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*EUDEA* LAMOUROUX (CALCISPONGEA) FROM THE OXFORDIAN  
 OF POLAND

*Abstract.* — Four species of calcisponges of the genus *Eudea* Lam. are described from the limestones of the *Idoceras planula* Zone of Działoszyn and the *Gregoryceras transversarium* Zone of Bałtów. One new species, *E. guttata*, is proposed.

INTRODUCTION

Approximately 30 well-preserved specimens of calcisponges of the genus *Eudea* Lam. were found by the present author in the limestones of the *Idoceras planula* Zone, exposed in the quarry "Warta" at Działoszyn, Polish Jura Chain; a few specimens were found by Dr. E. Roniewicz in the limestones of the *Gregoryceras transversarium* Zone at Bałtów, the Holy Cross Mts. The work was done in the Laboratory of Palaeontology, Institute of Geography, University of Łódź. The author would like to express her warm thank to Prof. Roman Kozłowski, Palaeozoological Institute, Polish Academy of Sciences, Warszawa and Dr. R. E. H. Reid of the University at Belfast. The photos were made by M. Sc. L. Łuszczewska, Warsaw University. Thin sections were made by Mrs. M. Nowińska, Palaeozoological Institute, Polish Academy of Sciences, Warszawa.

The specimens are housed at the palaeontological collection of the Laboratory of Palaeontology, Institute of Geography, University of Łódź.

DESCRIPTIONS

Genus *Eudea* Lamouroux, 1821

The Polish material makes it possible to supplement the diagnosis of this genus given by Hinde (1893).

*Diagnosis.* — Fibres of the main skeleton composed of triactines and, occasionally, diactines. Triactines are arranged net-like in fibres. Cortex skeleton dense, laminar, and developed on lateral walls or over the whole surface. Canals undifferentiated. Cloaca developed or not. Inhalant cavities subdermal, connected with one another forming aggregations; when the cortex is destroyed, these aggregations have star-like appearance. The genus *Eudea* includes over 10 species known to occur from the Triassic to Cretaceous.

*Eudea perforata* (Quenstedt, 1859)

(Pl. XXXVI, Figs. 1-9; Text-fig. 1)

1883. *Eudea perforata* (Quenstedt); J. G. Hinde, *Catalogus...*, p. 162 (*with earlier synonymy*).
1885. *Eudea perforata* (Quenstedt); F. A. Quenstedt, *Handbuch der Petrefaktenkunde...*, p. 1039, Pl. 85, Fig. 9.
1897. *Eudea* cf. *perforata* (Quenstedt); O. Zeise, *Die Spongien der Stramberger Schichten...*, p. 313.
1913. *Eudea perforata* (Quenstedt); J. Siemiradzki, *Gąbczaki jurajskie...*, p. 29, Pl. 7, Fig. 87.
1929. *Eudea perforata* (Quenstedt); F. Oppliger, *Die Kalkschwämme...*, p. 3.
1964. *Eudea perforata* (Quenstedt); B. Ziegler, *Die Cortex der fossilen Pharetronen...*, p. 815, Pl. 2, Fig. 6.

*Material.* — Approximately 25 specimens with internal and external structure well-preserved.

Dimensions (in mm):

	Height	Thickness		
		of summit part	maximal	at base
Club-shaped . . . . .	8—16	3—7	3—8	2—12
Ovate . . . . .	10—15	4—5	5—6	2.5—4
Globular . . . . .	7—8	4—12	8—12	3

*Description.* — Solitary specimens small, ovate or club-shaped. Summit part rounded, without wart-like nodes. Basal surface irregularly conical, flat or with narrow stalk. Outer surface even, except for fine traces of constrictions and rounded wart-like nodes irregularly distributed; the majority of nodes is obliterated, presumably because of delicate structure of their apices. The occurrence of these nodes, exposed owing to removal of cortex concealing them, results in characteristic appearance of this sponge. In the case of globular forms, wart-like nodes are more numerous, moderately high and uniform in size.

Channel pattern hardly discernible. Inhalant channels short, variable in trends, more regular in globular than in elongated forms. Oscule

variable in diameter; oscule of typical forms up to 1 mm in diameter and located at summit, occasionally surrounded by thin rim, presumably of peri-oscular spicules, i.e. marginalia. The widest oscule, observed in globular forms, attains maximally about 0.13 mm. Cloaca irregularly tubular, deep, with extensions or constrictions close to oscule. Postica ovate, regularly arranged over cloacal surface, with longer axes oriented

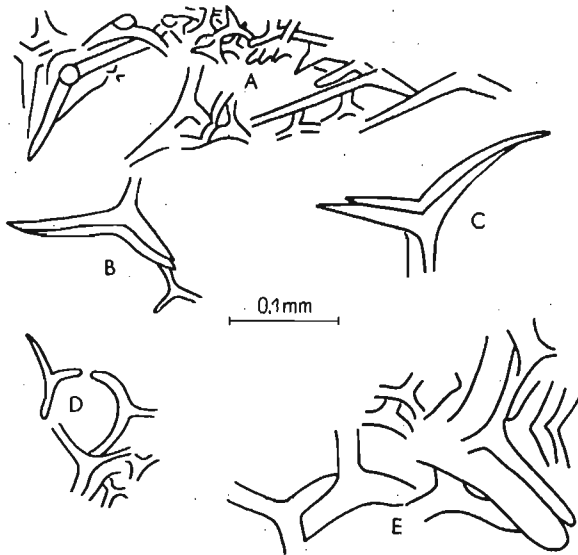


Fig. 1. — *Eudea perforata* (Quenstedt); specimen No. UL IV/9, thin section No. 17b; A, B, C—arrangements of triactines in cortex: A—on external surface of cortex, B and C—within cortex; D—arrangement of triactines in main skeleton; E—arrangement of triactines in choanosome band, size, length and character of points of rays variable.

vertically. Ostia barely discernible megascopically about 0.003 mm in diameter, more closely spaced in the lower part of sponge than upper, but also marked on the tops of nodes, above concentrations of subdermal inhalant cavities. Cavities, 4 to 6 in number on particular node, are arranged normally and star-like in relation to the external surface. Exhalant canals unseparated.

Cortex independent, covering the whole surface of sponge or limited to its base and walls up to a variable height. Cortex forms "felted" layer, 0.2 mm thick, composed of smaller, regular and larger, sagittal triactines; both types of triactines are equiangular. Rays of spicules somewhat arcuate (cf. Text-fig. 1 a-c). Size of spicules generally increases towards the top of sponge.

Main sponge skeleton (thin-section No.17b) formed by bands, varying from 0.15 to 0.6 mm in length and from 0.15 to 0.2 mm in thickness.

These bands anastomose into a net with meshes variable in size. Spicules, mainly regular triactines with straight rays, and occasionally sagittal triactines, are regularly oriented only along short sections, being arranged net-like. Ends of rays commonly sharp-pointed, occasionally obtuse, in the case of thicker spicules (Text-fig. 1 *d-e*).

Bands of main skeleton are more meandering and somewhat thicker in globular than in elongated forms. Sagittal triactines of the former are closer to regular triactines because their apical ray is insignificantly longer than facial arcuate rays, attaining about 0.035 mm.

*Variability.*— The variability of 25 specimens of *E. perforata* in the author's collection is expressed by changes in shape, resulting from different thickness/height ratio. The shape varies from elongate to ovate or even globular. Moreover, number, density and size of surfacial nodes are also variable, particularly in globular forms. These differences presumably result from differences in ecological conditions, hence it may be assumed that the specimens of *E. perforata* studied represent ecological variations.

*Comparisons.*— The author's specimens attributed to *E. perforata* differ from those described by Siemiradzki (1913) in the mode of growth. Siemiradzki's specimens, found in the Cracow region, formed clusters with the common base, and their skeletons were composed of "thick, worn-like fibres" (*l.c.*, p. 29), whereas the author's specimens are solitary forms, closer to those figured by Quenstedt (1859) as *Spongites perforata*. On the other hand, some author's specimens (Sp.No.IV/2,4) are morphologically similar to *E. cribraria* (Fromentel, 1859—60), differing in smaller size, less protruding nodes, shape of spicules and structure of spicule bands; globular ones (Pl. XXXVI, Fig. 2) are similar to *E. walfordi* Hinde (1893, p. 241), differing in shape, larger size, smaller ostia and the lack of forked and branching triactines. One specimen (Sp.No.IV/5, Pl. XXXVI, Fig. 8) is morphologically similar to Italian form of *E. polymorpha* (Klipstein) figured by Zardini *et al.* (1968, Pl. 19, Fig. 5) from the Middle Triassic of S. Cassian; full comparison of both these forms is precluded, because Zardini *et al.* did not characterize the structure of main skeleton and cortical skeletons. Moreover, Zardini *et al.* assumed that *E. perforata* is a synonymy of *E. polymorpha* (Klipstein, 1943), however, it seems improbable, because of differences in shape, ornamentation, general size and stratigraphical ranges.

*Occurrence.*— Poland: Wodna near Cracow, Bałtów, Middle Oxfordian; Działoszyn area, Upper Oxfordian, the *Idoceras planula* Zone; Germany: Rauden, Nattheim, Upper Jurassic; Switzerland: Aargau canton, Rauracien I—II.

*Eudea guttata* n.sp.

(Pl. XXXVI, Figs. 10—11; Text-fig. 2)

1858/59. *Spongites perforatus* Quenstedt; F. A. Quenstedt, Der Jura..., p. 698, Pl. 84, Fig. 25.

*Holotype*: Specimen No. UŁ.IV/26; Pl. XXXVI, Fig. 10, Text-fig. 2.

*Type horizon*: Oxfordian, the *Idoceras planula* Zone.

*Type locality*: Quarry of "Warta" cement plant at Działoszyn, marly limestone

*Derivation of the name*: Lat. *guttatus* — spotty.

*Material*. — Four specimens with well-preserved external morphology and skeletal structure.

Dimensions (in mm):

Height . . . from 4 to 8  
 Thickness . . . from 5 to 7.5  
 Width at base . . 3 and flat  
 Number of nodes 10 to 15 (conical and flat).

*Description*. — Small, subspherical forms ornamented with conical nodes, varying in number and height. Basal part slightly sharpened or flat, depending on the mode of attachment. Surface uneven, covered with cortex. Ostia situated between radii et cortical spicules, hardly discernible, on the topes of nodes concentrated around one ovate (?exhalant) pore. Oscule and cloaca not developed. Exhalant system obscured.

Cortical skeleton, 0.15 to 0.21 mm thick, structurally similar to that of *E. perforata*, coherent, felted. The skeleton consists of fine triactines, weakly differentiated and variably arranged within cortex. Apical ray of some spicules is oriented inwards, whereas facial rays — outwards. Facial rays of majority of spicules are horizontally located on the surface and occasionally obliquely to the surface.

Main skeleton is composed of bands, nonuniform in length, from 0.24 to 0.3 m long and about 0.09 mm thick, which form loose network. Numerous triactines and occasional diactines are distributed in these bands. Radii of some spicules are obliquely oriented. Spatial arrangement of spicules in a band is net-like, but not ordered. Interconnections of rays are indiscernible in cross-section; however, it seems that distal ends of rays are sharp-pointed and adjoin one another (thin section No. 15a).

*Comparisons*. — The specimens under discussion are very similar to *E. perforata* (Quenstedt) in external morphology, structure of main and cortical skeletons. However they significantly differ in system of water circulation, smaller and more regular spicules, which are more closely spaced in bands, and conical shape of nodes on the whole external surface. *E. guttata* n.sp. differs from conical form *E. pisum* (Hinde 1893)

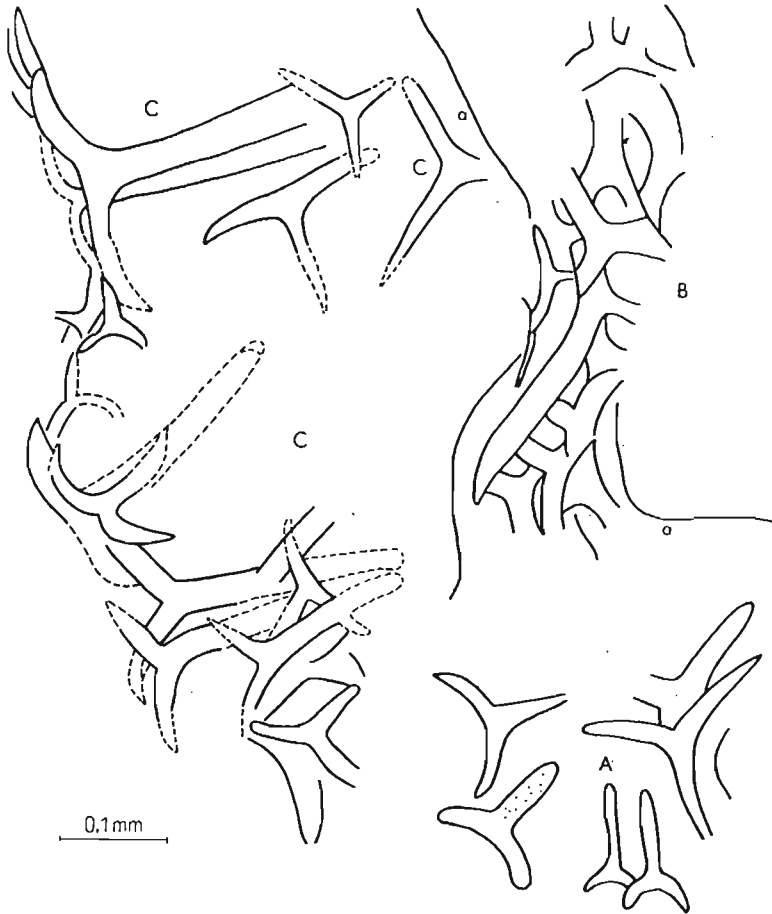


Fig. 2. — *Eudea guttata* n.sp.; specimen No. UL IV/26, thin-section No. 15a: A — types of spicules occurring in choanosomal skeleton; B — pattern of sagittal triactines in choanosomal band: a — surface of band; C — pattern of sagittal triactines in cortex.

in the lack of cloaca, oscule and growth constrictions, and in occurrence of single large pore on the top of every node. These differences seem sufficient for separation of these species.

*Occurrence.* — Poland: Działoszyn region, Oxfordian, *Idoceras planula* Zone; Germany: Upper Jurassic.

*Eudea* sp. A

(Pl. XXXVI, Fig. 13 a, b)

*Material.* — Two specimens, one of which is well-preserved, with external morphology and spicules distinct.

Dimensions of the specimen No. IV/28 (in mm):

Height	Width		Thickness	
	at base	at apex	at base	at apex
19	11.5	4.5	4.5	7.5

*Description.* — Form triangular, bilaterally flattened. Summit surface ovate, with rounded margin; basal surface sharp-pointed. Oscule and cloaca lacking. External surface uneven, covered with small nodes, irregularly distributed over lateral and summit areas. Ostia hardly discernible, circular, very minute, smaller than meshes of cortical skeleton, very numerous. Postica circular, about 0.5 mm in diameter, located on the top of every node, in small depression. Cortical skeleton covers the whole surface with thick, almost smooth layer of fine, sagittal spicules, unoriented and non-connected. Traces of occasional diactines noted. Main skeleton poorly preserved, consisting of bands with rough surface. Occurrence of triactines with similar structure and size as in cortex, inferred.

*Comparisons.* — Specimen No. IV/28 is very similar to *E. guttata* n.sp., having almost the same structure and composition of cortex and system of water circulation; however it differs in shape, mode of development (tendency to flatness distinctly marked) and attains larger size.

*Occurrence.* — Poland: vicinities of Paczoltowice and Wieluń, Nevisian.

*Eudea* sp. B

(Pl. XXXVI, Fig. 12)

*Material.* — One specimen.

Dimensions of the specimen No. IV/27 (in mm):

Height	Maximal thickness	Stem diameter
11	7.5	1.5

*Description.* — Single individual, probably a part of low, bush-like colony. External surface without cortex, with numerous oval pores. Basal part narrow; traces of attachment of other individuals marked on stem. Summit part irregularly rounded. Oscule and cloaca lacking. Skeleton mainly net-like, dense.

*Comparisons.* — Ovate openings on the surface of the specimen under discussion are typical for the genus *Eudea* Lam., and particularly for *E. corallina* Étallon (figured by Oppliger 1929, p. 4, Pl. 1, Fig. 1); however, it differs from the latter form in the mode of development and stratigraphical range. Moreover, colony of *E. corallina* consists of a few proximal

branches rising from a common "stem", whereas the specimen under discussion represents a part of a different colony.

*Occurrence.* — Poland: Piechocin near Inowrocław, Upper Oxfordian, spongy limestone.

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October, 1971

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#### EUDEA LAMOUREUX (CALCISPONGEA) Z OKSFORDU POLSKI

##### *Streszczenie*

Opisano cztery gatunki gąbek wapiennych, należących do rodzaju *Eudea* Lamouroux: *E. perforata* (Quenstedt, 1859), *E. guttata* n.sp., *Eudea* sp. A i *Eudea* sp. B. Okazy zebrano z wapieni oksfordu poziom *Idoceras planula* w kamieniołomie "Warta" koło Działoszyna i z poziomu *Gregoryceras transversarium* w Bałtowie.

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ХЕЛЕНА ХУРЦЕВИЧ

## EUDEA LAMOUREUX (CALCISPONGEA) ИЗ ОКСФОРДА ПОЛЬШИ

## Резюме

В работе дано описание четырех видов известковых губок рода *Eudea* Lamouroux: *E. perforata* (Quenstedt, 1859), *E. guttata* n.sp., *Eudea* sp. A и *Eudea* sp. B. Экземпляры были добыты из оксфордских известняков горизонта *Idoceras planula* в карьере „Варта”, близ Дзялошина, и горизонта *Gregoryceras transversarium* в местности Балтув.

## EXPLANATION OF PLATE XXXVI

*Eudea perforata* (Quenstedt, 1859)

- Fig. 1. Elongated form with bryozoan colony on the top; specimen No. UŁ IV/9,  $\times 4$ .  
 Fig. 2. Elongated form; concentrations of prosopores exposed in result of removal of cortex; specimen No. UŁ IV/11,  $\times 4$ .  
 Fig. 3. Arrangement of band network in main skeleton, observable in longitudinal cross-section along cloaca; cloacal skeleton deeply extending; specimen No. UŁ IV/17,  $\times 4$ .  
 Fig. 4. Arrangement of bands in ovate form; longitudinal section parallel to cloaca; specimen No. UŁ IV/18,  $\times 8$ .  
 Fig. 5. Club-like form, ovate; specimen No. UŁ IV/1,  $\times 4$ .  
 Fig. 6. Club-like form, encrusted with serpulae; specimen No. UŁ IV/2,  $\times 4$ .  
 Fig. 7. Short ovate form; *a* — lateral view, *b* — oscule; specimen No. UŁ IV/12,  $\times 4$ .  
 Fig. 8. Juvenile form; prosopores in small aggregates innumeros; specimen No. UŁ IV/5,  $\times 4$ .  
 Fig. 9. Cluster of globular forms; lateral view; *a* — first specimen, *b* — second specimen; specimen No. UŁ IV/19,  $\times 4$ .

*Eudea guttata* n.sp.

- Fig. 10. Holotype; lateral view; specimen No. UŁ IV/26,  $\times 4$ .  
 Fig. 11. The smallest specimen, subglobular in shape; nodes obliterated; specimen No. UŁ IV/4.  
 Fig. 12. *Eudea* sp. B; lateral view, specimen No. UŁ IV/27,  $\times 4$ .  
 Fig. 13. *Eudea* sp. A; *a* — lateral view, *b* — oscule and incrusting bryozoan colony; specimen No. UŁ IV/28,  $\times 4$ .

