

## CONTRIBUTION TO THE KNOWLEDGE OF THE GENUS *CALOPLACA* IN CENTRAL EUROPEAN RUSSIA

EUGENIA MUCHNIK, KARINA WILK<sup>1</sup>, JAN VONDRÁK & IVAN FROLOV

**Abstract.** The paper provides data on 21 *Caloplaca* Th. Fr. species from central European Russia. Two species are new for Russia: *C. atroflava* (Turner) Mong. *s.l.* and *C. soralifera* Vondrák & Hrouzek. A further seven are new for European Russia [*C. flavocitrina* (Nyl.) H. Olivier, *C. inconnexa* (Nyl.) Zahlbr., *C. marmorata* (Bagl.) Jatta, *C. oasis* (A. Massal.) Szatala] or central European Russia [*C. dichroa* Arup, *C. interfulgens* (Nyl.) J. Steiner, *C. monacensis* (Leder.) Lettau]. Short taxonomic notes together with information on habitat and distribution are provided for the newly recorded species. An additional twelve *Caloplaca* species recognized in the area are also briefly presented.

**Key words:** biodiversity, distribution, lichenized Ascomycota, new records, steppe zone, Teloschistaceae

Eugenia Muchnik, Institute of Forest Research, Russian Academy of Science, Odyntsovsky distr., v. Uspenskoe, Moscow region, 143030, Russia; e-mail: eugenia@lichenfield.com

Karina Wilk, Laboratory of Lichenology, W. Szafer Institute of Botany, Polish Academy of Sciences, Lubicz 46, 31-512 Kraków, Poland; e-mail: k.wilk@botany.pl

Jan Vondrák, Institute of Botany, Academy of Sciences of the Czech Republic, Zámek 1, 252 43 Průhonice; Department of Botany, Faculty of Biological Sciences, University of South Bohemia, Branišovská 31, 370 05, České Budějovice, Czech Republic; and Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýčká 1176, Praha 6, Suchbátka, Czech Republic; e-mail: j.vondrak@seznam.cz

Ivan Frolov, Faculty of Biology, Ural Federal University, Mira 19, Ekaterinburg, 620002, Russia; Faculty of Science, University of South Bohemia, Branišovská 31, CZ-37005, České Budějovice, Czech Republic; e-mail: ivfrolov@gmail.com

### INTRODUCTION

According to the lichen checklist of Russia, 136 species of the genus *Caloplaca* Th. Fr. are known from the country (Urbanavichus & Andreev 2010). During the last four years at least 15, including some newly described species, have been added to the list (Vondrák 2010; Urbanavichus *et al.* 2011; Urbanavichus & Urbanavichene 2012; Kondratyuk *et al.* 2013, 2014; Urbanavichus & Ismailov 2013; Vondrák *et al.* 2013). In central European Russia the genus *Caloplaca* is represented by 34 species (Urbanavichus & Andreev 2010; Muchnik & Śliwa 2013). This area is very diverse, with steppe, forest-steppe and various forest formations (e.g., broadleaved, coniferous-broadleaved and taiga forests). Among the vegetation zones, rocky steppe is the most important for *Caloplaca*

species. Steppes, widespread throughout the Lipetsk, Orel, Ryazan and Voronezh regions, are characterized by limestone or sandstone (base-rich siliceous) outcrops. Such sun-exposed and calcareous habitats are hotspots of *Caloplaca* diversity. Despite the natural uniqueness of the area, the lichen biota is insufficiently known, with little recent data on lichen biodiversity (e.g., Gudovicheva 2011; Muchnik & Śliwa 2011, 2013; Muchnik & Konoreva 2012a, b).

This paper presents data on 21 mostly calciphilous *Caloplaca* species. Two species are reported as new for the country: *C. atroflava* (Turner) Mong. *s.l.* and *C. soralifera* Vondrák & Hrouzek. A further seven are recorded as new for European Russia [*C. flavocitrina* (Nyl.) H. Olivier, *C. inconnexa* (Nyl.) Zahlbr., *C. marmorata* (Bagl.) Jatta, *C. oasis* (A. Massal.) Szatala] or central European

<sup>1</sup> Corresponding author

Russia [*C. dichroa* Arup, *C. interfulgens* (Nyl.) J. Steiner, *C. monacensis* (Leder.) Lettau]. Brief taxonomic comments, habitat preferences and distribution data are given for the newly recorded species, and 12 rare or otherwise interesting *Caloplaca* species are briefly presented.

## MATERIAL AND METHODS

The material was collected mostly by the first author in the Lipetsk, Orel, Ryazan and Voronezh regions of central European Russia between 1989 and 2013. The lichens are from steppe and taiga natural zones, mainly from calcareous rocky substrates. The study area was described in detail in Muchnik and Śliwa (2011, 2013) and Muchnik and Konoreva (2012a).

Lichens were identified by routine microscopic and laboratory techniques and by comparison with reference materials studied at KRAM and KPABG.

**NOMENCLATURE.** According to the most recent classification of Teloschistaceae by Arup *et al.* (2013), the recognized species belong to the following genera: *Athallia* Arup, Frödén & Söchting [*C. holocarpa* (Hoffm.) A. E. Wade], *Calogaya* Arup, Frödén & Söchting [*C. lobulata* (Flörke) Hellb., *C. pusilla* (A. Massal.) Zahlbr.], *Caloplaca* Th. Fr. [*C. monacensis* (Leder.) Lettau, *C. stillicidiorum* (Vahl.) Lyngé], *Flavoplaca* Arup, Söchting & Frödén [*C. dichroa* Arup, *C. flavocitrina* (Nyl.) H. Olivier, *C. oasis* (A. Massal.) Szatala, *C. polycarpa* (A. Massal.) Zahlbr.], *Leproplaca* (Nyl.) Hue [*C. chrysodeta* (Vain. ex Räsänen) Domb., *C. cirrochroa* (Ach.) Th. Fr.], *Pyrenodesmia* A. Massal. *s.l.* [*C. atroflava* (Turner) Mong. *s.l.*, *C. soralifera* Vondrák & Hrouzek], *Variospora* Arup, Frödén & Söchting [*C. velana* (A. Massal.) Du Rietz] and *Xanthocarpia* A. Massal. & D. Not. [*C. crenulatella* (Nyl.) H. Olivier, *C. interfulgens* (Nyl.) J. Steiner, *C. marmorata* (Bagl.) Jatta]. For some of the discussed species, however, there are no appropriate new combinations provided, so the traditional names for all of species were followed in this paper.

Cited specimens are available at KRAM, KPABG, LE, OHHI, RSU, VOR and VU.

## SPECIES NEW FOR RUSSIA OR ITS REGIONS

### *Caloplaca atroflava* (Turner) Mong. *s.l.*

This species belongs to the problematic *C. xerica* group (*sensu* Vondrák *et al.* 2012) and its taxonomy is not fully clarified. The studied speci-

mens represent the blastidiate variant of the taxon, which is more widely distributed than the non-sorediate morphotypes. The area of distribution of the blastidiate morphotype includes Europe as well as Central Asia and North America (Vondrák, unpublished). New for Russia.

**SPECIMENS EXAMINED:** RUSSIA. VORONEZH REGION. Bogucharsky district, near Monastyrshina village, 49°49.90'N, 40°55.25'E, alt. 119 m, on sandstone outcrops on steppe slope, 16 June 1994, *E. Muchnik s.n.* (VOR); Semiluksky district, near Gubaryovo village, Chernyshova Gora Nature Monument, 51°46.050'N, 39°02.033'E, alt. 147 m, on sandstone outcrops on steppe slope, 20 July 1989, *E. Muchnik s.n.* (LE).

### *Caloplaca dichroa* Arup

The species belongs to the *C. citrina* group (Arup 2006) and previously was often mistaken for *C. coronata*. It differs by having tinier, blastidiate vegetative diaspores and the occasional presence of sandglass-type spores. *Caloplaca coronata* was also recognized in the area.

Widespread throughout Europe (Arup 2006; Vondrák *et al.* 2009) and previously reported in Russia from the Sea of Azov coast (Vondrák *et al.* 2009) and the Leningrad region (Vondrák *et al.* 2010). A new record for central European Russia.

**SPECIMENS EXAMINED:** RUSSIA. LIPETSK REGION. Eletsy district, Eletsy Landscape Reserve, Derno-vskiy Kichy site, 52°34.552'N, 38°21.203'E, alt. 186 m, on limestone rock, 5 July 2012, *E. Muchnik s.n.* (VU); Zadonsky district, Galichya Gora State Reserve, 52°39.338'N, 38°59.410'E, alt. 147 m, on limestone rock, 30 June 2012, *E. Muchnik s.n.* (LE).

### *Caloplaca flavocitrina* (Nyl.) H. Olivier

This is one of the ecologically broadest species within the *C. citrina* group. It is common on base-rich rocks, concrete and dust-impregnated bark. Records of *C. citrina* (Hoffm.) Th. Fr. from the region (Muchnik 2005, 2013; Gudovicheva 2011; Notov *et al.* 2011; Muchnik & Konoreva 2012a) may refer to this taxon.

*Caloplaca flavocitrina* is known throughout Europe (Arup 2006; Vondrák *et al.* 2009). In Russia it was previously reported from the Black

Sea coast (Vondrák *et al.* 2009). A new record for European Russia.

**SPECIMENS EXAMINED:** RUSSIA. RYAZAN REGION. Kasimovskiy district, Scherbatovskie izvestnyaki Nature Monument, 54°48.298'N, 41°44.193'E, alt. 120 m, on limestone rock, 9 July 2009, *E. Muchnik s.n.* (RSU); Eletskiy district, Eletskiy Landscape Reserve, Dernovskiy Kichy site, 52°34.552'N, 38°21.203'E, alt. 186 m, on limestone rock, 5 July 2012, *E. Muchnik s.n.* (LE).

### *Caloplaca inconnexa* (Nyl.) Zahlbr.

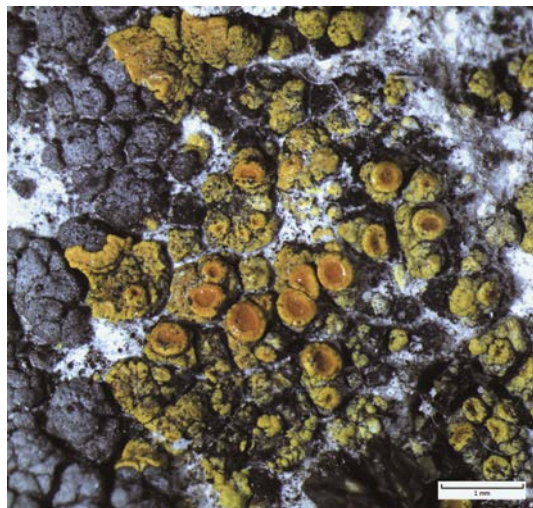
Usually parasitic on the thallus of *Acarospora cervina* (Ach.) A. Massal., it occurs on calcareous rocks in Central and Mediterranean Europe (Vondrák & Wirth 2013; Vondrák *et al.* 2007). In Russia it was previously reported from the Caucasus (Urbanavichus & Andreev 2010). A new record for European Russia.

**SPECIMENS EXAMINED:** RUSSIA. LIPETSK REGION. Krasninsky district, Nizovie Korytina sukhodola Nature Monument, on limestone outcrop on steppe slope, 23 July 1994, *E. Muchnik s.n.* (VOR); Lebedyansky district, Nizovaya balky Pavelka Nature Monument, 52°53.556'N, 39°06.699'E, alt. 147 m, on limestone outcrop on steppe slope, 3 July 2012, *E. Muchnik s.n.* (LE). OREL REGION. Novosilsky district, near Vyazhy village, on bank of Zusha River, 53°01.064'N, 36°55.312'E, alt. 187 m, on limestone outcrop on steppe slope, 6 June 2013, *E. Muchnik s.n.* (OHHI).

### *Caloplaca interfulgens* (Nyl.) J. Steiner

This species traditionally belongs to the *C. lactea* group (Navarro-Rosinés & Hladun 1996). It differs from other species within the group occurring in the area (*C. crenulatella*, *C. lacteoides*, *C. marmorata*) by having a yellow, well-developed thallus (Fig. 1). *Caloplaca interfulgens* superficially resembles some Teloschistaceae crusts within the genus *Variospora*. It was recently studied in detail by Vondrák *et al.* (2013).

*Caloplaca interfulgens* is known from desert or steppe in the Mediterranean region and Asia (Iran, Turkey, Kazakhstan), and some Central European localities (Navarro-Rosinés & Hladun 1996; Vondrák *et al.* 2011). In Russia the species was reported from the Orenburg region (Vondrák *et al.* 2013) but it seems to be common on calcareous



**Fig. 1.** *Caloplaca interfulgens* (Nyl.) J. Steiner. Scale bar = 1 mm.

rocks on the steppes of European Russia. A new record for central European Russia.

**SPECIMENS EXAMINED:** RUSSIA. LIPETSK REGION. Eletskiy district: Eletskiy Landscape Reserve, Dernovskiy Kichy site, 52°34.552'N, 38°21.203'E, alt. 186 m, on limestone rock, 5 July 2012, *E. Muchnik s.n.* (VU), Pazhen Nature Monument, 52°36.00'N, 38°26.012'E, alt. 179 m, 2 May 2002, *E. Muchnik s.n.* (VOR); Lebedyansky district, Nizovaya Krasivoy Mechy Nature Monument, Kurapovskiy skaly site, 52°57.530'N, 39°01.829'E, alt. 144 m., on limestone rock, 1 July 2012, *E. Muchnik s.n.* (VU); Zadonsky district, Galichya Gora State Reserve, Galichya Gora site, 52°39.338'N, 38°59.410'E, alt. 147 m, on limestone rock, 30 June 2012, *E. Muchnik s.n.* (VU).

### *Caloplaca marmorata* (Bagl.) Jatta

Characterized by its endolithic thallus, red apothecia and thin spore septa. For comparison with other similar species see Navarro-Rosinés and Hladun (1996) and Wilk (2012). *Caloplaca marmorata*, a calcareous species, is reported mostly from limestone and dolomite in warm regions.

Widespread throughout Europe, the Near East and North Africa (Navarro-Rosinés & Hladun 1996; Vondrák *et al.* 2007, 2011), and also reported from North America (Wetmore 2007). In Russia it was previously reported from southern

Siberia (Makryi 2008) and the northeast Caucasus (Urbanavichus & Ismailov 2013). New for European Russia.

**SPECIMENS EXAMINED:** RUSSIA. LIPETSK REGION. Lebedyansky district, Nizovya Krasivoy Mechy Nature Monument, Kurapovskiye skaly site, 52°57.530'N, 39°01.829'E, alt. 144 m, on limestone rock, 1 July 2012, *E. Muchnik s.n.* (LE). RYAZAN REGION. Shilovsky district, near Lubonos village, on high bank of Lubonos River, 54°33.149'N, 41°21.901'E, alt. 136 m, on limestone on stony steppe slope, 14 July 2011, *E. Muchnik s.n.* (RSU).

### *Caloplaca monacensis* (Leder.) Lettau

An epiphytic species belonging to the *C. cerina* group (*sensu* Šoun *et al.* 2011) and *Caloplaca s.str.* (*sensu* Arup *et al.* 2013). It differs from other species within the group by its distinctly granular thallus without vegetative propagules. It might be confused with *C. cerina s.l.* (thallus smooth, without granules) and *C. chlorina* (thallus with soralia and blastidia; mostly saxicolous).

Widespread throughout Europe, occurring on solitary trees and in open deciduous or mixed forests (Šoun *et al.* 2011). In Russia it was previously reported from the European part of the Orenburg region (Šoun *et al.* 2011). New for central European Russia.

**SPECIMENS EXAMINED:** RUSSIA. BELGOROD REGION. Alexeevsky district, near Menyailovo village, broad-leaved forest, on bark of *Malus sylvestris*, 2 Aug. 2005, *L.A. Konoreva s.n.* (KPABG 4097, KPABG 3968, sub *C. cerina*). LIPETSK REGION. Khlevensky district, 'Old Park of Sinyavin's barton' Nature Monument, 52°08.377'N, 39°09.466'E, alt. 168 m, on old ash tree, 11 July 2013, *E. Muchnik s.n.* (LE). REPUBLIC OF TATARSTAN. Lashievsky district, Volzhsko-Kamsky State Reserve, Saralavsky site, 54 quart., birch forest with aspen and lime tree, on bark of aspen, 29 Sept. 2002, *G.P. Urbanavichus s.n.* (KPABG 1294, sub *C. chlorina*).

### *Caloplaca oasis* (A. Massal.) Szatala

A normally parasitic lichen growing on the endolithic thalli of *Verrucaria s.l.* but also known as free-living. For comparison with the similar taxa *C. holocarpa* and *C. polycarpa* see Arup (2009). The latter two species were also recognized in the area (see below).

Widespread throughout Europe (Arup 2009) and the Near East (e.g., Temina & Brodo 2013). In Russia it was previously reported from northern Ural (Urbanavichus & Urbanavichene 2010). New for European Russia.

**SPECIMENS EXAMINED:** RUSSIA. LIPETSK REGION. Eletsy district, bank of Yasenok River, near Baranovo village, 52°32.724'N, 38°05.455'E, alt. 181 m, on limestone rock in broadleaved forest, 21 July 1994, *E. Muchnik s.n.* (VOR). Krasninsky district, Sokolskaya gora Nature Monument, above bank of Don River, 52°47.868'N, 38°58.134'E, alt. 150 m, on limestone rock on steppe slope, 27 June 2012, *E. Muchnik s.n.* (LE). Lebedyansky district, Nizovya Krasivoy Mechy Nature Monument, Kurapovskiye skaly site, 52°57.530'N, 39°01.829'E, alt. 144 m, on limestone rock, 1 July 2012, *E. Muchnik s.n.* (LE).

### *Caloplaca soralifera* Vondrák & Hrouzek

It belongs to the sorediate *Caloplaca* representatives lacking anthraquinones in the thallus (Vondrák & Hrouzek 2006). For comparison with other similar taxa see literature cited in this paragraph. A calcareous species occurring mostly on artificial substrates, less often on calcareous rocks, usually at sun-exposed sites (Vondrák & Hrouzek 2006).

It seems to be a rather common but undercollected species in Europe. Also reported from North America (Wetmore 2009). For distribution data see Vondrák & Hrouzek (2006), Arup (2011), and Wilk and Śliwa (2012). New for Russia.

**SPECIMENS EXAMINED:** RUSSIA. LIPETSK REGION. Terbunsky district: Romanov les Nature Monument, on bank of River Olym, 52°09.571'N, 38°04.894'E, alt. 158 m, on limestone outcrop at shaded site, 20 July 1994, *E. Muchnik s.n.* (LE), Apukhtinskiye peschaniki Nature Monument, 52°09.925'N, 38°06.760'E, alt. 200 m, on sandstone, 4 July 2012, *E. Muchnik s.n.* (LE).

### FURTHER RARE OR INTERESTING *CALOPLACA* SPECIES RECOGNIZED FROM THE AREA

#### *Caloplaca* aff. *atroalba* (Tuck.) Zahlbr.

This easily overlooked species is characterized by having dark brown apothecia, a creamy or brownish grey thallus and very thin spore septa. Morphologically and anatomically it is very similar

to the North American species *C. atroalba* but recent molecular studies indicate that the European specimens are separate from the North American *C. atroalba* and belong to undescribed taxa. The taxonomy and phylogeny of the group will be published separately (Vondrák *et al.*, in prep.). The European records of the taxon recently published from Poland and Ukraine (Wilk 2011, 2012) are conspecific with the examined material.

The only record for Russia was noted by Muchnik and Konoreva (2012b) but with no locality data provided.

**SPECIMEN EXAMINED:** RUSSIA. RYAZAN REGION. Miloslavsky district, valley of Kochurovka River, near Voyeykovo village, Kochurovskiy skaly Nature Monument, 53°25.923'N, 39°10.738'E, alt. 152 m, on limestone rock, 28 May 2009, *E. Muchnik s.n.* (RSU).

### *Caloplaca chrysodeta* (Vain. ex Räsänen) Dombr.

A rare species in central European Russia, previously reported elsewhere from the Galichya Gora State Reserve: Pluschan (Muchnik & Śliwa 2013), Tver region (Notov *et al.* 2011) and the Republic of Tatarstan (Evstigneeva 2007).

**SPECIMEN EXAMINED:** RUSSIA. LIPETSK REGION. Zadonsky district, Galichya Gora State Reserve: Galichya Gora site, 52°39.338'N, 38°59.410'E, alt. 147 m, on limestone, 30 June 2012, *E. Muchnik s.n.* (VU).

### *Caloplaca cirrochroa* (Ach.) Th. Fr.

This is the second record of the species for central European Russia. Previously it was reported from the Tver region (Notov *et al.* 2011).

**SPECIMEN EXAMINED:** RUSSIA. LIPETSK REGION. Zadonsky district, Galichya Gora State Reserve: Galichya Gora area, 52°39.338'N, 38°59.410'E, alt. 147 m, on limestone, 30 June 2012, *E. Muchnik s.n.* (VU).

### *Caloplaca crenulatella* (Nyl.) H. Olivier

The taxon is accepted here in the broad sense (*s.l.*) according to Vondrák *et al.* (2011). Phenotypically variable and probably comprising several species.

**SPECIMENS EXAMINED:** RUSSIA. LIPETSK REGION. Eletsy district, Pazhen Nature Monument, stony steppe

slope, on limestone, 2 May 2002, *E. Muchnik s.n.* (VU); Zadonsky district: near Donskoye village, Galychya Gora State Reserve, Galychya Gora area, on limestone, 16 Aug. 1961, *V.V. Matyushenko s.n.* (VU), near Lipovka village, stony steppe slope, on limestone, 11 July 2005, *L.N. Skolzneva s.n.* (VU). RYAZAN REGION. Mikhailovsky district, 0.5 km east of 'Zavidovsky dolinny complex' Nature Monument, 54°14.361'N, 38°47.054'E, stony steppe slope, on limestone, 27 May 2011, *E. Muchnik & L.A. Konoreva s.n.* (RSU); Putyatinsky district, Knyagina village, 54°08.775'N, 40°45.171'E, 139 m, on concrete, 30 May 2010, *E. Muchnik & L.A. Konoreva s.n.* (RSU); Shilovsky district, near Lubonos village, 54°33.149'N, 41°21.901'E, alt. 136 m, high bank of Lubonos River, stony steppe slope, on limestone, 14 July 2011, *E. Muchnik s.n.* (RSU).

### *Caloplaca holocarpa* (Hoffm.) A. E. Wade

Abundant throughout the area and known from many regions of central European Russia. Arup (2009) clarified the identity of *C. holocarpa s.str.* and separated it from the similar *C. oasis* and *C. pyracea*. Perhaps a common species in the region but only one specimen is confirmed so far.

**SPECIMEN EXAMINED:** RUSSIA. LIPETSK REGION. Krasninsky district, Galichya Gora State Reserve, Bykova Sheya area, 52°55.942'N, 39°03.938'E, alt. 137 m, on sandstone, 29 June 2012, *E. Muchnik s.n.* (VU).

### *Caloplaca lacteoides* Nav.-Ros. & Hladun

The species produces the biggest spores within the traditional *C. lactea* group. Further diagnostic features observed in the examined material are round cells in the parathecium, a huge capitate and simple paraphyses (Navarro-Rosinés & Hladun 1996).

Known from Spain, France, Israel, Syria and Turkey (Navarro-Rosinés & Hladun 1996). The only record for Russia was noted by Muchnik and Konoreva (2012b) but with no locality data provided.

**SPECIMENS EXAMINED:** RUSSIA. RYAZAN REGION. Kasimovsky district, right bank of River Oka near Scherbatovka village, Scherbatovskie izvestnyaki Nature Monument, 54°48.298'N, 41°44.193'E, alt. 120 m, on limestone, 2008, *L.F. Volosnova s.n.* (RSU, KRAM).

***Caloplaca lobulata*** (Flörke) Hellb.

Two records of *C. lobulata* from the Voronezh region were confirmed in the present study. Elsewhere it has been reported from many continental regions of Eurasia.

**SPECIMENS EXAMINED:** RUSSIA. RYAZAN REGION. Sasovsky district, near Temgenevo village, Temgenevskiye izvestnyaki Nature Monument, 54°24.045'N, 41°54.611'E, alt. 111 m, stony steppe slope, on dry branches of aspen, 2 June 2010, *E. Muchnik s.n.* (RSU). VORONEZH REGION. Khokholsky district, near Kostyonky village, Kostyonky-Borschovo Reserve Plot, on wood, 12 May 2003, *I.Y. Bogdanova s.n.* (VOR).

***Caloplaca polycarpa*** (A. Massal.) Zahlbr.

A little-known species found in central European Russia, though probably not very rare. Previously reported from the Ryazan region by Muchnik and Śliwa (2013).

**SPECIMENS EXAMINED:** RUSSIA. LIPETSK REGION. Eletsy district, Pazhen Nature Monument, stony steppe slope, on limestone, 2 May 2002, *E. Muchnik s.n.* (VU); Lebedyansky district, Nizovya Krasivoy Mechy Nature Monument, Kurapovskiy skaly site, 52°57.530'N, 39°01.829'E, alt. 144 m, on limestone rock, 1 July 2012, *E. Muchnik s.n.* (VU); Zadonsky district: Nizovya reki Chichyora Nature Monument, 52°33.019'N, 38°50.856'E, alt. 145 m, on limestone, 1 July 2012, *E. Muchnik s.n.* (VU), Galichya Gora State Reserve, Galichya Gora area, 52°39.338'N, 38°59.410'E, alt. 147 m, on limestone, 30 June 2012, *E. Muchnik s.n.* (VU).

***Caloplaca pusilla*** (A. Massal.) Zahlbr.

For many years the species was treated as a synonym of *C. saxicola* until a study by Gaya (2009). *Caloplaca pusilla* differs from *C. saxicola* by having distinct, long lobes, a salmon-colored thallus, dispersed apothecia not forming aggregates, and different spores.

**SPECIMENS EXAMINED:** RUSSIA. LIPETSK REGION. Zadonsky district: Galichya Gora State Reserve: Galichya Gora area, 52°39.338'N, 38°59.410'E, alt. 147 m, on limestone, 30 June 2012, *E. Muchnik s.n.* (VU), Kopchyonyi Kamen site, 52°34.099'N, 38°23.105'E, alt. 140 m, on limestone rock, 2 May 2002, *E. Muchnik s.n.* (VOR). RYAZAN REGION. Kasimovsky district, Gus-Zhelezny settlement, 55°03.410'N, 41°09.770'E, alt.

124 m, on limestone steps of church, 12 July 2009, *E. Muchnik s.n.* (RSU, KRAM).

***Caloplaca raesaenenii*** Breck.

Rare in central European Russia, previously found by L. A. Konoreva in the Belgorod region (specimen in KPABG) but not yet published.

**SPECIMENS EXAMINED:** RUSSIA. KURSK REGION. Gorsechensky district, Centralno-Chernozomyomny State Reserve, Barkalovka area, 51°33.083'N, 37°39.110'E, alt. 170 m, on mosses and plant debris on carbonate soil, 2 Aug. 1992, *N. Popova s.n.* (VOR). LIPETSK REGION. Krasninsky district, Sokolskaya gora Nature Monument, above bank of Don River, 52°47.868'N, 38°58.134'E, alt. 150 m, steppe slope, 27 June 2012, *E. Muchnik s.n.* (VU). RYAZAN REGION. Sasovsky district, near Temgenevo village, Temgenevskiye izvestnyaki Nature Monument, 54°24.045'N, 41°54.611'E, alt. 111 m, stony steppe slope, on carbonate soil, 2 June 2010, *E. Muchnik s.n.* (RSU).

***Caloplaca stillicidiorum*** (Vahl) Lyng

Rather scattered throughout the area, especially occurring in central European Russia. Previously treated as a synonym of *C. cerina*, but Šoun *et al.* (2011) recognized it as distinct species.

**SPECIMEN EXAMINED:** RUSSIA. RYAZAN REGION. Sasovsky district, near Temgenevo village, Temgenevskiye izvestnyaki Nature Monument, 54°24.045'N, 41°54.611'E, alt. 111 m, stony steppe slope, on carbonate soil, 2 June 2010, *E. Muchnik s.n.* (RSU).

***Caloplaca velana*** (A. Massal.) Du Rietz

The taxon is rarely reported from central European Russia; it is known from the Tula (Gudovicheva 2011) and Tver regions (Notov *et al.* 2011). However, as its taxonomy is not yet clarified, the taxon is treated here in its broad sense (*s.l.*).

**SPECIMEN EXAMINED:** RUSSIA. LIPETSK REGION. Eletsy district, Galichya Gora State Reserve, area Vorigolskiye scaly, Kopchyonyi Kamen plot, on limestone, 2 May 2002, *E. Muchnik s.n.* (VU).

**ACKNOWLEDGMENTS.** We thank Lyudmila Konoreva (St. Petersburg) for assistance in collecting lichens, Williams O. Purvis (London) for pre-submission line-editing, and the anonymous reviewer and Lucyna Śliwa

(Kraków) for critical comments on the manuscript. This work was supported by the Russian Academy of Science Fundamental Research Program entitled 'Wildlife: Current Status and Problems of Development', by grant NSh-1858.2014.4 from the President of the Russian Federation for state support of leading Russian science schools, by the Russian Foundation for Fundamental Research (RFFR 14-04-31024) and by the Grant Agency of the Faculty of Environmental Sciences, CULS, Prague, 42900/1312/3114. Financial support to KW was provided by the National Sciences Centre (NCN, grant no. N N303 821740).

## REFERENCES

- ARUP U. 2006. A new taxonomy of the *Caloplaca citrina* group in the Nordic countries, except Iceland. *Lichenologist* **38**(1): 1–20.
- ARUP U. 2009. The *Caloplaca holocarpa* group in the Nordic countries, except Iceland. *Lichenologist* **41**(2): 111–130.
- ARUP U. 2011. Contributions to the knowledge of *Caloplaca* in the Nordic countries. *Graphis Scripta* **23**(1): 10–20.
- ARUP U., SÖCHTING U. & FRÖDÉN P. 2013. A new taxonomy of the family Teloschistaceae. *Nordic J. Bot.* **31**: 16–83.
- EVSTIGNEEVA A. S. 2007. Check-list of lichens of the Republic of Tatarstan. *Novosti Sist. Nizsh. Rast.* **41**: 196–229 (in Russian).
- GAYA E. 2009. Taxonomical Revision of the *Caloplaca saxicola* Group (Teloschistaceae, Lichen-forming Ascomycota). *Biblioth. Lichenol.* **101**: 1–191.
- GUDOVICHEVA A. V. 2011. Lichens of the forest-steppe part of the Tula region. In: *Problems of study and restoration of landscapes forest-steppe zone*. **2**: 59–77. State Military-Historical and Natural Museum-Reserve "Kulikovo Field", Tula (in Russian).
- KONDRATYUK S. Y., LOKÖS L., ZAREI-DARKI B., HAJI MONIRI M., TCHABANENKO S., GALANINA I., YAKOVCHENKO L., HOOSHMAND F., EZHKIN A. & HUR J. 2013. Five new *Caloplaca* species (Teloschistaceae, Ascomycota) from Asia. *Acta Bot. Hung.* **55**(1–2): 41–60.
- KONDRATYUK S., LOKÖS L., TCHABANENKO S., SKIRINA I., GALANINA I., OH S.-O. & HUR J.-S. 2014. *Caloplaca kedrovopadensis* sp. nova and some new lichens from the Primorsky Region, Russia. *Acta Bot. Hung.* **56**(1–2): 125–140.
- MAKRYI T. V. 2008. Lichens. In: T. A. SAFONOVA & V. V. RYABTSEV (eds), *Cryptogamic plants of the Pribaikalsky National Park*, pp. 113–259. Academic Publishing House "Geo", Novosibirsk.
- MUCHNIK E. E. 2005. Lichens of stony substrates in the Central Chernozem region. *Novosti Sist. Nizsh. Rast.* **38**: 251–260 (in Russian).
- MUCHNIK E. E. 2013. Lichens of "Orlovskoye Polesie" National Park (Oryol region, Central Russia): an annotated checklist. *Uchyonye Zapiski Orlovskogo Universiteta, Seria Estestvennye Nauki* **6**(56): 125–132 (in Russian).
- MUCHNIK E. E. & KONOREVA L. A. 2012a. Additions to the lichen flora of Ryazan region (Central Russia). *Novosti Sist. Nizsh. Rast.* **46**: 174–189 (in Russian).
- MUCHNIK E. E. & KONOREVA L. A. 2012b. The lichen biota of protected territories in Ryazan region (Central Russia). In: L. LIPNICKI (ed), *Lichen protection – Protected lichen species*, pp. 213–220. Sonar Literacki, Gorzów Wlkp.
- MUCHNIK E. & ŚLIWA L. 2011. New records of *Lecanora percrenata*, with notes on other members of *L. dispersa* group in Ryazan region (Russia). *Polish Bot. J.* **56**(1): 89–93.
- MUCHNIK E. & ŚLIWA L. 2013. New and noteworthy lichen records from Central European Russia. *Herzogia* **26**(1): 117–121.
- NAVARRO-ROSINÉS P. & HLADUN N. L. 1996. Les especies saxícola-calcícolas del grupo de *Caloplaca lactea* (Teloschistaceae, líquenes), en las regiones mediterránea y medioeuropea. *Bull. Soc. Linn Provence* **47**: 139–166.
- NOTOV A. A., GIMELBRANT D. E. & URBANAVICHUS G. P. 2011. *The list of lichens and allied fungi of Tver Region*. Tver State University, Tver (in Russian).
- ŠOUN J., VONDRÁK J., SÖCHTING U., HROUZEK P., KHODOSOVITSEV A. & ARUP U. 2011. Taxonomy and phylogeny of the *Caloplaca cerina* group in Europe. *Lichenologist* **43**(2): 113–135.
- TEMINA M. & BRODO I. M. 2013. New records of lichens from Mount Carmel National Park and Atlit Beach (Israel). *Herzogia* **26**(1): 91–102.
- URBANAVICHUS G. P. & ANDREEV M. P. 2010. *A checklist of the lichen flora of Russia*. Nauka, St. Petersburg (in Russian).
- URBANAVICHUS G. P. & ISMAILOV A. 2013. The lichen flora of Gunib plateau, inner-mountain Dagestan (North-East Caucasus, Russia). *Turkish Journal of Botany* **37**: 753–768.
- URBANAVICHUS G. P. & URBANAVICHENE I. N. 2010. Lichens flora. In: *Flora and vegetation of the National Park "Bashkiria"*. AN RB, Gilem, Ufa.
- URBANAVICHUS G. P. & URBANAVICHENE I. N. 2012. Addition to the lichen flora of Russia. I. The species of the genus *Caloplaca* (Teloschistaceae) from the Northwestern Caucasus. *Novosti Sist. Nizsh. Rast.* **46**: 222–226.
- URBANAVICHUS G., GABIBOVA A. & ISMAILOV A. 2011. New records of lichens and lichenicolous fungi for Russia and the Caucasus. *Turkish Journal of Botany* **35**(3): 291–297.
- VONDRÁK J. 2010. Selected exsiccates of *Caloplaca*, Fasc. 2 (Nos 26–50). *Fritschiana* **67**: 1–10.
- VONDRÁK J. & HROUZEK P. 2006. *Caloplaca soralifera*, a new species from Europe. *Graphis Scripta* **18**(1): 6–15.

- VONDRÁK J. & WIRTH V. 2013. *Caloplaca*. In: V. WIRTH, M. HAUCK & M. SCHULTZ (eds), *Die Flechten Deutschlands*, pp. 262–317. Ulmer, Stuttgart.
- VONDRÁK J., KOCOURKOVÁ J., PALICE Z. & LIŠKA J. 2007. New and noteworthy lichens in the Czech Republic – genus *Caloplaca*. *Preslia* **79**: 163–184.
- VONDRÁK J., ŘÍHA P., ARUP U. & SÖCHTING U. 2009. The taxonomy of the *Caloplaca citrina* group (Teloschistaceae) in the Black Sea region; with contributions to the cryptic species concept in lichenology. *Lichenologist* **41**(6): 571–604.
- VONDRÁK J., REDCHENKO O., HIMELBRANT D., STEPANCHIKOVA I. & KUZNETSOVA E. 2010. Some sterile *Caloplaca* crusts identified by molecular data from the Leningrad region (Russia). *Folia Cryptog. Estonica* **47**: 97–99.
- VONDRÁK J., ŘÍHA P., REDCHENKO O., VONDRÁKOVÁ O., HROUZEK P. & KHODOSOVTSSEV A. 2011. The *Caloplaca crenulatella* species complex; its intricate taxonomy and description of a new species. *Lichenologist* **43**: 467–481.
- VONDRÁK J., ŠOUN J., VONDRÁKOVÁ O., FRYDAY A. M., KHODOSOVTSSEV A. & DAVYDOV E. 2012. Absence of anthraquinone pigments is paraphyletic and a phylogenetically unreliable character in the Teloschistaceae. *Lichenologist* **44**: 401–418.
- VONDRÁK J., FROLOV I., ŘÍHA P., HROUZEK P., PALICE Z., NADEYNA O., HALICI G., KHODOSOVTSSEV A. & ROUX C. 2013. New crustose Teloschistaceae in Central Europe. *Lichenologist* **45**(6): 701–722.
- WETMORE C. M. 2007. *Caloplaca*. In: T. H. III NASH, C. GRIES & F. BUNGARTZ (eds), *Lichen Flora of the Greater Sonoran Desert Region*. **3**: 179–220. Lichens Unlimited, Arizona State University, Tempe, Arizona.
- WETMORE C. M. 2009. New species of *Caloplaca* (Teloschistaceae) from North America. *Bryologist* **112**(2): 379–386.
- WILK K. 2011. New or noteworthy records of *Caloplaca* (Teloschistaceae) from Poland. *Mycotaxon* **115**: 83–98.
- WILK K. 2012. Calcicolous species of the genus *Caloplaca* in the Polish Western Carpathians. *Polish Bot. Stud.* **29**: 1–91.
- WILK K. & ŚLIWA L. 2012. Note on *Caloplaca soralifera* (Teloschistaceae, lichenized Ascomycetes) in Poland. *Acta Soc. Bot. Poloniae* **81**(1): 61–63.

Received 23 September 2014