THE RELATION BETWEEN THE GENERA CYRTINOPSIS SCUPIN, 1896 AND KOZLOWSKIELLLINA BOUCOT, 1957

BY

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ABSTRACT

A comparison of some morphological characters of Cyrtinopsis and Kozlowskiellina shows that the micro-ornamentation of Cyrtinopsis is essentially the same as in Kozlowskiellina and consists of growth lamellae, capillae and minor growth lines. The cardinal area of Cyrtinopsis is composed of a central interarea and a lateral palintrope, exactly the same as in Kozlowskiellina. The peculiar pedicle valve interior with the spondylium-like trough of Cyrtinopsis is fully comparable to and homologous with the interior of the pedicle valve of Kozlowskiellina which is also the case with the cardinalia in the brachial valve in both genera. As a conclusion it seems justified to unite both genera in one subfamily which for priority reasons must be named Cyrtinopsidinae.

INTRODUCTION

The genus Cyrtinopsis has been assigned by Scupin, 1896, with the type species Spirifer undosus Schnur, 1851. In 1957 A. J. Boucot placed the genus Cyrtinopsis in a new family, the Cyrtinopsidae (in 1962 changed by Boucot into the correct name Cyrtinopsididae). In the discussion of the family, Boucot states (1957): “The family possesses fine ornamentation distinct from that characterizing all known spiriferacean families”.

In the diagnosis of the genus Cyrtinopsis, Boucot states (1957): “Delthyridiform Spiriferacea, possessing lamellose ornamentation crossed by radial crenulations; fold and sulcus broad; lateral costae present; shell impunctate. Internally having a high median septum in the pedicle valve to which the dental lamellae are attached in a manner reminiscent of Cyrtina. Pseudodeltidium small, apically perforate, occurring in the apex of the deltidium”.

Fitz (1965) changed the family to the subfamily level, the Cyrtinopsinae within the family of the Delthyrididae. He gives the following diagnosis for the subfamily Cyrtinopsinae: “Lateral slope plicate; micro-ornament consisting of very prominent growth lamellae crossed by short radial crenulations; pedicle valve interior with dental plates converging to form spondylium supported by 3-layered septum”.

Up to now the following species are known in the genus Cyrtinopsis:

Cyrtinopsis pseudoaculeata Scupin, 1896. Eifelian of Eifel region

Cyrtinopsis crenata (Steininger, 1853). Eifelian of Eifel region
W. Struve, 1965, p. 31-34.

Cyrtinopsis exaggerata Struve, 1965. Eifelian of Eifel region

Cyrtinopsis brachyptera (Maillieux, 1914). Middle Eifelian of the Ardennes, Eifel region and Morocco

Cyrtinopsis undosa (Schnur, 1851). Upper Eifelian of Eifel region, Emsian and Eifelian of Ardennes region

Cyrtinopsis nalivkini Rzonsnickaja, 1952. Upper part of the Lower Devonian and the Middle Devonian of the Kuzneck Basin (Festerev Seam and Safonov Seams) M. A. Rzonsnickaja, 1952, p. 52-54; Pl. II, Figs. 1-4; text-figs. 1, 1-3.

Cyrtinopsis inflictens (Barrande, 1879). Ludlow or Lower Gedinnian of Bohemia (Vápence Lochkoské)
V. Havlíček, 1959, p. 144-147; Pl. XXIII, Figs. 5-7; text-figs. 65-67.

W. Struve (1965) described some poorly known Cyrtinopsis-species and he established within two species several subspecies. In his text-fig. 2 an elucidating diagram of the phylogeny of the Eifel species of Cyrtinopsis is given.

Little is known about the phylogenetic place of the genus Cyrtinopsis among other genera. This publication gives a morphological comparison between Cyrtinopsis and the genus Kozlowskiellina Boucot, 1957 (see Krans, 1969). Successively I shall describe the micro-ornamentation, the cardinal area, the interior of the pedicle valve and the interior of the brachial valve.
ACKNOWLEDGEMENTS

I am greatly indebted to Dr. W. Struve, Forschungs-Institut Senckenberg, Frankfurt (Main) for providing me with a well preserved specimen of *Cyrtinopsis* from the Eifelian of Auburg near Gerolstein (Germany). The sections shown in this publication have been made on this specimen. I also wish to thank Dr. A. Vandercammen, Institut royal des Sciences naturelles de Belgique, Brussels, for allowing me to examine his *Cyrtinopsis* collection from the Ardennes region and Prof. Dr. A. Brouwer, Department of Stratigraphy and Paleontology, Leiden University, for critical reading of the manuscript and for making valuable comments. I am indebted to Dr. J. F. Savage for his kind correcting the English text.

MORPHOLOGICAL OBSERVATIONS

Description of *Cyrtinopsis*
The micro-ornamentation. — In the literature the following descriptions of the micro-ornamentation are given:

Boucot, 1957,
p. 38: “lamellose ornamentation crossed by radial crenulations.”
p. 39: “fine ornamentation consisting of prominent growth lamellae intersected by minute radial crenulations which simulate costellae, giving the fine ornamentation a reticulate effect.” See Pl. 2, Fig. 11.

Vandercammen, 1963,
p. 101: “microsculpture constituée par des lamelles concentriques de croissance relevées et festonnées.”
p. 103: “La microsculpture ... est constituée par des lamelles concentriques de croissance épaisses, régulièrement espacées et dont le bord relevé donne l’aspect typique de chevron. Le bord commissural est festonné et le plat des lamelles concentriques est garni de petites crêtes radiaires séparant les festons.” See his text-figure 63, and Pl. X, Fig 2.

Drot, 1964,
p. 69: “Ornamentation lamelleuse, recoupée par des crénulations radiaires.”
p. 70: “Microornamentation constituée de lamelles d’accroissement proéminentes, ondulées, recoupées de petites crénulations qui donnent un aspect festonné à leur bord (Pl. 6, Figs. 7, 8). Entre ces crénulations, groupées parfois par deux ou trois, apparaît un minuscule quadrillage constitué de stries pararallèles aux lamelles d’accroissement et de stries radiaires.”

Struve, 1965,
p. 11: “Überraschend bezeichnende Skulptur aus dicht gedrängten, lamellösen, am freien Rande girlandenförmig geschwungenen, mit radialen Leisten besetzten Anwachszonen (gekehrte “Dachziegeln”).” See his Tafel 1, Fig. 1; Tafel 2, Figs. 3, 4; Tafel 4, Fig. 3; Tafel 5, Fig. 3.

The components of the micro-ornament of *Cyrtinopsis* are: growth lamellae, radial capillae (see Williams & Rowell, 1965, p. H141, and Krans, 1969, p. 266) and minor growth lines (see Krans, 1969, p. 267, and J. Drot, 1964, p. 69).

A specimen of *Cyrtinopsis undosa* from the Eifelian of the Ardennes (specimen no. 5519, Inst.roy.Sci.nat. Belgique in Brussels, from the Lower Couvinian (Co2c) figured by Vandercammen 1963, Pl. X, Figs. 1–2) makes it clear that the micro-ornament consists of overhanging growth lamellae with radial capillae formed by undulations in the growth lamellae. The outer radial capillae correspond with inner furrows (text-fig. 1).

Some areas on the valves of specimen 5518, Inst. roy.Sci.nat.Belg., (figured by Vandercammen 1963, Pl. X, Figs. 3–5) show a micro-ornamentation with the

Fig. 1. Anterior view of a growth lamella of *Cyrtinopsis undosa* from the Upper Eifelian of the Ardennes (specimen 5519, Inst.roy.Sci.nat. de Belgique, figured in Vandercammen, 1963, Pl. X, Figs. 1, 2).

Note that the capillae on the exterior of the lamella correspond with furrows in the inner side of the growth lamella.

Fig. 2. Schematic representation of the micro-ornamentation of *Cyrtinopsis undosa* from the Upper Eifelian of the Ardennes (specimen 5518, Inst.roy.Sci.nat.de Belgique, figured in Vandercammen, 1963, Pl. X, Figs. 3–5).

The freehanging parts of the growth lamellae have been broken away. Note the minor growth lines on the concave growth lamellae.
The relation between the genera *Cyrtinopsis* Scupin, 1896 and *Kozlowskiellina* Boucot, 1957

The relation between the genera *Cyrtinopsis* Scupin, 1896 and *Kozlowskiellina* Boucot, 1957

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A feature similar to that above is to be seen on specimen 5520, Inst.roy.Sci.nat. de Belgique. On the crests of the costae the curvature of the growth lamellae is more concave than in the intercostal spaces (text-fig. 3). Minor growth lines are very clearly visible. Small pustules were formed on the intersections of the minor growth lines and the radial capillae.

Specimen 5519, Inst.roy.Sci.nat.Belg., shows another peculiarity. The overhanging growth lamellae are broken and the visible growth lamellae are very thick. Probably Vandercammen (1963) took this example for his text-figure 63. In my opinion the thickness of the growth lamellae is caused by the successive intra-

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**Fig. 3.** Schematic representation of the micro-ornamentation of *Cyrtinopsis undosa* from the Upper Eifelian of the Ardennes (specimen 5520, Inst.roy.Sci.nat. de Belgique).

Note that on the crests of the costae the curvature of the growth lamellae is more concave than in the intercostal spaces.

**Fig. 4.** a. Scheme of the commissure of the pedicle valve of *Cyrtinopsis undosa* (same specimen as the one of text-figure 1). The growth lamella is thickened and underneath each capilla a groove in the thickened part is present. Probably the thick part represents a part of the intramarginal ridge. The grooves in the intramarginal ridge could have a function in respect to the setal follicles as explained in Krans, 1969, text-figure 4.

- 1 = radial capilla
- 2 = minor growth line on the growth lamella
- 3 = broken edge of the growth lamella (the overhanging part has been broken away)
- 4 = grooves in the supposed intramarginal ridge

b. Scheme of the commissure of *Cyrtinopsis* with a free-hanging growth lamella.

- 1 = costa
- 2 = growth lamella
- 3 = intramarginal ridge

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**Fig. 5.** Cardinal area of the pedicle valve of *Cyrtinopsis undosa* of the Upper Eifelian of the Ardennes (specimen 5518, Inst.roy.Sci.nat. de Belgique, figured in Vandercammen, 1963, Pl. X, Figs. 3-5).

- 1 = delthyrium
- 2 = ventral interarea
- 3 = ventral palintrope with growth lamellae
- 4 = delthyrial side
- 5 = interreal side
- 6 = beak ridge
- 7 = sulcus

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**Fig. 7.** Schematic representation of the micro-ornamentation of *Cyrtinopsis undosa* from the Upper Eifelian of the Ardennes (specimen 5520, Inst.roy.Sci.nat. de Belgique).

Note that on the crests of the costae the curvature of the growth lamellae is more concave than in the intercostal spaces.
marginal ridges underneath the growth lamellae (text-fig. 4).

Cardinal area. – The ventral cardinal area of Cyrtinopsis can be catacline to orthocline, high and plane or very concave. Struve described the differences in the interareas in the different Cyrtinopsis species.

On a specimen of Cyrtinopsis undosa (no. 5518, Inst.roy.Sci.nat.Belg., figured by Vandercammen, 1963, Pl. X, Figs. 3–5) it becomes clear that the lateral parts of the cardinal area are provided with overhanging growth lamellae (text-fig. 5) and that these lateral parts do not lie in the same plane as the interarea proper.

As we have stated earlier (1969, p. 268–269) an interarea is a posterior sector of shell with a growing edge at the hinge line where the two mantle lobes are fused. A palintrope is a posterior sector of shell with a growing edge not coinciding with the hinge line. The growing edge is in fact part of the normal commissure but is situated between the cardinal extremities.

Overhanging growth lamellae are formed by mantle retraction along the commissure. It is evident that also the cardinal area of the specimen just mentioned is in fact composed of an interarea (central part provided with the delthyrium) and of a palintrope (the two lateral parts with growth lamellae). This feature is also to be seen in Cyrtinopsis undosa of the Eifelian.

Fig. 6. Transverse sections of the pedicle valve of Cyrtinopsis spec. from the Eifelian of Auburg near Gerolstein, Germany.
1 = median septum
2 = spondylium-like trough
3 = lateral cavity
4 = dental ridge
5 = secondary connection of dental ridge with the median septum
Sections A, B, C, D, E and F respectively peelings 69002, 69003, 69004, 69005, 69007 and 69008.
of Gerolstein as is shown by Boucot, 1957, Tafel 2, Figs. 14, 15 and in *Cyrtinopsis* cf. *brachyptera* of the Eifelian of the Eifel region, Boucot, 1957, Tafel 2, Fig. 18.

J. Drot, 1964, illustrates the cardinal area of *Cyrtinopsis undosa maiderensis* Drot, 1964, where also here the peculiar form of the cardinal area appears. This subspecies comes from the Upper Eifelian of Morocco (Pl. 6, Fig. 2a of J. Drot, 1964). W. Struve, 1965, figures *Cyrtinopsis exaggerata maillici* Struve, 1964, from the Eifelian of the "Gerolsteiner Mulde", Tafel 2, Figs. 2b, 2c, which shows the same type of cardinal area. The same is true for *Cyrtinopsis pseudoaculeata* Scupin, 1896, on Struve's Tafel 3, Fig. 2b.

The distinctness of this character of the cardinal area depends greatly on the conservation of the specimens and this is the reason why it cannot always be demonstrated.

**Interior of the pedicle valve.** — Text-figure 6 shows a series of sections made on a specimen of *Cyrtinopsis* sp. of the Eifelian of Auburg near Gerolstein (this specimen was kindly given to me by dr. W. Struve). No dental plates are present (dental plates are platelike structures lying underneath the edges of the delthyrium and reaching the floor of the valve). In *Cyrtinopsis* we are dealing with dental ridges which are fused to a long and high median septum by convergence towards the floor of the valve forming a spondylium-like trough (Pl. I, Fig. 1; Pl. II, Fig. 1; Pl. III).

The fusion of the dental ridges with the median septum does not take place at the crest of the septum but somewhat lower so that in the trough the median septum still protrudes (text-fig. 7). From section 69005 it becomes also clear that outgrowths of the dental ridges towards the septum form the proper connection between the dental ridges and the median septum. In the dental ridges a very thin layer of clear prismatic calcite has been found on the delthyrial flanks of the ridges which could be possibly a myost layer indicating the attachment of a pair of pedicle muscles. These attachment areas on the flanks of the trough indicate the extension of the two dental ridges. The form of the trough is determined by the attachment of the accessory diductors. The anterior extension of the trough can be determined by the passing by from the pedicle sac towards the floor of the valve of the pedicle adjustors just anterior of the trough. Because of the fact that not all muscles have been attached in the trough, the latter can not be named spondylium, since this should be a trough serving for the attachment of all muscles. Therefore we call it a spondylium-like trough.

**Interior of the brachial valve.** — Crural plates are present in the sections of *Cyrtinopsis* spec. from the Eifelian of Auburg near Gerolstein (specimen provided by Dr. W. Struve) (text-fig. 8; Pl. I, Fig. 2; Pl. II, Fig. 2). The crural plates are very thick and do not really protrude as plates. The lateral cavities are very shallow. The crural bases are small and the outer hinge plates well distinguishable. The lamellae of the cardinal process are formed on a concave platform. In the plane of symmetry a deeper groove between the lamellae is present so that the cardinal process shows a weak bilobal aspect.

**Comparison with Kozlowskiellina**

**Micro-ornamentation.** — The components of the micro-ornamentation of both *Cyrtinopsis* and Kozlowskiellina are the same: growth lamellae, radial capillae corresponding with inner furrows, and minor growth lines (compare text-figure 1 with Krans, 1969, text-figure 1). Furthermore the aspect of the micro-ornament in case that the overhanging parts of the growth lamellae of *Cyrtinopsis* are broken away is just the same as in Kozlowskiellina, especially so in Kozlowskiellina velata (Krans, 1969, Pl. III, Figs. 5, 6). The growth lamellae in *Cyrtinopsis undata* show a greater concavity on the crests of the costae than in intercostal spaces. This aspect is also to be seen in Kozlowskiellina (see Krans, 1969, text-figure 3).

Both *Cyrtinopsis* and Kozlowskiellina show evidence for the presence of intramarginal ridges (see Krans, 1969, text-figure 2 and Pl. V, Fig. 4).

The similarities in the micro-ornamentation are very remarkable as this type of micro-ornamentation is unique in the spiriferids.

**Cardinal area.** — The cardinal area of *Cyrtinopsis* consists of a central interarea and a lateral palintrope. This peculiarity of the cardinal area, which is like the micro-ornament of *Cyrtinopsis* rather unique, is also to be found in all the species of Kozlowskiellina (see Krans, 1969, text-figure 5 and Pl. III, Figs. 7, 8).
**Interior of the pedicle valve.** – The formation of a spondylium-like trough is only present in the genera *Cyrtinopsis* and *Kozlowskiellina*. In *Kozlowskiellina* the evolutionary changes can be traced, indicating that a reduction of the dental plates took place, giving rise to the formation of the dental ridges. By convergence of the dental ridges towards the median septum a spondylium-like trough is formed, which is present in several *Kozlowskiellina* species, as also in *Cyrtinopsis*. The morphology and growth of the trough in *Cyrtinopsis* are exactly the same as in *Kozlowskiellina*.

The supposed evolutionary changes of this trough are figured in text-figure 9.

**Interior of the brachial valve.** – The internal characters of *Cyrtinopsis*, so far as we were able to examine the specimen, are: thick crural plates, a concave platform for the lamellae of the cardinal process which shows itself a weak bilobed aspect. Rather well developed outer hinge plates.

In some species in the genus *Kozlowskiellina* we find a similar interior of the brachial valve, especially so in *Kozlowskiellina perlamellosa* (see Krans, 1969, text-fig. 22).

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Fig. 8. Transverse sections of the brachial valve of *Cyrtinopsis* spec. from the Eifelian of Auburg near Gerolstein, Germany (same specimen as text-figure 6, position of sections are indicated in text-figure 6).
6 = crural base
7 = dental socket
8 = lamellae of the cardinal process
9 = outer hinge plate
RELATION BETWEEN CYRTINOPSIS AND KOZLOWSKIELLINA

Morphological considerations
All characters of Cyrtinopsis (i.e. micro-ornamentation, cardinal area, interior of pedicle valve and interior of brachial valve) indicate a close relationship with the genus Kozlowskiellina.

Concerning the micro-ornamentation. – Placing the micro-ornamentation of Cyrtinopsis in the scope of the evolution of the species in Kozlowskiellina, we see that the micro-ornament of Cyrtinopsis is not a very early stage in the evolution but comes near to the morphology of Kozlowskiellina velata, K. perlamellosa and K. raricosta. K. velata is known from the Helderberg of Oklahoma whereas K. raricosta appears in the Siegenian of Nevada. Judged from the micro-ornament it consequently could be possible that Cyrtinopsis branched off from the Kozlowskiellina tree somewhere before the appearance of K. velata, K. perlamellosa and K. raricosta.

Concerning the cardinal area. – The cardinal area of Cyrtinopsis is of the same type as the one of Kozlowskiellina. Because of the fact that all Kozlowskiellina species possess a lateral palintrope and a central interarea, no evolutionary indication is possible on this ground.

As is stated by Amsden the Silurian kozlowskiellinins possess a rather high catacline to orthocline cardinal area whereas the Devonian species have a much lower cardinal area except K. cyrtinoides. On this ground it would be possible that Cyrtinopsis branched off from the Kozlowskiellina branch somewhere before the appearance of the kozlowskiellinins like K. velata, K. hesione, K. perlamellosa.

← Fig. 9. Supposed evolution of the spondylium-like trough in the subfamily of the Cyrtinopsidinae.
a = primitive condition in the pedicle valve with two distinct dental plates reaching the floor of the valve.
b = on the dental plates attachment of a pair of pedicle muscles causes the reduction of the dental plates to dental ridges with a convergence of the ridges towards the median plane.
c = raising of the accessory diductors field on both sides of the median septum.
d = formation of a spondylium-like trough by further raising of the accessory diductor field. This condition is to be found in several Kozlowskiellina-species and in Cyrtinopsis.
Concerning the interior of the pedicle valve. — The absence of dental plates and converging dental ridges of *Cyrtinopsis* indicate that *Cyrtinopsis* probably arose from the kozlowskiellinins after the appearance of *K. vaningeni*. The ventral interior of *Cyrtinopsis* is much alike *K. cyrtinoides* and *K. raricosta*. Therefore we may conclude that *Cyrtinopsis* arose after the appearance of *K. vaningeni*.

The presence of a clear median septum indicates that *Cyrtinopsis* arose from the *vaningeni*-branch rather than from the *strautil*-branch (cf. Krans, 1969, text-fig. 24).

Concerning the interior of the brachial valve. — The interior of the brachial valve and especially the cardinal process of *Cyrtinopsis* is much alike *K. perlamellosa*. On this basis it would be logical that *Cyrtinopsis* appeared somewhere between *K. velata* and *K. perlamellosa*.

However, the stratigraphic range of *Cyrtinopsis* does not fit in this concept. Therefore it is very probable that this highly functional structure developed independently of the kozlowskiellins, so that concerning the cardinal process we assume a parallel evolution in *Cyrtinopsis* in relation to the branch of *K. velata* to *K. perlamellosa*.

Concluding we may say that *Cyrtinopsis* is closely related to *Kozlowskiellina* and that it arose from the *Kozlowskiellina* tree somewhere between *K. vaningeni*, *K. deltidualis* and *K. velata*.

Paleogeographic considerations

The Silurian shows generally a rather cosmopolitan brachiopod fauna (see Boucot, Johnson and Talent, 1967) so that from this point of view the geographical distribution of the kozlowskiellins does not have much evolutionary consequences. By the end of the Silurian *Kozlowskiellina cyrtinoides* appears in Tennessee with a very well developed "spondylial trough" whereas in Bohemia *Cyrtinopsis inflectens* occurs. But in the Early Devonian two brachiopod faunal provinces became marked (see Boucot, Johnson and Talent, 1967), the Appalachian and the Old World provinces. This provinciality becomes more prominent in the late Gedinnian and further in the Devonian. From this it is easily understandable that also the history of the *Kozlowskiellina-Cyrtinopsis* group shows a differentiation. In the Appalachian province we see a further development in the *Kozlowskiellina*-species, in the Old World in the Bohemian and later in the Renish Bohemian province the development of the *Cyrtinopsis* group took place.

An evolutionary diagram is shown in text-figure 10.

Taxonomical considerations

Taxonomically this relationship has a consequence. The genus *Cyrtinopsis* is placed by Struve, 1965, in the family of Cyrtinopsididae Wedekind, 1925. Pitrat, 1965, using the imperfect name Cyrtinopsidae, placed this group on the subfamily level Cyrtinopsinae. Derived from the valid name *Cyrtinopsididae* the subfamily should be named Cyrtinopsinae. In this subfamily only the genus *Cyrtinopsis* is known. However, it has been shown in this paper, that there is a close phylogenetic relation between *Cyrtinopsis* and *Kozlowskiellina*. Therefore it would be more logical to place the genus *Kozlowskiellina* within the same subfamily as the genus *Cyrtinopsis*. As the subfamily name Cyrtinopsidinae has priority over the subfamily name Kozlowskiellininae the genera *Cyrtinopsis* and *Kozlowskiellina* must be placed in the subfamily Cyrtinopsidinae.

The definition of this subfamily may be stated as follows: Delthyridae with lateral slopes plicate. Micro-ornamentation consisting of growth lamellae provided with capillae and minor growth lines. Pedicle valve interior with a median elevation in the floor, in most forms a real, high median septum; in the primitive forms real dental plates, in more advanced forms reduction of the dental plates to dental ridges; in some forms the dental ridges converge and form with the mostly high median septum a spondylial-like structure.

Brachial valve interior with in the primitive forms two small lamellated diductor fields situated on the inner socket walls, in the more advanced forms a more developed cardinal process with a more or less bilobed appearance; outer hinge plates mostly rather well developed; short and thick crural plates with mostly shallow lateral cavities.

It is clear that one valid definition of the subfamily which delimits it from other subfamilies is rather difficult to give since the genera within this subfamily and their species are far too differentiated. The state-
The relation between the genera *Cyrtinopsis* Scupin, 1896 and *Kozlowskiellina* Boucot, 1957

The relation between the definition of a genus in Krans (1969, p. 265) is also true on the subfamily level, namely that the definition of a subfamily which is in fact a group of historically related genera should be a historic account of all included species.

REFERENCES


PLATE I

_Cyrtinopsis_ spec. from the Eifelian of Auburg near Gerolstein, Germany.

Fig. 1. Acetate peel of a section of the pedicle valve (peeling 69003, = section B of text-figure 6).
Note the median septum and the plugged spondylium-like trough. 20 ×.

Fig. 2. Acetate peel of a section of the brachial valve (peeling 69010 = section G of text-figure 8).
Note the two crural bases (black) and the crural plates. 20 ×.
PLATE II

_Cyrtinopsis_ spec. from the Eifelian of Auburg near Gerolstein, Germany.

Fig. 1. Acetate peel of a section of the spondylium-like trough (peeling 69005 = section D of text-figure 6).

Note the extension of the right dental ridge with a part of the probable myotest. 20 x. 

Fig. 2. Acetate peel of a section of the brachial valve (peeling 69015 = section L of text-figure 8).

Note the crural bases, the outer hinge plates and the smooth, concave platform of the cardinal process and the formation of some low lamellae on the outgrowths of the outer hinge plates. 20 x.
PLATE III

*Cyrtinopsis* spec. from the Eifelian of Auburg near Gerolstein, Germany.
Acetate peel of the pedicle valve (peeling 69007 = section E of text-figure 6).
Note the thick myotest on both sides of the base of the median septum in the floor of the valve, the pronounced median septum, the extension of the two dental ridges and the connection of the dental ridges with the median septum, forming the spondylium-like trough. 20 X.