POLLEN MORPHOLOGY OF THE POLISH SPECIES OF THE FAMILY *CAPRIFOLIACEAE*. PART 1.

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ABSTRACT

This paper contains results of studies on pollen morphology of 5 Polish species of the family *Caprifoliaceae* (genera *Sambucus* and *Viburnum*). The pollen has been examined with LM and SEM. Besides detailed descriptions, series of microphotographs are presented. All examined species have small to medium-sized grains, with prolate polar axis, reticulate ornamentation (at least in mesocolpia), relatively long ectoapertures and with often visible equatorial bridges. Extent of fusion of capita in muri allows to divide observed pollen grains into 2 subtypes: one for examined *Sambucus* species and for *V. opulus*, the second for *V. lantana*.

KEY WORDS: *Caprifoliaceae*, *Sambucus*, *Viburnum*, pollen morphology, SEM, LM.

INTRODUCTION

The *Caprifoliaceae* family has been an object of palinological interest for at least 40 years. In 1952 Erdtman basing on light microscope (LM) examinations of 50 species (11 genera) distinguished 4 pollen types in this family. At the same time Straka (1952) described pollen grains of European species of *Sambucus* and of *Viburnum opulus*. Then Weberling (1966) published LM pollen photographs of 5 Central European species (4 genera). Pollen grains of *Caprifoliaceae* species (5 genera with 16 species) deriving from various parts of Canada were observed with LM by Bassett and Crompton (1970). The similar work including pollen (4 genera with 12 species) from European part of ex Soviet Union was carried out by Kuprianova & Alyoshina (1972). Stachurska and co-authors (1963, 1970, 1971) examined with LM pollen grains of 12 Polish *Caprifoliaceae* species (6 genera).

New information about *Caprifoliaceae* pollen morphology was obtained due to use scanning electron microscope (SEM). First SEM photographs were published in 1976 by Punt, Reitsma & Reuvers (for *Viburnum opulus*, *Sambucus ebulus* and *Lonicera periclymenum*). They also presented pollen diagnosis and keys to the pollen types of 13 *Caprifoliaceae* species (4 genera) occurring in NW Europe. Later Böhnke-Gütlein & Weberling (1981) published comprehensive LM and SEM survey of pollen of the tribes *Sambuceae*, *Viburneae* and *Diervilleae* (4 genera with 48 species). Paper of Samutina (1981) was very essential for recognition differences of pollen morphology among 15 *Sambucus* species, representing all sections of the genus, except *Tetrapetalus*. Accorsi and co-authors (1987) investigated with SEM pollen of 3 *Sambucus* species from Italy. Donoghue (1985) based on SEM studies on 78 species (13 genera) discussed relationships and the exine evolution in this group of plants. In 1988 results

of studies on taxonomic significance of pollen morphology of 12 *Caprifoliaceae* genera (31 species) from China were published by Hu & He (1988). More recently Di Wei Zhong, Ren Yi & Wang Guo Rui (1993) examined pollen grains of 49 *Viburnum* species native to this country.

The results of studies on pollen morphology of 5 *Caprifoliaceae* species occurring in Poland are presented in this paper. Beside native species, as *Sambucus ebulus* L., *S. nigra* L., *S. racemosa* L., *Viburnum opulus* L., locally running wild *Viburnum lantana* L. has been also analysed.

Pollen morphology of the next 6 Polish *Caprifoliaceae* species (genus *Linnaea*, *Lonicera*) will be discussed in the second part of article.

MATERIALS AND METHODS

Pollen from matures anthers was collected from natural localities and sometimes from herbarium. For each species 7-8 samples were examined. Only in case of *Viburnum lantana* 3 samples were studied. All samples have been determined by herbarium specimens. They have been mainly deposited in the Herbarium of Department of Forest Botany of Agricultural Academy in Poznań (POZNF) and some in the Herbaria of Institute of Dendrology of Polish Academy of Sciences in Kórnik (KOR), of Department of Plant Taxonomy of Adam Mickiewicz University in Poznań (POZ) and of Institute of Soils Sciences and Cultivation of Plants in Puławy (IUNG). Detailed information about collected material is given below pollen diagnosis of each species.

All samples were acetolysed according to Erdtmans method (1952), with some modifications, as follow: shrivelled, ground anthers (or only pollen) were blent with acetolysis mixture, consisted of acetic anhydrite and concentrated sul-

phuric acid, in proportion 9:1. Then suspension was heated to boiling point and kept in water bath for 2-3 minutes. Next the samples were centrifuged in acetolysis mixture, washed with acetic acid and centrifuged again. Finally they were both mixed with alcohol 96% and centrifuged four times. Prepared material was divided into two equal part. One half was used for light microscope (LM) and the other for scanning electron microscope (SEM).

For LM pollen grains were mounted in glycerin jelly. The observations and micrographs were performed with BIOLAR 2308 and NIKKON microscopes. 30 pollen grains from each locality were measured. The length of polar axis (P) and equatorial axis (E), the length ratio P/E, thickness of exine and its layers (nexine and sexine) were assigned. The measurements were taken from the centre of mesocolpium at 1000 magnification.

For SEM pollen grains were mounted in ethyl alcohol 96 %. The drop of the obtained suspension was placed on the aluminium stub. After evaporation of the alcohol, pollen grains were coated with the gold. The observations and micrographs were carried out with JEOL JSM 5300, JOEL ISM T300 and ISI 60 scanning electron microscopes.

The description terminology has been established with regard to Erdtman (1952), Faegri & Iversen (1992), Moore & Webb (1978), Moore, Webb & Collison (1991) and Reitsma (1970).

POLLEN DIAGNOSIS

Sambucus ebulus L. (Figs 1-6)

Size:

Small¹; P (longest axis) – 23.07 µm (19.6-27.2 µm); E – 21.38 µm (18.8-24.8 µm).

P/E ratio:

1.08 (0.9-1.4); grains with prolate polar axis predominate (prolate spheroidal – 55.2% of studied pollen grains, subprolate – 31.9% and prolate – 1.0%), slightly oblate ones are much rarer (oblate spheroidal – 11.9%).

Outlines:

Polar view – hexagonal with convex sides², equatorial view – elliptic or circular³.

Exine:

2.2 µm thick (1.6-3.0 µm)⁴, it is the thickest in the equatorial zone and gradually becomes thinner towards the apocolpium; consists of 2 layers. Generally sexine is thicker than nexine (about 1.5 times)⁵.

Ornamentation:

Mesocolpium reticulate. Muri simplicolumellate, about 0.44 µm thick, with smooth or gently undulate ridges. Lumina irregularly in shape, largely polygonal (5- or 6-angular), sometimes curve, with maximum diameter (about 3 µm) in the equatorial zone; gradually decreasing in size towards the apocolpium. Free columellae (from 1 to 4), much shorter than muri, visible within some lumina. Beside normally developed lumina

minute perforations present in equatorial zone. Apocolpium foveolate⁶.

Pollen class:

Trizonocolporate.

Apertures:

Compound.

Ectoaperture:

Colpus almost as long as polar axis of grain, slit-like or widely gaping, deeply sunken in exine, with acute ends, constricted at equator. Ectoaperture membrane slightly wrinkled and with scarce, minute perforations. Bridge over ectocolpus often present, rather small and narrow.

Endoaperture:

Lalongate colpus poorly visible in LM.

Remarks:

Pollen grains of *Sambucus ebulus* are similar both to the grains of the other observed *Sambucus* species and to the grains of *Viburnum opulus*. From *S. nigra* and *S. racemosa* they differ in size, beside they have longer diameter of lumina, slightly thicker exine and foveolate ornamentation of apocolpium. In comparison with the pollen grains of *V. opulus* they are smaller and more rounded. Beside they have wider muri of reticulum and different ornamentation of polar area.

Analysed samples of *Sambucus ebulus*:

1. Near Tursk (prov. Gorzów), 02.08.1977, S. Wójcik, POZ.
2. Between Wierzchoniów and Bochońnica (Prov. Lublin), 11.07.1954, H. Stasiak, IUNG.
3. Słowik near Kielce (prov. Kielce), 29.07.1954, W. Bugała, KOR.
4. Zwierzyniec (prov. Zamość) by Wieprz river, 20.07.1993, I. Maciejewska, D. Wrońska-Pilarek, POZF.
5. Zwierzyniec (prov. Zamość), above Bukowa Mt., Roztocze National Park, 19.07.1993, I. Maciejewska, D. Wrońska-Pilarek, POZF.
6. Grójec (prov. Kraków), 24.07.1951, L. Lilpop, POZ.
7. Brzozowiec near Sanok (prov. Krosno), 31.07.1993, K. Oklejewicz, POZF.

Sambucus nigra L. (Figs 7-13)

Size:

Small; P (longest axis) 21.14 µm (16.0-24.8 µm); E – 18.48 µm (16.0-22.0 µm)⁷.

P/E ratio:

1.15 (0.89-1.42); grains with ± prolate polar axis predominate (prolate spheroidal – 30.5% of observed pollen grains, subprolate – 44.8%, prolate – 9.6%); slightly oblate ones constitute no more than 1/5 observed samples (oblate spheroidal – 18.1%).

Outlines:

Polar view – hexagonal, with convex sides⁸; equatorial view – elliptic, sometimes also circular.

Exine:

1.65 µm thick (1.4-2.2 µm); it is the thickest in the zone of equator, then slightly decreases towards apertures and apocolpia; consists of 2 layers. Sexine ± equal nexine or a little thicker (no more than 1.4 times).

¹ 40% of pollen grains of *Sambucus ebulus* from Italy was medium-sized (Accorsi et al. 1987).

² According to Böhnke-Gütlein & Weberling (1981) and Punt, Reitsma & Reuvers (1976) – triangular, with convex sides.

³ According to Accorsi and co-authors (1987) – rhomboidal with convex sides.

⁴ Extreme values of exine thickness, cited in literature have been from 0.8 µm (Kuprianova & Alyoshina 1972) to 4 µm (Accorsi et al. 1987). Samutina (1986) determined exine of this taxon as the thickest one within 15 *Sambucus* species (from 6 sections).

⁵ According to Straka (1952) both layers were of the same thickness.

⁶ Accorsi and co-authors (1987) observed pollen grain with almost psilate apocolpium too.

⁷ For the other studied European populations of *Sambucus nigra* length of polar axis was from 16 (Accorsi et al. 1987) to 29 µm (Punt, Reitsma & Reuvers 1976), while length of equatorial axis was from 12.6 (Kuprianova & Alyoshina 1972) to 26 µm (Punt, Reitsma & Reuvers 1976).

⁸ In literature the equatorial outline of *Sambucus nigra* has been also described as circular or triangular with convex sides (Böhnke-Gütlein & Weberling 1981, Kuprianova & Alyoshina 1972, Punt, Reitsma & Reuvers 1976).

Caprifoliaceae pollen, LM and SEM photographs. On photo the bar refers to magnification.

Figs 1-6. *Sambucus ebulus* L.:

1 (LM) – Outline in polar view; marked exine layers.

2 (LM) – Apocolpium ornamentation.

3 (LM) – Outline in equatorial view; marked exine layers and outline of endoaperture.

4 (SEM) – Pollen grain with marked equatorial bridge.

5 (SEM) – Reticulate ornamentation of mesocolpium, within lumina free columellae visible.

6 (SEM) – Pollen grains in polar and equatorial views.

Figs 7-13. *Sambucus nigra* L.:

- 7 (LM) – Outline in polar view; marked exine layers.
- 8 (LM) – Outline in equatorial view; marked exine layers.
- 9 (LM) – Outline of bridge over ectocolpus.
- 10 (LM) – Outline in equatorial view with ornamentation of mesocolpium.
- 11 (SEM) – Pollen grains with reticulate apocolpia.
- 12 (SEM) – Reticulate ornamentation of mesocolpium, within lumina free columellae visible.
- 13 (SEM) – Ectoaperture membrane.

Ornamentation:

Reticulate all over pollen surface or sometimes with foveolate apocolpium. Muri simplicolumellate, about 0.3 μm wide, with smooth ridges. Lumina irregularly in shape, polygonal (often 4- or 5-angular) or rounded, with diameter about 1-2 μm ; gradually decrease towards apertures and apocolpia. Within lumina 1 to 3 free columellae, much shorter than muri, often present. Lumina in the apocolpia area similar to those in the mesocolpia or distinctly smaller, with the diameter up to 0.5 μm . The width of muri however in apocolpium is always the same as in mesocolpium.

Pollen class:

Trizonocolporate.

Apertures:

Compound.

Ectoaperture:

Colpus relatively long, variable in width, with truncate ends, constricted at equator. Ectoaperture membrane wrinkled, with granulations or scarce, fine perforations. Bridge often present, rather small.

Endoaperture:

Lalongate colpus poorly visible in LM⁹.

Remarks:

Pollen grains of *Sambucus nigra* are remarkably similar to the grains of *S. racemosa*. Both species differ however in ornamentation of apocolpium. On the other hand ornamentation of grains of *S. nigra* resembles very much *Viburnum opulus*; but pollen grains of *S. nigra* are usually smaller, besides they have thinner exine and smaller lumina.

Analysed samples of *Sambucus nigra*:

1. Warcino forest inspectorate (prov. Słupsk), 10.06.1993, J. Grygonis, POZF.
2. Near Głębokki Bród (prov. Suwałki), 15.06.1993, B. Czokajło, J. Czokajło, POZF.
3. Zielonka forest (prov. Poznań), near Łopuchowo, 30.05.1993, I. Maciejewska, POZF.
4. Mielno reserve (prov. Konin), 02.06.1993, T. Maliński, POZF.
5. Bronisławki near Gostyń (prov. Leszno), 19.06.1975, K. Nowacka, POZ.
6. Strzelecka Góra, (prov. Jelenia Góra), 23.05.1993, M. Grzegorz, POZF.
7. Near Lipownica (prov. Rzeszów), 30.05.1993, J. Kułaczek, POZ.

Sambucus racemosa* L. (Figs 14-19)*Size:**

Small; P – 21.31 μm (17.6-26 μm), E – 18.36 μm (15.6-21.2 μm).

P/E ratio:

1.16 (0.88-1.45); grains with prolate polar axis prevail (prolate spheroidal – 46.7% of analysed pollen grains, subprolate – 40.0%, prolate – 8.1%); only 8.1% grains are of $\pm$ spheroidal shape.

Outlines:

Polar view – hexagonal, with convex sides¹⁰, equatorial view – mainly elliptic, sometimes circular.

Exine:

1.57 μm thick (1.2-2.2 μm); formed by 2 layers. Sexine as thick as nexine or up to 1.5 times thicker.

Ornamentation:

Mesocolpium reticulate. Muri simplicolumellate, up to 0.35 μm width, with smooth ridges¹¹. Lumina often rounded or polygonal; with diameter about 1 μm . 1-3 free columellae within lumina shorter than muri. Apocolpia $\pm$ psilate¹².

Pollen class:

Trizonocolporate.

Apertures:

Compound.

Ectoaperture:

Colpus relatively long, narrow to wide, with acute ends, constricted at equator. Ectoaperture membrane wrinkled, sometimes with fine perforations. Bridge, if present, small, but well visible.

Endoaperture:

Lalongate colpus scarcely visible LM¹³.

Remarks:

Sambucus racemosa grains are similar to those of *S. nigra*. But the species are easy to distinguish by differences in ornamentation of apocolpium.

Analysed samples of *Sambucus racemosa*:

1. Mielno (prov. Koszalin), 07.05.1993, I. Maciejewska, POZF.
2. Słomowo (prov. Poznań), 01.05.1993, D. Wrońska-Pilarek, POZF.
3. Gorzeń (prov. Bydgoszcz), 30.04.1993, I. Maciejewska, D. Wrońska-Pilarek, POZF.
4. Świętokrzyski National Park – tourist rout to Święty Krzyż (prov. Kielce), 25.05.1993, T. Maliński, D. Wrońska-Pilarek, POZF.
5. Szklarska Poręba (prov. Jelenia Góra), near Szklarka waterfall, c. 300 m, 10.05.1993, I. Maciejewska, T. Maliński, POZF.
6. Lipnik forest district (prov. Bielsko Biała), 09.05.1993, M. Gancarczyk, POZF.
7. Tatra Mts., Kościeliska Valley (prov. Nowy Sącz), c. 500 m, 12.06.1993, I. Maciejewska, D. Wrońska-Pilarek, POZF.

Viburnum opulus* L. (Figs 20-25)*Size:**

Both small and medium; P (longest axis) – 26.39 μm (20.8-34.4 μm), E – 23.49 μm (20.0-27.6 μm)¹⁴.

P/E ratio:

1.13 (0.96-1.43); Grains with prolate polar axis predominate (prolate spheroidal – 35.4% of studied pollen grains, subprolate – 54.6%, prolate – 0.8%), grains with oblate shapes are much rarer (oblate spheroidal – 5.6%).

Outlines:

Polar view – circular or hexagonal with convex sides¹⁵, equatorial view – circular to elliptic.

¹¹ Ridges of muri can be microverrucate too (Accorsi et al. 1987).

¹² In comparison to the observations of Accorsi and co-authors (1987) and Samutina (1986) the apocolpium may have been perforate too.

¹³ Endoaperture formed by porus was also observed (Accorsi et al. 1987).

¹⁴ Pollen grains of *Viburnum opulus* var. *americana* were a little smaller (P = 22 μm , E = 24 μm , Bassett & Crompton 1970).

¹⁵ Or triangular with convex sides (Böhnke-Gütlein & Weberling 1981, Kuprianova & Alyoshina 1972, Punt, Reitsma & Reuvers 1976).

⁹ According to Accorsi and co-authors (1987) and Stachurska and co-authors (1971) endoapertures may have been formed by pori, somewhat prolate in polar or equatorial area.

¹⁰ According to Accorsi and co-authors (1987) and Böhnke-Gütlein & Weberling (1981) it may have been triangular with convex sides.

Figs 14-19. *Sambucus racemosa* L.:

14 (LM) – Outline in polar view.

15 (LM) – Outline in equatorial view; marked exine layers.

16 (SEM) – Pollen grains in equatorial views.

17 (SEM) – Reticulate ornamentation of mesocolpium, within lumina free columellae visible.

18 (SEM) – Psilate ornamentation of apocolpium.

19 (SEM) – Equatorial bridge over ectocolpus.

Figs 20-25. *Viburnum opulus* L.:

20 (LM) – Outline in polar view; marked exine layers.

21 (LM) – Reticulate ornamentation of apocolpium.

22 (LM) – Outline in equatorial view; marked exine layers.

23 (LM) – Outline of equatorial bridge over ectoaperture.

24 (SEM) – Pollen grains in polar and equatorial views.

25 (SEM) – Reticulate ornamentation of mesocolpium; free columellae within lumina; ectoaperture membrane.

Exine:

2.16 μm thick (1.8–2.6 μm)¹⁶; formed by two distinct layers¹⁷. Sexine 1.3–1.7 times thicker than nexine¹⁸.

Ornamentation:

Reticulate. Muri simplicolumellate, on average about 0.6 μm wide, with smooth ridges or sometimes fine, sparsely granula marked on their tops. Lumina wide, differ in shape and size, often polygonal (4- or 5-angled), with maximal diameter up to 3 μm . Within lumina free columellae (up to 5), much smaller than in muri. Lumina, adjacent to apertures distinctly smaller than those in the middle of mesocolpia. There is no significant difference, however, in size of lumina between mesocolpia and apocolpia.

Pollen class:

Trizonocolporate¹⁹.

Apertures:

Compound.

Ectoaperture:

Colpus rather long, with truncate ends, constricted at equator. Ectocolpus membrane with granulations; small bridge often present.

Endoaperture:

Lalongate colpus rather poorly visible in LM.

Remarks:

Ornamentation of grains of *Viburnum opulus*, formed by completely fused capita in muri and psilate ridges, distinctly differs this species from *V. lantana* having grains with partly fused capita in muri and beaded ridges. At the same time it makes it similar to *Sambucus*. The grains of the latter species are distinctly smaller.

Analysed samples of *Viburnum opulus*:

1. Near Głęboki Bród (prov. Suwałki), 15.06.1993, B. Czokajło, J. Czokajło, POZF.
2. Piesna (prov. Piła), 2 km N of Gaj Klasztorny 04.06.1963, K. Latowski POZ.
3. "Zielonka" forest, Leśne lake (prov. Poznań), 20.05.1993, T. Maliński, POZF.
4. Rudniki near Sokołów Podlaski (prov. Siedlce) by the Bug river, 24.05.1975, A. Boratyński, KOR.
5. Nowa Słupia, Świętokrzyski National Park (prov. Kielce), 25.05.1993, T. Maliński, D. Wrońska-Pilarek, POZF.
6. Żelazne Mts., between Żelazno and Stary Waliszów (prov. Wałbrzych), c. 300 m, 17.05.1993, I. Maciejewska, D. Wrońska-Pilarek, POZF.
7. Cisowo (prov. Rzeszów), 25.05.1993, J. Kułaczek, POZF.
8. Krzywa Mountain (prov. Bielsko Biała), 11.05.1993, M. Gancarczyk, POZF.

Viburnum lantana* L. (Figs 26–30)*Size:**

Small or medium; P (longest axis) – 29.29 μm (23.6–33.2 μm), E – 26.23 μm (20.8–31.2 μm).

P/E ratio:

1.12 (0.97–1.29), shape of grains ranges from forms with prolate polar axis (prolate spheroidal – 44.4% of observed pollen grains, subprolate – 50.0%) to suboblate (5.6%)²⁰.

Outlines:

Polar view – hexagonal, with convex sides²¹, in equatorial view – elliptic; sometimes $\pm$ circular.

Exine:

About 1.8 μm thick²², formed by 2 layers. Sexine as thick as nexine, or somewhat thicker.

Ornamentation:

Reticulate. Muri simplicolumellate, 0.8 μm wide, with only partly fused capita, so lumina not completely closed. Ridges of muri beaded. Lumina different in shape, often rounded, with diameter about 2 μm and with some free, very small but distinct columellae within. Lumina gradually decrease towards apertures. Lumina of mesocolpia and apocolpia only slightly differ from each other.

Pollen class:

Trizonocolporate.

Apertures:

Compound.

Ectoaperture:

Colpus long and relatively wide, with acute ends, without distinctly marked membrane.

Ectocolpus constricted at equator and bridge often present.

Endoaperture:

Lalongate colpus rather poorly visible in LM.

Remarks:

Beaded arrangement of capita in muri unmistakably separate pollen of *Viburnum lantana* from pollen of other species (*V. opulus*, *Sambucus ebulus*, *S. nigra*, *S. racemosa*), with reticulate tectum.

Analysed samples of *Viburnum lantana*:

1. Goraj (prov. Gorzów), R. Wojciechowski 11.05.1993, POZ.
2. Dobrowlany near Zaleszczyki, 19.05.1938. J. Mądalski, POZ.
3. Czech Republic, S. Moravia between Havraniky and Hnanice, 04.05.1947, F. Svestke, POZ.

CONCLUSION

All pollen grains of *Sambucus* and *Viburnum* species are small to medium-sized, with prolate polar axis, reticulate ornamentation (at least in mesocolpia) and relatively long ectoaperture. Extent of fusion of capita in muri allows to divide this pollen type into 2 subtypes: one for *Sambucus* species and *V. opulus*, second for *V. lantana*.

Pollen morphology of studied *Sambucus* species is relatively homogeneous. Ornamentation of tectum in the zone of apocolpia appears to be the most important quality feature for *Sambucus* pollen. Besides quantitative features (pollen size, P/E ratio, thickness of exine, lumina size and thickness of muri in reticulum) clearly distinguish *S. ebulus* from *S. nigra* and *S. racemosa*.

Owing to smooth muri, pollen grains of *Viburnum opulus* seem to be more similar to *Sambucus* species, than to *V. lantana*, with the beaded ridges of muri. Both *Viburnum* species are however very similar in other quantitative characters of their grains.

¹⁶ Kuprianova & Alyoshina (1972) and Punt, Reitsma & Reuvers (1976) noticed exine 3.4–4.0 μm thick.

¹⁷ Bassett & Crompton (1970) considered poor delimitation between ectexine and endexine for *Viburnum opulus* var. *americana*.

¹⁸ Northwest-European populations of species had sexine equal nexine, or a little thicker (Punt, Reitsma & Reuvers 1976).

¹⁹ Occasionally grains with 2 or 4 colpi were noted (Böhnke-Gütlein & Weberling 1981, Punt, Reitsma & Reuvers 1976).

²⁰ Punt, Reitsma & Reuvers (1976) observed considerable percentage of *Viburnum lantana* pollen with oblate shape.

²¹ According to Kuprianova & Alyoshina (1972) and Punt, Reitsma & Reuvers (1976) polar outline may have been triangular, with convex sides or circular.

²² Others authors have stated exine thickness of *Viburnum lantana*, as about 3–4 μm . It has decreased towards apertures (Kuprianova & Alyoshina 1972, Punt, Reitsma & Reuvers 1976).

Figs 26-30. *Viburnum lantana* L.:

26 (LM) – Outline in polar view; marked exine layers.

27 (LM) – Outline in equatorial view; marked exine layers.

28 (LM) – Reticulate ornamentation of mesocolpium.

29 (SEM) – Outline in equatorial view with reticulate ornamentation of mesocolpium.

30 (SEM) – Ectoaperture membrane.

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MORFOLOGIA ZIAREN PYŁKU KRAJOWYCH GATUKÓW Z RODZINY CAPRIFOLIACEAE. CZĘŚĆ 1.

STRESZCZENIE

W pracy przedstawiono wyniki badań nad morfologią ziarn pyłku 5 krajowych gatunków z rodzajów *Sambucus* i *Viburnum* (rodzina *Caprifoliaceae*). Obserwacje przeprowadzono w oparciu o różne typy mikroskopów świetlnych oraz skaningowych. Opisy morfologiczne ziarn poszczególnych gatunków zostały zilustrowane seriami zdjęć spod obydwu rodzajów mikroskopów. Ziarna pyłku badanych gatunków są małej lub średniej wielkości, o wydłużonej osi biegunowej, z siatkową skulpturą powierzchni (przynajmniej w obszarach międzybrzdowych) oraz ze stosunkowo długimi ektoaperturami, ponad którymi często zaznaczają się mostki równikowe. Stopień zrośnięcia się główek kolumnienek w ściankach siatki pozwala na wyróżnienie w obrębie analizowanych taksonów dwóch grup ziaren. Jedną tworzą tutaj badane gatunki z rodzaju *Sambucus* oraz *V. opulus*, drugą – *V. lantana*.

SŁOWA KLUCZOWE: *Caprifoliaceae*, *Sambucus*, *Viburnum*, morfologia, ziarna pyłku, SEM, LM.