**ERESSELLA, A NEW UNCINULOID BRACHIOPOD GENUS FROM THE MIDDLE DEVONIAN OF EUROPE AND AFRICA**

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**Abstract:** Eressella, a new genus of rhynchonellide brachiopods belonging to the superfamily Uncinuloidea Rzhonsnitskaya, 1956, is described with _Rhynchonella coronata_ Kayser, 1871, as the type and only species. It is characterised by a dorsibiconvex profile with a resupinate ventral valve, costae rounded posteriorly, but acute and developing ventrally directed spur-like protuberances anteriorly, small dental cavities, cardinal process multilobed posteriorly and massive anteriorly, and the presence of a septalium and thick dorsal median septum. Given the present state of flux in the systematics of the superfamily, it is conventionally placed within the family Uncinulidae Rzhonsnitskaya, 1956, although similarities with the subfamily Betterbergiinae Savage, 1996 and the family Eucharitinidae Sartenaer, 2015 are also noted. _Eressella coronata_, hitherto the only representative of the genus, is known from the Eifel Hills (Eifelian, mainly middle Eifelian), from central Poland (especially from the Eifelian of the Holy Cross Mts.), and from the Moroccan Anti-Atlas (late Eifelian to early Givetian, details uncertain).

**Key words:** Systematics, Brachiopoda, Rhynchonellida, Devonian, Germany, Poland, Morocco.

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**INTRODUCTION**

**Purpose of the present paper**

The Middle Devonian brachiopod species _Rhynchonella coronata_ was originally described from the Eifel Hills in Germany (Kayser, 1871) and subsequently reported from the Holy Cross Mountains in Poland (first by Gürich, 1896) and from the Moroccan Anti-Atlas (first by Drot, 1971; Fig. 1). As aptly summarised by Drot (1971, p. 72), the species discussed is characterised by a peculiar external morphology and thus is unmistakably recognisable even without analysing the interiors, but its affinities at the genus level remain unclear. Halamski (2004, p. 139–140) concluded that _Rhynchonella coronata_ should be placed within a new genus, but was unable to propose a formal description thereof, as the material at his disposal was too scarce.

The purpose of the present paper is therefore threefold: 1) to re-describe the morphology and the anatomy of _Rhynchonella coronata_ on the basis of specimens from the Eifel, the Holy Cross Mts. and the Anti-Atlas (Fig. 1); 2) to introduce the new genus _Eressella_, typified by the above-mentioned species, and to elucidate its affinities; and 3) to discuss the stratigraphic distribution of the brachiopod species studied.

**History of research**

The Middle Devonian _Rhynchonella coronata_ was first described by Kayser (1871). It need not be confused with the Jurassic species _Rhynchonella coronata_ Moore, 1861, a probable representative of the genus _Holcorhynchia_ (Ager, 1967, p. 153). _Rhynchonella coronata_ Moore, 1861 and _Rhynchonella coronata_ Kayser, 1871 are primary homonyms (Art. 53.3 of the ICZN). In the case of secondary homonyms no longer considered congeneric, the junior homonym is not to be rejected (Art. 59.2); however, the ICZN has no special provision for primary homonyms no longer considered congeneric. In the opinion of the present authors, the stability of nomenclature is best served by continuing the use of Kayser’s specific name.

The characteristic external morphology of _Rhynchonella coronata_ Kayser, 1871, namely the resupinate ventral valve with high costae and costellae commonly forming acute spur-like protuberances at lateral geniculation, reminiscent of a tiara or a crown (Fig. 2P), is reflected in the species name (Latin _coronatus_, crowned). The picturesque circumstances of the field studies of Emmanuel Kayser in the Eifel during the Franco-Prussian war were related by Alvarez et al. (1996, p. 75). The species discussed was then report-
ed from the Northern region of the Holy Cross Mountains (Poland) by Gürich (1896), Sobolew (1904, 1909) and Siemiradzki (1909, 1922a, b).

The internal features of *Rhynchothela coronata* Kayser, 1871 were first investigated by Schmidt (1941), who transferred it to the genus *Uncinulus*. Biernat (1966) serially sectioned one of three shells at her disposal and agreed with such a classification. It is also under the same genus name that the species discussed was reported in a few regional geology papers dealing with the Eifel (Schwenzer, 1965), in an account of the drilling of a borehole in central Poland (Łobanowski and Przybyłowicz, 1979), and in a compilation of stratigraphically important species of the Polish Devonian (Biernat *in* Sarneczka, 2003, p. 205).

Drot (1971) was the first author to find the discussed brachiopod in Northern Africa. She sectioned one of eight poorly preserved specimens at her disposal and concluded that inclusion into any of the genera *Uncinulus*, *Kransia*, *Glossinotoeca*, and *Pseudoglossinotoeca* was an equally unsatisfying solution. She used the name “*Uncinulus* coronatus”.

In a compilation of Middle Devonian brachiopods from the Eifel, Jungheim (2000) included *Rhynchothela coronata* Kayser, 1871 within the genus *Kransia*, although without discussing the issue.

In an unpublished Ph.D. thesis, Halamski (2004, p. 139) used the name “*Kransia* coronata”, but stated clearly that a new genus (of the family Hebetoechidiidae) should be proposed. Owing to the small quantity of specimens at his disposal (four shells from the Holy Cross Mts.), no formal nomenclatural act was attempted. In a paper dealing with brachiopods from the Moroccan Anti-Atlas, Halamski and Balínski (2013) used the name *Kransia? coronata*.

A few alleged subspecies of *Rhynchothela coronata* were described from Russia. Two of them come from the Eifelian of the Urals: *Hypothyridina (?) coronata alata* Khodalevitch, 1951 and *Hypothyridina (?) coronata tenuipli-cata* Khodalevitch, 1951. *Uncinulus coronatus kitaticus* Rzhonsnitskaya, 1968 was described from the Givetian of Kuznetsk. The present authors follow Drot (1971, p. 72) and Erlanger (1994, p. 72) in considering them as separate species. Their revision should be conducted on the basis of representative collections from type strata and is beyond the scope of the present paper.

**Material and methods**

The collections investigated include the type collection of Kayser (MB) and Schultz’s collection from the same area (MCZ). Only four shells from the Holy Cross Mts. (Gürich’s collection, MGUWr; Biernat’s collection, ZPAL) could be found. Particularly well preserved specimens come from the collection, established by the late Volker Ebbighausen in Morocco and bequeathed by him to the MB.

More precisely, the material investigated comes from the following outcrops.

**Eifel.** Prüm Syncline: “Crinoid Beds” [no further details are available for this collection] (coll. Kayser, MB); Schwirzheim (coll. Schultz in 1858, MCZ); Gondelsheim, Rommersheim, Oberlauch, Brühlbron (coll. Schmidt, SMF).


**Anti-Atlas.** North-western Maïder, Jebel Issoumour [this oronym is spelt Issimour, Issoumour, or Issoumour; the authors have chosen the latter variant used by du Dresnay *et al.* (1988)], outcrop 151 sensu Ebbighausen (unpublished), a continuous outcrop situated 3–8 km W–SW from Taboumakhlouf, “upper Droots Beds” [Bou Dib Fm., Givetian] (coll. Ebbighausen, MB); Droots Beds, Madène el Mrakib (coll. Ebbighausen, SMF); Aferdou el Mrakib (coll. Halamski and Balíński, ZPAL).

The stratigraphic setting of these outcrops is discussed in detail in a special chapter of the present paper. Collections that could not be used by the present authors include those of Sobolew (1904, 1909) and of Siemiradzki (1909, 1922a, b) from the Holy Cross Mts., that of Łobanowski and Przybyłowicz (1979) from a borehole in central Poland, and that of Drot (1971) from the Anti-Atlas.

The internal features of the species discussed have been studied on the basis of serial sections of five specimens: two from the Eifel (Schmidt, 1941, pl. 6, fig. 18 and Fig. 4B herein), two from the Anti-Atlas (Drot, 1971, text-pl. 1 and Fig. 4A herein), and one from the Holy Cross Mts. (Biernat, 1966, fig. 28). Sections made by the present authors were investigated, using the standard technique of acetate peels. The peels were mounted between microscope slides and photographed under a binocular microscope. The photographs were imported to CorelDRAW and internal details were drawn using a digital drawing tablet.

Synonymies are commented upon by means of the usual signs (Richter, 1948; Matthews, 1973), as explained by Halamski (2009, p. 46–47). Measurements are given in the following way: 

\[\text{a} \quad \text{b} \quad \text{c} \quad \text{d}\] 
\[\text{[e, N]}\]  
\(a – \text{minimum value}; \ b – \text{first quartile}; \ c – \text{third quartile}; \ d – \text{maximum value}; \ e – \text{arithmetic mean}; \ N – \text{number of observations} \) 

(not repeated, unless different from 35, the total number of measured specimens). In the main description, the values...
have been calculated on the basis of all measured specimens (Eifel and Mäider; \( N = 35 \)), whereas a biometric comparison of European and African samples is given separately below. The raw data are given in the Appendix.

Institutional abbreviations: L, Prirodnozavýžny Muzej NAMU (State Museum of Natural History, National Academy of Sciences of Ukraine; formerly Muzeum Przyrodnicze im. Dzieńuszyckich), Lviv, Ukraine; MB, Museum für Naturkunde, Berlin, Germany; MCZ, Museum of Comparative Zoology, Harvard University, Cambridge, Mass., United States of America; MGUWr, Muzeum Geologiczne Uniwersytetu Wrocławskiego (formerly Uniwersytet Wrocławski), Wrocław, Poland; PKUM, Geological Museum of Peking University, Beijing, China; SMF, Senckenberg, Frankfurt am Main, Germany; ZPAL, Instytut Paleobiologii PAN, Warszawa, Poland.

**SYSTEMATIC PALAEONTOLOGY**

**Position of Rhynchonella coronata Kayser, 1871 among the rhynchonellides and value of external characters for elucidation of its systematic position**

*Rhynchonella coronata* can be included in the superfamily Uncinuloidea on account of the costae and costellae being flattened and grooved on the anterior margin (Savage, in Savage et al., 2002). Such a feature of the radial ornamentation appears as a phylogenetically informative character, that is, not subject to homoeomorphy.

Classification at the family level is less evident because among the uncinuloid brachiopods, a multilobed (at least partly) cardinal process is found in some genera of the family Uncinulidae Rzhonsnitskaya, 1956, which the Eucharitinae Sartenaer, 2015, and restricted the Sartenaer (2015) proposed three new small families, among which the Eucharitinae Kayser, 1871, as *Eucharitina eucharis* (Havlíček, 1961, fig. 51), *E. oehleri* (Brice, 1991, fig. 8), *E. bulyncki* (Savage et al., 2002). Such a feature of the radial ornamentation appears as a phylogenetically informative character, that is, not subject to homoeomorphy.

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*Eucharitina* Schmidt, 1955 (see Havlíček, 1961; Brice, 1991; García-Alcalde and Herrera, 2015; Sartenaer, 2015) is similar to *Eressella* gen. nov. on account of the concavo-convex shape. Savage (Savage et al., 2002, p. 1092) described the cardinal process of *Eucharitina* as “multilobed posteriorly, but massively bilobed anteriorly”, but the serial sections of *Eucharitina eucharis* (Havlíček, 1961, fig. 51), *E. oehleri* (Brice, 1991, fig. 8), *E. bulyncki* (Savage et al., 2002, figs 16–17) show that the pattern is in fact quite different, consisting of a few relatively large lobes; this perhaps might be better called a paucilobate cardinal process (Latin pauci, few). Given the differences of ornamentation and internal structures, the resemblance must be interpreted as resulting from convergence, all the more since the costae of *Eucharitina* are not grooved. The same should be said about *Eationia* Hall, 1857, to which Williams and Breger (1916, p. 68) referred *Rhynchonella coronata* precisely on the basis of the “marginal recurvature in the pedicle valve”. These authors were of opinion that “the internal features are of doubtful constancy among the different species” (Williams and Breger, 1916, p. 67). This is another example of external features being misleading for the establishment of the affinities of brachiopods (see Jin and Copper, 2000 for an example among Silurian Pentamerida and Halamski and Segit, 2006 among Devonian Terebratulida).

Other examples of homoeomorphic rhynchonellides having resupinate ventral valve and spur-like protuberances on the ventral valve are the Carboniferous pugnacoid *Pleuropupnoides* Ferguson, 1966 [material examined: *P. pleurodon* (Phillips, 1836), MB.B.10540–10544; Fig. 25–T], the lower Permian wellerelloid *Antronaria* Cooper & Grant, 1976 (pl. 533, fig. 38), and the Lower Cretaceous hemithiridoid *Plicarostrum* Burri, 1953 (Burri, 1957, pl. 12, figs 1, 2). The repetitive occurrence of similar morphologies in several unrelated lineages indicates that such a shape has some adaptive significance. The interpretation thereof is difficult, especially given that no Recent brachiopod possesses these features (M.A. Bitner, pers. comm., March 2018).

**Description**

Order Rhynchonellida Kuhn, 1949
Superfamily Uncinuloidea Rzhonsnitskaya, 1956
Family Uncinulidae Rzhonsnitskaya, 1956

*Eressella* genus novum

**Type species:** *Rhynchonella coronata* Kayser, 1871, as below.

**Species assigned:** Type species only.

**Diagnosis:** Uncinuloid brachiopod with strongly convex dorsal valve and resupinate ventral valve; ornamentation of costae and costellae rounded posteriorly, high and acute near the lateral and antero-lateral commissures, flattened and grooved on the tongue; squama and glotta present; dental plates short, buried in umbonal callus, lateral umbonal cavities minute, ventral muscle field impressed, anteriorly divided by a median trough; dorsal median septum present;
septalium present, but buried in umbonal callus; cardinal process posteriorly multilobed, anteriorly forming a thick plate.

**Etymology:** Combined from *ereš*, Sumerian for ‘queen’ and the feminine suffix -ella.

**Remarks:** The combination of a dorsibiconvex shape with a resupinate ventral valve, ornamentation of the shell consisting of costae rounded posteriorly and developing spur-like protuberances on ventral flanks anteriorly, cardinal process multilobed (ctenophoridium-like) posteriorly and massive anteriorly, thick shell deposits obscuring dental plates and septalium, and the lack of median septum dividing the ventral muscle field is unique among the Rhynchonellida. A detailed analysis of the affinities of the new genus is given in the previous chapter.

*Eressella coronata* was attributed previously, with various degrees of confidence, to *Hypothyridina*, *Uncinulus* and *Kransia*. *Hypothyridina* has a cuboid shell shape, finer and more flattened ribs, and the dorsal median septum and septalium are weak to absent. *Uncinulus* has a ventral septum, whereas the dorsal septum is buried in the callus. *Kransia* is internally similar to *Eressella*, but the hinge plates are unituated anteriorly of the septalium, whereas in *E. coronata* they are supported by a median septum.

Veever’s (1959) and Biernat (1966) stressed similarities between *E. coronata* and *Flabellulirostrum wolicerincum* (Veever, 1959) from the Frasnian of the Fitzroy Basin (Australia). The differences in internal structure concern the dental plates (present, although in some extent buried in umbonal callus in *Eressella*, absent in *Flabellulirostrum*; Sartenaer, 1971) and dorsal median septum (thick and low; absent in umbonal callus in *Eressella*). *Veevers*, 1959) from the Frasnian of the Fitzroy Basin (Australia).

**Type material:** Articulated shell MB.B.740.1 (lectotype selected herein, specimen figured by Kayser, 1871, pl. 9, fig. 5 and re-figured herein in Fig. 32–DD); ten articulated shells MB.B.740.2–11 (paratypes, three of them figured herein in Fig. 3A–O).

**Type locality and stratum:** “Prümer Mulde, Crinoidenschicht” (Kayser, 1871, p. 513): Eifel Mrakib, Prüm Syncline; middle or upper Eifelian.


**Description:** Shell (13.1–16.8–22.8) mm in width [mean 17.5; N = 35] elliptic in outline, transverse [width-to-length ratio (1.13–) 1.22–1.31 (–1.49); mean 1.28], geniculately convexoconcave. Maximal width about midlength. Anterior commissure uniplicate, tongue narrowly trapezoidal to rectangular, moderately high to high, occupying (0.36–) 0.41–0.50 (–0.56) [mean 0.45] of the shell width. Squama and glotta present. Ventral valve resupinate, that is weakly convex in posterior region, then flattened and concave at flanks; lateral margins truncated. Distinct, rather deep, flat-bottomed sulcus appearing posteriorly to midlength of the valve, at about ¾ to ¼ of the valve length. Dorsal valve strongly convex, somewhat flattened medially, anterior and lateral margins truncated; maximal thickness of the valve anteriorly. Low fold appearing in the umbonal region.

Ornamentation of costae and costellae arising most often by bifurcation, up to twice from a single costa, seldom by intercalation; costae and costellae separated by somewhat narrower furrows, (4–)5–6–(8) on the fold, (3–)4–5–(7) in the sulcus, (5–)8–10–(12) on each lateral flank. Costae rounded posteriorly, sharp and acute near anterior and lateral commissures, flattened and grooved on subvertical lateral flanks. Ventral flank costae frequently forming acute, ventrally directed spur-like protuberances at lateral geniculation (Fig. 2P–R).

Ventral interior: delthyrium closed by massive conjunct deltoidal plates; dental plates short, poorly defined, buried in secondary shell deposit, slightly convergent ventrally, lateral umbonal cavities minute, largely infilled by callus;
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Fig. 3. Erressella coronata (Kayser, 1871) from Europe (A–DD, Eifel; EE–II, Holy Cross Mountains). Articulated shells in dorsal, ventral, lateral, anterior, and posterior views. A–E, F–J, K–O. Paratypes MB.B.740.12, 740.10, 740.4 from the Crinoid Beds of the Prüm Syncline, Eifel (coll. Kayser). P–T, U–Y. Shells MCZ 190712 and MCZ 190711 (serially sectioned, see Fig. 4A) from Schwirzheim, near Prüm (coll. Schultze). Z–DD. Holotype MB.B.740.1 from the Crinoid Beds of the Prüm Syncline, Eifel (coll. Kayser; specimen figured by Kayser, 1871, pl. 9, fig. 5). EE–II. Shell MGUWr 1973s from Skały (specimen figured by Gürich, 1896, pl. 7, fig. 5).
Fig. 4. Transverse serial sections of *Eresella coronata* (Kayser, 1871) through the shells MCZ 190711 from Schwirzheim near Prüm (coll. Schultze) (A) and MB.B.9422.6 from Jbel Issoumour (coll. Ebbighausen) (B). Distances measured in millimetres from the tip of the ventral umbo.
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ventral muscle field wide, posteriorly deeply impressed, anteriorly divided by a median trough.

Dorsal interior: septalium present, but buried in umbonal callus; cardinal process posteriorly wide and multilobed, anteriorly, forming a thick raised plate covering the septalium; median septum thick, long; crura proximally rodlike, slightly diverging anteriorly and gently curved ventrally, distal blades flat to convex laterally.

Shell of both valves thick-walled.

Remarks: Biometrical comparison of samples from the Eifel, Schwirzheim, $N = 12$; Eifel, Prüm Syncline, $N = 12$, including the holotype and 11 paratypes; Jebel Issoumour, $N = 11$). Raw data provided in the Appendix.

Fig. 5. Eressella coronata (Kayser, 1871). Scatter diagrams of shell width to shell length (A), total number of costae to shell width (B) and sulcus width to shell width (C) for three samples (Eifel, Schwirzheim, $N = 12$; Eifel, Prüm Syncline, $N = 12$, including the holotype and 11 paratypes; Jebel Issoumour, $N = 11$). Raw data provided in the Appendix.

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Remarks: Biometrical comparison of samples from the Eifel, Schwirzheim, $N = 12$; Eifel, Prüm Syncline, $N = 12$, including the holotype and 11 paratypes; Jebel Issoumour, $N = 11$) shows that European representatives of R. coronata are larger (mean width 18.4 mm, compared to 15.7 mm in the African sample; Fig. 5A) and slightly less transverse (mean value 1.25, compared to 1.34). This results in a higher mean total number of costae and costellae in the Eifel sample (24; Africa – 21), but the ratio of number of costae to width is nearly the same in both cases (1.31 and 1.33, respectively; Fig. 5B). The ratio of the width of the tongue to the total width of the shell is slightly greater in the Eifel (0.47) than in Africa (0.41; Fig. 5C). Overall, it may be said that samples from the Eifel and from Jebel Issoumour are rather similar.

It may be noted that the feature given by Biernat (1966, p. 86) as “believed by Schmidt (1941: 24)” to be “characteristic for the species”, namely twofold bifurcation of the costae limiting the fold, is in fact neither constant within the sample analysed, nor given as such by Schmidt (1941, p. 24).

Rhynchonella coronata sensu Siemiradzki (1922b) from Czarnów (L PZ-D olim 12904) is a representative of the Leiorhynchidae.

Distribution: Eifel, Germany; Lysogóry region of the Holy Cross Mts. and the environs of Radom (subsurface), Poland; Anti-Atlas, Morocco; Middle Devonian; never frequently. The stratigraphic distribution of this species is discussed in detail in the following chapter.

STRATIGRAPHY

Eifel, Germany

The stratigraphic distribution of Eressella coronata in the type area was described by Schmidt (1941, p. 24, 50–51). The details are not entirely clear, owing to her use of Happel and Reuling’s (1937) stratigraphic units that subsequently proved to be assembled partly in the wrong order (Struve, 1961; see also Schwenzer, 1965, p. 263), but it is evident that E. coronata has a restricted stratigraphic distribution, being limited to the so-called “ostiolatus-Horizont” of the “Gondelsheim Beds”. The ostiolatus horizon corresponds to a part of the Junkerberg Beds (middle Eifelian; Schwenzer, 1965 and references therein). However, some units between the ostiolatus Horizon and the Rommersheim Beds not listed by Schmidt (1941) have been relocated subsequently in the upper Eifelian and even to the Givetian (Schwenzer, 1965), so the upper limit of E. coronata in the Eifel is uncertain. According to Schwenzer (1965), in the Prüm Syncline E. coronata has been found in the Rechert, Nims, and Giesdorf horizons of the Junkerberg Beds (middle Eifelian). Apparently this species is unknown outside the Prüm Syncline (Frech 1886, p. 137).

Central Poland

In the Holy Cross Mountains, the species discussed is known solely from the Skaly Beds at Skaly (northern or Lysogóry region). Moreover, a single specimen was reported from the Pionki borehole, near Radom in the Mazovia Lowland (Senkowicz, 1973; Łobanowski and Przybyłowicz, 1979).
Holy Cross Mountains. According to Biernat (1966), *E. coronata* was found only in outcrop 83 *sensu* Pajchłowa (1957), belonging to set XVII. The data provided by Sobolew (1904) are slightly less precise (“crinoid limestone” over the “Calc-eola marls”), but still overall concordant with aforementioned stratigraphy. It follows that the stratigraphic position of *E. coronata* in the Grzegorzowice-Skały section is in the uppermost Eifelian (just below the Eifelian–Givetian boundary situated at about set XIX; Malec and Turnau, 1992, p. 80).

The data provided by Gürich (1896) are less clear. The species discussed is listed (Gürich, 1896, p. 50–51), along with several dozens of other species, some of which (like *Spirifer elegans sensu* Gürich, 1896 = *Macrospirifer diluvianoides* Biernat, 1966) are restricted to a single, famous outcrop (SK-3 *sensu* Halamski, 2009; 73 *sensu* Pajchłowa, 1957), informally called “the fundamental pit” (a Konzentrat-Lagerstätte, see Halamski and Zapalski, 2005; corresponding to set XIV *sensu* Pajchłowa, 1957), the age of which is late Eifelian, corresponding to the Freilingen Beds of the Eifel (Adamczak, 1976; Dzik, 1981, Malec and Turnau, 1997; Halamski, 2005; Halamski and Racki, 2005). However, it is unclear how precise were the limits of the unit used by Gürich (1896).

In any case, in the Grzegorzowice-Skały section *E. coronata* is present in the uppermost Eifelian and perhaps also in the lower part of the upper Eifelian. The middle part of the Eifelian in the Skáły section consists of dolomites of the Wojciechowice Formation (Kłossowski, 1985; Skompski and Szuleczewski, 1994; Halamski and Racki, 2005; Narkiewicz and Narkiewicz, 2010; Wójcik, 2015): their fauna is scarce, so the lower limit of the species discussed is unclear.

**Radom region.** A single shell of *Eressella coronata* was reported from the Pionki 4 borehole (depth 1765.2–1759.3 m; Senkowicz, 1973; Skompski and Szuleczewski, 1994, Halamski and Racki, 2005; Narkiewicz and Narkiewicz, 2010; Wójcik, 2015): the age of this species was reported by Drot (1966), as “Early Givetian or Eifelian age given in the preliminary description of the borehole record (Senkowicz 1973, p. 655) and indicated by a correlation provided by Turnau et al. (2005, fig. 2) appears more probable.

**Anti-Atlas, Morocco**

*Eressella coronata* (Kayser, 1871) is described herein from a locality in the Jebel Issoumour (northern Maïder), was described by Drot (1971) and by Halamski & Baliński (2013) from southern Maïder, and questionably reported from Jebel Ou Driss (southwest from Maïder) by Bultynck (1989).

**Jebel Issoumour.** Collecting localities of Volker Ebbighausen were usually described on cards kept in a separate archive, but for locality 151 the detailed data are lost (J. Bockwinkel, pers. comm., 11th Sep., 2017). If the “upper Drotops Beds” mentioned on the labels correspond to the locality figured and described by Struve (1995, p. 99, figs 25–26), then, according to a conodont-based age determination by Weddige (Struve 1995, p. 99) indicating the upper part of kockelianus-australis Zone till the lower part of the ensensis Zone, the level is late Eifelian in age. However, the Drotops armatus horizon belonging to the Bou Dib Formation (McKellar and Chatterton, 2009, p. 13), which is the higher of the two horizons with abundant Drotops fauna in the area (R. McKellar, pers. comm., 1st Dec., 2017), is interpreted as Givetian, according to Kaufmann (1998), Bultynck and Walliser (2000), and Campbell et al. (2002), as summarised by McKellar and Chatterton (2009, p. 63). This is based once more on a conodont-based age determination by Chatterton, indicating the lower varcus Zone (S. Gibb, pers. comm., 28th Feb., 2018). It may be mentioned that all the three species, noted by Weddige (Struve, 1995) as diagnostic for the Eifelian (*Polygnathus linguisformis linguisformis, Polygnathus pseudofoliatus, Icriodus struveri*), may be present in the lower Givetian (Bultynck, 2003; Narkiewicz and Bultynck, 2007; Walliser and Bultynck, 2011). However, the present authors do not intend to propose any solution to this apparent contradiction; one possibility, among others, might be that the two “upper Drotops” levels are not the same (M. Basse, pers. comm., 1st March, 2018).

**Southern Maïder.** The single specimen described by Halamski & Baliński (2013) was collected from a scree and its precise age cannot be determined. The age of the nearby outcrop TM 453 (El-Mrakib, southern Maïder; x = 566.5; y = 414.8), from which this species was reported by Drot (1971), was given as late Eifelian without any detailed argumentation; co-occurring *Spinella sp.* (Spiriferida) and *Calc-eola sandalina* (Rugosa) were listed (Drot, 1971, p. 71).

The material collected by V. Ebbighausen comes from the Drotops Beds at Madène el Mrakib. Halamski and Baliński (2013, p. 246) followed Struve (1990) in interpreting the age of these beds as Eifelian, although they noted the discrepancy in ages attributed to beds with Drotops to the north and south of Maïder.

**Jebel Ou Driss.** Bultynck (1989, p. 97) reports *Uncinulus coronatus* (provisional identification by J. Godefroid) from an interval between samples ODE-3 and ODE-2. According to the correlation provided, this part of the section is well above the Eifelian–Givetian boundary. No description of the macrofauna is provided, so the interpretation of the open nomenclature used is unclear.

**Summary of the stratigraphical distribution of *E. coronata***

In summary, the stratigraphic distribution of *Eressella coronata* in the three regions, from which it has been reported, is as follows:

- in the Eifel, mainly in the middle Eifelian, but with an uncertain upper limit;
— in the Holy Cross Mountains, in the upper (possibly only uppermost) Eifelian, but with an uncertain lower limit, due to extensive dolomitisation;
— in the Anti-Atlas, in the late Eifelian to early Givetian (at Jbel Issoumour and southern Ma’der the identification of the brachiopod is certain, but the age is uncertain, where-as at Jbel Ou Driss the age determination is certain, but the identification of the brachiopod is not).

Such a pattern, if not simply the result of imprecise correlation, may be due either to imperfections of the fossil record or to regional diachronism. At present, neither of these two interpretations can be favoured.

CONCLUSIONS

Rhynchonella coronata Kayser, 1871 cannot be placed within any existing rhynchonellide genus. It is proposed as the type species of the new genus ErEssElla, characterised by a dorsibiconvex profile with a resupinate ventral valve, costae rounded posteriorly, acute and developing spur-like protuberances anteriorly, and a cardinal process multilobed posteriorly and massive anteriorly.

ErEssElla gen. nov. belongs to the superfamily Uncinuloidea on account of costae flattened and grooved on the anterior margin. It is further tentatively placed within the family Uncinulidae, although similarities with the subfamily Betterbergiinae (that probably should be separated from the Hebetoechiidae) are also noted.

The new genus and its only species is known from the Eifel (Eifelian, probably mainly, if not solely, middle Eifelian), from central Poland (in the Eifelian of the Holy Cross Mountains, probably mostly uppermost Eifelian), and from the Moroccan Anti-Atlas (late Eifelian to early Givetian, details uncertain).

Acknowledgements

The following curators are thanked for granting access and help in various ways during studies of the collections under their care: Dieter Weyer, Dieter Korn, and Martin Aberhan (Museum für Naturkunde, Berlin), Jessica Cundiff (Museum of Comparative Zoology, Harvard University, Cambridge, Ma.), Yulia Didenko (State Museum of Natural History, National Academy of Sciences of Ukraine, Lviv, Ukraine), Ulrich Jansen (Senckenberg, Frankfurt am Main), Pawel Raczyński (Muzeum Geologiczne Uniwersytetu Wrocławskiego). Jürgen Bockwinkel searched (unfortunately without success) for data on the stratigraphic position of Volker Ebbighausen’s localities. Trilobite data were provided by Martin Basse (Forschungsinstitut Senckenberg), Stacey Gibb (University of Alberta), and Ryan McKellar (Royal Saskatchewan Museum, Regina). Conodont data were provided by Katarzyna Narkiewicz (Polish Geological Institute). The paper was reviewed by Xueping Ma (Peking University) and an anonymous reviewer. This study was financially supported in part by Grant No. 2016/23/B/ST10/02744 of the National Science Centre (Poland) to Andrzej Baliński. Help from the above-mentioned persons and institutions is gratefully acknowledged.

REFERENCES

Erlanger, O. A., 1994. The Devonian rhynchonellids of Mongolia. The Joint Russian–Mongolian Paleontological Expedition,
Transactions, 45: 5–144. [In Russian, title and table of contents in English.]


### Appendix

Biometric characteristics of *Eressella coronata* (Kayser, 1871); measurements in millimetres

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W – width of the shell; L – length of the shell; T – thickness of the shell; w – width of the sulcus; l – number of costae and costellae on the left flank (of either a dorsal or a ventral valve); f – number of costae and costellae on the fold; r – number of costae and costellae on the right flank (of either a dorsal or a ventral valve); s – number of costae and costellae in the sulcus; C – total number of costae (value of another flank of the same valve taken twice if one of these values missing). Abbreviations: m – mean; sd – standard deviation; v – variation coefficient ( = sd / m).