Vestnik zoologii, **48**(6): 553–561, 2014
DOI 10.2478/vzoo-2014-0066

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UDC 595.786:59.14(477)

EGG MORPHOLOGY OF SOME NOLIDAE AND EREBIDAE (LEPIDOPTERA, NOCTUOIDEA)

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Egg Morphology of Some Nolidae and Erebidae (Lepidoptera, Noctuoidea). Dolinskaya, I. V. — The eggs of one species from family Nolidae (subfamily Chloephorinae) and seven species from family Erebidae (subfamilies Hermeniinae, Hypeninae, Phytometrinae and Catocalinae) occurring in Ukraine are examined, described, and illustrated with SEM. The diagnostic characters of examined species are proposed.

K e y w o r d s: Nolidae, Erebidae, Lepidoptera, egg, morphology, diagnostic characters, scanning electron microscopy, Ukraine.

Морфология яиц некоторых Nolidae и Erebidae (Lepidoptera, Noctuoidea). Долинская И. В. — С помощью сканирующего электронного микроскопа изучены, описаны и проиллюстрированы яйца одного вида из семейства Nolidae (подсемейство Chloephorinae) и семи видов из семейства Erebidae (подсемейства Hermeniinae, Hypeninae, Phytometrinae и Catocalinae), встречающихся в Украине. Выделены диагностические признаки для исследованных видов.

К л ю ч е в ы е с л о в а: Nolidae, Erebidae, Lepidoptera, яйцо, морфология, диагностические признаки, сканирующая электронная микроскопия, Украина.

Introduction

This work continues a series of articles devoted to the morphology of eggs of Noctuoidea (Dolinskaya, 2010, 2011, 2014; Dolinskaya, Geryak, 2010; Dolinskaya, Ponomarenko, 2013). Before this study detailed line grawings of eggs belonging to three species (*Hypena proboscidalis*, *Euclidia glyphica* and *Catocala elocata*) were obtained by matter of optical microscope (Döring, 1955). More thorough examination of the chorionic structure can be achieved with the use of SEM. Many diagnostic characters not considered before were shown in course of present study.

Material and methods

This study is based on the material collected by the author in Ukraine. Eggs of one species from family Nolidae (Chloephorinae: *Pseudoips prasinana* (Linnaeus, 1758)) and seven species from family Erebidae (Hermeniinae: *Pechipogo strigilata* (Linnaeus, 1758); Hypeninae: *Hypena proboscidalis* (Linnaeus, 1758); Phytometrinae: *Colobochyla salicalis* ([Denis et Schiffermüller], 1775); Catocalinae: *Euclidia glyphica* (Linnaeus, 1758), *Dysgonia algira* (Linnaeus, 1767), *Catocala nupta* (Linnaeus, 1767) and *C. elocata* (Esper, [1787])) were examined. The eggs of three species (*Pseudoips prasinana*, *Hypena proboscidalis* and *Colobochyla salicalis*) were obtained from females captured in the field. The eggs of five species (*Pechipogo strigilata*, *Euclidia glyphica*, *Dysgonia algira*, *Catocala elocata* and *C. nupta*) were withdrawn from abdomen of dry females. The eggs were examined with the use of scanning electron microscopy (SEM). Terminology of the eggs is according to Salkeld (1984). The systematic arrangement follows Fibiger and Hacker (2004).

Pseudoips prasinana (Linnaeus, 1758)

D e s c r i p t i o n. Egg subspherical, flattened (fig. 1, 2), height 0.6 mm, diameter 1.1–1.25 mm (n = 2). Egg pale citron colour. As egg develops it becomes dark yellow with brownish-red spot at apical part of egg and same interrupted stripe on perimeter of its medial part. Before caterpillar emergence egg becomes wine red. Chorion white, translucent.

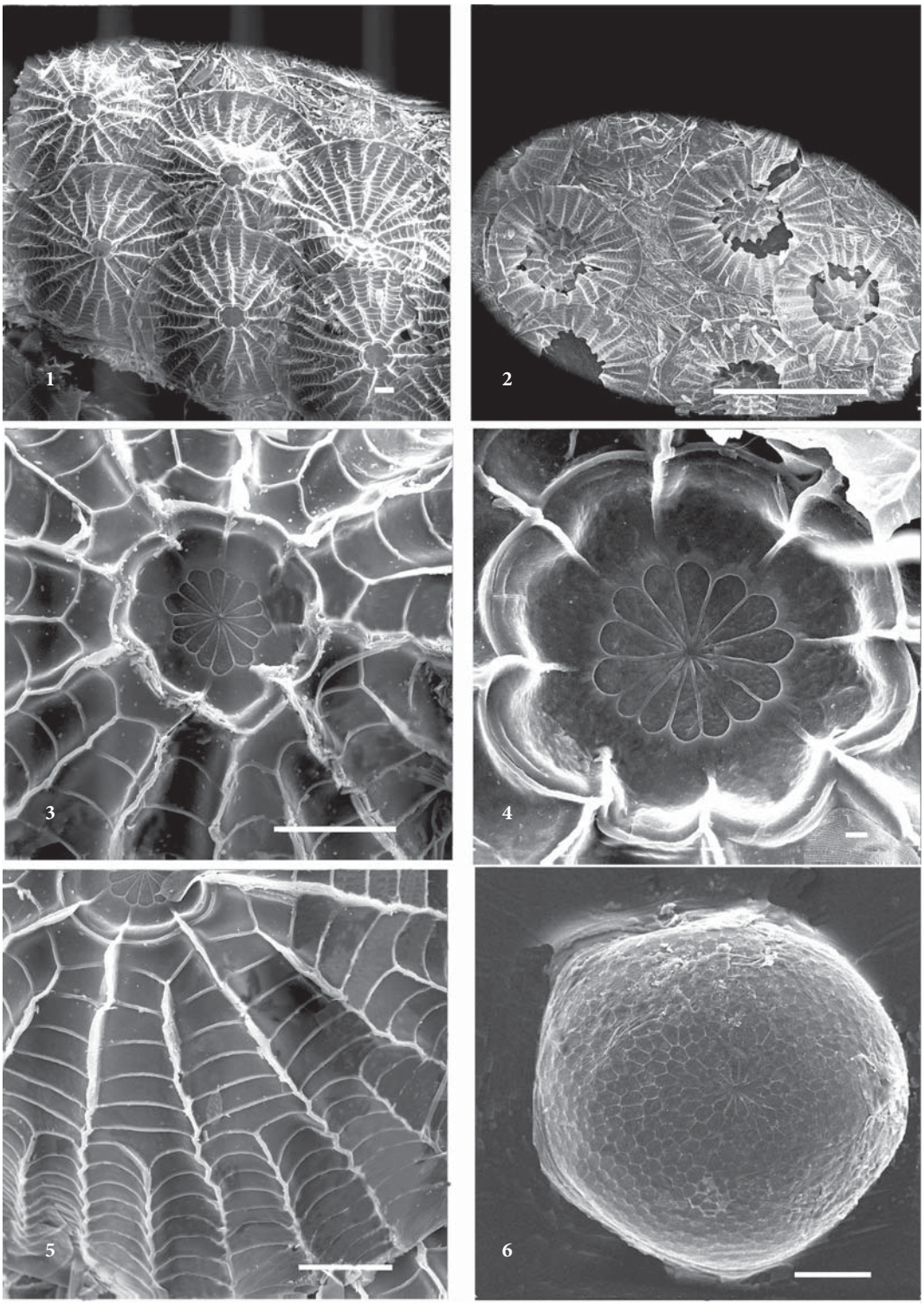

Fig. 1–6. Eggs of Nolidae, Chloephorinae: 1–5 — *Pseudoips prasinana*. Eggs of Erebidae, Hermeniinae: 6 — *Pechipogo strigilata*. Scale bars: 1, 3, 6 — 100 μm; 2, 5 — 1000 μm; 4 — 10 μm.

Рис. 1–6. Яйца Nolidae, Chloephorinae: 1–5 — *Pseudoips prasinana*. Яйца Erebidae, Hermeniinae: 6 — *Pechipogo strigilata*. Масштабные линейки: 1, 3, 6 — 100 мкм; 2, 5 — 1000 мкм; 4 — 10 мкм.

Chorion ridged, marked on two thirds surface. Micropylar area specific, sharply expressed, represented by rosette and 1 row of petalled cells (fig. 3, 4). Rosette clearly expressed with 14–16 long and narrow petalled cells. Secondary cells with sharply expressed distal edges. Resulting micropylar area rounded by raised ring. There are 7–8 of the 32–35 longitudinal ridges radiate from cells of micropylar area. Longest ridges slightly wavy, with high comb, especially at apical part of egg. Transverse walls less distinct and narrow than ridges (fig. 5). Aeropyles clearly expressed. Chorion folded everywhere, especially in the area of micropylar rosette.

Shape of gnawed holes in eggs. Caterpillars nibble out large rounded opening at apical area of eggs.

Oviposition. Eggs laid in single-layer tight clusters where they pressed one to another.

Remark. Egg shape, micropylar area and form of gnawed holes in eggs similar to those in some species of subfamilies Xyleninae (*Conistra rubiginea*) and Acronictinae (Dolinskaya, 2011, 2014).

Pechipogo strigilata (Linnaeus, 1758)

Description. Egg subspherical (fig. 6), diameter 0.7 mm (n = 2).

Chorion not ridged, marked by cells on two thirds surface (fig. 7). Clear transition between cells of micropylar area and remaining egg surface absent. Rosette with 12 long and narrow petalled cells (fig. 7). Cells with thin walls, arranged irregularly on chorion. Aeropyles small, slightly expressed at walls junctions (fig. 8).

Remark. Egg surface cells located not like radial lines as those in Noctuidae but chaotically, that typical for eggs of Notodontidae, Lymantriidae and Arctiidae.

Hypena proboscidalis (Linnaeus, 1758)

Description. Egg subspherical (fig. 9). Egg pale yellow. As egg develops, it becomes taupe (n = 2). According to Döring (1955) height 0.4 mm, diameter 0.48–0.5 mm.

Chorion ridged, marked on two thirds surface. Micropylar area sharply expressed, represented by rosette and 1 row long, narrow and pointed cells (fig. 10). Rosette slightly elevated, with 11–12 petalled cells. There are 16–20 of the 35–40 broad longitudinal ridges radiate from cells of micropylar area. Transverse walls filiform, much less distinct than ridges (fig. 11). Aeropyles weakly expressed at walls junctions. The entire surface of small, densely placed fibers.

Shape of gnawed holes in eggs. Caterpillars nibble out oval opening at lateral part of egg.

Oviposition. Eggs laid in single-layer tight clusters where they pressed one to another.

Colobochyla salicalis ([Denis et Schiffermüller], 1775)

Description. Egg subspherical (fig. 12, 13), diameter 0.6–0.7 mm (n = 2).

Chorion ridged, marked on two thirds surface. Micropylar area represented by rosette and 3 rows short and wide petalled cells. Rosette with 5 petalled cells and 5 micropylar openings (fig. 14). There are 15–16 of the 44–47 zig-zag longitudinal ridges radiate from cells of micropylar area. Transverse walls less distinct and narrow than ridges. Aeropyles large, bordered by roller-like edges, diameter of which greater than width of ribs (fig. 15). Chorion folded everywhere.

Shape of gnawed holes in eggs. Caterpillar nibbles out large oval opening at the lateral part of egg, sometimes opening being made apically.

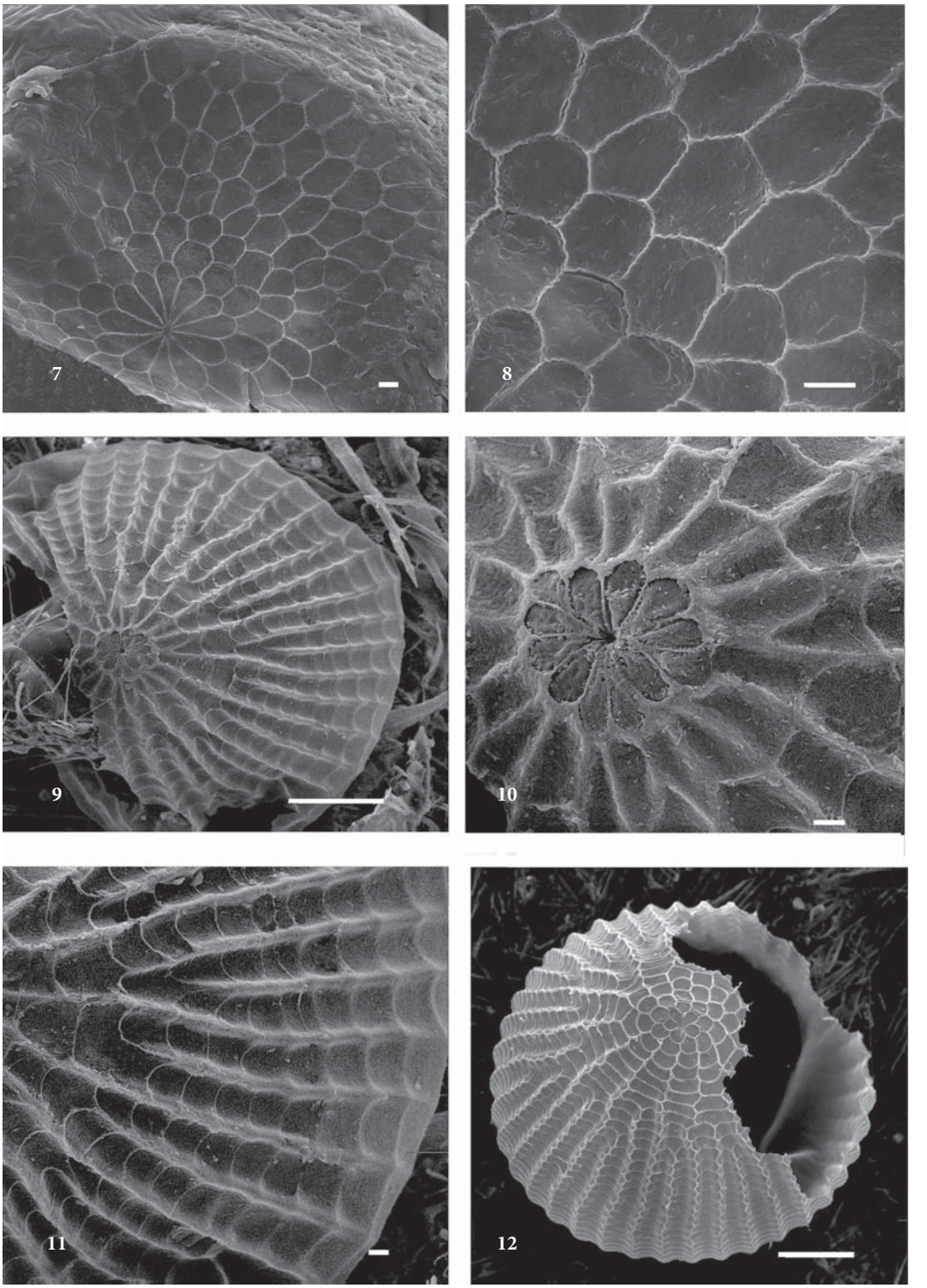

Fig. 7–12. Eggs of Erebidae: Hermeniinae: 7, 8 — *Pechipogo strigilata*; Hypeninae: 9–11 — *Hypena proboscidalis*; Phytometrinae: 12 — *Colobochyla salicalis*. Scale bars: 7–11 — 10 μm; 12 — 100 μm.

Рис. 7–12. Яйца Erebidae: Hermeniinae: 7, 8 — *Pechipogo strigilata*; Hypeninae: 9–11 — *Hypena proboscidalis*; Phytometrinae: 12 — *Colobochyla salicalis*. Масштабные линейки: 7–11 — 10 мкм; 12 — 100 мкм.

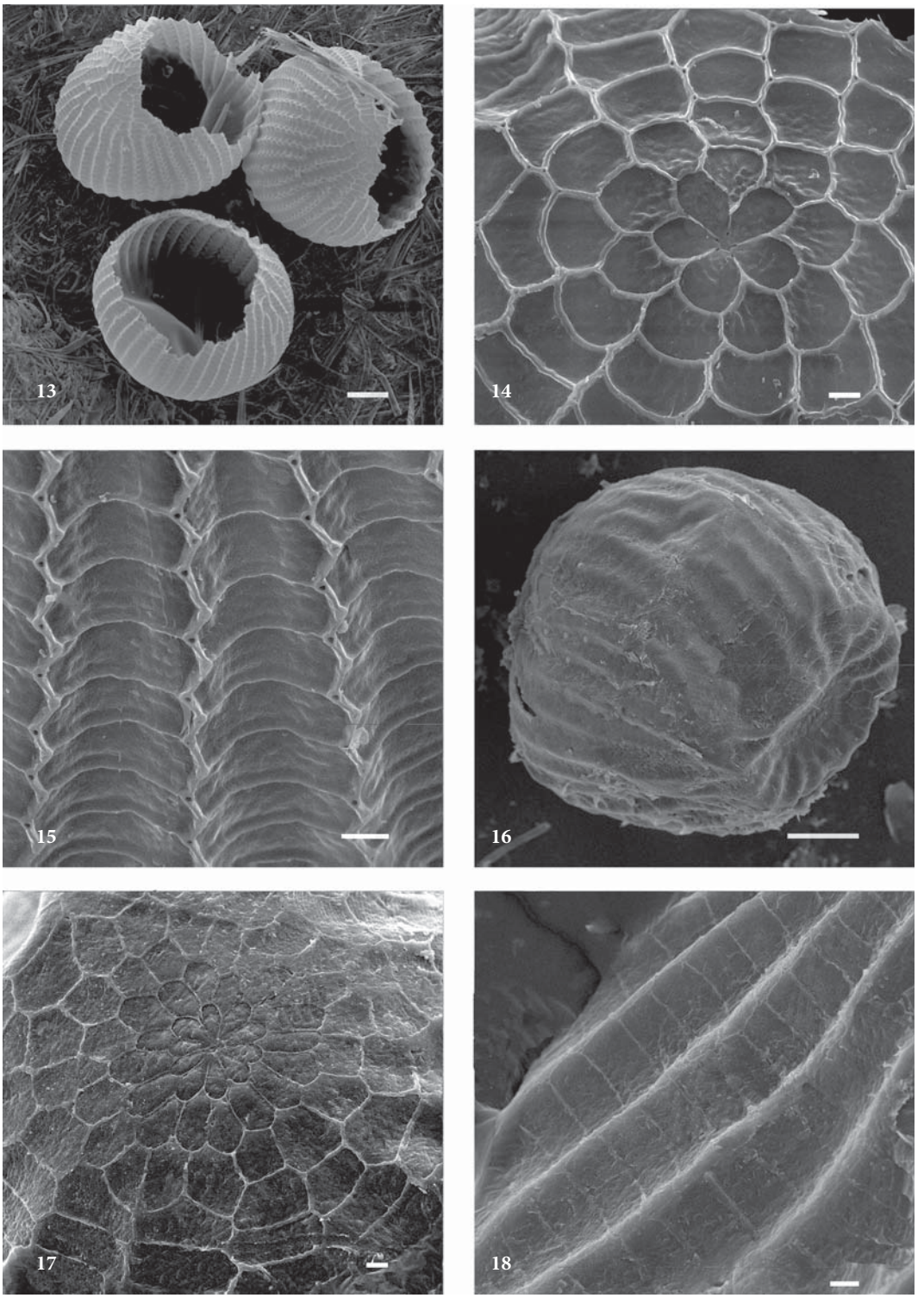

Fig. 13–18. Eggs of Erebidae: Phytometrinae: 13–15 — *Colobochyla salicalis*; Catocalinae: 16–18 — *Euclidia glyphica*. Scale bars: 13, 16 — 100 μm; 14, 15, 17, 18 — 10 μm.

Рис. 13–18. Яйца Erebidae: Phytometrinae: 13–15 — *Colobochyla salicalis*; Catocalinae: 16–18 — *Euclidia glyphica*. Масштабные линейки: 13, 16 — 100 мкм; 14, 15, 17, 18 — 10 мкм.

Euclidia glyphica (Linnaeus, 1758)

D e s c r i p t i o n. Egg subspherical (fig. 16), diameter 0.8–0.9 mm (n = 2). According to Döring (1955) egg green colour. As egg develops, it becomes ash grey.

Chorion ridged, marked on two thirds surface (fig. 18). Rosette with 10–11 long and narrow petalled cells and 6–7 micropylar openings. The clear transition between cells of micropylar area and remaining egg surface absent (fig. 17). There are 28–32 slightly wavy longitudinal ridges (Döring, 1955). Transverse walls narrow and distinct as ridges. Columnar cells broad and short (fig. 19). Along all surface of longitudinal ridges clearly expressed aeropyles at walls junctions. The entire surface of small, densely placed fibers (fig. 20).

Dysgonia algira (Linnaeus, 1767)

D e s c r i p t i o n. Egg subspherical (fig. 21), height 0.7–0.8 mm, diameter 0.8–0.9 mm (n = 2). Chorion white, transparent.

Chorion ridged, marked on two thirds surface. Micropylar area represented by rosette and 5 rows polygonal cells (fig. 22). Rosette with 9-10 broad and short petalled cells and 5 micropylar openings, which located as star (fig. 24). The clear transition between cells of micropylar area and remaining egg surface absent (fig. 22). There are 34–37 slightly wavy, narrow longitudinal ridges with aeropyles at walls junctions. Transverse walls narrow and distinct as ridges. Chorion sharply pebbled everywhere (fig. 23).

Catocala elocata (Esper, [1787])

D e s c r i p t i o n. Egg subspherical, flattened (fig. 25), height 0.6–0.8 mm, diameter 1.25–1.35 mm (n = 2). Chorion white, transparent. According to Döring (1955) egg reddish-gray with broad purple stripe in middle part, which interrupted by white-yellow stripe. Micropylar area white.

Chorion ridged, marked on two thirds surface. Micropylar area clearly expressed, represented by rosette and 3 rows petalled cells (fig. 26). Rosette with 9–10 petalled cells and 5 micropylar openings (fig. 27). Cells of 1–2 series petalled and small. Tertiary cells large, broad, with pointed distal part (fig. 26). There are 16–19 of the 33–37 elevated, longitudinal ridges radiate from cells of micropylar area. Longest ridges slightly wavy, with comb. Walls of columnar cells slightly wavy and distinct as ridges. Aeropyles slightly expressed (fig. 28). Chorion folded everywhere.

Catocala nupta (Linnaeus, 1767)

D e s c r i p t i o n. Egg subspherical, flattened (fig. 29), height 0.5–0.75 mm, diameter 1.1–1.2 mm (n = 2). Chorion white, transparent.

R e m a r k. The sculpture similar to previous species, but more distinct. Longitudinal ridges sharply expressed, wider and elevated than transwerse ridges. Transwerse ridges less wavy than in *C. elocata* (fig. 30).

Discussion

Based on the data above, flattened egg-shape is characteristic only for the family Nolidae (Chloephorinae).

The two types of sculpture, cellular and ridged, are typical for studied species of the family Erebidae.

The cellular sculpture is represented by the polygonal cells. The cells are located not like radial lines as those in species from family Noctuidae but chaotically, that is typical for species from families Notodontidae, Lymantriidae and Arctiidae. This sculpture is typical for the subfamily Hermeniinae (*Pechipogo strigilata*).

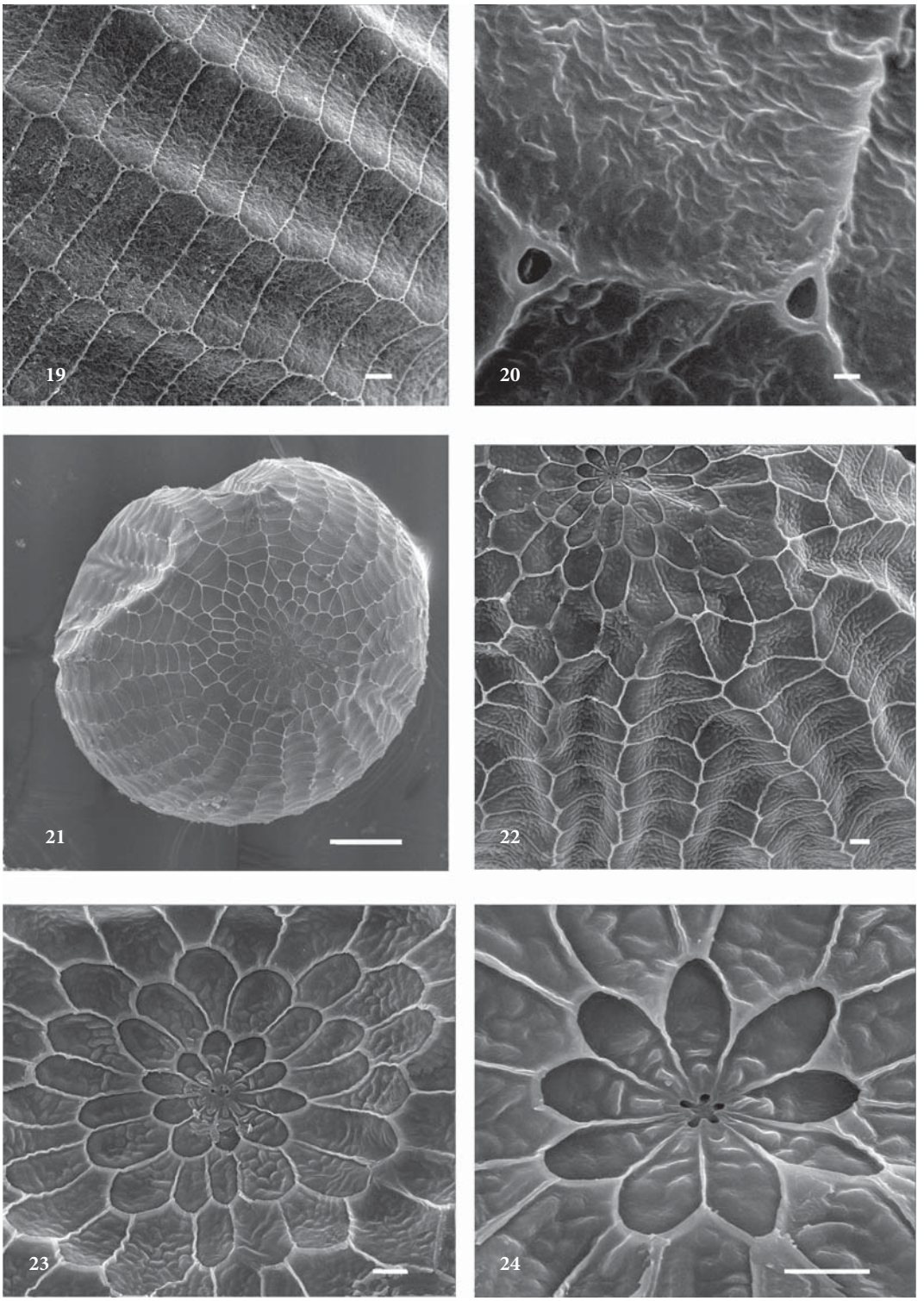

Fig. 19–24. Eggs of Erebidae, Catocalinae: 19, 20 — *Euclidia glyphica*; 21–24 — *Dysgonia algira*. Scale bars: 19, 22–24 — 10 μm; 20 — 1 μm; 21 — 100 μm.

Рис. 19–24. Яйца Erebidae, Catocalinae: 19, 20 — *Euclidia glyphica*; 21–24 — *Dysgonia algira*. Масштабные линейки: 19–24 — 10 мкм; 20 — 1 мкм; 21 — 100 мкм.

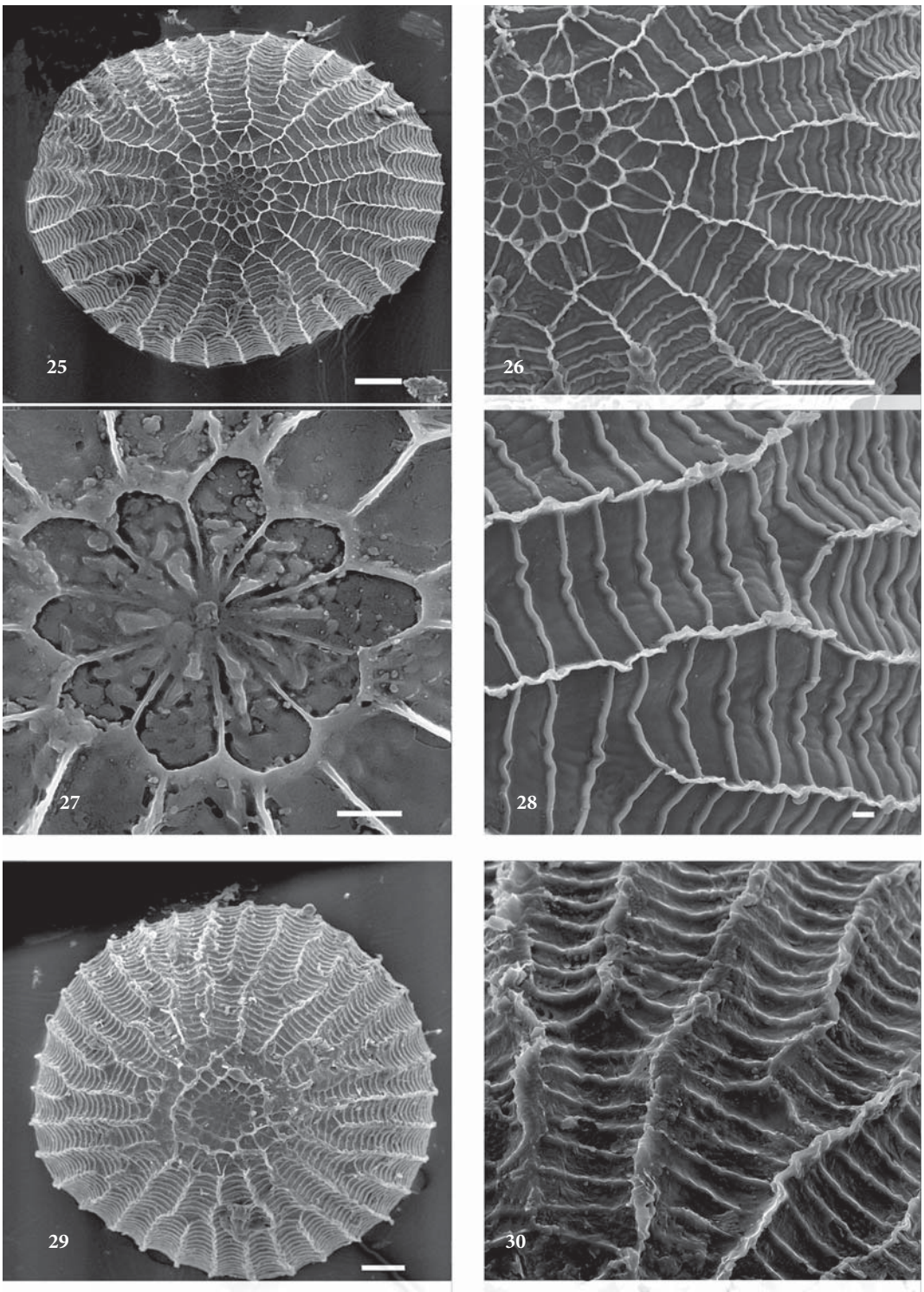

Fig. 25–30. Eggs of Erebidae, Catocalinae: 25–28 — *Catocala elocata*; 29, 30 — *Catocala nupta*. Scale bars: 25, 26, 29, 30 — 100 μm; 27, 28 — 10 μm.

Рис. 25–30. Яйца Erebidae, Catocalinae: 25–28 — *Catocala elocata*; 29, 30 — *Catocala nupta*. Масштабные линейки: 25, 26, 29, 30 — 100 мкм; 27, 28 — 10 мкм.

The ridged sculpture is represented by longitudinal, elevated ridges (*Pseudoips prasinana*, *Hypena proboscidalis*, *Colobochyla salicalis*, *Euclidia glyphica*, *Dysgonia algira*, *Catocala elocata* and *Catocala nupta*). Sometimes longitudinal ridges with high combs, especially at apical part of egg (*Pseudoips prasinana*, *Catocala elocata* and *Catocala nupta*). They have transverse walls narrow and distinct as ridges (*Euclidia glyphica*, *Dysgonia algira* and *Catocala elocata*).

Some species have specific diagnostic characters.

Pseudoips prasinana. Micropylar area specific. Secondary cells with sharply expressed distal edges. Resulting micropylar area rounded by raised ring. Longest ridges slightly wavy.

Hypena proboscidalis. Micropylar area represented by rosette and 1 row long, narrow and pointed cells Transverse walls very narrow, filiform.

Colobochyla salicalis. Micropylar area represented by rosette and 3 rows short and wide petalled cells. Longitudinal ridges zig-zag. Aeropyles large, bordered by roller-like edges, diameter of which greater than width of ribs.

Euclidia glyphica. Columnar cells broad and short. Along all surface of longitudinal ridges clearly expressed aeropyles at walls junctions.

Catocala elocata, *Catocala nupta*. Tertiary cells large, broad, with pointed distal part. Longest ridges and transverse walls slightly wavy.

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Received 14 July 2014
Accepted 26 November 2014