to the recent playa/sabkha deposits, which were sometimes flooded by marine incursions. In the upper third section of the “Obere Röttonsteine” the *vulgaris/costata* bed (isochronous to the “Dolomitischen Grenzbank” in Thuringia)

Table 1 Stratigraphic division of the Upper Buntsandstein (Röt 4) in Lower Franconia and South Thuringia

Chrono - stratigr.	Bio - stratigr.	Lithostratigraphy				
		Lower Franconia Mahler et al (1990), Mahler and Sell (2011)		South Thuringia Frantzen (1882), Mägdefrau (1957), Seidel (1978), Mahler and Sell (2011)		
Anisian	Bithynian	Assemblage zone <i>Beneckeia buchii</i> - <i>Myophoria vulgaris</i> - <i>Dadocrinus</i>	Jena-Formation	Grenzgelbkalkstein to 1.00 m	Grenzgelbkalkstein to 0.30 m	
			Röt 4 Subformation	Obere Röttonsteine 25.10 – 27.30 m	Strohgelbe Kalke 0.50 m	Strohgelbe Kalke 0.50 m
					Obere Dentritenschichten 3.00 m	Obere Dentritenschichten 3.60 m
					Rotes Zwischenmittel 4.70 – 6.50m	Myophorientone 2.00 m
					Untere Dentritenschichten 2.25 – 4.50 m	Rotes Zwischenmittel to 5.00m
	Aegean	Assemblage zone <i>Costatoria costata</i> - <i>Beneckeia tenuis</i>	Röt 4 Subformation	Obere Röttonsteine 25.10 – 27.30 m	Myophorientone 2.90 m	
					Myophorienplatten 4.50 m	
					2 Glaukonitbänke 1.30 m	
					gray and green marlstone 7.00 m	
					Vulgarisdolomit 0.15 m	
Aegean	Assemblage zone <i>Costatoria costata</i> - <i>Beneckeia tenuis</i>	Röt 4 Subformation	Obere Röttonsteine 25.10 – 27.30 m	variegated marlstone 6.00 m		
				Knollengipsterrasse II 1.00 m		
				variegated marlstone 3.00 m		
				Dolomitische Grenzbank 0.10 m		
				red marlstone 4.00 m		
Aegean	Assemblage zone <i>Costatoria costata</i> - <i>Beneckeia tenuis</i>	Röt 4 Subformation	Obere Röttonsteine 25.10 – 27.30 m	Subundatabank 0.10 m		
				variegated marlstone 4.00 m		
				marlstone with Knollengipsterrasse I 10.00 – 12.00 m		
				whitish, greenish, reddish up to purple quartzite cemented sandstones, in the north-eastern Lower Franconia two sandstone wedges separated by 6.70 m thick red-brown, purple to brick red mudstones		
				Obere Rote Schichten 7.00 – 10.00 m		

forms the most important key horizon in the Upper Buntsandstein in Lower Franconia (Mahler and Sell 1993).

The layers above the “*vulgaris/costata*” bed are characterized by some distinctive green to grey-yellow reduced horizons separated by red-brown, silty, crumbly

clay marls. The “Münnerstädter bank” with *Pseudocorbula subundata*, *Saurichthys* sp., vertebrate and insect remains along with the *vulgaris/costata* bed is the horizon with the richest content of fossils within the “Obere Röttonsteine.”

The “Myophorienschichten” (Myophoria beds) form the uppermost part of the Buntsandstein section. In Lower Franconia they begin by the “Untere Dendritenschichten,” an interbedding of green-grey mudstones and marls, at the base with glauconitic material (Mahler et al. 1990), which are overlaid by sandstones separated by thin clay marl layers. The terminal bed of grey-green mudstones of 0.20–0.80 m thickness (“Myophorien-Hauptbank”: Schuster 1936) with bivalves, conchostracans, decapods and rare insect remains (beetle elytra) extends from southern Thuringia to northern Baden-Württemberg.

The overlaying, maximally 6.5 m thick, “Rotes Zwischenmittel” is an equivalent of Myophorientone of the Thuringian Basin. It is formed mainly by red clay marls, in which spreite burrows (*Rhizocorallium* sp.) are rarely to be found.

The “Rotes Zwischenmittel” are followed by the “Obere Dendritenschichten,” a sequence of interbedded gray-gray-green and yellow clay marls, mudstones and sandstones. At the top there are intraformational mudstone/marlstone breccias up to 0.50 m thickness, penetrated by calcite veins, often with halite crystals. In contrast to the “Untere Dendritenschichten,” bivalves here are rare and small sized. Most commonly lingulids, vertebrate remains (particularly *Saurichthys* sp.), crustaceans (*Triops* sp., conchostracans), and plant and insect remains are found.

The “Strohgelbe Kalke” form the top of the *Myophoria* beds. Yellow-grey to straw-yellow dolomitic marls to mudstones contain mainly conchostracans, plant and insect fossils.

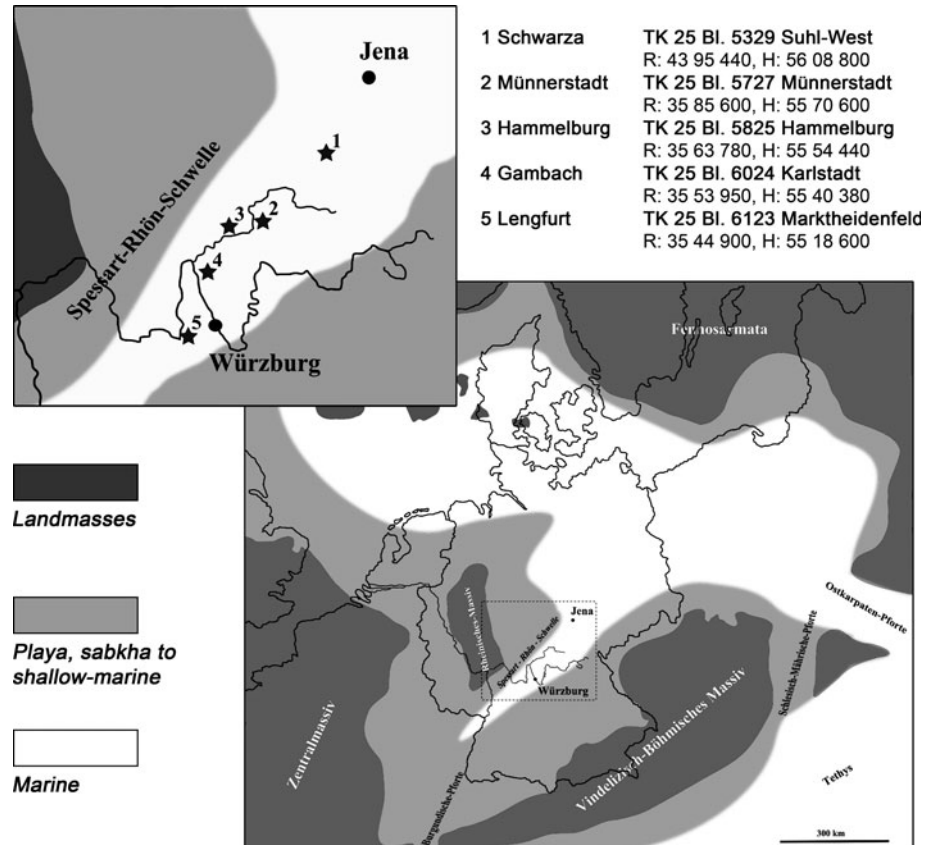
After Kozur (1974) the *Myophoria* beds are considered to be the biostratigraphic equivalent of the “Grès à Voltzia” Formation in the southwest and of the lower Gogoliner Schichten Formation in the east. However, the biostratigraphic correlation of the “Grès à Voltzia” Formation is based only on the occurrence of *Myophoria vulgaris*, which confirms at best the Bithynian age.

Localities and paleogeography

In the early Triassic the Germanic Basin resembled to a great extent that of the Zechstein sea. Due to tectonic processes at the beginning of the Anisian, a connection to the Tethys basin was established via the East Carpathian Gate (Fig. 1).

The marine sediments of the lower “Rötkalk” (equivalent of the “Dolomitischen Grenzbank” of Thuringia) with crinoids, *Costatoria costata* and *M. vulgaris* were deposited in areas of the East Carpathian Gate. In contrast, from the time of the formation of the *vulgaris/costata* bed, the region between Jena and Würzburg was situated within an area characterized by the frequent change of playa-

Fig. 1 Paleogeography of the Germanic Basin during the Upper Buntsandstein (Röt 4). Modified after Ziegler (1990). 1–5, insect localities



sabkha- and shallow-marine settings. This assumption, hitherto predominantly justified lithologically, is confirmed particularly by the frequent co-occurrence of terrestrial/freshwater, brackish and marine organisms.

Composition and taphonomy of insect assemblages

The ordinal composition of the insect collections from Upper Buntsandstein localities housed at the SMTE is summarized in the Table 2. The incomplete or poorly preserved specimens that cannot be definitely assigned to any particular order are listed as *incertae sedis* and excluded from percentage counts.

All assemblages are strongly biased, with the Coleoptera comprising from 48 to 78% of collected material. They are represented mainly by isolated elytra (or rarely by isolated thoracic fragments); among other insects the strongly sclerotized elements such as tegmina or their parts (isolated clavi) of Auchenorrhyncha and Blattodea also prevail. Wings of other insects, as well as whole insects including beetles, are very rare.

Assemblages enriched with robust elytra of beetles, cockroaches, and cicadas, are typical for allochthonous taphocoenoses with a long transportation of remains by flowing water (Zherikhin 2002). Though some schizocoleid coleopterans are presumed to be surely aquatic, they are taphonomically similar to other beetles and are apparently allochthonous as well. The only possibly autochthonous elements in the assemblage are quite numerous *Dasyleptus*

fossils (Fig. 2) found in the “Obere Dendritenschichten” of Hammelburg. They are mostly completely preserved (not as molting casts), including a number of specimens buried clustered on a small piece of rock. The data available imply at least a semiaquatic lifestyle of *Dasyleptus* (Rasnitsyn 1999; Rasnitsyn et al. 2004). There is no evidence of other aquatic insects, e.g., mayfly nymphs, which in contrast are very abundant in the Vosges.

The insect assemblage of the Schwarza locality rather differs from other regions: Here three rather complete grylloblattid wings (in other localities grylloblattids are represented mostly by wing fragments) and a fragment of large orthopteran wing are found among a total of ten insect fossils. The fossil content of the Buntsandstein section of Schwarza has not yet been prospected in detail, but owing to these finds it looks to be the most promising locality for fossil insects.

Coleoptera

Beetles are mostly represented by diverse Schizocoleidae and Permosynidae. Among the beetles determined as cf. *Ademosyne* sp. by Brauckmann and Schlüter, only two specimens may actually belong to this genus (SMTE, 5825/2-43, 5825/2-31), while most others are rather similar to *Ulomites* Dunstan, 1924 (in Tillyard and Dunstan 1924), and one specimen is referable to *Shepherdia* Dunstan, 1924 (in Tillyard and Dunstan 1924) (Schizocoleidae). The specimen identified as aff. *Meseumolpites* sp. by Brauckmann and Schlüter belongs most probably to the genus

Table 2 Distribution of insect orders in Upper Buntsandstein localities

Site	Lengfurt		Gambach		Hammelburg**				Münnerstadt		Schwarza	
	Strohgelbe Kalke		Strohgelbe Kalke		Ob. Dendritenschichten	Strohgelbe Kalke			Münnerstädter bank		Ob. Dendritenschichten	Strohgelbe kalke
Order	Expl.	%	Expl.	%	Expl.	%	Expl.	%	Expl.	%	Expl.	Expl.
Archaeognatha	–	–	–	–	>20	–	–	–	–	–	–	–
Ephemeroptera	1	2.2	–	–	1	2.1	–	–	–	–	–	–
Blattodea	3	6.7	10	8.7	3	6.3	6	10	4	17.4	–	–
Grylloblattida	5	11.1	1	0.9	–	–	3	5	–	–	3	1
Orthoptera	–	–	–	–	–	–	–	–	–	–	1	–
Hemiptera	1	2.2	17	14.8	8	16.7	20	33.3	1	4.3	–	–
Glosselytrodea	–	–	–	–	–	–	1	1.6	–	–	–	–
Coleoptera	34	75.6	87	75.6	36	75.0	29	48.3	16	78.3	4	–
Mecoptera	–	–	–	–	–	–	1	1.6	–	–	–	–
Diptera	1	2.2	–	–	–	–	–	–	–	–	–	–
All identifiable*	45	100	115	100	48	100	60	100	23	100	8	1
<i>Incertae sedis</i>	2		2		4		10		1		1	

* Except Dasyleptidae (Archaeognatha)

** In addition, two specimens of Coleoptera are found in the “Untere Dendritenschichten” of Hammelburg

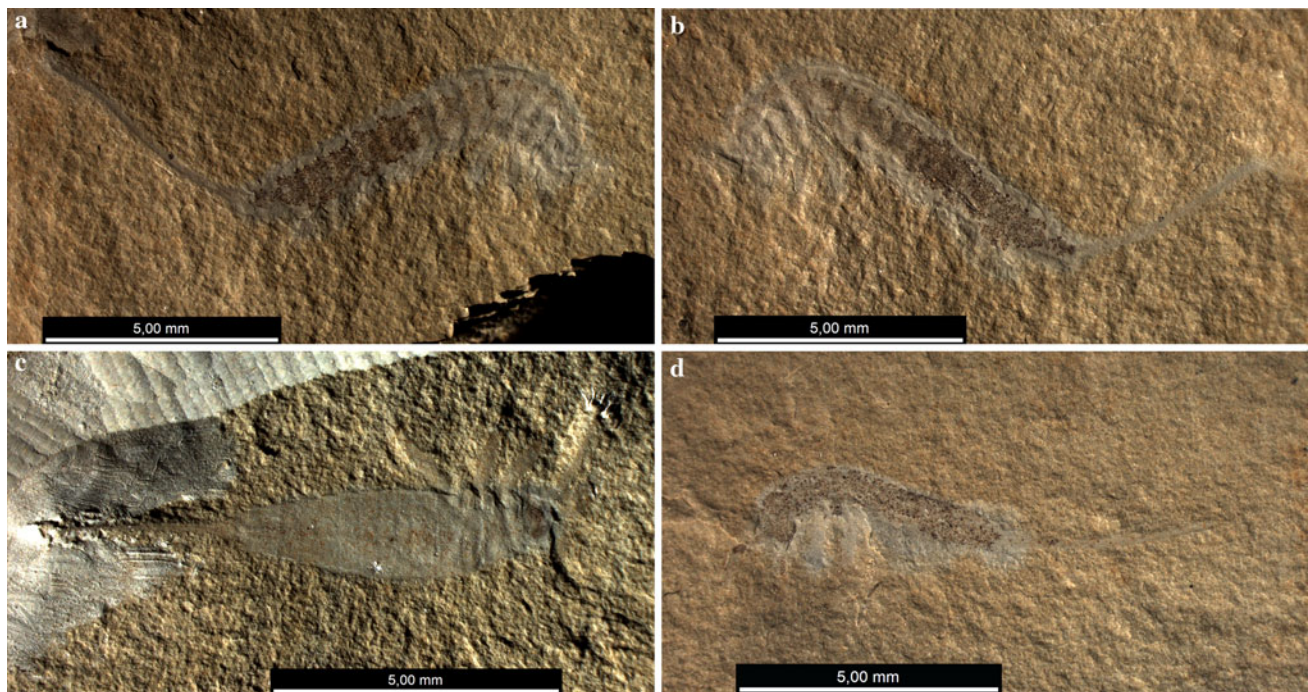


Fig. 2 *Dasyleptus* sp.; early Middle Triassic (Upper Buntsandstein, Röt Fm, “Strohgelbe Kalke”, Lower Anisian); Hammelburg, Lower Franconia. **a–b** Part and counterpart of specimen SMTE, 5825/2-436,

lateral view. **c** Specimen SMTE, 5825/2-364, *dorsal view*. **d** Specimen SMTE, 5825/2-417, *lateral view*

Triaplus Ponomarenko, 1977 (in Arnoldi et al. 1977) (Triaplidae): no other known Triassic beetles had their opistognathous head so deeply bent under the prothorax.

Other coleopterans are represented by rare Cupedidae (single specimen of *Notocupes* sp.) and indeterminate Tricoleidae. There are not any Polyphaga as well as true Adephega. Most determined genera are common in the Middle-Late Triassic and Early Jurassic.

The list of determined genera is provided in the Introduction section. But since many specimens are represented by poorly preserved isolated elytra, their further specification as well as the comprehensive systematic study of the beetle assemblage is needed.

Ephemeroptera

The finds of the fossil mayfly wings are quite rare. Therefore, the two complete wings with clear venation, recorded from the Upper Buntsandstein of Lower Franconia, are of great interest.

One wing (SMTE, 6123/1-28; Fig. 3), from “Strohgelbe Kalke” of Lengfurt, is referred to the family Misthodotidae and may be identified to the species level as *Triassodotes vogesiacus* Sinitshenkova, Marchal-Papier, Grauvogel-Stamm et Gall, 2005 from the Vosges in northeastern France (Sinitshenkova et al. 2005).

In the deposits of the “Grès à Voltzia” Formation in the Vosges, a rich mayfly fauna has been found. Two mayfly species, based on wings, belong to the families Misthodotidae and Toxodotidae (Sinitshenkova et al. 2005). Up to now this is the only case in which the typical Permian family Misthodotidae still occurs in Triassic deposits. The representatives of Misthodotidae and Toxodotidae are characterized by the presence of oval and almost homonomous wings.

The particular characters of the second wing make it possible to erect a new genus and species, named *H. pulchra* Sinitshenkova, gen. et sp. n. Due to the presence of a long CuA with intercalary veins forming a triad, it is included in the family Sharephemeridae Sinitshenkova, 2002. This family was originally established for the single species *Sharephemera cubitalis* Sinitshenkova, 2002, based on a unique find of a forewing from the Late Jurassic insect-bearing deposits in the Shar Teg locality in Mongolia (Sinitshenkova 2002). The new specimen renders a review of the family and the nominate genus *Sharephemera*, showing that the diagnosis of the family as given in the original paper was right. The new genus differs from *Sharephemera* in many features.

In the new species *H. pulchra* sp. n. the wing has an obviously expressed tornus, which is characteristic for a heteronomous flying apparatus. This means that hind wings

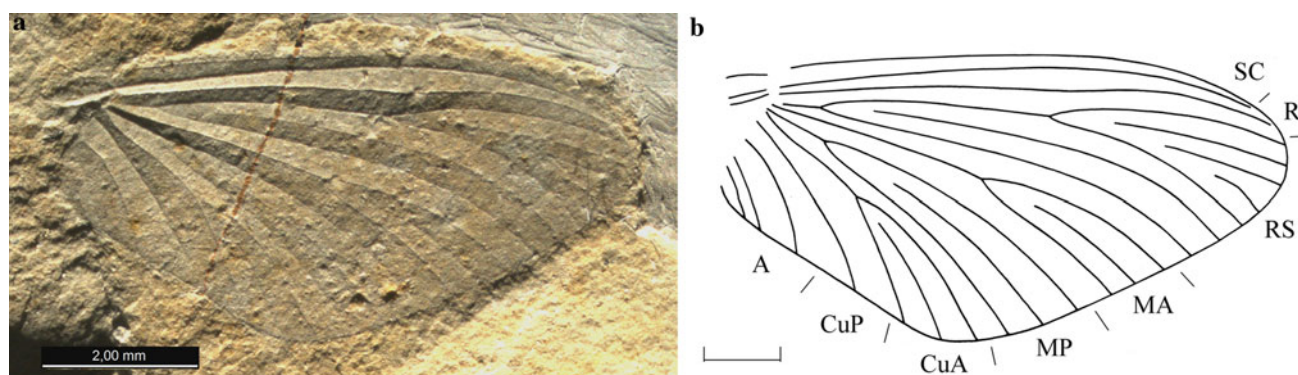


Fig. 4 *Hammephemera pulchra* Sinitshenkova, gen. et sp. n., holotype SMTE, 5825/2-365; early Middle Triassic (Upper Buntsandstein, Röt Fm, “Obere Dendritenschichten”, Lower Anisian); Hammelburg, Lower Franconia. **a** Photograph, **b** drawing

middle, CuP slightly curved near wing margin. Tornus situated almost at middle of wing.

Grylloblattida

All of the nine identifiable grilloblattid fossils found in the Upper Buntsandstein of Lower Franconia and Thuringia (including the specimen MHI 1486, deposited in the Muschelkalkmuseum Ingelfingen) belong to *C. picteti* Heer, 1864 (Chaulioditidae) (argumentation is given below in Remarks). In addition, there are four wing fragments belonging apparently to Chaulioditidae and possibly to *Chauliodites* as well. Thus, the grylloblattid assemblage is in contrast to that of the Vosges, where Blattogryllidae dominate (about 70% of all grylloblattids), while Chaulioditidae are rare (as well as Megakhosaridae and Mesorthopteridae) (Aristov et al. 2011).

Also, grylloblattids are relatively more abundant in Lower Franconia (Table 2) than in the Vosges: 5–11% in Hammelburg and Lengfurt; 4 specimens of 10 in Schwarza, versus 2 or <1% (Shcherbakov 2008; Aristov et al. 2011, respectively).

The family Chaulioditidae was erected by Handlirsch (1906) for *C. picteti* Heer, 1864 from the Middle Buntsandstein of Gödewitz near Salzmünde in Saxony-

Anhalt. As it proved later, Chaulioditidae (especially the most widespread genus *Chauliodites*) are among the most important insect index fossils of the Late Permian–Early Triassic, which numerically dominated most of the Early Triassic insect assemblages. The most ancient findings of the family are known from the Middle and Late Permian of European Russia, and the youngest ones from the Middle Triassic of France (Vosges) and China (Aristov 2003, 2004, 2005, 2008, 2009; Aristov et al. 2011).

Order Grylloblattida Walker, 1914
 Suborder Grylloblattina Walker, 1914
 Family Chaulioditidae Handlirsch, 1906
 Genus *Chauliodites* Heer, 1864
Chauliodites picteti Heer, 1864

Holotype: (Heer 1864: Fig. 11; Handlirsch 1906: pl. 39, Fig. 16); Gödewitz near Salzmünde (S Wettin), Saxony-Anhalt; Middle Buntsandstein, Lower Triassic.

New material: specimens SMTE, 5329/1-12 (Fig. 5) and 5329/1-39 (Fig. 6), each presented by part and counterpart of well-preserved forewing without anal area; Myophoria beds (“Obere Dendritenschichten”), Röt Fm, Lower Anisian, Bythinian, Middle Triassic; Schwarza, Thuringia;

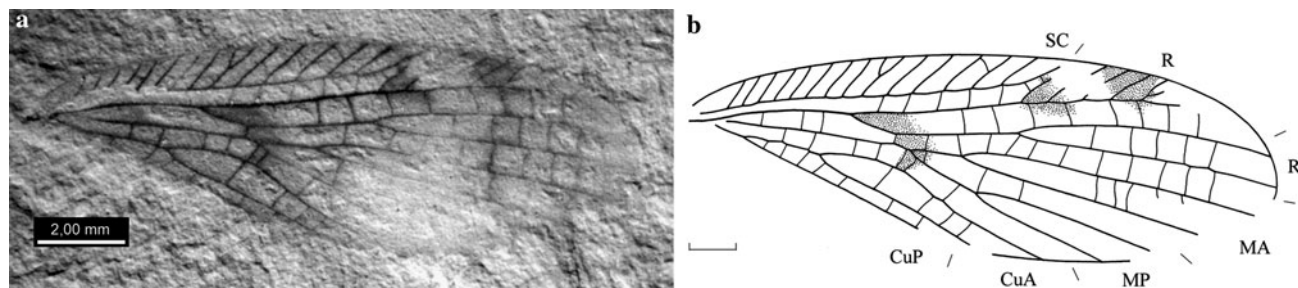


Fig. 5 *Chauliodites picteti* Heer, 1864, specimen SMTE, 5329/1-12; early Middle Triassic (Upper Buntsandstein, Röt Fm, “Obere Dendritenschichten”, Lower Anisian); Schwarza, Thuringia. **a** Photograph, **b** drawing

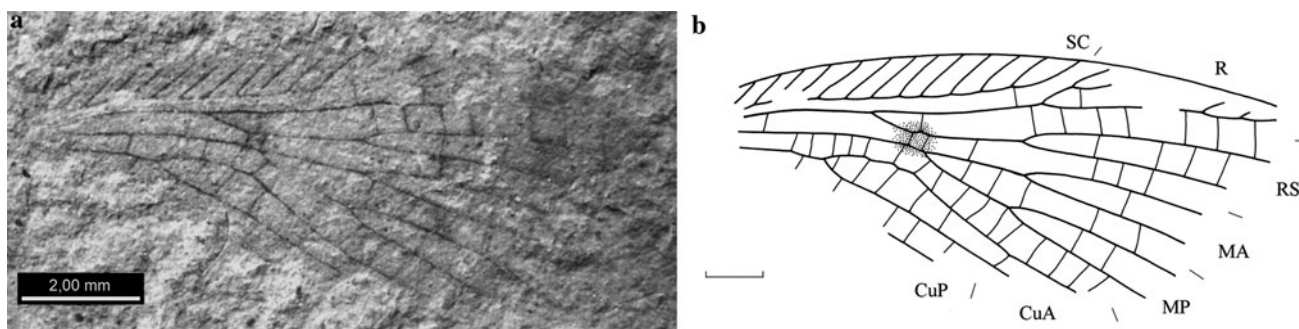


Fig. 6 *Chauliodites picteti* Heer, 1864, specimen SMTE, 5329/1-39; early Middle Triassic (Upper Buntsandstein, Röt Fm, “Obere Dendritenschichten”, Lower Anisian); Schwarza, Thuringia. **a** Photograph, **b** drawing

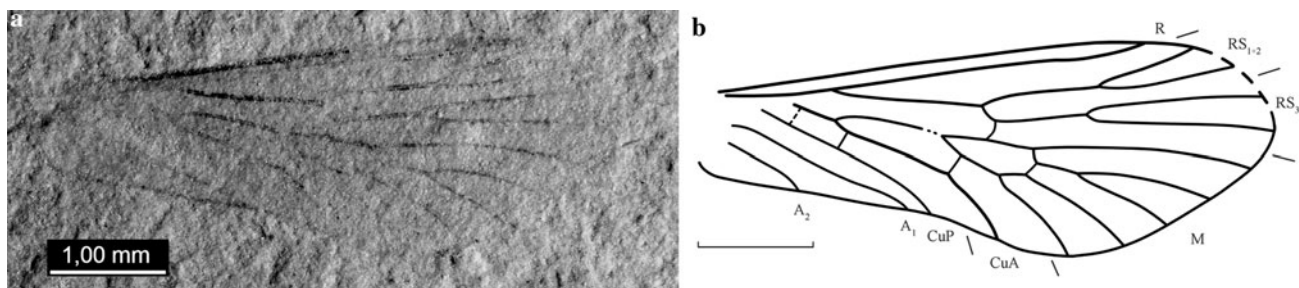


Fig. 7 *Pseudopolycentropus triasicus* Papier, Nel et Grauvogel-Stamm, 1996, specimen SMTE, 5825/2-199; early Middle Triassic (Upper Buntsandstein, Röt Fm, “Strohgelbe Kalke”, Lower Anisian); Hammelburg, Lower Franconia. **a** Photograph, **b** drawing

SMTE, 5329/1-1, forewing with apical and basal parts being destroyed; Myophoria beds (“Strohgelbe Kalke”), Röt Fm, Lower Anisian, Bythinian, Middle Triassic; Schwarza, Thuringia; SMTE, 5825/2-198, fragment of central part of forewing; Myophoria beds (“Strohgelbe Kalke”), Röt Fm, Lower Anisian, Bythinian, Middle Triassic; Herolds-Berg N’Hammelburg, Lower Franconia.

Specimens SMTE, 5825/2-21 (Brauckmann and Schlüter 1993: Fig. 10, described as *Planipennia*, fam., gen. et sp. indet.), from “Strohgelbe Kalke” of Hammelburg, and SMTE, 6123/1-26, 6123/1-31 and 6123/1-32 from “Strohgelbe Kalke” of Lengfurt, Lower Franconia, all represented by forewing fragments, also belong most likely to the same species.

Description: Forewing length about 14; length/width ratio about 3:1. Anterior margin convex. Costal space at the beginning of RS is 2.5–3 times as wide as subcostal space. SC terminating before distal wing third. Fore branches of SC and R simple or dichotomous. R curving towards before beginning of RS. RS beginning in basal wing third, forked before the SC apex. M forked distally to base of RS. MA and MP two-branched. Space between the CuA branches narrowed in its distal half. CuA₁ kinked at joints with crossveins. Interradial space at wing base narrow. Crossveins simple. Color pattern formed by dark spots in wing base, at base of RS and at pterostigma.

Remarks: The described material is indistinguishable from the holotype of *Ch. picteti* as figured by Ansoerge and Brauckmann (2008, Fig. 3b) and referred here to this species despite of the stratigraphic difference. Since the holotype of *Ch. picteti* is missing (Ansoerge and Brauckmann 2008, p. 256), the final decision of the specific attribution of the described material should be deferred until new finds of conspecific wings in the type locality.

The specimen MHI 1486 from “Strohgelbe Kalke” of Gambach, described as *Ch. cf. picteti* by Ansoerge and Brauckmann (2008), is only distinguished by the simple (or forking very late) MP and falls apparently within the observed intraspecific variability.

Mecoptera

The only specimen of Mecoptera from German Buntsandstein occurs from “Strohgelbe Kalke” of Hammelburg and is referred to the Vosges species *P. triasicus* Papier, Nel, et Grauvogel-Stamm, 1996. The family Pseudopolycentropodidae includes three genera, of which the most widespread, nominate genus *Pseudopolycentropus* is known from the Middle Triassic to Late Jurassic of Europe und Asia (Grimaldi et al. 2005), comprising only the minor component of the mecopteran fauna in almost all localities. The only exception is for the Vosges, where 19 of 22

mecopteran specimens belong to *P. triasicus*, while the rest fall within Permochoristidae (*Prochoristella pilosa* Papier, Nel et Grauvogel-Stamm, 1996), Liassophilidae [*Laurentiptera gallica* (Laurentiaux et Grauvogel, 1953) (in Laurentiaux 1953)] and Parachoristidae (Bashkuev, personal observation). In consideration of the shared species, it can be assumed that the Mecoptera assemblage of Lower Franconia was generally similar to the Vosges.

Order Mecoptera Packard, 1886

Family Pseudopolycentropodidae Handlirsch, 1925

Genus *Pseudopolycentropus* Handlirsch, 1906

Pseudopolycentropus triasicus Papier, Nel et Grauvogel-Stamm, 1996

Holotype: Papier et al. (1996): Fig. 1; Northern Vosges Mountains, NE France; “Grès à Voltzia” Formation, Lower Anisian, Middle Triassic.

New material: SMTE, 5825/2-199; complete forewing, part and counterpart (Fig. 7); Herolds-Berg N’Hammelburg, Lower Franconia; Myophoria beds (“Strohgelbe Kalke”), Röt Fm, Early Anisian, Bythinian, Middle Triassic.

Remarks: Wing length, 5 mm, and maximum width 1.9. SC, pterostigma, free base of CuA and crossveins in anal area are not traceable because of poor preservation. The described specimen slightly differs from the holotype of *P. triasicus* in the narrow costal space and shorter CuA, reaching just the wing midlength. These deviations apparently fall within the range of intraspecific variability shown in the material from the Vosges.

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