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**Аннотированный список молей *Phyllonorycter* Hbn., 1822 (Lepidoptera:
Gracillariidae) Ульяновской области**

**An annotated check-list of the *Phyllonorycter* Hbn., 1822 (Lepidoptera:
Gracillariidae) of the Uljanovsk Region (Middle Volga Area) of Russia**

(Insecta, Lepidoptera)

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Аннотация. В статье описывается группа минирующих молей семейства Gracillariidae рода *Phyllonorycter* Среднего Поволжья. Чешуекрылые имеют важное значение как вредители: гусеницы развиваются на листьях важных в хозяйственном отношении пород древесных растений из розоцветных, буковых, берёзовых и других. Личинки молей заселяют более 20 видов важных в хозяйственном отношении растений, образуя повреждения, занимающие нередко значительную площадь листовой пластинки и вызывающие общее угнетение и раннюю дефолиацию. Весьма остро в

последние годы встаёт проблема проникающих на территорию Поволжья видов минирующих чешуекрылых, ранее здесь не встречавшихся и распространившихся из прилежащих территорий (так называемые инвазивные виды). Не встречая естественных врагов в новых регионах, они очень быстро наращивают популяцию и дают вспышки численности, нанося значительный урон кормовым растениям. Статья публикуется на английском языке в надежде на широкую читательскую аудиторию, включая зарубежных специалистов в данной области.

The article deals with the Gracillariidae of the Uljanovsk Region of Russia situated in the middle course of Volga River. The group is clearly diagnosed in nature and easily reared as larvae from very diagnostic mines. Main aim of the article to give more information (especially of distributional purposes and of hostplants) for our european colleagues.

All material has been collected in 2017-2018 in various localities of the Uljanovsk Region by authors and their colleagues. Most species of the *Phyllonorycter* Hbn., 1822 were reared by the senior author. For determination, the keys of V. Kuznetsov (1981) as well as V. Kuznetsov & S. Baryshnikova (2003) have been used.

Although this is in all probability largest but not almost complete portion of the actual fauna of the region, we publish these records here, since they provide interesting biogeographical data.

Location of research (Uljanovsk Region):

1. Karamzina vill., Uljanovsk distr., 10 km SWS Uljanovsk, mixed forest near by water, 54° 14' N, 48° 19' E [пос. Карамзина, Ульяновский район].

2. Staraja Majna, Staraja Majna distr., 60 km NE Uljanovsk, 54° 37' N, 49° 05' E [р.п. Старая Майна, Старомайнский район].

3. Tsemzavod, Sengilej distr., 20 km S Uljanovsk, mixed forest, 54° 02' N, 48° 21' E [Цемзавод, Сенгилеевский район].

4. Uljanovsk city, park Pobedy, mixed forest, 54° 22' N, 48° 25' E [Ульяновск, парк Победы].

5. Uljanovsk city, Vinnovka park, mixed forest, 54° 16' N, 48° 20' E [Ульяновск, парк Винновская роща].

6. Uljanovsk city, Chernoe ozero, 54° 19' N, 48° 19' E [Ульяновск, Чёрное озеро].

7. Krasny Yar, Cherdaklinskiy distr., 19 km N Uljanovsk, mixed forest, 54° 14' N, 48° 33' E [Красный Яр, Чердаклинский район].

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Abbreviations used:

AM – Andrey V. Mishchenko

EA – Elena A. Artemjeva

An annotated check-list of species

Phyllonorycter apparella H.-Sch.

Material - 5 spec.: Karamzina outskirts, 8.VII.2018, 4 spec. from mines on *Populus tremula* (AM); Krasny Yar, 19.VII.2018 г, 1 spec. from mines on *Populus tremula* (EA) (fig. 1).

Larvae in mines on leaves of *Salix* and *Populus* species.

Phyllonorycter cerasicolella H.-Sch.

Material - 3 spec.: Uljanovsk, Vinnovka, 11.VIII. 2018, 3 spec. from mines on *Cerasus* species (AM).

Larvae in mines on leaves of *Prunus* and *Cerasus* species.

Phyllonorycter comparella Z. (= *cerusella* Hartig)

Material - 1 spec.: Uljanovsk, Vinnovka, 21 VII 2018, 1 spec. from mines on *Populus alba* (AM).

Larvae in mines on leaves of *Populus alba* and *P. nigra*.

Phyllonorycter coryli Nicelli

Material - 3 spec.: Uljanovsk, Vinnovka, 1 VIII 2018, 2 spec. from mines on *Corylus avellana* (AM); Karamzina outskirts, VII 2018, 1 male from mines on *Corylus avellana* (AM).

Larvae in mines on leaves of *Corylus avellana*.

Phyllonorycter corylifoliella Hw.

Material - 1 spec.: Uljanovsk Pobedy Park, 25.VI 2018, 1 male (AV).

Larvae in mines on leaves of the Rosaceae, possible on *Malus* species.

Phyllonorycter emberizaepenella Bouche

Material - 1 spec.: Karamzina outskirts, 20 VII 2018, 1 male from mines on *Lonicera tatarica* (AM).

Larvae in mines on leaves of *Lonicera xylosteum*, *L. tatarica*.

Phyllonorycter harrisella L.

Material - 1 spec.: Uljanovsk, Vinnovka, 1 VII 2018, 1 male from mines on *Quercus robur* (AM).

Larvae in mines on leaves of *Quercus robur*.

Phyllonorycter insignitella Z.

Material - 3 spec.: Uljanovsk, Vinnovka, 15 VII 2018, 3 male from mines on *Trifolium* species.

Larvae in mines on leaves of herbaceous Fabaceae.

Phyllonorycter issikii Kumata

Material - 10 spec.: Uljanovsk, Vinnovka, 20 VIII 2018, 3 males, 7 females from mines on *Tilia cordata* (AM).

This specie is a serious pest of *Tilia cordata*. Up to 20-22 mines can be find on a leaf.

Phyllonorycter kleemannella F.

Material - 4 spec.: Uljanovsk, Vinnovka, 7 VIII 2018, 4 spec. from mines on *Alnus glutinosa* (AM).

Larvae in mines on leaves of *Alnus* species.

Phyllonorycter lantanella Schrank

Material - 2 spec.: Karamzina outskirts, gardens, VII-VIII 2017, a lot of empty mines and 1 larva on *Viburnum lantana* (AM); imago hatches 25 IX 2017 (1 female); Karamzina outskirts, gardens, 2 VIII 2018, 1 male from mines on *Viburnum lantana* (AM).

Very long pronimphal diapause within mine without cocoon has been observed; pupal development within 10 days. Hibernation stage unclear; probably a moth hibernates.

Phyllonorycter medicaginella Grsm.

Material - 12 spec.: Vjazovka, Uljanovsk, park Chernoe ozero, 2 VIII 2003, 12 spec. from mines on *Melilotus* (AM)

Larva in mines on herbaceous Fabaceae.

Phyllonorycter muelleriella Z.

Material - 1 spec.: Uljanovsk, Vinnovka, 7 VIII 2018, 1 male from mines *Quercus robur* (AM).

Larva in mines on leaves of *Quercus* species.

Phyllonorycter nigrescentella Logan

Material - 6 spec.: Tsemzavod, mixed forest, 2 VII 2018, 6 spec. from mines on *Orobus vernum* (AM).

Larva in mines on herbaceous Fabaceae.

Phyllonorycter pastorella Z.

Material - 8 spec.: Uljanovsk, Vinnovka, 3 VIII 2018, 8 spec. from mines on *Salix* species (AM).

Larva in mines on leaves of *Salix* species.

Phyllonorycter pomonella Z.

Material - 4 spec.: Uljanovsk, Vinnovka, 10 VIII 2018, 4 spec. from mines on *Prunus spinosa* (AM).

Larva in mines on leaves of *Prunus spinosa*.

Phyllonorycter populifoliella Tr.

Material - 3 spec.: Uljanovsk, Vinnovka, 1 VIII 2018, 3 spec. from mines on *Populus nigra* (AM).

Larva on *Populus tremula*, *P. nigra* and *P. balsamifera*, those are damages strongly in Leningrad provinces (dozens mines pro leave); in Uljanovsk prov. rather rare and known in sole specimens.

Phyllonorycter pyrifoliella Grsm.

Material - 2 spec.: Uljanovsk, Vinnovka, 4 VIII 2018, 2 males from mines on *Malus* species (AM).

Larva in mines on leaves of *Malus* species.

Phyllonorycter quercifoliella Z.

Material - 2 spec.: Uljanovsk, Vinnovka, 17 VII 2018, 2 spec. from mines on *Quercus robur* (AM).

Larva in mines on leaves of *Quercus* species.

Phyllonorycter rajella L.

Material - 4 spec.: Uljanovsk, Vinnovka, 11 VIII 2018, 1 male from mines on *Alnus glutinosa* (AM); Uljanovsk, Vinnovka, 10 VIII 2018, 2 males and 1 female from mines on *Alnus glutinosa* (AM).

Larva in mines on leaves of *Alnus glutinosa*.

Phyllonorycter roboris L.

Material – 1 spec.: Uljanovsk, Vinnovka, 16 VII 2018, 1 spec. from mines on *Quercus robur* (AM).

Larva in mines on leaves of *Quercus* species.

Phyllonorycter sagitella Bjerkaner

Material - 10 spec.: Uljanovsk, Vinnovka, 1 VIII 2018, 6 spec. from mines on *Populus tremula* (AM); Karamzina outskirts, 13 VII 2018, 4 spec. from mines on *Populus tremula*(AM).

Larva in mines on leaves of *Populus tremula*.

Phyllonorycter salictella Z.

Material - 8 spec.: Uljanovsk, Vinnovka, 3 VIII 2018, 5 spec. from mines on *Salix* species (AM); Karamzina outskirts, 14 VII 2018, 3 spec. from mines on *Populus tremula* (AM).

Larva in mines on leaves of *Salix* species; *Populus tremula* is a new hostplant for this specie.

Phyllonorycter schreberella F.

Material - 7 spec.: Staraja Majna, Staraja Majna distr., 10-14.VII 2018, 7 spec. ex l. (AM).

Reared from the mines collected on *Ulmus pumila*. The species was firstly noted from the Middle Volga Region and the hostplant is also new for the species. It was known before from *Ulmus scabra* and *U. foliacea* (Kuznetzov & Baryshnikova, 1998) or from *Ulmus caprinifolia* in Astrakhan Distr. (Puplesis & al., 1991).

Phyllonorycter sorbi Frey.

Material - 4 spec.: Uljanovsk, Vinnovka, 2 VIII 2018, 4 spec. from mines on *Sorbus aucuparia* (AM).

Larva in leavemines on *Sorbus aucuparia*.

Phyllonorycter sylvella Hw.

Material – 5 spec.: Uljanovsk, Vinnovka, 1 VIII 2018, 5 spec. from mines on *Acer platanoides* (AM).

Larva in mines on leaves of *Acer* species.

Phyllonorycter ulmifoliella Hbn.

Material- 17 spec.: Uljanovsk, Vinnovka, 5 VIII 2018, 4 spec. from mines on *Betula pendula* (AM); Uljanovsk, Vinnovka, 4 VIII 2018, 13 spec. from mines on *Betula pendula* (AM).

Larva in mines on leaves of *Betula pendula*.



Fig. 1. Mines *Phyllonorycter apparella* on *Populus tremula* (by Elena A. Artemjeva)

The table 1

The trophic links of *Phyllonorycter* species with 13 families of hostplants in the Uljanovsk Region.

Families of hostplants	<i>Phyllonorycter</i>	Hostplants	%
Aceraceae	<i>Ph. sylvella</i> Hw.	<i>Acer platanooides</i>	3.6
Betulaceae	<i>Ph. kleemannella</i> F. <i>Ph. rajella</i> L. <i>Ph. ulmifoliella</i> Hbn.	<i>Alnus glutinosa</i> <i>Alnus glutinosa</i> <i>Betula pendula</i>	10.7
Caprifoliaceae	<i>Ph. emberizaepennella</i> Bouché <i>Ph. lantanella</i> Schrank	<i>Lonicera xylosteum</i> <i>Viburnum lantana</i>	7.1
Corylaceae	<i>Ph. coryli</i> Nicelli	<i>Corylus avellana</i>	3.6
Fabaceae	<i>Ph. insignitella</i> Z. <i>Ph. medicaginella</i> Grsm.	<i>Trifolium alpinus</i> <i>Melilotus officinalis</i>	10.7

	<i>Ph. nigrescentella</i> Logan	<i>Orobus vernus</i>	
Fagaceae	<i>Ph. harrisella</i> L. <i>Ph. muelleriella</i> Z. <i>Ph. quercifoliella</i> Z. <i>Ph. roboris</i> L.	<i>Quercus robur</i> <i>Quercus robur</i> <i>Quercus robur</i> <i>Quercus robur</i>	14.3
Rosaceae	<i>Ph. cerasicolella</i> H.-Sch. <i>Ph. corylifoliella</i> Hw. <i>Ph. pomonella</i> Z. <i>Ph. pyrifoliella</i> Grsm. <i>Ph. sorbi</i> Frey	<i>Cerasus vulgaris</i> <i>Malus sylvestris</i> <i>Prunus spinosa</i> <i>Malus sylvestris</i> <i>Sorbus aucuparia</i>	17.9
Salicaceae	<i>Ph. apparella</i> H.-Sch. <i>Ph. comparella</i> Z. <i>Ph. pastorella</i> Z. <i>Ph. populifoliella</i> Tr. <i>Ph. sagitella</i> Bjerkander <i>Ph. salictella</i> Z.	<i>Populus tremula</i> <i>Populus alba</i> <i>Salix alba</i> <i>Populus nigra</i> <i>Populus tremula</i> <i>Salix alba</i>	21.4
Tiliaceae	<i>Ph. issikii</i> Kumata	<i>Tilia cordata</i>	3.6
Ulmaceae	<i>Phyllonorycter agilella</i> Z. <i>Ph. schreberella</i> F.	<i>Ulmus glabra</i> <i>Ulmus glabra</i>	7.1
Total	28 species	20 species	100

Parallel, 21 species of eulophid wasps have been reared from the *Phyllonorycter* during this study (tab. 1):

The table 2

Trophic links of Eulophidae (Hymenoptera) with *Phyllonorycter* (Gracillariidae) in the Uljanovsk Region

<p>Eulophidae (Hymenoptera)</p>	<p><i>Phyllonorycter</i> (Gracillariidae)</p>																					
			<i>Phyllonorycter apparella</i> H.-Sch.																			
			<i>Ph. cerasicolella</i> H.-Sch.																			
			<i>Ph. comparella</i> Z.																			
			<i>Ph. emberizaepennella</i> Bouché																			
			<i>Ph. insignitella</i> Z.																			
			<i>Ph. issikii</i> Kumata																			
			<i>Ph. medicaginella</i> Grsm.																			
			<i>Ph. pastorella</i> Z.																			
			<i>Ph. pomonella</i> Z.																			
			<i>Ph. populifoliella</i> Tr.																			
			<i>Ph. pyrifoliella</i> Grsm.																			
			<i>Ph. salictella</i> Z.																			
			<i>Ph. schreberella</i> F.																			
	<i>Ph. sorbi</i> Frey																					
	<i>Ph. ulmifoliella</i> Hbn.																					
<i>Achrysocharoides butus</i> (Walker, 1839)																					+	
<i>Aprostocetus zoilus</i> (Walker, 1839)																						+
<i>Cirrospilus lyncus</i> (Walker, 1838)																						+
<i>Cirrospilus diallus</i>																						+

(Walker, 1838)															
<i>Cirrospilus viticola</i> (Rondani, 1877)						+									
<i>Chrysocharis amyite</i> (Walker, 1839)						+									
<i>Chrysocharis laomedon</i> (Walker, 1839)	+		+			+									
<i>Chrysocharis pubicornis</i> (Zetterstedt, 1838)					+	+									+
<i>Diaulinopsis arenaria</i> (Erdos, 1951)	+		+												
<i>Elachertus pulcher</i> (Erdos, 1961)														+	
<i>Hemiptarsenus ornatus</i> (Nees, 1834)									+						
<i>Hyssopus geniculatus</i> (Hartig, 1838)					+		+			+		+			+
<i>Minotetrastichus frontalis</i> (Nees, 1834)							+					+		+	
<i>Neochrysocharis</i> sp.					+										
<i>Omphale rubigus</i>					+						+				

(Walker, 1839)															
<i>Pediobius metallicus</i> (Nees, 1834)				+											
<i>Pediobius cassidae</i> (Erdos, 1958)		+													
<i>Pnigalio pectinicornis</i> (L., 1758)				+											
<i>Pnigalio soemius</i> (Walker, 1839)						+			+		+				
<i>Sympiesis gordius</i> (Walker, 1839)			+			+				+			+		+
<i>Sympiesis sericeicornis</i> (Nees, 1834)					+	+		+	+		+	+		+	
TOTAL: 21	2	1	3	6	3	1	1	1	4	1	5	2	1	3	3
						0									

In spite many species of the family feed on cultural or economically important hostplants, injuring damages normally are minor. The first reason is that the females are avoid laied their eggs on leaves already заселенные. But it is normal only for aborigine species and can't be attributed to invasion species, occupying new territories and correspondingly, new ecological niches.

Most typical example is *Phyllonorycter issikii* Kumata 1963 feeding on *Tilia* spp. It was originally described from Japan (Kumata, 1963) basing on material reared from *Tilia maximowicziana*, *T. japonica* and *T. kiusiana*. Soon after it was

found from Russia Far East (Ермолаев, 1977) and Korea (Kumata & al., 1983), and after that suddenly in European Russia, with a large gap through Siberia and Transural – in Uljanovsk Region in 1982 (Sachkov S. A., pers. comm.; Zolotuhin, 2002), in Moscow Region (Osipova, 1990), Voronezh Region (Kuznetsov et al., 1998), Kaluga Region (Shmytova, 2001), Yaroslavl Region (Klepikov, 2005), Ukraine (Mey, 1991). The species distributes very quick westwards and in 1995 it was found in Western and Central Europe (Deschka, 1995), in 1997 in Lithuania (Noreika, 1998), and in East Germany (Sachsen и Brandenburg) (Speidel et al., personal communication, 2006). Now, the species is known from almost all Regions of Central and southern Russia; no barriers for its further продвижению southwards are known. Investigation of biology of this species and, especially, of host-parasitoid relationship will aim of our further researches.

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