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Eggs of six East Palearctic *Suwallia* Ricker, 1943 species (Plecoptera, Chloroperlidae)

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Abstract

Eggs of six East Palearctic *Suwallia* Ricker, 1943 species are examined, illustrated, and described using scanning electron microscopy images for the first time. It is suggested that collar morphology characters and chorion punctuations may be considered potential diagnostic features for *Suwallia* eggs. Keys for their identification are proposed.

Key words: stoneflies, *Suwallia*, egg, key, East Palearctic, Far East, Russia

Introduction

The genus *Suwallia* Ricker, 1943, belongs to the tribe Suwalliini Surdick, 1985, of the subfamily Chloroperlinae and family Chloroperlidae. Up to the present, 31 species are distributed in the East Palearctic and Nearctic regions (DeWalt *et al.* 2026). There are 18 East Palearctic species in four countries: Mongolia (= 2), Russia (= 6), Japan (= 7), and the highest richness in China (= 9) (Alexander & Stewart 1999, Judson & Nelson 2012, Rehman *et al.* 2022, Teslenko & Zhiltzova 2009, Zhang *et al.* 2024). Of the six *Suwallia* species noted in Russia, *S. errata* Li & Li, 2021, *S. kerzhneri* Zhiltzova & Zwick, 1971, *S. decolorata* Zhiltzova & Levanidova, 1978, and *S. talalajensis* Zhiltzova, 1976 are widespread in the Eastern Palearctic, including Siberia and the Russian Far East, and some of them have been recorded in Mongolia, China, and East Kazakhstan. *Suwallia asiatica* Zhiltzova & Levanidova, 1978 and *S. sachalina* Zhiltzova, 1978 are two East Asian species whose ranges are restricted to the southern Russian Far East and expand into China (*S. asiatica*). However, no common species of *Suwallia* have been found in the Nearctic and East Palearctic. Recently, a comprehensive phylogenetic analysis of the *Suwallia* was conducted using molecular data (Houston *et al.* 2022). It was found that Palearctic and Nearctic *Suwallia* do not form reciprocally monophyletic clades, and that a biogeographic history including dispersal, vicariance, and founder event speciation via jump dispersal best explains the geographic distribution of this group. Phylogenetic analysis based on ultraconserved element sequences rendering the genus paraphyletic.

All species can be distinguished primarily by the morphological features of the male and female genitalia (Teslenko & Zhiltzova 2009). However, the eggs of *Suwallia* remain poorly studied. It is unknown whether the structure of the chorion can be used to distinguish between species. Limited information on the eggs of some Nearctic and Palearctic *Suwallia* species was presented by Knight *et al*. (1965), Baumann & Bottorff (1997), and mainly by Alexander & Stewart (1999) in their global-scale revision of the genus. This paper presents the results of a scanning electron microscopy (SEM) study of the egg morphology of six East Palaearctic *Suwallia* species for the first time.

Materials and Methods

Specimens used in this study are housed in the collection of the Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far Eastern Branch, Russian Academy of Sciences (FSC EATB FEB RAS), Vladivostok, Russia.

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Mature eggs were removed from females preserved in 75% ethanol and sonicated ≤ 5 seconds to remove the extrachorionic membranes. Most eggs were easily broken and difficult to clean, so attempts were made to clean those using needles, tweezers, and paintbrushes. After cleaning, they were transferred to 95% ethanol, air-dried, and mounted on stubs covered with double-sided adhesive tape. Stubs were carbon-coated and examined using a Zeiss Merlin SEM. Morphological terminology follows Szczytko & Kondratieff (2015).

Results

Suwallia asiatica Zhiltzova & Levanidova, 1978

Figs. 1–8

Suwallia asiatica Zhiltova & Levanidova 1978: 14, figs. 19–22. (original description of male); Zhiltzova & Potikha 1983: 23. (female description); Potikha & Zhiltzova 1986: 54, fig. 2, (female); Zhiltzova & Zapekina-Dulkeit 1986:199, figs.93 (3, 4) (male); Zhiltzova 1995: 14. (catalog); Alexander & Stewart 1999: 196–197, figs 2A, B. (diagnosis); Teslenko 2009: 699. (distribution); Teslenko & Zhiltsova 2009: 87, figs. 528– 530, (key); Shi *et al.* 2022: 585, fig. 2, 5B. (male, female, new record for China); Huo *et al.* 2022:6, fig. 9. (male, female, addition distribution, biology).

Material examined. Russia, Far East. Amur Region: 1♂, Bolshoy Oldoy River, bridge, Khabarovsk-Chita highway, 22.07.2005, coll. TM Tiunova; Jewish Autonomous Region: 1♂, 3♀, the Kuldur River, about 1 km upstream of the confluence with the Sutara River, and 2 km downstream of the Dvurechye settlement, 48.977907 N 131.599802 E, 19.08.2003, coll. TM Tiunova; Khabarovsk Krai: 4♀, Ulchsky District, Yai River, Bolshoe Kizi Lake basin, Amur River basin, 51.243872 N 139.829682 E, 01.08.2005, coll. EA Makarchenko; 2♂, 3♀, Melgin River, 3 km from the mouth, Bureya Reservoir Basin, 50.601938 N, 131.357698 E, light trap, 20.07.2005, coll. OV Orel; 1♀, upper reaches of the Anyuy River, near the Horse Trail stream, 48.4817 N 138.1033 E, 27.08.2012, coll. VF Lyubarets; Primorsky Krai: 6♂, 2♀, Armu River, Bolshaya Ussurka River basin, 21.07.2004, coll. VF Lyubarets; 2♂, 1♀, Poperechka River, tributary of Molokanka River, Melgunovka River Basin, 24.06.1998, coll. VA Teslenko; 1♂, 2♀, Margaritovka River, the Sea of Japan Basin, 8 km NW from Shcherbakovka village, 8.08.1995, coll. VA Teslenko.

Egg. Elongate oval, anterior pole narrower than posterior one (Figs 1–2). Length 328–339 μm, width at equator 214–221 μm (n=3). Collar consists of two rows of large, irregularly shaped meshes; the lateral sides of the meshes bear short longitudinal carinae; the shoulder has a narrow circular zone; the mesh rims are irregularly incised (Figs. 4, 6). Chorion at equator is irregularly covered with relatively sparse pits, 0.9−1.1 μm in diameter, anterior and posterior poles smooth without pits (Figs. 1, 3, 5, 7). Micropyles are sparse, with their diameters at least 1.5X greater than the diameter of the pits (Figs. 1, 7–8); sperm guides are teardrop-shaped and tunnel-shaped; and the orifices without rims (Fig. 8).

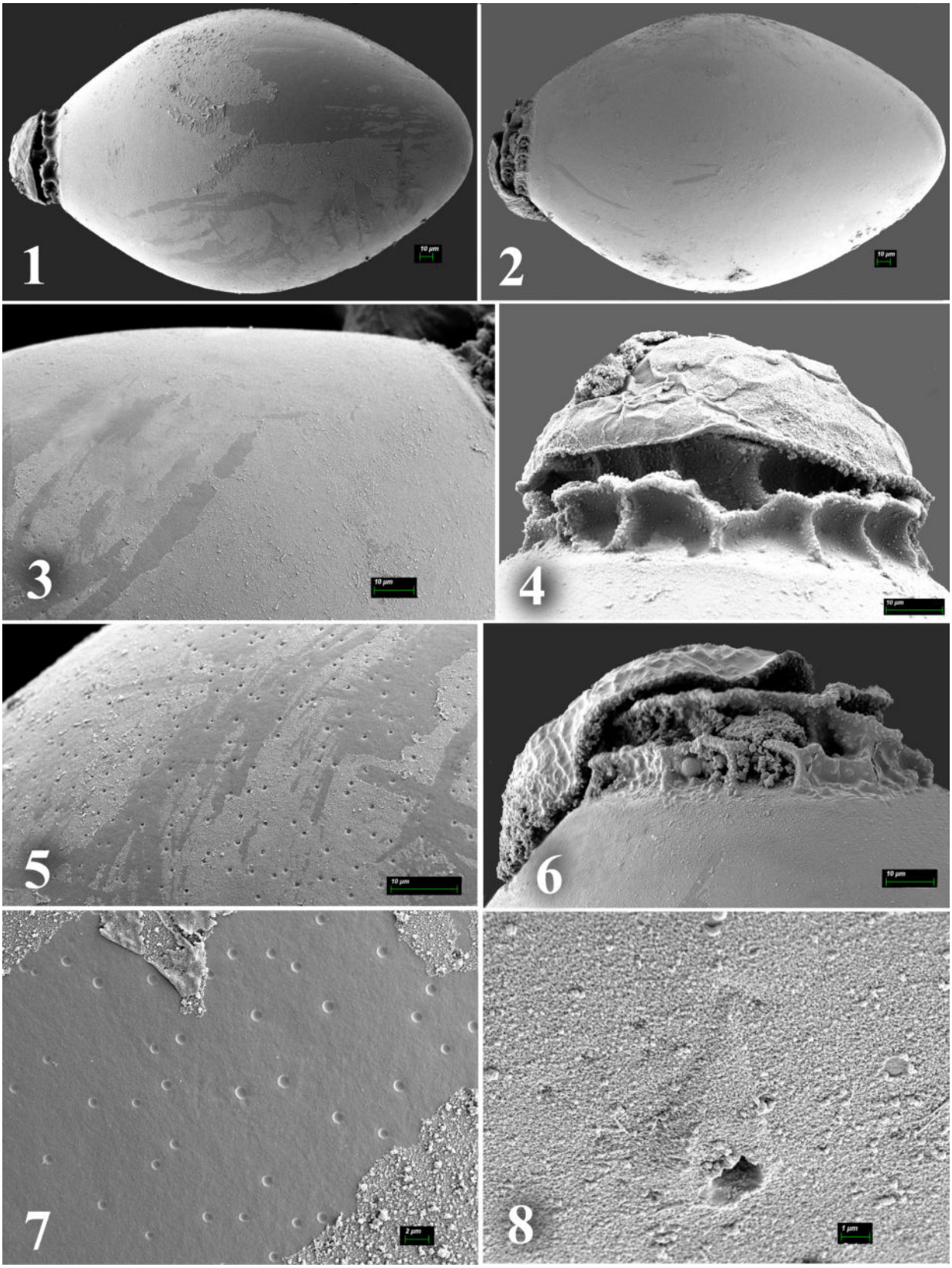
Distribution: East Asian species with limited distribution in the south of the Russian Far East, including Amur Region, Jewish Autonomous Region, Khabarovsk Krai, and Primorsky Krai. China.

Suwallia decolorata Zhiltzova & Levanidova, 1978

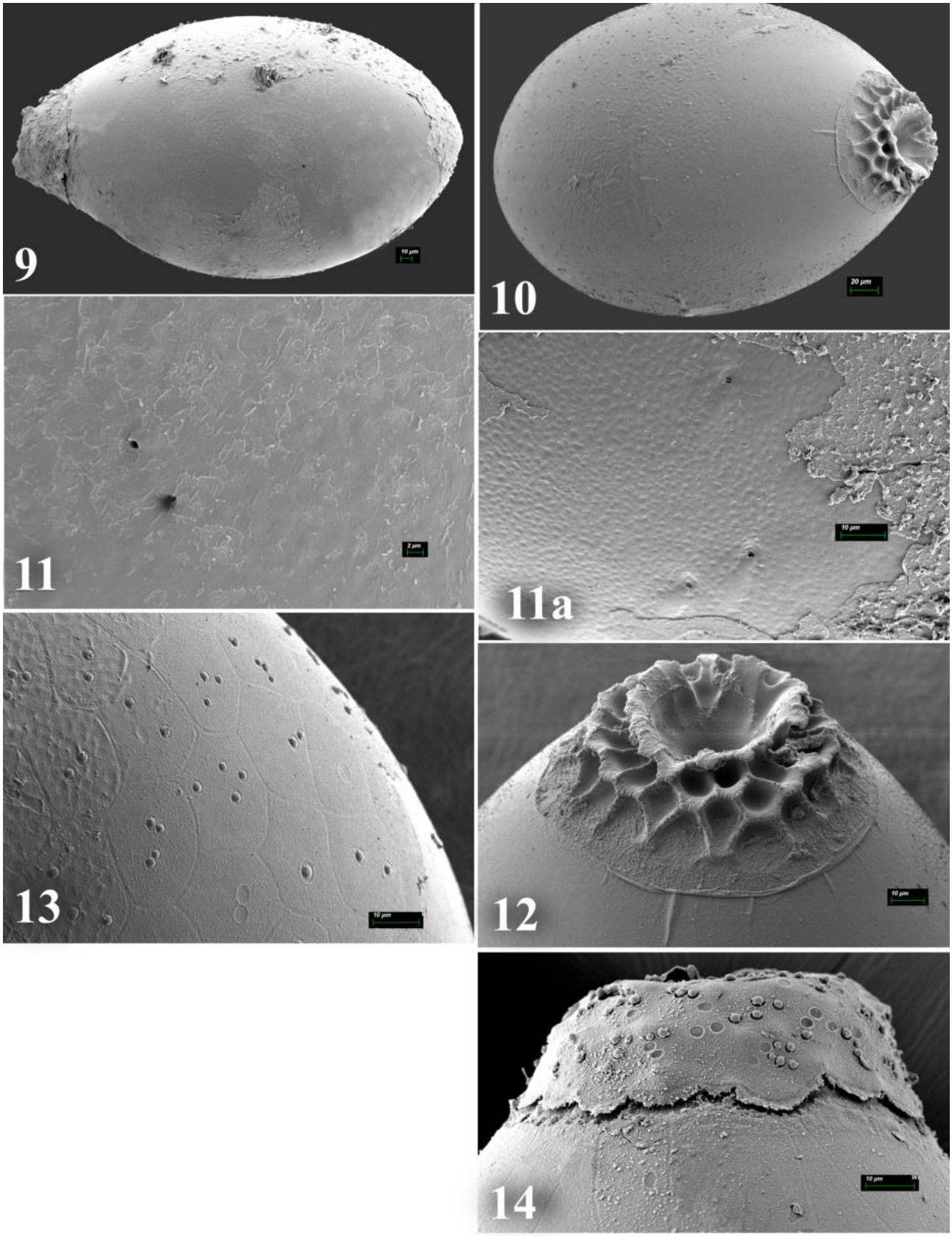
Figs. 9–14

Suwallia decolorata Zhiltzova & Levanidova 1978:16, figs. 23–25. (original description of male and female); Zhiltzova 1995: 15. (catalog); Alexander & Stewart 1999: 199, figs. 5A–E. (male, female, diagnosis); Teslenko 2009: 699. (distribution); Teslenko & Zhiltsova 2009: 87, figs. 531– 532. (key); Li *et al.* 2015b: 557, figs. 1–4. (male, female, description of larvae; first record for China).

Material examined. Russia, Far East. Amur Region: 1♀, Bolshaya Erakingra River, Zeya R. basin, Zeisky Nature Reserve, 54.093764 N 126.889739 E, Malaise, 17−23.09.2013, coll. EV Ignatenko; 2♂, Bolshoy Garmakan River, 300 m from the mouth, Zeya R. basin, Zeisky Nature Reserve, 02.07.2017, coll. TM Tiunova; Jewish Autonomous Region: 1♀, Amur River, Pashkovo village, 24–27.07.2003, coll. TV Nikulina, OV Orel; Khabarovsk Krai: 2♂, Kurkaltu River, Badzhalsky Nature Reserve, 22.07.2023, coll. NM Yavorskaya; 1♀, unnamed stream, Gorin River, left bank, Komsomolsky Nature Reserve, Amur R basin, 04.07.2021, coll. NM Yavorskaya; Primorsky Krai: 2♂, 1♀, Milogradovka River, the Sea of Japan basin, 14 km above Listvinichnoye settlement, 13.06.1998, coll. VA Teslenko;



FIGURES 1–8. *Suwallia asiatica* Zhiltzova & Levanidova, 1978. Russia. Far East, Khabarovsk Krai, Ulchsky District, Yai River, Bolshoe Kizi Lake basin, Amur River basin. Egg. 1. Habitus with anchor, uncleaned, lateral. 2. Habitus with collar and anchor, cleared, lateral. 3. Posterior pole rough without pits, chorion at equator irregularly covered with shallow pits, lateral. 4. Anchor and collar. 5. Chorion with pits, equator, lateral. 6. Collar with two rows of large, irregularly shaped meshes, posterior pole without pits. 7. Chorion at equator covered irregularly located shallow pits. 8. Uncleaned micropyle, the sperm guide teardrop-shaped, orifice without rims.



FIGURES 9–14. *Suwallia decolorata* Zhiltzova & Levanidova, 1978**.** Russia. Far East, Primorsky Krai, Khrustalnaya River, Zerkalnaya River basin, the Sea of Japan basin. Egg. 9. Habitus, with anchor, uncleaned, lateral. 10. Habitus with collar, uncleaned, dorsolateral. 11. Chorion with very shallow wide pits and micropyle. 11a. Micropylar row; sperm guides teardrop-shaped orifices without rims. 12. Collar with two irregular rows of hexagonal meshes, lateral. 13. Extrachorionic adhesive layer with hexagonal FCIs and globular bodies. 14. Anchor plate, chorion structure on posterior pole, lateral.

1♂ 1♀, Kedrovaya River, Vodopadny spring, Kedrovaya Pad Nature Reserve, the Sea of Japan basin, 18.07.1973, coll. IM Levanidova; 1♀, Kedrovaya River, Kedrovaya Pad Nature Reserve, light trap, coll. EA Makarchenko; 1♂, 2♀, Berezovy spring, Partizanskaya R. basin, Anisimovka settlement, 27.06.2001, coll. VA Teslenko; 5♂, 5♀, Sukhoi Creek, a right tributary of the Kievka River, the Sea of Japan basin, Lazovsky Nature Reserve, 21.06.1979, coll. TS Vshivkova; 1♂ 2♀, Lazovsky Nature Reserve, kordon America, 18.07.2006, coll. Sundukov Yu.; 2♂, 14♀, Khrustalnaya River, Zerkalnaya River basin, beyond Khrustalny settlement, 26.07.2009, coll. VA Teslenko; 1♂, 1♀, Inza River, Rudnaya River basin, the Sea of Japan basin, 09.06.2013, coll. M. Tiunov.

Egg. Oval, anterior pole slightly narrower than posterior one (Fig. 9). Length 353–377 μm, width at equator 232–248 μm (n=5). Collar consists of two rows of large, irregular, hexagonal-shaped meshes and surrounded by a narrow circular zone basally; the mesh rims are irregularly incised (Figs. 10, 12). Anchor mushroom-shaped, covered with small globular bodies gathered into small groups (Fig. 14). Chorion in equator rough and covered with very shallow, barely noticeable, wide pits; posterior and anterior poles smooth (Figs. 10−12). Micropyle small, sperm guide is short, orifice without rim (Figs. 11–11a). The extrachorionic adhesive layer has shallow hexagonal follicle cell impressions (FCIs), each bearing a single or a few globular bodies inside (Fig. 13).

Distribution. East Palaearctic species. Russia; Far East: Amurskaya Oblast, Magadanskaya Oblast, Khabarovsk Krai, and Primorsky Krai. China.

Suwallia errata Li & Li, 2021 in Li, Wang, Wang & Li (2021)

Figs. 15–20

Alloperla teleckojensis Šámal, 1939: sensu Zapekina-Dulkeit 1955: 172. (redescription of the male, female and larva erroneously);

Chloroperla teleckojensis (Šámal, 1939): Illies 1966: 443, comb. n.;

Suwallia teleckojensis (Šámal, 1939): Zwick *et al.* 1971: 857, figs. 23–25, comb. n. (description of the male and female); Zwick 1973: 297. (catalog); Zhiltzova & Teslenko 1997: 258, table 50, fig. 1. (larva); Alexander & Stewart 1999: 221, fig. 21A–E. (description of the male, female and egg); Teslenko & Zhiltzova 2009: 86, 312, figs. 533–535, 1643–1644. (keys to the male, female, and larva); Judson & Nelson 2012: 28, figs. 83, 86, 121,126–130. (description of the male, female and larva); Li *et al.* 2015a: 25, figs. 1–10. (description of the male and female, first report for China); Chen 2019: 176. (key); Wang *et al*, 2018: 680. (genome);

Suwallia errata Li & Li, in Li, Wang, Wang & Li 2021:597. (new name).

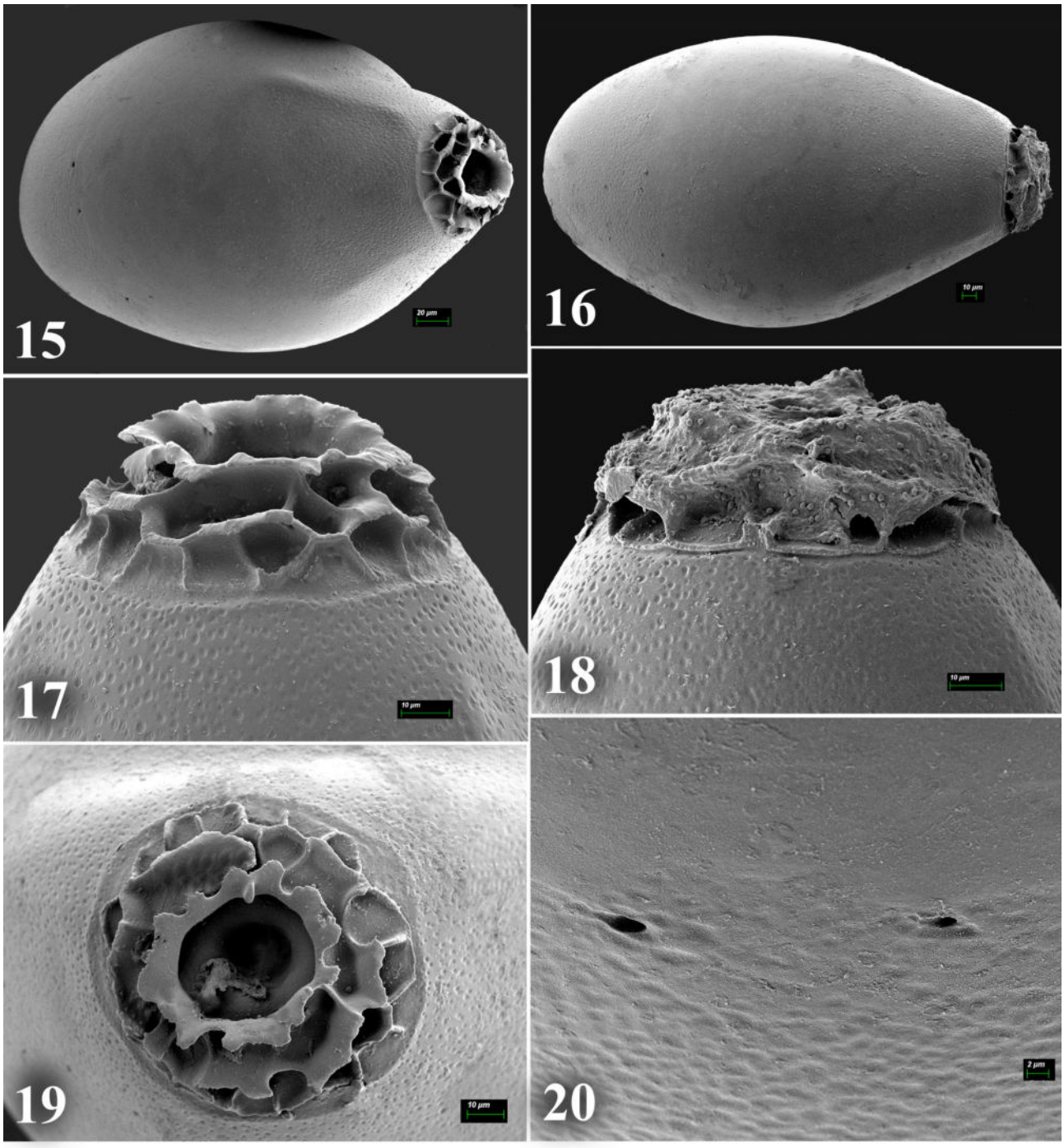
Material examined. Russia, Far East. Sakha Republic (Yakutia): 4♂, 5♀, Ungra River, the Yukhta Reserve, Aldan R. basin, Lena R. basin, 27.07.2006, coll. TM Tiunova; Amur Region: 3♂, Allenga River, Tygda, Dep, Zeya, Amur River basin, 14−15.07.2012, coll. VA Teslenko; 1♂, 1♀, Sigikta River, Gilyuy R. basin, downstream of the bridge, Neryungri-Bolshoy Never highway, 03.08.2006, coll. TM Tiunova; Jewish Autonomous Region: 3♂, 3♀, unnamed stream near the railway station of the Kuldur, Bira R. basin, Amur R. basin, 17.08.2024, coll. NM Yavorskaya; Khabarovsk Krai: 17♂, 19♀, Kurkaltu River, Badzhal Nature Reserve, Amgun R. basin, Amur R. basin, 22.07.2023, coll. NM Yavorskaya; 1♂, 1♀, Tuguro-Chumikansky District, Bolshaya Delya River, 12.08.2022, coll. IM Tiunov; 2♂, 7♀, unnamed stream in upper reaches of the Anyui River, Amur R. basin, 24.08.2012, coll. VF Lyubarets; Kamchatka Krai: 1♂, 7♀, Kizhichenok River, Bystraya River basin, bridge on the highway to Ust-Kamchatsk, 53.4811 N 157.4020 E, 04.09.2018, coll. IP Tiunov.

Egg. Oval, anterior pole rounded, while the posterior pole has four ribs behind the collar (Figs. 15 –16). Length 345–394 μm, width at equator 205–215 μm (n=4). Collar consists of two irregular rows of large, hexagonal, or irregularly shaped meshes and is surrounded by a narrow circular band basally; the lateral sides of the meshes have short longitudinal carinae; the mesh rims are irregularly incised (Figs. 15, 17−19). Anchor mushroom-shaped, does not protrude beyond the border of the collar, and is covered with small, globular bodies (Figs. 16, 18). Chorion enclosed with pits, densely covering both poles; equator is smooth (Figs. 15−18, 20). Row of three sparse micropyles located close to the anterior pole (Figs. 15, 16, 20). Sperm guides are short, orifices oval without rims (Fig. 20).

Distribution. East Palaearctic species widespread in Siberia (Altai, East Syan), one of the most common species in the Russian Far East, including Chukotka Autonomous Okrug, Magadanskaya Oblast, Kamchatka Krai, Yakutia, Amur Region, Jewish Autonomous Region, Khabarovsk Krai, Primorsky Krai, Sakhalin Island, and the Kuril Islands. East Kazakhstan. Mongolia. China.

Remarks. The egg size range and chorionic structure of the *S. errata* agree with generic-level data provided by Alexander & Stewart (1999) for this species in revision of the genus *Suwallia*. There is a difference in the count

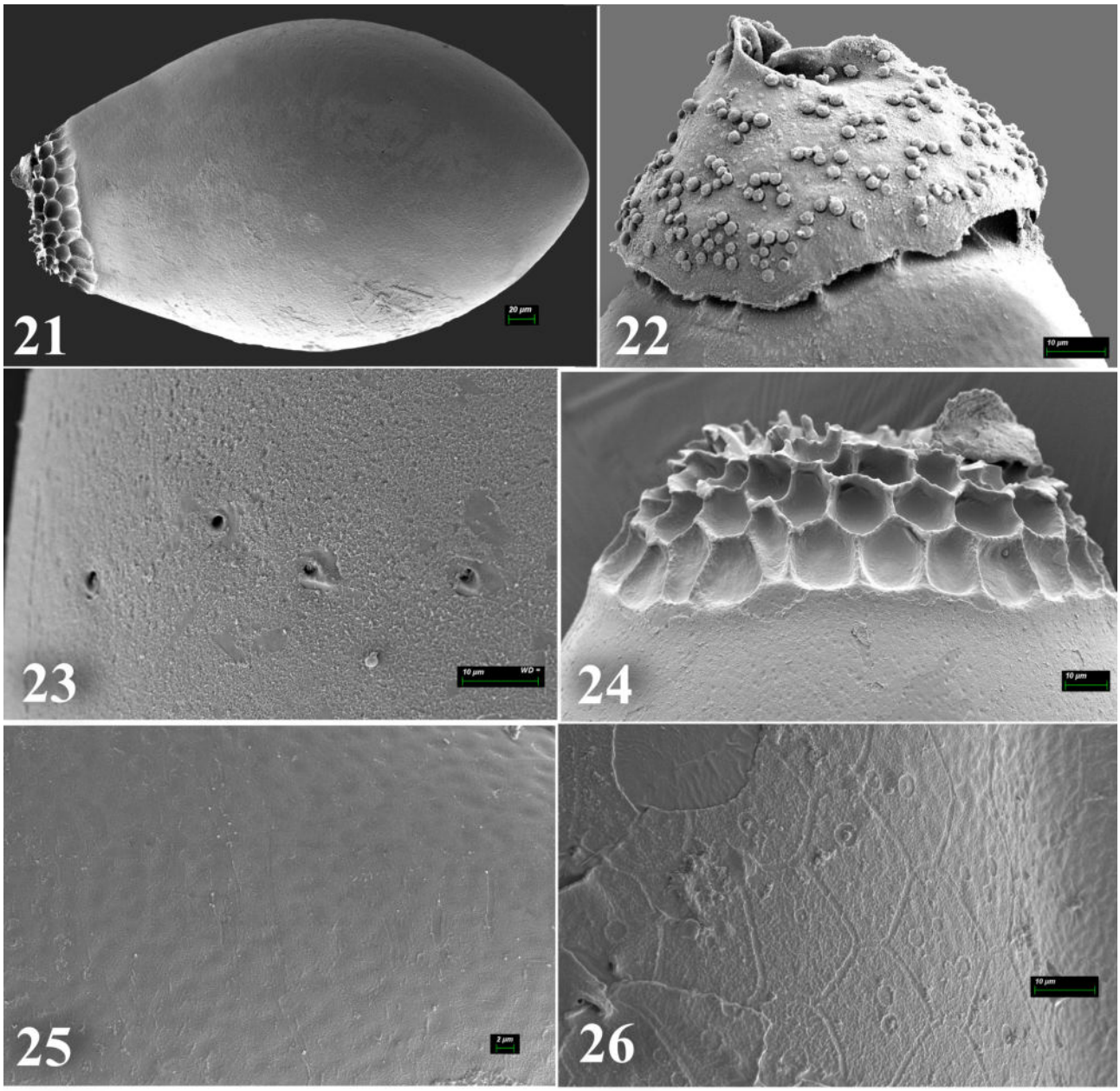
of the rows of hexagonal meshes in the collar. According to Alexander and Stewart (1999) there is one row, while on our data there are two. The discovery of the holotype of *Alloperla teleckojensis* Šámal, 1939 (Li *et al*. 2021) in the National Museum in Prague led to a reconsideration of the conspecificity of *A. teleckojensis* and *Suwallia teleckojensis* sensu Zapekina-Dulkeit (1955). As a result of the research, *Alloperla deminuta* Zapekina-Dulkeit, 1970, is a junior synonym of *A. teleckojensis* Šámal, 1939, and the widespread species previously known as *S. teleckojensis* sensu Zapekina-Dulkeit (1955) was given the new name *S. errata* Li & Li, 2021.



FIGURES 15–20. *Suwallia errata* Li & Li, 2021. Russia. Far East, Khabarovsk Krai, Kurkaltu River, Badzhal Nature Reserve, Amgun R. basin, Amur R. basin. Egg. 15. Habitus with collar cleaned, lateral. 16. Habitus, with anchor, cleaned, chorion structure, lateral. 17. Collar with two rows of large meshes, narrow circular band, chorion structure on posterior pole, lateral. 18. Anchor, covered with small globular bodies, chorion structure on posterior pole, lateral. 19. Collar, ventral. 20. Chorion structure near equator and anterior pole, the micropylar row, and sperm guides, with oval orifices, rims absent, lateral.

***Suwallia kerzhneri* Zhiltzova & Zwick, 1971 in Zwick, Levanidova & Zhiltzova (1971)**
Figs. 21–26

Suwallia kerzhneri Zhiltzova & Zwick, 1971 in Zwick, Levanidova & Zhiltzova 1971:859, figs.26–28 (original description of male and female); Zhiltzova 1995: 15. (catalog); Alexander & Stewart 1999: 205, figs. 19A–E. (male, female, diagnosis); Teslenko, 2009: 699. (distribution); Teslenko & Zhiltsova 2009: 87, figs. 536– 537. (key); Judson & Nelson 2012: 27, figs. 122–125. (description of male and female).



FIGURES 21–26. *Suwallia kerzhneri* Zhiltzova & Zwick, 1971. Russia. Far East, Magadan Region, Omulyovka River, Nerega R. basin, Kolyma R. basin. Egg. 21. Habitus, collar, lateral. 22. Anchor with globular bodies, lateral. 23. Micropylar row, short sperm guides, oval orifices with thin rims; chorion structure. 24. Collar with three rows of hexagonal meshes and circular band; chorion structure near posterior pole. 25. Chorion rough, with shallow, wide pits, lateral. 26. Extrachorionic adhesive layer, shallow hexagonal FCIs, and globular bodies.

Material examined. Russia, Far East. Chukotka Autonomous Okrug: 1♂, 1♀, Enmyvaam River, mouth of Emungyretveem River, 66.94051 N 172.42729 E, 21.08.2017, coll. AA Semenchenko; Magadan Region: 4♂, 16♀, Omulyovka River, downstream, Nerega R. basin, Kolyma R. basin, 64°10.673 N, 149°21.126 E, 05–09.VIII.2023,

coll. EV Khamenkova; Sakhalin Isl.: 2♂, 6♀, Tym River, 50°53.524 N, 142°38.280 E, 31.07.2002, coll. N. Minakawa; Sakha Republic (Yakutia): 1♂, 2♀, Chulman River, above the city of Neryungri, Timpton, Aldan R. basin, Lena R. basin, 04.08.2010, rearing, VA Teslenko; 14♂, 3♀, Darpir-Yuryakh River, Kolyma R. basin, 64°21.129 N, 148°02.224 E, 10.VIII.2023, coll. EV Khamenkova; Khabarovsk Krai: 16♂, 19♀, Okhota River, 6 km above the mouth, 1−5.08.1998, coll. TM Tiunova; 8♂, 2♀, unnamed stream in the Anyui River basin, Amur R. basin, 24.08.2012, coll. VF Lyubarets; 23♂, 14♀, Bureinsky Reserve, Bureya River, Strelka cordon, Amur R. basin, 5–10.08.2012, coll. unknown; Kamchatka Krai, 4♂, 5♀, Kamchatka River, left bank, 05.09.1969, coll. IM Levanidova.

Egg. Oval, anterior pole narrower than posterior one (Fig. 21). Length 305–445 μm, width at equator 206–252 μm (n=6). Collar high and well developed, consisting of three rows of hexagonal meshes and surrounded by a very narrow circular band basally; the lateral sides of the meshes have short longitudinal carinae, the mesh rims are irregularly incised (Figs. 21–22, 24). Anchor mushroom-shaped, does not protrude beyond the collar edge, and covered with small, globular bodies collected in small groups (Fig. 22). Chorion covered throughout with very shallow and wide tiny pits, giving a rough aspect to the chorionic surface (Figs. 23−25). Micropylar row is subequatorial, located closely to anterior pole (Fig. 21). Sperm guides are short, teardrop-shaped, oval orifices with thin rims (Fig. 23). The extrachorionic adhesive layer has shallow FCIs, each bearing a single or a few globular bodies inside (Fig. 26).

Distribution. East Palearctic species originally described from Mongolia and Kamchatka (Zwick *et al.* 1971), and is now known throughout the eastern to the Russian Far East; occurs in Chukotka Autonomous Okrug, Magadanskaya Oblast, Kamchatka Krai, Yakutia, Khabarovsk Krai, Primorsky Krai, Sakhalin Island, and the Kuril Islands.

Suwallia sachalina Zhiltzova, 1978

Figs. 27–32

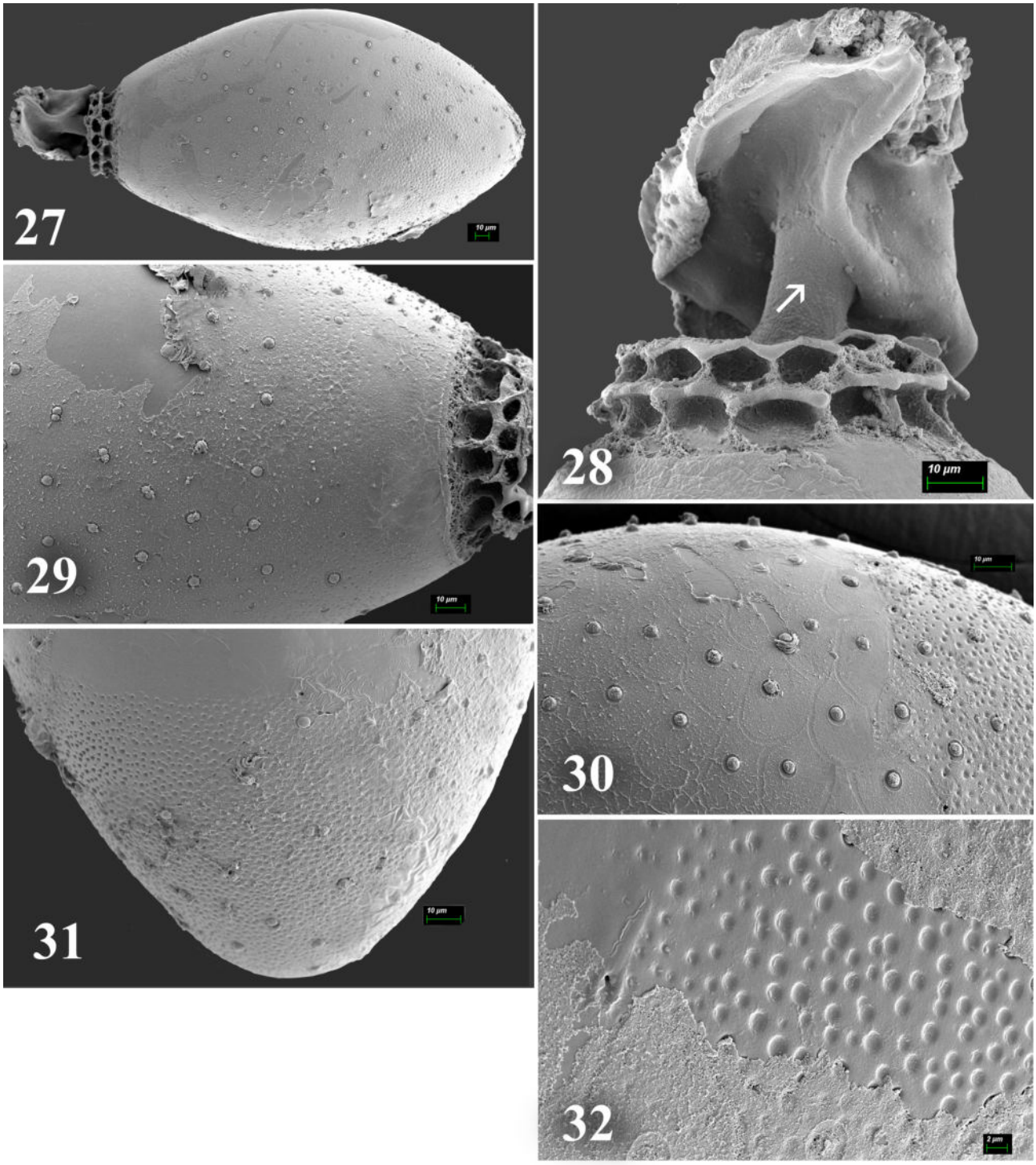
Suwallia sachalina Zhiltzova 1978:546, figs. 5–12. (original description of male and female); Zhiltzova 1995: 16. (catalog); Alexander & Stewart 1999: 213, figs. 13A–C. (male, female, diagnosis); Teslenko 2009: 699. (distribution); Teslenko & Zhiltsova 2009: 87, figs. 521– 523. (key).

Material examined. Russia, Far East. Sakhalin Island: 10♂, 20♀, Lyutoga R., near Vysokoye village, the Sea of Okhotsk basin, 46.48377 N, 142.20247 E, 25.07.2001, coll. VA Teslenko; 22♂, 11♀, Lyutoga R., vicinity of the Vysokoye village, 46.58420 N, 142.14686 E, 26.07.2001, coll. VA Teslenko; 15♂, 30♀, Tiobut R., left tributary of the Lyutoga R., 46.58420 N, 142.14686 E, 25.07.2001, coll. VA Teslenko.

Egg. Elongated, spindle-shaped, gradually tapering towards the anterior pole, the anterior pole being narrower than the posterior one (Fig. 27). Length 309–340 μm, width at equator 178–183 μm (n=4), thickness 3.3 μm. Collar well developed and consists of two regular rows of large, hexagonal-shaped meshes and is surrounded by a narrow circular band basally; the lateral sides of the meshes have short longitudinal carinae, the mesh rims are irregularly incised (Figs. 27−29). Anchor large, covered on top with small globular bodies, leg strong (Figs. 27–28). Chorion at equator smooth, anterior and posterior poles covered with well-visible pits; additionally, below collar there is smooth narrow band without pits occupying 1/5 of the egg length near posterior pole before equatorial area (Figs. 27, 29, 30−32). Row of sparse micropyles located close to the anterior pole (Figs. 30−32). Sperm guides are tunnel-shaped with oval orifices with thin rims (Fig. 32). Diameter of the micropyle is 2-4 times smaller than the diameter of the pits (Figs. 31−32). The extrachorionic adhesive layer has shallow loop-shaped FCIs, each bearing a single globular body inside (Fig. 30).

Distribution: East Asian species with limited distribution on Sakhalin Island of the Russian Far East.

Remarks. Eggs of *S. sachalina* are the narrowest of all the examined *Suwallia* species distributed in the East Palearctic. *Suwallia kawaii* Li & Li, 2021, recently described from Hokkaido, appears most similar to *S. sachalina* in the structure of the male epiproct and the female subgenital plate. Genetic studies will be able to confirm or refute the conspecificity of these species.



FIGURES 27–32. *Suwallia sachalina* Zhiltzova 1978. Russia. Far East, Sakhalin Island, Lyutoga R., near Vysokoye village, the Sea of Okhotsk basin. Egg. 27. Habitus with anchor lateral. 28. Anchor, the arrow indicates the anchor leg; collar with two rows of hexagonal meshes and circular band; smooth chorion structure near collar. 29. Collar, chorion structures on posterior pole and equatorial area, lateral. 30. Equator, anterior pole, and micropylar row, uncleaned, lateral. 31. Chorion structures and micropylar row on the anterior pole. 32. Tunnel-shaped sperm guide, oval orifices with thin rims, and differences in the micropyle diameter and diameter of the pits.

Suwallia talalajensis Zhiltzova, 1976 in Levanidova & Zhiltzova (1976)

Figs. 33–40

Suwallia talalajensis Zhiltzova in Levanidova & Zhiltzova 1976: 25, fig. 8. (original description of male and female); Zhiltzova 1995:16. (catalog); Alexander & Stewart 1999: 220, figs. 20A–D. (male, female, egg, diagnosis); Teslenko 2009: 699. (distribution); Teslenko & Zhiltzova 2009: 86, figs. 524–527. (key); Teslenko 2011: 387, figs. 2–10. (description of larva); Li *et al.* 2015b: 561, fig. 5. (male, first record for China).

Material examined. Russia, Far East. Sakha Republic (Yakutia): 13♂, 11 ♀, Gorbylakh River, Lena R. basin, above the road bridge, 31.07–1.08.2010, coll. VA Teslenko; Amur Region: 8 ♂, 27 ♀, Zeisky Nature Reserve, Bolshaya Erakingra River, Malaise trap, 27.08–2.09.2013, coll. EV Ignatenko.

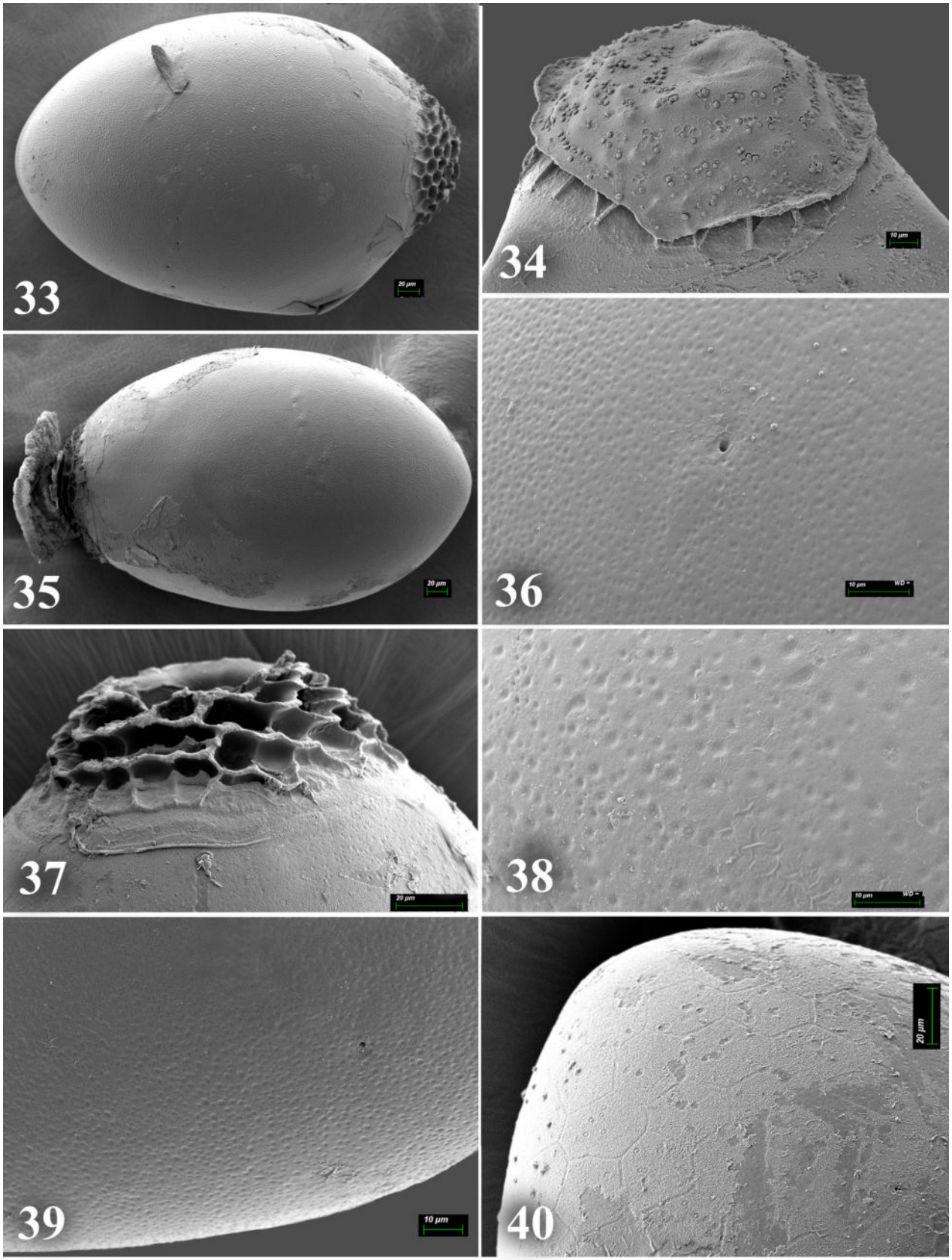
Egg. Elongated-oval, and gradually tapering towards the anterior pole, the anterior pole being narrower than the posterior one (Figs. 33, 35). Length 402–423 μm, width at equator 240–289 μm (n=4). Collar well developed and consists of three rows of large, hexagonal-shaped meshes and is surrounded by a narrow circular band basally; the lateral sides of the meshes have short longitudinal carinae, the mesh rims are irregularly incised (Figs. 33–34, 37). Anchor large, covered on top with globular bodies grouped into small clusters (Fig. 34). Chorion rough, covered completely with small pits, varying in size; hexagonal structure of the follicular cell impression is barely noticeable (Figs. 33, 36, 38–39). Sparse micropyles located in line closer to the anterior pole (Fig. 35). Sperm guides are tunnel-shaped, orifices without rims (Fig. 36). Diameter of the micropyle is 2-4 times bigger than the diameter of the pits. The extrachorionic adhesive layer has shallow hexagonal FCIs, each bearing a single or a few globular bodies inside (Fig. 40).

Distribution. East Palearctic species. Chukotka Autonomous Okrug, Yakutia, Kamchatka Krai, Magadan Region, Amur Region, and Primorsky Krai. China.

Remarks. Eggs of *S. talalajensis* are the largest of all the examined East Palearctic *Suwallia* species. The only consistent findings from the previously described eggs (Alexander & Stewart 1999) are the number of rows of hexagonal meshes in the collar (three) and, to a certain extent, overall size. The authors noted the smooth structure of the chorion. According to our data, the chorion is covered with small pits, giving its surface a rough appearance; the hexagonal structure of the follicular cell impressions is barely noticeable.

Discussion

Eggs of Palearctic *Suwallia* species have an elongated-oval or spindle shape. The largest eggs of *S. talalajensis* are 289 μm in width at the equator and 423 μm in length while eggs of *S. kerzhneri* can reach 445 μm in length. The smallest are those of the island species *S. sachalina*; with a width of 178–183 μm and length of 309–340 μm. The unstalked collar consists of two or three rows of large, irregularly arranged or hexagonal meshes and is surrounded by a narrow circular band basally; the mesh sides have short longitudinal carinae, and the mesh rim is irregularly incised (Figs. 4, 6, 10, 12, 17, 19, 21, 24, 28–29, 33, 37). It is suggested that collar morphology character and chorion punctuations may be considered potential diagnostic features for *Suwallia* eggs. Anchors are mushroom-shaped with globular bodies, singly or collected in small groups (Figs. 6, 14, 18, 22, 34). The chorionic surface is covered with weak, indistinct, or well-defined pits of varying size, depth, and spacing. Based on chorion punctation sculpturing, all examined species can be divided into two groups. The chorion of the *Suwallia* eggs of the first group is rough and completely covered with punctations across the entire surface, with deep or shallow pits (*S. kerzhneri* and *S. talalajensis*; Figs. 21, 25, 33, 36). The second group is distinguished, along with punctuation patterns, by the presence of smooth areas either at poles or at the equator (*S. asiatica, S. decolorata, S. errata,* and *S. sachalina*; Figs. 3, 5, 9, 11, 17, 20, 29, 31). Sparse micropyles are located along a line closer to the anterior pole (Figs. 2, 9, 15, 21, 31, 35). Sperm guides are tunnel-shaped, short, or long; orifices are without or with rims (Figs. 8, 11, 20, 23, 32, 36). Follicular hexagonal cell impressions are barely noticeable on the chorionic surface (Fig. 39). Shallow hexagonal FCIs, bearing globular bodies inside, are well visible in the extrachorionic adhesive layers (Figs. 8, 13, 26, 30, 40).



FIGURES 33–40. *Suwallia talalajensisi* Zhiltzova, 1976. Russia, Far East, Sakha Republic (Yakutia), Gorbylakh River, Lena R. basin. Egg. 33. Habitus, collar and micropylar row. 34. Anchor with globular bodies. 35. Habitus with anchor, lateral. 36. Chorion structure, micropyle without rim. 37. Collar of three rows of hexagonal-shaped meshes and circular band. 38. Chorion structure, shallow pits of different sizes. 39. Chorion structure with barely noticeable hexagonal FCIs. 40. Extrachorionic adhesive layer with shallow hexagonal FCIs and globular bodies, anterior pole.

Key to the eggs of the East Palearctic *Suwallia* species

1	Chorion rough, covered with punctations completely (Figs. 21, 25, 35–36)	5
-	Chorion has smooth areas without punctations (Figs. 3, 9, 16, 29)	2
2	Chorion at equator rough, covered with pits; anterior and posterior poles are smooth, without pits (Figs. 3, 5, 9, 11)	3
-	Chorion at equator smooth; anterior and posterior poles covered with pits (Figs. 16–18, 20, 29, 31)	4
3	Chorion at equator covered with sparse pits irregularly (Figs. 3, 5, 7)	*S. asiatica*
-	Chorion at equator with shallow, wide pits (Figs. 9, 11)	*S. decolorata*
4	Chorion at equator smooth; anterior and posterior poles covered with pits; anterior pole below collar with smooth, narrow band without pits (Figs. 29, 31–32)	*S. sachalina*
-	Chorion at equator smooth; anterior and posterior poles covered with punctations densely (Figs. 16–17, 20)	*S. errata*
5	Chorion rough, covered completely with punctations vary in size; hexagonal pattern of the follicular cell impression is barely noticeable (Figs. 35–36, 38–39)	*S. talalajensis*
-	Chorion rough, covered completely with very shallow, wide pits (Figs. 21, 23–25)	*S. kerzhneri*

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