

UDC 595.786:591.342

THE CHORIONIC SCULPTURE IN EGGS OF SOME NOCTUIDAE (LEPIDOPTERA)

I. V. Dolinskaya¹, M. G. Ponomarenko^{2, 3}

¹ Schmalhausen Institute of Zoology, NAS of Ukraine, vul. B. Khmelnytskogo, 15, Kyiv, 01601 Ukraine
E-mail: dd8v@mail.ru

² Institute of Biology and Soil Science, 159, Prospect 100-letya Vladivostoka, Vladivostok, 690022 Russia

³ Far Eastern Federal University, Oktyabrskaya str., 27, Vladivostok, 690000 Russia
E-mail: margp@ibss.dvo.ru

The Chorionic Sculpture in Eggs of Some Noctuidae (Lepidoptera). Dolinskaya I. V., Ponomarenko M. G. — The eggs of 9 species Noctuidae belonging in 4 subfamilies (Plusiinae, Eustrotinae, Acontiinae and Pantheinae) are examined, described, and illustrated with SEM. The diagnostic characters of the eggs of examined species are given.

Key words: Noctuidae, Lepidoptera, egg, description, diagnostic characters, scanning electron microscopy.

Скульптура хориона яиц некоторых совков (Lepidoptera). Долинская И. В., Пономаренко М. Г. — С помощью сканирующего электронного микроскопа изучены, описаны и проиллюстрированы яйца 9 видов совков из 4 подсемейств (Plusiinae, Eustrotinae, Acontiinae, Pantheinae). У исследованных видов выявлены диагностические признаки.

Ключевые слова: Noctuidae, Lepidoptera, яйцо, описание, диагностические признаки, сканирующая электронная микроскопия.

Introduction

This work continues a series of articles devoted to morphology of noctuid eggs (Dolinskaya, 2010, 2011; Dolinskaya, Geryak, 2010). Only the eggs of four noctuid species have been illustrated as detailed line drawings (*Abrostola triplasia*, *Macdunnoughia confusa*, *Autographa gamma* and *Acontia trabealis*) (Döring, 1955) before our studies. Our studies of the chorionic structure with the using of SEM reveal many diagnostic characters not considered before.

Material and methods

This research is based on the original materials collected by the authors in Ukraine and Far East of Russia (Primorskiy Krai). Eggs of six species Plusiinae (*Abrostola triplasia*, *A. tripartita*, *Macdunnoughia confusa*, *Autographa gamma*, *A. jota*, *A. pulchrina*), one species of Eustrotinae (*Deltote bankiana*), one species of Acontiinae (*Acontia trabealis*) and one species of Pantheinae (*Colocasia coryli*) were examined. The eggs were obtained from females captured in the field. The eggs of three species (*Abrostola tripartita*, *Autographa pulchrina* and *Autographa jota*) were withdrawn from abdomen of dry females. The eggs were examined with the use of scanning electron microscopy (SEM). Terminology of the eggs follows Salkeld (1984). The systematic arrangement follows Fibiger, Hacker (2004).

Abrostola triplasia (Linnaeus, 1758)

Description. Egg subspherical (fig. 1), height 0.5 mm, diameter 0.6 mm (n = 2). Egg pale yellow, before caterpillar emergence egg becoming grey. Chorion white, transparent, ridged. Egg marked on two thirds surfaces. Micropylar area clearly expressed, represented by rosette and 2 rows of typical cells (fig. 2). Floor of cells with 1–3 long and narrow projections. Rosette with 8–10 broad and short petalled cells. Central portion of rosette large (its length reaches 1/2 the length of the petals) with

6–7 micropylar openings (fig. 3). There are 13–14 of the 30–32 longitudinal ridges radiate from secondary cells. Longitudinal ridges are as wide as transversal ridges, but are more clearly visible. Along all surface of longitudinal ridges densely placed aeropyles with large roller-like edges. Aeropyles diameter greater than the width of ribs. Aeropyles often arranged in pairs (fig. 4, 5). Cells have smooth floors.

Oviposition. Eggs were laid solitary.

Notes. According to E. Döring (1955) diameter is a little more 0.75–0.8 mm.

Abrostola tripartita (Hufnagel, 1766)

Description. Egg subspherical ($n = 2$). Morphologically similar to *Abrostola triplasia*. However, in contrast to the previous species aeropyles sparsely placed along all surface of longitudinal ridges, roller-like edges weakly expressed and only slightly exceed the width of ribs (fig. 7). Longitudinal ridges wider and more elevated than transverse (fig. 6).

Macdunnoughia confusa (Stephens, 1850)

Description. Egg subspherical (fig. 8), height 0.35–0.4 mm, diameter 0.6 mm ($n = 2$). Egg pale yellow. As egg develops it becomes pale brown. Chorion white, transparent, ridged. Egg marked on two thirds surfaces.

Micropylar area clearly expressed, represented by rosette and 2 rows of typical cells (fig. 9). Floor of cells with 4–6 long and narrow projections. Rosette represented by 7–8 broad and short petalled cells. Central portion of rosette reaches 1/3 the length of the petals, with 4–5 micropylar openings (fig. 10). There are 14–16 of the 38–39 longitudinal ridges radiate from outer ends of quaternary cells. Transverse walls less distinct and narrow than ridges. Aeropyles slightly expressed (fig. 11). The entire surface of a small, densely placed fibers.

Oviposition. Eggs were laid solitary.

Autographa gamma (Linnaeus, 1758)

Description. Egg subspherical (fig. 12), height 0.25–0.3 mm, diameter 0.6–0.7 mm ($n = 7$). Egg pale citron colour. Before caterpillar emergence egg becoming grey with black spot at apical part (head of the caterpillar). Chorion white, transparent, ridged. Egg marked on two thirds surfaces. Micropylar area clearly expressed, represented by rosette and 2 rows of typical cells (fig. 13). Floor of cells with 2–4 long and narrow projections, elevated medially. Rosette represented by 7–8 broad and short petalled cells. Central portion of rosette reaches 1/3 the length of the petals. Secondary and tertiary cells rounded by carinae (fig. 13, 14). There are 13–14 of the 39–41 longitudinal ridges radiate from outer ends of quaternary cells. Longitudinal ridges slightly wavy, clearly expressed. Transverse walls less distinct and narrow than ridges. Aeropyles small, weakly expressed (fig. 15). Cells have smooth floors.

Oviposition. Eggs were laid solitary.

Autographa pulchrina (Haworth, 1809)

Description. Egg subspherical. Distinctions from the previous species it is not discovered (fig. 16).

Autographa jota (Linnaeus, 1758)

Description. Egg subspherical. Distinctions from *Autographa pulchrina* it is not discovered (fig. 17–19).

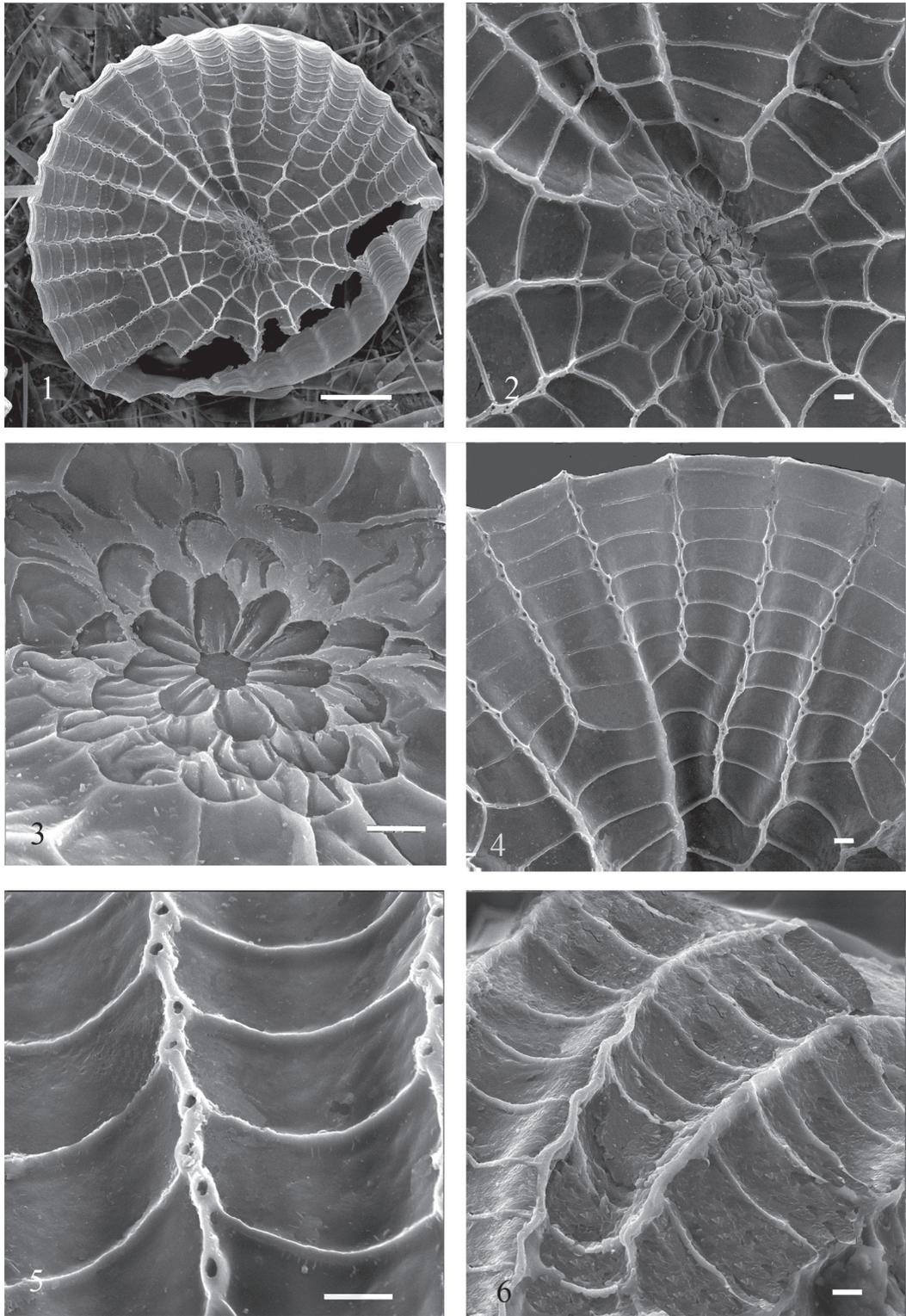


Fig. 1–6. Eggs of Plusiinae: 1–5 — *Abrostola triplasia*; 6 — *A. tripartita*. Scale bars: 1 — 100 μm ; 2–6 — 10 μm .
Рис. 1–6. Яйца Plusiinae: 1–5 — *Abrostola triplasia*; 6 — *A. tripartita*. Масштабные линейки: 1 — 100 мкм; 2–6 — 10 мкм.

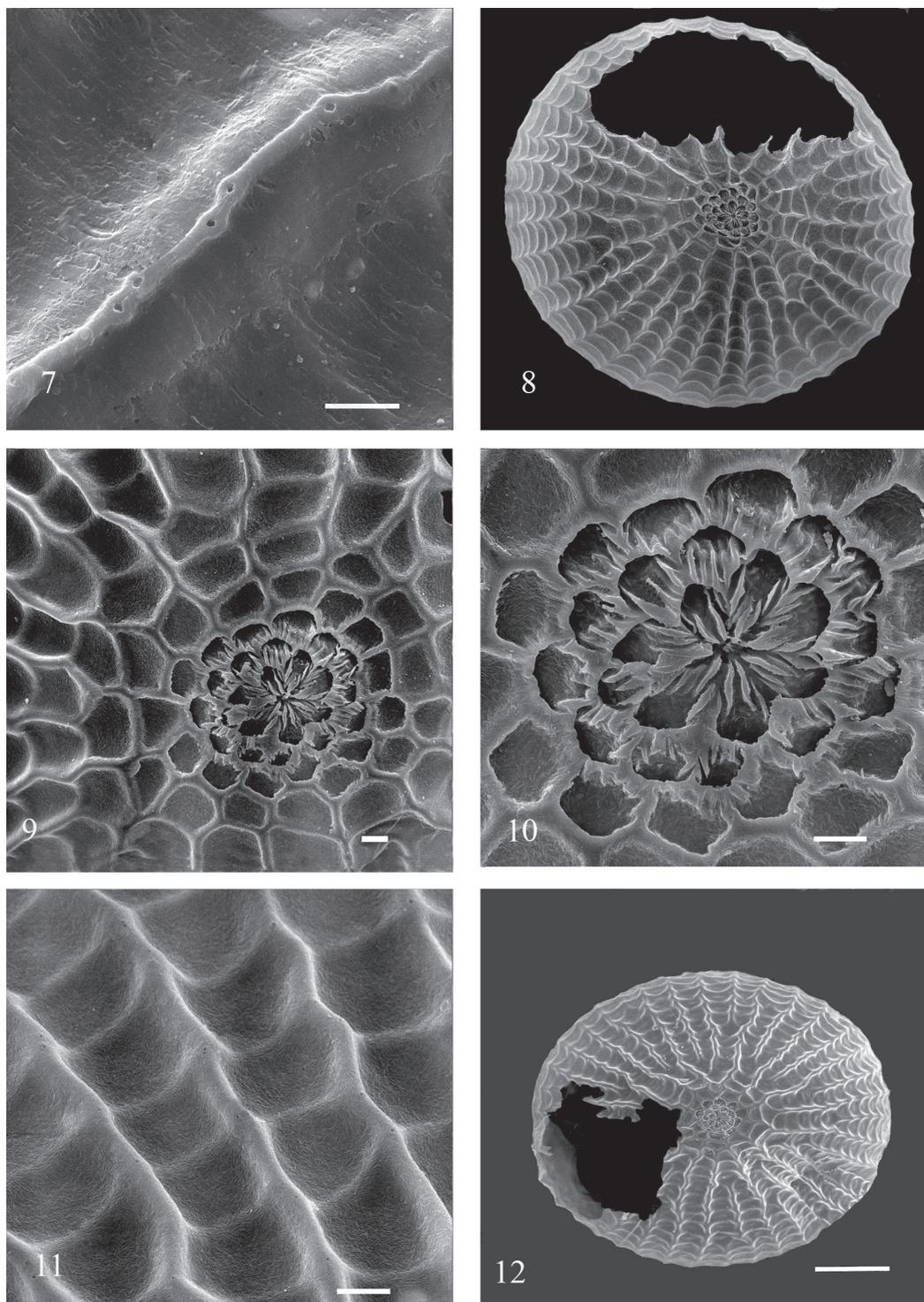


Fig. 7–12. Eggs of Plusiinae: 7 — *Abrostola tripartita*; 8–11 — *Macdunnoughia confusa*; 12 — *Autographa gamma*. Scale bars: 8, 12 — 100 μm ; 7, 9–11 — 10 μm .

Рис. 7–12. Яйца Plusiinae: 7 — *Abrostola tripartita*; 8–11 — *Macdunnoughia confusa*; 12 — *Autographa gamma*. Масштабные линейки: 8, 12 — 100 мкм; 7, 9–11 — 10 мкм.

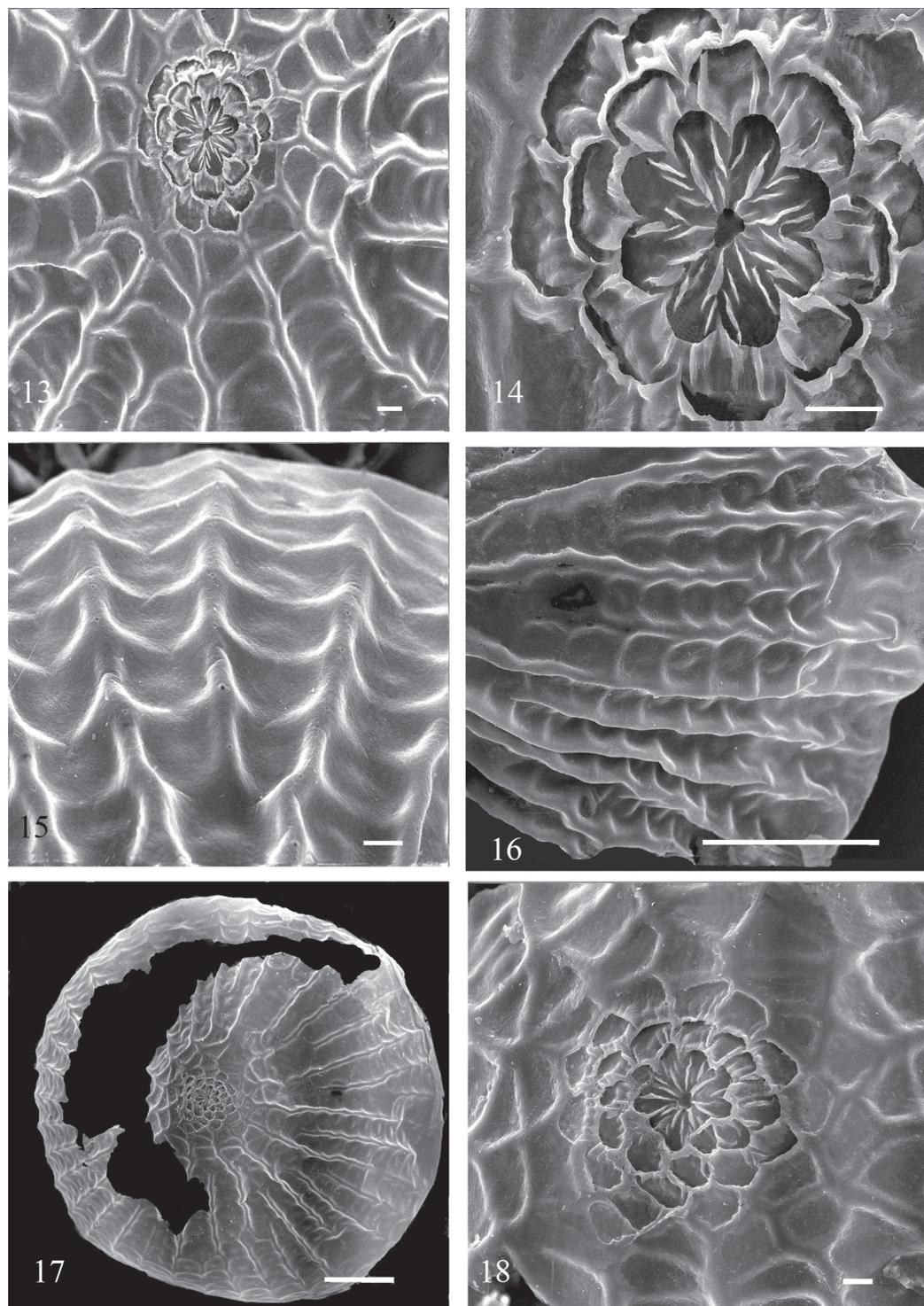


Fig. 13–18. Eggs of Plusiinae: 13–15 — *Autographa gamma*; 16 — *A. pulchrina*; 17, 18 — *A. jota*. Scale bars: 16, 17 — 100 μm ; 13–15, 18 — 10 μm .

Рис. 13–18. Яйца Plusiinae: 13–15 — *Autographa gamma*; 16 — *A. pulchrina*; 17, 18 — *A. jota*. Масштабные линейки: 16, 17 — 100 мкм; 13–15, 18 — 10 мкм.

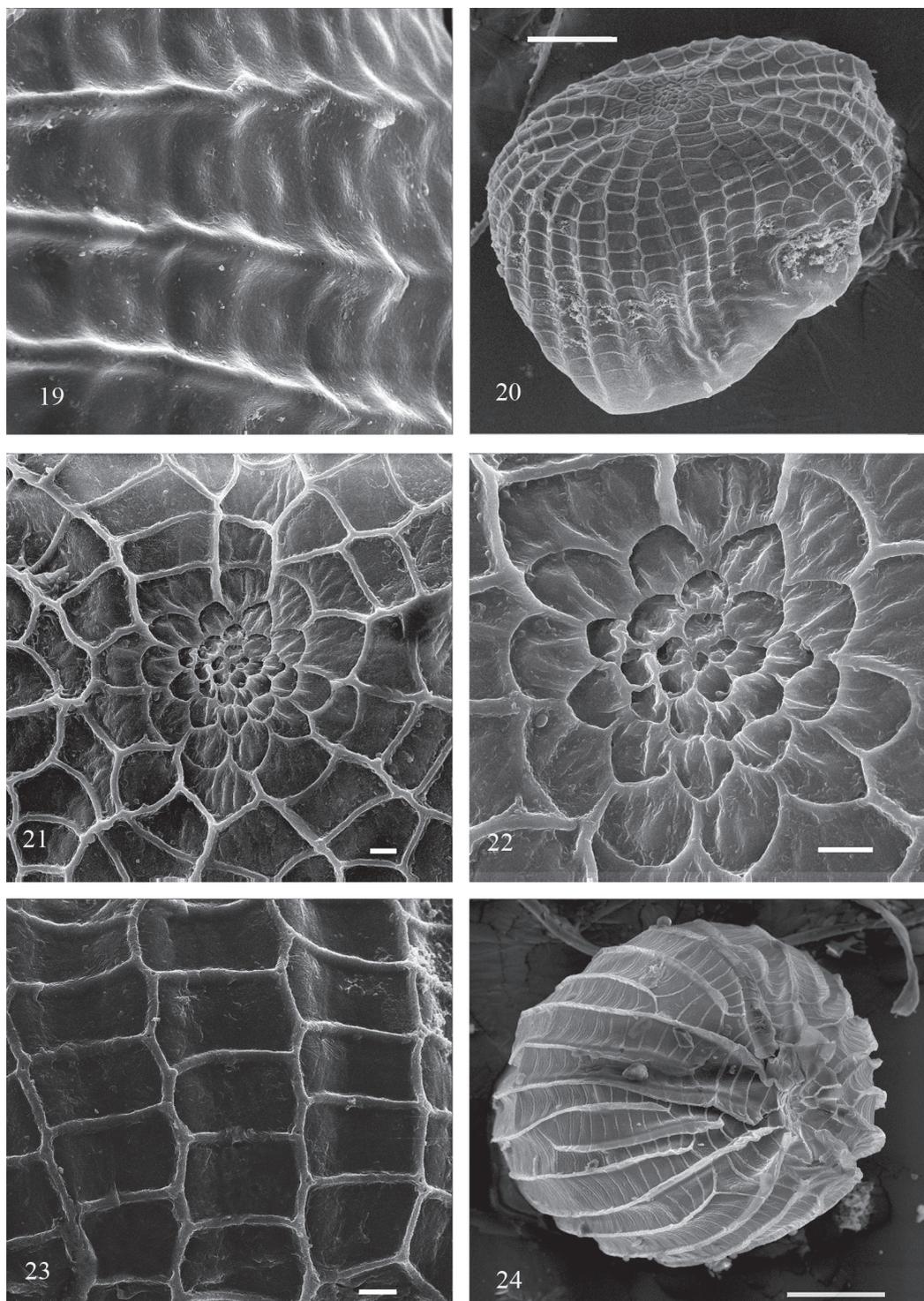


Fig. 19–24. Eggs of Plusiinae: 19 — *Autographa jota*; Eustrotiinae: 20–23 — *Deltote bankiana*; Acontiinae: 24 — *Acontia trabealis*. Scale bars: 20, 24 — 100 μm ; 19, 21–23 — 10 μm .

Рис. 19–24. Яйца Plusiinae: 19 — *Autographa jota*; Eustrotiinae: 20–23 — *Deltote bankiana*; Acontiinae: 24 — *Acontia trabealis*. Масштабные линейки: 20, 24 — 100 мкм; 19, 21–23 — 10 мкм.

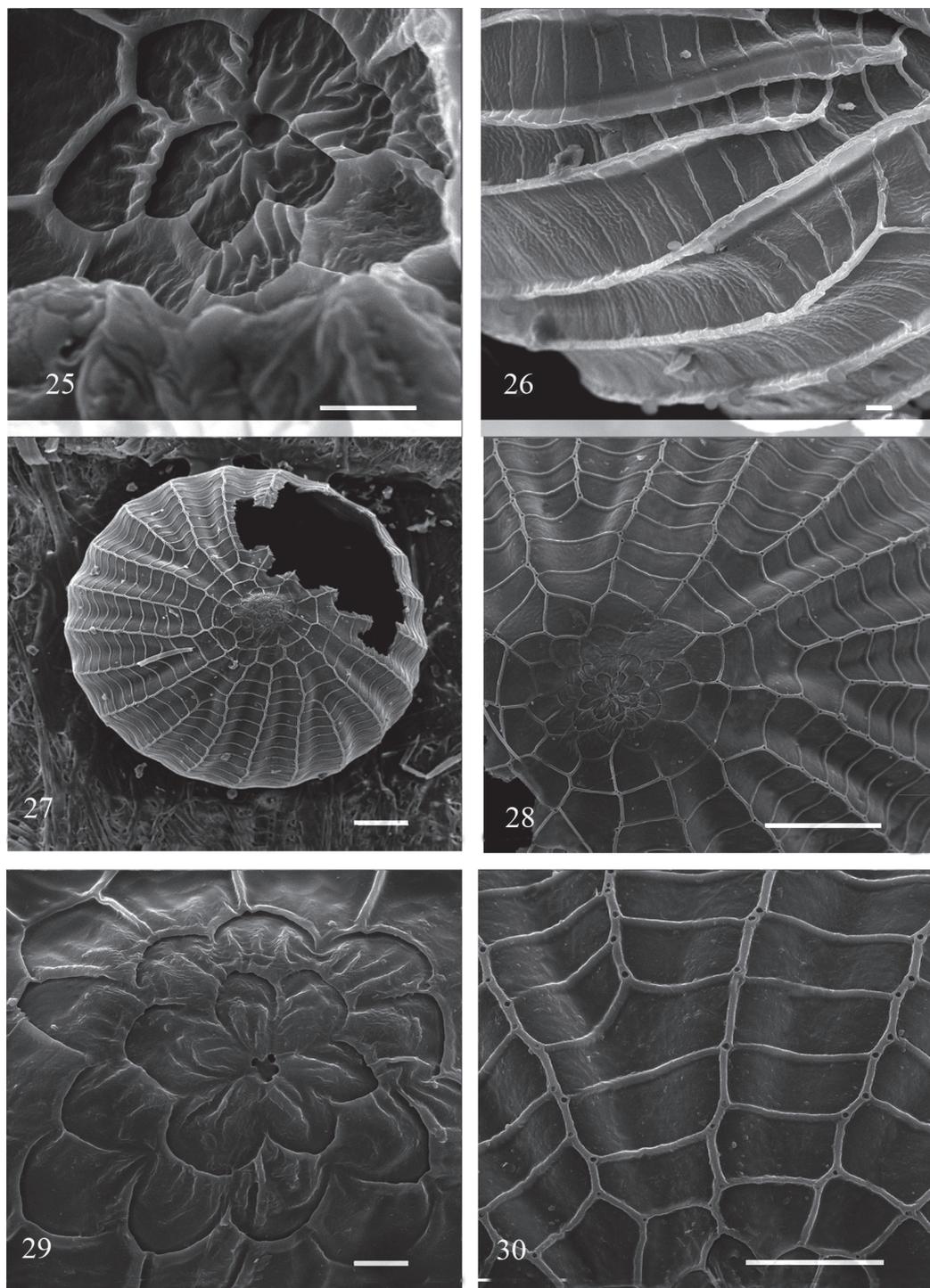


Fig. 25–30. Eggs of Acontiinae: 25, 26 — *Acontia trabealis*; Pantheinae: 27–30 — *Colocasia coryli*. Scale bars: 27, 28, 30 — 100 μm ; 25, 26, 29 — 10 μm .

Рис. 25–30. Яйца Acontiinae: 25, 26 — *Acontia trabealis*; Pantheinae: 27–30 — *Colocasia coryli*. Масштабные линейки: 27, 28, 30 — 100 мкм; 25, 26, 29 — 10 мкм.

Deltote bankiana (Fabricius, 1775)

Description. Egg subspherical, height 0.4 mm, diameter 0.6 mm (n = 2).

Characteristics. Chorion faintly ridged. It is marked on two thirds surfaces (fig. 20). Micropylar area clearly expressed, represented by rosette and 2–3 rows of typical cells (fig. 21). Floor of cells with 1–3 long and narrow projections, elevated medially. Rosette represented by 5–6 broad and short petalled cells. Central portion of rosette large (its length reaches 1/2 the length of the petals) (fig. 22). There are 32–34 difficult-to-count longitudinal ridges are placed on the egg surface. Transverse walls broad and distinct as ridges. Aeropyles weakly expressed (fig. 23). Cells have folded floors.

Acontia trabealis (Scopoli, 1763)

Description. Egg subspherical (fig. 24), height 0.5 mm, diameter 0.45 mm (n = 1). According E. Döring (1955) egg green colour with small red spots at apical part. Chorion white, translucent.

Characteristics. Chorion ridged. It is marked on two thirds surfaces. Micropylar area clearly expressed, represented by rosette and 1 row of typical cells. Floor of cells with numerous, long and narrow projections, elevated medially. Rosette represented by 5 broad and short petalled cells. Central portion of rosette reaches 1/3 the length of the petals (fig. 26). There are 11–12 of the 25–26 longitudinal ridges radiate from secondary cells. Longest ridges with high comb especially in anterior portions. Transverse walls less distinct and narrow than ridges. Aeropyles weakly expressed (fig. 25). Cells have folded floors.

Colocasia coryli (Linnaeus, 1758)

Description. Egg subspherical (fig. 27), height 0.5 mm, diameter 0.9 mm (n = 1). Egg yellowish-white. As egg develops, it becomes grey-yellow with umber spot at apical part of egg and the same interrupted stripe on perimetre of its medial part. Before caterpillar emergence egg becoming pale brown with brown spot at apical part. Chorion white, translucent.

Characteristics. Chorion ridged. It is marked on two thirds surfaces. Micropylar area clearly expressed, represented by rosette and 2 rows of typical cells (fig. 28). Floor of cells with 2–4 long and narrow projections. Rosette represented by 6–8 broad and short petalled cells (fig. 29). There are 11–13 of the 21 longitudinal ridges radiate from micropylar area. Transverse walls broad as ridges, but much less distinct than ridges. Along all surface of longitudinal ridges clearly expressed aeropyles at walls junctions. Columnar cells broad and short (fig. 30). Cells have smooth floors.

Oviposition. Eggs were laid solitary.

Discussion

Based on the data above, only the ridged sculpture is characteristic for the studied species from the subfamilies Plusiinae, Eustrotiinae, Acontiinae and Pantheinae of the family Noctuidae (Table 1 summarizes the distribution of the character states found in my studies of the egg chorionic sculpture of the species of Noctuidae). However ridged sculpture is weakly expressed in *Deltote bankiana* (Eustrotiinae) and *Colocasia coryli* (Pantheinae). There have transverse walls broad and distinct as ridges. Ridged sculpture is sharply expressed in *Acontia trabealis* (Acontiinae), where longitudinal ridges are with high combs. Ridged sculpture is moderately expressed in *Abrostola triplasia*, *A. tripartita*, *Macdunnoughia confusa*, *Autographa gamma*, *A. pulchrina* and *A. jota* (Plusiinae) where longitudinal ridges are clearly distinct.

Table 1. Distribution of the characters of the egg's chorion in the studied species of Noctuidae

Таблица 1. Распределение признаков хориона яиц у исследованных видов Noctuidae

Characters	Species						
	1	2	3	4	5	6	7
Chorion (A — moderately ridged; B — faintly ridged; C — sharply ridged).	A	A	A	A	B	C	B
Longitudinal ridges (A — more wide transversal; B — as wide as transversal, but indistinct).	B	A	A	A	B	A	B
Longitudinal ridges (A — straight; B — slightly wavy).	A	A	A	B	A	A	A
Aeropyles (A — slightly expressed; B — clearly expressed; C — sharply expressed).	C	A	A	A	A	A	B
Cells have floors (A — smooth; B — with small, densely placed fibers; C — folded).	A	A	B	A	C	C	A
Micropylar area (A — with carinae; B — without carinae).	B	B	B	A	B	B	B

Note. 1 — *Abrostola triplasia*; 2 — *A. tripartita*; 3 — *Macdunnoughia confusa*; 4 — *Autographa gamma*, *A. pulchrina*, *A. jota*; 5 — *Deltote bankiana*; 6 — *Acontia trabealis*; 7 — *Colocasia coryli*.

Sculpture of the micropylar area is typical for studied species of the subfamilies Plusiinae, Eustrotiinae, Acontiinae and Pantheinae. Micropylar area clearly expressed, represented by rosette and 2–3 rows of typical cells. Floor of cells with long and narrow projections.

Diagnostic features of eggs of the studied noctuids:

Abrostola. Micropylar rosette and 2 rows of cells with 1–3 long and narrow projections. Cells have smooth floors.

Abrostola triplasia. The aeropyles are densely placed along all surface of longitudinal ridges. Aeropyles diameter is greater than the width of ribs.

Abrostola tripartita. Aeropyles are sparsely placed along all surface of longitudinal ridges, and their diameter slightly exceeds the width of ribs. Longitudinal ridges wider and more elevated than transverse walls.

Macdunnoughia confusa. Micropylar rosette and 2 rows of cells with 4–6 long and narrow projections. The entire surface of a small, densely placed fibers.

Autographa gamma*, *A. pulchrina*, *A. jota. Micropylar rosette and 2 rows of cells with 2–4 long and narrow projections, elevated medially. Secondary and tertiary cells bordered by carinae. Longitudinal ridges slightly wavy.

Deltote bankiana. Micropylar rosette and 2–3 rows of cells with 1–3 long and narrow projections. Chorion faintly ridged. Transverse walls broad and distinct as ridges.

Acontia trabealis. Micropylar rosette and 1 row of cells with numerous, long and narrow projections, elevated medially. Longitudinal ridges with high comb especially in anterior portions.

Colocasia coryli. Micropylar rosette and 2 rows of cells with 2–4 long and narrow projections. Transverse walls broad as ridges, but much less distinct than ridges.

The study was partly financially supported by grant FEB RAS N 12–III–A–06–078.

References

- Dolinskaya I. V.* The chorionic sculpture of the eggs of some Hadeninae from Ukraine (Lepidoptera, Noctuidae) // Українська ентомофауністика. — 2010. — 1 (3). — P. 2–32.
- Dolinskaya I. V.* The chorionic sculpture of the eggs of some Xyleninae (Lepidoptera, Noctuidae) // Vestnik zoologii. — 2011. — 45, N 1. — P. 41–56.
- Dolinskaya I. V., Geryak Yu. N.* The chorionic sculpture of the eggs of some Noctuinae from Ukraine (Lepidoptera, Noctuidae) // Vestnik zoologii. — 2010. — 44, N 5. — P. 421–432.
- Döring E.* Zur Morphologie der Schmetterlingseier. — Berlin: Akademie-Verlag, 1955. — 154 p.
- Fibiger M., Hacker H.* Systematic List of the Noctuoidea of Europe (Notodontidae, Nolidae, Arctiidae, Lymantriidae, Erebidae, Micronoctuidae and Noctuidae) // Esperiana. — 2004. — 11. — P. 83–172.
- Salkeld E. H.* A catalogue of the eggs of some Canadian Noctuidae (Lepidoptera), with comments // Mem. Entom. Soc. Canada. — 1984. — 127. — P. 1–167.

Received 4 September 2013

Accepted 1 October 2013