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MOLECULAR KEYS FOR THE IDENTIFICATION OF APHIS SPECIES ASSOCIATED WITH APPLE TREES IN BELARUS

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In Belarus *Aphis pomi* de Geer, *Aphis spiraecola* Patch (Foottit et al., 2009; Razmjou et al., 2014), *Dysaphis anthrisci* Börner, *Dysaphis plantaginea* Pass., *Dysaphis radicola* Mordvilko (Rakauskas, Bašilova & Bernotienė, 2015), *Eriosoma lanigerum* (Hausmann) (Holman, 2009) and *Rhopalosiphum insertum* (Walker) (Holman, 2009) are the major pests in apple orchards. These aphids often cause irreversible damage to leaves, branches, and bourgeons and are responsible for severe losses of yield. Despite the biological distinction and potential harmfulness, these species are difficult to separate using their morphological characters, which lead to the difficulties with correct diagnosis of the species. Using of molecular-genetic methods of the species identification allows to solve such problems (Valenzuela et al., 2007). PCR-RFLP identification is a precise and cheap method of the identification of morphologically similar species of aphids. In this regard, we have developed the PCR-RELP keys based on the COI gene sequence to identify 6 aphid species included in the list of apple pests of the fauna of Belarus.

Available sequences of the mitochondrial COI gene (137 of *A. pomi*, 212 of *A. spiraecola*, 1 of *D. anthrisci*, 22 of *D. plantaginea*, 9 of *D. radicola*, 26 of *E. lanigerum*, and 8 of *R. insertum*) were obtained from GenBank NCBI. To avoid any discrepancies when analyzing data, sequences were aligned by reference. The length of the fragment was 708 bp. The restriction maps that allowed distinguishing between all 6 species of aphids were constructed. The COI sequences of analyzed species of aphids possess sufficient conservatism at the intraspecific level that allows developing PCR-RFLP keys for their identification.

The maps included 11 unique restriction sites for *A. pomi*, for *A. spiraecola* it is 8, for *R. insertum* it is 8, for *E. lanigerum* it is 5, for *D. radicola* it is 10, for *D. plantaginea* it is 8, and for *D. anthrisci* it is 6. These endonucleases can be used for precise identification of aphid species by alternative feature. Developed PCR-RFLP keys can also be used to evaluate the frequency of occurrence of the specific species of aphids on apple trees.

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Contents

ORGANIZING, SCIENTIFIC AND PROGRAM COMMITTEES	7
CONFERENCE PROGRAMME	9
Section 1. Invasive And Alien Animal Species	10
THE PRESENCE OF <i>OTIORHYNCHUS ARMADILLO</i> (ROSSI, 1792) (COLEOPTERA: CURCULIONIDAE: ENTIMINAE) IN NORTH POLAND <i>O. Aleksandrowicz, M. Wanat</i>	11
INFLUENCE OF ALIEN SPECIES ON THE AVIFAUNA OF THE REPUBLIC OF BELARUS <i>M. A. Bogachova, A. V. Khandogiy</i>	12
ON THE NORTH-EASTERN INVASIVE RANGE LIMIT OF <i>AGRILUS PLANIPENNIS</i> (COLEOPTERA: BUPRESTIDAE) IN THE EUROPEAN RUSSIA <i>A. A. Egorov, A. N. Afonin, D. L. Musolin, A. V. Selikhovkin, E. A. Milyutina</i>	14
ALIEN SPECIES OF EARTHWORMS IN THE ECOSYSTEMS OF THE URALS <i>E. V. Golovanova</i>	16
DYNAMICS OF ABUDANCE AND BIOMASS OF <i>OITHONA DAVISAE</i> (FERRARI F.D. & ORSI, 1984) IN THE DANUBE REGION OF THE BLACK SEA IN 2016-2019 <i>Yu. V. Kharytonova, V. G. Dyadichko</i>	18
USING DIFFERENT METHODS FOR THE CONTROL OF INVASIVE PHYTOPHAGES IN THE BREST REGION <i>A. P. Kolbas, A. V. Sinchuk, N. V. Sinchuk</i>	20
ALIEN SPECIES OF SUCKING INSECTS DAMAGING LARCH (<i>LARIX</i> MILL.) IN BELARUS <i>Ya. V. Kovalev, F. G. Yakovchik, S. V. Buga</i>	21
INVASIVE SPECIES OF TERRESTRIAL WOODLICE IN EUROPE. PROSPECTS FOR RESEARCHING WOODLICE IN BELARUS <i>M. A. Logachev, A. V. Sinchuk</i>	23
INVASIVE SPECIES OF TRUE BUGS (HEMIPTERA: HETEROPTERA) ON THE TERRITORY OF BELARUS <i>A. O. Lukashuk</i>	25
INVASIVE SPECIES OF PHYTOPHAGES IN GRODNO (BELARUS) <i>M. A. Melenec, A. V. Ryzhaya</i>	27
GIS MODELING AND STUDY OF THE INFLUENCE OF INVASIVE MAMMALIAN SPECIES' DISTRIBUTION ON EUROPEAN POND TURTLE <i>O. D. Nekrasova, M. Pupins, O. Yu. Marushchak, V. M. Tytar, A. Čeirān, A. Skute</i>	28
FIRST RECORD OF ALIEN SPECIES <i>CHYMOMYZA AMOENA</i> (LOEW 1862) (DIPTERA: DROSOPHILIDAE) IN BELARUS <i>A. M. Ostrovsky</i>	30
RISK ASSESSMENT AFTER THE HARMONIA+ PROTOCOL OF INVASIVE ALIEN GALL-FORMING ARTHROPOD SPECIES IN BELARUS <i>D. L. Petrov, F. V. Sautkin, S. V. Buga</i>	32
zebra mussel IN NATURAL ECOSYSTEMS OF BELARUS <i>E. G. Pinchuk, A. V. Khandohiy</i>	34
ALIEN INSECT SPECIES ESTABLISHED IN LITHUANIA IN THE LAST TWO DECADES <i>J. Rimšaitė, P. Ivinskis</i>	36
ALIEN SPECIES OF HYDROPHILIDAE (INSECTA: COLEOPTERA) IN THE BELARUSSIAN FAUNA <i>S. K. Ryndevich</i>	38

BLACK LOCUST APHID, <i>APPENDISETA ROBINIAE</i> : FURTHER EXPANSION IN CENTRAL AND EASTERN EUROPE	
<i>F. V. Sautkin, S. V. Buga, A. V. Stekolshchikov</i>	40
NEW DATA ON THE DISTRIBUTION OF <i>CALOPTILIA ROSCIPENNELLA</i> IN BELARUS	
<i>A. V. Sinchuk, N. V. Sinchuk, S. V. Baryshnikova</i>	42
NEW DATA ON HARLEQUIN LADYBIRD <i>HARMONIA AXYRIDIS</i> (PALLAS, 1773) (COLEOPTERA, COCCINELLIDAE) DISTRIBUTION IN BELARUS	
<i>I. A. Solodovnikov, V. M. Kotsur, Ye. A. Derzhinsky</i>	43
MOLECULAR KEYS FOR THE IDENTIFICATION OF APHIS SPECIES ASSOCIATED WITH APPLE TREES IN BELARUS	
<i>M. M. Varabyova, N. V. Voronova, D. G. Zhorov</i>	45
INVASIVE DENDROPHILOUS AGROMYZIDAE SPECIES IN THE FAUNA OF BELARUS	
<i>M. V. Lazarenko</i>	46
 Section 2. Invasive And Alien Plant Species.....	48
TODAY AND TOMORROW OF <i>IMPATIENS</i> INVASIONS IN RUSSIA	
<i>W. Adamowski, A. Ebel, A. Seregin, A. Zernov</i>	49
GROWING THREAD OF INVASIVE MACROPHYTES IN POLAND: THE CASE OF <i>ELODEA NUTTALLII</i>	
<i>M. Draga, M. Gąbka, D. Lisek, S. Rosadziński, Ł. Bryl</i>	53
NATIVE AND ADVENTIVE STATUS OF SOME ROSES (<i>ROSA</i>) AND HAWTHORNS (<i>CRATAEGUS</i>) IN THE FLORA OF BELARUS	
<i>D. V. Dubovik</i>	54
PUTATIVE HYBRID BETWEEN NORTH AMERICAN SPECIES OF <i>ASCLEPIAS</i> (APOCYNACEAE, ASCLEPIADOIDEAE) IN BELARUS	
<i>M. A. Dzhus</i>	56
NORTH AMERICAN TREES AND SHRUBS IN THE GREEN SPACES OF SURGUT (NORTH OF WESTERN SIBERIA)	
<i>A. A. Egorov, G. M. Kukurichkin</i>	58
ADVENTIVE PLANTS SPECIES IN THE FLORA OF DROHOBYCH	
<i>N. P. Halytska</i>	60
DISTRIBUTION OF ALIEN SPECIES <i>AILANTHUS ALTISSIMA</i> (MILL.) SWINGLE AND <i>AMBROSIA ARTEMISIIFOLIA</i> L. IN CRIMEA	
<i>E. S. Kashirina, S. A. Svirin, E. I. Golubeva</i>	61
THE INVASION OF INTERSPECIFIC HYBRIDS OF THE GENUS <i>HERACLEUM</i> AT the SCIENTIFIC-EXPERIMENTAL STATION “OTRADNOYE” BIN RAS AND HIS COMPETITION WITH FEED CEREALS	
<i>A. G. Khmarik, A. N. Khmarik</i>	63
INFLUENCE OF ACER NEGUNDO INVASION ON THE SPECIES DIVERSITY OF PLANT COMMUNITIES IN THE FLOODPLAIN OF THE STEPNOI ZAI RIVER (TATARSTAN, RUSSIA)	
<i>M. V. Kozhevnikova, V. E. Prokhorov</i>	65
A REVIEW OF RESEARCH ON ALIEN PLANTS IN UZBEKISTAN	
<i>T. Kh. Makhkamov, N. Yu. Beshko, A. D. Gaziev</i>	67
ALIEN SPECIES OF PLANTS IN THE FLORA OF THE PRIPYAT POLESYE (BELARUS) AND THEIR INVASIVE POTENTIAL	
<i>A. M. Mialik</i>	69
MODERN TRENDS OF INVASION OF INTRODUCED PLANTS IN THE REGIONS OF BELARUS	
<i>M. M. Motyl</i>	71

SOME IMPORTANT PARAMETERS OF <i>SOLIDAGO CANADENSIS</i> L. IN MODEL POPULATIONS IN UKRAINIAN POLESIE	
<i>A. A. Orlov, A. I. Ishchuk</i>	73
DISTRIBUTION PROPERTIES OF THE SPECIES OF <i>IRIS</i> L. GENUS (<i>IRIS</i> L., IRIDACEAE JUSS.) IN UZBEKISTAN	
<i>E. A. Ortikov, D. E. Turdiev</i>	75
VASCULAR PLANTS – TRANSFORMERS OF THE OMSK OBLAST	
<i>N. V. Plikina, A. N. Efremov</i>	77
PREDICTIVE MODELING OF <i>HERACLEUM SOSNOWSKYI</i> MANDEN. DISTRIBUTION IN THE VOLGA-KAMA REGION IN A CHANGING CLIMATE	
<i>V. E. Prokhorov</i>	79
iNATURALIST VS. PL@NTNET: ACCELERATING DATA COLLECTING ON ALIEN PLANTS OF RUSSIA IN REAL-TIME MODE	
<i>A. P. Seregin</i>	81
THE COMPOSITION OF INVASIVE PLANTS IN URBANIZED TERRITORIES ON THE EXAMPLE OF THE RECREATIONAL ZONE OF BREST	
<i>N. V. Shkuratova</i>	83
INVASIVE PLANTS OF THE BELARUSIAN-LITHUANIAN BORDER	
<i>O. V. Sozinov, V. A. Sipach</i>	85
CRYPTIC INVASION OR NATIVE SPECIATION? THE CASE OF PHRAGMITES IN BELARUS	
<i>V. N. Tikhomirov, Z. E. Grushetskaya, O. V. Dzyuban</i>	87
THE FIRST FINDING OF <i>SPERMOTHAMNION STRICTUM</i> (RHODOPHYTA) AT ZERNOV’S PHYLLOPHORA FIELD (BLACK SEA, UKRAINE)	
<i>I. P. Tretiak</i>	90
<i>HALOSIPHON TOMENTOSUS</i> (OCHROPHYTA) IN THE DNIESTER REGION OF THE BLACK SEA	
<i>I. P. Tretiak</i>	92
THE FIRST CASE OF ALIEN RED ALGAE <i>CHONDRIA CAPILLARIS</i> IN ODESSA BAY	
<i>I.P. Tretiak</i>	94
Section 3. Invasive and alien fungi species.....	95
RECORDS OF THE DOTHISTROMA NEEDLE BLIGHT PATHOGENS IN BELARUS	
<i>N. G. Dishuk, L. A. Golovchenko, S. V. Panteleev, O. Yu. Baranov</i>	96
THE OCCURENCE OF INVASIVE FUNGI <i>ERYSIPHE FLEXUOSA</i> AND <i>PHYLLOSTICTA PAVIA</i> ON THE HORSE CHESTNUT IN THE REPUBLIC OF BELARUS	
<i>V. A. Timofeeva, I. I. Butko</i>	98
Section 4. Ecology of invasive and alien species.....	100
ECOLOGICAL STRUCTURE OF PHYTOPHAGES-INVADERS COMPLEXES IN URBAN GREEN PLANTS OF THE GRODNO NEMAN RIVER REGION (BELARUS)	
<i>E. I. Hliakouskaya, A. V. Ryzhaya</i>	101
TAXONOMIC COMPOSITION OF APOIDEA VISITORS OF <i>SOLIDAGO</i> INFLORESCENCES IN DIFFERENT BIOTOPES IN MINSK	
<i>D. O. Koroteeva</i>	103
SIZE STRUCTURE OF THE <i>DREISSENA POLYMORPHA</i> POPULATION OF LAKE MYASTRO	
<i>D. V. Kruk, H. A. Zhukava, B. V. Adamovich</i>	105

OCCURRENCE OF LEAF GALLS FORMED BY GALL MIDGE <i>OBOLODIPLOSI</i> <i>ROBINIAE</i> LARVAE ON BLACK LOCUST IN GREEN AREAS OF MINSK AND LIDA (BELARUS) <i>Yu. S. Roginskaya, Yu. V. Anacko, A. S. Roginsky</i>	107
ASSESSMENT OF THE DAMAGE TO LEAF BLADES BY <i>PARECTOPA ROBINIELLA</i> LARVAE IN THE BREST REGION <i>A. V. Sinchuk, N. V. Sinchuk</i>	109
FIRST EVIDENCE OF <i>PLANKTOTHRIX AGARDHII</i> (CYANOPROKARYOTA) IN THE UKRAINIAN MARINE COASTAL WATER <i>G. Terenko, K. Hushchyna</i>	110
MODELLING THE RANGE EXPANSION OF PUMPKINSEED <i>LEPOMIS GIBBOSUS</i> ACROSS EUROPE, WITH SPECIAL FOCUS ON LATVIA AND UKRAINE <i>V. Tytar, O. Nekrasova, M. Pupins, A. Čeirāns, A. Skute</i>	112
POSSIBLE CONSEQUENCES OF THE INVASION OF THE ALIEN MOLLUSK <i>ARCUATULA SENHOUSIA</i> (BIVALVIA, MYTILIDAE) IN THE BLACK SEA <i>A. Yu. Varigin</i>	114
ALIEN AND POTENTIALLY INVASIVE SPECIES OF PHYTOPATHOGENIC FUNGI AND OOMYCETES IN PLANT COMMUNITIES OF BELARUS <i>V. D. Poliksenova, A. K. Khramtsov, N. A. Lemeza, S. G. Sidorova, M. A. Stadnichenko</i>	116
Journal of the Belarusian State University. Biology.....	118
Russian Journal of Biological Invasions.....	119