

**DICTYOCOONELLA HENSON, 1948, UPPER CRETACEOUS LARGER BENTHIC FORAMINIFERA: A TAXONOMIC REVISION WITH THE ESTABLISHMENT OF GUSICELLA GEN. NOV. (TYPE-SPECIES DICTYOCOONELLA MINIMA HENSON)**

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**INTRODUCTION**

In his important monograph on Mesozoic-Cenozoic Larger Benthic Foraminifera from the area of the Middle East and southwestern Asia, Henson (1948) described 14 new genera, and 27 new species among many agglutinated taxa from the Upper Cretaceous (Fig. 1, Tab. 1).

![Map of the Persian Gulf area showing the location of Dukhan Well in Qatar, the type-locality of Dictyocoonella complanata Henson and Gusicella minima (Henson) gen. et comb. nov. (from free maps, https://d-maps.com).](image)

**Table 1** Agglutinated taxa described by Henson (1948) from the Upper Cretaceous of Qatar (Dukhan Well).

| Cenomanian Mishrif Formation | Maastrichtian Simsima Formation |
|-----------------------------|--------------------------------|
| Dictyocoonella minima n. sp. | Broeckinella arabica n. gen., n. sp. |
| Orbitinella depressa n. gen., n. sp. | ? Dictyocoonella minima n. sp. |
| Qataria dukhali n. gen., n. sp. | Dictyocoonella complanata n. gen., n. sp. |
| Dohaia planata n. gen., n. sp. | Lituconnelloides compressus n. gen., n. sp. |
|                           | Loftusia coxi n. sp. |

Some of them, such as the Lower Cretaceous Dictyocoonella arabicus, have meanwhile been taxonomically revised (e.g. Cherchi & Schroeder, 1991). Others have been inadequately illustrated and are still poorly known today. Among them is the genus Dictyocoonella, one of the “Key Mesozoic Benthic Foraminifera of the Middle East” (Whittaker et al., 1998) established with two species: the type-species D. complanata from the Maastrichtian of Qatar (= Simsima Formation), and D. minima from strata with an age of “most probably Upper Cenomanian or Turonian” of Qatar … “a single specimen, possibly of this species … in Maastrichtian limestones” of Iraq (op. cit., p. 26). The two species assigned to the family

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Orbitolinidae were poorly illustrated. According to Henson, both possess a subepidermal polygonal pattern, and *D. minima* main partitions (= primary beams) that are lacking in *D. complanata*. The test of *D. complanata* is distinctly compressed with subparallel opposite sides, flabelliform (like in cuneolinids) whereas the one of *D. minima* only slightly and may show ellipsoidal transverse sections (Henson, 1948, pl. 11, figs. 8, 10). In addition, Henson supplied morphologic details in the description of *D. minima* that are not discernible in the provided illustrations, such as the occurrence of a planispiral initial coil. It is worth mentioning that in the monograph of Henson the holotype has been illustrated only for *D. complanata* (Henson, ibid., pl. 6, fig. 2 and refigured herein in Figure 3a). For *D. minima* however only paratypes were illustrated. Douglass (1960, p. 256) stated that “it is likely that the form described by Henson (1948) as *Dictyoconella* is merely a variant of the genus *Iraqia* Henson” a form where “the partitions are reticulate throughout the central area”. Although almost 80 years have passed since their description, their systematic position and biostratigraphy require substantial improvements. Structural differences with generic and suprageneric importance between the two taxa were observed by Schlagintweit et al. (2016). Based on new data from the Maastrichtian Tarbur Formation of Iran (= litostratigraphic equivalent of the Simsima Fm. of Qatar), the genus *Dictyoconella* and the taxonomic status of its two species are herein revised.

**MATERIAL STUDIED**

The material studied comes from the Late Cretaceous Tarbur Formation, a predominantly carbonate lithostratigraphic unit that contains rich microfauna and microflora associated with rudists cropping out in the SW Zagros Basin (James and Wynd, 1965). The shallow water carbonates have been studied in random thin sections from two localities named Naghan and Mandegan section. The former is located in the folded Zagros belt approximately 50 km south west of Naghan town near the Gandomkar village (31°47’ 52” N and 50° 32’ 53” E). The Mandegan section is situated in the High Zagros Belt, north of Mount Dena, about 65 km south of the town of Semirom (31°, 25’, 8.13” N and 51°, 24’, 34.58” E). For further details on the two sections see Schlagintweit et al. (2016). *Dictyoconella complanata* Henson and *Gusicella minima* (Henson) gen. et comb. nov. occur in platform carbonates of the Tarbur Formation that evolves as a shallowing-upward sequence on top of the pelagic/hemipelagic Gurpi Formation. The wacke-/pack- and floatstones are rich in
Larger Benthic Foraminifera associated with dasycladalean algae (Fig. 2). *Guscellia minima* occurs more common in the lower part of the Tarbur Fm. associated with *Omphaloclyclus* and *Loftusia* (Wynd, 1965: *Omphaloclyclus-Loftusia* assemblage zone), and other taxa such as *Gyroconulina columelliforma* Schroeder & Darmoian (Fig. 2c-d). *D. complanata* is restricted to the upper part of the Tarbur Formation in a more inner platform setting (compared to the occurrence of *G. minima*). Here it is associated with taxa such as *Loftusia* div. sp., *Dictyocyclina schlumbergeri* Munier-Chalmas, *Tarburina zagrosiana* Schlagentweit & Rashidi and *Pseudonummoculina kalantarii* Schlagentweit & Rashidi (Fig. 2a-b).

**SYSTEMATICS**

Phylum Foraminiferida d’Orbigny, 1826
Class Globothalamaea Pawlowski et al., 2013
Order Loftusia Kaminski and Mikhailевич in Kaminski, 2004
Suborder Loftusina Kaminski and Mikhailевич in Kaminski, 2004
Superfamily Orbitolinoidea Martin, 1890
Family Orbitolinidae Martin, 1890
Subfamily Dictyocoinae Moullade, 1965
Genus *Dictyoconella* Henson, 1948 emended herein

**Type-species:** *Dictyoconella complanata* Henson, 1948. Holotype P.35832 in Henson (1948), in repository at the Natural History Museum London.

**Diagnosis:** Large-sized, laterally compressed test, flabelliform. The test displays a distinct asymmetry, with one side (with the eccentric embryo) that is wider (with respect to the central axis) and presents a concave outer periphery in equatorial section. Test base distinctly convex. Megalospheric embryo simple, bilocular with ellipsoidal protoconch and hemispherical to sickle-shaped deuteroconch, eccentric position with twisted apex. Microspheric embryo not discernible within a close-coiled whorl. Adult chambers arched and rectilinear. Exoskeleton with several orders of horizontal and vertical partitions forming a delicate subepidermal network. The marginal zone is separated from the central zone by a marginal trough. Central zone with pillars alternating between subsequent chambers. Foramina multiple in the central zone and with straight arrangement between chambers; marginal foramina are present. Wall finely agglutinated, thin, consisting of an epiderm and a delicate sub-epidermal cellular layer.

**Comparisons:** Morphologically, *Dictyoconella* is unique among all other Orbitolinidae due to its strongly compressed (flattened) test. This makes a detailed comparison to the other Upper Cretaceous genera of the Orbitolinidae superfluous. Douglass (1960, p. 256) stated that “it is likely” that *Dictyoconella* “is merely a variant of the genus *Iraqia*”. This assumption must be rejected because of the difference in the central zone: reticulate in *Iraqia* (e.g. Moullade, 1965) and pillaroid in *Dictyoconella*. It is worth noting at this point that the incorrect view of Douglass was also approved by BouDagher-Fadel and Price (2009, p. 7) who included *Dictyoconella* in a group of “Orbitolinids with radial partitions that became zigzagged, thickening and fusing centrally. Last but not least, neither *Dictyonella complanata* nor “D.” *minima* were treated in the revision of the Orbitolinidae by Cruz-Abad (2018) although the genus was considered valid by Loeblich and Tappan (1987). Accessible from the original samples of Qatar deposited at the Natural History Museum in London (see pictures at nhm.ac.uk), the specimens were labeled *Dictyoconella (Dictyoconus) complanata* by Henson. In fact, *Dictyoconella* is best described as a distinctly compressed (flattened) *Dictyoconus* Blanckenhorn. Two specimens of *Dictyoconella complanata* were interpreted as microspheric specimens of

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Fig. 3 *Dictyoconella complanata* Henson from the Maastrichtian of Qatar (a-b) and Iran (c-e). a, isolated specimen, holotype (from Henson, 1948, pl. 6, fig. 2). Section planes 1-----‘1’ and 2-----‘2’ refer to b and d respectively. b, transverse section parallel to the median plane (from Henson, 1948, pl. 6, fig. 3, paratype). c, slightly oblique median section. Note the inclination of the chambers towards the apex. Thin section 2Ng 83. d-e, slightly oblique subaxial sections, perpendicular to the median plane (s = septum, f = foramen). Thin sections 2Ng 81, 2Ng 80-5.
Fig. 4 Dictyoconella complanata Henson from the Maastrichtian of the Tarbur Formation of Iran (Naghan section, a-i, k) and the Simsima Formation of Qatar (j). a, d, oblique sections perpendicular to plane of compression. Note the inclination of the apical-juvenile part expressed by the parallel-sectioning of septum (s) and foramina (f) in d. b, oblique section passing through the initial part of a microspheric specimen. c, f, i-k, oblique sections in the plane of compression (j, paratype from Henson, 1948, pl. 10, fig. 14). Detail from i shows the fine subepidermal cellular network, marginal foramina and undivided marginal trough. e, g-h, oblique sections passing through the initial part of megalospheric specimens. Thin sections: 2Ng 81-2 (a, d), Ng 76 (b), 2Ng 81-3 (c), Ng 85 (e), 2Ng 87-2 (f, i), 2Ng 80-1 (g), 2Ng 85-4 (h). Abbreviations: b = beam, deu = deuteroconch, f = foramen m.f. = marginal foramen, m.t. = marginal trough, pi = pillar, pr = proloculus, T = Tarburina zagrosiana Schlagintweit et al. (in k).
Dictyoconus bakhtiari by Schlagintweit et al. (2016) but this taxonomic interpretation is revised herein. Dictyoconus has a medium-high conical test with circular transverse section (Fig. 5). Notably, this feature alone is generally given generic importance. Examples are the Liassic forms Lituosepta Cati, 1959 (uncompressed) and Plani-septa Septfontaine in Kaminski, 2000 (compressed), the Lowermost Cretaceous Scythiolina Neagu, 2000 (compressed) and Histerolina Neagu, 2000 (uncompressed), or the Paleogene Rhapydionina Stache, 1913 (uncompressed) and Fanrhapydionina Fleury, 2014 (compressed).

Dictyoconella complanata Henson, 1948
Figs. 2a-b pars, 3-4
1948 Dictyoconella complanata n. gen., n. sp. – Henson, p. 25, plate 6, figs. 2-3, 16, pl. 10, fig. 14.

1986 Dictyoconella complanata Henson – Köylüoğlu, pl. 86, fig. 1 pars.
1998 Dictyoconella complanata Henson – Whittaker et al., pl. 47, figs. 4-6.
2016 Dictyoconus bakhtiari Schlagintweit et al. – Schlagintweit et al., fig. 8g, fig. 10f.
2020 Dictyoconella complanata Henson – Schlagintweit, p. 75, fig. 4d-f.

**Description:** See the genus description.

**Dimensions:**
Test diameter: up to 4.8 mm (3.3 mm, holotype specimen of Henson, 1948)
Test height: 3.6 mm (2.9 mm, holotype specimen of Henson, 1948)
Thickness: mostly between 0.8 and 0.9 mm (~0.8 mm, Henson, 1948)
Fig. 7 *Gasicella minima* (Henson) gen. et comb. nov. from the late Maastrichtian of the Tarbur Formation, SW Iran (Mandegan section: b, l; Naghan section: a, c–k). a Oblique transverse section. b Oblique section cutting the marginal (upper part) and central zones (lower part) displaying irregularly distributed fused pillars/secondary deposits. c, k Subaxial sections. d–g, Axial sections showing initial spire. h–i Details (from e and g) of the initial spire. j Tangential section. Slightly oblique transverse sections showing subdivision of the marginal zone and circle of marginal apertures (left and above). Abbreviations: m.f. = marginal foramen, m.t. = marginal trough, pr = protoconch, s.d. = secondary deposits/fused pillars. Thin sections: 2Ng 17 (a, k), Rt 100 (b), Ng 180-1 (c), 2Ng 179-1 (d), 2Ng 168 (e, h), 2Ng 175 (f), 2Ng 174 (g, i), 2Ng 177 (j), Rt 113 (l).
Fig. 8 Gusicella minima (Henson) gen. et comb. nov. from the late Maastrichtian of the Tarbur Formation, SW Iran (Naghan section: a–b, j, l; Mandegan section: c–i, k, m–p). a Subaxial section. b, i, l Oblique sections. c–e, m Deep tangential sections displaying primary septules (beams) continuous (aligned) from one chamber to the next. f Shallow tangential section displaying subepidermal network of beams and rafters. g, j, l, o–p Different transverse sections, some slightly oblique. Note five marginal foramina arranged in a radial circle (inside yellow marked rectangle in o). Note oval test outline in j. Subaxial section. Note alternation of pillars by stairway-like arrangement of foramina (yellow line) and opaque fused pillars/secondary deposits in the central zone. k Detail from h showing marginal foramina arranged in vertical lines between successive chambers. n Tangential-oblique section. Abbreviations: b = beam, ib = intercalary beam, f = foramen, m.f. = marginal foramen, m.t. = marginal through, pi = pillar, s = septum. Thin sections: Ng 196 (a), Ng 192 (b), Rt 108-3 (c–e, g, n), Rt 104 (f), Rt 96 (h, k), Rt 108-6 (i), Ng 187 (j), Ng 186 (l), Rt 107 (m), Rt 102-2 (o), Rt 104 (p).
Number of chambers last mm axial length: 7-9 (about 7, Henson, 1948)

Remarks: The dimorphism of *D. complanata* is well constrained by the biloculine embryo in the A-form and an indiscernible embryo within a close-coiled whorl including more chambers in the B-form (one section only, see Fig. 4b). The differences in the external test morphology between the two generations are unknown. In the family Orbitolinidae, B-specimens are generally larger and more flattened (e.g., Hofker, 1966). In the Iranian Tarbur Formation, *D. complanata* is comparably rare and only a couple of sections are available. Due to the revision presented herein, *Dictyoconella* becomes a monospecific genus and an assumed Maastrichtian newcomer that became extinct shortly afterwards at the K-Pg boundary. Besides the Tarbur Formation of Iran, *D. complanata* has been reported so far from the Maastrichtian Garzan Formation of southeastern Turkey (Köylüoğlu, 1986) revealing some kind of bioprovincialism, which requires subsequent study (Schlagintweit, 2020a).

Subfamily Dictyorbitolininae Schroeder, 1990 (in Schroeder et al., 1990)

**Remarks:** Subfamily Dictyorbitolininae includes the following genera: *Dictyorbitolina* Cherchi & Schroeder, 1976, *Praedictyorbitolina* Schroeder in Schroeder et al., 1990, *Paracoskinolina* Moullade, 1965 (see Schroeder in Schroeder et al., 1990) of the Lower Cretaceous, *Gusicella* gen. nov. of the Upper Cretaceous, and *Schroedericonus* Schlagintweit, 2020b of the Paleogene.

**Genus Gusicella** n. gen.

**Type species:** *Dictyoconella minima* Henson, 1948. Holotype P.35838 in Henson (1948), stored at the Natural History Museum London (see also https://data.nhm.ac.uk).

**Derivation of the name:** The name is dedicated to Ivan Gusič for his numerous contributions to Mesozoic benthic foraminifera and dasycladalean algae.

**Diagnosis:** Finely agglutinated shell of medium conical morphology; wall thin, without any texture. Early stage with small embryo and an eccentric spire consisting of a few compressed chambers (~ half a whorl) displaying an angular margin in vertical section. Transverse section of the cone can be slightly compressed. Adult conical part with numerous rectilinear chambers subdivided into marginal and central zones separated by an undivided marginal trough. Marginal zone with several orders of beams and rafters forming a polygonal network. Main vertical partitions (beams) continuous between chambers. Central zone with pillars alternating between successive chambers; secondary deposits may be present. Marginal foramina are inclined at about 45 degrees with respect to the cone axis and form a circular row at the outer margin of the marginal trough. Multiple foramina situated in the central test part. Microspheric forms presumably broader and with convex cone base.

**Comparisons:** Due to the vertically alignment of the main partitions, *Gusicella* belongs to the Dictyorbitolininae as defined by Schroeder in Schroeder et al. (1990). *Gusicella* is so far the only genus of the Dictyorbitolininae reported from the Late Cretaceous Global Community Maturation Cycle of larger benthic foraminifera (e.g., Hottinger, 1997, Consorti, 2017). *Dictyoconella* Henson instead with its alternating vertical skeletal elements belongs to the Dictyoconinae Moullade (see discussion in Schlagintweit et al., 2016). The discreteness of *Gusicella* gen. nov. is given by the combined features of the initial part, and structural (exo- and endoskeleton) and foraminal features. *Dictyorbitolina* Cherchi and Schroeder has an apical embryo consisting of a simple protoconch and septate deuteroconch, and alternating pillars in the central zone. It is worth noting that *Dictyorbitolina* was previously placed within the subfamily Orbitolininae (Cherchi and Schroeder, 1976; Loeblich and Tappan, 1987), then transferred to the Dictyorbitolininae by Schroeder in Schroeder et al. (1990). *Praedictyorbitolina* Schroeder et al., 1990 has a simple embryo in eccentric position and alternating pillars in the central zone. In *Paracoskinolina* Moullade, 1965, the main partitions and pillars are aligned between the consecutive chambers.

Henson (1948, p. 24–25) noted the presence of a “zone with undivided chamber space” (or marginal ridge) between the marginal (with exoskeleton) and central zones (with endoskeleton; see also Hottinger, 2006, p. 22) as also described from *Dictyoconus* Blanckenhorn by Davies (1930: marginal trough; see Figs. 7a, 9d). Henson (1948, p. 26) also noted that in *D. minima* “the interseptal structures are sporadic and poorly defined in the central shield” (= central zone). In this context, Henson (ibidem) was obviously referring to the presence of secondarily infilled shell material as for instance reported from the Pfenderinidae Smout and Sugden or the orbitinid *Carinoconus* Cherchi & Schroeder (Loeblich and Tappan, 1987). The characteristics compared to those of the dictyconid genera *Carinoconus* Cherchi & Schroeder and *Dictyoconus* Blanckenhorn are compiled in figure 6.

**Remarks:** The new compilation shows that the post-Cenomanian Upper Cretaceous Orbitolinidae consists of nine genera which in alphabetical order are: *Abrardia* Neumann & Damotte, *Calveziconus* Caus & Cornella, *Dictyoconella* Henson, *Dictyoconus* Blanckenhorn, *Falsurgonina* Arnaud-Vannée, *Gusicella* Schlagintweit & Rashidi, *Orbilihinopis* Henson, *Paleodictyoconus* Moullade, and *Pseudorbitolina* Douvillé.

*Gusicella minima* (Henson, 1948) comb. nov.

Figs. 2c-d, 7-9

*1948 Dictyoconella minima* n. sp. – Henson, p. 25, pl. 11, fig. 3, 8-10.

1998 *Dictyoconella minima* Henson – Whittaker et al., pl. 4, fig. 3, pl. 5, figs. 1-2, pl. 48, figs. 1-4.

2008 *Dictyoconella minima* Henson – Schlagintweit et al., p.34, fig. 3a-b pars, 5-6.
Fig. 9 Gasicella minima (Henson) gen. et comb. nov. from the late Maastrichtian of the Tarbur Formation, SW Iran (Naghian section: c–f, h–k): Mandegan section: a–b, g, i. a subaxial section of an assumed microspheric specimen. b–e axial sections showing initial spire with acute margin beneath the apex. d oblique section showing the marginal trough between the marginal and central zones as well as a circular row of marginal apertures between. e tangential section showing subepidermal network; septa in the lower part marked by white dash lines. f subaxial section of a possibly microspheric specimen. g transverse section. h subaxial section. i tangential section showing aligned main beams. j subaxial section of a possibly microspheric specimen. k tangential section. l slightly oblique transverse section showing several orders of vertical partitions (beams, intercalary beams), marginal trough, and pillared central zone. Abbreviations: m.f. = marginal foramen, m.t. = marginal through, pi = pillar. Thin sections: Rt 105 (a), 2Ng 17 (e), Rt 96 (b), 2Ng 167 (d), 2Ng 174 (e), 2Ng 118-1 (f), Rt 108-2b (g), 2Ng 169 (h), 2Ng 191 (i), 2Ng 176 (j), 2Ng 146 (k), Rt 111-1 (l).
**Description:** Test medium conical (apical angle from 50 to 90 degrees); both sides and cone base slightly convex. Assumed microspheric specimens broader and larger (Fig. 8a, 9a, 9f, 9j). Transverse sections circular (Fig. 8p) or ovoidal-compressed (Fig. 7l, 8j). The initial part is characterized by a small spire of few chambers arranged in half a whorl that is closely attaching (almost parallel) to the side test wall (Fig. 7d, g, i, 9b). The acute apex is tilted, marking the early development in a downward turning to the cone base (e.g. Fig. 7g). The megalospheric embryo appears as a single subspherical chamber (protoconch) showing short septules at its upper part facing the cone base (Fig. 7g-i). The chambers are subdivided into marginal and central zones. The exoskeleton consists of horizontal (rafters) and radial vertical partitions (beams) subdividing the chamber margins. There are one to three rafters in the marginal zone (e.g. Fig. 7e). In case of two rafters, the upper one (in direction to the apex) is twice as long as the lower one. In case of three rafters, the middle one is roughly twice as long as the others. There are two to three intercalary beams between the longer main partitions (beams) (Fig. 8p, 9d). The latter are continuous from one chamber to the next (Fig. 8c, 8m, 9i). They extend to the undivided marginal through marking the boundary to the central zone (Fig. 7a, 9d). Here, the septa slightly bend upwards in direction to the apex forming a "buttress on marginal ridge" sensu Davies (1930) as seen in axial sections (Fig. 8k). Shallow-tangential sections display a pattern of subrounded alveolar compartments (subepidermal network) (Fig. 7), 8f, 9e). At their distal ends the primary beams are moderately thickening. The marginal chamberlets are tapering distally terminating inwards with a marginal foramen, oriented at about 45 degrees to the main axis. In transverse sections they form a circular ring (Fig. 7l, 8k, 8o). Foramina can form a continuous line running parallel to the outer test surface as seen in axial sections (Fig. 7e, 8a). Certain portions of the central zone are filled with opaque micritic masses (fused pillars and/or secondary deposits) that obliterate the original structure (Fig. 7b-c, 8h). The pillars of the central zone are comparably narrowly spaced and alternate between consecutive chambers (Fig. 7c-d, 8a, h, 9f). In the central part, the foramina present a cribrate distribution and are vertically arranged.

**Dimensions** (in mm; data from Henson, 1948, between brackets):
- Test diameter (D): 0.7–1.9 mm (0.7–1.8 mm). Note: specimens with a test diameter > 1.5 mm appear to be microspheric specimens.
- Test height (H): 0.8–1.4 (1.0–1.5 mm)
- D/H: 0.8–1.35

Numbers of chambers per 1 mm of the axial length: 12–16, mostly 15–16 (15)

**Remarks on stratigraphy:** Henson (1948) reported *Dictyoconella minima* “most probably” from the late Cenomanian or Turonian of Qatar (Dukhan no. 2 and 3 wells; Wasia Group, see figs. 1-2 in Sugden and Standring, 1975). In addition, Henson (op. cit, p. 26) noted “a single speci-

men, possibly of this species” from the Maastrichtian of Iraq. For the Dukhan oil field of Qatar, Hewaidy and Al-Hitmi (1994) established a Late Cenomanian “*Dictyocella minima* total range Zone”. The “zonal taxon” however, has not been illustrated and therefore, cannot be commented. Within the framework of our observations in the Cenomanian Sarvak Formation of Iraq (e.g. Yazdi-Moghadam and Schlagintweit, 2020), no specimens of *G. minima* have been observed. There are specimens of an orbitolinid displaying a pillared central zone and a complex exoskeleton that needs further taxonomic study and evaluation, and it is different from *G. minima*. So far, only the occurrence in the Maastrichtian is well constrained and older occurrences require further study.

**CONCLUSIONS**

The generic individuality of *Dictyoconella* Henson is reinstated herein. The taxonomic revision however, leads to the genus monotypy, including only the type-species *D. complanata*. The taxon described as *Dictyoconella minima* Henson is considered a separate new genus: *Gusicella*, which is also a monospecific taxon. *Gusicella* is the first and thereby only representative of the subfamily Dictyorbitolininae in the Upper Cretaceous. Both *Dictyoconella* and *Gusicella* are restricted to the Upper Cretaceous and became extinct at the K-Pg boundary mass-extinction event.

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