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The Eurasian species of *Xyela* (Hymenoptera, Xyelidae): taxonomy, host plants and distribution

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Abstract

The 28 Eurasian species of *Xyela* Dalman, 1819 are revised based on material of ca 7,500 imagines including about 10 % reared specimens. Larvae of Eurasian *Xyela* usually are monophagous and feed inside the staminate cones of pines (*Pinus* spp., Pinaceae). Based on the reared material, on identification by barcoding and on additional collection observations, the larval host associations for the *Xyela* species are summarized and additional biological observations are noted. An illustrated key to the species and distribution maps are presented. Eight species are described as new: *X. altenhoferi* Blank, **sp. nov.** (Croatia), *X. heldreichii* Blank, **sp. nov.** (Albania, Greece), *X. koraiensis* Blank & Shinohara, **sp. nov.** (Russia, South Korea), *X. peuce* Blank, **sp. nov.** (Bulgaria), *X. pumilae* Blank & Shinohara, **sp. nov.** (Japan), *X. rasnitsyni* Blank & Shinohara, **sp. nov.** (China, Russia, South Korea), *X. sibiricae* Blank, **sp. nov.** (Mongolia, Russia), and *X. uncinatae* Blank, **sp. nov.** (Andorra, France, Spain, Switzerland). For the other species redescriptions are given. A lectotype is designated for *X. longula* Dalman, 1819, and neotypes are designated for *X. graeca* J.P.E.F. Stein, 1876 and *Pinicola julii* Brébisson, 1818. The following new synonymies are proposed: *X. lii* Xiao, 1988, **syn. nov.** of *X. sinicola* Maa, 1947; *X. nigroabscondita* Haris & Gyurkovics, 2011, **syn. nov.** of *X. lugdunensis* (Berland, 1943); and *X. suwonae* Ryu & Lee, 1992, **syn. nov.** of *X. ussuriensis* Rasnitsyn, 1965.

Key words: Palearctic, Oriental, new species, Pinaceae, *Pinus*, barcoding

Introduction

Xyela is the most diverse group of extant Xyelidae comprising 48 species worldwide including eight described here from Eurasia (Smith 1978, Taeger et al. 2010, present data). *Xyela* primarily occurs in the Holarctic, and like its host plants, pine species (*Pinus* spec., Pinaceae), it extends southwards into the northern parts of the Neotropical and of the Oriental regions (Fig. 1). Seven exclusively fossil *Xyela* species, and also *X. graeca* and *X. julii*, were reported from Oligocene deposits of Germany and the USA (Rasnitsyn 1995). A number of additional species still remain undescribed, particularly from the Nearctic where the largest radiation of pines has occurred (Mirov 1961, Richardson 1998).

The first *Xyela* species were described from Europe and from eastern North America: *X. julii*, *X. longula*, *X. graeca*, *X. minor*, *X. alpigena*, *X. obscura* and *X. bakeri* (Brébisson 1818, Dalman, 1819, Stein, 1876, Norton 1869, Strobl, 1895, Konow 1898). Smallness of the specimens, similarity of the species, and paucity of suitable identification characters caused early students of the European species like Konow (1897) and Enslin (1918) to concede only *X. longula* and *X. julii* the status of valid species and to treat the remaining species as synonyms of *X. julii*. Other researchers have been convinced that the European nominal taxa are to be applied to East Palearctic material, too, e.g., to specimens of allegedly East Palearctic '*X. alpigena*' in Benson (1961), '*X. julii*' in Takeuchi (1938) and '*X. obscura*' in Kondo & Miyake (1974). Following Benson's (1961, 1962) view '*X. alpigena*' and '*X. obscura*' should even be Holarctic. Except for Rasnitsyn's (1965) treatise, keys for the identification of Palearctic *Xyela* always concerned a limited geographical area (Gussakovskij 1935, Takeuchi 1938, Berland 1943, Togashi 1964, Rasnitsyn 1965, Schedl 1978, Blank 2002). Previously described taxa have often been assessed only from their more or less inadequate original descriptions instead of re-examination of type material. Taxonomic problems have thus remained largely unresolved.

Since Dyar (1898) it has been noted that the larvae of most *Xyela* species live in the male cones of pines, where they feed on the sporophylls. Only *X. gallicaulis* D.R. Smith, 1970 causes galls in the vegetative shoots (Yates & Smith 2009). A good number of data on the host plant relationships have been accumulated since Dyar's time. But single data sets may appear deficient either because of their unresolved taxonomic background or in view of a true larval host plant association. The most excellent and comprehensive work is that of Burdick (1961) on the Nearctic taxa. But apparently Burdick failed to discriminate single forms within particular, allegedly variable and oligophagous species like *X. bakeri* Konow, 1898, *X. minor* Norton, 1869 and *X. pini* Rohwer, 1913 (Blank, unpublished data). Rasnitsyn (1965) adopted information on the Nearctic taxa from Burdick (1961) and completed it for the Palearctic species. Schedl (1978, 1980) gathered observations on the European species. Since he combined data on the collection of imagines on particular pine species with information on larval biology, a number of reported host plant associations of European taxa are ambiguous. Pschorn-Walcher & Altenhofer (2000) first demonstrated for several European species by extensive rearing of larvae that *Xyela* species are usually monophagous or exceptionally oligophagous. The knowledge of the parasitoid community is even more fragmentary. Khalaim & Blank (2011) recently reviewed the species of *Gelanes* Horstmann, 1981 (Ichneumonidae: Tersilochinae), which parasitize the larvae of *Xyela*. In addition, *Xyeloblacus leucobasis* van Achterberg & Altenhofer, 1997 (Braconidae: Blacinae; van Achterberg & Altenhofer 1997) and an *Idiogramma* species (Ichneumonidae: Tryphoninae; Blank 2002) have been reported as larval parasitoids of European *Xyela* species.

Here, we concentrate on the analysis of the situation in the Palearctic and the Oriental realms. We pursue the revision of the *Xyela* species to obtain a proper taxonomic basis for this difficult group. Ecological data on the larval host plant relationships and description of behavioral aspects are secured by extensive rearing and additional field observations, which complete or correct earlier reports by Blank (2002). For selected species, larvae and imagines are associated with help of their barcoding sequence to corroborate host-insect relationships. Study of extensive collection material yields information on the general distribution of the species. These data are the indispensible basis for the discussion of evolutionary trends within *Xyela* and form the backbone of a phylogenetic hypothesis which awaits future development.

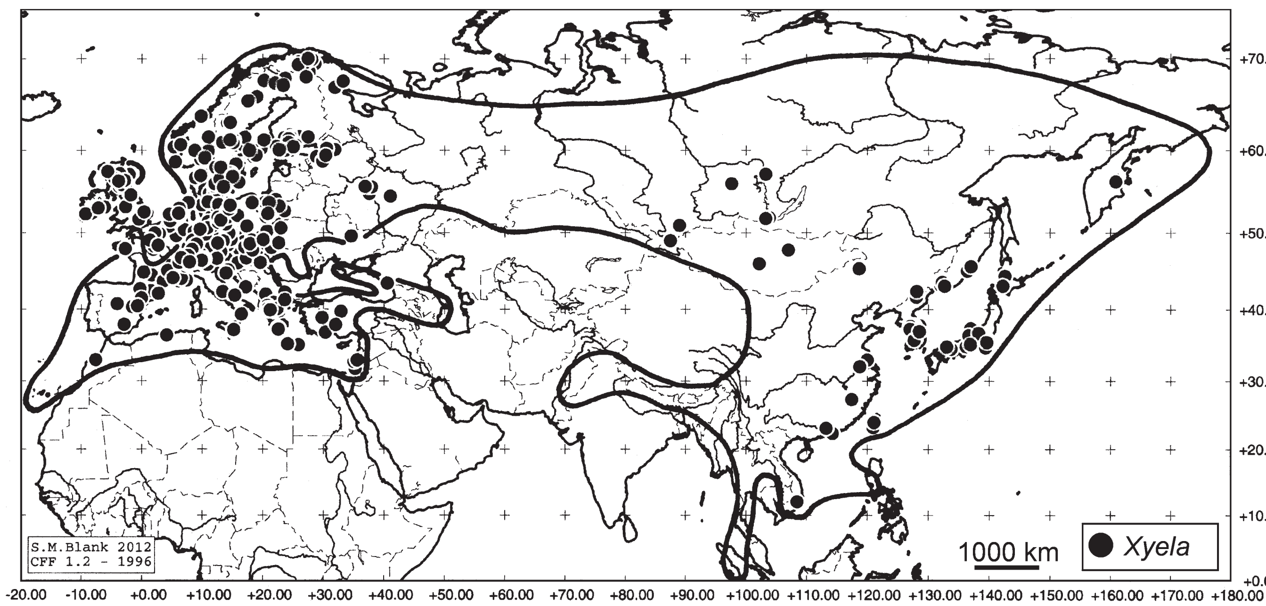


FIGURE 1. Records of *Xyela* species in Eurasia and natural distribution of their host plants, *Pinus* species (solid line, combined from Mirov 1967, Sokolov et al. 1977 and Richardson 1998).

Material and Methods

Rearing of Xyela

About 750 specimens of *Xyela alpigena*, *X. altenhoferi*, *X. curva*, *X. graeca*, *X. julii*, *X. menelaus*, and *X. obscura* were reared successfully from staminate cones of pines (*Pinus* spp., Pinaceae), which comprises about 10 % of the studied imagines. *Xyela* larvae were obtained—partly in large numbers—from male cones of pines. Larger twigs with flowers were cut from the tree and put into large plastic bags together with some paper to absorb condensation water. The bags were stored at room temperature. The mature larvae fell out of the cones and crawled around at the bottom of the bag. Once or twice per day they were sorted out. Best sampling results were obtained from cones which were collected some one or two days before blooming. Cones which had already enlarged to shed pollen had mostly been left by the larvae. Rearing from cones which were too young often failed due to desiccation. However, larvae of the species described here as *X. altenhoferi* could be obtained from cones of *P. halepensis* collected some two or three weeks before flowering.

For pupation the larvae were put into 50–500 ml large glass jars filled with a moderately moist mixture of sand and humus. *Xyela* larvae dig themselves even into comparatively dry substrate, which was refused by *Pleroneura coniferarum* Hartig, 1837 (Xyelidae) for digging. Jars with *Xyela* larvae were alternatively stored under laboratory conditions, in a humid cellar or in a shelter under almost natural conditions. The latter method yielded the best results. During February and March of the following year the jars were brought to the laboratory and emerging imagines were sorted out. *Xyela* larvae may diapause for a long period. The jars were accordingly stored for several years.

Host plants

Identification, nomenclature and distribution data of the *Pinus* species serving as host plants follow Mirov (1967), Kindel (1995) and Richardson (1998). The vernacular name ‘hard pine’ refers to the monophyletic *Pinus* (*Pinus*), and ‘soft pine’ to the demonstrably paraphyletic *Pinus* (‘*Strobus*’), although here mostly the representatives of the monophyletic section *Strobus* are considered. Information on host plant relationships, which was gained during this study, is presented as follows in the text and in Tab. 2:

•*Pinus sylvestris*: host plant, relationship due to evidence of rearing, collection by emergence trap below a distinct pine species, observation of oviposition, or association of larvae and imagines by barcoding;

·*Pinus sylvestris*: exceptional host plant relationship due to evidence of rearing;

°*Pinus sylvestris*: supposed host plant relationship due to evidence of situation at collection site (e.g., only available pine species on site), observation of collector, and label data of studied material (if rearing is not mentioned explicitly);

?*Pinus sylvestris*: doubtful host plant relationship;

~~Pinus sylvestris:~~ host plant relationship reported in literature but hereby disallowed.

Secondary information on host plants is accompanied by a reference to its publication. This concept of data presentation was introduced for the host plants relationships of sawflies by Taeger & Blank (1998). By explicitly demonstrating which published data sets are wrong, it shall help to avoid erroneous adoption of discarded sets in future works.

Collections and type material

Labeling of primary types is cited as found on the original material. Supplementary data are given in brackets “[...]”. In case of Strobl’s types, labels have been added which refer to Strobl’s (1895) original publication. This additional labeling shall ensure the recognition of specimens and it will not be repeated below. Green labels have been added to single specimens and preparations, which bear an individual code referring to the database at the

DEI. These labels are omitted for citation. The citation of secondary types and faunistic records is standardized. Any explanatory data are given in brackets, e.g., coordinates, orthographic correction according to modern use of name, and association of locality with a geographic unit if the locality itself could not be traced for mapping. The spelling of locality names originally not written in Roman characters is according to the Geoname Digital Gazetteer (GDE Systems Inc., San Diego / CA, USA, 1995) and the Times Atlas of the World (Comprehensive Edition, London, UK, 1992). Cyrillic names have been transliterated according to Kerzhner & Nartshuk (1992), if they were not listed in the latter works. The Geoname Digital Gazetteer also was used to locate collection sites and their geographical coordinates, and to associate the corresponding countries and provinces.

Material from the following collections has been studied. Private collectors, curators or technical staff responsible for public institution collections, who have kindly put the material at our disposal, are mentioned together with the acronym of the collection and the name of the institutions:

BMNH	Natural History Museum, London / UK (G. Broad, S. Lewis, C. Taylor)
BNMC	Bündner Natur-Museum, Entomological Department, Chur / Switzerland (U.E. Schneppat)
BPBM	Bernice P. Bishop Museum, Honolulu, HI / USA (G.T. Nishida, via D.R. Smith)
CALS	College of Agriculture and Life Sciences, Seoul National University, Suwon / South Korea (Kun-suk Woo)
CAS	California Academy of Sciences, San Francisco CA / USA (W. Pulawski)
CFRB	Chinese Academy of Forestry, Forest Research Institute, Beijing / China (via Mei-cai Wei)
CRC	private collection of C. Ritzau, Coburg / Germany
CSFU	Central South University of Forestry and Technology, Laboratory of Insect Systematics and Evolutionary Biology, Changsha, Hunan Sheng / China (Mei-cai Wei)
CUBS	Cumhuriyet University, Department of Biology, Faculty of Science and Literature, Sivas / Turkey (H.H. Başıbüyük)
DEI	Senckenberg Deutsches Entomologisches Institut, Müncheberg / Germany
EAC	private collection of E. Altenhofer, Etzen / Austria
EJC	private collection of E. Jansen, Leipzig / Germany
EMAU	Ernst-Moritz-Arndt-Universität, Zoologisches Institut und Museum, Greifswald / Germany (G. Müller-Motzfeld)
FCC	private collection of F. Creutzburg, Jena / Germany
GFTC	private collection of G. F. Turrisi, Tremestieri Etneo CT / Italy
HBC	private collection of H. Bathon, Darmstadt / Germany
HMUG	University of Glasgow, Hunterian Museum and Art Gallery, Glasgow / Great Britain (E.G. Hancock)
HNHM	Hungarian Natural History Museum, Department of Zoology, Budapest / Hungary (G. Puskás, S. Czösz, L. Zombori)
INRA	Institut National de la Recherche Agronomique, Ecole Nationale Supérieure Agronomique, Montpellier / France (C. Cocquempot)
ISNB	Institut royal des Sciences naturelles de Belgique, Département d'Entomologie, Brussels / Belgium (J.-L. Boevé)
IZUI	Institut für Zoologie der Universität, Innsbruck / Austria (W. Schedl)
JLC	private collection of J. Lacourt, Le Pâty, Ige / France
KNUC	Center for Insect Systematics, Kangwon National University, Chuncheon / South Korea (Kyu-Tek Park)
MCFS	Museo Civico di Storia Naturale, Ferrara / Italy (F. Pesarini)
MCSN	Museo Civico di Storia Naturale "Giacomo Doria", Genova / Italy (R. Poggi)
MHNG	Museum d'histoire naturelle, Département d'entomologie, Genève / Switzerland (B. Merz)
MHNL	Museum d'Histoire Naturelle, Lyon / France (H. Labrique)
MHNN	Musée d'Histoire Naturelle, Neuchâtel / Switzerland (J.-P. Haenni)
MKC	private collection of M. Kraus, Nürnberg / Germany
MMBC	Moravske Muzeum, Brno / Czech Republic (P. Lauterer)
MNHN	Museum National d'Histoire Naturelle, Laboratoire d'Entomologie, Service Hymenoptera, Paris / France (C. Villemant, C. Casevitz-Weulersse)
MNMS	Museo Nacional de Ciencias Naturales, Entomologia, Madrid / Spain (C. Martin)
MSC	private collection of Martin Schwarz, Kirchschlag bei Linz / Austria

MVC private collection of Matti Viitasaari, Helsinki / Finland
MZHF Helsinki University, Deptartment of Applied Zoology, Helsinki / Finland (M. Viitasaari)
MZLS Musée de Zoologie, Lausanne / Switzerland (S. Knispel)
MZLU Museum of Zoology, Lund University, Lund / Sweden (R. Danielsson)
NHRS Naturhistoriska riksmuseet, Sektionen för entomologi, Stockholm / Sweden (L.-A. Janzon)
NMBA Stift Admont, Naturhistorisches Museum, Collection G. Strobl, Admont / Austria (J. Götze, Berlin)
NMBS Naturhistorisches Museum, Bern / Switzerland (H. Baur)
NMNS National Museum of Natural Sciences, Taichung / Taiwan (Mei-ling Chan)
NMP National Museum, Praha / Czech Republic (J. Macek)
NMW Naturhistorisches Museum Wien, II. Zoologische Abteilung, Wien / Austria (D. Zimmermann, S. Schödl)
NSMT National Museum of Nature and Science, Department of Zoology, Tsukuba, Ibaraki / Japan, including the collection of I. Togashi, Tsurugi-machi, Ishikawa Prefecture / Japan (A. Shinohara)
OLML Biologiezentrum des Oberösterreichischen Landesmuseums, Linz / Austria (F. Gusenleitner, M. Schwarz)
RMNH Nationaal Natuurhistorisch Museum, Leiden / Netherlands (C. van Achterberg)
RSME National Museums of Scotland, Department of Geology and Zoology, Edinburgh / Great Britain (M. Shaw)
SCMK Somogy County Museums, Kaposvár / Hungary (Á. Levente)
SMFD Senckenberg Forschungsinstitut und Naturmuseum, Entomologie III, Frankfurt / Germany (J.-P. Kopelke)
SMNG Senckenberg Museum für Naturkunde, Görlitz / Germany (B. Seifert)
SMNK Staatliches Museum für Naturkunde, Karlsruhe / Germany (M. Verhaag, F. Brechtel)
SMNS Staatliches Museum für Naturkunde, Stuttgart / Germany (L. Krogmann, T. Osten)
SMTD Senckenberg Museum für Tierkunde, Abteilung Entomologie, Dresden / Germany (R. Eck)
TARI Taiwan Agricultural Research Institute, Department of Applied Zoology, Taichung / Taiwan RC (Ho Chyi-Chen via Mei-ling Chan)
TAUI Tel Aviv University, George Wise Faculty of Life Sciences, Department of Zoology, Tel Aviv / Israel (A. Freidberg)
TNC private collection of Th. Noblecourt, Antugnac / France
UOPJ University of Osaka Prefecture, Entomological Laboratory, Sakai / Japan (via A. Shinohara)
USNM Smithsonian Institution, National Museum of Natural History, Department of Entomology, Washington DC / USA (D.R. Smith)
UUZM Museum of Evolution, Zoology, Uppsala / Sweden (H. Mejlon)
YUIC Yeungnam University, Department of Biology, Yeungnam University Insect Collections, Kyungsan / South Korea (Jong-Wook Lee)
ZIN Zoological Institute of the Russian Academy of Sciences, St. Petersburg / Russia (S.A. Belokobylskij, A.G. Zinovjev)
ZMAN Universiteit Amsterdam, Zoologisch Museum Amsterdam, Afdeling Entomologie, Amsterdam / Netherlands (W. Hogenes)
ZMHB Leibniz-Institut für Evolutions- und Biodiversitätsforschung, Museum für Naturkunde, Berlin / Germany (F. Koch)
ZMPA Polish Academy of Sciences, Institute of Zoology, Warszawa / Poland (T. Huflejt)
ZMUB Bergen Museum, Zoologisk Avdeling, Bergen / Norway (L. Greve-Hensen)
ZMUC University of Copenhagen, Zoological Museum, Copenhagen / Denmark (L. Vilhelmsen, R. Meier)
ZMUH Zoologisches Institut und Zoologisches Museum der Universität Hamburg, Abteilung Entomologie, Hamburg / Germany (H. Riefenstahl)
ZMUM Zoological Museum of the Moscow Lomonosov State University, Moscow / Russia (A.V. Antropov, A.P. Rasnitsyn)
ZSM Zoologische Staatssammlung, München / Germany (S. Schmidt, J. Schuberth, E. Diller)

Genitalia preparation

Whole specimens were softened in a moist chamber for one day. In females the distal part of the abdomen was cut off, in males the whole genitalia capsule was extracted. The attached tissue was dissolved in 3 % potassium hydroxide solution for 6–24 hours at room temperature or gently warmed up to 50 °C in an oven. In females the ovipositor was cut off at its base, and usually one of the valvulae 1 was removed. The distal abdominal terga 8, 9+10 and the attached valvifer 2 and valvula 3 were dissected along the median line. A single half was photographed in lateral view to demonstrate the shape, position and color pattern of the female ovipositor sheath. The penis valves were dissected from the male genitalia capsule after they were cut off from each other at their lower edge. Genital preparations were studied and photographed when mounted in glycerine to enhance contrast. After study the preparations were stored in glycerine in a genitalia vial (BioQuip Products Inc., Gardena PA, USA), or they were glued to a piece of cardboard. All genitalia preparations are stored on the pin of the corresponding specimen.

SEM preparation

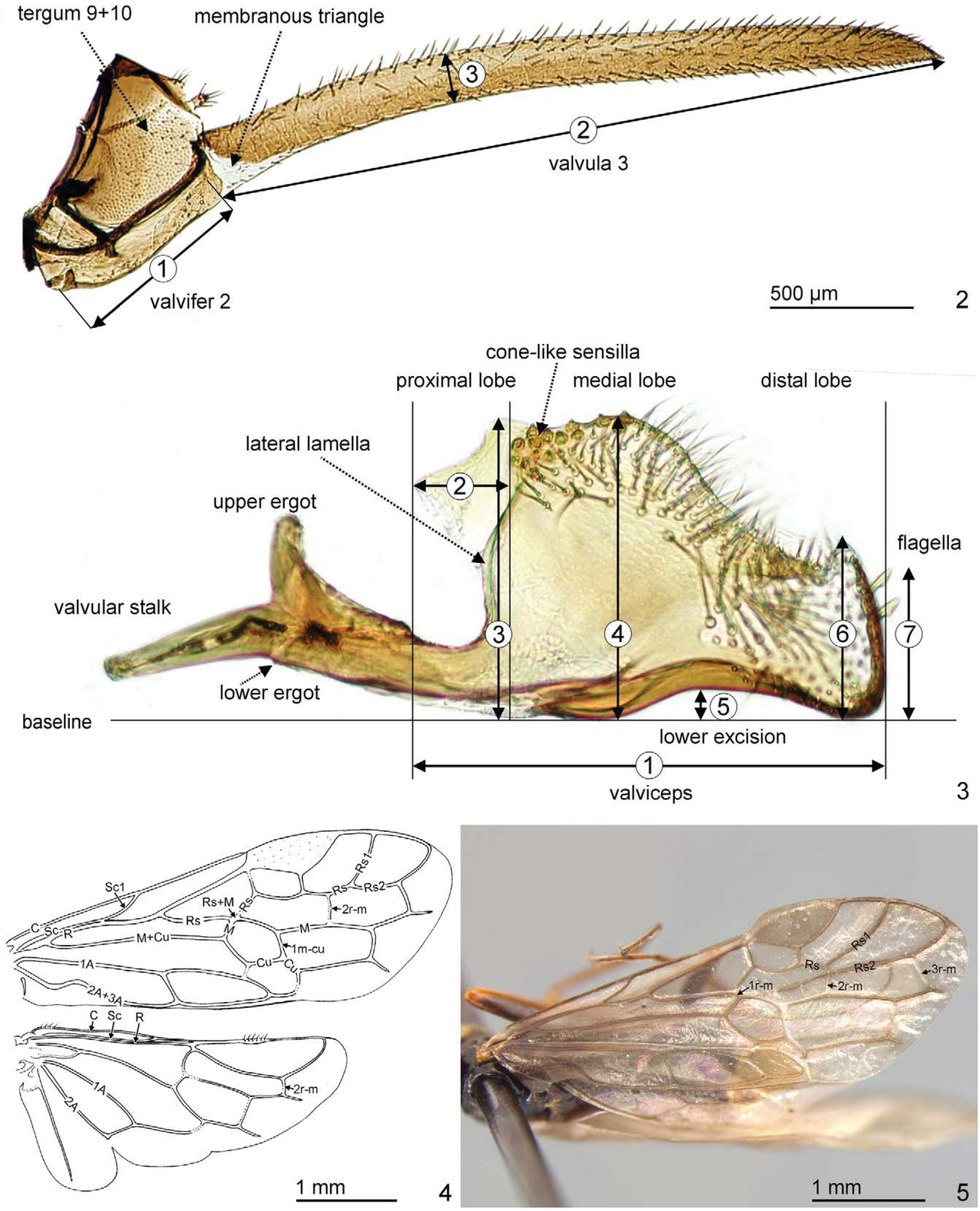
Mostly dried, rehydrated specimens were investigated. The specimens were partly cleaned with ultrasound in 70 % alcohol. Since the soft ovipositor was often completely destroyed and many setae disrupted during ultrasound treatment, this was later omitted. Specimens were transferred to 80 %, 90 %, 96 % and 100 % ethanol, and solid specimens finally air dried. Soft specimens (e.g., whole mount of the imaginal abdomen) were critical point dried (Bal-tec CPD 030). After mounting on conductive pads or plasticine (Leit-C) the specimens were coated with gold and palladium (Polaron SC 7640). SEM investigation was conducted with a LEO 1450VP and a JEOL JSM-6060LV scanning electron microscope at 6–10 kV. Unique specimens were left uncoated for the SEM study. Debris was gently removed using a penguin feather. Photos were taken with a JSM-6060LV (Jeol) microscope at only 1.8–2.5 kV acceleration voltage. The files were finally processed with PhotoImpact (Ulead Systems Inc.).

Light microscopic images

Images from preparations were taken from an Olympus BX50 compound microscope either with a conventional Olympus OM-4 camera and subsequently scanned, or directly with a digital Olympus C-3030ZOOM camera. Whole specimens were photographed through an Olympus SZX-12 stereo microscope attached to the Olympus OM-4 camera, or with a Leica M405 C stereo microscope attached to a Leica DFC450 C camera. In these cases lighting was either from a cold light source attached to double light guides or from a reversed LED ringlight. The specimens were illuminated indirectly by diffused light reflected from the inner surface of a styrofoam cup or a styrofoam hemisphere set up around the specimen. Usually a gray card has been used as the background and for white balance. Composite images with an extended depth of field were created using the software Extended Focal Imaging (EFI of the analySIS programm, Soft Imaging System GmbH, Münster, FRG), Automontage (Syncroscopy), or CombineZM or CombineZP (http://hadleyweb.pwp.blueyonder.co.uk). Light microscopic as well as electron microscopic images were finally processed with PhotoImpact (Ulead Systems Inc.) and mounted with CorelDraw (Corel Co.).

Morphological terminology and measurement

Terminology for the morphology generally follows Huber & Sharkey (1993) and Viitasaari (2002); for surface microsculpture it follows Harris (1979). The elongate and widened third antennal article, which is the ontogenetical product of the fusion of a variable number of articles, is called **synantennomere 3** (Fig. 6). The combination of the more thin articles following distally, is the **antennal filament**. **Article 3 of maxillary palp** (Fig. 6) corresponds with Rasnitsyn's (1965) "pmx". **Kidney shaped spots** refers to a pair of black, elongated spots of the vertex each situated between lateral ocellus and eye (Fig. 7; Fig. 25, kss; see Fig. 25 for **medial frontal spot**, mfs, and **stripes along frontal furrow**, sff). Terminology for **wing veins** as applied here is illustrated in Figs 4–5. **Flagellum of penis valve** indicates the specialized, long setae arising close to the lower distal margin of the valviceps of males (Figs 3, 126). In imagines of *Xyela* and *Pleroneura* Konow, 1897 the male genitalia are twisted at 180° along their longitudinal axis (strophandrous state), whilst in *Xyelecia* Ross, 1932, *Macroxyela* W.F. Kirby, 1882 and *Megaxyela* Ashmead, 1898 they remain untwisted (orthandrous state). To avoid confusion in comparing characters among the strophandrous and orthandrous taxa, the penis valves of *Xyela* species have been illustrated with the ventral margin directed upwards as it is usual for most sawflies. Accordingly the physiological ventral vs. dorsal parts will be called **upper** vs. **lower** parts as illustrated throughout this work. Along the upper margin of the valviceps in most *Xyela* species there is an apparent **proximal**, **medial** and **distal lobe**, the medial lobe bearing characteristic **cone-like sensilla** (Fig. 3).



FIGURES 2–5. Measurements and terminology of wing venation (see explanations on pp. 8–10). 2, *Xyela rasnitsyni* (paratype), ovipositor sheath (embedded in glycerine and therefore valvula 3 a little wider compared to dry, pinned specimens). 3, *X. alpigena*, penis valve. 4, *X. curva*, wings. 5, *X. lugdunensis* (paratype of *X. nigroabscondita*), fore wing.

Morphological measurement on whole specimens was carried out with stereo microscopes (Wild M3Z with maximum magnification 40 ×, Olympus SZX 12 with maximum magnification of 90 ×) equipped with an ocular scale, which enabled exact measurement of minimal distances of 25µm /11 µm or estimated 0.3 and 0.5 fractions of it. Accordingly, distances given in the descriptions are rounded in 10 µm or 25 µm steps. The estimated relative error varies between 1 % for long measured distances like length of tibia, and 5 % for very short distances like interspace of posterior ocelli. Measurement of characters from the penis valve was taken from printed digital images at similar magnification, which enabled minimal distances of 4 µm or an estimated 0.5 fraction of it (estimated relative mistake 1 %) to be measured. Usually measurements were made only from one body side of a specimen. If in a species only a single specimen per sex was available, both body sides were studied to estimate the variability range. Displayed values are to be understood as variable within the range of errors in measurement and natural variability, even though they are seemingly exact. Measured values were calculated with the spread sheet QuattroPro 8 (Corel Co.). Zöfel (1988) was consulted for statistical analysis.

Sections of the wing venation were measured from the medial point of a vein furcation / fusion. Measured distances on the penis valve (Fig. 3) were taken either along the longitudinal axis of the penis valve or along lines at a right angle relative to longitudinal axis). The following measurements have been taken:

– **POL**, postocellar line: shortest distance between medial edges of posterior ocelli (POL and OOL are each taken in vertical view on measured line).
– **OOL**, ocellus-ocular line: shortest distance between lateral edge of posterior ocellus and edge of neighboring eye (taken in vertical view on measured line).
– **Length of synantennomere 3**, **antennomere 4**, **scape**, **article 3 of maxillary palp**, **posterior tibia**: distance between proximal and distal end of these articles, in parallel-sided antennal articles 3 and 4 taken parallel to outer edge (base of article 4 sometimes retracted into apex of synantennomere 3), in scape along outer surface (base sometimes covered), in maxillary article 3 along lateral surface, in posterior tibia along dorsal edge.
– **Width of antennomere 4**: width at distal end of article (larger diameter if cross-section was asymmetric).
– **Length of fore wing**: distance between anterior edge of tegula to distal edge of wing.
– **Length of valviceps** of penis valve: distance between proximal edge of proximal lobe and distal edge of distal lobe (Fig. 3: 1).
– **Length of proximal lobe** of penis valve: distance between proximal edge of proximal lobe and proximal edge of medial lobe (Fig. 3: 2).
– **Width of proximal lobe** of penis valve: widest distance between upper edge of proximal lobe and base line (Fig. 3: 3).
– **Width of medial lobe** of penis valve: widest distance between upper edge of medial lobe and base line (Fig. 3: 4).
– **Width of lower excision** of penis valve: widest distance between upper edge of excision and base line (Fig. 3: 5).
– **Width of distal lobe** of penis valve: distance between tip of distal lobe and base line (Fig. 3: 6).
– **Length of longer distal filament** of penis valve: distance between apex of filament and base line (actually the filament is shorter, because it arises dorsally from lower distal edge of penis valve, Fig. 3: 7).
– **Length of valvifer 2** of ovipositor: distance between proximal, curved edge and distal sclerotized edge (proximal edge sometimes covered by hypopygium, Fig. 2: 1).
– **Length of valvula 3** of ovipositor: distance between distal sclerotized edge of valvifer 2 and tip of valvula 3 (taken as a straight line in species with curved valvula 3, Fig. 2: 2).
– **Length of ovipositor**: combined length of valvifer 2 plus valvula 3 as described above (Fig. 2).
– **Width of valvula 3** of ovipositor: distance between dorsal and ventral edge of valvula 3 (Fig. 2:3).

Usually dry specimens were measured, as this is the normal condition of material that is to be identified. The ovipositor sheaths illustrated in Figs 2, 86, 88–89 and 92 were photographed after having been mounted in glycerine. Here valvula 3 may be pressed flat and therefore be a little wider. Other light microscopic images of ovipositor sheaths (Figs 95–120) were taken from dried collection material.

Barcoding analysis

The barcoding analysis was conducted for the following species for which suitable material was available: *Xyela alpigena*, *X. bakeri*, *X. curva*, *X. graeca*, *X. julii*, *X. longula*, *X. menelaus*, and *X. obscura*. DNA extraction was attempted for a considerable number of additional specimens and species, but conventional collection material was often too old or had been treated in an unsuitable way (e.g., specimens re-moistened for mounting subsequent to collection). For DNA extraction the single leg of an imago or a small section from the abdomen of a larva was removed and submitted to the Canadian Centre for DNA Barcoding (CCDB) in Guelph, Canada, where the DNA sequencing was performed. Specimens sequenced successfully are listed in the Appendix. The DNA extracts are stored at the CCDB, the vouchers at the DEI.

DNA extraction, PCR amplification, and sequencing were conducted using standardised high-throughput protocols (Ivanova et al. 2006, DeWaard et al. 2008). The target region has a length of 658 bp, starting from the 5' end of the mitochondrial cytochrome c oxidase I (COI) gene and includes the 648 bp barcode region used as standard in the animal kingdom (Hebert et al. 2003). Sequence data can be obtained through BOLD (http://www.barcodinglife.com/) and include LIMS report, primer information, and access to trace files. Sequences were aligned using the BOLD Aligner. Sequence divergence statistics were calculated using the Kimura 2-parameter model. Genetic distances were calculated using analytical tools in BOLD and are given as maximum pairwise distances for intraspecific variation and as minimum pairwise distances for interspecific variation. Specimens without a Binary Index Number (BIN) were excluded from these calculations but some with shorter sequences were subsequently included to associate imagines and larvae (Fig. 23). Clusters of similar sequences are denoted by a Globally Unique Identifier (GUID) that is registered in BOLD.

Distribution maps

Distribution maps were printed with CFF 1.2 (Carto Fauna-Flora by Barbier & Rasmont, Mons, Belgium, 1996 / 1997) with 35° latitude adopted as the reference parallel for cylindrical projection and scale. The overlay of the natural distribution of host plants follows various references cited in the figure legends. Depicted records are based on material examined during this study, unless specified otherwise in the legends. The number of specimens and records illustrated in a map is given in the legends, but fewer records may be visible on a map due to overlap of collection sites situated near to each other.

Author contributions

AS collected imagines mainly in the East Palearctic, SB in the West Palearctic and in the Nearctic. EA and SB collected and reared larvae of West Palearctic species. SB was responsible for taxonomic decisions and for writing the manuscript. All authors contributed improvements during the final stages of manuscript preparation.

Results and discussion: identification, hosts and distribution

Character assessment

Xyela species, particularly those of the *X. julii* group, are difficult to distinguish and it is sometimes impossible to identify individual specimens for certain (Blank et al. 2005; see also discussion under particular species below). This is primarily caused by the paucity of utilizable characters. The key mainly uses genitalic characters and the relative length of the body appendages for species identification, e.g., of antennomere 4, article 3 of maxillary palp, fore wing, and valvifer 2 and valvula 3 of the ovipositor sheath. The relative distance of the posterior ocelli from each other (POL) and from the eye margin (OOL) is an additional aid in a few species, e.g., in *X. julii* and *X. obscura*. The relative length of the synantennomere 3 and the posterior tibia has been found to be of lesser use due to comparatively high intraspecific variability. Most characters are visible under a stereo microscope at magnifications of 40–100, but for the study of the ovipositor and penis valve temporary embedding of the material on slides and investigation under a compound microscope is indispensable. Among reared series single 'abnormal' specimens with enlarged or shortened body appendages (e.g., antennomeres, ovipositor and sheath), with an atypical deflection of the ovipositor sheath or with malformed wing veins have regularly been observed.

Many keys to *Xyela* and other Hymenoptera apply the complete antennal length or the length of the flagellum as an identification character (e.g., Enslin 1918, Benson 1951, Zhelochovtsev & Zinovjev 1988). However, in the vast majority of dried Hymenoptera specimens the antennae are more or less curved or even curled (e.g., many Ichneumonidae and Pompilidae), which in practice tempts users of these keys to estimate the length rather than to measure. This curved condition is general in *Xyela*, too (Figs 6–7). Despite individual variability, the length of article 4 has proved to correlate with the length of the complete filament. Therefore it appears more practicable to measure only this article. The identification of material within a known geographical or biological context may sometimes be easily achieved using the length of article 4, e.g., for the discrimination of *X. curva* from *X. graeca* and *X. menelaus* in reared series from *Pinus nigra*.

The comparatively short and narrow article 3 of the maxillary palp in relation to the scape is characteristic for *X. lugdunensis* and the *X. longula* group. Although the base of the scape may be hidden a little in the antennal toruli, the relative proportions are usually clear.

The ovipositor and the ovipositor sheath bear several characters which are important for species identification. Valvula 3 is curved in several species to various degrees (particularly in the *X. curva* group and in *X. rasnitsyni*, Figs 104, 118–120). Therefore, the absolute length of the ovipositor sheath is always taken as the combination of the length of valvifer 2 and valvula 3, each taken separately as a straight line (Fig. 2). The base of valvifer 2 may be covered a little by the hypopygium. The shape of valvula 3 in the medial section (round, diamond-shaped, strongly compressed in cross section; dorsal and ventral edge parallel-sided or narrowing toward tip), and at the tip (acicular, narrowly or widely rounded, knife-like) are reliable and easily accessible identification characters. The tip of valvula 3 bears a sensilla field in most *Xyela* species, which is furnished with 3–9 stout setae (Figs 91, 93–94). The investigation of this assemblage requires temporary embedding of valvula 3 and study with a compound microscope. The setae may be absent because they easily break off in dry specimens. On principle this method applies to the study of the ovipositor, too, which may bear annuli and teeth on the lateral wall (Figs 121–125), and setae on the medial wall. The assemblage of closely spaced, parallel, oblique annuli of valvula 2, ctenidia, the distal end of the aulax (Fig. 124), the pale and dark color pattern and the dorsal tooth of valvula 2 in the *X. curva* group (Fig. 123) are usually already visible under the stereo microscope, without special preparation of the specimens.

The male genitalia can be studied after treatment in potassium hydroxide solution and temporary embedding. Only the length of the harpe can be taken from dry specimens (Fig. 153). *Xyela rasnitsyni* is easily distinguished from other species occurring in this region by the harpe, which is longer than wide (in other species as long as wide or shorter). The basiparamere bears either a rectilinear (Figs 153–154) or a curved longitudinal apodeme (Figs 155–156). Printouts of electronic images enable the most accurate measurement of penis valves, although it is also possible to measure the values directly using a microscope eye piece with scale. The lower ergot may be present or absent. A very small, virtually absent lower ergot, which is completely concealed by the valvular stalk, has been scored as absent for practical reasons. Despite some individual variability, the relative length and width of the valviceps, of its three lobes, of the excision on the lower edge, and of the longer distal filament yielded a set of taxonomically useful characters (Figs 3, 126–152). The proximal end of the proximal lobe, which passes over to less sclerotized connective cuticle, may be obscured. The proximal end of the medial lobe is sometimes difficult to identify, if it fuses softly with the surface of the proximal lobe.

The general coloration has often been found to be species specific although it varies between individuals (see, e.g., Figs 54–57 for *X. densiflorae*, Figs 66–69 for *X. par*, Figs 74–77 for *X. tecta*, Figs 78–81 for *X. uncinatae*, Figs 82–85 for *X. variegata*). Voucher specimens may fade drastically after long storage in daylight. The head typically is yellow with black or brown on postocellar area in the middle, surroundings of ocelli, kidney shaped spots of the vertex, stripes along the antennal furrows, and a longitudinal spot in the middle of the frontal area (Figs 24–85). This pattern may become darker (head predominantly dark brown to black in females of *X. heldreichii* [Fig. 58], *X. obscura* [Fig. 64], many females of *X. uncinatae* [Fig. 78], and in both sexes of *X. japonica* [Figs 44–45], *X. occidentalis* [Figs 46–47]) or paler (e.g., stripes along the antennal furrows tiny or often absent in *X. graeca* [Fig. 51], *X. menelaus* [Figs 62–63]). Also the coloration of the ovipositor sheath may be suitable for identification, although it appears to be more variable than the pattern of the head.

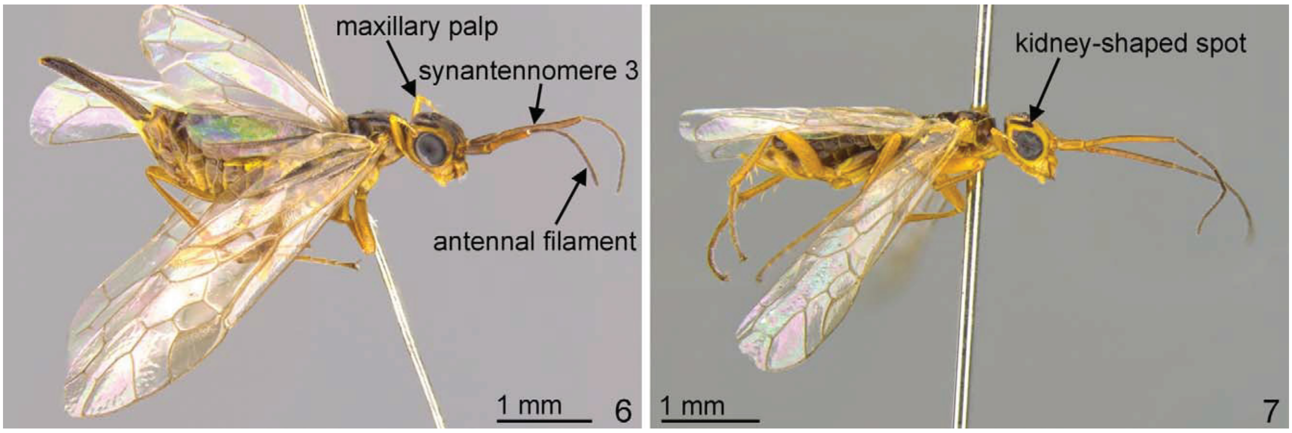
Xyela Dalman, 1819

Pinicola Brébisson [reported by Blainville], 1818: 116–117, type species: *Pinicola julii* Brébisson, 1818, by monotypy, preoccupied by *Pinicola* Vieillot, 1807 or 1808 in Vieillot 1807–1809: tome 1, p. iv, tab. 1 fig. 13 (Aves: Fringillidae).
Mastigocerus [also spelled: Mastigocère] Latreille, 1818: 451 (unavailable name); Taeger & Blank 1996: 255 (nomenclature).
Mastigocera Berthold, 1827: 442 (unavailable name).
Mastigoceras Klug: Thomson 1871: 341 (misspelling).
Xyela Dalman, 1819: 122–124, type species: *Xyela pusilla* Dalman, 1819, by subsequent designation of Curtis 1824 : 30.
Pinicolites Meunier, 1920: 896, type species: †*Pinicolites graciosus* Meunier, 1920, by monotypy.
Xyela subgen. *Pinicolites*: Rasnitsyn 1997: 2 (status changed).
Tritokreion Schilling in Schummel, 1826: 43, type species: *Xyela pusilla* Dalman, 1819, by subsequent designation of Blank et al. 2009: 72.
Tritokriton: Dalla Torre 1894: 458 (misspelling).
Tritocreion: Konow 1905: 22 (misspelling).
Neoxyela Curran, 1923: 20, type species: *Neoxyela alberta* Curran, 1923, by monotypy; Ross 1937: 106–107 (junior synonym of *Xyela*).
Xyelatana Benson, 1938: 34, type species: *Xyela longula* Dalman, 1819, by original designation; Burdick 1961: 322 (junior synonym of *Xyela*).
Xyela subgen. *Mesoxyela* Rasnitsyn, 1965: 491, 497–498, 512–513, type species: *Xyela* (*Mesoxyela*) *mesozoica* Rasnitsyn, 1965, by original designation.
Xyela subgen. *Xyela* section *Alpigenixyela* Rasnitsyn, 1971: 194, name for *X. alpigena* group of Rasnitsyn (1965) (unavailable name due to missing designation of type species, Art. 13.3., ICZN 1999).
Xyela subgen. *Xyela* section *Concavixyela* Rasnitsyn, 1971: 194, type species: *Xyela concava* Burdick, 1961, by monotypy.
Xyela subgen. *Xyela* section *Desertixyela* Rasnitsyn, 1971: 194: type species: *Xyela deserti* Burdick, 1961, by monotypy.
Xyela subgen. *Xyela* section *Linsleyixyela* Rasnitsyn, 1971: 193, name for *X. linsleyi* group of Rasnitsyn (1965) (unavailable name due to missing designation of type species, Art. 13.3., ICZN 1999).
†*Xyela* subgen. *Xyela* section *Magnixyela* Rasnitsyn, 1971: 193, name for *X. magna* group of Rasnitsyn (1965) (unavailable name due to missing designation of type species, Art. 13.3., ICZN 1999).
Xyela subgen. *Xyela* section *Minorixyela* Rasnitsyn, 1971: 194, name for *X. minor* group of Rasnitsyn (1965) (unavailable name due to missing designation of type species, Art. 13.3., ICZN 1999).

Remarks. *Xyela* Dalman, 1819 is the type genus of Xyelidae Newman, 1834, which was originally spelled Xyelites by Newman (1834: 408). André (1881) recognized that the description of *Pinicola* Brébisson, 1818 predates that of *Xyela*, and he treated the latter name as a synonym. Consequently he also introduced the family-group name Pinicolidae André, 1881 (pp. 465–466) to replace Xyelides since at that time family-group names were usually based on the stem of the valid name of the type genus concerned. The name *Pinicola* had already been used by Vieillot (1807–1809) for the valid description of a genus of birds. This description has been wrongly dated to 1805 (e.g., by Hellmayr 1938, Blank et al. 2009), but the proper publication date of *Pinicola* in Vieillot's work, which was printed in 12 consecutive issues, is 1.12.1807 (Browning & Monroe 1991, Banks & Browning 1995) or 1808 (Peterson 2013). *Pinicola* Vieillot makes *Pinicola* Brébisson a junior homonym. Due to this homonymy, Pinicolidae André is not available (ICZN 1999, Art. 39). The stem Xyel- of the junior name *Xyela* has to be used for the formation of relevant family-group names. The validity and availability of the other genus-group names associated with *Xyela* were discussed by Blank et al. (2009).

Xyela can be recognized with help of the key by Blank (2002). Imagines are distinguished from other Xyelidae by the combination of the following characters: vein Sc of the fore wing closely adpressed to vein R (Fig. 4); ovipositor elongate (Figs 6, 95–120); antennal flagellum longer than synantennomere 3, comprising 9 antennomeres (Figs 6–7); maxillary palp enlarged, particularly palpomere 3 (Figs 6–7, smaller in *X. helvetica*, *X. longula*, *X. lugdunensis*); evident tergal grooves present; surface coriaceous (except for the Nearctic *X. deserti*); wings without setae. The Nearctic *X. lata* D.R. Smith, 1990 disagrees with this concept. It has a narrow cell present between veins Sc and R, a comparatively short antennal filament and unlike other *Xyela* species a shiny surface sculpture (Smith 1990, Rasnitsyn 1995). *Xyela lata* has therefore been placed in *Xyela* (*Pinicolites*), while all other extant species are classified with *Xyela* (*Xyela*) (Rasnitsyn 1997, Blank et al. 2009, Taeger et al. 2010). A key for larvae of Xyelidae, which allows identification on genus level, was published by Smith (1967).

Rasnitsyn (1965) distinguished within the extant fauna a number of species groups based on his own studies and on the work of Burdick (1961). The *julii* group and the *longula* group only include species distributed in Eurasia. Subsequently, Rasnitsyn (1971) fused with the *julii* group the *bakeri* group, in which he originally included the Nearctic *X. bakeri* Konow, 1898 and the West Palearctic *X. graeca* and *X. menelaus*. In our barcoding analysis, *X. bakeri* imagines and larvae collected from *Pinus sabiniana* from California are placed at 10.07 % interspecific distance next to *X. menelaus* (Fig. 23, intraspecific variation ca 2 %). But this seemingly large divergence might merely result from insufficient consideration of additional species distributed in the New World. The *alpigena* group, *linsleyi* group and *minor* group contain species distributed both in Eurasia and in the Nearctic according to Rasnitsyn (1965). In our treatise on Eurasian *Xyela* species, leaving the Nearctic species out of consideration, these groups are named the *alpigena* group, *lugdunensis* group (for *linsleyi* group) and *curva* group (for *minor* group). Rasnitsyn's *concava* group (*Concavixyela*) and *deserti* group (*Desertixyela*) include only Nearctic species. The *meridionalis* group and the *rasnitsyni* group, which are defined in this study, are not associated with one of the groups recognized by Rasnitsyn. The use of species group names is here intended as an informal aid in sorting species taxonomically, although some of the groups that include more than a single species might be monophyletic. The diagnosis for each species group precedes a list of the included species below.



FIGURES 6–7. Habitus of *Xyela*. 6, *X. curva*, female. 7, *X. meridionalis*, male.

Key to the Eurasian *Xyela* species

1 Female **2**

– Male **31**

2(1) Tip of valvula 3 acutely pointed, without defined sensilla field (Figs 86–87, 95, 104). Ovipositor sheath very long, fore wing 0.90–1.35 times longer than ovipositor sheath **3**

– Tip of valvula 3 narrowly or widely rounded, bearing defined sensilla field (Figs 88–94, 96–103, 105–120). Ovipositor sheath shorter, fore wing at least 1.45 times longer than ovipositor sheath **5**

3(2) Article 3 of maxillary palp 1.45–1.65 times longer than scape, wider than synantennomere 3. Ovipositor sheath compressed, in medial section, combined width of both valvulae 3 in lateral view ca 3.5 times wider than in dorsal view. Dorsal edge of valvula 3 sloping down to acute tip, ventral edge almost straight (Fig. 2, 104). Vein 2r-m meeting Rs proximal to furcation of Rs1 and Rs2 from Rs. Northeastern China (Jilin), Russian Far East (Primorskiy Kray), South Korea (Fig. 22) . . . . ***Xyela rasnitsyni* Blank & Shinohara, sp. nov.** ♀

– Article 3 of maxillary palp 0.70–0.90 times as long as scape, narrower than synantennomere 3. Ovipositor sheath in medial section diamond-shaped in cross section, combined width of both valvulae 3 in medial section in lateral view ca 1.2 times width in dorsal view. Both dorsal and ventral edge of valvula 3 evenly narrowing to tip (Figs 86–87). Vein 2r-m mostly meeting Rs1 distal to furcation of Rs1 and Rs2 from Rs. West Palearctic species **4**

4(3) Ovipositor sheath ca 3.4 mm long, valvula 3 2.9–3.1 times longer than valvifer 2, 11.5–12.0 times longer than wide at base (Fig. 86). Fore wing 1.20–1.35 times longer than ovipositor sheath. Male unknown. Subalpine zone of Austria and Switzerland (Fig. 19). . . . . ***Xyela helvetica* (Benson, 1961)** ♀

– Ovipositor sheath 4.1–5.6 mm long, valvula 3 3.6–4.2 times longer than valvifer 2, 13.5–16.5 times longer than wide at base (Fig. 95). Fore wing 0.90–1.10 times longer than ovipositor sheath. Lowlands and mountainous regions of Europe, southwards to the Alps and neighboring mountain ranges (Fig. 20) . . . . ***Xyela longula* Dalman, 1819** ♀

5(2) Ovipositor strikingly short (Figs 89, 103): valvula 3 of ovipositor sheath 0.85–0.90 as long as valvifer 2, fore wing 3.3–3.5 times longer than ovipositor sheath. Taiwan (Fig. 12) . . . . ***Xyela meridionalis* Shinohara, 1983** ♀

– Ovipositor longer: valvula 3 of ovipositor sheath at least 1.35 times longer than valvifer 2, fore wing at most 2.8 times longer than ovipositor sheath **6**

6(5) Valvula 3 diamond-shaped in cross section, dorsal and ventral edge parallel in medial portion, narrowing in distal 0.10–0.15 to round tip (Fig. 88, 96). Article 3 of maxillary palp 1.10–1.20 times as long as scape, about as wide as synantennomere 3. France, Hungary (Fig. 21) . . . . ***Xyela lugdunensis* Berland, 1943** ♀

– Valvula 3 either strongly compressed and medially parallel-sided (Figs 92, 105–120), or diamond-shaped in cross section and wedge-shaped over complete length (Figs 90, 97–102). Article 3 of maxillary palp more than 1.30 times longer than scape, wider than synantennomere **7**

7(6) Valvula 3 wedge-shaped, dorsal and ventral outline steadily narrowing toward round tip (Figs 90, 97–102), medial portion diamond-shaped in cross-section, width about equal in lateral and dorsal view. Pale membranous triangle at base of valvula 3 several times longer on ventral edge than wide at base, distally often extending to preapical region of valvula **8**

– Valvula 3 of ovipositor sheath knife-shaped (Fig. 92, 105–120), strongly compressed, medial part of valvula 3 in lateral view 3–4 times wider than combined width of both valvulae 3 in dorsal view, dorsal edge sloping down to round apex, ventral edge almost straight. Pale membranous triangle of valvula 3 about as long on ventral edge as wide at base **13**

8(7) Valvula 3 2.30–2.60 times longer than valvifer 2. East Palearctic species **9**

– Valvula 3 1.90–2.20 times longer than valvifer 2. West and East Palearctic species **10**

9(8) Fore wing 1.55–1.70 times longer than ovipositor sheath. Wings almost clear. Article 3 of maxillary palp completely pale. Mesoscutellum usually with large yellow spot, seldom completely black. Eastern East Palearctic: Russian Far East (Primorskiy Kray), South Korea (Fig. 10) . . . . . . ***Xyela koraiensis* Blank & Shinohara, sp. nov.** ♀

– Fore wing (1.75–)1.85–2.00 times longer than ovipositor sheath. Wings slightly infuscate. Article 3 of maxillary palp more or less infuscate in proximal half. Mesoscutellum usually black, sometimes indistinctly yellow in middle. Eastern East Palearctic: subalpine zone of Japan (Hokkaido, Honshu), Russia (Kamchatka) (Fig. 9) . . . . . . ***Xyela kamtshatica* Gussakovskij, 1935** ♀

10(8) West Palearctic species **11**

– East Palearctic species **12**

11(10) Valvula 3 1.75–1.95 times longer than valvifer 2 (Fig. 97). Kidney-shaped spots and black stripes along frontal furrows fusing (ca. 75 % of specimens; pale specimen illustrated in Fig. 28). Subalpine zone of Austria, Germany, Switzerland (Fig. 8) . . . . . . ***Xyela alpigena* (Strobl, 1895)** ♀

– Valvula 3 (1.90–)1.95–2.20 times longer than valvifer 2 (Fig. 100). Kidney-shaped spots separated from black stripes along frontal furrows by yellow (ca. 75 % of specimens; dark specimen illustrated in Fig. 34). Mountains of Bulgaria (Fig. 8) . . . . . . ***Xyela peuce* Blank, sp. nov.** ♀

12(10) Ovipositor sheath 2.55–2.80 mm, valvula 3 9.0–9.5 times longer than wide basally (Fig. 101), fore wing 1.75–1.90 times longer than ovipositor sheath. Wings slightly infuscate. Valvifer 2 pale brown basally and infuscate distally. Central East Palearctic (possibly also in western part): Russia (Irkutskaya Obast), Mongolia (Hentiyn Nuruu) (Fig. 9) . . . . . . ***Xyela sibiricae* Blank, sp. nov.** ♀

– Ovipositor sheath 1.90–2.25 mm, valvula 3 6.5–8.0 times longer than wide basally (Fig. 102), fore wing 1.95–2.05 times longer than ovipositor sheath. Wings pale. Valvifer unicolorous pale brown. Eastern East Palearctic: Russian Far East (Primorskiy Kray), South Korea (Fig. 10) . . . . . . ***Xyela ussuriensis* Rasnitsyn, 1965** ♀

13(7) Posterior claws with subapical tooth (often very feeble). Valvula 3 evenly and distinctly curved downwards, often black (Figs 118–120). Valvula 2 of ovipositor with more or less evident alternating dark and pale pattern in distal half (Fig. 124) **14**

– Posterior claws without subapical tooth. Valvula 3 usually straight, sometimes indistinctly bent downwards in species with long ovipositor, often pale brown, sometimes dark brown, never black (Figs 105–117). Valvula 2 of ovipositor evenly pale brown **17**

14(13) Head yellow with dark pattern (Fig. 42) **15**

– Head black, or brown with dark brown or black pattern (e.g., in faded collection specimens; Figs 44, 46) **16**

15(14) Antennomere 4 6.0–7.5 times longer than wide distally. Fore wing 2.15–2.30 times longer than ovipositor sheath. European part of Mediterranean area, central and western Europe, Turkey (Fig. 11) . . . . . . ***Xyela curva* Benson, 1938** ♀

– Antennomere 4 4.0–5.0 times longer than wide distally. Fore wing 1.95–2.05 times longer than ovipositor sheath. China (Fujian, Hong Kong) (Fig. 12) . . . . . . ***Xyela exilicornis* Maa, 1949** ♀

16(14) Ovipositor 1.7–1.9 mm (Fig. 119), fore wing 3.7–4.6 mm long. Japan (Honshu) (Blank et al. 2005, fig. 3) . . . . . . ***Xyela japonica* Rohwer, 1910** ♀

– Ovipositor 1.5–1.7 mm (Fig. 120), fore wing 3.3–3.7 mm long. East Asian mainland: northeastern China (Jilin), South Korea (Blank et al. 2005, fig. 3) . . . . . . ***Xyela occidentalis* Blank & Shinohara, 2005** ♀

17(13) East Palearctic species **18**

– West Palearctic species **24**

18(17) Ovipositor sheath 1.20–1.85 mm long, if up to 2.00 mm then Japanese species **19**

– Ovipositor sheath 1.90–2.60 mm long and species from Asian mainland **23**

19(18) Wings brown infuscate. Ovipositor sheath 1.80–2.00 mm long (Fig. 115). Subalpine zone of Hokkaido, Japan (Fig. 9) . . . . . . ***Xyela pumilae* Blank & Shinohara, sp. nov.** ♀

– Wings clear or slightly infuscate. Ovipositor sheath usually shorter than 1.80 mm long, sometimes up to 1.95 mm (*X. variegata*). Species distributed below subalpine zone **20**

20(19) Japan. [Identification often doubtful.] **21**

– South Korea, expected for neighboring regions of East Asian mainland **22**

21(20) Fore wing (?2.30–)2.40–2.55 times longer than ovipositor sheath (Fig. 111). Japan (Honshu) (Blank et al. 2005, fig. 4) . . . . . . ***Xyela tecta* Blank & Shinohara, 2005** ♀

– Fore wing 2.00–2.30(–?2.40) times longer than ovipositor sheath (Fig. 112). Japan (Honshu) (Blank et al. 2005, fig. 5) . . . . . . ***Xyela variegata* Rohwer, 1910** ♀

22(20) Fore wing 2.10–2.40 times longer than ovipositor sheath (Fig. 106). Head yellow with dark pattern varying from pale brown to dark brown: frons brown with wide dark brown stripes along frontal furrows, dark brown medial spot, sometimes paler with medial spot surrounded by yellow (Figs 54–55), seldom frons completely dark, kidney-shaped spots on vertex usually fusing with brown pattern of frons anteriorly. South Korea (Blank et al. 2005, fig. 4) . . . . . *Xyela densiflorae* **Blank & Shinohara, 2005** ♀

– Fore wing 1.70–2.00 times longer than ovipositor sheath (Fig. 114). Frons and vertex with a large dark black to brown spot, kidney-shaped spots, stripes along frontal furrows and medial frontal spot usually not discernable (Figs 66–67). South Korea (Blank et al. 2005, fig. 5). [See Blank et al. 2005 for material from Vietnam with pale face and only with dark kidney-shaped spots and ocellar-postocellar area.] . . . . *Xyela par* **Blank & Shinohara, 2005** ♀

23(18) Valvula 3 2.15–2.25 times longer than valvifer 2, valvula 3 7.5–9.0 times longer than wide basally (Fig. 116). OOL : POL = 1.65–2.00 : 1. China (Fujian, Hong Kong, Jiangsu) (Fig. 12). . . . . *Xyela sinicola* **Maa, 1947** ♀

– Valvula 3 2.00–2.15 times longer than valvifer 2, valvula 3 6.5–8.0 times longer than wide basally (Fig. 109). OOL : POL = 1.30–1.70(–2.00) : 1. In East Palearctic eastwards to Mongolia, widely distributed in West Palearctic (Fig. 17; see also couplet 28) . . . . *Xyela julii* **(Brébisson, 1818)** ♀

24(17) Head dark brown or black, sometimes vertex with pale brown stripes (Figs 58, 64, 78). High montane and subalpine species (usually above 1,500 m altitude) **25**

– Face usually with rich yellow pattern, sometimes predominantly yellow, at least with large yellow stripes on vertex (Figs 50–52, 60, 62, 79). Species of lowland and montane regions (usually between 0–1,000 m altitude), rarely in subalpine zone **27**

25(24) Vertex usually completely black, seldom with indistinct brown spots (Fig. 64). Valvula 3 1.75–2.00 times longer than valvifer 2 (Fig. 113). Fore wing 2.00–2.15 times longer than ovipositor sheath. Distance between posterior ocelli often narrow, OOL : POL = 1.60–2.10 : 1. Central and eastern European Alps, westwards to Switzerland (overlapping there with *X. uncinatae*), neighboring low mountain ranges in Bulgaria and Slovakia (Fig. 19) . . . . *Xyela obscura* **(Strobl, 1895)** ♀

– Vertex usually with distinct pale brown to brown spots or stripes. Valvula 3 1.95–2.25 times longer than valvifer 2. Fore wing 1.60–2.05 times longer than ovipositor sheath. Distance between posterior ocelli often wide, OOL : POL = 1.40–1.85 : 1. . . . . **26**

26(25) Fore wing 1.60–1.80 times longer than ovipositor sheath. Ovipositor sheath usually longer than 2.3 mm, usually valvula 3 brown and valvifer 2 pale brown (Fig. 108). Albania, Greece (Fig. 16). . . . . *Xyela heldreichii* **Blank, sp. nov.** ♀

– Fore wing 1.80–2.05 times longer than ovipositor sheath. Ovipositor sheath usually shorter than 2.3 mm, valvifer 2 and valvula 3 similarly colored (Fig. 117). Western Alps (France, Switzerland), Pyrenees (Andorra, Spain) (see also couplet 28; Fig. 19). . . . . *Xyela uncinatae* **Blank, sp. nov.** ♀

27(24) Valvula 3 6.5–8.0 times longer than wide basally **28**

– Valvula 3 4.0–6.0 times longer than wide basally **29**

28(27) Fore wing 1.60–1.90 times longer than ovipositor sheath (Fig. 109). Widely distributed from 0–1,000 m altitude in northern and central West Palearctic (occasionally at higher altitude), in Mediterranean region at 1,400–1,700 m altitude, in East Palearctic eastwards to Mongolia (see also couplet 23; Fig. 17) *Xyela julii* **(Brébisson, 1818)** ♀

– Fore wing 1.80–2.05 times longer than ovipositor sheath (Fig. 117). Pale form of *X. uncinatae* (see also couplet 26). Subalpine zone of western Alps (France, Switzerland) and Pyrenees (Andorra, Spain) (Fig. 19) *Xyela uncinatae* **Blank, sp. nov.** ♀

29(27) Valvifer 2 pale brown, valvula 3 dark brown (Fig. 105). Wings slightly infuscate. Face medially diffusely pale brown up to eye margins, darker than yellow stripe on vertex between kidney-shaped spot and upper eye margin, along frontal furrows little darker brown without clearly defined stripes, brown medial spot of frons present and weakly contrasting (Fig. 50). Lateral face of posterior coxae dark brown. Male unknown. Croatia (Fig. 13) . . . . *Xyela altenhoferi* **Blank, sp. nov.** ♀

– Valvifer 2 and valvula 3 similarly pale brown or yellow (Figs 107, 110). Wings clear. Medial part of face similarly yellow as stripe on vertex between kidney-shaped spot and upper eye margin, face often with strongly contrasting dark brown medial spot and stripes along frontal furrows (Figs 51–52, 62). Lateral face of posterior coxae usually yellow or pale brown. Identification often doubtful **30**

30(29) Valvula 3 (?4.5–)4.8–5.8 times longer than wide basally, valvula 3 (?1.60–)1.70–2.00 times longer than valvifer 2, ovipositor sheath (1.45–)1.60–1.80 mm long (Fig. 107), fore wing 1.90–2.35(–2.55?) times longer than ovipositor sheath. Northern part of Mediterranean Basin and adjacent areas, on Balkans northwards to Vienna Basin (Fig. 15) . . . . *Xyela graeca* **J.P.E.F. Stein, 1876** ♀

– Valvula 3 4.0–4.5(–?4.8) times longer than wide basally, valvula 3 1.35–1.70(–?1.80) times longer than valvifer 2, ovipositor sheath 1.30–1.65(–?1.70) mm long (Fig. 110), fore wing (2.25?–)2.40–2.80 times longer than ovipositor sheath. Northern part of Mediterranean Basin and adjacent areas, on Balkans northwards to Vienna Basin (Fig. 18) . . . . *Xyela menelaus* **Benson, 1960** ♀

31(1) Posterior claws without subapical tooth. Medial lobe of valviceps strongly protruding, proximal lobe 0.60–0.80 times as wide as medial lobe. Lateral lamella of valviceps distinct, strongly oblique (Figs 141–152). Face yellow or pale brown at least along eye margin, vertex with yellow stripe (e.g., Figs 53, 61), frons often more or less brown or black (e.g., Figs 57, 81) **32**

– Posterior claws with subapical tooth (often very feeble). Proximal lobe of valviceps at least 0.90 times as wide as medial lobe, often wider than medial lobe (Figs 126–140). Lateral lamella of valviceps vertical or slightly oblique (Fig. 126–139), sometimes indistinct or absent (Figs 126–127, 140). Either face yellow with brown and black pattern (e.g., Figs 25, 29), or head predominantly dark (at least face with eye margin continuously dark, Figs 45, 47) **44**

32(31) East Palearctic species **33**

– West Palearctic species **39**

33(32) Upper edge of proximal lobe of valviceps almost parallel to longitudinal axis of valviceps, straight or slightly concave (Figs 141, 144, 148, 150) **34**

– Upper edge of proximal lobe of valviceps sloping down toward valvular stalk proximally, more or less convex (Figs 149, 152, 147) **37**

34(33) Medial lobe of valviceps 1.10–1.25 times as wide as distal lobe (Figs 144, 148) **35**

– Medial lobe of valviceps 1.30–1.50 times as wide as distal lobe. Identification without additional geographic information often doubtful (Figs 141, 150) **36**

35(34) Wings brown infuscate. Tip of longer distal filament of valviceps reaching 0.55–0.65 of width of distal lobe of valviceps (Fig. 148). Stripes along frontal furrows and medial spot of frons black. Subalpine zone of Hokkaido, Japan (Fig. 9) . . . . *Xyela pumilae* **Blank & Shinohara, sp. nov.** ♂

– Wings almost clear. Tip of longer distal filament of valviceps reaching 0.65–0.75 of width of distal lobe of valviceps (Fig. 144). Stripes along frontal furrows and medial spot of frons often dark brown. East Palearctic eastwards to Mongolia, widely distributed in West Palearctic (see also couplet 42; Fig. 17) *Xyela julii* **(Brébisson, 1818)** ♂

36(34) Proximal vertical edge of medial lobe of valviceps straight or slightly concave (Fig. 150). Japan (Honshu) (Blank et al. 2005, fig. 4) *Xyela tecta* **Blank & Shinohara, 2005** ♂

– Proximal vertical edge of medial lobe of valviceps concave (Fig. 141). South Korea (Blank et al. 2005, fig. 4) . . . . *Xyela densiflorae* **Blank & Shinohara, 2005** ♂

37(33) Proximal lobe of valviceps 0.18–0.22 times as long as valviceps (Fig. 149). China (Fujian, Hong Kong, Jiangsu) (Fig. 12) . . . . *Xyela sinicola* **Maa, 1947** ♂

– Proximal lobe of valviceps 0.24–0.33 times as long as valviceps (Figs 147, 152) **38**

38(37) Valviceps (1.30–)1.40–1.45 times longer than wide, proximal lobe 0.60–0.65 times as wide as medial lobe. Median longitudinal sclerotization of valviceps usually distinct (Fig. 152). Japan (Honshu) (Blank et al. 2005, fig. 4) . . . . *Xyela variegata* **Rohwer, 1910** ♂

– Valviceps 1.45–1.65 times longer than wide, proximal lobe of valviceps 0.65–0.70 times as wide as medial lobe. Median longitudinal sclerotization of valviceps usually indistinct (Fig. 147). South Korea (Blank et al. 2005, fig. 4) . . . . *Xyela par* **Blank & Shinohara, 2005** ♂

39(32) Longer distal filament of valviceps 0.85–1.05 times as long as width of distal lobe of valviceps. Distal edge of medial lobe of valviceps gradually ascending (Fig. 142, 145). Lateral side of posterior coxae predominantly yellow, more or less dark at base. Face predominantly yellow, stripes along frontal furrows often inconspicuous (Figs 53, 63) **40**

– Longer distal filament of valviceps 0.55–0.75 times as long as width of distal lobe of valviceps. Distal edge of medial lobe of valviceps steeply ascending (Fig. 143–144, 146, 151). Lateral side of posterior coxae predominantly brown or dark brown. Stripes along frontal furrows usually wide and conspicuous or face predominatly brown (Figs 59, 61, 65, 81). [Species very similar in color and morphology; identification often impossible without information on collection site like altitude, geographical position, available *Pinus* species.] **41**

40(39) Proximal lobe of valviceps with upper edge converging with longitudinal axis of valviceps, proximal edge evenly rounded. Excision of lower edge 0.16–0.22 times as deep as width of medial lobe, medial lobe 1.35–1.55 times wider than distal lobe. Distal flagella usually longer, longer flagellum reaching (0.90–)0.95–1.05 of width of distal lobe (Fig. 142). Northern part of Mediterranean Basin, northwards to Lower Austria (Fig. 15) . . . . *Xyela graeca* **J.P.E.F. Stein, 1876** ♂

– Proximal lobe of valviceps with upper edge almost parallel to longitudinal axis of valviceps, proximally abruptly turning down to truncate vertical edge. Excision of lower edge 0.23–0.27 times as deep as width of medial lobe, medial lobe 1.15–1.30(–1.35) times wider than distal lobe. Distal flagella usually shorter, longer flagellum reaching 0.85–0.90(–0.95) of width of distal lobe (Fig. 145). Northern part of Mediterranean Basin, northwards to Lower Austria (Fig. 18). . . . *Xyela menelaus* **Benson, 1960** ♂

41(39) OOL : POL = 1 : (1.30–)1.40–1.75. Altitudinal distribution from lowland to subalpine zone **42**

– OOL : POL = 1 : (1.50–)1.60–1.90 and altitudinal distribution exclusively subalpine **43**

42(41) Synantennomere 3 640–810 µm long. Hypopygium usually yellow, paler than preceding sterna. Stripes along frontal furrows 1.0–1.5 times as wide as ocellar diameter (Fig. 59). On stands of *Pinus heldreichii*. Mountains of Albania and Greece above 1,500 m altitude (Fig. 16) . . . . *Xyela heldreichii* **Blank, sp. nov.** ♂

– Synantennomere 3 540–600(–650) µm long. Hypopygium usually brown to dark brown, color similar to that of preceding sterna. Stripes along frontal furrows often wide and fusing with medial spot, at least wider than 2 times ocellar diameter (Fig. 61). On stands of *Pinus sylvestris*. Widely distributed from 0–1,000 m altitude in northern and central West Palearctic (occasionally at higher altitude), in Mediterranean region at 1,400–1,700 m altitude, in East Palearctic eastwards to Mongolia (see also couplet 35; Fig. 17) . . . . *Xyela julii* **(Brébisson, 1818)** ♂

43(41) On stands of *Pinus mugo*. Central and eastern European Alps, westwards to Switzerland (overlapping there with *X. uncinatae*), mountain ranges in Bulgaria and Slovakia (Fig. 19). . . . . *Xyela obscura* **(Strobl, 1895)** ♂

– On stands of *Pinus uncinata*. Western European Alps (France, Switzerland), Pyrenees (Fig. 19) . . . . *Xyela uncinatae* **Blank, sp. nov.** ♂

44(31) Valviceps without lateral lamella (Fig. 126) or lateral lamella indistinct and oblique (Fig. 140) **45**

– Valviceps with distinct lateral lamella, vertical or slightly oblique (Figs 128–139) **46**

45(44) Medial lobe broadly rounded, situated almost in middle of valviceps, 1.05–1.15 times wider than distal lobe. Excision of lower edge of valviceps 0.16–0.23 times as deep as width of medial lobe (Fig. 126). Lowland and mountainous regions of Europe, southwards to the Alps and neighboring mountain ranges (Fig. 20). [Unknown male of *X. helvetica* from subalpine zone of Austrian and Swiss Alps (Fig. 19) possibly similar.] . . . . *Xyela longula* **Dalman, 1819** ♂

– Medial lobe roundly protruding, situated in proximal quarter of valviceps, 1.60–1.65 times wider than distal lobe. Excision of lower edge of valviceps 0.30 –0.31 times as deep as width of medial lobe (Fig. 140). Northeastern China (Jilin), Russian Far East (Primorskiy Kray), South Korea (Fig. 22) . . . . *Xyela rasnitsyni* **Blank & Shinohara, sp. nov.** ♂

46(44) Dorsal edge of proximal lobe of valviceps strongly curved, proximal section more or less concave (Figs 128–135). Proximal lobe often wider than medial lobe. Lateral lamella usually narrow (seldom as wide as in Figs 128), proximal and distal weakly edge s-shaped **47**

– Dorsal edge of proximal lobe of valviceps weakly curved, evenly concave throughout (Figs 136–139). Proximal lobe of valviceps usually narrower, at most as wide as medial lobe. Lateral lamella of valviceps wide, proximal edge convex and distal base concave **54**

47(46) Article 3 of maxillary palp 1.15 times as long as scape. Proximal lobe of valviceps 0.90 times as wide as medial lobe (Fig. 128). Medial lobe with 28–30 cone-like sensillae. France, Hungary (Fig. 21) . . . . ***Xyela lugdunensis*** **(Berland, 1943)** ♂

– Article 3 of maxillary palp 1.25–1.65 times as long as scape. Proximal lobe of valviceps 0.95–1.10 times as wide as medial lobe (Figs 129–135). Medial lobe with 8–30 cone-like sensillae (only 8–15 sensillae in specimens with article 3 of maxillary palp 1.25–1.30 times as long as scape) **48**

48(47) Excision of lower edge of valviceps ca 0.27 as deep as width of medial lobe. Medial lobe ca 1.25 times wider than distal lobe and tip of longer distal filament reaching ca 0.95 of width of distal lobe (Fig. 135). Taiwan (Fig. 12) . . . . ***Xyela meridionalis*** **Shinohara, 1983** ♂

– Excision of lower edge of valviceps 0.11–0.23 as deep as width of medial lobe. Medial lobe at least 1.30 times (usually 1.50–1.75 times) wider than distal lobe or tip of longer distal filament reaching at most 0.90 of width of distal lobe (Figs 129–134) **49**

49(48) Wings slightly infuscate. Medial lobe of valviceps 1.50–1.75 times wider than distal lobe (Figs 129–130, 132–133) **50**

– Wings clear. Medial lobe of valviceps 1.25–1.45 times wider than distal lobe (Figs 131, 134) **53**

50(49) Stripes along frontal furrows in middle at most as wide as ocellar diameter, often fading (Figs 29, 35). West Palearctic species **51**

– Stripes along frontal furrows in middle at least 2 times wider than ocellar diameter, sometimes frons predominantly black (Figs 31, 37). East Palearctic species **52**

51(50) Valviceps 1.45–1.50 times longer than wide, medial lobe with 22–30 cone-like sensilla (Figs 3, 129). Stripes along frontal furrows often fading (Fig. 29). Subalpine zone of Austria, Germany, Switzerland (Fig. 8) ***Xyela alpigena*** **(Strobl, 1895)** ♂

– Valviceps 1.55–1.60 times longer than wide, medial lobe with 14–15 cone-like sensilla (Figs 132). Stripes along frontal furrows continuous (Fig. 35). Mountains of Bulgaria (Fig. 8) ***Xyela peuce*** **Blank, sp. nov.** ♂

52(50) Valviceps 1.30–1.40 times longer than wide, medial lobe 1.70–1.75 times wider than distal lobe, proximal lobe 0.19–0.23 times as long as valviceps (Figs 130). Mesoscutellum black. Article 3 of maxillary palp yellow, proximal half more or less infuscate. Eastern East Palearctic: subalpine zone of Japan (Hokkaido, Honshu), Russia (Kamchatka) (Fig. 9) . . . . ***Xyela kamtshatica*** **Gussakovskij, 1935** ♂

– Valviceps 1.45–1.50 times longer than wide, medial lobe 1.50–1.55 times wider than distal lobe, proximal lobe 0.14–0.15 times as long as valviceps (Fig. 133). Mesoscutellum with large yellow spot. Article 3 of maxillary palp yellow or pale brown. Central East Palearctic (possibly also in western part): Russia (Irkutskaya Obast), Mongolia (Hentiyn Nuruu) (Fig. 9) . . . . ***Xyela sibiricae*** **Blank, sp. nov.** ♂

53(49) Hypopygium as dark brown as other sterna, seldom a little paler. Medial lobe of valviceps 1.40–1.45 times as wide as distal lobe (Fig. 131). Eastern East Palearctic: Russian Far East (Primorskiy Kray), South Korea (Fig. 10) . . . . ***Xyela koraiensis*** **Blank & Shinohara, sp. nov.** ♂

– Hypopygium pale brown to yellow, preceding sterna significantly darker. Medial lobe of valviceps 1.30–1.40 times as wide as distal lobe (Fig. 134). Eastern East Palearctic: Russian Far East (Primorskiy Kray), South Korea (Fig. 10) . . . . ***Xyela ussuriensis*** **Rasnitsyn, 1965** ♂

54(46) Pale colored species: head yellow with pale brown to black pattern (Fig. 43) **55**

– Predominantly dark colored species: head black or brown with dark brown to black pattern (Figs 45, 47) **56**

55(54) Lower edge of valviceps with evenly rounded excision, excision 0.15–0.21 times as deep as width of valviceps (Fig. 136). European part of Mediterranean area, central and western Europe, Turkey (Fig. 11) . . . . ***Xyela curva*** **Benson, 1938** ♂

– Lower edge of valviceps with triangular excision, excision 0.30–0.33 times as deep as width of valviceps (Fig. 137). China (Fujian, Hong Kong) (Fig. 12) . . . . ***Xyela exilicornis*** **Maa, 1949** ♂

56(54) Valviceps 1.45–1.50 times longer than wide, proximal lobe 0.20–0.22 times as long as valviceps (Fig. 138). Japan (Honshu) (Blank et al. 2005, fig. 3) ***Xyela japonica*** **Rohwer, 1910** ♂

– Valviceps 1.55–1.70 times longer than wide, proximal lobe (0.22–)0.25–0.30 times as long as valviceps (Fig. 139). East Asian mainland: northeastern China (Jilin), South Korea (Blank et al. 2005, fig. 3). . . ***Xyela occidentalis*** **Blank & Shinohara, 2005** ♂

Species accounts

The following sections present detailed descriptions of morphology, nomenclature and ecology of the Eurasian *Xyela* species. *Xyela densiflorae*, *X. par*, *X. tecta*, *X. variegata* (members of the *julii* group) and *X. japonica* and *X. occidentalis* (*curva* group) from China (Jilin), Japan (Honshu) and South Korea have been treated by Blank et al. (2005) and only short summaries are included here. The host plant relationships for all *Xyela* species have been summarized in Tab. 2 on page 65.

Xyela alpigena group

Diagnosis. Ovipositor sheath usually straight, wedge-shaped, black, ventral edge more or less white, basal half diamond-shaped in cross-section, with narrowly rounded tip (Figs 90, 97–102), sensilla field in obliquely lateral position with 7–9 setae (Fig. 91); valvula 2 with irregularly spaced groups of sensilla campaniformia surrounded by dense sclerotization protruding roundly from dorsal edge of valvula 2 (Fig. 122); basal and medial lobe of penis valve protruding above level of distal lobe, basal lobe rounded on upper edge and slightly protruding above medial lobe, lateral lamella usually narrow with proximal and distal edges s-shaped (Figs 3, 129–134).

Species included. *Xyela alpigena* and *X. peuce* in the West Palearctic and *X. kamtshatica*, *X. koraiensis*, *X. sibiricae* and *X. ussuriensis* in the East Palearctic.

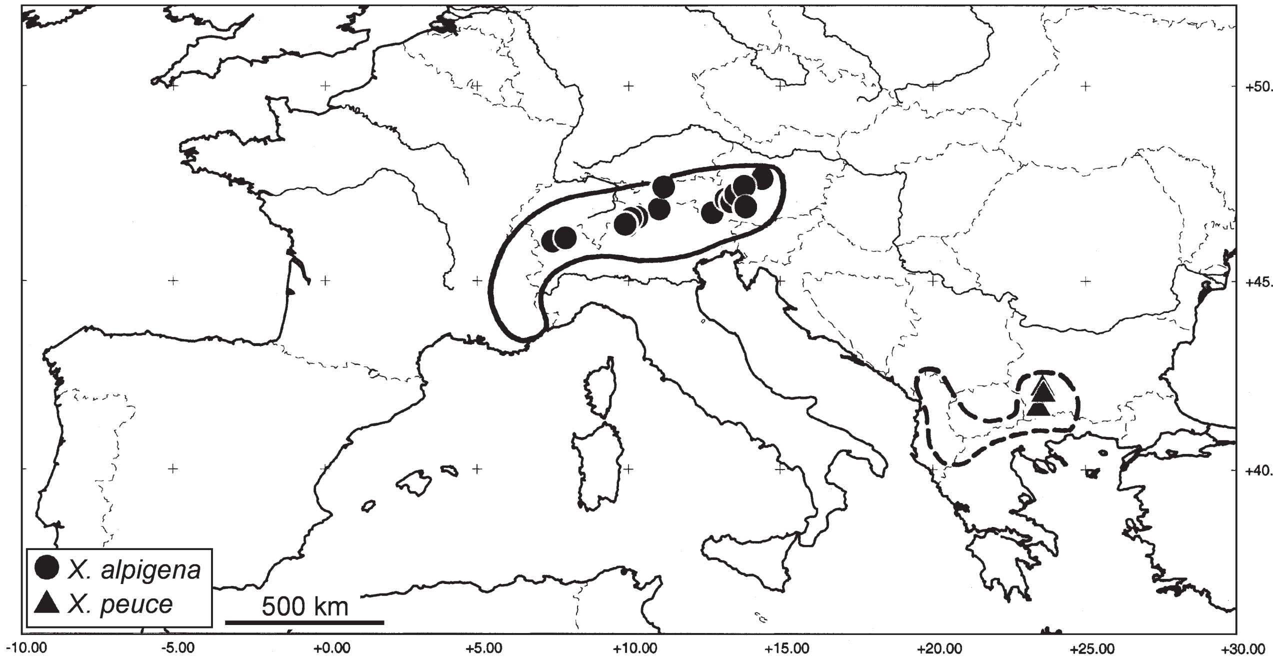


FIGURE 8. Records of *Xyela alpigena* (51 specimens from 22 collection sites) and *X. peuce* (21 specimens from 5 collection sites) and natural distribution of the (supposed) host plants, *Pinus cembra* (solid line) and *P. peuce* (dashed line, both according to Willis et al. 1998).

Xyela alpigena (Strobl, 1895)

Pinicola alpigena Strobl, 1895: 277–278, ♀♂, type locality: Austria, Styria, Rottenmanner Tauern, environs of Scheibelsee [= Scheiplsee]; Konow 1897: 58 (junior synonym of *julii*).
Xyela alpigena: Enslin 1918: 682 (combination with *Xyela*).

Description. Female. Color. Head yellow with black pattern: two black stripes along supraantennal furrows 2–5 times wider than ocellar diameter, meeting black ocellar and postocellar area, black longitudinal spot in middle of frons always present; kidney-shaped spots on vertex often fusing with stripes along supraantennal furrows (Fig. 28), sometimes separated by small yellow gap. Antenna black, a little paler below. Thorax dorsally black, more or less brown or yellow on pronotum, mesonotal lobes and mesoscutellum, tegula pale and infuscate in middle, mesepisternum largely pale brown to yellow. Abdominal terga dark brown, lateral parts of terga 8 and 9+10 paler and 2 preapical sterna more or less pale brown, valvifer 2 pale brown basally and dark distally, membrane between valvifer 2 and valvula 3 white, valvula 3 black with small white ventral margin extending up to preapical region (often indistinct, Fig. 97). Legs pale brown, femora usually with infuscate longitudinal stripes, posterior coxae dark brown with distal 0.3–0.5 pale ventrally. Wing membrane slightly infuscate, venation and pterostigma pale brown.

Morphology. Fore wing 4.5–4.8 mm long, 1.90–2.05 times longer than ovipositor sheath, vein Rs+M 0–100 µm long, seldom 1r-m present and 0–60 µm long (e.g., in lectotype), 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 810–960 µm long, antennomere 4 240–260 µm long and 6.5–7.5 times longer than wide distally. Article 3 of maxillary palp 540–600 µm long, 1.70–1.80 times longer than scape and distinctly wider than synantennomere 3. OOL : POL = 1.70–2.00 : 1. Ovipositor sheath 2.25–2.50 mm long, valvula 3 1.75–1.95 times longer than valvifer 2 and 7.0–8.0 times longer than wide at base (Fig. 90, 97). Valvula 3 of ovipositor sheath wedge-shaped, in distal third diamond-shaped in cross section, pale membranous area distally extending up to preapical region as small ventral pale margin, valvula 3 distally narrowing to small round tip, distally with sensilla field sunk and directed laterally, bearing 9 setae (Fig. 91). Ovipositor indistinctly bent downwards. Valvula 1 of ovipositor compressed, aulax terminating preapically, ventral edge sloping up to tip, with 3 vertical and 3–4 oblique annuli in distal 0.05 of ovipositor length, 5–6 serrulae, olistether with ca 4 setae. Left and right valvulae 2 fused along dorsal edge up to distal 0.15. Valvula 2 evenly tapering toward tip, in distal 0.15 with 4–5 teeth, in preapical 0.6 with 7–9 irregularly spaced groups of 2–3 sensilla campaniformia surrounded by dense sclerotization protruding roundly from dorsal edge of valvula 2, in between groups additional single sensilla campaniformia (Fig. 122). Posterior tibia 1.00–1.15 mm long, all claws with delicate subapical tooth.

Male. Color. Dark pattern less extensive, e.g., stripes along frontal furrows often narrower than diameter of ocellus and more or less interrupted (Fig. 29), scape, pedicel and synantennomere 3 pale brown, posterior coxae predominantly pale, hypopygium completely pale, preceding sterna more or less pale.

Morphology. Fore wing 3.8–4.3 mm long, Rs+M 0–120 µm long, seldom vein 1r-m present and 0–50 µm long, 2r-m usually meeting Rs proximal to furcation of Rs1 and Rs2, seldom fusing with Rs2 0–40 µm distal of furcation. Synantennomere 3 740–930 µm long, antennomere 4 260–330 µm long and 7.5–10.0 times longer than wide distally. Article 3 of maxillary palp 430–550 µm long, 1.40–1.50 times longer than scape and distinctly wider than synantennomere 3. OOL : POL = 1.65–1.90 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe about as long as wide in lateral view. Lower ergot on valvular stalk present (Fig. 129), sometimes small (Fig. 3). Valviceps 1.40–1.50 times longer than wide on medial lobe, lateral lamella vertical with proximal and distal edge s-shaped, proximal lobe of penis valve 0.18–0.22 times as long as valviceps and 0.98–1.05 times as high as medial lobe, excision on lower edge 0.11–0.15 as deep as width of medial lobe, valviceps on medial lobe 1.55–1.70 times wider than on distal lobe, 2 (exceptionally 3) distal flagella present, tip of longer flagellum reaching 0.80–0.90 width of distal lobe (Figs 3, 129). Valviceps without median longitudinal sclerotization (seldom valviceps slightly infuscate longitudinally), medial lobe broad and slightly truncate on upper edge and evenly sloping down to distal lobe, with dense group of 22–30 cone-like sensilla along upper edge and on lateral surface, upper edge between medial and distal lobe with dense pattern of setae. Posterior tibia 0.95–1.10 mm long, claws with delicate subapical tooth.

Barcodes. GUID ABU9234 (1♀, 3 larvae).

Type material. *Pinicola alpigena*. Lectotype ♀ (designated by Blank 2002): [green label:] "*Xyela* sp. *alpigena* [...; illegible Gabelsberg stenography] 26/5 90"; [label added by G. Morge, green handwriting:] "22"; "*Xyela alpigena* (Strobl) ♀ det. W. Schedl 1971"; [red:] "Lectotypus ♀ *Pinicola alpigena* Strobl, 1895 des. S. M. Blank 1999"; "*Xyela alpigena* (Str.) ♀ det. S. M. Blank 1999". Head missing. NMBA. Paralectotype: 1♂ (= *X. obscura*) labeled "*Xyela alpigena* Str. ♂ Scheiplsee 26/5 90" and Morge's label "23", NMBA.

Host plant. •*Pinus cembra* L. (16♀ 12♂ from 3 reared samples, 3 larvae identified by barcoding), ~~*P. koraiensis* Sieb. & Zucc.~~ (Schedl 1978, 1980, cited as *P.* "*koraensis*"), ~~*P. peuce* Grisebach~~ (Blank 2002), ~~*P. strobus* L.~~ (Benson 1962).

Biology. See Blank (2002).

Geographic distribution. Austria, Germany, Switzerland. Additionally recorded from Italy, from the Aosta Valley (Casale & Pesarini 1976), Trentino (Coslop & Masutti 1979) and from South Tyrol (Hellrigl et al. 1996) (Fig. 8). The record from Bulgaria by Taeger (1987) refers to *X. peuce* (Fig. 8). Published records for the East Palearctic and Nearctic are based on Benson's (1962) erroneous synonymy of *X. brunneiceps* Rohwer, 1913, *X. kamtshatica* (Fig. 9), and *X. middlekauffi* Burdick, 1961 with *X. alpigena*, but actually *X. alpigena* is restricted to the European Alps (and possibly the neighboring Carpathian mountains).

Remarks. See *Xyela peuce* for differentiation from other representatives of the *alpigena* group. The four specimens of *X. alpigena* included in the barcoding analysis display an intraspecific variation of 0.46 % and are placed at an interspecific distance of 11.29 % to the next neighbor, *X. curva* (Fig. 23).

Strobl (1895) supposed that *Xyela alpigena* might live on *Pinus cembra* which was here confirmed by rearing. In the barcoding analysis a female of *X. alpigena* and three larvae extracted from *P. cembra* were grouped at short distance within the same cluster (Fig. 23). Benson (1961, 1962) considered *X. alpigena* to be Holarctic with *X. brunneiceps*, *X. kamtshatica*, and *X. middlekauffi* as synonyms. He considered *Pinus strobus* as a host of *X. alpigena*, which Burdick (1961) had reported for *X. middlekauffi*. Schedl (1980) added *P. koraiensis*, which Rasnitsyn (1965) had listed for *X. kamtshatica*. However, material similar to *X. alpigena* from the Nearctic and the East Palearctic regions belongs to several, morphologically different species (*X. brunneiceps*, *X. middlekauffi*, *X. kamtshatica*, *X. koraiensis*, *X. sibiricae*, *X. ussuriensis*). Specimens mentioned by Blank (2002) from Bulgarian stands of *Pinus peuce* belong to *X. peuce*.

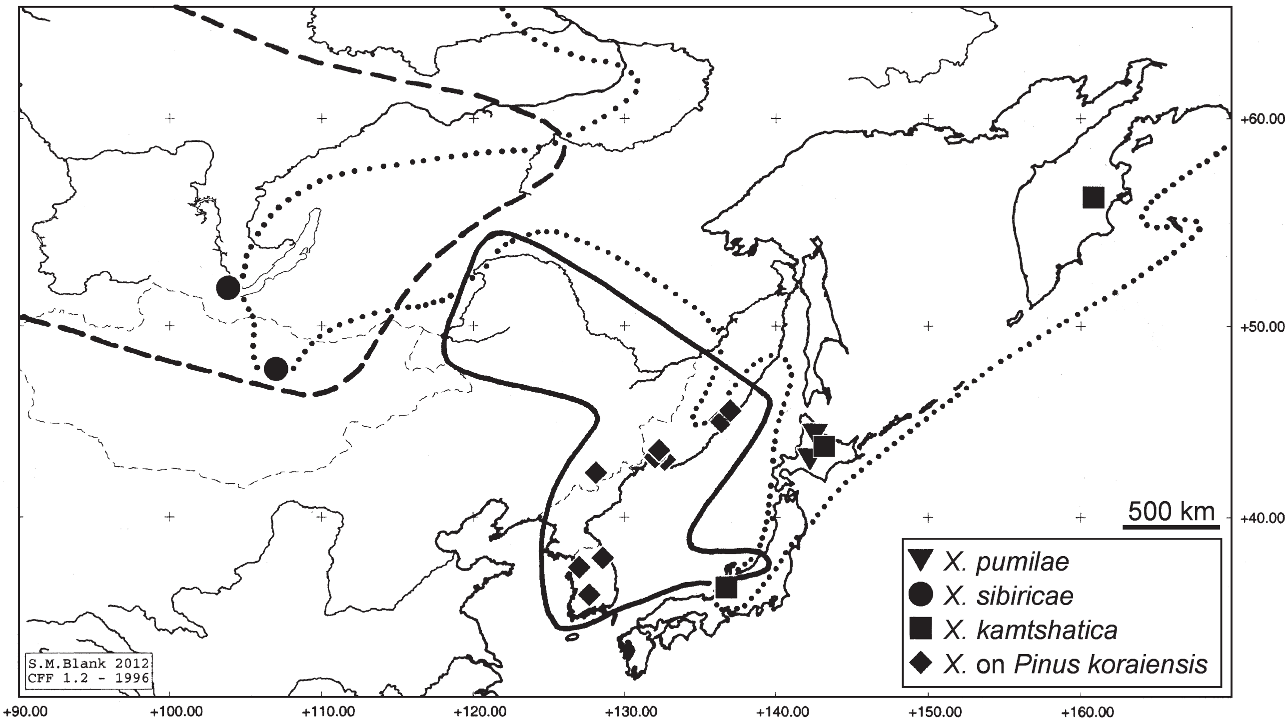


FIGURE 9. Records of the East Asian *Xyela* species supposedly feeding on *Pinus* (*Strobus*) species: *X. kamtshatica* (21 specimens from 4 collection sites), *X. pumilae* (4 specimens from 2 collection sites) and *X. sibiricae* (8 specimens from 2 collection sites). Additional record of *X. kamtshatica* by Takeuchi (1938) included for Hokkaido. The rhomb-shaped symbol represents records of *X. koraiensis*, *X. rasnitsyni* and *X. ussuriensis* supposedly feeding on *Pinus koraiensis* (illustrated separately in Figs 10, 22). Legend for natural distribution of *Pinus* species: *P. koraiensis* (solid line, according to Mirov 1967), *P. pumila* (dotted line) and *P. sibirica* (dashed line, both combined from Sokolov et al. 1977 and Kremenetski et al. 1998).

Xyela kamtshatica Gussakovskij, 1935

Xyela kamtshatica Gussakovskij, 1935: 131, 133–134, 363–364, ♀, type locality: Russia, Klyuchi, on river Kamtshatka; Benson 1961: 171 (junior synonym of *alpigena*); Rasnitsyn 1965: 503 (removed from synonymy).
Xyela julii: Enslin 1927: 379–380 (misidentification).
Xyela alpigena: Benson 1961: 171 (senior synonym of *kamtshatica*); Benson 1962: 385 (partly misidentified); Togashi 1964: 51 (misidentification).

Description. Female. Color. Head yellow with black and brown pattern: two black stripes along supraantennal furrows 2–4 times as wide as diameter of lateral ocellus, meeting black ocellar and postocellar area or separated by yellow, black longitudinal spot in middle of frons present, sometimes confluent with other dark pattern; kidney-shaped spots on vertex not clearly separate from black postocellar area (Fig. 30). Antennae brown, paler below. Proximal half of article 3 of maxillary palp more or less infuscate. Thorax dorsally brown with more or less distinct paler pattern on pronotum and mesonotal lobes, mesoscutellum black or with small spot, tegulae pale with brown spot in middle, mesepisternum largely pale. Abdominal terga dark brown to black, lateral parts of terga 8 and 9+10 sometimes brown to pale brown, valvifer 2 dark or partly pale brown, membrane between valvifer 2 and valvula 3 white, valvula 3 black with small white ventral margin up to distal fifth (Fig. 98). Legs brown, posterior coxae dark brown with small pale distal spot ventrally, femora partly with dark longitudinal stripes. Wing membrane slightly infuscate, venation and pterostigma pale brown.

Morphology. Fore wing 4.0–4.7 mm long, (1.75–)1.85–2.00 times longer than ovipositor sheath, Rs+M 50–200 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 680–810 µm long, antennomere 4 160–200 µm long and 4.5–6.0 times longer than wide distally. Article 3 of maxillary palp 430–500 µm long, ca 1.40–1.55 times longer than scape and distinctly wider than synantennomere 3. OOL : POL = 1.60–2.00 : 1. Ovipositor sheath 2.15–2.45 mm long, valvula 3 2.30–2.50 times longer than valvifer 2 and 9.0–10.0

times longer than wide (Fig. 98). Valvula 3 of ovipositor sheath wedge-shaped, in distal third diamond-shaped in cross section, pale membranous area distally extending up to preapical region as small ventral pale margin of valvula 3, valvula 3 distally narrowing to round tip, distally with sensilla field directed caudally, bearing ca 6 setae. Ovipositor gently curved downwards. Valvula 1 of ovipositor compressed and slightly wedge-shaped, distal 0.1 narrowed to sclerotized tip bearing 3–4 serrulae and 7–8 annuli (4–5 distal vertical and 3–4 basal oblique), ventral edge sloping up to tip, aulax preapically, olistether with ca 5–7 setae in distal half. Valvula 2 evenly tapering toward slightly sclerotized tip, with 4 vertical annuli, dorsal edge without teeth, lateral wall of distal 0.4 with ca 6 evenly spaced groups of sensilla campaniformia surrounded by dense sclerotization, dorsal margin of valvula 2 smooth. Posterior tibia 0.95–1.05 mm long, all claws with delicate subapical tooth.

Male. Color. Similar to female. Dark color pattern of face above antennae confluent or medial stripe separated by a narrow yellow gap (Fig. 31), mesoscutellum completely black, pedicel and synantennomere 3 pale brown. Hypopygium dark brown.

Morphology. Fore wing 3.5–4.2 mm long, Rs+M 0–150 µm long, sometimes 1r-m present and 0–50 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2 or fusing with Rs2 distal to furcation. Synantennomere 3 630–780 µm long, antennomere 4 160–210 µm long and 4.0–6.5 times longer than wide distally. Article 3 of maxillary palp 360–430 µm long, 1.25–1.35 times longer than scape. OOL : POL = 1.70–2.15 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe about as long as wide in lateral view. Lower ergot on valvular stalk present. Valviceps 1.30–1.40 times longer than wide on medial lobe, lateral lamella vertical with proximal and distal edge s-shaped, proximal lobe of penis valve 0.19–0.23 times as long as valviceps and 0.95–1.00 times as high as medial lobe, excision on lower edge 0.15–0.18 as deep as width of medial lobe, valviceps on medial lobe 1.70–1.75 times wider than on distal lobe, 2 distal flagella present, tip of longer flagellum reaching 0.70–0.75 width of distal lobe (Fig. 130). Valviceps without median longitudinal sclerotization, medial lobe broad and slightly truncate on upper edge and evenly sloping down to distal lobe, with dense group of 8–14 cone-like sensilla along upper edge and on lateral surface, upper edge between medial and distal lobe with dense pattern of setae. Posterior tibia 0.85–1.05 mm long, all claws with delicate subapical tooth.

Type material: Holotype ♀: [round, golden label signifying type specimen in ZIN]; [in Cyrillic:] “sel. [= selo, village] Klyuchevskoe na r. [= na reka, on river] Kamchatk A Derzhavin 6.vi 09”; [Enslin’s handwriting:] “*Xyela julii* Breb. ♀”; “*Xyela kamtschatica* [sic!] sp. n. ♀ Gussakovskij det.”; “1:2,5”; [red:] “Holotypus *Xyela kamtshatica* Gussakovskij, 1935 ♀ det. S. M. Blank 2001”; “*Xyela kamtshatica* Gussakovskij, 1935 ♀ det. S. M. Blank 2001”. Body was broken in two and then glued together by a previous investigator, otherwise in good condition. ZIN.

Host plant. ~~*Pinus koraiensis* Sieb. & Zucc.~~ (Rasnitsyn 1965), °*Pinus pumila* Regel.

Biology. Togashi (1961) reported 5♀ 20♂ swept from *Alnus maximowiczii* catkins above 2,500 m close to the Oonanjimine peaks. The alder catkins are supposedly a pollen source for the imagines.

Geographic distribution. Japan (Honshu), Russia (Kamchatskaya Oblast) (Fig. 9). Reported from Hokkaido by Takeuchi (1938).

Remarks. Among East Palearctic representatives of the *alpigena* group, *Xyela kamtshatica* is characterized by the combination of usually dark scutellum, infuscate wings, basally infuscate article 3 of the maxillary palp, valvula 3 being 2.30–2.50 times longer than valvifer 2 (similar in *X. koraiensis*, which has clear wings), and comparatively stout valviceps. See *X. peuce* for differentiation of West and East Palearctic taxa.

With some reservations Enslin (1927) reported the specimen under the name *Xyela julii* which Gussakovskij (1935) subsequently designated as holotype of *X. kamtshatica*. *Xyela julii* was the only *Xyela* species accepted as valid at that time besides the strikingly different *X. longula*. Benson (1961) synonymized *X. kamtshatica* with the central European *X. alpigena* without giving any reason and without type study. Rasnitsyn (1965) erroneously applied the name *kamtshatica* for a species of the Russian Far East (Kamtshatka and Primorye) occurring on *Pinus koraiensis*. But *P. koraiensis* is absent from Kamtshatka, while *P. pumila* is present both on Kamtshatka and in the Primorskiy Kray (Figs 9–10). Records of *X. kamtshatica* auct. from the Primorskiy Kray refer to *X. koraiensis* (see below). Rasnitsyn (1965) indicated “*X. ?kamtshatica* Guss.” for Japan. Contrary to *X. kamtshatica* it should be characterized by valvula 3 being 2.3 times longer than valvifer 2. The relevant specimen from Mt. Haku in the ZMUM is badly damaged (head and most of the abdomen missing). A series from this site (NSMT) agrees with the concept of the real *X. kamtshatica*.

As discussed by Maa (1949), the Russian and Latin original descriptions of the wing venation and the relevant keys conflict with Gussakovskij’s (1935) figure 49 for *X. kamtshatica*. He gives a description of “the basal vein being interstitial with the cubital vein" (translated from the key on p. 363), which corresponds with the absence of vein Rs+M, and cell 1M (Gussakovskij's cell d_1) being pentagonal as illustrated for *X. longula* (see Gussakovskij's figure 48). Figure 49, however, depicts a wing with an evident vein Rs+M and a hexagonal cell 1M. Actually the left wing of the holotype is similar to Gussakovskij's figure 48 (vein Rs+M ca 50 µm long) and the right resembles his figure 49 (vein Rs+M ca 100 µm long).

Although *X. kamtshatica* has not yet been reared, *P. pumila* is undoubtedly the larval host, and *P. koraiensis* reported by Rasnitsyn (1965) can be excluded (see above). At its type locality, in Klyuchi, as on the whole Kamtshatka Peninsula *Pinus pumila* is the only, though abundant, pine species present at 300–1,000 m altitude (Fig. 9). The vegetation in the subalpine zone of Mt. Hakusan is dominated by *P. pumila*, and Togashi (1964) and Okutani (1982) supposed this to be the host plant for Japanese *X. kamtshatica*. It is the only pine species growing there, and it is intermixed with birch, alder and mountain ash (Ogishi 1999).

Material of *X. kamtshatica* studied here was collected on Kamtshatka and on Mt Hakusan, two widely distant localities at the eastern limits of the wide range exhibited by *P. pumila*. Takeuchi (1938) additionally reported the presence on the mountain Daisetsuzan, Hokkaido. In the Sikhote Alin *P. pumila* forms thickets above the forest at an elevation of (1,150–)1,200–1,300 m altitude (Kolesnikov 1938). Disjunct populations occur even farther south at high elevations in the high mountains of North Korea (Mirov 1967, Sokolov et al. 1977). Although extensive material was available from the Russian Far East and from South Korea, *X. kamtshatica* was not found there.

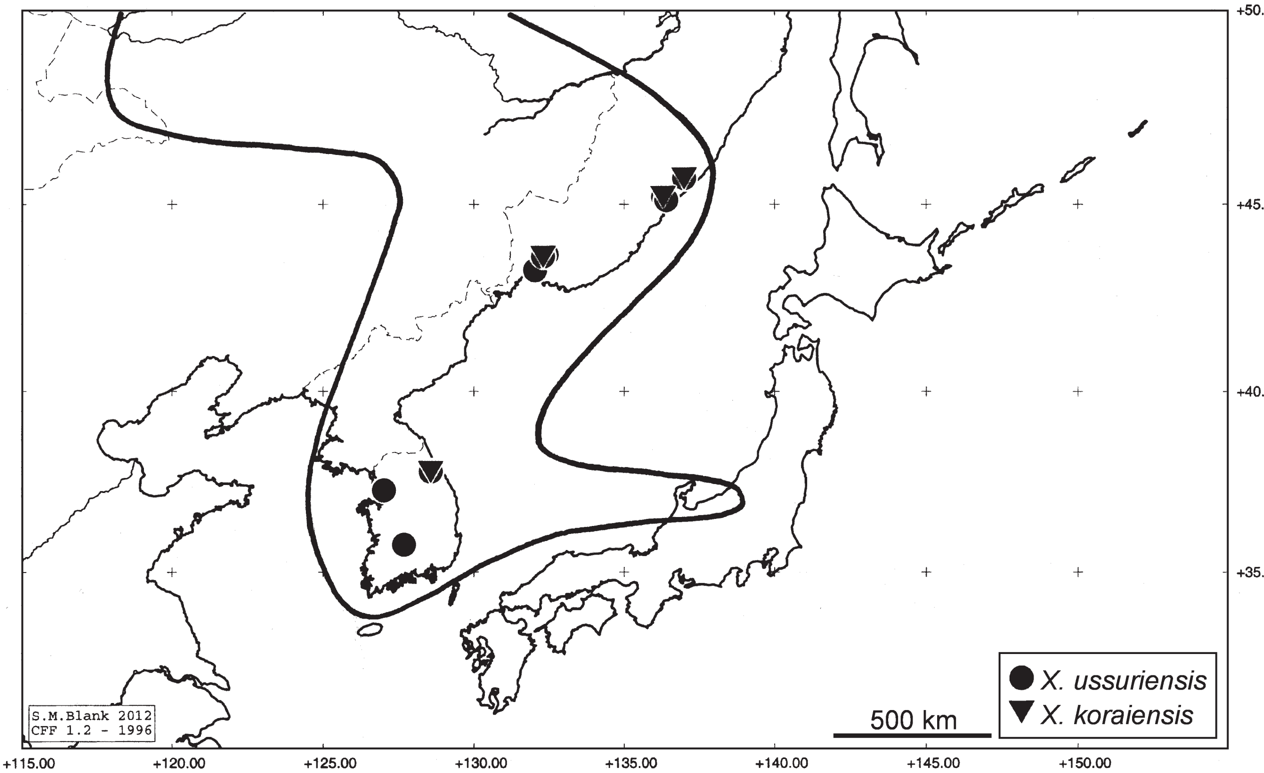


FIGURE 10. Records of *Xyela koraiensis* (31 specimens from 5 collection sites) and *X. ussuriensis* (39 specimens from 10 collection sites), and natural distribution of the supposed host plant, *Pinus koraiensis* (solid line, according to Mirov 1967).

Xyela koraiensis Blank & Shinohara, sp. nov.

Type locality: Russia, Primorskiy Kray, Ussuriysky Reserve.

Xyela kamtshatica: Rasnitsyn 1965: 492, 514 (partly misidentified); Zhelochovtsev & Zinovjev 1995: 396 (partly misidentified)

Description. Female. Color. Head yellow with black pattern: two black stripes along frontal furrows ca 2 times wider than ocellar diameter, meeting black ocellar and postocellar area, black longitudinal medial spot of frons always present and separate from stripes along frontal furrows, kidney-shaped spots on vertex usually separate from black postocellar area (Fig. 32). Antennae black, a little paler below. Thorax dorsally brown with more or less distinct paler pattern on pronotum, mesonotal lobes and mesoscutellum, tegulae pale, sometimes brown in middle, mesepisternum largely brown. Abdominal terga dark brown, lateral parts of terga 8 and 9+10 often pale brown, valvifer 2 basally pale and distally dark brown, membrane between valvifer 2 and valvula 3 white, valvula 3 black with small white ventral margin up to distal fifth (Fig. 99). Legs pale brown, posterior coxae predominantly dark brown with small pale distal spot ventrally, femora sometimes with brown longitudinal stripes. Wing membrane clear, venation and pterostigma pale.

Morphology. Fore wing 3.7–4.2 mm long, 1.55–1.70 times longer than ovipositor sheath, Rs+M 100–240 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 630–760 µm long, antennomere 4 150–200 µm long and 5.0–7.0 times longer than wide distally. Article 3 of maxillary palp 430–500 µm long, 1.45–1.65 times longer than scape and distinctly wider than synantennomere 3. OOL : POL = 1.70–1.90 : 1. Ovipositor sheath 2.25–2,55 mm long, valvula 3 2.35–2.60 times longer than valvifer 2 and 9.0–10.5 times longer than wide (Fig. 99). Valvula 3 of ovipositor sheath wedge-shaped, in distal third diamond-shaped in cross section, pale membranous area distally extending up to preapical region as small ventral pale margin of valvula 3, valvula 3 distally narrowing to round tip, sensilla field present and directed laterad, bearing ca 6 sensilla. Ovipositor indistinctly bent downwards. Valvula 1 of ovipositor compressed and slightly wedge-shaped, distal 0.07 narrowed to sclerotized tip bearing 4–5 serrulae and 7–8 annuli (6 of them perpendicular), ventral edge sloping up to tip, aulax terminating distally, olistether with 5 setae in distal half. Valvula 2 pale and evenly sclerotized, distal 0.07 tapering to sclerotized tip, in distal half with evenly spaced groups of sensilla campaniformia, dorsal margin of valvula 2 smooth with small prominences above sensilla groups. Posterior tibia 0.80–1.00 mm long, all claws with delicate subapical tooth.

Male. Color. Similar to female (see Fig. 31 for color pattern of head). Antennae usually pale brown. Hypopygium dark brown.

Morphology. Fore wing 3.4–3.8 mm long, Rs+M 60–175 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 660–750 µm long, antennomere 4 200–220 µm long and 5.5–7.5 times longer than wide distally. Article 3 of maxillary palp 400–450 µm long, 1.35–1.65 times longer than scape. OOL : POL = 1.40–1.75 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe about as long as wide in lateral view. Valviceps 1.50–1.65 times longer than wide on medial lobe, lateral lamella vertical with proximal and distal edge s-shaped, proximal lobe of penis valve 0.19–0.21 times as long as valviceps and 1.05–1.10 times as high as medial lobe, valviceps on medial lobe 1.40–1.45 times wider than on distal lobe, excision on lower edge 0.19–0.23 as deep as width of medial lobe, 2 distal flagella present, tip of longer flagellum reaching 0.70–0.80 width of distal lobe (Fig. 131). Valviceps with median longitudinal sclerotization absent, medial lobe broad and slightly truncate on upper edge and evenly sloping down to distal edge, with dense group of 12–15(–25) cone-like sensilla along upper edge, upper edge between medial and distal lobe with dense pattern of setae. Posterior tibia 830–930 µm long, all claws with delicate subapical tooth.

Type material. Holotype ♂: “Ussuriyskij Res., Primorskii Kray, Russia, 21.–26.5.1994, leg. A. Shinohara”; [red:] “Holotypus ♂ *Xyela koraiensis* spec. nov. det. S. M. Blank 2001”. Genitalia kept inside small vial on pin of holotype. NSMT. Paratypes 12♀ 18♂, DEI, NSMT, ZMUM, ZIN.

Etymology. The species name, an adjective, is chosen in accordance with the strongly supposed host plant relationship.

Host plant. °*Pinus koraiensis* Sieb. & Zucc. (Rasnitsyn 1965 under the name *Xyela kamtshatica*).

Geographic distribution. Russia (Primorskiy Kray), South Korea (Fig. 10).

Remarks. *Xyela koraiensis* and *X. ussuriensis* have pale wings, whereas other representatives of the *alpigena* group have infuscate wings. The former two taxa are separated from each other, among other characters, by the length of the ovipositor (shorter in *X. koraiensis* than in *X. ussuriensis*) and the color of the hypopygium in males (brown in *X. koraiensis* and yellow in *X. ussuriensis*). The association of the sexes is supported by the color of the distal abdominal segments and of the posterior coxae, which is generally darker in both sexes of *X. koraiensis* than in *X. ussuriensis*. The species identification of the males by means of the shape of the hypopygium as proposed by Rasnitsyn (1965) for *X. kamtshatica* auct. and *X. ussuriensis* is impossible, because in both species males with round, truncate or shallowly emarginate hypopygium occur. The relative size of medial and distal lobes of the valviceps overlaps between the species. Also the seta pattern of the penis valve is unusable due to the similarity in long series.

Under the name *Xyela kamtshatica*, Rasnitsyn (1965) associated females with a comparatively long ovipositor and males with a long, on the lower side shallowly excised valviceps, whereas he called females with a shorter ovipositor and males with a stout and more deeply excised valviceps *X. ussuriensis*. Actually the name *kamtshatica* refers to a species of the *alpigena* group, which is distributed in Kamchatka and subalpine Japan along with *Pinus pumila* (see *X. kamtshatica*; Fig. 9).

According to Rasnitsyn (1965 and personal communication) *Pinus koraiensis* is the host plant of *X. kamtshatica* auct. Although rearing data are still lacking, this relationship is certainly correct. Combinations of two or three species of *X. koraiensis*, *X. ussuriensis* and *X. rasnitsyni* were observed on six collection sites in the Russian Far East and South Korea (Figs 10, 22). This coincidence certainly depends on a common larval host species. Only *P. koraiensis* occurs in all collection sites of these three *Xyela* species, and it is the only pine reported on collection labels.

Xyela peuce Blank, sp. nov.

Type locality: Bulgaria, Pirin Mountains, environs of Begovica mountain refuge.
Xyela alpigena: Taeger 1987: 1 (misidentification); Blank 2002: 214 (partly misidentified).

Description. Female. Color. Head yellow with black pattern: two black stripes along supraantennal furrows 2–4 times wider than ocellar diameter, meeting black ocellar and postocellar area and black longitudinal spot in middle of frons always present; kidney-shaped spots on vertex often separated by small yellow gap from stripes along supraantennal furrows (Fig. 34), sometimes fusing with stripes. Antennae black, brown below. Thorax dorsally black, usually more or less brown or yellow on pronotum, mesonotal lobes and mesoscutellum, tegulae pale and infuscate in middle, mesepisternum largely pale brown to yellow. Abdominal terga dark brown, lateral parts of terga 8 and 9+10 paler and 2 preapical sterna more or less pale brown, valvifer 2 pale brown basally and dark distally, membrane between valvifer 2 and valvula 3 white, valvula 3 black with small white ventral margin extending up to preapical region (Fig. 100). Legs pale brown, femora usually with infuscate longitudinal stripes, posterior coxae dark brown (sometimes pale brown) with distal 0.3–0.5 pale ventrally. Wing membrane slightly infuscate, venation and pterostigma pale brown.

Morphology. Fore wing 3.9–4.8 mm long, 1.85–2.00 times longer than ovipositor sheath, vein Rs+M 0–100 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2, seldom fusing with Rs2 0–50 µm distal of furcation. Synantennomere 3 600–860 µm long, antennomere 4 200–250 µm long and 5.5–7.0 times longer than wide distally. Article 3 of maxillary palp 490–600 µm long, 1.55–1.80 times longer than scape and distinctly wider than synantennomere 3. OOL : POL = 1.75–2.10 : 1. Ovipositor sheath 2.15–2.50 mm long, valvula 3 (1.90–)1.95–2.20 times longer than valvifer 2 and 7.5–8.5 times longer than wide at base (Fig. 100). Valvula 3 of ovipositor sheath wedge-shaped, in distal third diamond-shaped in cross section, pale membranous area distally extending up to preapical region as small ventral pale margin, valvula 3 distally narrowing to small round tip, distally with sensilla field directed caudally, bearing about 8 setae. Ovipositor indistinctly bent downwards. Valvula 1 of ovipositor compressed, aulax terminating preapically, ventral edge sloping up to tip, with 4 vertical and 2–3 oblique annuli in distal 0.05 of ovipositor length, 4 serrulae, olistether with about 4 setae. Valvula 2 evenly tapering toward tip, distally with about 5 teeth, in preapical 0.6 with irregularly spaced groups of sensilla campaniformia surrounded by dense sclerotization protruding roundly from dorsal edge of valvula 2. Posterior tibia 0.90–1.10 mm long, all claws with delicate subapical tooth.

Male. Color. Dark pattern less extensive, e.g., stripes along frontal furrows only little wider than diameter of ocellus (Fig. 35), scape, pedicel and synantennomere 3 pale brown, posterior coxae predominantly pale, hypopygium completely and preceding sterna more or less pale.

Morphology. Fore wing 3.9–4.0 mm long, Rs+M 60–100 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 740–810 µm long, antennomere 4 250–300 µm long and 6.5–8.5 times longer than wide distally. Article 3 of maxillary palp 480–490 µm long, 1.50–1.65 times longer than scape and distinctly wider than synantennomere 3. OOL : POL = 1.70–1.80 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe about as long as wide in lateral view. Lower ergot on valvular stalk present. Valviceps 1.55–1.60 times longer than wide on medial lobe, lateral lamella vertical with proximal and distal edge s-shaped, proximal lobe of penis valve 0.20–0.21 times as long as valviceps and 0.90–1.00 times as high as medial lobe, excision on lower edge 0.11–0.12 as deep as width of medial lobe, valviceps on medial lobe 1.65–1.75 times wider than on distal lobe, 2 distal flagella present, tip of longer flagellum reaching 0.75–0.85 width of distal lobe (Fig. 132). Valviceps without median longitudinal sclerotization, medial lobe broad and slightly truncate on upper edge and evenly sloping down to distal lobe, with dense group of 14–15 cone-like sensilla along upper edge and on lateral surface, upper edge between medial and distal lobe with dense pattern of setae. Posterior tibia 0.95–1.00 mm long, claws with delicate subapical tooth.

Type material: Holotype ♂: "BG: Pirin-Geb. Nähe Begovica [= Bulgaria: Pirin Mountains, environs of Begovica mountain refuge] 1800 m, 10.6.1990, [leg.] Taeger & Menzel"; [red:] "Holotype *Xyela peuce* spec. nov. det. S. M. Blank 2001". Genitalia stored in small vial on pin of holotype. DEI. Paratypes: 19♀ 1♂, DEI, USNM.

Etymology. The species is named in accordance with the strongly suspected host plant, *Pinus peuce*. The Latin noun peuce is derived from the Ancient Greek noun η πεύκη meaning spruce or pine, and mainly referring to mountain pines (Le Maitre 1998).

Host plant. °*Pinus peuce* Grisebach.

Geographic distribution. Bulgaria (Fig. 8).

Remarks. *Xyela peuce* is most similar to the allopatric *X. alpigena*. Males of *X. peuce* have a comparatively longer valviceps than males of *X. alpigena* (relative length : width of valviceps 1.54–1.61 in *X. peuce* / 1.42–1.52 in *X. alpigena*), and the medial lobe bears fewer cone-like sensilla (14–15 / 22–30). Most females can be identified by the relative length of valvifer 2 : valvula 3 ([1.90–]1.95–2.20 / 1.75–1.95). Females of *X. peuce* are on average paler: only ca 75 % have the kidney-shaped spots separated in front from the black stripe of the frontal furrow by yellow, whereas only ca 25 % of such pale specimens occur among females of *X. alpigena*. Other Palearctic species of the *alpigena* group have either the wings clear (*X. koraiensis*, *X. ussuriensis*), an evidently longer ovipositor sheath (*X. sibiricae*), or a different relative length of valvifer 2 : valvula 2 (*X. kamtshatica*).

Taeger (1987) first recorded this species from Bulgaria under the name *X. alpigena*. A female was collected at the edge of snow patches at 2,050 m altitude. At the collection sites in the Pirin and Rila Mountains in southern Bulgaria, *Pinus peuce* is the only representative of the *Pinus* ('*Strobus*') group. This presumed Tertiary relic is endemic to the southern Balkans, where it grows in a few places in Macedonia, Albania, Bulgaria and Greece between 800–2,100 m and forms pure stands above 1,700 m (Mirov 1967, Richardson & Rundel 1998; 17 specimens of *X. peuce* were collected between 1,865–2,185 m, 1 specimen at 1,000 m altitude). Although it has never been reared from *P. peuce*, this pine species is strongly indicated as the host plant of *X. peuce* due to (1) evidence of the records for *X. peuce* covering the geographical and altitudinal distribution of *P. peuce* and (2) the occurrence of other representatives of the *alpigena* group on *Pinus* ('*Strobus*'). *Pinus mugo* also occurs in the subalpine zone of the Rila and Pirin Mountains, but the restricted distribution of *X. peuce* cannot be explained by the far wider range of *P. mugo*, which is a member of *Pinus* (*Pinus*).

Xyela sibiricae Blank, sp. nov.

Type locality: Russia, Irkutskaya Oblast, Shelekhovskiy Rayon, Bolshaya Glubokaya.
Xyela kamtshatica: Zombori 1971: 233 (misidentification); Zhelochovtsev & Zinovjev 1995: 396 (partly misidentified).
Xyela spec. nov. cf. *kamtschatica*: Verzhutskij 1981: 38.

Description. Female. Color. Head yellow with black pattern: two black stripes along supraantennal furrows ca 2 times wider than ocellar diameter, meeting black ocellar and postocellar area, black longitudinal spot in middle of frons always present and surrounded by yellow, kidney-shaped spots on vertex separate from black postocellar area (Fig. 36). Antennae brown, a little paler below. Thorax dorsally brown with extensive yellow pattern on pronotum, mesonotal lobes and mesoscutellum, mesepisternum and tegulae. Abdominal terga dark brown, lateral parts of terga 8 and 9+10 sometimes paler, valvifer 2 pale basally and dark brown distally, membrane between valvifer 2 and valvula 3 white, valvula 3 black with small pale ventral margin up to distal fifth (Fig.101). Legs pale brown, femora partly with longitudinal dark stripes, posterior coxae dark brown with distal 0.3–0.5 of ventral side pale. Wing membrane brownish infuscate, venation and pterostigma brown.

Morphology. Fore wing 4.8–4.9 mm long, 1.75–190 times longer than ovipositor sheath, vein Rs+M 100–200 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 800–890 µm long, antennomere 4 210–250 µm long and 5.5–7.5 times longer than wide distally. Article 3 of maxillary palp 530–550 µm long, 1.45–1.50 times longer than scape and distinctly wider than synantennomere 3. OOL : POL = 1.60–1.85 : 1. Ovipositor sheath 2.55–2.80 mm long, valvula 3 2.00–2.10 times longer than valvifer 2 and 9.0–9.5 times longer than wide at base (Fig.101). Valvula 3 of ovipositor sheath wedge-shaped, in distal third diamond-shaped in cross section, pale membranous area distally extending up to preapical region as small ventral pale margin of valvula 3, valvula 3 distally narrowing to small round tip, distally with sensilla field present and directed laterad, bearing ca 7 sensilla. Ovipositor indistinctly bent downwards. Valvula 1 of ovipositor compressed and slightly wedge-shaped, distal 0.05 narrowed to sclerotized tip bearing 4 serrulae and 6 annuli (4 of them vertical), ventral edge sloping up to tip, aulax terminating distally, olistether with 8 setae. Valvula 2 pale and evenly sclerotized, distal 0.05 tapering to sclerotized tip, in distal half with small sclerotization surrounding groups of 1–5(–8) sensilla campaniformia, dorsal margin of valvula 2 smooth. Posterior tibia 1.00–1.20 mm long, all claws with delicate subapical tooth.

Male. Color. Similar to female (see Fig. 37 for color pattern of head). Antennae usually pale brown. Hypopygium brown to dark brown.

Morphology. Fore wing 4.0–4.1 mm long, Rs+M 130–200 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 790–900 µm long, antennomere 4 240–300 µm long and 7.0–8.0 times longer than wide distally. Article 3 of maxillary palp 440–490 µm long, 1.30–1.40 times longer than scape and distinctly wider than synantennomere 3. OOL : POL = 1.60–1.85 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe about as long as wide in lateral view. Medial lobe of valviceps 1.45–1.50 times longer than wide, lateral lamella vertical with proximal and distal edge s-shaped, proximal lobe of penis valve 0.14–0.15 times as long as valviceps and ca 0.95 times as high as medial lobe, excision on lower edge 0.16–0.17 as deep as width of medial lobe, medial lobe of valviceps 1.50–1.55 times wider than distal lobe, 2 distal flagella present, tip of longer flagellum reaching 0.75–0.80 width of distal lobe (Fig. 133). Valviceps with median longitudinal sclerotization absent, medial lobe broad and slightly truncate on upper edge, with dense group of ca 15 cone-like sensilla along upper edge, upper edge between medial and distal lobe with dense pattern of setae. Posterior tibia 1.05–1.15 mm long, all claws with delicate subapical tooth.

Type material. Holotype ♂: [in Cyrillic:] “Irkutsk.[aya] obl.[ast], Shelekhovski r-n [= rayon], D. B. Glubokaya [= Bol’shaya Glubokaya], s *Pinus sibirica* pri okolote [= beaten from *Pinus sibirica*], B. Verzhutskij, 26.V.[19]69”; [red:] “Holotypus ♂ *Xyela sibiricae* spec. nov. det. S. M. Blank 2001”. ZMUM. Paratypes: 3♀ 4♂, DEI, HNHM, ZMUM.

Etymology. The species is named after the strongly suspected host plant, *Pinus sibirica*.

Host plant. °*Pinus sibirica* Mayr. (“*Xyela* sp. n. cf. *kamtschatica* Gussakovskij” of Verzhutskij 1981).

Biology. Verzhutskij (1981) reported the imagines to be rather common in the Baikal region. They are active from May to June. One male we studied was collected in the beginning of April. The larvae can be found from June to July. Some of the studied imagines are densely covered with ca 25 µm large pollen grains. Pollen analysis showed that these large tricolpate grains pertain to a non-coniferous plant species (Faegri & Iversen 1993). The Mongolian females were collected in the clearing of a wood with conifers and birches (Kaszab 1968).

Geographic distribution. Mongolia, Russia (Irkutskaya Oblast) (Fig. 9). Besides the material we studied from Bolshaya Glubokaya, Verzhutskij (1981) mentioned additional records of “*Xyela* spec. nov. cf. *kamtschatica*” from Chunoyar (Krasnoyarskiy Kray) and from Bolshiye Koty (Baikal Region).

Remarks. Compared with the length of the fore wing, *Xyela sibiricae* has the longest ovipositor among representatives of the *alpigena* group. The relative length of the proximal lobe of the valviceps is shorter than in other species.

The sexes have been associated with the help of material Verzhutskij collected in Glubokaya. According to their labeling, all but one specimen of this series were collected on *Pinus sibirica* (see Verzhutskij 1981 under the provisional naming “*Xyela* sp. n. cf. *kamtschatica* Gussakovskij”), which presumably is the host plant. The Mongolian record also fits the distribution range of *P. sibirica. Pinus sibirica* has been ranked as a subspecies of the European *P. cembra* by Kindel (1995), but it usually is now accredited species status (Richardson 1998). Its range covers a vast area of northern Asia and extends through Russia west to 50° crossing the Ural Mountains to Europe (Mirov 1967, Willis et al. 1998), where an occurrence of *X. sibiricae* might be expected.

Xyela ussuriensis Rasnitsyn, 1965

Xyela (*Xyela*) *ussuriensis* Rasnitsyn, 1965: 491, 495–497, 503, 512–513, 516–518, ♀♂, type locality: Russia, Primorskiy Kray, Sikhote-Alin Mountains, basin of river Takema.

Xyela suwonae Ryu & Lee, 1992: 1–4, ♀, type locality: South Korea, Kyonggido, Suwon, **syn. nov.**

Description. Female. Color. Head yellow with black pattern: two black stripes along supraantennal furrows 2–3 times as wide as ocellar diameter, meeting black ocellar and postocellar area, black longitudinal spot in middle of frons always present, usually separated from other black pattern by yellow gap, kidney-shaped spots on vertex usually separate from black postocellar area (Fig. 38). Antennae black, a little paler below. Thorax dorsally brown with more or less distinct paler pattern on pronotum, mesonotal lobes and mesoscutellum, tegulae pale, sometimes brown in middle, mesepisternum largely pale brown. Abdominal terga dark brown, lateral parts of terga 8 and 9+10 sometimes paler, valvifer 2 completely pale brown, membrane between valvifer 2 and valvula 3 white, valvula 3 black with small white ventral margin up to distal fifth (Fig. 102). Legs pale brown, posterior coxae dark brown with distal 0.3–0.5 of ventral side pale, femora seldom with indistinct brown longitudinal stripes. Wing membrane clear, venation and pterostigma pale brown.

Morphology. Fore wing 3.8–4.6 mm long, 1.90–2.05 times longer than ovipositor sheath, vein Rs+M 0–160 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 700–910 µm long, antennomere 4 200–250 µm long and 6.0–9.0 times longer than wide distally. Article 3 of maxillary palp 460–540 µm long, 1.40–1.65 times longer than scape and distinctly wider than synantennomere 3. OOL : POL = 1.77–2.20(–2.45) : 1. Ovipositor sheath 1.90–2.25 mm long, valvula 3 1.90–2.05(–2.15) times longer than valvifer 2 and 6.5–8.0 times longer than wide at base (Fig. 102). Valvula 3 of ovipositor sheath wedge-shaped, in distal third diamond-shaped in cross section, pale membranous area distally extending up to preapical region as small ventral pale margin of valvula 3, valvula 3 distally narrowing to round tip, distally with sensilla field present and directed laterad, bearing 6–7 sensilla. Ovipositor indistinctly bent downwards. Valvula 1 of ovipositor compressed and slightly wedge-shaped, distal 0.05 narrowed to sclerotized tip bearing 5–6 serrulae and 7 annuli (4 of them more or less perpendicular), ventral edge sloping up to tip, aulax terminating distally, olistether with 5–7 setae in distal half. Valvula 2 pale and evenly sclerotized, distal 0.05 tapering to sclerotized tip, in distal half with small sclerotization surrounding groups of 1–5(–8) sensilla campaniformia, dorsal margin of valvula 2 smooth with small prominences above sensilla groups, distally with 4 dorsal teeth. Posterior tibia 0.85–1.10 mm long, all claws with delicate subapical tooth.

Male. Color. Similar to female (see Fig. 39 for color pattern of head). Antennae usually pale brown. Hypopygium pale brown.

Morphology. Fore wing 3.5–4.2 mm long, Rs+M 0–120 µm long or 1r-m present and 0–50µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 700–890 µm long, antennomere 4 210–280 µm long and 6.5–9.0 times longer than wide distally. Article 3 of maxillary palp 430–500 µm long, 1.35–1.55 times longer than scape and distinctly wider than synantennomere 3. OOL : POL = 1.60–2.00(–2.40) : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe about as long as wide in lateral view. Valviceps 1.55–1.95 times longer than wide on medial lobe, lateral lamella vertical with proximal and distal edge s-shaped, proximal lobe of penis valve 0.17–0.22 times as long as valviceps and 1.00–1.05 times as high as medial lobe, excision on lower edge (0.12–)0.15–0.19 as deep as width of medial lobe, valviceps on medial lobe 1.30–1.40 times wider than on distal lobe, 2 distal flagella present, tip of longer flagellum reaching 0.70–0.90 width of distal lobe (Fig. 134). Valviceps with median longitudinal sclerotization absent (seldom with an indistinct shadow), medial lobe broad and slightly truncate on upper edge, with dense group of (15–)20–25 cone-like sensilla along upper edge, upper edge between medial and distal lobe with dense pattern of setae. Posterior tibia 0.85–1.05 mm long, all claws with delicate subapical tooth.

Type material. *Xyela ussuriensis*. Holotype ♀: "Sikhote-Alin, bas r. [basseyn reka; = basin of river] Takema, K. Grunin 6.VI.1937"; [red:] "Holotypus ♀ *Xyela ussuriensis* A. Rasnitsyn". Left antenna and right antennal flagellum missing, right anterior wing glued to piece of cardboard, ovipositor mounted on slide kept on pin of holotype. ZMUM. Paratypes: 1♀ 2♂, ZMUM.

Xyela suwonae. Holotype ♀: "[in Korean letters: Kyonggido, Suwon] Korea 1987.IV.29 Coll. R.S.M. [= S. M. Ryu] Yeungnam Univ. Biology"; "SYM–0004"; [red:] "Holotype *Xyela suwonae* Ryu et Lee 1992". In good condition. YUIC. Paratypes: 2♀ with identical collection data (1♀ studied), YUIC.

Host plant. °*Pinus koraiensis* Sieb. & Zucc. (see Rasnitsyn 1965).

Geographic distribution. Russia, South Korea (Fig. 10).

Remarks. For species differentiation and association of the sexes see *Xyela kamtshatica*.

Several features mentioned in Ryu & Lee's (1992) original description of *X. suwonae* match with the overwhelming majority of known *Xyela* species (e.g., the color pattern of head and thorax) or even most sawflies (presence of a furrow between antennal sockets and clypeus). The ovipositor sheaths of the two studied type specimens are distorted (see Ryu & Lee 1992, fig. 7), but the outline of valvula 3 is evidently wedge-shaped. The ovipositor itself is evenly tapering toward its tip (see Ryu & Lee 1992, fig. 8). Both features are characteristic for species of the *X. alpigena* group. Valvula 3 is 1.90 times longer than valvifer 2, the fore wing is 2.00 times longer than the ovipositor sheath. These data agree well with *X. ussuriensis*.

Several times imagines have been swept from the supposed larval host plant *Pinus koraiensis.* The type specimens of *X. ussuriensis* were collected in a pure population of this pine (Rasnitsyn 1965, personal communication and present data; see also *X. koraiensis*).

Xyela curva group

Diagnosis. Ovipositor sheath clearly curved downwards, tip round and knife-shaped with dorsal edge sloping down and ventral edge almost straight (Figs 118–120); valvula 1 with small preapical dorsal tooth, distally with 12–14 oblique, closely spaced annuli, valvula 2 in distal half with 10–13 mostly vertical annuli and clear sclerotization on lateral wall around groups of sensilla campaniformia (Figs 124–125); lateral lamella of valviceps vertical with proximal edge convex and distal base concave, distal flagella often projecting beyond distal lobe of valviceps (Figs 136–139).

Species included. *Xyela curva* in the West Palearctic and *X. exilicornis*, *X. japonica* and *X. occidentalis* in the East Palearctic.

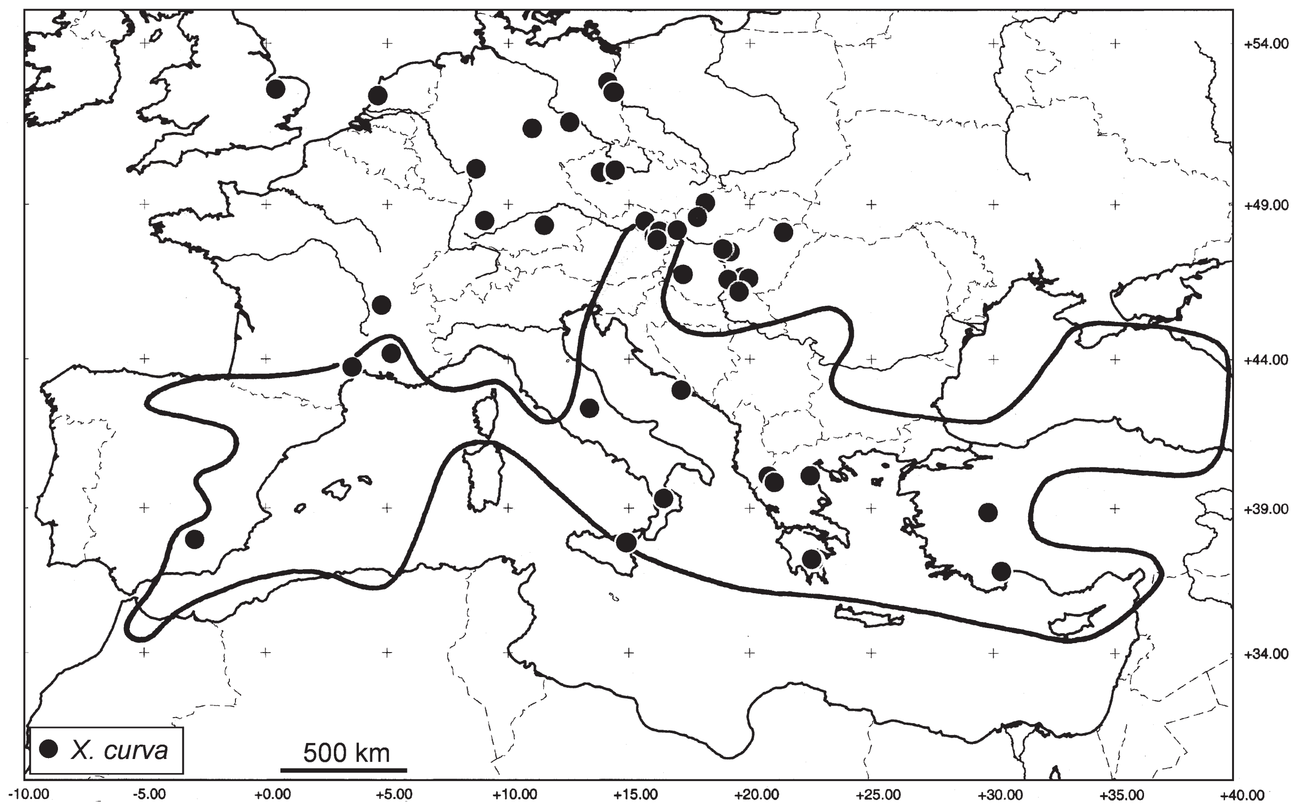


FIGURE 11. Records of *Xyela curva* (480 specimens from 67 collection sites) and natural distribution of the host plant, *Pinus nigra* (solid line, combined from Meusel et al. 1965 and Barbéro et al. 1998). Additional record included for Sicily (Turrisi 2007).

Xyela curva Benson, 1938

Xyela curva Benson, 1938: 35–36, ♀♂, type locality: Austria, Weissenbach an der Tristing [= Weissenbach on river Triesting].
Xyela curvae: Zombori 1974: 238 (misspelling).
Xyela graeca: Schedl 1997: fig. 2b (misidentification).

Description. Female. Color. Head yellow with brown and black pattern: two dark brown stripes along the frontal furrows meeting black ocellar and postocellar area and dark longitudinal spot in middle of frons always present; kidney-shaped spots on vertex usually separate from black postocellar area (Fig. 42). Antennae dark brown to black, a little paler below. Thorax dorsally brown with pale pattern on pronotum, mesonotal lobes and mesoscutellum, tegulae pale, mesepisternum largely pale brown. Abdominal terga dark brown to brown, sterna often paler, lateral parts of terga 8 and 9+10 and hypopygium pale, valvifer 2 mostly dark brown, membrane between valvifer 2 and valvula 3 white, valvula 3 black or dark brown (Fig. 92, 118). Legs pale brown, posterior coxae pale, more or less their base and longitudinal ventro-lateral line dark. Wing membrane slightly infuscate, venation and pterostigma pale brown.

Morphology. Fore wing 4.7–5.2 mm long, 2.15–2.30 times longer than ovipositor sheath, vein Rs+M 150–350 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2 (Fig. 4). Synantennomere 3 780–930 µm long, antennomere 4 210–250 µm long and 6.5–7.5 times longer than wide distally. Article 3 of maxillary palp 530–630 µm long, 1.45–1.65 times longer than scape and about as wide as synantennomere 3. OOL : POL = 1.85–2.20 : 1. Ovipositor sheath 2.05–2.30 mm long, valvula 3 1.50–1.70 times longer than valvifer 2 and 6.5–7.5 times longer than wide at basis (Fig. 92, 118). Valvula 3 of ovipositor sheath compressed in cross section, pale membranous area about as long as basal width of valvula 3, valvula 3 almost parallel-sided in basal and medial part, in distal part dorsal edge sloping down to round tip, sensilla field present and directed distad, with 7–8 setae (Fig. 93). Ovipositor (Fig. 124) curved downwards. Valvula 1 of ovipositor compressed, aulax terminating preapically, with preapical small tooth, ventral edge sloping up to tip, with ca 13 oblique closely spaced annuli in distal 0.2, without serrulae, olistether with 7–9 setae. Left and right valvulae 2 fused along dorsal edge up to distal 0.1. Valvula 2 with dorsal margin engraved, abruptly tapering in distal 0.1 after an inconspicious widening, darker than valvula 1, in distal half with ca 13 mostly vertical annuli, in distal 0.4 with ca 13 evenly spaced sclerotizations each enclosing 1–2 sensilla campaniformia. Posterior tibia 1.05–1.20 mm long, all claws with delicate subapical tooth.

Male. Color. Similar to female (see Fig. 43 for color pattern of head). Stripes along supraantennal furrows often smaller, antennae usually pale brown. Hypopygium and often preceding sterna pale brown.

Morphology. Fore wing 4.0–4.6 mm long, Rs+M ca 110–200 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 840–1,000 µm long, antennomere 4 280–350 µm long and 8.5–10.5 times longer than wide distally. Article 3 of maxillary palp 500–580 µm long, 1.35–1.55 times longer than scape and about as wide as synantennomere 3. OOL : POL = 1.65–2.00 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe about as long as wide in lateral view (Figs 155–156). Lower ergot on valvular stalk present, usually erect. Valviceps (1.60–)1.75–1.85 times longer than wide on medial lobe, lateral lamella vertical with proximal edge convex and distal base concave, proximal lobe of penis valve 0.14–0.17(–0.19) times as long as valviceps and ca 0.95–1.00 times as high as medial lobe, excision on lower edge 0.15–0.21 as deep as width of medial lobe, valviceps on medial lobe 1.00–1.20 times wider than on distal lobe, 2 distal flagella present, tip of longer flagellum reaching 1.05–1.15(–1.25) width of distal lobe (Fig. 136). Valviceps without median longitudinal sclerotization, medial lobe evenly rounded, with 8–12(–19) cone-like sensilla along proximal part of upper edge and of lateral surface, upper edge between medial and distal lobe with numerous setae. Posterior tibia 1.00–1.15 mm long, all claws with delicate subapical tooth.

Barcodes. GUID AAQ3776 (3♀).

Type material. Holotype ♀: [round label with red margin:] “Type”; “Weissenbach a. d. Tristing 5.83”; [leg.] “Kolazy”; “*Julii* det. Konow”; “Holotype *Xyela curva* sp. nov. ♀ det. R. B. Benson 1937”; [red:] “Typus”; “*Xyela curva* Benson ♀ det. S. M. Blank”. Left antenna, left middle and hind legs and ovipositor sheath missing. NMW. Paratypes: 1♀ 2♂, BMNH, NMW (other paratypes not checked).

Host plant. ~~*Pinus cembra* L.~~ (Liston 1995), ~~*P. mugo* Turra~~ (Liston 1995), °*P. nigra* ssp. *laricio* Poir (= *P. laricio calabrica* (Loud.) Cesca et Peruzzi, reported by Turrisi 2007), •*P. nigra* ssp. *nigra* Arn. (17♀ 34♂ from 6 reared samples), •*P. nigra* ssp. *pallasiana* Lamb. (22♀ 22♂ from 7 reared samples, 1 larva identified by barcoding), °*P. nigra* ssp. *salzmannii* Dunal, ~~*P. sylvestris* L.~~ (Beneš 1975).

Biology. The flimsy, transparent cocoon was described by Schedl (1997). We have not been able to identify the mode of silk secretion unambiguously when observing *X. curva* larvae producing a cocoon below a pane of glass. The larvae make a cavity in the soil and cover its wall with cocoon material by repeatedly touching the surface with the stretched labio-maxillar complex and the chewing mandibles. Secretion of a liquid or a thread from the mouth or from the abdominal tip has not been observed, but possibly only a small amount of material is discharged. A histological or ultrastructural study is required to decide, whether labial glands or malpighian tubules of the larva produce the secretion during cocoon-spinning. For additional data on the biology of *X. curva* see Blank (2002).

Geographic distribution. Austria, Belgium (Liston & Blank, 2006), Croatia, Czech Republic, France, Germany (Blank & Burger 1996), Great Britain (Liston & Blank, 2006), Greece, Hungary, Italy (for records from Sicily see Turrisi 2007), Netherlands, Slovakian Republic, Spain, Turkey (Fig. 11). Benson's (1961) record from Switzerland is a misidentication of a *X. obscura* female.

Remarks. Female *Xyela curva* are similar to *X. exilicornis* but have a longer ovipositor, and the pale and dark pattern of valvula 2 is more extensive. The ventral excision of the valviceps is round in *X. curva* but angular in other representatives of the group. In females from Austria and Germany the dark stripes along the frontal furrows are usually wider than the kidney-shaped spots, and sometimes the frontal area becomes diffuse brown, whereas in Greek and the, palest, Turkish specimens the stripes may be as small as the diameter of an ocellus and the frontal area predominantly yellow. The generally paler males exhibit a similar geographic variation of the dark pattern of the face as the females.

A complete barcoding sequence was obtained for three imagines of *X. curva*. The specimens display an intraspecific variation of 1.40 % and are placed at an interspecific distance of 11.29 % to the next neighbor *X. alpigena* (Fig. 23).

The type material corresponds well with our concept of the species. Males and females have been associated by means of extensive material either reared or swept from *Pinus nigra*.

Imagines were reared several times from *Pinus nigra* ssp. *nigra* in Austria and Germany, and from ssp. *pallasiana* in Greece and Turkey. For a larva extracted from *P. nigra* ssp. *pallasiana* a short COI sequence (282 bp) could be obtained. The barcoding analysis placed this larva in the cluster of *X. curva* (Fig. 23). *Pinus nigra* ssp. *laricio* and ssp. *salzmannii* are additionally supposed to be hosts due to geographical coincidence of these pine subspecies with *X. curva* in southern Italy and on the Iberian Peninsula (differentiation of subspecies following Barbéro et al. 1998). Beneš (1975) reported *P. sylvestris*. This should be deleted, because there is no indication of rearing. Liston's (1995) records of *P. cembra* and *P. mugo* are most likely based on Benson's (1961) misidentification of *X. curva* (actually *X. obscura*) from 1,800 m altitude in the Swiss National Park.

Xyela exilicornis Maa, 1949

Xyela exilicornis Maa 1949: 30–32, ♂, type locality: China, Fujian Sheng, Shaowu, Wuku.

Description. Female. Color. Head yellow with brown and black pattern: face predominantly pale brown leaving small stripe along eye and on vertex yellow, two diffuse black stripes along frontal furrows meeting black ocellar and postocellar area, black longitudinal spot in middle of frons present; kidney-shaped spots on vertex separate from black postocellar area. Antenna pale brown. Thorax dorsally brown with more or less yellow pattern on pronotum, mesonotal lobes and mesoscutellum, tegulae pale, mesepisternum largely pale brown. Abdominal terga brown, lateral parts of terga 8 and 9+10 paler, valvifer 2 completely pale brown, membrane between valvifer 2 and valvula 3 white, valvula 3 brown (darker than valvifer 2). Legs pale brown, posterior coxae dark brown with distal 0.3–0.5 pale. Wing membrane slightly infuscate, venation and pterostigma pale brown.

Morphology. Fore wing 4.0–4.3 mm long, 1.95–2.05 times longer than ovipositor sheath, vein Rs+M 125–150 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 640–760 µm long, antennomere 4 130–150 µm long and 4.0–5.0 times longer than wide distally. Article 3 of maxillary palp 440–480 µm long, 1.35–1.50 times longer than scape and about as wide as synantennomere 3. OOL : POL = 1.70–1.90 : 1. Ovipositor sheath 2.0–2.1 mm long, valvula 3 1.70–1.80 times longer than valvifer 2 and 6.5–7.0 times longer than wide at base. Valvula 3 of ovipositor strongly compressed in cross section, pale membranous area along ventral edge of valvula 2 about as long as width of valvula 3 at base, dorsal edge of valvula 3 sloping down to round tip in distal fifth, valvula 3 with sensilla field exposed and directed caudally, bearing 8 setae. Ovipositor bent downwards. Valvula 1 compressed, aulax terminating preapically, small preapical tooth of dorsal edge present, dorsal edge sloping down and ventral edge sloping up to tip, with ca 13 oblique closely spaced annuli in distal 0.2, without serrulae, olistether with ca 7 setae. Left and right valvulae 2 fused along dorsal edge up to distal 0.1, dorsal margin almost smooth, distal 0.1 abruptly narrowing to tip. Valvula 1 in distal third with 10 almost vertical annuli, slightly proximal to annuli groups of 2 sensilla campaniformia enclosed by an indistinct sclerotization. Posterior tibia 0.9–1.0 mm long, all claws with delicate subapical tooth.

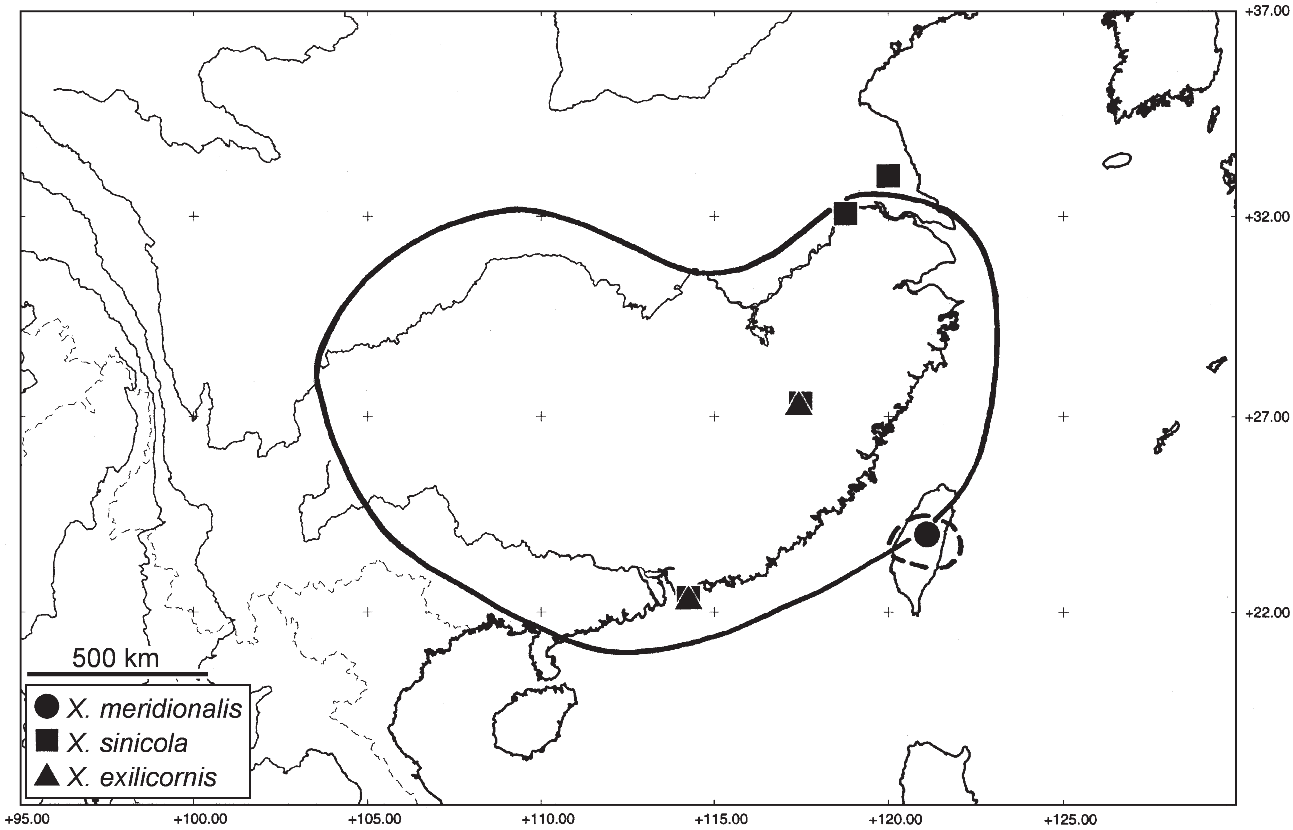


FIGURE 12. Records of Chinese and Taiwanese *Xyela* species, *X. exilicornis* (5 specimens from 2 collection sites), *X. meridionalis* (4 specimens from 1 collection site) and *X. sinicola* (10 specimens from 4 collection sites), and natural distribution of their supposed host plants, *Pinus massoniana* (solid line, according to Kindel (1995) and *P. morrisonicola* (dashed line, according to Mirov 1967).

Male. Color. Head yellow with pale and dark brown pattern: ocellar and postocellar area and kidney-shaped spots dark, frons pale or indistinctly diffuse pale brown (faded holotype possibly with brown stripes along supraantennal furrows and dark longitudinal stripe in middle of frons, male from Hong Kong without indication of dark pattern on frons). Antennae pale brown. Thorax dorsally brown with distinct pale pattern on pronotum, mesonotal lobes and mesoscutellum, tegulae pale, mesepisternum largely pale brown. Abdominal terga brown, sterna possibly paler than terga (faded?), hypopygium completely pale. Legs including posterior coxae pale brown (faded?). Wings slightly infuscate, venation and pterostigma pale brown.

Morphology. Fore wing ca 3.4 mm long, Rs+M 50–90 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 740–790 µm long, antennomere 4 210–220 µm long and ca 7.0 times longer than wide distally. Article 3 of maxillary palp ca 450 µm long, ca 1.45 times longer than scape and about as wide as synantennomere 3. OOL : POL = 1.60–1.90 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe ca 1.3 times longer than wide distally in lateral view. Lower ergot on valvular stalk small but evident. Valviceps 1.50–1.65 times longer than wide on medial lobe, lateral lamella vertical with proximal edge convex and distal base concave, proximal lobe of penis valve ca 0.21–0.22 times as long as valviceps and 0.90–0.95 times as high as medial lobe, excision on lower edge triangularly shaped and 0.30–0.33 as deep as width of medial lobe, valviceps on medial lobe ca 1.17 times wider than on distal lobe, 2 distal flagella present, tip of longer flagellum reaching 0.95–1.00 width of distal lobe (Fig. 137). Valviceps with distinct median longitudinal sclerotization absent (indistinct shadow present), medial lobe broad and slightly rounded on upper edge, with 5–9 cone-like sensilla on proximal portion of medial lobe, upper edge between medial and distal lobe with numerous setae. Posterior tibia 0.90–0.95 mm long, all claws with delicate subapical tooth.

Type material. Holotype ♂: "Wuku [...; 2 Chinese characters for Wuku], Shaowu, Fukien, 400 m, 15.iii.1945, K. S. Lin (indoor)"; [pink with a red edge:] "*Xyela exilicornis* sp. n. Holotype ♂ T. Maa, 1948"; "*Xyela exilicornis* Maa, 1949 det. S. M. Blank 2001". Specimen partly covered by mould and psocopteran excrement, antennomeres 4–12, right fore wing and right hind leg missing. Apparently faded since time of original description, because the dark color is pale brown (e.g., abdomen) and pale color of body is brownish yellow (e.g., most of face). Genitalia glued to piece of cardboard and stored on pin of holotype. TARI.

Host plant. [?]*Pinus massoniana* Lamb.

Geographic distribution. China (Fujian Province, Xianggang) (Fig. 12).

Remarks. The ovipositor is longer than that of the similarly colored *Xyela curva*. The penis valve is triangularly excised, similar to that of *X. japonica* and *X. occidentalis*, but the latter two species have a dark head.

A "punctuation" of the body surface as mentioned in Maa's original description of *X. exilicornis* is not present, but the holotype exhibits coriaceous microsculpture as is typical for *Xyela*. The color of the holotype specimen is possibly strongly modified. The dark pattern may have become paler and the yellow pattern partly pale brown. Also 2 of the 3 studied females from Hong Kong are possibly faded, and the above description of the color pattern in female sex is taken from the third, dark specimen. The pale females have the dark pattern generally pale brown. Their face is predominantly pale brown, and they lack the dark stripes along the frontal furrows and the dark medial spot of frons.

Maa (1949) emphasized that *X. exilicornis* "is only comparable to *X. kamtshatica* Guss. (Kamtshatka) in its wing venation", and accordingly, Rasnitsyn (1965) placed it in the *alpigena* group. The presence of a vertical lateral lamella on the penis valve with a concave excision and the proximal lobe of the valviceps not protruding above the medial lobe refer it to the *X. curva* group.

The hitherto unknown female was associated with the help of material collected in Hong Kong on the same site and period of time. *Xyela exilicornis* was found there together with *X. sinicola*.

Pinus massoniana is supposed to be the host plant, because it is the only pine species whose native geographical and altitudinal distribution range coincides with the known collection records of *X. exilicornis* (Mirov 1967; see also *X. sinicola*). Among the material of both species 4 specimens are labeled as being collected on "10.V.1965" and 6 on different days of "[...].II.1965". The date May is regarded as a type error for February, because blooming of *P. massoniana* in February is more likely due to the rather southern geographical position of the collection locality Hong Kong.

Xyela japonica Rohwer, 1910

Xyela japonica Rohwer, 1910: 99-100, ♀, type locality: Japan, Honshu, Kanagawa Prefecture, Hakone; Benson 1961: 171 (junior synonym of *obscura*); Blank 2002: 226–227 (removed from synonymy).

Xyela obscura: Benson 1961: 170 (senior synonym of *japonica*); Benson 1962: 385 (partly misidentified); Okutani 1982: (misidentification).

Description. See Blank et al. (2005).

Host plant. Unknown.

Geographic distribution. Japan (Honshu) (see Blank et al. 2005, fig. 3).

Xyela occidentalis Blank & Shinohara, 2005

Xyela occidentalis Blank & Shinohara in Blank et al., 2005: 264–266, ♀♂, type locality: South Korea, Kangweondo, Mt. Samagsan.

Description. See Blank et al. (2005).

Host plant. •*Pinus densiflora* Sieb. & Zucc.

Geographic distribution. China (Jilin Province), South Korea (see Blank et al. 2005, fig. 3).

Xyela julii group

Diagnosis. Ventral edge of ovipositor sheath straight or slightly curved downwards in species with long ovipositor, tip knife-shaped with dorsal edge sloping down and ventral edge almost straight (Figs 105–117), sensilla field with 3–4 setae (Fig. 94); valvula 1 distally with 12–14 oblique, closely spaced annuli (similar to Fig. 94); lateral lamella of valviceps oblique, medial lobe strikingly protruding above proximal and distal lobes (Figs 141–152).

Species included. *Xyela altenhoferi*, *X. graeca*, *X. heldreichii*, *X. julii*, *X. menelaus*, *X. obscura* and *X. uncinatae* in the West Palearctic, *X. densiflorae*, *X. julii*, *X. par*, *X. pumilae*, *X. sinicola*, *X. tecta*, *X. variegata* in East Asia, and an unidentified species similar to *X. par* in Vietnam (Blank et al. 2005).

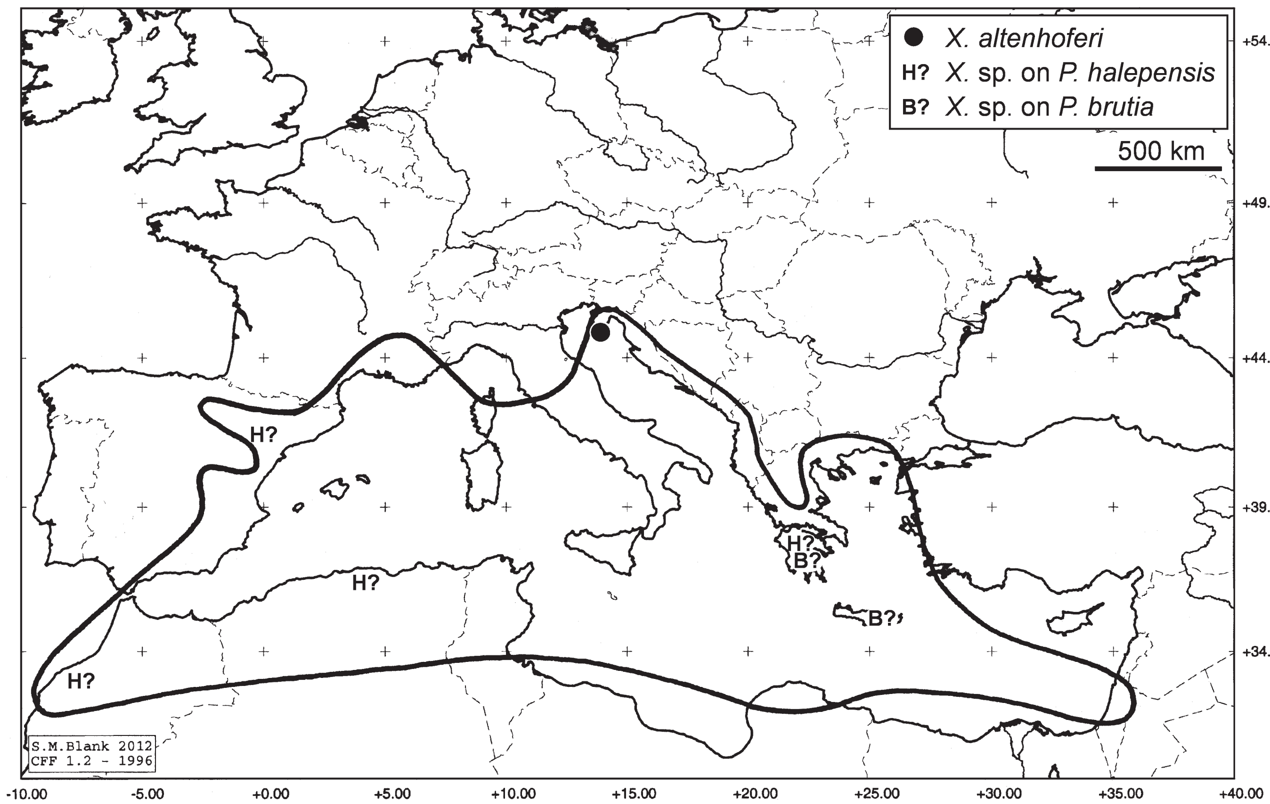


FIGURE 13. Records of *Xyela altenhoferi* (12 specimens from 1 collection site) and natural distribution of the host plant, *Pinus halepensis* (solid line, according to Barbéro et al. 1998). "B?" and "H?" denote additional collection sites of similar, unidentified *Xyela* specimens collected close to or reared from *P. brutia* or *P. halepensis* (see text).

Xyela altenhoferi Blank, sp. nov.

Type locality: Croatia, Premantura N 1 km.

Description. Female. Color. Head yellow with black and brown pattern: face medially diffuse pale brown laterally up to eye margins, along frontal furrows slightly darker brown without clearly defined stripes, dark brown medial spot of frons present and weakly contrasting, kidney-shaped spots, ocellar and postocellar spot black and embedded in diffuse brown pattern, yellow stripe between kidney-shaped spot and upper eye margin (Fig. 50). Antennae brown, ventrally a little paler. Thorax dorsally black with indistinct brown spots on pronotum, mesoscutum and mesoscutellum. Mesepisternum largely pale brown. Abdomen dark brown, lateral parts of terga 8 and 9+10, partly the distal sterna, and valvifer 2 pale brown, membranous base of valvula 3 white, valvula 3 dark brown (Fig. 105). Legs brown, femora unicolorous, posterior coxae dark brown except for the ventral distal portion. Fore wing membrane, veins and pterostigma slightly infuscate, hind wing membrane hyaline.

Morphology. Fore wing 3.7–4.0 mm long, 2.00–2.15 times longer than ovipositor sheath, vein Rs+M 210–290 µm long, 2r-m meeting Rs 210–330 µm proximal to furcation of Rs1 and Rs2. Synantennomere 3 570–680 µm long, antennomere 4 130–160 µm long and 4.5–5.5 times longer than wide distally. Article 3 of the maxillary palps 380–460 µm long, 1.35–1.55 times longer than the scape and wider than synantennomere 3. OOL : POL = (1.35–)1.50–1.65 : 1. Ovipositor sheath 1.80–1.95 mm long, valvula 3 1.50–1.65 times longer than valvifer 2 and 5.5–6.0 times longer than wide at its base (Fig. 105). Valvula 3 of ovipositor compressed, pale membranous area about as long as basal width of valvula 3, dorsal edge of valvula 3 sloping down to a round tip, distally with sensilla field exposed and directed caudally, bearing 3 hairs. Ovipositor almost straight and compressed. Valvula 1 with aulax terminating distally, ventral edge to tip, with ca 15 oblique closely spaced annuli in distal quarter, without serrulae, olistether with 3–4 setae. Left and right valvula 2 fused along dorsal edge in basal half. Valvula 2 with smooth dorsal margin, tapering in distal half, pale and evenly sclerotized, in distal 0.4 with single scattered sensilla campaniformia, in distal 0.1 with 5 oblique annuli. Posterior tibia 0.80–0.95 mm long, claws without subapical tooth.

Male. Unknown.

Type material. Holotype ♀: "Croatia: Premantura N 1 km, 0 m NN [altitude], 44°49'N 13°54'E [leg.] S.M. Blank & E. Altenhofer c[ollected on] 7.4.1999 em[erged on] 24.4.2001 Z 20/99 *Pinus halepensis*"; [red:] "Holotype ♀ *Xyela altenhoferi* det. S. M. Blank 2005". DEI. Paratypes: 11♀, EAC, DEI.

Etymology. The species is dedicated to Dr. Ewald Altenhofer, whose support of this study by rearing a large number of *Xyela* specimens was invaluable.

Host plant. •*Pinus halepensis* Mill. (12♀ from 1 reared sample).

Biology. Apparently the flight period of *X. altenhoferi* commences comparatively early. Cones with larvae were collected in Croatia while *X. graeca* and *X. menelaus* imagines were found to be active at a nearby place. The imagines emerged in the second year after the larvae were collected.

Geographic distribution. Croatia (Fig. 13).

Remarks. *Xyela altenhoferi* differs from other members of the *X. julii* group in the combination of short ovipositor, valvula 3 darker than valvifer 2, infuscate wings, diffuse brown frons with brown pattern touching eyes and stripes along frontal furrows weak or missing. The similar *X. graeca* and *X. menelaus* differ in the more extensively yellow face, the yellow or pale brown posterior coxae and the almost hyaline wings. The East Palearctic *X. pumilae*, in which the wings are also infuscate, has a yellow face with strongly contrasting black stripes, and its valvula 3 is 1.65–1.85 times longer than valvifer 2.

The male of *X. altenhoferi* is unknown. So far *Pleroneura coniferarum* (Hartig, 1837) was supposed to be the only parthenogenetic species among xyelid sawflies (Pesarini 2000, Blank 2002).

Xyela densiflorae Blank & Shinohara, 2005

Xyela densiflorae Blank & Shinohara in Blank et al., 2005: 266–268, ♀♂, type locality: South Korea, Kangweondo, Mt. Samagsan.

Description. See Blank et al. (2005).

Host plant. •*Pinus densiflora* Sieb. & Zucc.

Geographic distribution. South Korea (see Blank et al. 2005, fig. 4).

Xyela graeca J.P.E.F. Stein, 1876

Xyela graeca J.P.E.F. Stein, 1876: 57–58, ♀, type locality: Greece, Nomos Ioanina, Konitsa S 6 km; Konow 1897: 58 (junior synonym of *julii*); Benson 1938: 33, 35 (removed from synonymy).

Pinicola graeca: André 1881: 468 (combination with *Pinicola*).

Xyela nigrae Rasnitsyn, 1965: 519, ♀, type locality: Ukraine, Transcarpathia, Tur'i-Remety near Perechin; Rasnitsyn 1971: 193 (junior synonym of *graeca*).

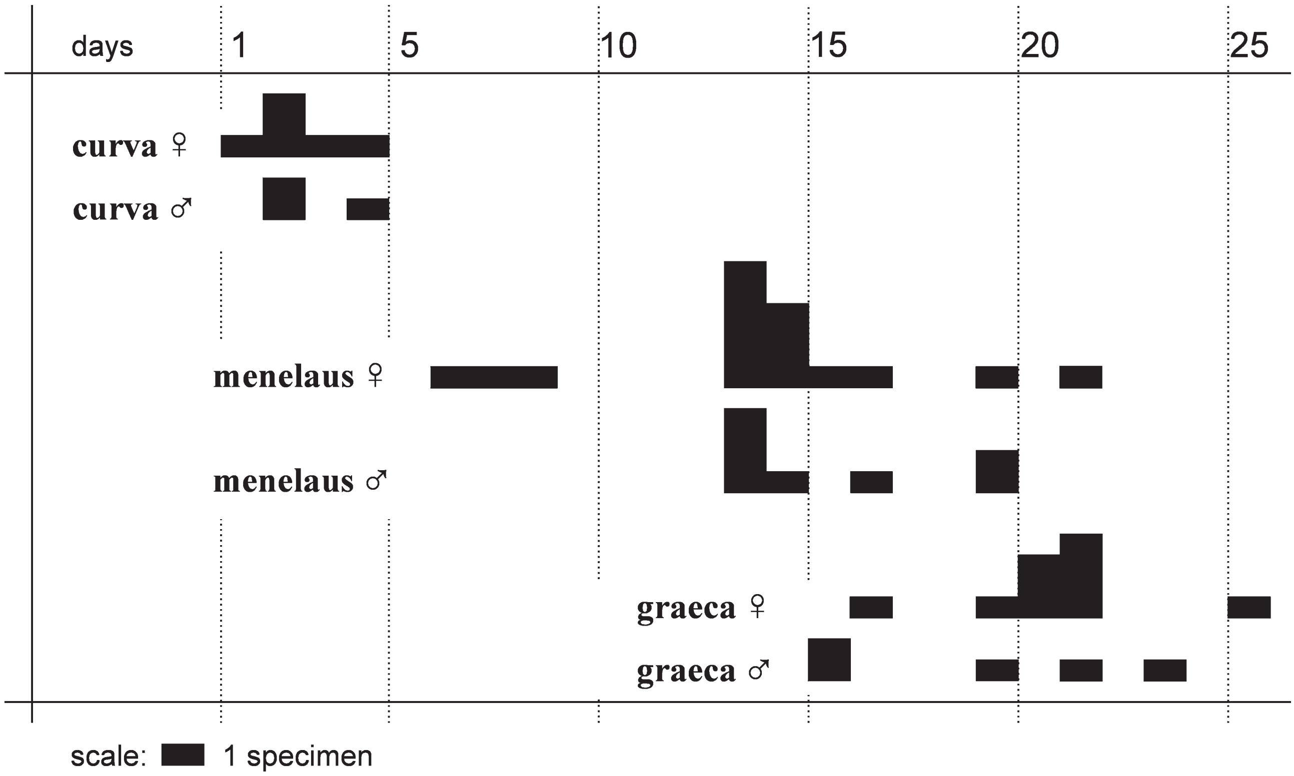


FIGURE 14. Emergence phenology of imagines of *Xyela curva*, *X. graeca* and *X. menelaus* under laboratory conditions between 24.3. (= day 1) and 19.4.1999 (= day 25). Rearing data from two almost syntopic samples (Z42A/98, Z42B/98) taken from *Pinus nigra pallasiana* in southern Turkey in 1998.

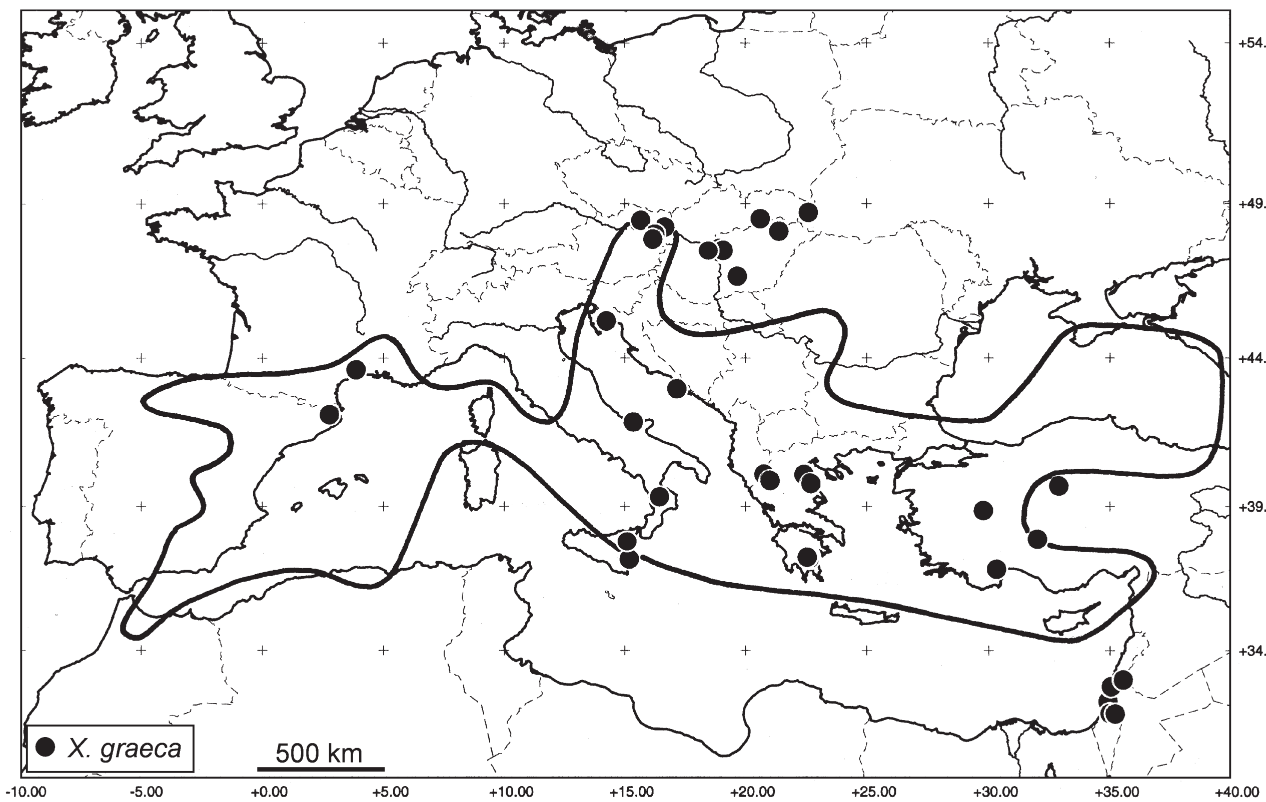


FIGURE 15. Records of *Xyela graeca* (553 specimens from 53 collection sites) and natural distribution of the host plant, *Pinus nigra* (solid line, combined from Meusel et al. 1965 and Barbéro et al. 1998).

Description. Female. Color. Head yellow with black and brown pattern: black stripes along frontal furrows often fading and at most 2 times wider than ocellar diameter, meeting black ocellar and postocellar area, black longitudinal medial spot of frons always present, weak in pale specimens, rarely fusing with frontal stripes, kidney-shaped spots on vertex separate from black postocellar area (Fig. 51–52). Antennae brown or pale brown, scape sometimes yellow. Thorax dorsally brown with rich yellow pattern on pronotum, mesonotal lobes and mesoscutellum, tegulae yellow and sometimes brown in middle, mesepisternum largely pale yellow. Abdominal terga brown, lateral parts of terga 7, 8 and 9+10 yellow or pale brown, valvifer 2 completely yellow or pale brown, membrane between valvifer 2 and valvula 3 white, valvula 3 varying from yellow to pale brown (Fig. 107). Legs pale brown, posterior coxae pale brown or yellow and more or less infuscate from base. Wing membrane clear, venation and pterostigma pale.

Morphology. Fore wing 2.6–3.9 mm long, 1.90–2.35(–?2.55) times longer than ovipositor sheath, vein Rs+M 130–280 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 510–710 µm long, antennomere 4 130–160 µm long and 4.5–5.5 times longer than wide distally. Article 3 of maxillary palp 410–480 µm long, 1.65–1.85 times longer than scape and wider than synantennomere 3. OOL : POL = 1.60–2.00 : 1. Ovipositor sheath (1.35–)1.60–1.80 mm long, valvula 3 (?1.60–)1.70–2.00 times longer than valvifer 2 and (?4.5–)4.8–5.8 times longer than wide at base (Fig. 107). Valvula 3 of ovipositor compressed, pale membranous area about as long as basal width of valvula 3, dorsal edge of valvula 3 sloping down to round tip, distally with sensilla field exposed and directed caudally, bearing 3 setae. Ovipositor straight and compressed. Valvula 1 with aulax terminating distally, ventral edge sloping up to tip, with ca 13–15 closely spaced oblique annuli in distal quarter, without serrulae, olistether with 4–5 setae. Left and right valvulae 2 fused along dorsal edge in basal half. Valvula 2 with smooth dorsal margin, tapering in distal half, pale and evenly sclerotized, in distal 0.4 with single scattered sensilla campaniformia, in distal 0.1 with 3–5 oblique annuli. Posterior tibia 0.80–1.05 mm long, claws without subapical tooth.

Male. Color. Similar to female, but often generally paler (see Fig. 53 for color pattern of head). Hypopygium yellow, often also preapical sterna largely yellow.

Morphology. Fore wing 2.9–3.5 mm long, Rs+M 160–250 µm long, 2r-m meeting Rs (130–)180–280 µm proximal to furcation of Rs1 and Rs2. Synantennomere 3 510–700 µm long, antennomere 4 140–200 µm long and 5.5–7.0 times longer than wide distally. Article 3 of maxillary palp 340–430 µm long, 1.35–1.55 times longer than scape and wider than synantennomere 3. OOL : POL = (1.40–)1.60–2.00(–2.20) : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe about as long as wide in lateral view. Lower ergot on valvular stalk absent. Valviceps (1.70–)1.80–2.00 times longer than wide on medial lobe, lateral lamella distinct and oblique, proximal lobe of penis valve at proximal end round, 0.20–0.30 times as long as valviceps and 0.70–0.80 times as high as medial lobe, excision on lower edge 0.16–0.22 as deep as width of medial lobe, valviceps on medial lobe 1.35–1.55 times wider than on distal lobe, 2 distal flagella present, tip of longer flagellum reaching (0.90–)0.95–1.05 width of distal lobe (Fig. 142). Valviceps with median longitudinal sclerotization present, medial lobe almost symmetrical and broad, with 5–10 cone-like sensilla along upper edge and scattered on lateral surface, upper edge between medial and distal lobe with 6–9 setae. Posterior tibia 0.70–0.85 mm long, claws without subapical tooth.

Barcodes. GUID ABU8786 (2♀ 1♂)

Type material. *Xyela graeca*. Neotype ♂ (here designated): "Greece, Nomos Ioanina, Konitsa S 6 km, 650 m NN [altitude above sea level], 40°06'N 20°46E, leg. Blank & Kutzscher c. [collected] 4.5.1999 em. [emerged] 21.3.2000 [rearing number] Z37/99, larva ex *Pinus nigra* [i.e., *Pinus nigra pallasiana*]"; "*Xyela graeca* J.P.E.F. Stein, 1876 det. S. M. Blank 2000"; [rot:] "Neotypus ♂ *Xyela graeca* J.P.E.F. Stein, 1876 des. S. M. Blank 2001". Genitalia stored inside small vial and kept on pin of type specimen. DEI.

Xyela nigrae. Holotype ♀: [Cyrillic letters:] "Karpati, Tur'i-Remety bliz Perechina [= Tur'i-Remety near Perechin], 15.V.65, A. Rasnitsyn"; [rot:] "Holotypus *Xyela nigrae* ♀ A. Rasnitsyn". In good condition. ZMUM. Paratype: 1♀, ZMUM.

Host plant. ~~*Pinus brutia* Ten.~~ (Schedl 1981), °*Pinus nigra* ssp. *laricio* Poir, ~~*P. nigra* ssp. *mauretanica* Maire & Peyerimhoff~~ (Berland 1937, 1943), •*Pinus nigra* ssp. *nigra* Arn. (43♀ 21♂ from 6 reared samples), •*P. nigra* ssp. *pallasiana* Lamb. (78♀ 28♂ from 9 reared samples), °*P. nigra* ssp. *salzmannii* Dunal, ·*P. sylvestris* L. (2♂ from 1 reared sample).

Biology. In a series reared from two almost syntopic samples of *Pinus nigra pallasiana* taken in southern Turkey *X. menelaus* hatched significantly earlier than *X. graeca* (females: n[*graeca*] = 10, n[*menelaus*] = 14, U = 9, α < 0.001; males: n[*graeca*] = 5, n[*menelaus*] = 11, U = 7, α < 0.05; U-test). The difference was on average 6 days. The few *X. curva* from this sample hatched even ca 18 days earlier than *X. graeca*. This corresponds well with Pschorn-Walcher & Altenhofer's (2000) observation, that Austrian *X. graeca* emerge in April, 1 or 2 weeks later than *X. curva*. In fact, Pschorn-Walcher & Altenhofer (2000) had a mixture of *X. graeca* and *X. menelaus* on hand.

For additional phenological data see Blank (2002). Specimens collected in February 1937 in Algeria (Berland 1937 recording *X. julii* from Tikdja in the Djurjura) were identified as *X. graeca* by Blank (2002) but they might belong to a species associated with *Pinus halepensis*.

Geographic distribution. Austria, Croatia, France, Greece, Hungary, Israel, Italy, Spain, Turkey, Ukraine (Fig. 15). Additionally reported from Bulgaria (Vasilev 1987), the Slovakian Republic (Roller 1999) and Cyprus (Schedl 2002 as *X.* "cf. *graeca*"). These records are likely to be correct but should be re-examined, because they could relate to *X. graeca* or to *X. menelaus*. The record for Corsica by Liston & Späth (2005) refers to *X. menelaus*.

Remarks. Among the pale representatives of the *Xyela julii* group with a comparatively short ovipositor two very similar forms occur in the West Palearctic, which both feed on *Pinus nigra*. Corresponding males have an apparent longitudinal sclerotization of the valviceps and a gradually ascending distal edge of the valviceps. The existence of two separate species is well founded upon the recognition of two different forms of penis valves. These species are here called *X. graeca* and *X. menelaus*, and in accordance with Benson (1960) the name *menelaus* is applied to the species with the shorter ovipositor (see below for discussion on nomenclature). The sexes of the two species were associated with the help of two reared series from Lower Austria and a reared series from southern Turkey. The first series from Hernstein mainly comprised of females with a comparatively long ovipositor and males with a shallowly excised valviceps bearing a narrowly rounded proximal lobe (= *X. graeca*). The second series from Dürnstein contained mainly females with shorter ovipositor and males with deeper excised valviceps having the proximal side of the proximal lobe truncate (= *X. menelaus*). This association of the sexes corresponds with the emergence phenology of specimens from the reared Turkish series (see above and Fig. 14).

Unlike the males the discrimination of females of *X. graeca* and *X. menelaus* is often dubious. The relative length of fore wing : ovipositor sheath and valvifer 2 : valvula 3, and the absolute ovipositor sheath length exhibit bimodal distributions. Since a wide overlap is considered, the characters in the key will separate some 80 % of the females.

In the barcoding analysis, three specimens of *X. graeca* were grouped in a common cluster with 0.93 % intraspecific variability. This cluster is well separated from the cluster comprising specimens identified as *X. menelaus* (Fig. 23). The closest neighbor of *X. graeca* is *X. obscura* at an interspecific distance of 6.13 %.

Xyela graeca was described from two females collected in Greece. Stein (1876) reported his own collection as their place of deposition. Today the collection of J.P.E.F. Stein is preserved at ZMHB (Groll 2010), but no corresponding specimen could be found there. Already Benson (1938) reported that H. Bischoff, former curator of the Hymenoptera section of ZMHB, was not able to trace the *X. graeca* type material, "as it was never received there with the rest of the collection". As types of other taxa described by Stein (1876) like *Lyda maculipennis* (= *Kelidoptera m.*; see Blank et al. 1998) and *Pachycephus smyrnensis* can still to be located in ZMHB, the syntypes of *X. graeca* are deemed to be lost.

Stein's (1876) pale *Xyela* species can be assigned to the *X. julii* group because of its knife-like ovipositor sheath. Konow (1897) regarded it as a "schwächliches Exemplar" (feeblish specimen) of *X. julii*. Enslin (1918) cast doubt on the correctness of Konow's opinion referring to Stein's description of the comparatively short and yellow ovipositor sheath. Benson (1938) removed *X. graeca* from synonymy and applied the name to a Mediterranean species, which is distributed northwards to Austria. Already Berland (1943) considered Stein's description not to allow the recognition of this species, and the assignment of the name to a particular species to remain uncertain as the type is lost. But he maintained the name for a Mediterranean species. Benson (1960) added a very similar species from Greece, *X. menelaus*, which was considered to differ from all previously known in the world by its very short ovipositor. He omitted to give a reason, why he believed it to be different from Stein's *X. graeca*, which was also described due to its short ovipositor. Actually, Stein's description suits both, *X. graeca* and *X. menelaus*, and both may be common on Greek stands of *Pinus nigra*. Interpreting only the original description it is impossible to decide which of them Stein had on hand, as he did not consider the exact proportion of the ovipositor sheath. The designation of a neotype is necessary to promote nomenclatural stability by assigning the name *X. graeca* to a distinct Mediterranean species of the *X. julii* group. Differing from the original type series a male specimen has been chosen as a consequence of the ambiguous identification of females (Art. 75.3.5., ICZN 1999). Like the original types it originates in Greece. It was reared from *Pinus nigra pallasiana*.

In a footnote Berland (1943) mentioned *X. graeca* collection material from the MNHN labeled as "*pinicola*, n. sp." by Abeille de Perrin. However, the name is not available as "*pinicola*", because it refers to *Pinicola* which has been assessed as a valid generic name in former times (see Berland 1947, who refers to the same specimen citing it as "*Pinicola*, n. sp." written with a capital initial letter).

Study of the *X. nigrae* holotype confirms the synonymy of this name with *X. graeca*, which has already been proposed by Rasnitsyn (1971). Both *X. nigrae* type specimens were reared from *Pinus nigra*.

Schedl (1981) reported dark "*X. graeca*" females collected from *P. brutia* near Thripi on the Greek island Crete, and accordingly he concluded *P. brutia* to be an additional host plant of *X. graeca*. Berland (1937 under the name *X. julii*, 1943) accounted *P. nigra* var. *mauretanica* as a host of *X. graeca*, but the presence of *X. graeca* in Morocco or Algeria has not been confirmed. Such material belongs to forms which are similar to *X. altenhoferi* (Fig. 13) and these host record should be deleted for *X. graeca*.

Single specimens of *X. graeca* occurred in a reared series of *X. julii* from *P. sylvestris*. The sample was taken from a mixed stand of *P. sylvestris* and *P. nigra* in Lower Austria. In northeastern Germany *P. sylvestris* was found to shed pollen about two weeks earlier than *P. nigra*, but after a cold spring the phenology of both pines may overlap providing females the opportunity to oviposit on an unusual pine species.

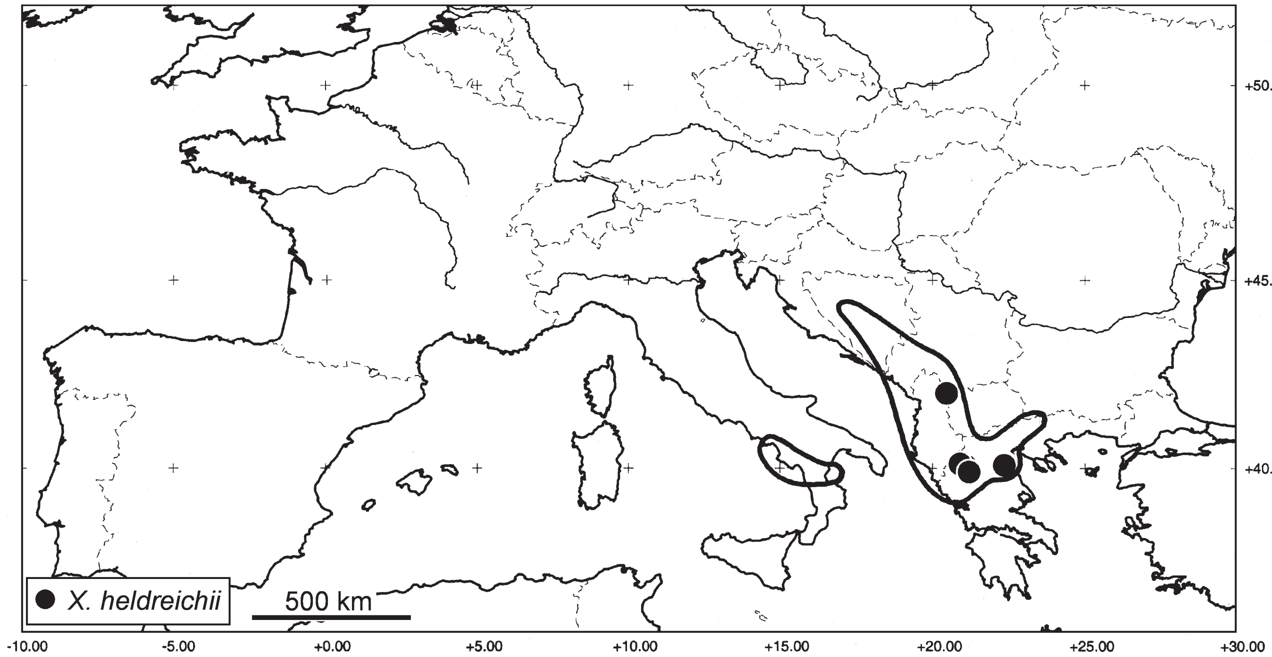


FIGURE 16. Records of *Xyela heldreichii* (72 specimens from 7 collection sites) and natural distribution of the host plant, *Pinus heldreichii* (solid line, according to Willis et al. 1998).

Xyela heldreichii Blank, sp. nov.

Type locality: Greece, Nomos Grevena, Pindos National Park E, Metsovo N 15 km, Mount Blia.
Xyela julii: Csiki 1923: 104 (misidentification).

Description. Female. Color. Head dark brown to black, usually with indistinct stripes on vertex along upper eye margin extending more or less toward facial and genal orbits, sometimes with indistinct spots lateral to postocellar area and on interantennal area. Antennae brown, ventrally a little paler (Fig. 58). Thorax dorsally brown, rarely with more or less distinct pale pattern on mesonotal lobes and mesoscutellum, tegulae pale and largely brown in middle. Thorax ventrally brown, mesosternum laterally yellow. Abdomen brown, tergum 8 and 9+10 laterally and more or less preapical sterna pale brown to yellow. Valvifer 2 yellow, valvula 3 generally darker, preapically infuscate and pale at tip (Fig. 108). Legs yellow, coxae brown, upper side of femora and lower side of femora 3 more or less darkened. Wings almost clear, venation and pterostigma pale brown.

Morphology. Fore wing (3.2–)3.6–4.5 mm long, 1.60–1.80 times longer than ovipositor sheath, vein Rs+M 200–330 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 (490–)610–860 µm long, antennomere 4 (100–)140–180 µm long and 4.0–5.5 times longer than wide distally. Article 3 of maxillary palp 470–610 µm long, 1.45–1.80 times longer than scape and wider than synantennomere 3. OOL : POL = 1.45–1.85 : 1. Ovipositor sheath (2.00–)2,30–2,75 mm long, valvula 3 1.95–2.25 times longer than valvifer 2 and 7.0–8.0 times longer than wide at base (Fig. 108). Valvula 3 of ovipositor compressed, pale membranous area about as long as basal width of valvula 3, dorsal edge of valvula 3 sloping down to round tip, distally with sensilla field exposed and directed caudally, bearing 3 setae. Ovipositor almost straight and compressed. Valvula 1 with aulax terminating distally, ventral edge sloping up to tip, with 15–16 oblique closely spaced annuli in distal quarter, without serrulae, olistether with 6–7 setae. Left and right valvulae 2 fused along dorsal edge in basal half. Valvula 2 with smooth dorsal margin, tapering in distal half, pale and evenly sclerotized, in distal 0.4 with single sensilla campaniformia, in distal 0.1 with 5 oblique annuli. Posterior tibia (0.80–)0.90–1.15 mm long, claws without subapical tooth.

Male. Color. Head yellow with black pattern: narrow black stripes along frontal furrows meeting ocellar and postocellar spot, medial spot on frons, kidney-shaped spots on vertex separate from black postocellar area (Fig. 59). Antennae pale brown. Thorax dorsally black, pronotum laterally sometimes with brown spot, lateral and more or less anterior mesonotal lobes with yellow, mesoscutellum with yellow spot, tegulae pale and sometimes brown in middle, mesepisternum largely yellow. Abdominal terga dark brown, hypopygium yellow to brown, usually paler than preceding sterna. Legs pale brown, posterior coxae laterally brown and ventrally brown in basal and pale in distal half. Wing membrane almost hyaline, venation and pterostigma pale brown.

Morphology. Fore wing 3.3–3.7 mm long, Rs+M 210–250 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 640–810 µm long, antennomere 4 (130–)160–200 µm long and 4.5–5.5 times longer than wide distally. Article 3 of maxillary palp 440–530 µm long, 1.45–1.65 times longer than scape and wider than synantennomere 3. OOL : POL = 1.55–1.75 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe about as long as wide in lateral view. Lower ergot on valvular stalk absent. Valviceps 1.50–1.55 times longer than wide on medial lobe, with distinct oblique lateral lamella, proximal lobe of penis valve 0.26–0.30 times as long as valviceps and 0.70–0.75 times as high as medial lobe, excision on lower edge 0.18–0.21 as deep as width of medial lobe, valviceps on medial lobe 1.15–1.25 times wider than on distal lobe, 2 distal flagella present, tip of longer flagellum reaching 0.70–0.75 width of distal lobe (Fig. 143). Valviceps with median longitudinal sclerotization present, medial lobe almost symmetric and broad, with 5–9 cone-like sensilla along upper edge and scattered on lateral surface, upper edge between medial and distal lobe with 11–15 setae. Posterior tibia (0.85–)0.90–1.00 mm long, claws without subapical tooth.

Type material. Holotype ♀: "Greece: Nom. [Nomos] Grevena, Pindos Natl. [National] Park E, Metsovo N 15 km, Mt. Blia, 1550 m NN, 27.–28.5.2000, 20°54N 21°12E, swept from grass below *Pinus heldreichii*, leg. Blank & Kutzscher"; [red:] "Holotype ♀ *Xyela heldreichii* spec. n. det. S. M. Blank 2000". DEI. Paratypes: 63♀ 8♂, DEI, EJC, HNHM, MKC, MZLS, RSME, WSC, ZSM.

Etymology. Like its host plant, *Pinus heldreichii*, the new *Xyela* species is dedicated to Theodor von Heldreich, who was one of the first modern scientific explorers of the Olympus mountain range, where part of the material of *X. heldreichii* was collected. From 1851, when von Heldreich climbed the Olympus first, until his death in 1902, he contributed more to Greek botany than anybody else before (Strid 1980).

Host plant. •*Pinus heldreichii* Chr. (observation of two females ovipositing into staminate cones).

Geographic distribution. Albania, Greece (Fig. 16).

Remarks. *Xyela heldreichii, X. obscura* and *X. uncinatae* differ from other Palearctic representatives of the *X. julii* group in their (at least predominantly) dark brown or black head. Female *X. heldreichii* are separated from *X. obscura* and *X. uncinatae* by the longer ovipositor and the smaller fore wing : ovipositor ratio, and the brown valvula 3. There are single specimens with a predominantly pale valvula 3, which is not darker than valvifer 2 (possibly not completely colored specimens). In males, the hypopygium is usually paler than the preceding sterna, whereas the sterna are similarly colored in *X. julii*, *X. obscura* and *X. uncinatae*. See also remarks under *X. julii*.

This species has been reported under the name *Xyela julii* by Csiki (1923), who studied two females collected at "Mts. Gyalicalums" at 1,650 m. This name corresponds with the Albanian mountain Gjalicë e Lumës, which lies southeast of Kukës (Friese & Königsmann 1962).

The larval host plant is without doubt *Pinus heldreichii*. In Greece, imagines have been collected several times in *P. heldreichii* woodland either directly from the pine trees or they were swept from the grass below the trees (Mt. Olymp at 2,000 m; Pindos National Park at 1,750 m; Vasilitsa Ski Resort at 1,830 m). On collection sites at lower altitudes *P. heldreichii* was growing intermixed with *P. nigra* (Pindos National Park at 1,550 m; Mt Smolikas at 1,500 m). However, *P. nigra* can be excluded as the host plant for two reasons: 1, their staminate cones were too strongly developed at the time of collecting *X. heldreichii*, and the remaining period for a proper development of the larvae would accordingly have been too short; and 2, cones of *P. nigra* presented to *X. heldreichii* females were not accepted for oviposition, but cones of *P. heldreichii* were. Fully developed *Xyela* larvae hatched from *P. heldreichii* cones collected in the Pindos National Park at 1,400 m and on Mt Smolikas at 1,500 m in the year 2000. From these samples no imagines hatched in spring 2001, but living larvae were still present in the rearing jars. Possibly, larvae of *P. heldreichii* diapause at least two years as is known for the other European subalpine *Xyela* species, *X. alpigena* and *X. obscura*.

Pinus heldreichii (panzer pine, white-bark pine) occurs in the dry and usually rocky upper zone of limestone mountains in the western part of the Balkan Peninsula (Friese & Königsmann 1962, Polunin 1988, Kindel 1995). A disjunct population is present in southeastern Italy (Adamović 1909, Kindel 1995), but no *Xyela* material was available from there. In Greece, single *P. heldreichii* trees are found at ca 1,000 m. There and at higher altitude it grows intermixed with *P. nigra*, *P. heldreichii* becoming dominant from ca 1,700 m. Above 2,000 m it forms an open woodland. Between 2,300 and 2,500 m, the *P. heldreichii* is reduced to krummholz which gradually becomes lower and more scattered (Strid 1980). Within the *P. heldreichii* zone, *X. heldreichii* has been collected from 1,400 to 2,000 m. It is possibly absent at lower altitudes as no larvae were found in 4 samples of staminate cones collected on the Mt. Olympus range between 900 and 1,300 m.

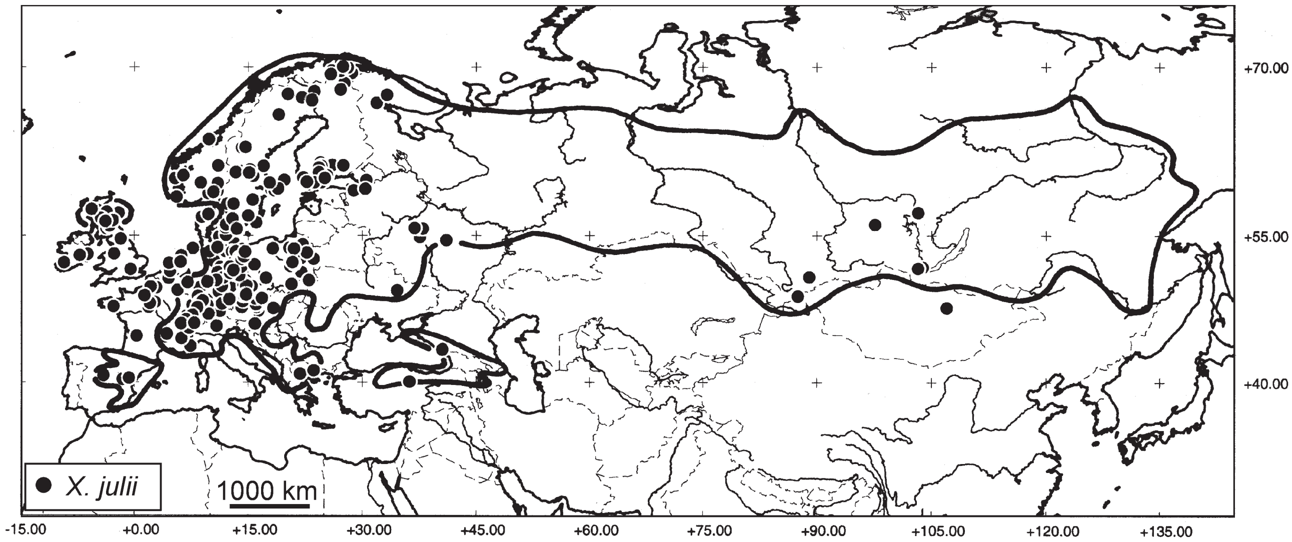


FIGURE 17. Records of *Xyela julii* (2094 specimens from 356 collection sites) and natural distribution of the host plant, *Pinus sylvestris* (solid line, combined from Mirov 1967, Sokolov et al. 1977 and Willis et al. 1998).

Xyela julii (Brébisson, 1818)

Pinicola julii Brébisson [reported by Blainville], 1818: 117, ♀♂, type locality: Austria, Lower Austria, Hörweix near Etzen.
Xyela julii: Konow 1897: 57 (combination with *Xyela*)
Xyela pusilla Dalman, 1819: 124, figs 1–11, ♀♂, type locality: Sweden, Uplandia and Vestrogothia [= Uppsala län, Västmanlands län, Skaraborgs län or Älvborgs län]; Lepeletier & Serville 1828: 792 (junior synonym of *julii*).
Xyela henschii Mocsáry, 1912: 131, ♀♂, type locality: Croatia, Krapina; Blank 2002: 222 (junior synonym of *julii*).
Xyela henschi: Enslin 1918: 682 (misspelling).

Description. Female. Color. Head yellow with black and brown pattern: at least two black stripes along supraantennal furrows meeting black ocellar and postocellar area and longitudinal spot in middle of frons present, often dark pattern fusing to large dark sport of the frons; kidney-shaped spot on vertex often not confluent with black postocellar area (Fig. 60). Antennae brown. Mesoscutum black with yellow pattern on medial half of lateral lobes, mesoscutellum with yellow spot. Mesepisternum pale except for brown dorsal, posterior and ventral margins. Abdominal terga brown, lateral parts of preapical terga, partly distal sternum, valvifer 2 and valvula 3 pale brown, membranous base of valvula 3 whitish, tip of valvula 3 darkened (Fig. 109). Legs mainly pale brown, femora unicolorous pale, posterior coxae mainly dark brown. Wing membrane, venation and pterostigma pale brown.

Morphology. Fore wing 2.8–4.3 mm long, (1.60–)1.70–1.90 times longer than ovipositor sheath, vein Rs+M 180–280 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 560–690 µm long, antennomere 4 130–160 µm long and 3.5–5.5 times longer than wide distally. Article 3 of maxillary palp 390–490 µm long, 1.45–1.65 times longer than scape and wider than synantennomere 3. OOL : POL = (1.30–)1.40–1.65(–2.00) : 1. Ovipositor sheath (1.60–)1.90–2.40 mm long, valvula 3 2.00–2.35 times longer than valvifer 2 and 6.5–8.0 times longer than wide at base (Fig. 109). Valvula 3 of ovipositor compressed, pale membranous area about as long as basal width of valvula 3, dorsal edge of valvula 3 sloping down to round tip, distally with sensilla field exposed and directed caudally, bearing 3 setae. Ovipositor almost straight and compressed. Valvula 1 with aulax terminating distally, ventral edge sloping up to tip, with ca 15–16 oblique closely spaced annuli in distal quarter, without serrulae, olistether with 6 setae. Left and right valvulae 2 fused along dorsal edge in basal half. Valvula 2 with smooth dorsal margin, tapering in distal half, pale and evenly sclerotized, in distal 0.4 with single scattered sensilla campaniformia, in distal 0.1 with 5–6 oblique annuli. Posterior tibia 0.75–0.95 mm long, claws without subapical tooth.

Male. Color. Variability of coloration similar to female but usually paler (see Fig. 61 for color pattern of head), hypopygium brown to dark brown.

Morphology. Fore wing 3.1–3.7 mm long, Rs+M 75–250 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 540–650 µm long, antennomere 4 140–170 µm long and 4.0–6.0 times longer than wide distally. Article 3 of maxillary palp 350–410 µm long, 1.35–1.55 times longer than scape and wider than synantennomere 3. OOL : POL = (1.30–)1.40–1.75 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe about as long as wide in lateral view. Lower ergot on valvular stalk absent. Valviceps 1.50–1.60(–1.70) times longer than wide on medial lobe, with distinct oblique lateral lamella, proximal lobe of penis valve 0.23–0.29 times as long as valviceps and 0.70–0.75 times as high as medial lobe, excision on lower edge 0.22–0.27 as deep as width of medial lobe, valviceps on medial lobe (1.10–)1.20–1.25 times wider than on distal lobe, 2 distal flagella present, tip of longer flagellum reaching 0.65–0.75 width of distal lobe (Fig. 144). Valviceps with median longitudinal sclerotization present, medial lobe almost symmetric and broad, with 4–8 cone-like sensilla along upper edge and scattered on lateral surface, upper edge between medial and distal lobe with 8–12 setae. Posterior tibia 0.60–0.85 mm long, claws without subapical tooth.

Barcodes. GUID ABY6138, AAJ9260 (5♀, 2 larvae)

Type material. *Pinicola julii*. Neotype ♀ (here designated): "A [= Austria]: Niederösterr. [= Niederösterreich, Lower Austria]: Hörweix (Etzen), 31.5.1996 *Pinus sylvestris*, em. 18.4.1998 leg. Ewald Altenhofer"; "*Xyela julii* (Brébisson, 1818) det. S. M. Blank 2000"; [red:] "Neotypus ♀ *Pinicola julii* Brébisson, 1818 des. S. M. Blank 2001". DEI.

Xyela pusilla. Unknown number of ♀ and ♂ syntypes from "Uplandia" (= historical province Uppland; = modern Uppsala län or Västmanlands län) and "Vestrogothia" (= historical province Västergötland; = modern Skaraborgs län or Älvborgs län). Type material lost.

Xyela henschii. Lectotype ♀ (designated by Blank 2002): "Dr. Hensch Krapina Cro."; "*Xyela henschii* Mocs. typ. det. Mocsáry"; [label with red margin:] "Lectotypus ♀ *Xyela Henschii* Mocsáry, 1912 des. Zombori, 1976"; [label with red margin:] "Paralectotypus ♂ *Xyela Henschii* Mocsáry, 1912 des. Zombori, 1976"; "*Xyela julii* (Brébisson, 1818) ♀♂ det. S. M. Blank 1999". Lectotype missing both valvulae 3, otherwise in good condition. HNHM. Paralectotype: 1♂ on same mount as lectotype, genitalia glued to small slide, HNHM.

Host plant. ~~*Pinus cembra* L.~~ (Schedl 1978), ·*P. nigra* ssp. *nigra* Arn. (1♂ reared, A.P. Rasnitsyn personal communication), ·*P.* x *rotundata* Link (2♀ 4♂ from 1 reared sample), •*Pinus sylvestris* L. (105♀ 54♂ from 9 reared samples; = °*P. hamata* D.Sosn. from Caucasus), ~~*P. uncinata* Ramond~~ (Pschorn-Walcher & Altenhofer 2000).

Biology. In the lowlands and the mountainous regions of Central, West and East Europe, and in the high mountains of Greece (1,600–1,800 m altitude) imagines are active between mid-April and end May. In northern Finland and Sweden, they occur almost up to the North Cape from the end of May to the beginning of July (Tab. 5). For additional data see Blank (2002).

Geographic distribution. Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Finland, France, Georgia (Abkhaszkaya Respublika), Germany, Great Britain Greece, Ireland, Italy, Mongolia, Netherlands, Norway, Poland, Russia (Irkutskaya Oblast, Moskovskaya Oblast, Murmanskaya Oblast, Respublica Gorno-Altay, Ryazanskaya Oblast, Sankt Peterburg Oblast), Slovakian Republic, Spain, Sweden, Switzerland, Turkey, Ukraine (Fig. 17). Additionally reported from Estonia (Viitasaari et al. 1998), Latvia (Tsinovskiy 1953), Luxembourg (Chevin & Schneider 1988). Zombori (1974) listed it for the Carpathian Basin but there is no material of *X. julii* in HNHM. Records of *X. julii* by Zirngiebl (1937) and Benson (1938) refer to a form similar to *X. altenhoferi* for North Africa and to *X. variegata* and *X. tecta* for Japan. The USNM holds a single female *X. julii* which was intercepted at a United States port among cargo on an aircraft from the Rhein-Main Airport in Frankfurt.

Remarks. *Xyela julii* is similar to the West Palearctic *X. heldreichii*, *X. obscura* and *X. uncinatae* and the East Palearctic *X. pumilae* in the shape of the valviceps with upper edge of proximal lobe almost parallel to the longitudinal axis, medial lobe symmetric, and longitudinal sclerotization apparent. Females of *X. heldreichii*, *X. obscura* and *X. uncinatae* have the head (at least predominantly) dark, whereas in the darkest *X. julii* females the face remains yellow at least along the eyes. *Xyela pumilae* differs in the infuscate wings and the different proportion of the ovipositor sheath. Males and females have been associated by study of extensive series reared from *Pinus sylvestris*.

Imagines of *X. julii* and *X. obscura* cannot be distinguished in the barcoding analysis (Fig. 23). Accordingly, it is not possible to identify genetically their larvae extracted from *Pinus mugo* and *P. sylvestris*, but these fall within the same cluster as the imagines of the two species. Specimens of both *X. julii* and *X. obscura* are associated with two subclusters bearing the GUIDs ABY6138 and AAJ9260, but these subclusters remain unreproducible applying morphological approach. The intraspecific variability of *X. julii* is 2.34 % and of *X. obscura* 2.66 %. The nearest neighbor, *X. graeca*, is placed at a distance of 6.13%.

Both along altitudinal and geographical gradients the morphology of *X. julii* is rather stable. Usually material from the South is paler than that from the North. Females from Scandinavia often have the face predominantly black leaving only a narrow yellow line along the eye margin, whereas females from Spain, Irkutsk and Mongolia often have only dark brown to black stripes along the frontal furrows and the medial spot and the kidney-shaped spots more or less disconnected from the other dark pattern of the face.

Xyela julii is by far the most frequently cited xyelid in faunistic literature (see catalogue of Smith 1978). Its comparatively easy availability in the lowlands of Central and North Europe made it the favorite representative of the Xyelinae for comparative morphological studies and phylogenetic analysis of the lower Hymenoptera (e.g., Vilhelmsen 2001, Sharkey et al. 2012). Astonishingly the original description of *Pinicola julii* has not been reexamined seriously in comparison with the taxa which have been accepted as valid in the course of the past 70 years.

The *Bulletin des Sciences par la Société Philomatique de Paris*, which includes the original description of *P. julii*, is a rare journal, and it was possibly unavailable to most authors. Konow (1897) distinguished two European species, the strikingly different *X. julii* and *X. longula*. Enslin (1918) followed his opinion, although he expressed some doubt on the status of *X. alpigena*, *X. graeca* and *X. henschi* as synonyms with *X. julii*. Benson was the first who recognized *X. alpigena*, *X. graeca* and *X. julii* for certain among the European species. He added *X. curva* and published a key for the females (Benson 1938). Later he separated the dark subalpine form *X. obscura* from *X. julii*, and he described *X. menelaus* (Benson 1960). Benson's understanding of *X. julii* has generally been accepted by later authors (e.g., Rasnitsyn 1965, Schedl 1978, Zhelochovtsev & Zinovjev 1988, Blank 2002), although he never gave a reason for his decision relating the name *Pinicola julii* as described by Brébisson to a particular *Xyela* species.

If the characters given in Brébisson's original description are considered alone, the identity of *P. julii* is doubtful. Among others the description characterizes the conspicuous antennae, the long article 3 of the maxillary palp (apparently the tiny article 1 was overlooked and article 3 therefore counted as the article 2), the presence of vein Rs+M ("trois cellules sous-marginales, la première reçoit la première nervure récurrente"), and for the female the long, compressed and darkened oviposition apparatus ("une longe et forte tarrière" and "la tarière est grise"). This encompasses the current understanding of both *X. curva* and *X. julii*. Valvula 3 of the ovipositor sheath is black to infuscate in *X. curva* and more or less infuscate in the preapical portion in *X. julii*. Other known European species can be excluded either by coloration, shape of ovipositor sheath, and / or known altitudinal and geographical distribution excluding the collection locality in northeastern France.

Brébisson described *P. julii* from Tour (near Falaise, Normandy, France). Neither *Pinus sylvestris* nor *P. nigra* are autochthonous to Normandy (Mirov 1967, Willis et al. 1998), although we studied *X. julii* from several places in the lowlands of northern France. *Xyela curva* may be expected there on cultivated *P. nigra*. Brébisson collected *Pinicola julii* from resin trees ("arbres resineux") and conifers in the first days of May, and he found it during a period of 15–20 days. This late phenology better fits a lowland population of *X. curva* than of *X. julii*.

The original description of *P. julii* was published under the name of the co-editor of the journal, H. de Blainville (signed by "Bv."; see editorial board of the journal), but its title refers to "M. [= Monsieur] Brébisson", who is the responsible person for nomenclatural matter (Art. 52.1 ICZN 1999). The work is generally assigned to the coleopterist Jean Baptiste Gilles de Brébisson (1760–1832) and not to his son Louis Alphonse de Brébisson (1798–1872), who became famous for his botanical work (Constantin 1992). The collection of Brébisson was bought by A. Fauvel, given to Mrs B. Rancin and should have been forwarded to the ISNB later (Dalibert 1927, Constantin 1992, Groll 2010). However, no relevant material could be located at the ISNB according to J.-L. Boevé (personal communication) and during our own study of the complete xyelids housed there. Accordingly the syntypes must be regarded as lost.

A neotype is necessary to ensure the unambiguous current and future use of the name *Pinicola julii*, because of the absence of original type material and due to conflicting evidence for the proper placement of *P. julii* from the data given in the original description. The neotype is selected for that *Xyela* species, which 1, infests *Pinus sylvestris*; 2, which is the most abundant Central and North European *Xyela* species, and which has the widest distribution range among *Xyela* species; and 3, which might be the most frequently cited name for a xyelid species still today (see references in Smith 1978). A specimen reared from *Pinus sylvestris* is hereby designated. The neotype agrees with the description above, which is covered by Brébisson's characterization. It originates from the western part of the vast distribution range of *X. julii* as did the original syntypes.

Also the types of *X. pusilla* must be regarded as lost, because we could not locate concerning material in the NHRS, which includes J.W. Dalman's collection. The original description, which was accompanied by excellent illustrations, leaves no doubt that *X. pusilla* agrees with *X. julii*. Only *X. julii* and *X. longula* are known from Scandinavia, and within this geographical context the long article 3 of the maxillary palp, the comparatively short ovipositor, and the well developed vein Rs+M on the fore wing (see Dalman's [1819] figs 1a, 2a and 4) unequivocally indicate *X. julii*. Therefore, the current synonymy, first proposed by Lepeletier & Serville (1828), is considered correct.

Pinus sylvestris is well known to be the host plant of *X. julii* (e.g., Rasnitsyn 1965). The types of *X. pusilla* were collected in a *P. sylvestris* wood (Dalman 1819). Rudow (1912) supposed that he had reared *X. julii* from enlarged shoots of *P. sylvestris* with swollen buds, but obviously his sample contained not only buds infested by the moth *Rhyacionia buoliana* (Denis & Schiffermüller, 1775) (Tortricidae) but also staminate cones with *Xyela* larvae. Over 140 subspecies, varieties or forms of *P. sylvestris* have been described, but besides the type var. *sylvestris* only var. *hamata* C. Steven (Balkan peninsula, N Turkey, SW Transcaucasia) and var. *mongolica* Litvinov (Mongolia, NW China, S Siberia) are now normally accepted (Earle 2011). All these forms are relevant as larval host plants. A female from Georgia was caught on "*P. hamata*" according to its labeling. Records from the Baikal region are inside the range of var. *mongolica*.

Pinus sylvestris exhibits the largest distribution area among pines, reaching from Scotland almost up to the Pacific Coast in Siberia, from Norway to Spain and from Arctic Siberia to Mongolia. *Xyela julii* apparently follows up to the limits of its host plant's distribution range. In northern Europe, it was collected in vast number almost up to the North Cape. It is abundant in Scotland, where a *P. sylvestris* population became isolated some 4,400 years ago (Willis et al. 1998), and later spread from there over England apparently along with cultivated trees. The most southern West Palearctic records of *X. julii* are from Spain (El Ventorillo) and northern Greece (Mt. Kajmakčalan and Mt. Vrondou), where it was found between 1,480–1,680 m altitude, and from Georgia (Caucasus National Park). In southern Siberia it occurs in the Altai Mountains (reported as *X. obscura* by Rasnitsyn 1965), where *P. sylvestris* grows between 350–700 m altitude (Mirov 1967), and it was collected several times by Verzhutskij in the environs of Irkutsk (see also Verzhutskij 1966). The most southeastern record is from Mongolia (Hentiyn Nuruu, Bogdo ul).

The exceptional occurrence of *X. julii* on *P. nigra* might possibly have been caused by coinciding host plant phenologies similar to the occurrence of *X. graeca* on *P. sylvestris*. Pschorn-Walcher & Altenhofer (2000) reared *X. julii* from *P.* x *rotundata*, but they erroneously quoted *P. uncinata* for "Moor-Spirke" (see *X. uncinatae* for nomenclature of the pines). Pine and reared material have here been checked. Today this pine is mostly considered a variety or subspecies of *P. sylvestris*, which mainly differs in resin chemistry (Mirov 1967, Earle 2011). Development on *P. cembra* as assumed by Schedl (1978) cannot be confirmed. This relationship is very unlikely due to restriction of *P. cembra* to the subalpine zone of the central Alps, where *X. julii* is absent.

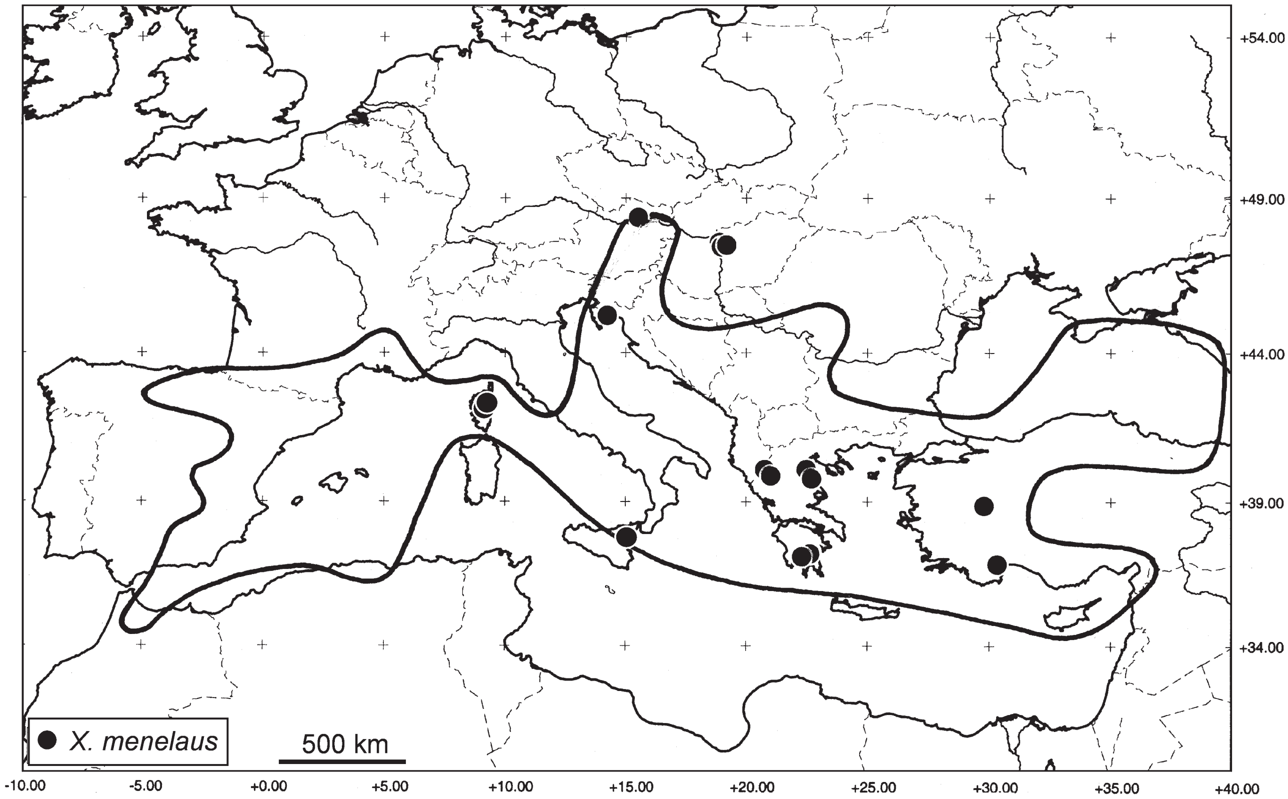


FIGURE 18. Records of *Xyela menelaus* (311 specimens from 20 collection sites) and natural distribution of the host plant, *Pinus nigra* (solid line, combined from Meusel et al. 1965 and Barbéro et al. 1998).

Xyela menelaus Benson, 1960

Xyela menelaus Benson, 1960: 111, ♀, type locality: Greece, Peloponnesus, Taïygetos Mountains.
Xyela graeca: Pschorn-Walcher & Altenhofer 2000: 276 (partly misidentified); Blank 2002: 218 (partly misidentified).

Description. Female. Color. Head yellow with brown and black pattern: black stripes along frontal furrows often fading and at most 2 times wider than ocellar diameter, meeting black ocellar and postocellar area, black longitudinal medial spot of frons always present, weak in pale specimens, kidney-shaped spots on vertex separate from black postocellar area (Fig. 62). Antennae brown or pale brown. Thorax dorsally brown with rich yellow pattern on pronotum, mesonotal lobes and mesoscutellum, tegulae yellow and sometimes brown in middle, mesepisternum largely pale yellow. Abdominal terga brown, lateral parts of terga 7, 8 and 9+10 yellow or pale brown, valvifer 2 completely yellow or pale brown, membrane between valvifer 2 and valvula 3 white, valvula 3 varying from yellow to pale brown (Fig. 110). Legs pale brown, posterior coxae pale brown or yellow and more or less infuscate from base. Wing membrane clear, venation and pterostigma pale.

Morphology. Fore wing 3.2–4.2 mm long, (?2.25–)2.40–2.80 times longer than ovipositor sheath, vein Rs+M 200–310 µm long, 2r-m meeting Rs 230–300 µm proximal to furcation of Rs1 and Rs2. Synantennomere 3 530–690 µm long, antennomere 4 140–170 µm long and 4.5–6.0 times longer than wide distally. Article 3 of maxillary palp 400–500 µm long, 1.45–1.75 times longer than scape and wider than synantennomere 3. OOL : POL = 1.45–1.90 : 1. Ovipositor sheath 1.30–1.65(–1.70) µm long, valvula 3 1.35–1.70(–?1.80) times longer than valvifer 2 and 4.0–4.5(–4.8) times longer than wide at base (Fig. 110). Valvula 3 of ovipositor compressed, pale membranous area about as long as basal width of valvula 3, dorsal edge of valvula 3 sloping down to round tip, distally with sensilla field exposed and directed caudally, bearing 3 setae. Ovipositor almost straight and compressed. Left and right valvulae 2 fused along dorsal edge in basal half. Valvula 1 with aulax terminating distally, ventral edge sloping up to tip, with 14–15 oblique closely spaced annuli in distal quarter, without serrulae, olistether with 5 setae. Valvula 2 with smooth dorsal margin, tapering in distal half, pale and evenly sclerotized, with 4(–5) annuli and in distal 0.4 with single sensilla campaniformia. Posterior tibia 0.80–1.10 mm long, claws without subapical tooth.

Male. Color. Similar to female, but often generally paler (see Fig. 63 for color pattern of head). Hypopygium yellow, often also preapical sterna largely yellow.

Morphology. Fore wing 3.0–3.6 mm long, Rs+M 160–290 µm long, 2r-m meeting Rs 170–290 µm proximal to furcation of Rs1 and Rs2. Synantennomere 3 560–750 µm long, antennomere 4 160–220 µm long and 5.5–7.0 times longer than wide distally. Article 3 of maxillary palp 360–450 µm long, 1.30–1.50 times longer than scape and wider than synantennomere 3. OOL : POL = 1.55–1.95 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe about as long as wide in lateral view. Lower ergot on valvular stalk absent. Valviceps 1.60–1.85 times longer than wide on medial lobe, lateral lamella distinct and oblique, proximal lobe of penis valve at proximal vertical edge truncate, 0.18–0.27 times as long as valviceps and 0.75–0.80 times as high as medial lobe, excision on lower edge 0.23–0.27 as deep as width of medial lobe, valviceps on medial lobe 1.15–1.30(–1.35) times wider than on distal lobe, 2 distal flagella present, tip of longer flagellum reaching 0.85–0.90(–0.95) width of distal lobe (Fig. 145). Valviceps with median longitudinal sclerotization present, medial lobe almost symmetrical and broad, with 5–9 cone-like sensilla along upper edge and scattered on lateral surface, upper edge between medial and distal lobe with 7–11 setae. Posterior tibia 0.75–0.95 mm long, claws without subapical tooth.

Barcodes. GUID ABU9016, ABU9017 (2♀ 3♂).

Type material. Holotype ♀: [round label with red margin:] "Type"; "Gréce—Péloponése Taygéte 21 V 1955 J. Aubert" [back side:] "2400 m"; "*Xyela menalaus* [sic!] sp. n. ♀ det. R. B. Benson 1959"; "*Xyela menelaus* Benson det. S. M. Blank 2000". Abdomen partly covered by mould, right anterior wing missing. MZLS.

Host plant. •*Pinus nigra* ssp. *nigra* Arn. (3♀ 7♂ from 2 reared samples), •*Pinus nigra* ssp. *pallasiana* Lamb. (69♀ 90♂ from 7 reared samples).

Geographic distribution. Austria, Croatia, France (Corsica), Greece, Hungary, Italy (Sicily), Turkey (Fig. 18).

Remarks. See *Xyela graeca* for species differentiation. According to Benson (1960) the relative length of valvifer 2 : valvula 3 should be 1 : 1.1, but actually the holotype measures 1 : 1.48. Possibly due to these wrong data and the high similarity with *X. graeca*, *X. menelaus* has never been reported since Benson's original description until Blank (2002).

The five specimens of *X. menelaus* included in the barcoding analysis display an intraspecific variation of 6.44 % (Fig. 23). They form two clusters at a distance of 5.85 %; specimens from Greece with ABU9017 and specimens from Sicily with ABU9016. No evident morphological differences could be found between these clusters so far. The next neighbor of *X. menelaus, X. obscura*, is placed at an interspecific distance of 5.55 %.

Blank (2002) did not recognize the presence of *X. menelaus* among *X. graeca* in the Vienna Basin. Ecological characters reported for *X. graeca* like parasitism by *Xyeloblacus leucobasis* and up to 3 years' duration of the diapause may apply to both taxa, which were reared from the same samples (Pschorn-Walcher & Altenhofer 2000, Blank 2002). Actually these two species display different imaginal emergence phenologies (Fig. 14; see *X. graeca*), which possibly may also be reflected in larval feeding strategies and parasitism.

Xyela obscura (Strobl, 1895)

Pinicola julii var. *obscura* Strobl, 1895: 277, ♀, type locality: Austria, Styria, environs of Admont, Scheibleggerhochalpe; Konow 1897: 58 (junior synonym of *julii*).

Xyela obscura: Benson 1960: 110 (removed from synonymy, combination with *Xyela*).

Xyela julii var. *tatrica* Gregor in Gregor & Baťa, 1940: 225, ♀, type locality: Slovakia, Vysoké Tatry Mountains, Štrbské Pleso; Beneš 1975: 121 (junior synonym of *obscura*).

Xyela curva: Benson 1961: 171 (misidentification).

Xyela julii: Rasnitsyn 1965: 515 (partly misidentified).

Description. Female. Color. Head dark brown to black, sometimes with indistinct brown stripes on vertex between kidney-shaped spot and eye margin (Fig. 64). Antennae brown, ventrally a little paler. Thorax dorsally brown, seldom with indistinct brown pattern on mesonotal lobes, tegulae pale and largely brown in middle. Thorax ventrally brown, mesepisternum pale brown. Abdomen brown, tergum 8 and 9+10 laterally pale brown. Valvifer 2 yellow or pale brown, membrane between valvifer 2 and valvula 3 white, valvula 3 pale brown, preapically infuscate and pale at tip (Fig. 113). Legs pale brown, coxae brown, femora more or less darkened. Wings almost clear, venation and pterostigma pale brown.

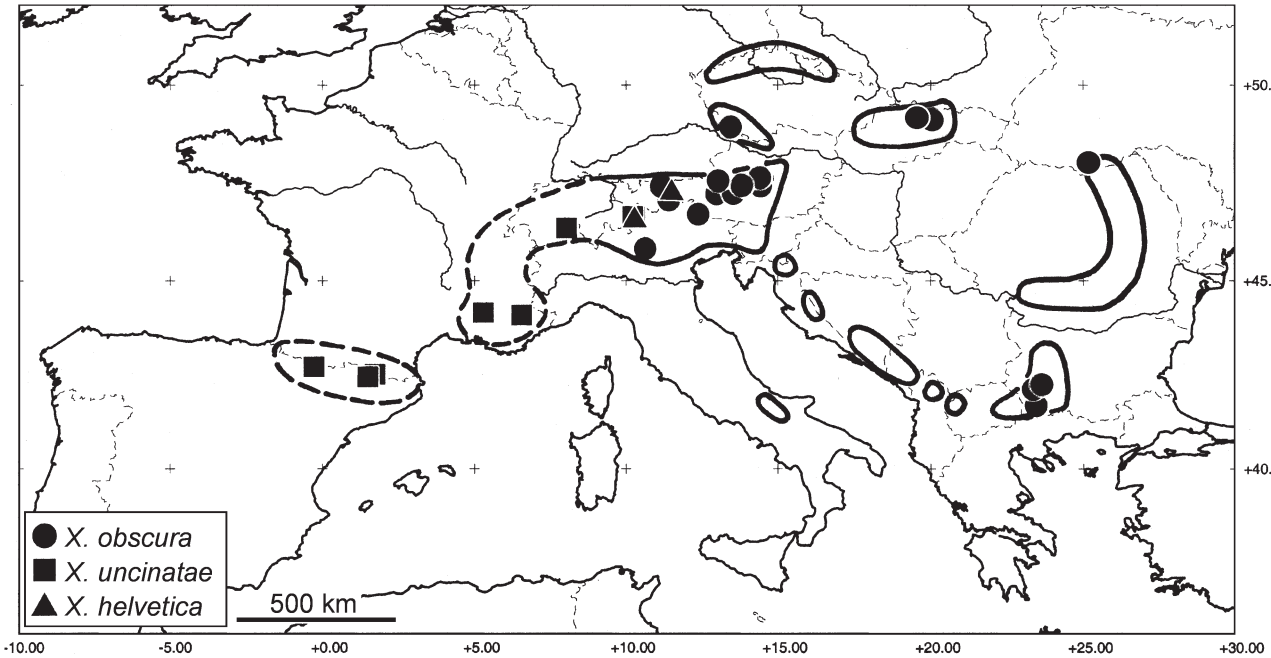


FIGURE 19. Records of three West Palearctic, subalpine *Xyela* species, *X. helvetica* (2 specimens from 2 collection sites), *X. obscura* (221 specimens from 30 collection sites) and *X. uncinatae* (48 specimens from 9 collection sites) and natural distribution of the (supposed) host plants, *Pinus mugo* (solid line) and *P. uncinata* (dashed line, distribution of both pines according to Meusel et al. 1965). The distribution ranges of these pine species overlap in the Alps (see text). Additional literature record included for *X. obscura* from the Ukraine (Zombori & Ermolenko 1999).

Morphology. Fore wing 3.6–4.3 mm long, 2.00–2.15 times longer than ovipositor sheath, vein Rs+M 230–330 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 560–730 µm long, antennomere 4 130–180 µm long and 3.5–4.5(– 5.5) times longer than wide distally. Article 3 of maxillary palp 430–530 µm long, 1.50–1.75 times longer than scape and wider than synantennomere 3. OOL : POL = 1.60–2.10 : 1. Ovipositor sheath 1.75–2.10 mm long, valvula 3 1.75–2.00 times longer than valvifer 2 and 6.5–7.5 times longer than wide at base (Fig. 113). Valvula 3 of ovipositor compressed, pale membranous area about as long as basal width of valvula 3, dorsal edge of valvula 3 sloping down to round tip, distally with sensilla field exposed and directed caudally, bearing 3 setae. Ovipositor almost straight and compressed. Valvula 1 with aulax terminating distally, ventral edge sloping up to tip, with ca 14–15 oblique closely spaced annuli in distal quarter, without serrulae, olistether with 4–5 setae. Left and right valvulae 2 fused along dorsal edge in basal half. Valvula 2 with smooth dorsal margin, tapering in distal half, pale and evenly sclerotized, in distal 0.4 with single sensilla campaniformia, in distal 0.1 with 4–5 annuli. Posterior tibia 0.80–1.00 mm long, claws without subapical tooth.

Male. Color. Head yellow with black and brown pattern: frontal furrows usually with wide stripes meeting ocellar and postocellar spot, medial spot of frons present and sometimes fused with frontal stripes, kidney-shaped spots on vertex separate from black postocellar area and often fused with frontal stripes anteriorly (Fig. 65). Antennae pale brown. Thorax dorsally black, pronotum, mesonotal lobes and mesoscutellum sometimes pale brown, tegulae pale and brown in middle, mesepisternum largely pale brown. Abdomen including hypopygium brown. Legs pale brown, posterior coxae laterally brown and ventrally brown in the basal and more or less pale in distal half. Wing membrane almost hyaline, venation and pterostigma pale brown.

Morphology. Fore wing 2.9–3.9 mm long, Rs+M 130–330 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 (560–)630–740 µm long, antennomere 4 140–190 µm long and 4.5–6.0 times longer than wide distally. Article 3 of maxillary palp 400–470 µm long, 1.35–1.60 times longer than scape and wider than synantennomere 3. OOL : POL = (1.50–)1.75–1.90 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe about as long as wide in lateral view. Lower ergot on valvular stalk absent. Valviceps 1.44–1.55(–1.60) times longer than wide on medial lobe, with distinct oblique lateral lamella, proximal lobe of penis valve 0.23–0.28 times as long as valviceps and 0.70–0.75 times as high as medial lobe, excision of lower edge 0.20–0.23 as deep as width of medial lobe, valviceps on medial lobe 1.10–1.20 times wider than on distal lobe, 2 distal flagella present, tip of longer flagellum reaching 0.60–0.70 width of distal lobe (Fig. 146). Valviceps with median longitudinal sclerotization present, medial lobe almost symmetric and broad, with 5–9 cone-like sensilla along upper edge and scattered on lateral surface, upper edge between medial and distal lobe with 5–13 setae. Posterior tibia 0.80–1.00 mm long, claws without subapical tooth.

Type material. *Pinicola julii* var. *obscura*. Lectotype ♀ (designated by Schedl 1978): [label added by G. Morge, green handwriting:] “4”; “*Xyela obscura* (Strobl) ♀ stat. nov. Benson 1960 det. W. Schedl 1971”; [red:] “Lectotypus ♀ *Pinicola julii* var. *obscura* Strobl, 1895 S. M. Blank 1999”; [hereby added copy of cabinet label:] “*X. Julii* v. *obscura* m. Scheibleggerhochalpe 26/5 94 ♀”; “*Xyela obscura* (Str.) ♀ det. S. M. Blank 1999”. In perfect condition. NMBA. Paralectotypes: 1♀ with Strobl’s label “v. *obscur* [sic!] Scheiblstein [...; illegible Gabelsberg stenography] 6/6 95 ♀. Strobl” and Morge’s label “5” and 1♀ with Strobl’s label “*Jul.* v. *obsc.* Kalbling [...; illegible Gabelsberg stenography] 8/6 95. ♀.” and Morge’s label “6”, NMBA.

Xyela julii var. *tatrica* Gregor, 1940. NMP, not studied.

Host plant. ~~*Pinus banksiana* Lamb.~~ (Benson 1962), ~~*Pinus cembra* L.~~ (Schedl 1980), ~~*P. densiflora* Sieb. & Zucc.~~ (Kondo & Miyake 1974, Miyake & Kondo 1974), ~~*P. elliottii* Engelm.~~ (Smith 1978), ~~*P. heldreichii* Chr.~~ (Blank 2002), •*Pinus mugo* Turra (55♀ 58♂ from 3 reared samples), ~~*Pinus nigra* Arn.~~ (Beneš 1975), ~~*P. palustris* Mill.~~ (Benson 1962), ~~*P. ponderosa* Laws.~~ (Benson 1962), ~~*P. taeda* L.~~ (Smith 1978), ~~*P. virginiana* Mill.~~ (Benson 1962), ~~*P. uncinata* Ramond~~ (Blank 2002).

Biology. In samples from *Pinus mugo*, larvae of the weevil *Doydirhynchus austriacus* (Olivier, 1807) (Cimberidae, Curculionoidea; det. L. Behne) were sometimes abundant, which are also internal feeders on the staminate cones. For additional data see Blank (2002).

Geographic distribution. Austria, Bulgaria, Germany, Italy, Slovakian Republic (Roller et al. 2006), Switzerland (Fig. 19). Additionally recorded from the Carpathian Basin (Zombori 1974) and the Ukraine (Zombori & Ermolenko 1999). The record for France (Blank 2002) refers to *X. uncinatae*. Rasnitsyn’s (1965) record for the Altai Mountains is a misidentification of *X. julii*. Records from Japan and North America (e.g., Benson 1962, Togashi 1974) refer to other *Xyela* species.

Remarks. See *Xyela julii* and *X. uncinatae* for diagnosis. The sexes have been associated with the help of imagines reared from *Pinus mugo*.

Beneš (1975) studied the type material of *X. julii* var. *tatrica* in NMP and identified it as *X. obscura*. This material was unavailable to us, but we checked two females from HNHM labeled “Štrbské Pléso 21 Obenberger”, which most likely were collected at the type locality, and which agree well with the concept of *X. obscura*.

Benson (1961, 1962) considered *X. obscura* to be a Holarctic species, and he synonymized the East Palearctic *X. japonica* and the Nearctic *X. pini* Rohwer, 1913 with it. Actually *X. obscura* is restricted to Europe, and the other names actually concern *X. japonica* and species associated with the *X. minor* group.

The host records of *P. banksiana*, *P. elliottii*, *P. palustris*, *P. ponderosa*, *P. taeda* and *P. virginiana* for *X. obscura* resulted from Benson’s (1962) erroneous synonymy of the Nearctic *X. pini* with this species (see Burdick 1961 and Ebel 1966 for primary data). Kondo & Miyake (1974) and Miyake & Kondo (1974) reported *P. densiflora* for Japanese *X.* ‘*obscura*’, but actually they had studied a mixture of *X. tecta* and *X. variegata*. The record of *P. cembra* is due to repeated collecting of *X. obscura* imagines from this pine (Benson 1960, 1961, Schedl 1978), which may occur syntopically with *P. mugo* in the subalpine zone. Beneš (1975) listed *P. nigra* doubtfully as an additional host plant. Actually *X. obscura* has never been reared from *P. cembra* and *P. nigra*. All these pines are to be excluded as host plants for *X. obscura*.

Xyela par Blank & Shinohara, 2005

Xyela par Blank & Shinohara in Blank et al., 2005: 268–269, ♀♂, type locality: South Korea, Kangweondo, Mt. Samagsan.

Description. See Blank et al. (2005).

Host plant. •*Pinus densiflora* Sieb. & Zucc.

Geographic distribution. South Korea (see Blank et al. 2005, fig. 5).

Xyela pumilae Blank & Shinohara, sp. nov.

Type locality: Japan, Hokkaido, Kamikawa, Mt. Piyashiri.

Description. Female. Color. Head yellow with black pattern (brown is absent): two black stripes along supraantennal furrows meeting black ocellar and postocellar area and black longitudinal spot in middle of frons always present; kidney-shaped spot on vertex anteriorly confluent with black postocellar area (Fig. 66). Antennae brown. Mesoscutum black with yellow pattern on medial half of lateral lobes, mesoscutellum with large yellow spot. Abdominal terga dark brown to black, lateral parts of preapical terga, partly distal sternum, valvifer 2 and valvula 3 brown, membranous base of valvula 3 whitish (Fig. 115). Legs mainly pale brown, femora sometimes with brown longitudinal stripes, posterior coxae mainly dark brown to black. Wing membrane, venation and pterostigma brownish infuscate.

Morphology. Fore wing 3.9–4.3 mm long, 2.15 times longer than ovipositor sheath, vein 1m-cu absent and Rs+M 175–275 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 590–610 µm long, antennomere 4 150–160 mm long and 4.5–5.0 times longer than wide distally. Article 3 of maxillary palp 450–500 µm long, 1.50–1.65 times longer than scape and distinctly wider than synantennomere 3. OOL : POL = 1.40–1.60 : 1. Ovipositor sheath 1.80–2.00 mm long, valvula 3 1.65–1.85 times longer than valvifer 2 and 6.0–6.5 times longer than wide (Fig. 115). Valvula 3 of ovipositor sheath compressed, basally with pale membranous about as long as width of valvula, dorsal outline preapically sloping downwards to round apex, distally with sensilla field exposed and directed caudally, bearing 4 setae. Ovipositor almost straight and compressed. Valvula 1 with aulax terminating distally, ventral edge sloping up to tip, with ca 14 oblique closely spaced annuli in distal quarter, without serrulae, olistether with 4 setae. Left and right valvulae 2 fused along dorsal edge in basal half. Valvula 2 with smooth dorsal margin, tapering in distal half, pale and evenly sclerotized, in distal 0.4 with single scattered sensilla campaniformia, in distal 0.05 with 4 indistinct oblique annuli. Posterior tibia 0.85–0.95 mm long, all claws without subapical tooth.

Male. Color. Similar to female (see Fig. for color pattern of head). Supraantennal furrows with small black stripes, kidney-shaped spots free. Hypopygium brown.

Morphology. Fore wing ca 3.8 mm long, Rs+M 200–230 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 ca 710 µm long, antennomere 4 ca 170 µm long and ca 5.0 times longer than wide distally. Article 3 of maxillary palp ca 430 µm long, ca 1.40 times longer than scape and wider than synantennomere 3. OOL : POL = ca 1.40 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe about as long as wide in lateral view. Lower ergot on valvular very small and in lateral position (seemingly absent). Valviceps ca 1.55–1.60 times longer than wide on medial lobe, oblique lateral lamella distinct, upper edge of proximal lobe of valviceps almost parallel to longitudinal axis of valviceps, 0.24–0.25 times as long as valviceps and 0.70–0.75 times as high as medial lobe, excision on lower edge ca 0.23 as deep as width of medial lobe, valviceps on medial lobe 1.15–1.20 times wider than on distal lobe, 2 distal flagella present, tip of longer flagellum reaching 0.55–0.65 width of distal lobe (Fig. 148). Valviceps with distinct median longitudinal sclerotization present, upper edge of medial lobe round and strikingly protruding, with 8–10 cone-like sensilla along upper edge and scattered on lateral surface, upper edge between medial and distal lobe with few short setae. Posterior tibia ca 0.95 mm long, all claws without subapical tooth.

Type material: Holotype ♀: "Mt. Piyashiri, Kamikawa, Hokkaido, 23.VI.1990, [leg.] A. Shinohara"; [red:] "Holotype ♀ *Xyela pumilae* spec. nov. det. S. M. Blank 2000". NSMT. Paratypes: 2♀ 1♂, DEI, NSMT.

Etymology. The species is named according to the strongly supposed host plant, *Pinus pumila*.

Host plant. °*Pinus pumila* Regel.

Geographic distribution. Japan (Hokkaido), map (Fig. 9).

Remarks. This is the only Japanese *Xyela* of the *julii* group with conspicuously brownish infuscate wings. Additionally, other Japanese species have the dark pattern of the frons either more or less brown (*X. variegata*) or the dark pattern is more extensive (*X. tecta*). See also remarks under *X. julii*.

Xyela pumilae is the only representative of the *X. julii* group for which a host association with *Pinus* (‘*Strobus*’) can be demonstrated. On Mt. Piyashiri A. Shinohara swept the two females from *P. pumila*. As this is the only pine species at the collection site, this species is believed to be associated with it. *Pinus pumila* is widely distributed in northeastern Asia (Russian Far East, North Korea, Sakhalin, Kuril Islands, Japan) with a large altitudinal amplitude (300–3,700 m; Kindel 1995), but *X. pumilae* has so far only be found on the Japanese island Hokkaido.

Xyela sinicola Maa, 1947

Xyela sinicola Maa, 1947: 61–63, ♀, type locality: China, Fujian Sheng, Chung-An, Bohea Hills, Sing-Yang-Tsuen.
Xyela lii Xiao, 1988: 410–413, ♀♂, type locality: China, Jiangsu Sheng, Nanjing [= Nanking], **syn. nov.**

Description. Female. Color. Head yellow with black pattern (brown is almost absent): stripes along frontal furrows absent or indistinctly pale brown, ocellar and postocellar area black; kidney-shaped spots on vertex separate from black postocellar area (Fig. 72). Antennae pale brown. Thorax dorsally brown with yellow pattern on pronotum, mesonotal lobes and mesoscutellum, tegulae pale, mesepisternum largely pale brown. Abdominal terga brown, lateral parts of terga 8 and 9+10 paler, valvifer 2 pale brown, membrane between valvifer 2 and valvula 3 white, valvula 3 brown (Fig. 116). Legs pale brown, dark pattern of posterior coxae almost absent. Wing membrane almost clear, venation and pterostigma pale brown.

Morphology. Fore wing 3.4–3.9 mm long, 1.45–1.85 times longer than ovipositor sheath, vein Rs+M 200–300 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 510–610 µm long, antennomere 4 110–150 µm long and 3.5–5.0 times longer than wide distally. Article 3 of maxillary palp 380–440 µm long, 1.55–1.65 times longer than scape and about as wide as synantennomere 3. OOL : POL = 1.65–2.00 : 1. Ovipositor sheath 2.00–2.60 mm long, valvula 3 2.15–2.25 times longer than valvifer 2 and 7.5–9.0 times longer than wide at base (Fig. 116). Valvula 3 of ovipositor sheath compressed in cross section, pale membranous area about as long as basal width of valvula 3, dorsal edge of valvula 3 sloping down to round tip, distally with sensilla field exposed and directed caudally, bearing 3 setae. Ovipositor almost straight and compressed. Valvula 1 with aulax terminating distally, ventral edge sloping up to tip, with ca 17 oblique closely spaced annuli in distal 0.2, without serrulae, olistether with ca 6 setae. Left and right valvulae 2 fused along dorsal edge in basal half. Valvula 2 with smooth dorsal margin, tapering in distal half, pale and evenly sclerotized, in distal 0.4 with single scattered sensilla campaniformia, in distal 0.05 with 5 indistinct oblique annuli bearing a sensilla field. Posterior tibia 0.85–0.90 µm long, all claws without subapical tooth.

Male. Color. Similar to female (see Fig. 73 for color pattern of head). Supraantennal furrows indistinctly pale brown on the upper quarter close to the ocellar area. Hypopygium pale.

Morphology. Fore wing 2.9–3.4 mm long, Rs+M 160–230 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 500–680 µm long, antennomere 4 120–160 µm long and 4.0–4.5 times longer than wide distally. Article 3 of maxillary palp 330–380 µm long, 1.30–1.35 times longer than scape and about as wide as synantennomere 3. OOL : POL = 1.55–1.80 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe about as long as wide in lateral view. Lower ergot on valvular very small and in lateral position (seemingly absent). Valviceps 1.30–1.50 times longer than wide on medial lobe, with distinct oblique lateral lamella, proximal lobe of penis valve small and strikingly sloping down toward the valviceps, 0.18–0.22 times as long as valviceps and 0.60–0.70 times as high as medial lobe, excision on lower edge 0.13–0.17 as deep as width of medial lobe, valviceps on medial lobe 1.75–1.85 times wider than on distal lobe, 2 or sometimes 3 distal flagella present, tip of longer flagellum reaching 0.75–0.90 width of distal lobe (possibly >0.90 in holotype of *X. sinicola*, but tips of both flagella missing in this specimen) (Fig. 149). Valviceps with median longitudinal sclerotization present, upper edge of medial lobe round and strikingly protruding, with 7–14 cone-like sensilla along upper edge and scattered on lateral surface, upper edge between medial and distal lobe with few short setae. Posterior tibia 0.70–0.85 mm long, all claws without subapical tooth.

Type material: *Xyela sinicola*. Holotype ♀: “Bohea hills 15.iii.1940 T. Maa coll.”; [red:] “*Xyela sinicola* Maa ♀ Holotype”; “*Xyela sinicola* Maa, 1947 det. S. M. Blank 2001”. In good condition, one antenna glued to piece of cardboard, other antenna missing. TARI.

Xyela lii. Holotype ♀: “Jiangsu Province (Nanking), 18.3.1984 [date correct?—see paratypes], Li Shangshu lg." (unavailable for this study, labeling cited after Xiao 1988). Paratypes: 3♀ 4♂ with same data, 1♀ 1♂ of this series here studied: "[Chinese characters for: China Forestry Science Research Institute {= CFRB}, Nanjing City, 28.3.1984 {sic!}]"; "[Chinese characters for: host *Salix babylonica*] No. 610"; "Paratype"; "*Xylex* [sic!] *lii* Xiao"; "*Xyela lii* Xiao [♀/♂] [Chinese characters for:] M. C. Wei"; "China: Nanjing 28.3.1984, host: *Salix babylonica* L. (translation of Chinese label to English by Mei-cai Wei)". CSFU.

Host plant. °*Pinus massoniana* Lamb.

Geographic distribution. China (Fujian Province, Jiangsu Province, Xianggang) (Fig. 12).

Remarks. *Xyela sinicola* is unique within the *X. julii* group due to the very long ovipositor and the valviceps bearing a distinct longitudinal sclerotization, a short proximal lobe and being shallowly excised on the lower edge. The morphological variability of *X. sinicola* is large, and the studied types exhibit almost the extremes. The ovipositor sheath is shorter in the females from Jiangsu Sheng and Nanjing (ca 2.0 mm long, fore wing ca 1.80 times longer than ovipositor, valvula 3 7.5–8.0 times longer than wide) than in females from Fujian Sheng and Hong Kong (ca 2.3–2.6 mm / 1.45–1.55 / 8.5–9.0). The valviceps is shorter and has a shorter proximal lobe in the males from Hangzhou, Hong Kong and Jiangsu Sheng (1.30–1.40 times longer than wide, length of proximal lobe : length of valviceps 0.18–0.19) than in the paratype from Nanjing (1.50 / 0.22). Despite the observed variability *X. lii* and *X. sinicola* are considered to be conspecific, since the available material including the type specimens displays no apparent character pattern to segregate two unambiguous groups for each sex with respect to the geographical origin of the material. The measured morphological values may be apparently discontinuous since only limited material collected over a large distance of more than 1,300 km has been available.

The original description of *Xyela sinicola* in the rare *Biological Bulletin of Fukien Christian University* is cited with the year 1943 by Smith (1978, p. 17). Maa (1949) himself cited his work as being published in 1944. The publication date and publication locality of each volume of the journal is printed on its front page in Chinese. The imprinted Chinese year has to be added to 1911 to obtain the corresponding year of the Gregorian calendar (translation and information on Chinese calendar by courtesy of Mei-ling Chan; see Tab. 1).

TABLE 1. Publication dates of the 'Biological Bulletin of Fukien Christian University'.

volume	imprinted date, Chinese calendar	publication date, Gregorian calendar	publication locality
1	December 26	December 1937	Shaowu
2	December 29	December 1940	Shaowu
3	April 36	April 1947	Foochow
4	20. September 33	20. September 1944	Shaowu
5	25. April 36	25. April 1947	Foochow
6	31. December 36	31. December 1947	Foochow

Each volume is exactly dated (at least the month is denoted), thus the successive volumes seem not to have been published in chronological order. The specimens in the BMNH library are stamped with later dates (vols. 2–5 with 29 May 1948 and vol. 6 with 8 April 1948; S. Lewis, personal communication), which possibly are the dates of receipt at this library. They are dated later and do not contradict the imprinted publication dates. We accept 1947 as the year of publication for all volumes published in Foochow, including Maa's original description of *X. sinicola*. The volumes published in Shaowu, a different locality in Fujian province, are all dated earlier. The reason for the disarranged publication dates and localities is unknown.

Maa (1947) gave more detailed collection data "Sin-Yang-Tsuen, ca 250 m, Bohea Hills, Chung-An Hsien, Fukien NW., 15-III-1940, T. Maa leg." than can be read from the type label, and the geographical coordinates 27.333°N 117.482°E. Maa (1949) published faunistic data of further material identified as *X. sinicola*, and he associated the sexes on the basis of a couple of *X. sinicola* from Hangchow (= Hangzhou). He featured this male as "allotype", but this does not represent a paratype because it has been added subsequently (Art. 72.4.1. ICZN 1999).

We studied this male and additional material from Hong Kong, Jiangsu Sheng and Nanjing, where males and females were collected together. Both sexes of *X. sinicola* agree in the strikingly pale color of the face with the stripes along the supraantennal furrows being absent or at least indistinct.

The name of the type locality “Nanking” in Jiangsu Sheng cited by Xiao (1988) for *X. lii* is a synonymous transliteration of Nanjing (Mei-ling Chan, personal communication). The collection date 18.3.1984 given by Xiao is regarded as a type error for 28.3.1984 as it can be read from the labels of both paratypes. These were collected from *Salix babylonica* as has been mentioned in the original description. Willows are a common collection place for *Xyela*, since the male catkins are a rich pollen source and imagines may gather there in large numbers.

Xiao’s (1988) detailed illustrations of antenna, fore wing, penis valve, ovipositor and its sheath agree with the corresponding organs in the studied paratypes. The position of *X. lii* in the *X. julii* group is immediately obvious from the figures. Nevertheless, the figure of the maxillary palp is inaccurate. It has been depicted as consisting of a small basal and three elongate distal articles. The maxillary palps of the paratypes are typically shaped as in the majority of *Xyela* species with an elongate article 3 and a modified distal part bearing long curved setae.

Pinus massoniana is the only pine species present on all collection localities of *X. sinicola*. This is a common pine, which covers a vast area of central and southeastern China and northern Vietnam, and which crosses the sea to Hainan and Taiwan, growing from 0–2,000 m (Wu 1947, Mirov 1967). *Pinus hwangshanensis* Hsia occurs on scattered places within this area. It can be excluded as the host plant with high probability, because it is everywhere confined to elevations above 900 m (Mirov 1967, Richardson & Rundel 1998), whereas the holotype was collected at ca 250 m (Maa 1947), and this pine is absent from the collection sites Hong Kong, Kanton and Nanjing, which are (almost) at sea level. In Hong Kong *X. sinicola* was collected together with *X. exilicornis* during the same period, which indicates a common host plant.

Xyela tecta Blank & Shinohara, 2005

Xyela tecta Blank & Shinohara in Blank et al., 2005: 269–271, ♀♂, type locality: Type locality: Japan, Honshu, Saitama Prefecture, Akigase-koen.
Xyela julii: Takeuchi 1938: 204 (misidentification); Togashi 1974: 13 (misidentification).
Xyela obscura: Togashi 1964: 51 (misidentification); Kondo & Miyake 1974: 100–102 (misidentification); Miyake & Kondo 1974: 92–95 (misidentification).

Description. See Blank et al. (2005).

Host plant. •*Pinus densiflora* Sieb. & Zucc.

Geographic distribution. Japan (Honshu) (see Blank et al. 2005, fig. 4).

Xyela uncinatae Blank, sp. nov.

Type locality: France, Alpes-de-Haute-Provence, Thorame-Haute.
Xyela obscura: Blank 2002: 208, 227 (partly misidentified).

Description. Female. Color. Head predominantly dark, darkest specimens with head completely brown (Fig. 78), in pale specimens face yellow along eye, on vertex and between postocellar area and kidney-shaped spot (Fig. 79). Antenna brown dorsally and pale brown ventrally. Thorax dorsally brown, lateral mesonotal lobe, mesoscutellum and tegulae more or less pale. Mesepisternum largely pale brown. Abdomen brown, tergum 9+10 laterally and preapical sterna pale brown to yellow. Ovipositor sheath yellow, tip of valvula 3 infuscate preapically (Fig. 117). Legs pale brown, coxae brown, femora more or less darkened on the upper side, distal tarsomeres darkened. Wings hyaline to little brown, venation pale.

Morphology. Fore wing 3.8–4.6 mm long, 1.80–2.05 times longer than ovipositor sheath, vein Rs+M 150–300 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 590–760 µm long, antennomere 4 130–180 µm long and 3.5–4.5 times longer than wide distally. Article 3 of maxillary palp 450–540 µm long, (1.45–)1.55–1.75 times longer than scape and wider than synantennomere 3. OOL : POL = 1.40–1.75 : 1. Ovipositor sheath (1.85–)1.95–2.25 mm long, valvula 3 1.95–2.25 times longer than valvifer 2 and 6.5–8.0 times longer than wide at base (Fig. 117). Valvula 3 of ovipositor compressed, pale membranous area about as long as basal width of valvula 3, dorsal edge of valvula 3 sloping down to round tip, distally with sensilla field exposed and directed caudally, bearing 3 setae. Ovipositor almost straight and compressed. Valvula 1 with aulax terminating distally, ventral edge sloping up to tip, with 13–14 oblique closely spaced annuli in distal quarter, without serrulae, olistether with 4–5 setae. Left and right valvulae 2 fused along dorsal edge in basal half. Valvula 2 with smooth dorsal margin, tapering in distal half, pale and evenly sclerotized, in distal 0.4 with single scattered sensilla campaniformia, in distal 0.05 with 5 indistinct oblique annuli. Posterior tibia 0.90–1,05 mm long, claws without subapical tooth.

Male. Color. Head yellow with black and brown pattern: frontal furrows at least with wide stripes meeting ocellar and postocellar spot and medial spot of frons present, kidney-shaped spots on vertex separate from black postocellar area in pale specimens but usually fused with frontal stripes anteriorly, often dark pattern fusing to a large dark brown or black spot (Figs 80–81). Antennae pale brown. Thorax dorsally black, pronotum, mesonotal lobes and mesoscutellum sometimes pale brown, tegulae pale and brown in middle, mesepisternum largely pale brown. Abdomen including hypopygium brown. Legs pale brown, posterior coxae laterally brown, ventrally brown or more or less pale in distal half. Wing membrane almost hyaline, venation and pterostigma pale brown.

Morphology. Fore wing length 3.2–4.0 mm, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 (520–)610–780 µm, antennomere 4 140–180 µm and 4.0–5.0 times longer than wide. Article 3 of maxillary palp 360–490 µm long, 1.30–1.50 times longer than scape and wider than synantennomere 3. OOL : POL = (1.50–)1.60–1.90 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe about as long as wide in lateral view. Lower ergot on valvular stalk absent. Valviceps 1.45–1.65 times longer than wide on medial lobe, with distinct oblique lateral lamella, proximal lobe of penis valve 0.22–0.26 times as long as valviceps and 0.70–0.80 times as high as medial lobe, excision of lower edge 0.22–0.24 as deep as width of medial lobe, valviceps on medial lobe 1.15–1.20 times wider than on distal lobe, 2 distal flagella present, tip of longer flagellum reaching 0.55–0.70 width of distal lobe (Fig. 151). Valviceps with median longitudinal sclerotization present, medial lobe almost symmetric and broad, with 5–9 cone-like sensilla along upper edge and scattered on lateral surface, upper edge between medial and distal lobe with 7–11 setae. Posterior tibia 0.75–0.90 mm long, claws without subapical tooth.

Type material. Holotype ♀: "F-04-Alpes H. P. [France, Alpes-de Haute Provence], Thorame Haut, 28-V-[19]95, Noblecourt Rec [leg. T. Noblecourt]"; "*Xyela julii* ♀ Noblecourt det: 95"; [red:] "Holotype ♀ *Xyela uncinatae* spec. nov. det. S. M. Blank 2000". The holotype is a pale specimen (see below for variability). DEI. Paratypes: 37♀ 20♂, DEI, JLC, MNHN, MHNN, MZLS, MZLU, RMNH, TNC.

Etymology. The species name, a noun in genitive singular, has been chosen in accordance with the supposed host plant, *Pinus uncinata*.

Host plant. °*Pinus uncinata* Ramond.

Geographic distribution. Andorra, France, Spain, Switzerland (Fig. 19).

Remarks. *Xyela uncinatae* is most similar to *X. obscura* in coloration, in ovipositor sheath morphology, and in the closely spaced posterior ocelli. In females the head is predominantly black or dark brown, but usually the vertex bears more or less distinct pale stripes in *X. uncinatae*, which are mostly absent or at least indistinct in *X. heldreichii* and *X. obscura*. The pale pattern of the head varies considerably in *X. uncinatae*: Among 25 females 4 have continuous yellow or pale brown stripes on the face along the eyes (pale form similar to *julii*; see couplet 29 in the key), 10 have obvious brown stripes on the vertex (similar to pale *X. obscura*), and 11 have the head completely dark brown (similar to dark *X. obscura*). Morphological characters of the females overlap, but they are statistically different (U-test, $n_{obscura} = 13$, $n_{uncinatae} = 16$). On average the ovipositor is longer ($U = 28$, $\alpha < 0.001$), the relative length of valvula 3 : valvifer 2 smaller ($U = 20$, $\alpha < 0.001$), and the relative length of fore wing : ovipositor larger ($U = 54.5$, $\alpha < 0.05$) in *X. uncinatae* than in *X. obscura*.

Male *X. obscura* and *X. uncinatae* resemble *X. julii* in the dark hypopygium. About 85–90 % will be distinguished from the latter by the closely spaced posterior ocelli. However, males of *X. obscura* and *X. uncinatae* cannot definitely be distinguished from each other. Males of *X. uncinatae* were associated with females using series collected by net and in Malaise traps in Thorame Haute, since this was the only female *Xyela* species found on this site.

Xyela uncinatae has not yet been reared, but the circumstances of collecting unequivocally indicate *Pinus uncinata* as the larval host plant. The French specimens were swept at ca 2,000 m altitude from cut grass below *P. uncinata* at the edge of a wood, which consisted only of this pine species and of larch (T. Noblecourt, personal communication). Other pine species can be excluded as host plants with high likelihood. *Pinus mugo* is almost absent from the Hautes-Alpes, and *P. sylvestris* is mostly restricted to warm places at lower altitude (Chas 1994, Kindel 1995). In the Pyrenees *P. mugo* is absent, however, here *P. sylvestris* may be present in the subalpine zone (Dupias 1987a, Kindel 1995, Babéro et al. 1998).

There has been a long lasting controversial discussion about taxonomy and nomenclature of *P. mugo*, *P. uncinata* and *P. rotundata*. There is still no consensus on the treatment of *mugo* (krummholz, small seed cones with narrow apophyses) and *uncinata* (tree-shaped, large seed cones with prominent, hooked apophyses) as subspecies or two separate species. The two taxa hybridize extensively, giving the hybrid subspecies *P.* x *rotundata*. For practical reason *mugo* and *uncinata* are treated as species throughout this work following the taxonomic opinion and nomenclature presented by Earle (2011). *Pinus uncinata* is distributed in the western Alps, the Jura mountain range of Switzerland, the Pyrenees and the Spanish Sierra de Javalambre (Meusel et al. 1965, Kindel 1995), although published data on the natural eastern distribution limit still differ among recent authors perhaps due to taxonomic problems (Barbéro et al. 1998: fig. 8.8; Willis et al. 1998: fig. 5.1). It forms the montane to subalpine woodland in the western Alps at 1,200–2,550 m and in the Pyrenees at 1,500–2,000 m preferably on rocky places with limestone (Chas 1994, Dupias 1987b, Kindel 1995, Lauber & Wagner 1998). Such a western distribution can also be demonstrated for *Xyela uncinatae*, which overlaps with the Eastern *X. obscura* in Switzerland.

Xyela variegata Rohwer, 1910

Xyela variegata Rohwer, 1910: ♀, 100, 118. Type locality: Japan, Hakone; Takeuchi 1938: 204 (junior synonym of *julii*); Blank et al. 2005: 271 (removed from synonymy).
Xyela julii: Zirngiebl 1937: 348–349 (misidentification?); Takeuchi 1938: 204 (misidentification); Togashi 1964: 51 (misidentification?); Okutani 1982: 19 (misidentification).
Xyela obscura: Togashi 1964: 51 (misidentification); Togashi 1974: 13 (misidentification); Kondo & Miyake 1974: 100–102 (misidentification); Miyake & Kondo 1974: 92–95 (misidentification).

Description. See Blank et al. (2005).

Host plant. •*Pinus densiflora* Sieb. & Zucc.

Biology. See Blank et al. (2005) for a translation of the information presented in Japanese by Kondo & Miyake (1974) and Miyake & Kondo (1974).

Geographic distribution. Japan (Honshu) (see Blank et al. 2005, fig. 5).

Xyela longula group

Diagnosis. Article 3 of maxillary palp 0.75–0.90 times as long as scape, clearly narrower than synantennomere 3; ovipositor 0.9–1.4 times as long as fore wing; medial part of valvula 3 diamond-shaped in cross-section (Figs 86, 95), dorsal and ventral edge of valvula 3 distally evenly narrowing to acicular tip, sensilla field absent (Fig. 87); penis valve without lateral lamella, upper edge of proximal and medial lobe at almost same level, lower ergot present (Fig. 126).

Species included. *Xyela helvetica* and *X. longula* in the West Palearctic.

Xyela helvetica (Benson, 1961)

Xyelatana helvetica Benson, 1961: 171, ♀, type locality: Switzerland, Grisons, Val Ftur, near Fuorn.
Xyela helvetica: Rasnitsyn 1965: 492, 504, 514 (combination with *Xyela*).

Description. Female. Color. Head yellow with black and brown pattern: two black stripes along frontal furrows meeting dark ocellar and postocellar area, dark longitudinal spot in middle of frons and kidney-shaped spots on vertex. Antennae brown. Thorax dorsally predominantly dark with few pale markings on pronotum, mesonotal lobes and mesoscutellum, tegulae pale, mesepisternum largely pale brown. Abdominal terga dark brown, lateral parts of terga 8 and 9+10 brown or pale brown, valvifer 2 brown basally and dark distally, membrane between valvifer 2 and valvula 3 pale brown, valvula 3 brown with small pale ventral margin up to middle or farther (Fig.

86). Legs brown, femora with infuscate longitudinal stripes, ventral side of posterior coxae pale preapically. Wing membrane brownish infuscate, venation and pterostigma pale brown.

Morphology. Fore wing 4.1–4.6 mm long, 1.20–1.35 times longer than ovipositor sheath, vein Rs+M 25–100 µm long, 2r-m meeting Rs 75–140µm distal to the furcation of Rs1 and Rs2. Synantennomere 3 740–790 µm long, antennomere 4 ca 240 µm long and ca 6.5 times longer than wide distally. Article 3 of maxillary palp 260–280 µm long, 0.75–0.80 times as long as scape and narrower than synantennomere 3. OOL : POL = 1.55–2.00 : 1. Ovipositor sheath ca 3.40 mm long, valvula 3 2.9–3.1 times longer than valvifer 2 and 11.5–12.0 times longer than wide at base (Fig. 86). Valvula 3 of ovipositor sheath diamond-shaped in cross section, pale membranous area distally extending up to middle or even farther as small ventral pale margin of valvula 3, valvula 3 distally narrowing to acicular tip, tip without defined sensilla field, with 4–7 blunt setae (Fig. 86). Ovipositor almost straight. Valvula 1 of ovipositor compressed, medial part parallel-sided and longitudinally slightly bicolorous (presumably due to different degree of sclerotization of dorsal and ventral portions), aulax terminating almost at tip, ventral edge sloping up to tip in distal 0.1, with ca 10 wide-spaced annuli in distal 0.1 (basal 2 annuli only present close to aulax and distal continuous from aulax to ventral edge of valvula 1, basal oblique and distal 2 almost vertical), 4–5 shallow serrulae, olistether with 6–8 setae. Valvula 2 dorsally smooth and parallel-sided with regular shallow notches and indistinct vertical annuli in distal half, notches not evidently related to evenly spread sensilla campaniformia, dorsal edge of left and right valvula fused for most of their length up to triangular rise at 0.9 of ovipositor length, distal 0.1 of valvula 2 tapering to tip, with ca 7 oblique annuli. Posterior tibia 1.00–1.05 mm long, all claws with delicate subapical tooth.

Male. Unknown.

Type material. Holotype ♀: [round label with red margin:] “Type”; “Suisse—Gr. Val Ftur 23 IV 53 J. Aubert”; “*Xyelatana helvetica* sp. n. ♀ det. R. B. Benson 1960”; “*Xyela helvetica* (Benson) ♀ det. S. M. Blank 2000”. Right antennal flagellum and parts of posterior tarsi missing. BNMC.

Host plant. °*Pinus mugo* Turra, ~~*P. sylvestris* L.~~ (Schedl 1978).

Geographic distribution. Austria, Switzerland (Fig. 19).

Remarks. Females are distinguished from *Xyela longula* by the shorter ovipositor and the almost evenly pale colored valvula 1. See also remarks under *X. longula*.

The male of *X. helvetica* remains unknown. The supposal of Viitasaari (1980) and Blank (2002) that the male reported by Schedl (1978) as *X. longula* from Hohe Wand (Lower Austria, NMW) belongs to *X. helvetica* cannot be confirmed here. In this male the valviceps is quite shallowly excised on its lower edge and the tip of the longer flagellum reaches 0.85 of the width of the distal lobe. However, study of a longer series of *longula* males reveals now that the morphological features of this specimen fall within the variability of *X. longula*. Thus the former identification of Schedl (1978) was correct, and the male *X. helvetica* remains undescribed.

The collection data of the only two known females indicate an occurrence in the subalpine zone of the Alps and accordingly *Pinus mugo* as the supposedly only larval host plant. The holotype from Switzerland was collected at 1,900 m altitude, and a specimen from the Haller Zunderkopf (Karwendel Mountains, Austria) was swept from *P. mugo*. *Pinus sylvestris*, which was additionally taken into consideration (Schedl 1978, Blank 2002), should be excluded, because it is absent in the subalpine zone of the central Alps.

Xyela longula Dalman, 1819

Xyela longula Dalman, 1819: 124–125, ♀, type locality: Sweden, Vestrogothia [= Skaraborgs län or Älvborgs län].
Pinicola longula: André 1881: 468 (combination with *Pinicola*).
Xyelatana longula: Benson 1938: 34 (combination with *Xyelatana*).
Xyelatana longula ssp. *longula*: Benson 1945: 36 (status changed).
Xyela piliserra C. G. Thomson, 1871: 317, ♀, type locality: Sweden, Lapland; Blank 2002: 223 (junior synonym of *longula*).
Pinicola piliserra: André 1881: 468 (combination with *Pinicola*).
Xyelatana piliserra: Benson 1938: 34 (combination with *Xyelatana*).
Xyelatana longula ssp. *piliserra*: Benson 1945: 36 (status changed).

Description. Female. Color. Head yellow with black and brown pattern: two black stripes along frontal furrows meeting black ocellar and postocellar area and black longitudinal spot in middle of frons always present (Fig. 24);

kidney-shaped spots on vertex usually separate from black postocellar area. Antennae brown. Thorax dorsally brown with more or less distinct pale pattern on pronotum, mesonotal lobes and mesoscutellum, tegulae pale, sometimes brown in middle, mesepisternum largely pale brown. Abdominal terga brown, lateral parts of terga 8 and 9+10 and distal sternum partly pale, valvifer 2 dark brown with pale base, membrane between valvifer 2 and valvula 3 and ventral edge in basal half of valvula 3 pale, valvula 3 brown (Fig. 95). Legs pale brown, femora with dark longitudinal stripes, posterior coxae dark brown with distal 0.3–0.5 of ventral side pale. Wing membrane, venation and pterostigma brownish infuscate.

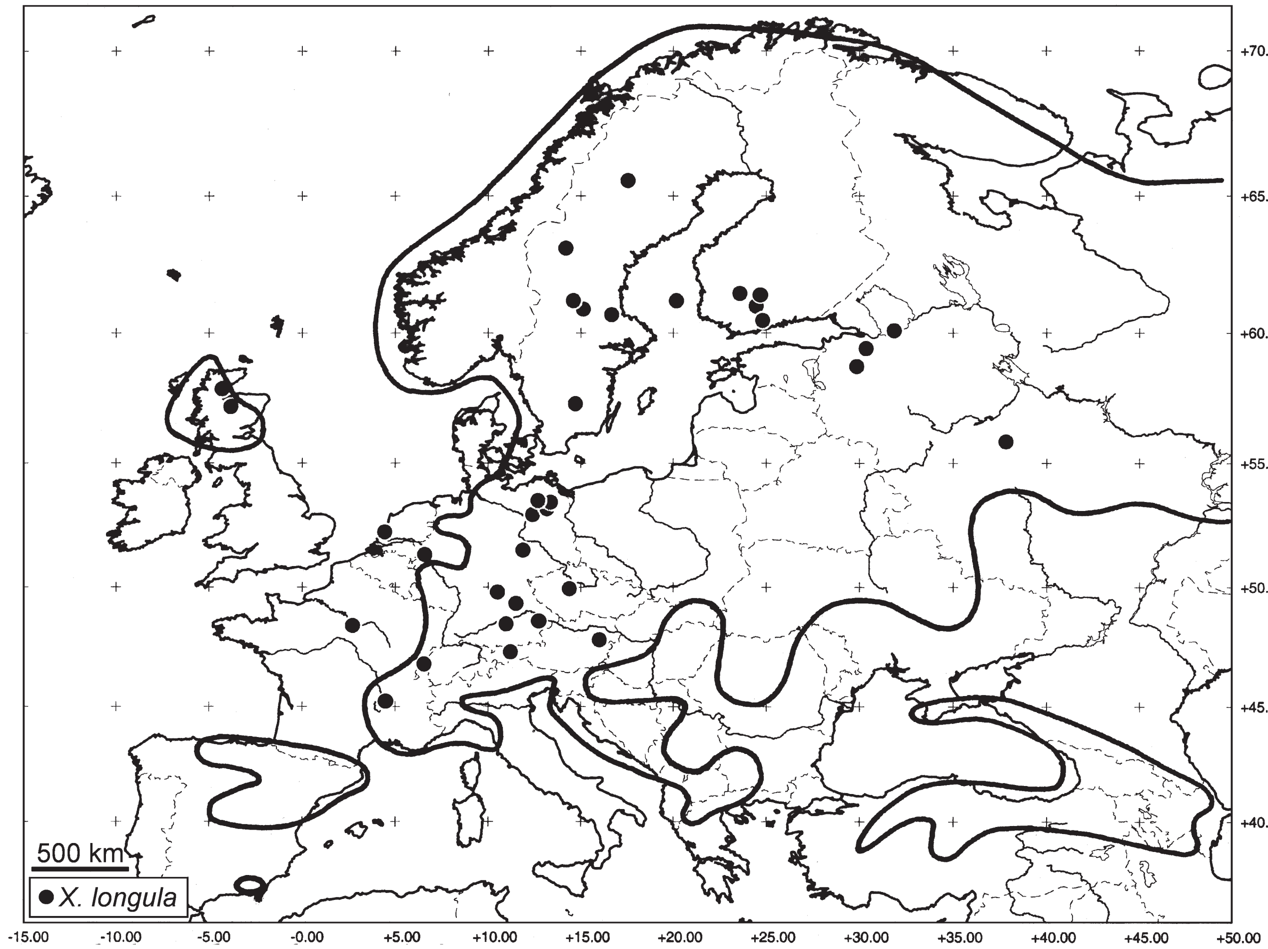


FIGURE 20. Records of *Xyela longula* (49 specimens from 32 collection sites) and natural distribution of the host plant, *Pinus sylvestris* (solid line, combined from Mirov 1967, Sokolov et al. 1977 and Willis et al. 1998). Two additional records included from Scotland (Harwood 1950, Entwistle 1996). The question mark refers to a tentatively identified male from Tence (France: Auvergne; see text).

Morphology. Fore wing (4.1–)4.7–5.7 mm long, 0.90–1.10 times longer than ovipositor sheath, either Rs+M (up to 100 µm) or 1r-m (up to 60 µm) present, usually 2r-m meeting Rs distal to the furcation of Rs1 and Rs2 (seldom interstitial and once observed proximal to furcation). Synantennomere 3 780–1050 µm long, antennomere 4 210–260 µm long and 6.0–7.0 times longer than wide distally. Article 3 of maxillary palp 250–330 µm long, 0.75–0.90 as long as scape and narrower than synantennomere 3. OOL : POL = 1.9–2.2(–2.3) : 1. Ovipositor sheath (4.1–)4.4–5.6 mm long, valvula 3 3.6–4.2 times longer than valvifer 2 and 13.5–16.5 times longer than wide at base (Fig. 95). Valvula 3 of ovipositor sheath diamond-shaped in cross section, pale membranous area distally elongate but faintly delimited, valvula 3 distally narrowing to acicular tip, which bears no defined sensilla field, ventrally with ca 5 blunt setae (Fig. 87). Ovipositor almost straight. Valvula 1 of ovipositor compressed, medial part parallel-sided and longitudinally bicolorous (presumably due to different degree of sclerotization of dorsal and ventral portions), aulax terminating almost at tip, ventral edge sloping up to tip, with 9–10 wide-spaced annuli in distal 0.1 (basal 3 annuli only present close to aulax and distal continuous from aulax to ventral edge of valvula 1, basal oblique and distal 2–3 almost vertical), 6–7 serrulae, olistether with 6–9 setae (Fig. 121). Valvula 2 dorsally smooth and parallel-sided with regular shallow notches with indistinct vertical annuli in distal half, notches not evidently related to evenly spread sensilla campaniformia, dorsal edge of left and right valvula fused for most of their length up to triangular rise at 0.9 of ovipositor length, distal 0.1 of valvula 2 tapering to tip, with ca 7–8 oblique annuli. Posterior tibia 0.95–1.20 mm long, all claws with delicate subapical tooth.

Male. Color. Similar to female. Coloration of face varying from extensively yellow (Fig. 25) to predominantly brown. Hypopygium mostly yellow.

Morphology. Fore wing (3.7–)4.0–4.7 mm long, either Rs+M (up to 100 µm) or 1r-m (up to 40 µm) present, usually 2r-m meeting Rs distal to the furcation of Rs1 and Rs2 (seldom interstitial). Synantennomere 3 (650–)850–910 µm long, antennomere 4 180–250 µm long and 6.0–7.5 times longer than wide distally. Article 3 of maxillary palp 230–280(–310) µm long, 0.70–0.90 times as long as scape and narrower than synantennomere 3. OOL : POL = 1.8–2.2 : 1. Longitudinal apodeme of basiparamere straight-lined, basal portion in ventral position, harpe ca 0.6 times as long as wide in lateral view. Lower ergot on valvular stalk present. Valviceps 1.90–2.20 times longer than wide on medial lobe, without lateral lamella, proximal lobe of penis valve 0.12–0.17 times as long as valviceps and 0.90–1.00 times as high as medial lobe, excision on lower edge 0.16–0.23 as deep as width of medial lobe, valviceps on medial lobe 1.05–1.15 times wider than on distal lobe, 2 distal flagella present, tip of longer flagellum reaching 0.90–1.05 width of distal lobe (Fig. 126). Valviceps without median longitudinal sclerotization, medial lobe broadly rounded, 7–17 cone-like sensilla present, upper edge between medial and distal lobe with dense pattern of setae. Posterior tibia (0.80–)0.93–1.10 mm long, all claws with delicate subapical tooth.

Barcodes. GUID ABV4344 (1 larva).

Type material. *Xyela longula*. Lectotype ♀ (**here designated**): [bottom label adjacent to specimen, forwarded as image file by H. Mejlon:] "*Xyela longula* Dalman [reference to Dalman's original description:] act. H. 1819. 124. 2. ♀"; [on pin of specimen:] "♀"; "87."; [red:] "Lectotype *Xyela longula* Dalman, 1819 det. S. M. Blank 2012"; "*Xyela longula* Dalman, 1819 det. S. M. Blank 2012". Left antenna and left fore wing missing, right antenna glued to cardboard label. UUZM, in box 304 of Gyllenhal's collection.

Xyela piliserra. Lectotype ♀ (designated by Blank 2002): [small blue label]; "Lpl." [= Lappland]; [large label with red margin, possibly a cabinet label:] "*piliserra*"; "1978 292"; [yellow:] "ZML 1998 269"; [red:] "Lectotypus ♀ *Xyela piliserra* C. G. Thomson, 1871 des. S. M. Blank 1999"; "*Xyela longula* Dalman, 1819 ♀ det. S. M. Blank 1999". In perfect condition. MZLU.

Host plant. •*Pinus sylvestris* L. (1 larva associated with imagines by barcoding analysis).

Biology. The earliest flight records in the season for *X. longula* are from the end of March (Austria, North Tyrol, Zirler Berg, Martinswand; Germany, Mecklenburg-Vorpommern, Teschendorf). Judging from the data of collection material, imagines of *X. longula* are active about 10–20 days earlier than *X. julii* in Germany and Scandinavia. But an overlapping flight phenology might be expected (Tab. 5). Entwistle (1996) made similar observations in Great Britain: "My own records [of *X. longula*] were 28th March, 1994—one female; 1st April, 1995—one female; 10th April, 1994—one male. [...] Standardised weekly samples at Migdale Wood in 1995 showed *X. julii* imagines to be present from 16th April to 23rd May, peaking in about the first week of May (during the whole sample period a total of 525 *X. julii* imagines were collected)."

Geographic distribution. Austria, Czech Republic, Finland, France, Germany, Netherlands, Russia (Moskovskaya Oblast, Sankt Peterburg Oblast), Sweden, Switzerland (Fig. 20). Additionally reported for Belgium and Luxembourg (Magis 1994), Great Britain (Harwood 1950, Entwistle 1996), Estonia (Viitasaari et al. 1998), Hungary (Carpathian Basin; Zombori 1974), Latvia (Tsinovskiy 1953).

Remarks. Females are distinguished from *Xyela helvetica* by the longer ovipositor (fore wing 0.90–1.10 times longer than ovipositor, 1.20–1.35 in *X. helvetica*). Valvula 1 of the ovipositor is strikingly bicolorous in longitudinal direction.

All male *Xyela* specimens from Europe, which lack a lateral lamella on the penis valve, have so far been attributed to *X. longula*. One male from Tence (France: Auvergne, MNHN) is tentatively identified as *X. longula*. The most striking difference is the presence of ca 30 cone-like sensilla on the medial lobe (Fig. 127), while only 7–17 sensilla are present in *X. longula*. In addition this male differs in the 90–140 µm long vein 1r-m on the fore wing (either Rs+M present or 1r-m up to 40 µm long in *X. longula*), and the proximal lobe of the penis valve being 0.20 times as long as the valviceps (0.12–0.17 in *X. longula*). The collection site is close to those of *X. lugdunensis*, but the male of this species has a lateral lamella present on the valviceps (Fig. 128). Association with *X. helvetica* is not supported since the present male was collected in the lowlands far outside the native, subalpine distribution range of the supposed host of *X. helvetica*, *Pinus mugo*.

The larva of *X. longula*, for which a full barcoding sequence could be obtained, is placed next to *X. curva* at an interspecific distance of 21.69 %. This larva was grouped in the same cluster as a female and a male of *X. longula*, from which respectively only 241 bp and 266 bp long sequences could be obtained (Fig. 23).

The type of *X. longula* was deemed to be lost, because it was searched for in MZLU and NHRS (Schedl 1978). But Dalman (1819) referred to "Mus. Dom. Gyllenhal", i.e., to the collection of L. Gyllenhal which today is preserved in UUZM. Dalman had several females on hand for his description ("Non nisi feminas vidi."). Only one specimen is still available from UUZM, which here is designated as the lectotype. The morphological parameters of the lectotype fall within the variability range of the species called *X. longula*.

The synonymy of *X. longula* and *X. piliserra* was already supposed by Viitasaari (1980), who pointed out that "specialists know either *X. longula* or *X. piliserra*, but not both." A lectotype for *X. piliserra* was designated by Blank (2002), who finally synonymized these two names. Benson's (1938) statement that he examined "the type of *X. piliserra* C. G. Thomson, 1871" cannot be assessed as a lectotype designation. Benson neither gave indications on how to recognize this particular specimen, nor did he add any type or identification label.

Males and females of this species were associated with the help of specimens of both sexes found at the same collection site (e.g., 3♀ 3♂ at the Martinswand in North Tyrol, Austria) or within the same geographical range (e.g., Konow's specimens from Fürstenberg and Teschendorf, Germany).

Under the names *X. longula* or *X. piliserra* this species has repeatedly been reported to be associated with *P. sylvestris* (Harwood 1950, Crooke 1957, Rasnitsyn 1965 and personal communication, Schedl 1978, Entwistle 1996), and this pine species undoubtedly is the larval host. *Xyela longula* imagines were reported several times to have been collected from this pine. All known records of imagines originate from the distribution range of *P. sylvestris*, and this is the only available autochthonous pine species in the northern part of the distribution range (e.g., Finland, Sweden). Veli Vikberg (personal communication) extracted larvae from staminate cones of *P. sylvestris.* One of them was identified as *X. longula* genetically (see above).

Xyela lugdunensis group

Diagnosis. Article 3 of maxillary palp 1.10–1.20 times longer than scape and about as wide as synantennomere 3; valvula 3 of ovipositor sheath diamond-shaped in cross section, parallel-sided in middle, in distal 0.1 dorsal and ventral edge narrowing to round tip (Figs 88, 96), tip with a defined sensilla field directed laterally and bearing 5–6 setae; penis valve with lateral lamella, proximal lobe with 28–30 cone-like sensilla and 0.90 times as wide as medial lobe (Fig. 128).

Species included. *Xyela lugdunensis* in the West Palearctic.

Xyela lugdunensis (Berland, 1943)

Xyelatana lugdunensis Berland, 1943: 90–91, ♀, type locality: France, Lyon.
Xyela lugdunensis: Rasnitsyn 1965: 492, 514 (combination with *Xyela*).
Xyela nigroabscondita Haris & Gyurkovics, 2011: 140–141, ♀♂, type locality: Hungary, Szeged, Újszeged, Népliget; **syn. nov.**
Xyela curva: Chevin & Tussac 1992: 62 (misidentification).

Description. Female. Color. Head yellow with black and brown pattern: two dark brown to black stripes along the frontal furrows 2.0–3.5 times as wide as ocellar diameter, meeting black ocellar and postocellar area, black longitudinal spot in middle of frons present, isolated or fusing dorsally; kidney-shaped spots on vertex separate from or fusing with black postocellar area (Fig. 26). Antennae brown, a little paler below. Thorax dorsally brown or black, more or less with pale pattern on pronotum, mesonotal lobes and mesoscutellum. Tegulae pale and infuscate in middle, mesepisternum largely pale brown. Abdominal terga brown to black, lateral parts of terga 8 and 9+10 partly paler, valvifer 2 and valvula 3 brown or black, membrane between valvifer 2 and valvula 3 pale, valvula 3 sometimes with small pale ventral margin up to the preapical portion (Figs 88, 96). Legs brown to dark brown, femora with more or less distinct longitudinal dark stripes, posterior coxae dark brown with distal 0.3–0.5 of the ventral side pale. Wing membrane, venation and pterostigma brownish infuscate.

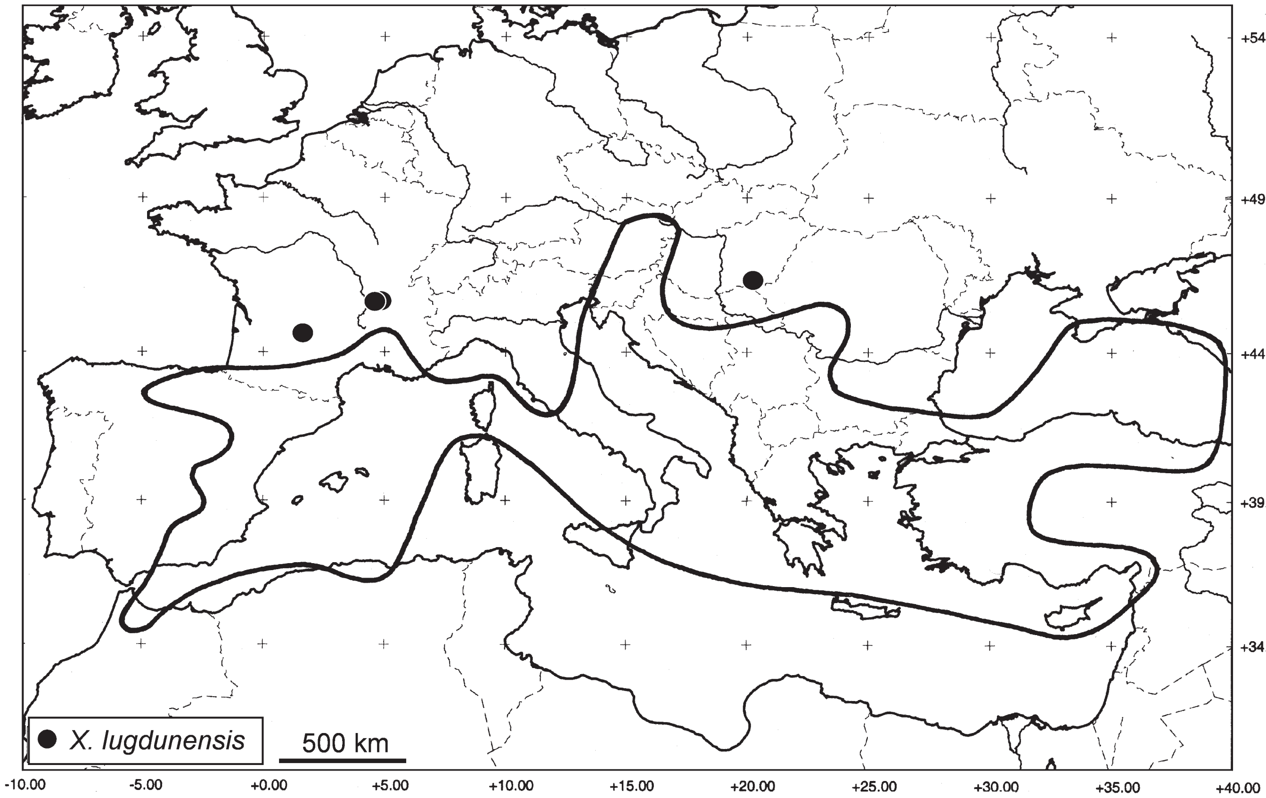


FIGURE 21. Records of *Xyela lugdunensis* (7 specimens from 4 collection sites) and natural distribution of the supposed host plant, *Pinus nigra* (solid line, combined from Meusel et al. 1965 and Barbéro et al. 1998).

Morphology. Fore wing 4.9–5.4 mm long, 1.50–1.65 times longer than ovipositor sheath, vein 1r-m usually present and 20–140 µm long (Fig. 5; one specimen with 130 µm long vein Rs+M on right wing), position of 2r-m variably proximal or distal with respect to the furcation of Rs. Synantennomere 3 1.00–1.13 mm long, antennomere 4 290–330 µm long and 8.5–10.0 times longer than wide distally. Article 3 of maxillary palp 440–480 µm long, 1.10–1.25 times longer than scape and about as wide as synantennomere 3. OOL : POL = 1.85–2.00 : 1. Ovipositor sheath 3.10–3.40 mm long, valvula 3 2.35–2.50 times longer than valvifer 2 and 10.0–11.0 times longer than wide at base (Figs 88, 96). Valvula 3 of ovipositor sheath diamond-shaped in cross section, pale membranous area triangular in basal 0.2 of valvula 3, sometimes extending up to preapical region as narrow ventral pale margin, valvula parallel-sided in the middle, in distal 0.1 dorsal and ventral edge narrowing to round tip, tip with a defined sensilla field directed laterally and bearing 5–6 setae. Ovipositor slightly curved downwards. Valvula 1 of ovipositor compressed, aulax terminating almost at tip, dorsal edge sloping down and ventral edge sloping up to tip, distal 0.1 more sclerotized, with 8–10 wide-spaced annuli (basal oblique and distal 3–4 perpendicular), ventral edge with ca 4 shallow serrulae, olistether with 7–8 setae. Left and right valvulae 2 fused along dorsal edge up to distal 0.1. Valvula 2 almost parallel-sided, medial and preapical part with ca 6 shallow, regularly spaced prominences bearing 1–2 sensilla campaniformia each (similar to *alpigena* but less sclerotized), in distal 0.1 with smooth dorsal margin evenly tapering toward tip and with ca 9 oblique annuli. Posterior tibia 1.15–1.25 mm long, all claws with delicate subapical tooth.

Male. Color. Similar to dark female specimens. Face and vertex predominantly dark brown to black (Fig. 27). Dorsal side of thorax black. Hypopygium yellow.

Morphology. Fore wing 4.7 mm long, 1r-m 60–80 µm long. Synantennomere 3 1000 µm long, antennomere 4 350 µm long and 10.5 times longer than wide distally. Article 3 of maxillary palp 450 µm long, ca 1.15 times longer than scape and about as wide as synantennomere 3. OOL : POL = 1.90 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe ca 0.90 times as long as wide in lateral view. Lower ergot on valvular stalk present, small. Valviceps 1.40–1.45 times longer than wide on medial lobe, lateral lamella slightly oblique with proximal edge convex and distal base weakly s-shaped, proximal lobe of penis valve 0.30–0.35 times as long as valviceps and 0.90 times as high as medial lobe, excision on lower edge asymmetric, 0.10–0.15 as deep as width of medial lobe, valviceps on medial lobe 1.40 times wider than on distal lobe, 2 distal flagella present, tip of longer flagellum reaching 0.85 width of distal lobe (Fig. 128). Valviceps without median longitudinal sclerotization, medial lobe evenly rounded, with 28–30 cone-like sensilla mainly along proximal to distal upper edge, upper edge between medial and distal lobe with numerous setae. Posterior tibia ca 1.15 mm long, all claws with delicate subapical tooth.

Type material. Holotype ♀: "Lyon"; "Museum Paris Coll. J. de Gaulle 1919"; "*Xyela Julii* Bréb."; "*Xyelatana lugdunensis* Berl. L. Berland ~~det.~~ 1943"; [red letters:] "Type"; [red:] "Holotypus ♀ *Xyelatana lugdunensis* Berland, 1943 det. S. M. Blank 1999"; "*Xyela lugdunensis* (Berland, 1943) ♀ det. S. M. Blank 1999". Left anterior leg and right flagellum missing. MNHN.

Xyela nigroabscondita. Holotype ♀: "A"; "Szeget: Népliget"; "2011 III. 14 Gyurkovics H."; [label with red frame:] "Holotypus sp.n. ♀ *Xyela nigroabscondita* Haris & Gyurkovics"; "*Xyela lugdunensis* (Berland, 1943) det. S.M. Blank 2012". Tips of antennal filaments broken, fragments glued to cardboard label. SCMK. Paratypes: 1♀ 1♂ HNHM (studied), 1♀ 1♂ SCMK.

Host plant. °*Pinus nigra* Arn.

Geographic distribution. France, Hungary (Fig. 121).

Remarks. Among the European taxa, *Xyela lugdunensis* is distinguished from the similar *X. alpigena* by shorter maxillary palps (article 3 1.10–1.25 times longer than scape in *lugdunensis* / 1.70–1.80 in *X. alpigena* females, 1.40–1.50 in males) and longer ovipositor (fore wing 1.60–1.65 times longer than ovipositor / 1.90–2.05). The penis valve of the male is similar to that of *X. meridionalis* and of members of the *X. alpigena* group. Most of these species have the proximal lobe of the valviceps 0.95–1.10 times wider than the medial lobe (0.90 in *X. lugdunensis*) except for *X. peuce*, but which has 14–15 cone-like sensilla on the medial lobe (28–30). Members of the *X. alpigena* group have the medial lobe of the valviceps 1.50–1.75 timed wider than the distal lobe (1.40 in *X. lugdunensis*) except for *X. ussuriensis* (1.30–1.40) in which the proximal lobe is 1.00-1.05 times as wide as the medial lobe (0.90 in *X. lugdunensis*). Penis valves of species associated with the *X. curva* group have a similarly wide lateral lamella, but the distal edge is concave (weakly s-shaped in *X. lugdungensis*), and the proximal lobe of the valviceps is evenly rounded (roundly bulging and proximally descending). Blank (2002), who had only the female *X. lugdunensis* holotype on hand, tentatively placed the species in the *X. alpigena* group because of similar structure of the ovipositor sheath. Now the preparation and mounting of valvula 2 of the ovipositor sheath has revealed that it is not wedge-shaped like in the *X. alpigena* group, but medially parallel-sided and narrowing to the tip in the distal 0.1. This was not apparent from the dry specimen.

The sexes have been associated with help of the type series of *X. nigroabscondita* from Hungary. Haris & Gyurkovics (2011) observed copulations among these specimens. Additional support comes from the comparatively short maxillary palps, extensive dark pattern of the frons strongly contrasting with the yellow color, and the infuscate wings.

Judging from the holotype and two paratypes of *X. nigroabscondita* and the few specimens from France including the holotype of *X. lugdunensis* studied here, these two taxa are synonyms. Morphometric features of the specimens from Hungary fall within or immediately adjoin the variability range of specimens collected in France. For example, the relative length of maxillary palpomere 3 is 1.10–1.20 times longer than the scape in specimens from France and 1.20–1.25 in specimens from Hungary (1.26–1.42 according to Haris & Gyurkovics 2011). The holotype of *X. lugdunensis* was collected in 1919 and has faded brown, which explains differences in the color of the ovipositor sheath and the wings, which are respectively predominantly black and grey in more fresh specimens. However, the black pattern of the Hungarian specimens is generally more extensive. Haris & Gyurkovics (2011) stated the "anterior mesonotal lobes [are] without any spot", but actually the holotype has large spots on these lobes and on the mesoscutellum, and a paratype female inconspicuous spots on the mesonotal lobes. The "white triangular-shaped spot on [the] base of valvula 3 (Fig. 6) is a characteristic feature of the new species [*X. nigroabscondita*]" according to Haris & Gyurkovics (2011), but actually a similar white spot is present in *X. alpigena* and other species of the associated species group. Haris & Gyurkovics (2011) stated that the "total length of [the] body with valvula 3 : total length without valvula 3 is 1.54 max. 1.56 (54–56%) in the new species [*X. nigroabscondita*], but 1.95 in *Xyela lugdunensis* (95%!)". Morphometric comparison with the body length has turned out as an unreliable character in other *Xyela* species due to variable inclination of head and prothorax and due to shrinking. The absolute length of valvula 3 is similar among French (2.20–2.35 mm) and Hungarian specimens (2.40 µm) as well as the relative length of the fore wing compared to the ovipositor length (1.55–1.65 :

1 / 1.50–1.55 : 1). Minute differences in the shape and inflection of the ovipositor sheath between *X. nigroabscondita* (figs 4, 6 in Haris & Gyurkovics 2011) and *X. lugdunensis* (figs 3, 5) cannot be followed, since they may depend on different shrinkage of mounted specimens with dehiscent (holotype of *X. lugdunensis*) or closed ovipositor sheath (holotype of *X. nigroabscondita*). Haris & Gyurkovics (2011) stated that "RS+M vein [is] missing in the new species [*X. nigroabscondita*] (Fig. 4 and 12)" and that "it is true for all 5 specimens (males and females)." Actually in the holotype veins Rs+M / Rs / M are practically interstitial on the right side, and a female paratype has a 40 µm long Rs+M on the left and a 130 µm long 1r-m on the right fore wing. In specimens from France a more or less long vein 1r-m is present. In females the position of vein 2r-m with respect to the furcation of vein Rs1 and Rs2 from Rs is variable and not suitable to distinguish *X. lugdunensis* and *X. nigroabscondita*. In the holotype of *X. lugdunensis* and a female from Ecully 2r-m meets Rs2 0–65 µm beyond the furcation (asymmetric in both specimens and not "interstitial" as stated by Haris & Gyurkovics 2011 for the holotype of *X. lugdunensis*), in the holotype of *X. nigroabscondita* 90–130 µm beyond, and in a female paratype of *X. nigroabscondita* 210–260 µm before the furcation. Left and right wing of a second female from Ecully is asymetric in this respect (left: 60 µm before, right: 130 µm beyond). In the single male the of 2r-m fusion is 60–80 µm before the furcation.

Although all known specimens of *X. lugdunensis* were collected outside the native distribution range of *Pinus nigra* (Fig. 21), circumstances of collection indicate this pine species to be the host plant. General presence of *P. nigra* in the Hungarian plain is also indicated by the occurrence of *X. curva*, *X. graeca* and *X. menelaus* there (Figs 11, 15, 18). The type series of *X. nigroabscondita* was collected "on the ground amongst leaf-litter and fallen twigs" below "some isolated black pine trees (*Pinus nigra*)" in the city park of Szeged (Haris & Gyurkovics 2011). The specimen recorded by Chevin & Tussac (1992) was collected in a yellow pan trap ca 10 m distant from a small *P. nigra* wood (H. Tussac, personal communication). This pine is also demonstrably present in Ecully, where two female *X. lugdunensis* and two female *X. curva* were collected. Larvae of *X. curva* are known to be associated with *P. nigra* as the host.

A female from Cabrerets was misidentified as *X. curva* by Chevin & Tussac (1992). In France *X. lugdunensis* appears to have only a small distribution range, as the specimens were collected at most ca 300 km apart from each other in the environs of the Massif Central. The recent record from Szeged in Hungary has been a surprise and raises the question, why *X. lugdunensis* has been observed so seldom, while the putative host, *Pinus nigra*, has a wide distribution and was studied extensively in the course of our work.

Together with the Nearctic *X. linsleyi* Burdick, 1961 and *X. styrax* Burdick, 1961, Rasnitsyn (1965) placed *X. lugdunensis* in his *X. linsleyi* group. His view cannot be confirmed, because the characters presented do not include unequivocally derived states for such an association: the lack of serrulae on valvula 2 of the ovipositor is the ground plan condition of *Xyela*; a short article 3 of the maxillary palp, narrowly rounded tip of valvula 3, and curved ovipositor are of minor weight, because they occur homoplastically in other species groups, too.

***Xyela meridionalis* group**

Diagnosis. Valvula 3 only 0.85–0.90 times as long as valvifer 2, laterally flattened and in dorsal 0.75 somewhat rounded in cross-section (Figs 89, 103), sensilla field directed caudally, bearing most probably 9 setae; dorsal edge of valvula 2 with sclerotizations each enclosing one or two sensilla campaniformia, aulax terminating preapically; ventral excision of valviceps ca 0.27 as wide as width of valviceps, distal flagella ca 0.95 times as long as width of distal lobe, medial lobe ca 1.25 times as wide as distal lobe (Fig. 135).

Species included. *Xyela meridionalis* in Taiwan.

***Xyela meridionalis* Shinohara, 1983**

Xyela meridionalis Shinohara, 1983: 310–312, ♀, type locality: Taiwan, Nantou-Hsien, Puli E 13 km, Nanshanchi.

Description. Female. Color. Head yellow with black pattern (brown is absent): two black stripes along frontal furrows meeting black ocellar and postocellar area and black longitudinal spot in middle of frons always present; kidney-shaped spots on vertex separate from black postocellar area (Fig. 40). Antennae brown. Thorax dorsally brown with yellow pattern on pronotum, mesonotal lobes and mesoscutellum, tegulae pale, mesepisternum largely pale brown. Abdominal terga black, lateral parts of terga 8 and 9+10 and preapical sterna brown, valvifer 2 completely pale brown, membrane between valvifer 2 and valvula 3 white, valvula 3 black with small white ventral edge up to distal quarter (Figs 89, 103). Legs pale brown, posterior coxae brown laterally at basal quarter. Wing membrane, venation and pterostigma slightly infuscate.

Morphology. Fore wing 3.8–4.1 mm long, 3.30–3.50 times longer than ovipositor sheath, vein Rs+M 100–210 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 680–740 µm long, antennomere 4 180–210 µm long and 6.0–6.5 times longer than wide distally. Article 3 of maxillary palp 440–500 µm long, 1.45–1.55 times longer than scape and about as wide as synantennomere 3. OOL : POL = 1.55–1.70 : 1. Ovipositor sheath 1.15–1.20 mm long, valvula 3 0.85–0.90 times longer than valvifer 2 and 2.7–2.8 times longer than wide at base (Fig. 89, 103). Valvula 3 of ovipositor sheath laterally flattened, in lateral view ca 2 times higher than wide in dorsal view, dorsal 0.75 somewhat rounded in cross-section. Length of pale membranous area longer than high and distally extending up to distal third of valvula 3, dorsal and ventral edge of valvula 3 distally narrowing to round tip, distally with sensilla field directed caudally, bearing most likely 9 (possibly 8) setae. Ovipositor straight. Valvula 1 of ovipositor straight and compressed, aulax terminating preapically, in distal 0.25 evenly tapering to the tip bearing 11 vertical annuli and 5(–6) serrulae, olistether with 4–5 setae. Left and right valvulae 2 fused along dorsal edge up to distal 0.25. Valvula 2 pale brown throughout and sclerotized, basal 0.75 of valvula 2 with scattered sensilla campaniformia and in the middle with 3 shallow protuberances, distal 0.25 tapering toward the tip, distal 0.25 with 6 vertical annuli and 6 dorsal teeth, areas between the annuli each with 1–3 sensilla campaniformia. Posterior tibia 0.90–0.95 mm long, all claws with subapical tooth.

Male. Color. Similar to female (see Fig. 41 for color pattern of head). Stripes along supraantennal furrows anteriorly indistinct. Hypopygium and partly preapical sterna pale brown.

Morphology. Fore wing 3.7 mm long, Rs+M 210 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 850 µm long, antennomere 4 290 µm long and 8.5 times longer than wide distally. Article 3 of maxillary palp 450 µm long, 1.35 times longer than scape and about as wide as synantennomere 3. OOL : POL = 1.65 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position, harpe about as long as wide in lateral view. Lower ergot on valvular stalk small but evident. Valviceps 1.60 times longer than wide on medial lobe, vertical lateral lamella present with proximal and distal edge s-shaped, proximal lobe of penis valve 0.16 times as long as valviceps and 1.05 times as high as medial lobe, excision on lower edge 0.27 as deep as width of medial lobe, valviceps on medial lobe 1.25 times wider than on distal lobe, 2 distal flagella present, tip of longer flagellum reaching 0.95 width of distal lobe (Fig. 135). Valviceps without distinct median longitudinal sclerotization present but slightly infuscate longitudinally, medial lobe almost symmetric, with 23–27 cone-like sensilla along upper edge and scattered on lateral surface, upper edge between medial and distal lobe with dense pattern of setae. Posterior tibia 0.95 mm long, all claws with a subapical tooth.

Type material. Holotype ♀: "Nanshanchi, nr. Puli, Nantou, Taiwan, China, 15.III.1979, A. Shinohara leg."; [red:] "Holotype *Xyela meridionalis* Shinohara, 1983". Left antennomeres 6–12 missing, otherwise in perfect condition, distal part of abdomen in small genitalia vial on pin of type specimen. UOPJ.

Host plant. °*Pinus morrisonicola* Hayata.

Geographic distribution. Taiwan (Fig. 12).

Remarks. The male of *Xyela meridionalis* has not been recognized until now. The sexes were associated using material collected by A. Shinohara at the same locality, even from the same individual tree, during several years. From this site, only a single unidentified male of the *X. julii* group was additionally available.

This species is very similar to representatives of the *X. alpigena* group due to, 1, presence of a narrow vertical, s-shaped lamella of the valviceps; 2, upper edge of proximal lobe of valviceps protruding above medial lobe; 3, presence of sclerotization on the dorsal edge of valvula 2 each enclosing one or two sensilla campaniformia. Since *X. meridionalis* does not share some of the apomorphies of the *X. alpigena* group, it is treated separately. *Xyela meridionalis* has the basal part of valvula 3 parallel-sided and the sensilla field directed caudally. In the *X. alpigena* group valvula 3 is wedge-shaped and the sensilla field directed laterally. The strikingly short valvula 3 is an apomorphy of *X. meridionalis*, which makes it difficult to assess agreement or disagreement of the shape of its cross section among the taxa. The penis valve of *X. meridionalis* differs from representatives of the *X. alpigena* group in the shorter proximal lobe, the deeper excision of the lower edge, and the longer distal flagella.

Shinohara (1983) discussed *X. meridionalis* and the Chinese *X. exilicornis* as possibly conspecific. The latter is here classified as member of the *X. curva* group. It has a strikingly different penis valve, e.g., proximal lobe not protruding above medial lobe, and lateral lamella wide and not s-shaped anteriorly.

The host plant supposedly is *Pinus morrisonicola*. The holotype and the material collected in 1991 were swept from the same pine tree belonging to the *Pinus* ('*Strobus*') in an open grove at about 800 m altitude (Shinohara 1983, and present data). Two species of *Pinus* ('*Strobus*') are native to Taiwan, *P. armandii* Franchet and *P. morrisonicola. Pinus armandii* can be excluded as host plant, because it is restricted to an altitude of (1,500–)2,300–3,000 m, and it is generally found above *P. morrisonicola* (300–2,300 m) (Mirov 1967, Richardson & Rundel 1998).

Xyela rasnitsyni group

Diagnosis. Ovipositor sheath very long (3.0–3.3 mm), fore wing 1.20–1.25 times longer than ovipositor (Fig. 104); valvula 3 compressed in cross-section, with acicular tip, without defined sensilla field; harpes longer than wide; medial lobe of penis valve strongly asymmetrical, inclined toward base of valviceps (Fig. 140).

Species included. *Xyela rasnitsyni* in the East Palearctic.

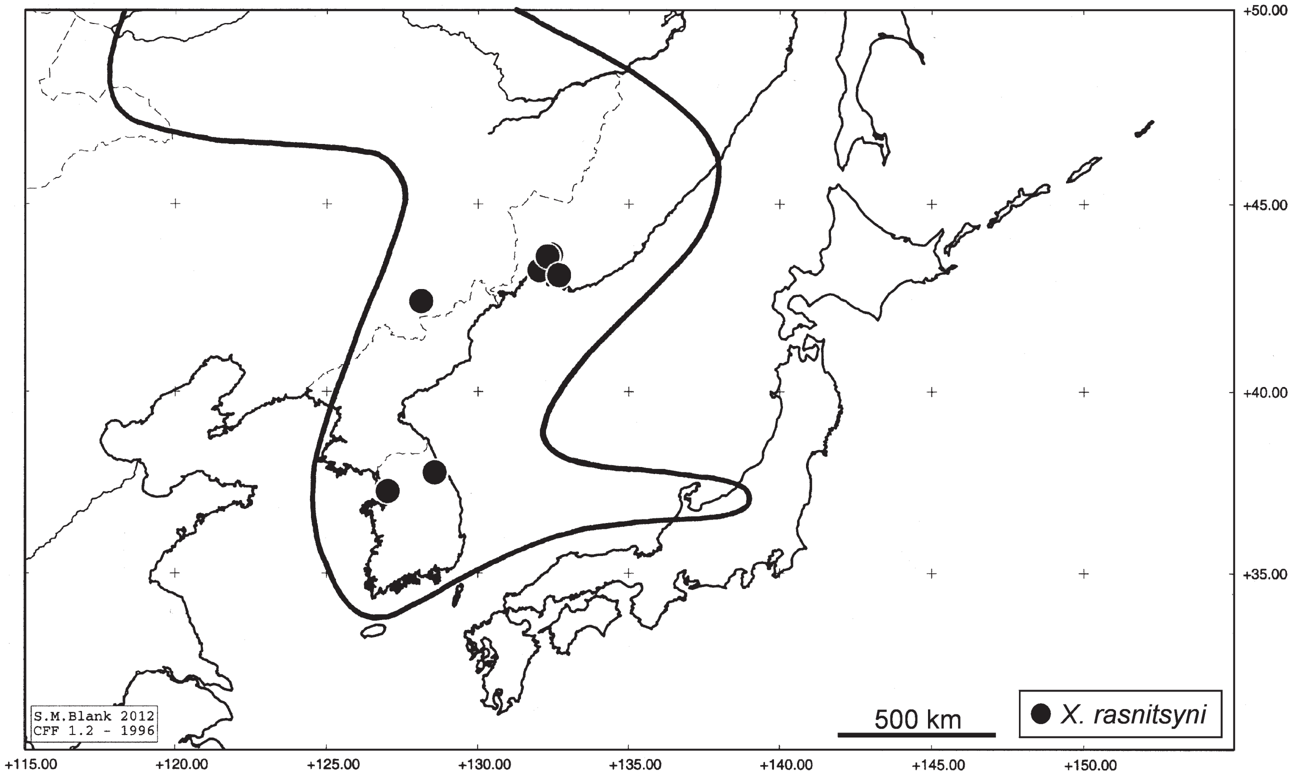


FIGURE 22. Records of *Xyela rasnitsyni* (27 specimens from 7 collection sites) and natural distribution of the supposed host plant, *Pinus koraiensis* (solid line, according to Mirov (1967).

Xyela rasnitsyni Blank & Shinohara, sp. nov.

Type locality: Russia, Primorskiy Kray, Ussuriysky Reserve.

Description. Female. Color. Head yellow with black pattern (brown usually almost absent): two black stripes along supraantennal furrows meeting black ocellar and postocellar area and black longitudinal spot in middle of frons always present; kidney-shaped spot on vertex confluent with black postocellar area or sometimes leaving indistinct yellow stripe in between (Fig. 48). Antennae brown, paler below. Mesoscutum black or slightly brown or yellow anteriorly on lateral lobes. Abdominal terga brown, lateral parts of preapical terga, partly preapical sterna and valvifer 2 pale brown, valvula 3 dark brown with membranous base whitish (Fig. 2, 104). Legs pale brown, anterior side of femora usually with darker longitudinal stripes (at least on posterior legs), posterior coxae predominantly dark brown. Wing membrane, venation and pterostigma pale brown.

Morphology. Fore wing 3.5–4.1 mm long, 1.20–1.25 times longer than ovipositor sheath, vein 1m-cu absent and Rs+M 100–200 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 590–680 µm long, antennomere 4 150–180 µm long and 4.5–5.5 times longer than wide distally. Article 3 of maxillary palp 400–480 µm long, 1.45–1.65 times longer than scape and distinctly wider than synantennomere 3. OOL : POL = (1.30–)1.40–1.60 : 1. Ovipositor sheath (2.8–)3.0–3.3 mm long, valvula 3 3.5–4.0 times longer than valvifer 2 and 13.5–14.5 times longer than wide (Fig. 2, 104). Valvula 3 of ovipositor sheath compressed, ca 3 times wider in lateral view than combined width of the valvulae 3 in dorsal view, basally with pale membranous area little longer than width of valvula and distally with very narrow pale margin extending up to about middle of valvula 3, distally narrowing to acicular tip without defined sensilla field, ventral edge distally with 3–4 setae, distal setae shorter than more basal setae. Ovipositor indistinctly evenly curved in the basal 0.7. Valvula 1 of ovipositor compressed, aulax terminating preapically, dorsal edge sloping down and ventral edge sloping up to tip, with 13–14 oblique annuli in distal quarter, without serrulae, olistether most likely without setae (Fig. 125). Valvula 2 with smooth dorsal margin, tapering in distal third, pale and evenly sclerotized, in distal half with single and regularly spaced sensilla campaniformia. Posterior tibia 0.85–0.95 mm long, all claws with delicate subapical tooth.

Male. Color. Similar to female. Dark pattern on face, vertex and clypeus less extensive, e.g., small yellow stripe between kidney-shaped spots and postocellar area usually present (Fig. 49). Antennae pale brown. Mesoscutum at most a little yellow anteriorly on lateral lobes. Abdomen brown, tergum 8 with pale blotch medially, hypopygium dirty yellowish brown.

Morphology. Fore wing 3.0–3.4 mm long, Rs+M (60–)100–200 µm long, 2r-m meeting Rs proximal to furcation of Rs1 and Rs2. Synantennomere 3 580–740 µm long, antennomere 4 170–210 µm long and 5.5–7.0 times longer than wide distally. Article 3 of maxillary palp 350–400 µm long, 1.30–1.40 times longer than scape and distinctly wider than synantennomere 3. OOL : POL = 1.40–1.60 : 1. Longitudinal apodeme of basiparamere curved, basal portion in lateral position (Figs 153–154), harpe 1.15–1.30 longer than wide in lateral view. Lower ergot on valvular stalk present and erect. Valviceps 1.70–1.75 times longer than wide on medial lobe, with indistinct oblique lateral lamella, proximal lobe of penis valve 0.09–0.13 times as long as valviceps and ca 0.90 times as high as medial lobe, excision on lower edge ca 0.30 as deep as width of medial lobe, valviceps on medial lobe 1.60–1.65 times wider than on distal lobe, 2 (exceptionally 3) distal flagella present, tip of longer flagellum reaching 1.05–1.15 width of distal lobe (Fig. 140). Valviceps with median longitudinal sclerotization present, medial lobe conspicuously asymmetric and situated in basal quarter of valviceps, with 7–10 cone-like sensilla along upper edge and scattered cone-like sensilla on lateral surface, upper edge between medial and distal lobe with ca 10 scattered setae. Posterior tibia 0.80–0.85 mm long, all claws with delicate subapical tooth.

Type material: Holotype ♀: "Ussurijskij Res., Primorskii Kray, Russia, 21.–26.V.1994, [leg.] A. Shinohara"; [red:] "Holotype ♀ *Xyela rasnitsyni* spec. nov. det. S. M. Blank 2000". NSMT. Paratypes: 12♀ 15♂, DEI, NSMT, YUIC, ZIN, ZSM.

Etymology. This conspicuous species is dedicated to Alexandr P. Rasnitsyn (Moscow), who contributed and at an age of 80 years still contributes fundamentally to the knowledge in diversity and phylogeny of extant and fossil insects, among them the basal Hymenoptera.

Host plant. °*Pinus koraiensis* Sieb. & Zucc.

Geographic distribution. China (Jilin Province), Russia (Primorskiy Kray), South Korea (Fig. 22).

Remarks. The female of *Xyela rasnitsyni* shares its sharply pointed tip of valvula 3 with *X. helvetica* (Benson, 1961) and *X. longula* Dalman, 1819, which are Western Palearctic. However, the latter have article 3 of the maxillary palp shorter than the scape (in *X. rasnitsyni* 1.45–1.60 times longer than scape), and the valvula 3 straight (slightly bent downwards) and diamond-shaped in cross section (compressed). The male is easily distinguished from other forms occurring in this region by the harpes, which are longer than wide (in other species as long as wide).

In Russia, A.P. Rasnitsyn collected four females from *Pinus koraiensis*, and at least the specimens from China were collected close to this pine species (E.-J. Fittkau, personal communication, see also *X. koraiensis*).

TABLE 2. Host plant relationships of Eurasian *Xyela* species according to present results and Blank et al. (2005). Classification of *Pinus* species to *Pinus* s.str. and "Strobus" follows Seitz (1997) and Price et al. (1998). Legend for host relationships: ●: primary; •: exceptional; ○: supposed; ?: doubtful; –: literature record disallowed (see text for explanations). Records for Nearctic *Pinus* species not shown in table. Other legends: grey underlay: host plant relationship recorded in literature: association of *Xyela* species to species groups (first column): al: *X. alpigena* group; cu: *X. curva* group; ju: *X. julii* group; lo: *X. longula* group; lu: *X. lugdunensis* group; me: *X. meridionalis* group; ra: *X. rasnitsyni* group.

		***Pinus* ("*Strobus*")**						***Pinus* (*Pinus*)**									
		cembra	*koraiensis*	*morrisonicola*	*peuce*	*pumila*	*sibirica*	*brutia*	*densiflora*	*halepensis*	*heldreichii*	*massoniana*	*mugo*	*nigra*	*x rotundata*	*sylvestris*	*uncinata*
lo	*Xyela helvetica*												○			–	
	Xyela longula															●	
lu	*Xyela lugdunensis*													○			
al	*Xyela alpigena*	●	–		–												
	Xyela kamtshatica		–			○											
	Xyela koraiensis		○														
	Xyela peuce				○												
	Xyela sibiricae						○										
	Xyela ussuriensis		○														
me	*Xyela meridionalis*			○													
cu	*Xyela curva*	–											–	●		–	
	Xyela exilicornis											?					
	Xyela japonica																
	Xyela occidentalis								●								
ra	*Xyela rasnitsyni*		○														
ju	*Xyela altenhoferi*									●							
	Xyela densiflorae								●								
	Xyela graeca							–						●		•	
	Xyela heldreichii										●						
	Xyela julii	–												•	•	●	-
	Xyela menelaus													●			
	Xyela obscura	–							–		–		●	–			–
	Xyela par								●								
	Xyela pumilae					○											
	Xyela sinicola											?					
	Xyela tecta								●								
	Xyela uncinatae																○
	Xyela variegata								●								

Nomina nuda

Xyela coerulea Schilling, 1830

Xyela coerulea Schilling in Gravenhorst, 1830: 54–55, sex?, Poland: Silesia ["Schlesien"], Zobtenberg; nomen nudum.
Xyela caerulea: Dalla Torre 1894: 399 (unjustified emendation).

Remarks. The name *Xyela coerulea* is mentioned with Schilling as the author in Gravenhorst's (1830) report about the 1829's meetings of the entomological section of the "*Schlesische Gesellschaft für vaterländische Cultur*": "Hr. Schilling beschrieb eine neue Art von *Xyela*, welche *coerulea* genannt wurde, und am Zobtenberg gefangen war [...]" [Mr Schilling described a new species of *Xyela*, which has been called *coerulea*, and which was collected at the Zobtenberg]. Dalla Torre (1894) emended the name as *caerulea*, and Klima (1937) listed it as a *species inquirenda*. Smith (1978) correctly treated it as a *nomen nudum*, because the name was not accompanied by an original description (Art. 12.1, ICZN 1999).

Xyela erichsoni Dahlbom, 1835

Xyela erichsoni Dahlbom, 1835: 16, sex?, Sweden: Jemtlands län ["Jemtlandia"]; nomen nudum.
Xyela erichsonii: Hartig 1837: 352 (misspelling); Dalla Torre 1894: 399 (unjustified emendation).

Remarks. Dahlbom (1835) listed *Xyela erichsoni* as follows: "*Xyela Erichsoni* mih. nov. sp.—Jemtlandia, D. Boheman". This taxon has been treated as available, e.g., by Hartig (1837) but as unknown to the author, and by Klima (1937) under *species inquirendae*. Thomson (1871), who had studied Dahlbom's material, did not take note of it. Hartig (1837) and Dalla Torre (1894) listed it as *erichsonii*, an unjustified emendation. Schedl (1978) associated *X. erichsoni* with *Xyelatana* (= *Xyela longula* group). The name has to be set aside as a *nomen nudum* (Smith 1978), because it was not accompanied by an original description (Art. 12.1, ICZN 1999).

Concluding discussion and perspectives

Faunistic data on phytophagous insects like sawflies often consider solely collection data for imagines. They contribute only in a limited way to knowledge on the specific biology. On the other hand, collection and rearing of larvae may provide rich information on the relationships to host plants and parasitoids, on behavior and other insights into the specific ecology. But still today, knowledge of the biology remains comparatively poor even for many Central and North European sawfly species (Taeger et al. 1998). In comparison with imagines, larvae are often more abundant, conspicuous and less mobile (e.g., gregarious, mining and gall-making sawfly taxa). Since the larval stage is usually the longer lasting, it is often easier to detect than the imago (Lorenz & Kraus 1957, Pschorn-Walcher & Altenhofer 2000). These attributes enable the collection of extensive biological data, which necessarily correct or corroborate the opinions, which have been deduced from the study of imagines. Since the study of larvae is much more laborious and rearing is often accompanied by severe losses, this field has largely been neglected.

Restricted feeding preferences are common among sawflies whose larvae are internal feeders like miners and gallers (e.g., Nyman et al. 2006, Leppänen et al. 2012) or whose larvae sequester plant compounds for chemical defense (e.g., Barker et al. 2002). The larvae of *Xyela* are internal feeders in staminate cones of pines as observed first by Dyar (1898). Only *X. gallicaulis* is an exception, which causes galls in the vegetative shoots (Yates & Smith 2009). In the *Xyela* species infesting staminate cones, close adaptation to a particular pine species appears to result from the blooming phenology of the host and from the short availability of suitable cones in spring. *Xyela* females oviposit into the cones when the shoots are still growing, and the larvae have already left the cones shortly before these open to shed the pollen (Burdick 1961, Blank 2002). At least in Europe, only one native pine species can normally be found blooming at a particular location, but depending on weather conditions blooming phenologies may overlap in some years. Rare switches to the 'wrong' pine species could be demonstrated for *X. graeca* and *X. julii* by the rearing of a few imagines respectively from *P. nigra* and *P. sylvestris* (present data and

A.P. Rasnitsyn, personal communication). Possibly such initially accidental switches have been a driving force for shifts onto novel hosts and for ecological speciation in *Xyela*.

In this study, we observed *Xyela* species to be usually monophagous in the larval stage (Tab. 2). Against the background of current rearing data a number of insect-host relations reported in literature for Eurasian *Xyela* species appear to be wrong. They obviously refer to the collection of imagines on pine species other than the true hosts, onto which they strayed incidentally or fed on the pollen (e.g., Schedl 1978, 1980). Other erroneous host data were introduced by misidentifications of imagines (e.g., Benson 1961, 1962, Kondo & Miyake 1974, Miyake & Kondo 1974, Blank 2002).

Particular Nearctic species were reported as oligophagous on staminate cones of several pine species. Four pine species were listed as hosts for *X. pini*, five for *X. bakeri*, and nine for *X. minor* (Maxwell 1955, Burdick 1961, Ebel 1966, Smith 1979). Most of these data originate from sites in the USA. Forest tree communities there often include several pine species growing next to each other. Oligophagy cannot on principle be excluded for Nearctic species and it appears to apply at least to *X. bakeri*, which Ebel (1966) reared from syntopically growing *Pinus elliottii* and *P. palustris* in Florida. But oligophagous species for which Burdick (1961) reported "pines [...] found on host labels" need to be re-assessed to ascertain whether such data refer to the collection of imagines or actually concern larval hosts. Furthermore, Burdick (1961) obviously failed to discriminate morphologically very similar, partly allopatric forms among the material he identified as *X. bakeri*, *X. minor* and *X. pini* (Blank, unpublished data). Oligophagy was also demonstrated for *X. gallicaulis*, which is distinguished from other *Xyela* species by its galling habit, and whose galls were detected on six pine species and one pine hybrid (Smith 1970, Yates & Smith 2009).

Almost all West Palearctic pine species were found to be infested by *Xyela* (Tab. 2). Exceptions are *P. canariensis*, *P. pinaster* and *P. pinea* from which no larvae could be obtained (Schedl 2009, Blank unpublished data). Leaving exceptional host-insect associations out of consideration, the West Palearctic pine species each provide an environment for a range of a single (*P. cembra*, *P. heldreichii*, *P. peuce*, *P. uncinata*) to up to four *Xyela* species (*P. nigra*). For East Asia, from where considerably fewer reliable host data were available, five *Xyela* species could be found associated with *P. densiflora*. These do not all occur on the same spot but they are distributed in groups of two or three species vicariantly on the East Asian mainland and in Japan (Blank et al. 2005). At least in the case of *P. nigra*, several *Xyela* species occur on the same tree, i.e., *X. curva*, *X. graeca* and *X. menelaus*. *Xyela lugdunensis* might be the fourth species associated with black pine. Immediate competition among the larvae for the food source, the sporophylls inside the staminate cones, could not be observed so far. Strikingly, the imagines of the involved species exhibit a slightly different emergence phenology, with *X. curva* emerging first, followed by *X. menelaus* and finally by *X. graeca* (Fig. 14). This sequence is paralleled by the average body size, with the largest of these species, *X. curva*, occurring as the imago first. The comparatively early occurrence enables the larvae of *X. curva* to feed for the longest period, which is terminated when the host starts to bloom. A similarly different phenology of imagines has been observed for the species associated with *P. sylvestris*. Collection data of imagines also indicate that within the same geographical region the larger *X. longula* is on the wing in the field about one or two weeks earlier than the smaller *X. julii* (see appendix and Blank 2002).

The genetic approach to associate imagines with larvae collected from a known host may significantly enhance the recognition of host-insect relations, if gene sequences are studied which differentiate among closely related species. In the course of this work, this has successfully been done for *X. alpigena*, *X. bakeri*, *X. curva* and *X. longula* (Fig. 23). Also the sexes of *X. bakeri*, *X. graeca* and *X. menelaus* could be associated with help of barcoding. But use of the COI sequence failed to discriminate among specimens of *X. julii* and *X. obscura*. In these species the intraspecific variability of this gene overlaps broadly with the interspecific variation. On the other hand, the analysis tool of BOLD proposed two separate clusters for *X. menelaus*, which cannot be interpreted as separate species morphologically.

Future studies on the discrimination of the morphologically often highly similar *Xyela* species and the proper recognition of their hosts will certainly profit from molecular taxonomy. Barcoding provides a reliable, cost-effective tool (Hebert et al. 2003) which in addition yields results comparatively fast. Rearing of *Xyela* larvae may entail heavy losses, and obligate diapauses of one or two years considerably delay the outcome. Methodological constraints of the genetic approach call in addition for morphological-taxonomic expertise, and conclusions should be drawn from the combined, more complex data set.

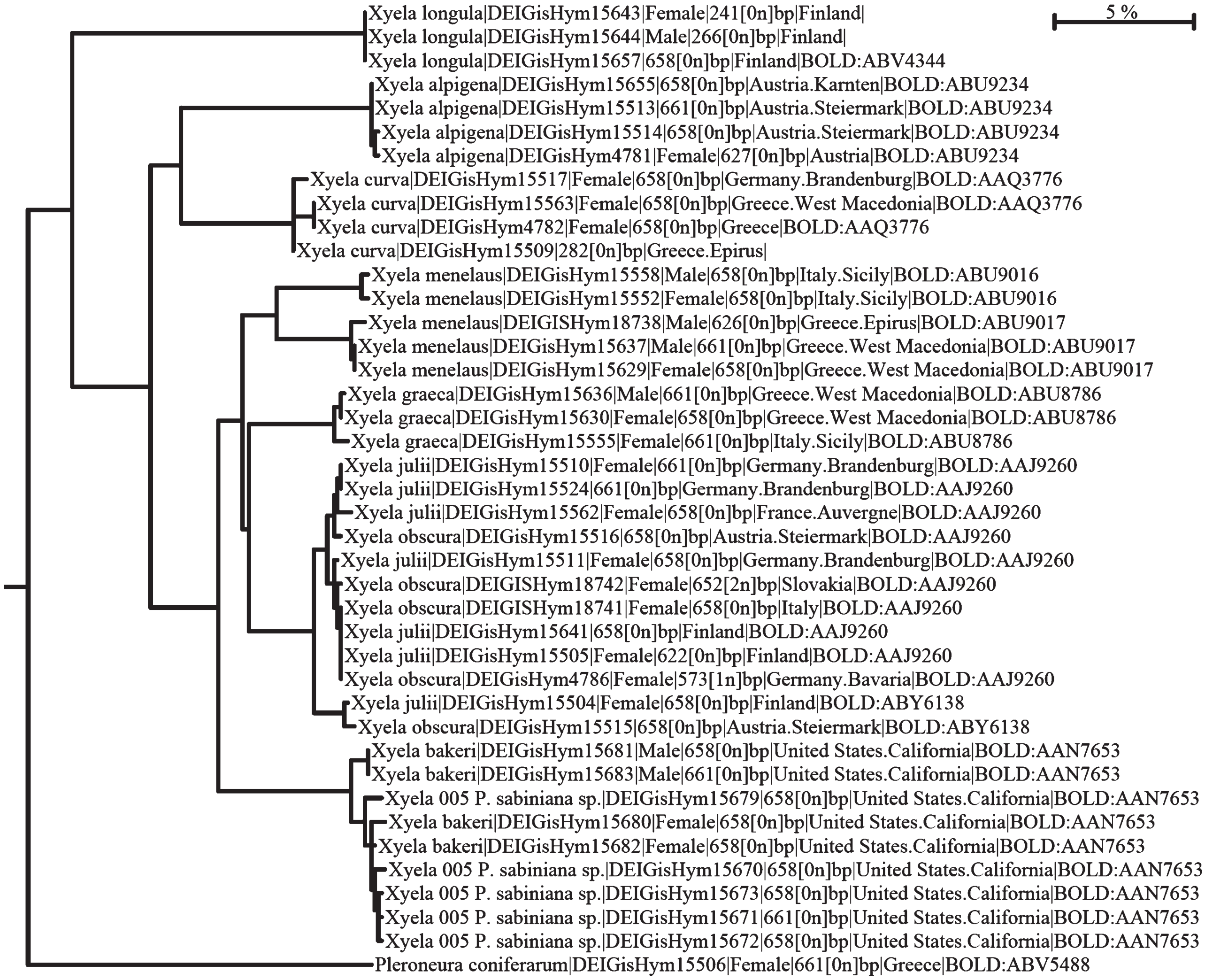


FIGURE 23. Barcoding analysis of *Xyela* species. The tree is primarily based on specimens for which COI sequences longer than 600 bp and including less than three ambigous nucleotides could be obtained. Some shorter sequences have been added to associate sexes or larvae with imagines. Each specimen is labelled as follows: "Xyela ..."—species name; "DEIGISHym ..."—unique identification number of specimen in DEI collection; "Male / Female"—sex, larva if no sex is indicated; e.g., "661" / "603" / "658" ...—base pairs [bp] sequence length; "[0n] / [1n] / [2n]"—0–2 ambiguous nucleotides included in sequence; e.g., "Austria, Karnten [= Kärnten, Carinthia]"—country and province of origin of specimen; "BOLD: ..."—globally unique identifier (GUID). The label "Xyela 005 P. sabiniana sp." refers to larvae obtained from Pinus sabiniana which here are identified as *X. bakeri*.

Currently 112 extant *Pinus* species (Richardson & Rundel 1998) and 48 extant *Xyela* species are accepted (Taeger et al. 2010, present data). Two or three times as many *Xyela* species might possibly be expected, if the comparatively well substantiated species numbers for the West Palearctic realm are extrapolated conservatively for the northern hemisphere. Within Eurasia, knowledge of the West Palearctic fauna of *Xyela* species is at present the best. But even here some ambiguities could not be solved in the course of this study. *Xyela altenhoferi* is described from larvae found on *P. halepensis*. Some additional material from Algeria, Morocco and Spain found on sites with *P. halepensis* (Fig. 13) and a few specimens from mainland Greece and Crete reared or collected from *P. brutia* have pale wings. Such specimens are morphologically extremely similar to *X. altenhoferi* and *X. menelaus* and could not be differentiated here with certainty.

Future taxonomic and ecological studies of *Xyela* should focus mainly on mainland China and Taiwan, Mexico and the USA, because these countries possess the greatest diversity of completely unexplored or still deficiently studied pine species, which potentially could serve as hosts. In East and Southeast Asia 28 pine species occur, with 15 on the mainland of China and in Taiwan (Richardson & Rundel 1998). Not a single *Xyela* specimen is known from the region between Afghanistan and Yunnan (Fig. 1; M.S. Saini personal communication for India), where *P.*

gerardiana, *P. roxburghii* and *P. wallichiana* grow along the southern slope of the Himalayas (Kindel 1995). The southernmost record of *Xyela* is represented by a female similar to *X. par* from southern Vietnam (Fig. 1; Blank et al. 2005), but *Pinus* extends even more southward with *P. merkusii* just crossing the Equator in Sumatra (Mirov 1961). Absence of distribution records in Russia between 45°E and 85°E is certainly based on lack of available collection material, because *P. sibirica* and *P. sylvestris* are native to this vast region (Fig. 17; Mirov 1967, Sokolov et al. 1977, Kremenetski et al. 1998, Willis et al. 1998).

The Nearctic realm is inhabited by 71 pine species; 38 of these in Mexico and 39 in the USA and Canada (Richardson & Rundel 1998). Smith (1988) listed only four specimens of possibly two species for Mexico. But against the background of the enormous diversity of *Pinus* in Mexico and the frequent occurrence of *Xyela* species in neighboring states of the USA, the abundance of *Xyela* species is presumably much larger in this country. Floristic differences between the eastern and the western USA are dramatic, and actually most species treated by Burdick (1961) were found only on one side of the continent. *Pinus banksiana* alone crosses the continent (Mirov 1961) and only *X. bakeri*, *X. minor* and *X. pini*—as treated by Burdick—are regarded as transcontinental. Despite the pioneering study of Burdick (1961) and subsequent publications of Ebel (1966), Smith (1970, 1990) and Yates & Smith (2009) only 18 of 39 pine species of the USA have been confirmed or are suspected as hosts of one or several *Xyela* species. The enigmatic 'living fossil' *X. lata* from the western USA has been classified as belonging to *Xyela* (*Pinicolites*), the sister group of the remaining extant *Xyela* (*Xyela*) species (Rasnitsyn 1995, 1997). Discovery of the male and uncovering the larval biology of *X. lata* would be crucially helpful in explaining the evolution of *Xyela*.

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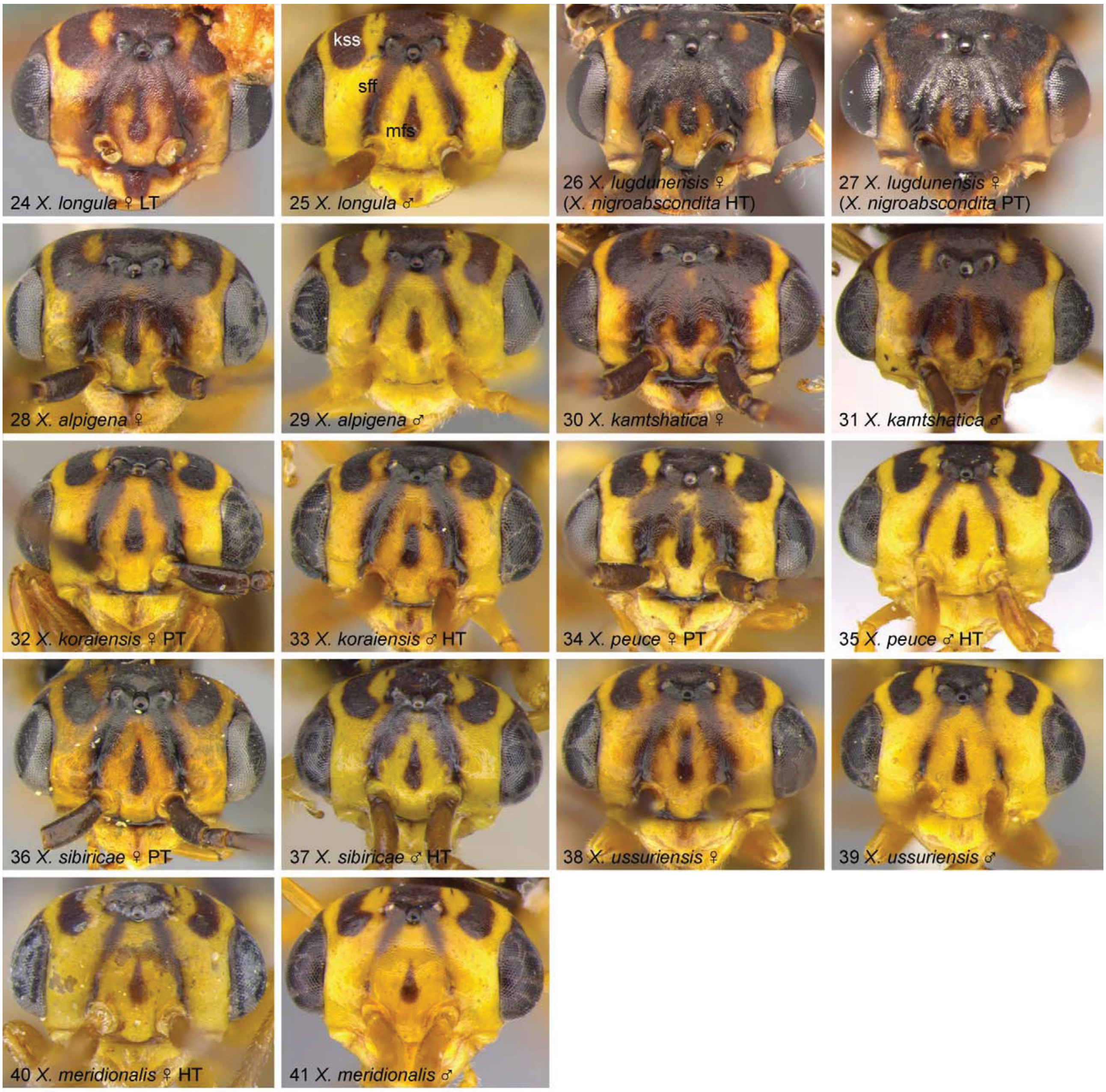
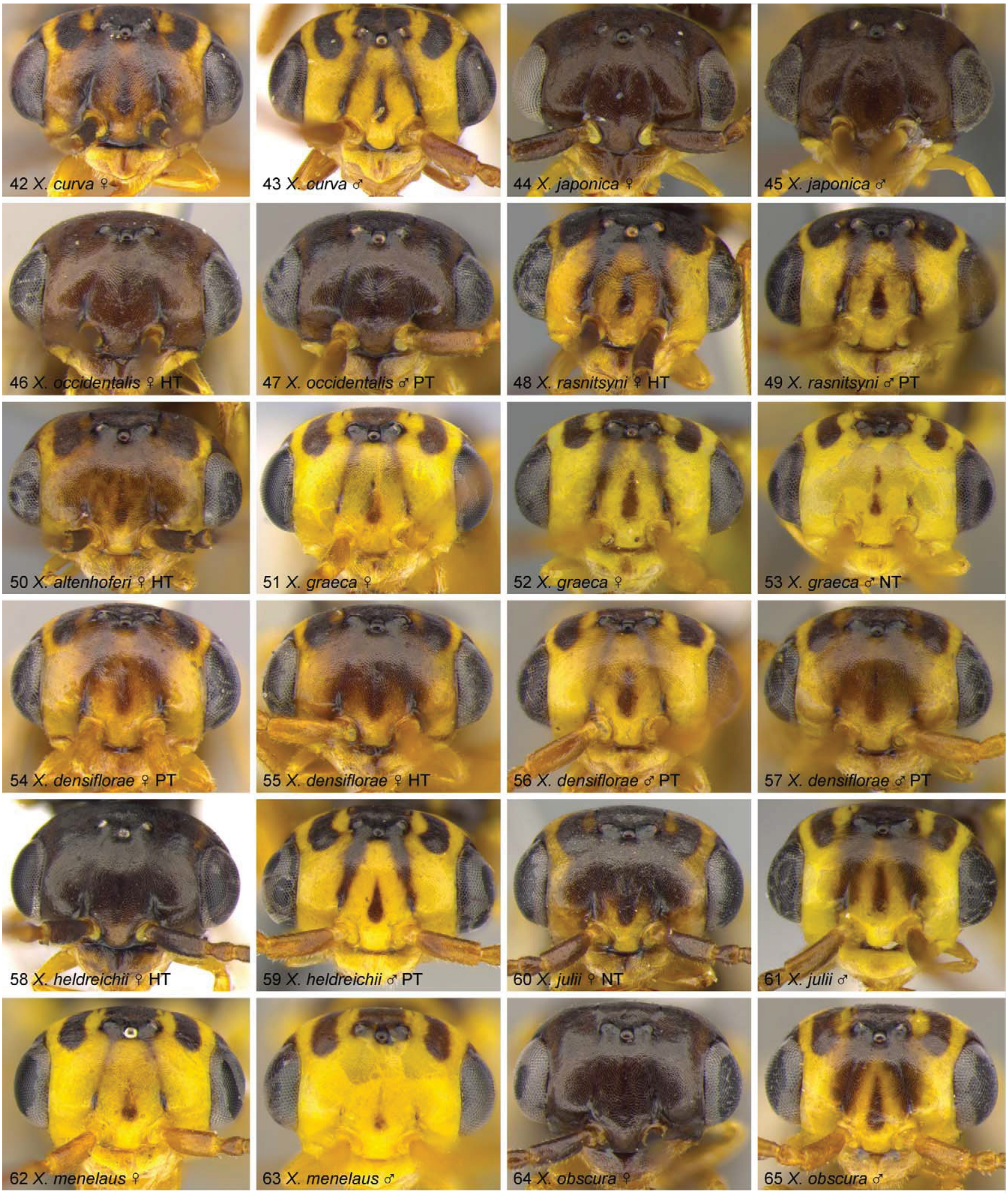
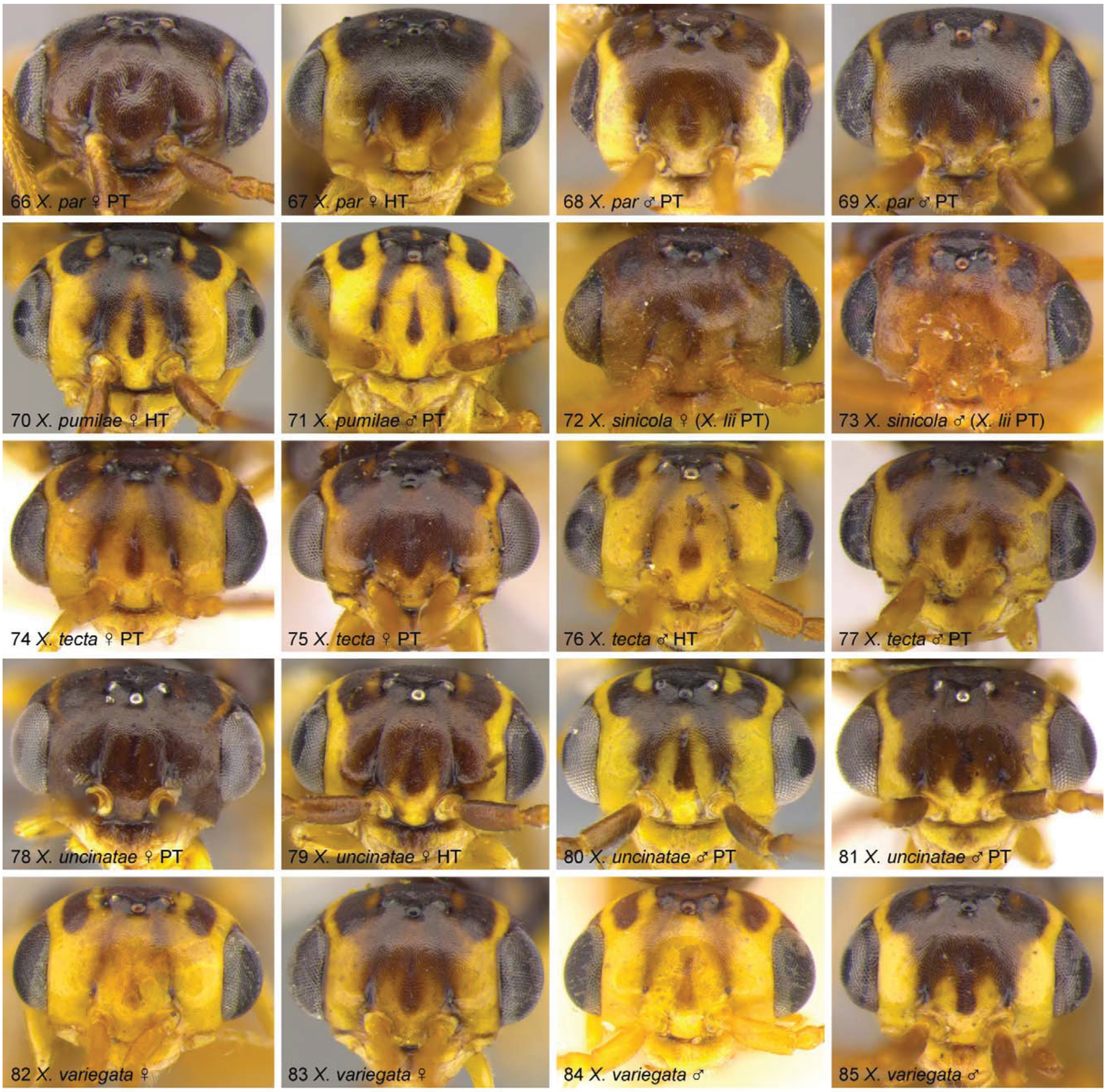


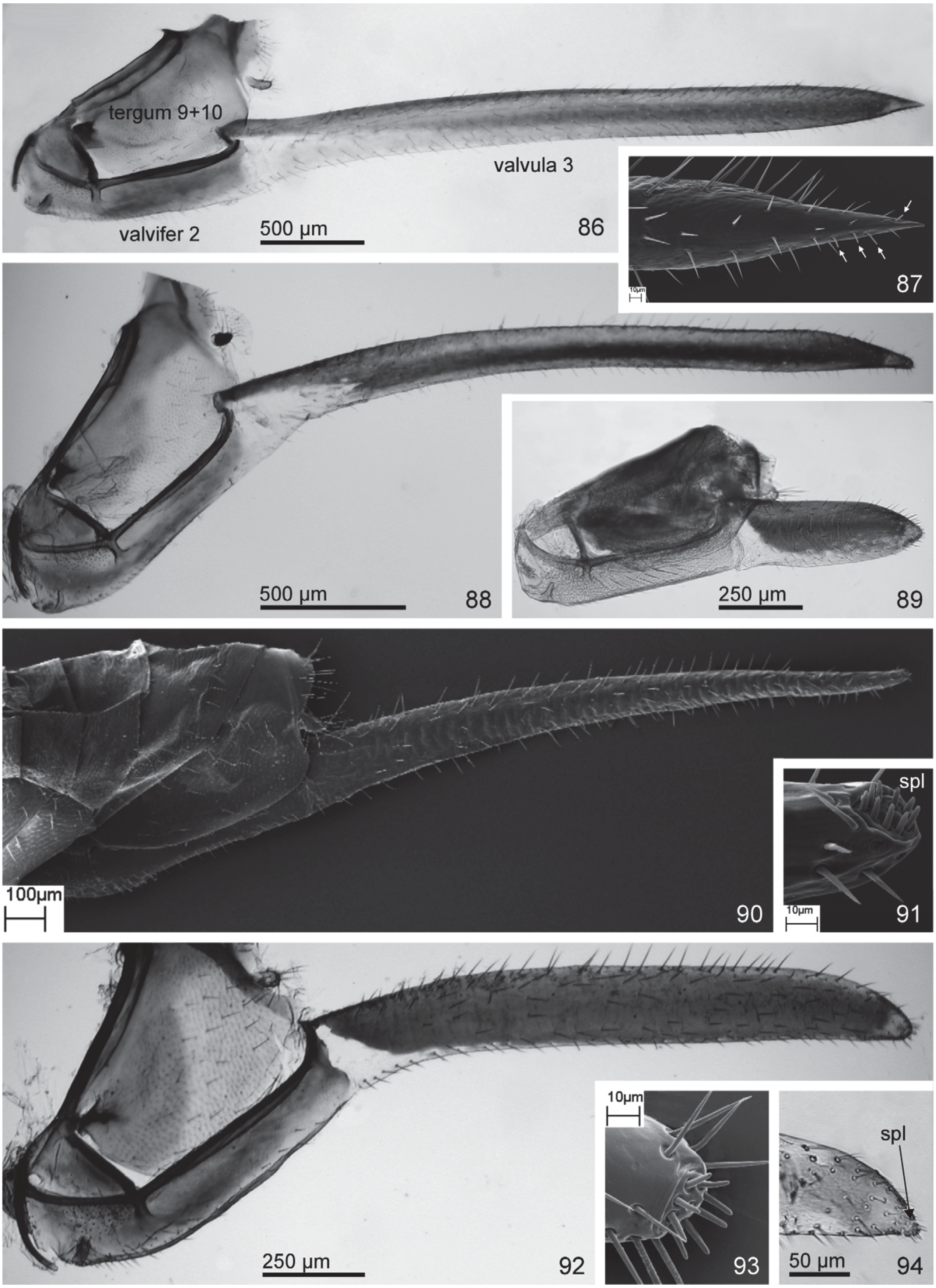
FIGURES 24–41. Color pattern of head of *Xyela* species: *X. longula* group, *X. lugdunensis* group, *X. alpigena* group, *X. meridionalis* group. Legend: HT—holotype; LT—lectotype; PT—paratype. Legend for Fig. 25: kss—kidney-shaped spot; mfs—medial frontal spot; sff—stripe along frontal furrow.



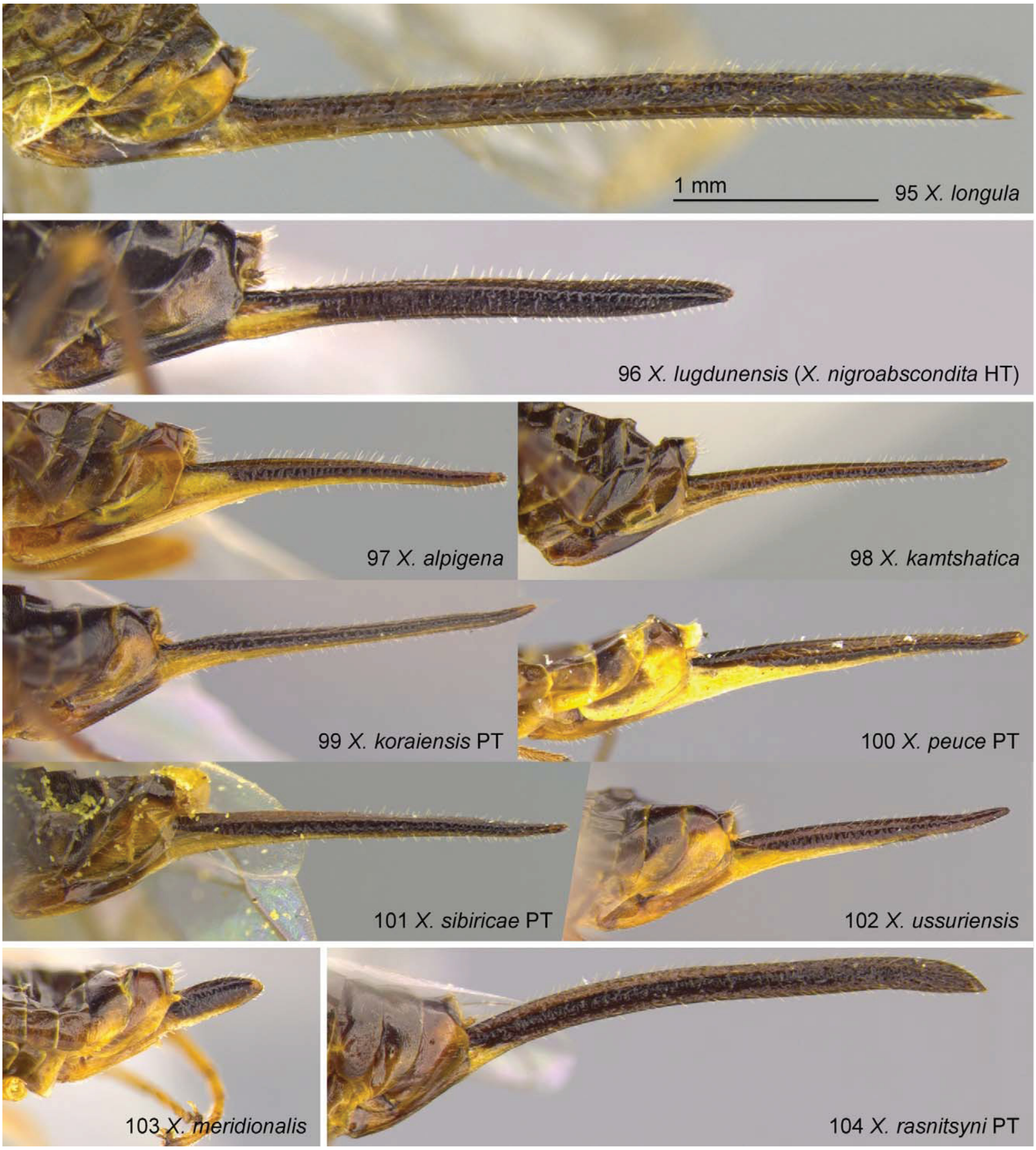
FIGURES 42–65. Color pattern of head of *Xyela* species: *X. curva* group, *X. rasnitsyni* group, *X. julii* group (part). Legend: HT—holotype; NT—neotype; PT—paratype.



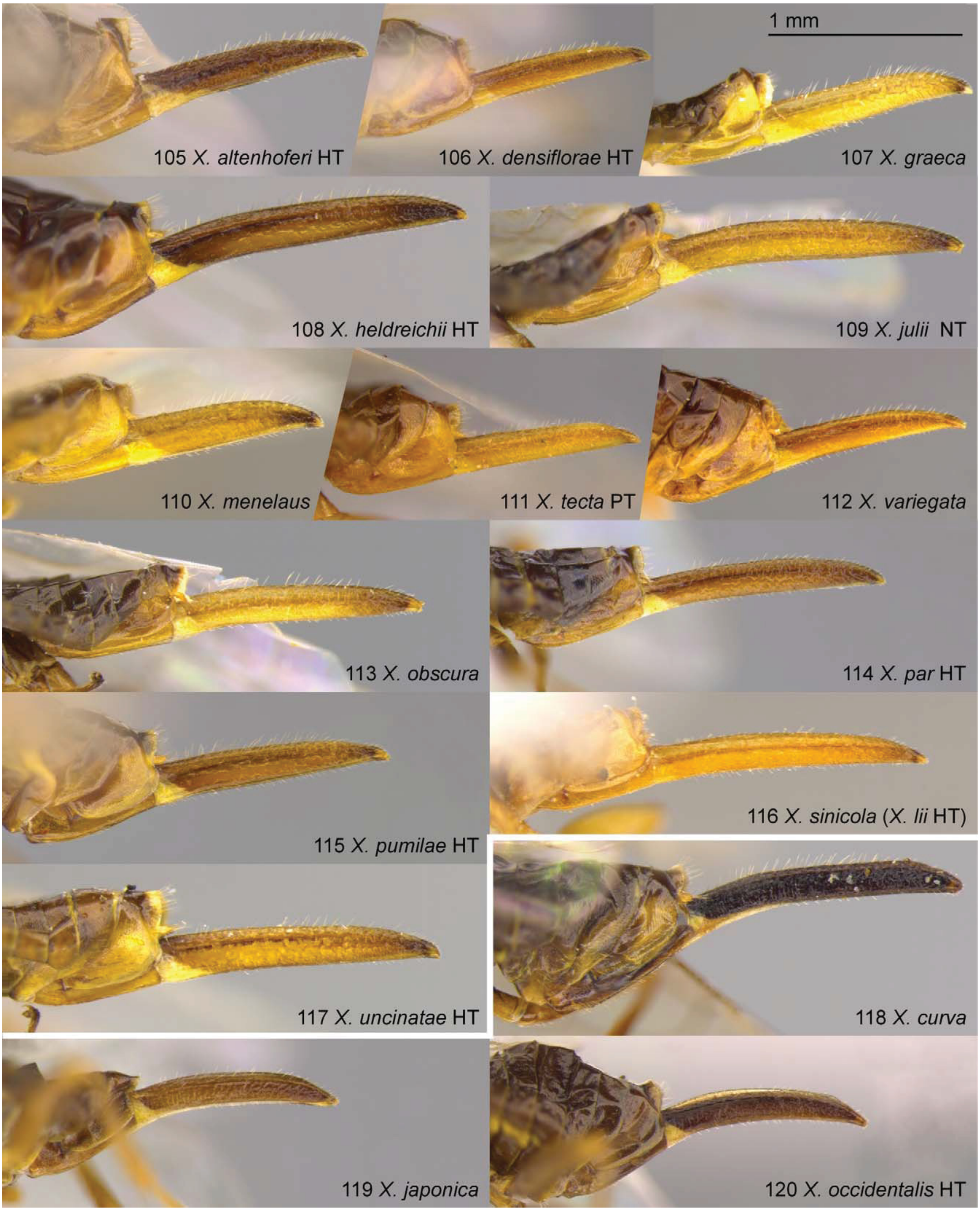
FIGURES 66–85. Color pattern of head of *Xyela* species: *X. julii* group (part). Legend: HT—holotype; PT—paratype.



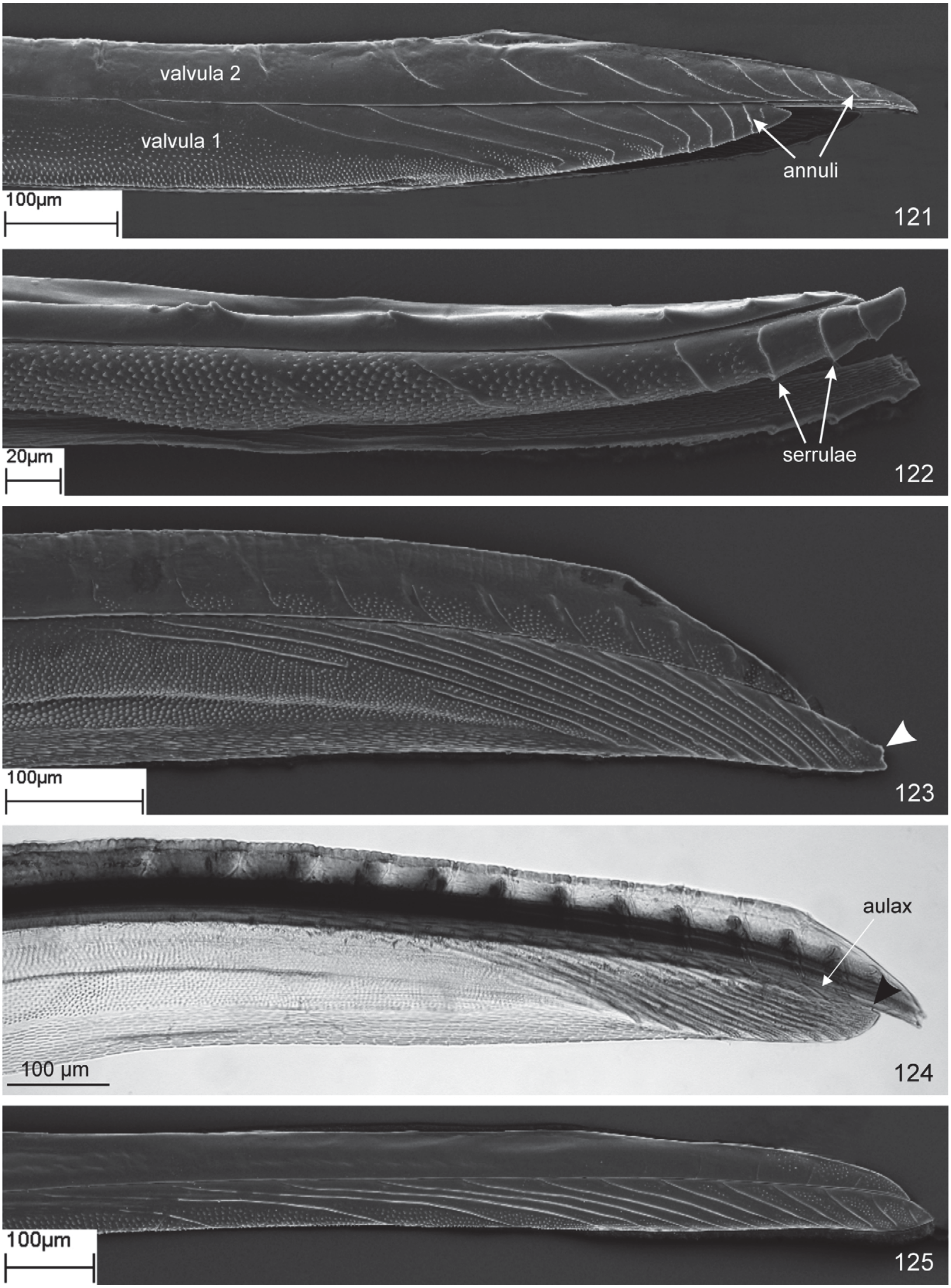
FIGURES 86–94. Ovipositor sheath, sensilla pattern and sensilla plate (spl) at the apex of the ovipositor sheath. 86, *Xyela helvetica*. 87, *X. longula*, arrows indicate the modified hairs at apex of valvula 1. 88, *X. lugdunensis*. 89, *X. meridionalis*. 90–91, *X. alpigena*. 92–93, *X. curva*. 94, *X. densiflorae*.



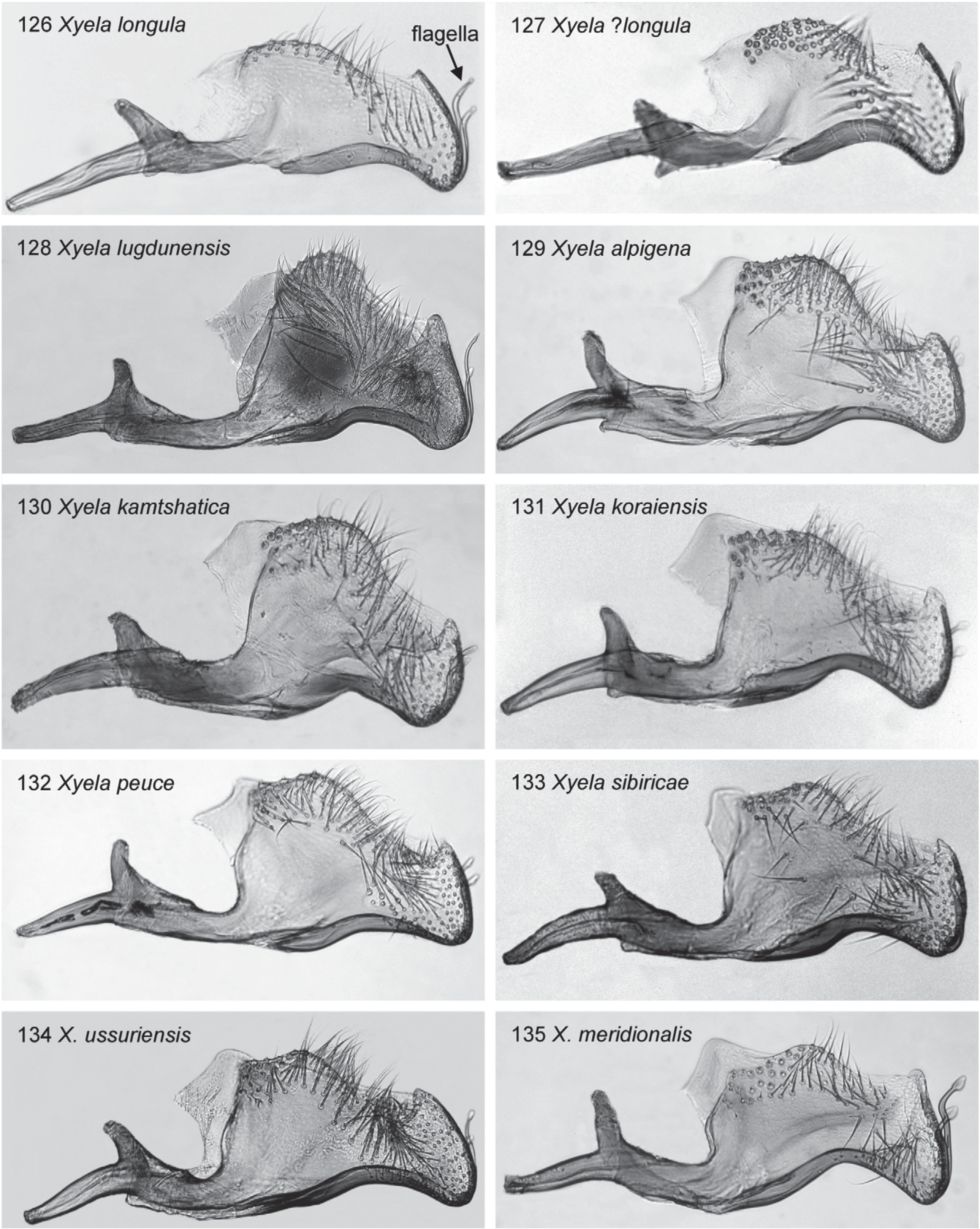
FIGURES 95–104. Ovipositor sheaths of *Xyela* species. All figures at same scale. Legend: HT—holotype; PT—paratype.



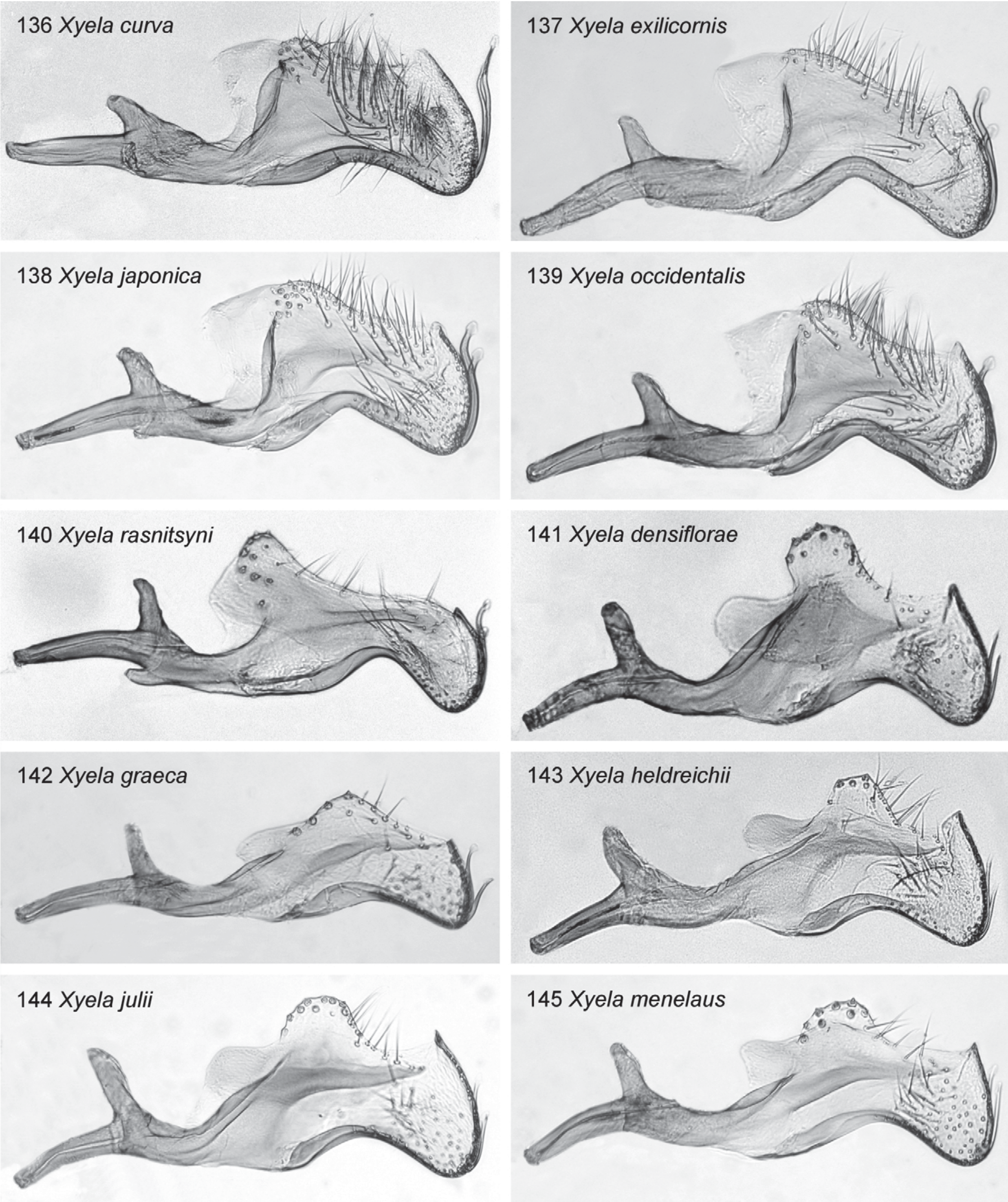
FIGURES 105–120. Ovipositor sheaths of *Xyela* species. All figures at same scale. Legend: HT—holotype; NT—neotype; PT—paratype.



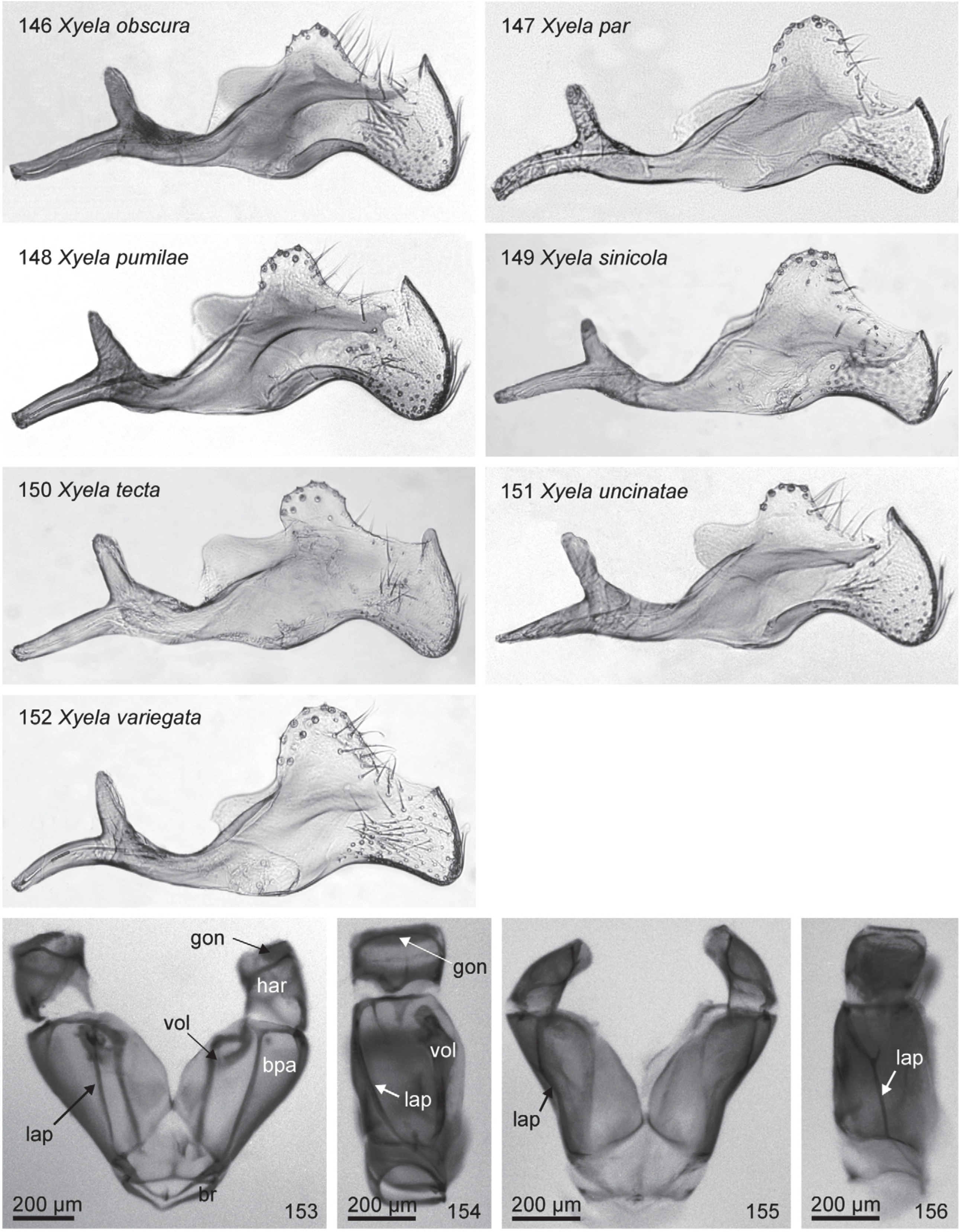
FIGURES 121–125. Distal section of ovipositors. 121, *Xyela longula*. 122, *X. alpigena*. 123, *X. occidentalis* (paratype). 124, *X. curva*. 125, *X. rasnitsyni* (paratype). Arrowheads in Figs 123–124 indicate preapical small tooth on dorsal edge of valvula 1.



FIGURES 126–135. Penis valves of *Xyela* species: *X. longula* groups, *X. lugdunensis* group, *X. alpigena* group, *X. meridionalis* group. 127, tentatively identified male of from Tence (France: Auvergne, MNHN), see text. 128, paratype of *X. nigroabscondita*.



FIGURES 136–145. Penis valves of *Xyela* species: *X. curva* group, *X. julii* group (part). Figs 138–139 and 141 reproduced from Blank et al. (2005).



FIGURES 146–156. Penis valves of *Xyela* species (*X. julii* group, part), and male external copulatory apparatus of *Xyela* in ventral and lateral view. 153–154, *X. longula* (penis valves removed). 155–156, *X. curva* (penis valves and volsellae removed). Legend: bpa—basiparamere, br—basal ring, gon—gonomacula, har—harpe, lap—lateral apodeme, vol—volsella. Figs 147, 150 and 152 reproduced from Blank et al. (2005).

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Page numbers for the mention of taxa in the key are set in italics, those in the Species Accounts in bold, those on illustrations underlined.

Appendix

The data for the specimes studied in the course of this work are listed below except for those of *Xyela densiflorae*, *X. japonica*, *X. occidentalis*, *X. par*, *X. tecta*, *X. variegata* reported already by Blank et al. (2005). Coordinates for most collecting sites have been reconstructed with help of various gazetteers except if they could be read directly from collection labels. The specimens included in the barcoding analysis are marked with a "DEI-GISHym" number, which has also been allocated in Fig. 23 displaying the result of the barcoding analysis. Rearing numbers "EA ..." for Altenhofer's and "Z ..." for Blank's samples were given to imagines obtained from particular pine species. These data form the basis for the evaluation of host associations of *Xyela* species. For a number of specimens literature references are given which indicate their citation in secondary references.

Xyela alpigena (Strobl, 1895)

AUSTRIA: Carinthia, Innerkrems, Schönfeld [= Innerkrems], 1700–1900 m alt. [13.72°E 46.97°N], 14.7.1996, leg. S.M. Blank, larvae, DEI; Carinthia, Maltatal, Kattowitzer Hütte, 1950 m alt. [13.38°E 47.07°N], 18.7.1996, leg. S.M. Blank, larvae, DEI; Carinthia, Maltatal, Schöneck E, 1700 m alt. [13.40°E 47.05°N], 16.7.1996, leg. S.M. Blank, larvae, DEI; Carinthia, Nockalmstraße [= Nockgebiet], 1800–1950 m alt. [13.83°E 46.92°N], 15.7.1996, leg. S.M. Blank, larvae, DEI; Carinthia, Nockalmstraße [= Nockgebiet], Schiestlscharte, 2050 m alt. [13.79°E 46.88°N], 18.7.2008, leg. S.M. Blank, 32 larvae, DEI [1 specimen used for barcoding: DEI-GISHym 15655]; East Tyrol, Kerschbaumer Alm, 2100 m alt. [12.77°E 46.77°N], 20.7.1996, leg. S.M. Blank, larvae, DEI; North Tyrol, Hochgurgl, Angerer Alm, 2250 m alt. [11.06°E 46.90°N], 27.5.1968, leg. W. Schedl, 1♀, NSMT; North Tyrol, Ötztal, Obergurgl, 1900 m alt. [11.02°E 46.87°N], 7.6.1983, leg. E. Jansen, 7♀ 2♂, EJC; same data, 7.6.1983, 1♀, SMNS; North Tyrol, Ötztal, Obergurgl, Zirbenwald, 2000–2040 m alt. [11.02°E 46.87°N], 30.5.1987, leg. W. Schedl, 1♀ 1♂, HNHM [beaten from *Pinus cembra*]; Salzburg, Kötschachtal, Possau [13.22°E 47.12°N], 2.5.1996, leg. Martin Schwarz, 1♂, MSC; Salzburg, Obertauern [13.54°E 47.25°N], 5.7.1995, leg. E. Altenhofer, rearing no. EA5.7.95 / *Pinus cembra*, em. 10.2.1997, 1♀, RMNH; same data, em. 12.2.1997, 4♀ 7♂, DEI, RMNH; same data, em. 15.2.1997, 2♀ 1♂, DEI; same data, em. 20.2.1997, 1♀, DEI; same data, em. 22.2.1997, 3♀, DEI; same data, em. 23.2.1997, 2♀, DEI [1 specimen used for barcoding: DEI-GISHym 4781]; same data, em. 24.2.1997, 1♀, DEI [Pschorn-Walcher & Altenhofer 2000]; Styria, Rottenmannertauern, Scheiplsee [= Scheibelsee] environs, 1600 m alt. [14.41°E 47.65°N], 26.5.1890, leg. G. Strobl, 1♀, NMBA [lectotype, Strobl 1895]; Styria, Stoderzinken [= Gröbming, Dachstein Mountains, Stoderzinken] [13.82°E 47.45°N], 8.7.1994, leg. E. Altenhofer, rearing no. EA8.7.94 / *Pinus cembra*, em. 22.4.1996, 1♀ 4♂, DEI; same data, 2.7.2011, 5 larvae from *Pinus cembra*, DEI [2 specimens used for barcoding: DEI-GISHym 15513, 15514]; Styria, Turracher Höhe, 1750 m alt. [13.87°E 46.92°N], 15.7.1996, leg. S.M. Blank, larvae, DEI.

GERMANY: Bavaria, Schachen, Alpengarten of the Botanic Institute, Malaise trap 2, 1840 m alt. [11.17°E 47.43°N], 30.6.1999, leg. J. Voith, 1♀, DEI.

SWITZERLAND: Graubünden, Engadin, Pontresina SW, Rosegtal, 1900–2100 m alt. [9.88°E 46.47°N], 13.–14.7.2000, leg. S.M. Blank & A. Taeger, larvae, DEI; same data, 14.7.2000, leg. S.M. Blank, rearing no. Z17/00 / *Pinus cembra*, em. 2.2001, 1♀, DEI; Graubünden, Rosegg-Tal [= Engadin, Pontresina SW, Rosegtal], 2000 m alt., 5.1863, leg. O. Sichel, 1♀, MNHN; Graubünden, Engadine, Swiss National Park, 1800–1900 m alt. [10.28°E 46.65°N], 6.–9.6.1960, leg. J.E. & R.B. Benson, 1♀, BNMC; Graubünden, Mortratsch [= Morteratsch Glacier] [9.93°E 46.42°N], 15. June, leg. O. Sichel, 1♀, MNHN [from "Arve", = *Pinus cembra*]; Graubünden, Müschauns, 2000 m alt. [10.07°E 46.62°N], 10.7.1919, 1♂, MZLS; Graubünden, Pontresina, 2150 m alt. [9.90°E 46.48°N], 5.1863, leg. O. Sichel, 1♀, MNHN; Schweiz [8.00°E 47.00°N], leg. O. Sichel, 4♀, MNHN; Valais, Arolla, 2000 m alt. [7.48°E 46.03°N], 12.6.1935, leg. J.E. & R.B. Benson, 1♀, NHRS; Valais, Saas Fee, 2000–2300 m alt. [7.91°E 46.12°N], 16.6.1962, leg. J.E. & R.B. Benson, 1♀, NSMT.

Xyela altenhoferi Blank, sp.n.

CROATIA: Premantura N 1 km, 0 m NN, [44.82°N 13.90°E], leg. S. M. Blank & E. Altenhofer, 7.4.1999, rearing no. Z20/99 / *Pinus halepensis*, em. 24.4.2001, 12♀, DEI [including holotype], EAC.

Xyela bakeri Konow, 1898

USA: California, Alpine County and Tuolumne County, Sonora Pass SW, 2950–3050 m alt. [119.63°W 38.32°N], 13.6.2007, leg. S.M. Blank, 1♀ 2♂, DEI [specimens used for barcoding: DEI-GISHym 15681–15683]; California, Contra Costa County, Mount Diabolo State Park, Summit Road, 1015 m alt. [121.92°W 37.88°N], 7.4.2007, rearing no. Z16/07 / *Pinus sabiniana*, leg. S.M. Blank, 1 larva, DEI [specimen used for barcoding: DEI-GISHym 15679]; California, El Dorado County, Placerville W, Green Valley Road N to Moulberry Road 410 m alt. [120.90°W 38.72°N], 28.3.2007, rearing no. Z6/07 / *Pinus sabiniana*, leg. S.M. Blank, 1 larva, DEI [specimen used for barcoding: DEI-GISHym 15671]; California, Lake County, Kelseyville S, Hwy 29+175, 560 m alt. [122.83°W 38.95°N], 26.3.2007, rearing no. Z5/07 / *Pinus sabiniana*, leg. S. M. Blank, 1 larva, DEI [specimen used for barcoding: DEI-GISHym 15670]; California, Placer County, Tahoe City NNW 9 km, Pole Creek, 2250–2340 m alt. [120.23°W 39.24°N], 13.6.2007, leg. S.M. Blank, 1♀, DEI [specimen used for barcoding: DEI-GISHym 15680]; California, San Benito County, New Idria, 900 m alt. [120.68°W 36.42°N], 30.3.2007, rearing no. Z11/07 / *Pinus sabiniana*, leg. S.M. Blank, 2 larvae, DEI [2 specimens used for barcoding: DEI-GISHym 15672–15673].

Xyela curva Benson, 1938

AUSTRIA: Austria, leg. Giraud, 4♀, MNHN; Lower Austria, Dürnstein [15.52°E 48.38°N], 7.–9.4.1994, leg. E. Altenhofer, rearing no. EA7.–9.5.94 / *Pinus nigra nigra*, em. 24.4.1996, 3♀ 2♂, DEI; same data, em. 1.5.1996, 1♀ 5♂, MZHF [Pschorn-Walcher & Altenhofer 2000]; 7.5.1994, leg. E. Altenhofer, rearing no. EA7.5.94 / *Pinus nigra nigra*, em. 23.4.1996, 3♀ 16♂, DEI; Lower Austria, Dürnstein [15.52°E 48.38°N], 26.5.1996, leg. E. Altenhofer, rearing no. EA26.5.96 / *Pinus nigra nigra*, em. 28.4.1997, 1♀, RMNH; Lower Austria, Krems [15.60°E 48.41°N], 5.1996, leg. E. Altenhofer, rearing no. EA5.1996 / *Pinus nigra nigra*, em. 2.5.1997, 1♀, RMNH; Lower Austria, Langenlois [15.67°E 48.47°N], 20.5.1995, leg. E. Altenhofer, rearing no. EA20.5.95 / *Pinus nigra nigra*, em. 21.4.1996, 7♂, DEI; Lower Austria, Markt Piesting [= Piesting] [16.13°E 47.88°N], leg. C. Tschek, 1♂, NMW; Lower Austria, Perchtoldsdorf [16.27°E 48.12°N], 3.5.1917, leg. H. Zerny, 1♀, NMW; Lower Austria, Pfaffstätten [16.26°E 48.02°N], 2.4.1916, 6♂, NMW, ZSM [according to label data thousands of specimens on upper tigs of blooming *Prunus domestica*]; Lower Austria, Weissenbach an der Triesting [= Tristing] [16.04°E 47.99°N], 5.1883, leg. J. Kolazy, 1♀, NMW [holotype, Benson 1938]; Lower Austria, Wöllersdorf [16.17°E 47.87°N], 12.5.1993, leg. E. Altenhofer, rearing no. EA12.5.93 / *Pinus nigra nigra*, em. 2.4.1994, 2♂, HNHM, RMNH; same data, em. 3.4.1994, 2♀ 2♂, RMNH, USNM; same data, em. 14.3.1994, 1♀, RMNH; same data, em. 16.3.1994, 3♀, HNHM, RMNH; same data, em. 17.3.1994, 2♀, RMNH; Vienna, Maur [= Vienna, Mauer] [16.27°E 48.15°N], 1869, leg. Mann, 2♂, BMNH, NMW; Wien [= Vienna] [16.35°E 48.20°N], leg. W.H.C.F. Wüstnei, 1♂, ZMUC.

BELGIUM: Brabant, Ophain, Bois Seigneur Isaac [4.32°E 50.65°N], 21.4.2003, leg. S.M. Blank, 1♀, ISNB.

CROATIA: Orebic environs, Vruciza [17.17°E 42.98°N], 16.–23.4.1930, leg. H. Zerny, 1♂, NMW.

CZECHIAN REPUBLIC: Bohemia, Praha-Troja [14.40°E 50.12°N], 27.5.1965, leg. J. Strejček, 1♂, MKC; Chýnice [14.27°E 50.00°N], 28.4.1955, leg. Bouček, 1♂, HNHM; Dvorce, Zlíchov [14.42°E 50.05°N], 6.5.1956, 1♀, MKC; Karlstejn [14.19°E 49.94°N], 7.5.1955, leg. Starý, 1♂, MKC; Křivoklátsko, Nezabudideké skály [13.82°E 50.02°N], 18.5.1982, leg. J. Strejček, 1♀ 1♂, MKC; Malá Chuchle [14.40°E 50.03°N], 20.4.1960, leg. J. Strejček, 1♀ 1♂, MKC; Praha, Sulava [14.42°E 50.09°N], leg. J. Macek, 1♀, MKC; same data, 6.7.1960, 1♀, MKC; same data, 1.5.1965, 1♀, MKC; Praha-Krč, Krčský les [14.45°E 50.03°N], 3.5.1970, leg. J. Strejček, 1♀, MKC; Praha-Prokop. údolí [14.42°E 50.08°N], 23.4.1964, leg. J. Strejček, 1♀, MKC.

FRANCE: Languedoc-Roussillon, St.-Guilhem-le-Désert [3.55°E 43.73°N], 25.4.1997, leg. Cocquempot, 1♀, TNC; Provence-Alpes-Côte-d'Azure, Ventoux [5.16°E 44.18°N], 9.5.1975, leg. H. Chevin, 1♀, INRA; Rhone-Alpes, Écully, Rhône [4.77°E 45.77°N], leg. G. Audras, 2♀, MHNL.

GERMANY: Baden-Württemberg, Tübingen SW, Bühl, Bühler Tal [9.02°E 48.48°N], 26.4.1991, leg. E. Jansen, 1♀, EJC; Bavaria, Röhrmoos [11.48°E 48.33°N], 8.4.1989, leg. S.M. Blank, 1♀, DEI; Brandenburg, Bad Freienwalde NE, Altglietzen, Gabower Hangkante, 20 m alt. [14.12°E 52.82°N], 26.4.1998, leg. S.M. Blank, 22♀, DEI, MZHF; same data, 28.4.1998, 3♀, DEI; same data, 29.4.1998, 5♀, DEI; same data, 4.4.1999, 1♂, DEI; same data, 1.5.2001, leg. C. Lange & J. Ziegler, 2♀, DEI; (many specimens swept from *Pinus nigra*); same data, 28 larvae from *Pinus nigra*, DEI; Brandenburg, Müncheberg, at DEI building [14.11°E 52.51°N], 27.4.–3.5.2006, leg.

S.M. Blank, 2♀, DEI [1 specimen used for barcoding: DEI-GISHym 15517]; Hesse, F. a. M. [= Frankfurt am Main] [8.66°E 50.12°N], 1884, leg. C.F.Th. Katheder, 2♀, NMW; Saxony, Rotes Haus, Prellheide [12.54°E 51.58°N], 23.4.1997, leg. E. Jansen, 1♂, EJC; Thuringia, Frankenhausen [in coll. Ermisch, = Bad Frankenhausen], Kyffhäuser [11.10°E 51.37°N], 16.–19.4.1960, leg. K. Ermisch, 2♀ 2♂, DEI; Thuringia, Rottleben N 1 km [11.03°E 51.37°N], 13.4.1998, leg. S.M. Blank, 3♀, DEI; same data, 2.5.1998, 13♀ 2♂, DEI [collected from *Pinus nigra*]; Thuringia, Rottleben NW [10.98°E 51.38°N], 13.4.1998, leg. S.M. Blank, 4♀ 5♂, DEI.

GREAT BRITAIN: England, Norfolk, Santon Downham, Norfolk [0.38°E 52.60°N], 21.–30.5.1985, leg. J. Field, 1♀, RSME.

GREECE: Epirus, Konitsa NE [20.82°E 40.05°N], 2.5.1999, leg. S.M. Blank & C. Kutzscher, 64♀ 89♂, CSFU, DEI [1 specimen used for barcoding: DEI-GISHym 15509], MHNG, MHNN, RSME, ZIN; Epirus, Konitsa, 650 m alt. [20.75°E 40.05°N], 2.5.1999, leg. S.M. Blank & C. Kutzscher, rearing no. Z36/99 / *Pinus nigra pallasiana*, em. 20.3.2000, 1♀ 8♂, DEI; Epirus, Konitsa S 6 km, 650 m alt. [20.77°E 40.10°N], 4.5.1999, leg. S.M. Blank & C. Kutzscher, rearing no. Z37/99 / *Pinus nigra pallasiana*, em. 20.3.2000, 8♀ 8♂, DEI; same data, em. 21.3.2000, 1♀, DEI; Epirus, Metsovo NW 16 km, Flambouari ESE 3 km, 1200 m alt. [21.00°E 39.85°N], 26.5.2000, leg. S.M. Blank & C. Kutzscher, rearing no. Z7/00 / *Pinus nigra pallasiana*, em. 18.–19.2.2001, 3♀, DEI [1 specimen used for barcoding: DEI-GISHym 4782]; same data, em. 20.2.2001, 1♀, DEI; Epirus, Metsovo NW 19 km, Vovoussa SW 7 km, 1500 m alt. [21.02°E 39.88°N], 26.5.2000, leg. S.M. Blank & C. Kutzscher, rearing no. Z8/00 / *Pinus nigra pallasiana*, em. 23.2.2001, 1♀, DEI; Grevená, Kónitsa ENE 23 km, Samarína NW 3 km, 1670 m alt. [20.98°E 40.13°N], 13.5.2007, leg. S.M. Blank & A. Taeger, 7♀ 3♂, DEI [1 specimen used for barcoding: DEI-GISHym 15563]; Macedonia, Olymp Mountains, Litochoron environs, Agios Ioannis, 800 m alt. [22.49°E 40.11°N], 21.4.1987, leg. S.M. Blank, 1♂, DEI [misidentified as *X. graeca* by Blank 1993]; Macedonia, Litochoron E, 780 m alt. [22.48°E 40.10°N], 5.5.1999, leg. S.M. Blank & C. Kutzscher, rearing no. Z38/99 / *Pinus nigra pallasiana*, em. 20.3.2000, 1♀ 3♂, DEI; Peloponnes, Parnon, Vamvakou environs, 950–1200 m alt. [22.63°E 37.20°N], leg. W.H. Muche, 1♂, MKC; same data, May, 4♂, MKC, ZMHB.

HUNGARY: Bács-Kiskun Megye, Bugac, Ösborókás [19.68°E 46.68°N], 19.4.1979, leg. J. Papp, 1♀, HNHM; Bács-Kiskun Megye, Fekete Gy., Szalonca [19.10°E 46.60°N], 1♀, HNHM; Bács-Kiskun Megye, Fekete Gy., Trenosén [19.95°E 46.63°N], leg. Biró, 1♀, HNHM; Bács-Kiskun Megye, Kelebia [19.62°E 46.20°N], 21.4.1953, leg. Erdös, 2♀ 1♂, HNHM; Bács-Kiskun Megye, Tompa [19.55°E 46.20°N], 16.4.1951, leg. Erdös, 1♀, HNHM; Borsod-Abaúj-Zemplén Megye, Tokaj, Kopasz Hegy [21.38°E 48.12°N], 26.4.1989, leg. J. Papp, 1♀, HNHM; Pest Megye, Budakeszi, Fekete hegyek [18.93°E 47.52°N], 29.4.1972, leg. Szelènyi, 1♀, HNHM; Pest Megye, Budakeszi, Hársbokorhegy [18.93°E 47.52°N], 8.4.1954, leg. Bajári, 2♀, HNHM; Pest Megye, Budapest SW 9 km, Budaörs, Csiki-hegyek [= Csiki Mountains] [18.97°E 47.45°N], 21.4.1977, leg. Újhelyiné, 2♀, HNHM; Pest Megye, Budapest, Cinkota, Naplás-to [= Lake Naplas] [19.18°E 47.50°N], 22.4.1993, leg. L. Zombori, 6♀ 4♂, HNHM; Hungary, Pest Megye, Nagykovácsi [18.88°E 47.58°N], 1.5.1993, leg. L. Zombori, 4♀, HNHM; Pest Megye, Nagykovacsi, Belterület [18.88°E 47.58°N], 7.4.1974, leg. L. Zombori, 1♀, HNHM; Zala Megye, Keszthely [17.25°E 46.77°N], 1.5.1958, leg. Jermy, 1♀, HNHM.

ITALY: Abruzzi, L'Aquila [13.37°E 42.37°N], 1951, 1♀, HNHM; Calabria, Camigliatello Silano [16.45°E 39.33°N], 6.1933, leg. A. Dodero, 1♀, MCFS; Calabria, Sila [= La Sila], Camigliatello [16.45°E 39.33°N], 1.4.1933, leg. A. Dodero, 4♀ 21♂, MCSN [Zombori 1980].

NETHERLANDS: Overveen [4.61°E 52.40°N], 19.4.1974, leg. B. van Aartsen, 6♀, RMNH; same data, 2.5.1974, 3♀, RMNH, ZMAN; same data, 31.5.1974, 1♀, RMNH.

SLOVAKIAN REPUBLIC: Devinska Kobyla [17.00°E 48.18°N], 12.–18.4.1994, leg. L. Roller, 1♀, USNM; Krivoklát [18.16°E 49.05°N], 28.4.1973, leg. Z. Pádr, 2♂, MKC; Piešťany [17.84°E 48.60°N], 10.4.1964, leg. J. Strejček, 1♂, MKC.

SPAIN: Andalusia, Sierra de Cazorla [2.92°W 37.92°N], 15.5.1960, leg. J. Aubert, 1♀, MZLS; same data, 1300 m alt., 28.5.1959, 1♀, MZLS.

TURKEY: Antalya Prov., Antalya W 37 km, Saklıkent S, Bakırlıdağı (Bey Dağları), 1700 m alt. [30.33°E 36.84°N], 3.6.1998, leg. S.M. Blank, rearing no. Z42A/98 / *Pinus nigra pallasiana*, em. 24.3.1999, 1♀, DEI; same data, em. 25.3.1999, 3♀ 2♂, DEI; same data, em. 26.3.1999, 1♀, DEI; em. 27.3.1999, 1♀ 1♂, DEI; Burdur Prov., Çardak E 10 km, Acigöl Salzsee [= salt lake] [29.78°E 38.86°N], 5.5.1992, leg. L. Behne, 27♀ 9♂, DEI.

AMBIGUOUS: [no data / label data illegible] 11♀ 1♂, BMNH, MNHN, MZLS, NHRS, NMBA, ZMHB.

Xyela exilicornis Maa, 1949

CHINA: Fujian Prov., Shaowu, Wu-Ku [117.43°E 27.34°N], 15.3.1945, leg. K.S. Lin, 1♂, TARI [holotype, Maa 1949]; Xianggang [= Hong Kong], Sai Kung Station [114.26°E 22.38°N], 10.2.1965, leg. W.J. Voss & Hui Wai Ming, 2♀ 1♂, BPBM [additional material from this collecting series (other days in February 1965) indicates that these specimens have most likely been labelled with the obviously wrong collecting date 10.V.1965 instead of 10.II.1965]; same data, 15.2.1965, 1♀, BPBM.

Xyela graeca J.P.E.F. Stein, 1876

AUSTRIA: Austria, leg. Giraud, 1♀, MNHN; Lower Austria, Dürnstein [15.52°E 48.38°N], 7.5.1994, leg. E. Altenhofer, rearing no. EA7.5.94 / *Pinus nigra nigra*, em. 23.4.1996, 1♂, DEI; same data, em. 1.5.2096, 2♀ 3♂, DEI; Lower Austria, Dürnstein [15.52°E 48.38°N], 7.–9.4.1994, leg. E. Altenhofer, 1♀ 1♂, RSME; same data, 7.–9.4.1994, rearing no. EA7.–9.5.94 / *Pinus nigra nigra*, em. 24.4.1996, 2♀ 7♂, DEI; Lower Austria, Hernstein [16.08°E 47.90°N], 23.5.1994, leg. E. Altenhofer, rearing no. EA23.5.94 / *Pinus nigra nigra*, em. 22.–23.4.1997, 2♀ 2♂, DEI; same data, 5.1997, rearing no. EA5.97 / *Pinus nigra nigra* (small larvae), em. 3.1998, 28♀ 78♂, DEI [Pschorn-Walcher & Altenhofer 2000]; Lower Austria, Krems [15.60°E 48.41°N], 10.5.1997, leg. E. Altenhofer, rearing no. EA10.5.97 / *Pinus sylvestris*, em. 3.1998, 2♀, DEI [bred from same series like numerous *X. julii*]; Lower Austria, Langenlois [15.67°E 48.47°N], 20.5.1995, leg. E. Altenhofer, rearing no. EA20.5.95 / *Pinus nigra nigra*, em. 21.4.1996, 1♂, DEI; Lower Austria, Marchfeld, Oberweiden [16.67°E 48.25°N], 16.5.1956, 1♀, ZMHB; Lower Austria, Markt Piesting [= Piesting] [16.13°E 47.88°N], leg. C. Tschek, 1♂, NMW; Lower Austria, Pfaffstätten [16.26°E 48.02°N], 2.4.1916, 1♂, NMW; Lower Austria, Wöllersdorf [16.17°E 47.87°N], 12.5.1993, leg. E. Altenhofer, rearing no. EA12.5.93 / *Pinus nigra nigra*, em. 15.3.1994, 1♂, HNHM; same data, em. 17.3.1994, 2♀, HNHM; same data, em. 18.3.1994, 2♀ 2♂, RMNH, USNM; same data, em. 20.3.1994, 4♀ 1♂, RMNH; same data, em. 21.3.1994, 1♂, RMNH; same data, em. 22.3.1994, 2♂, HNHM, RMNH; em. 24.3.1994, 1♀ 2♂, USNM.

CROATIA: Istrien, Opatija [= Abbazia] SE, Monte Maggiore [14.20°E 45.28°N], 21.5.1930, leg. Oldenberg, 2♀, DEI; Moscenice—Sv. Jelena, 150 m alt. [14.23°E 45.22°N], 7.4.1999, leg. S.M. Blank, 10♀ 1♂, DEI [swept from gras under *Pinus nigra* and *P. halepensis*]; Orebic environs, Vruciza [17.17°E 42.98°N], 16.–23.4.1930, leg. H. Zerny, 3♀ 6♂, NMW, ZSM.

FRANCE: Languedoc-Roussillon, Montpellier [3.87°E 43.61°N], leg. M. Licht., 1♀, MZLS; same data, 20.3.1987, leg. H. Tussac, 1♀, INRA.

GREECE: Epirus, Konitsa [20.75°E 40.05°N], 2.5.1999, leg. S.M. Blank & C. Kutzscher, 1♀, DEI; Epirus, Konitsa NE, 1350 m alt. [20.82°E 40.05°N], 2.5.1999, leg. S.M. Blank & C. Kutzscher, 88♀ 1♂, DEI, MHNG, MHNN, ZIN; Epirus, Konitsa, 650 m alt. [20.75°E 40.05°N], 2.5.1999, leg. S.M. Blank & C. Kutzscher, rearing no. Z36/99 / *Pinus nigra pallasiana*, em. 20.3.2000, 7♀ 2♂, DEI; same data, em. 21.3.2000, 4♀, DEI; same data, em. 22.3.2000, 1♀, DEI; Epirus, Konitsa S 6 km, 650 m alt. [20.77°E 40.10°N], 4.5.1999, leg. S.M. Blank & C. Kutzscher, rearing no. Z37/99 / *Pinus nigra pallasiana*, em. 20.3.2000, 11♀ 4♂, DEI; same data, em. 21.3.2000, 4♀ 1♂, DEI [including neotype of *X. graeca*]; same data, em. 22.3.2000, 1♀, DEI; same data, em. 23.3.2000, 1♂, DEI; Epirus, Metsovo NW 16 km, Flambouari ESE 3 km, 1200 m alt. [21.00°E 39.85°N], 26.5.2000, leg. S.M. Blank & C. Kutzscher, rearing no. Z7/00 / *Pinus nigra pallasiana*, em. 21.2.2001, 1♀, DEI; Epirus, Metsovo NW 19 km, Vovoussa SW 7 km, 1500 m alt. [21.02°E 39.88°N], 26.5.2000, leg. S.M. Blank & C. Kutzscher, rearing no. Z8/00 / *Pinus nigra pallasiana*, em. 18.–19.2.2001, 3♂, DEI; same data, em. 21.2.2001, 3♀, DEI; same data, em. 24.2.2001, 1♀, DEI; Grevená, Kónitsa ENE 23 km, Samarína NW 3 km, 1670 m alt. [20.98°E 40.13°N], 13.5.2007, leg. S.M. Blank & A. Taeger, 6♀ 1♂, DEI [2 specimens used for barcoding: DEI-GISHym 15630, 15636]; Macedonia, Olymp Mountains, Prionia, 1500 m alt. [22.41°E 40.09°N], 6.4.2001, leg. L. Zerche & L. Behne, 1♂, DEI; Macedonia, Litochoron E, 780 m alt. [22.48°E 40.10°N], 5.5.1999, leg. S.M. Blank & C. Kutzscher, rearing no. Z38/99 / *Pinus nigra pallasiana*, em. 20.3.2000, 9♀ 6♂, DEI; same data, em. 21.3.2000, 2♀, DEI; Peloponnes, Kastanica [22.65°E 37.27°N], leg. W.H. Muche, 1♀ 1♂, SMTD; Peloponnes, Parnon, Vamvakou environs, 950–1200 m alt. [22.63°E 37.20°N], leg. W.H. Muche, 2♀ 6♂, MKC, SMTD; same data, May, 9♀ 23♂, HNHM, MKC, ZMHB [partly without data on altitude]; Thessalia, Mount Ossa, Anatoli N, 1200 m alt. [22.70°E 39.78°N], 24.5.2000, leg. S.M. Blank & C. Kutzscher, rearing no. Z5/00 / *Pinus nigra pallasiana*, em.

18.–19.2.2001, 3♀ 3♂, DEI; same data, em. 20.2.2001, 18♀ 1♂, DEI, MHNG; same data, em. 21.2.2001, 1♂, DEI; same data, em. 22.2.2001, 1♀, MHNN; same data, em. 23.2.2001, 1♀, DEI.

HUNGARY: Bács-Kiskun Megye, Bugac, Alsó-puszta [19.67°E 46.67°N], 20.4.1979, 1♂, HNHM; Borsod-Abaúj-Zemplén Megye, Tokaj, Kopasz Hegy [21.38°E 48.12°N], 26.4.1989, leg. J. Papp, 2♀, HNHM; Pest Megye, Budakeszi, Hársbokorhegy [18.93°E 47.52°N], 14.5.1954, leg. Bajári, 1♀, HNHM; Pest Megye, Budapest [19.08°E 47.50°N], 1921, leg. Biró, 1♀, HNHM; Pest Megye, Budapest NW 15 km, Nagykovácsi [18.88°E 47.58°N], 25.4.1993, leg. L. Zombori, 7♀ 2♂, HNHM; same data, 1.5.1993, 16♀ 2♂, HNHM; same data, 25.4.2002, 26♀, HNHM; Pest Megye, Budapest NW 15 km, Nagykovácsi, Remete-hegy [18.93°E 47.57°N], 19.4.1977, leg. J. Papp, 1♀, HNHM; Pest Megye, Budapest SW 9 km, Budaörs, Csiki-hegyek [= Csiki Mountains] [18.97°E 47.45°N], 20.4.1975, leg. Újhelyiné, 1♂, HNHM; same data, 21.4.1977, leg. Újhelyiné, 22♀ 5♂, HNHM; Pest Megye, Budapest-hatohg [= Budapest] [19.08°E 47.50°N], 20.4.1976, leg. Bodor, 1♂, HNHM; Szin, Szeicepuszta [20.62°E 48.52°N], 4.5.1988, leg. J. Papp, 1♀, HNHM.

ISRAEL: Beth Berl [= Tel Aviv NE 10 km, Bet Berl] [34.92°E 32.20°N], 1.3.1983, leg. I. Yarom, 1♀, TAUI; Eshta'ol [35.00°E 31.78°N], 21.5.1986, leg. Q. Argaman, 2♂, RMNH; Hefa, Carmel, Place of Sacrifice [35.05°E 32.73°N], 22.2.1981, leg. A. Freidberg, 6♂, USNM; Jerusalem Sc. [= Jerusalem, Botanical Garden on Mount Scopus] [35.22°E 31.77°N], 17.2.1943, leg. H. Bytinski-Salz, 1♀ 4♂, TAUI [Benson 1955, Smith 1982]; Karmel (= Carmel) Place of Sacrifice [35.05°E 32.73°N], 22.2.1981, leg. A. Freidberg, 1♀ 6♂, TAUI; Rosh Pinna [35.55°E 32.97°N], 18.2.1986, leg. A. Freidberg, 1♀, TAUI.

ITALY: Calabria, Camigliatello Silano [16.45°E 39.33°N], 6.1933, leg. A. Dodero, 1♀, MCFS; Calabria, Sila [= La Sila], Camigliatello [16.45°E 39.33°N], 1.4.1933, leg. A. Dodero, 15♀ 28♂, MCSN [Zombori 1980]; Puglia, Lesina [15.35°E 41.87°N], 1900, leg. Novak, 2♀, NMBA; Sicily, Monte Etna E slope, Macchia NE 3 km, Torrente Macchia, 100 m alt. [15.18°E 37.18°N], 5.2.1994, leg. G.F. Turrisi, 1♀, GFTC [Turrisi 1999]; Sicily, Etna Massif N, Linguaglossa SW ca 10 km, Piano Provenzana, 1600 m alt. [15.03°E 37.80°N], 16.5.2010, leg. A.D. Liston, 4♀ 2♂, DEI [1 specimen used for barcoding: DEI-GISHym 15555]; .

SPAIN: Catalunya, Gerona, Banyoles [= Banyolas], Rocacorba [2.77°E 42.12°N], 13.4.1989, leg. E. Jansen, 1♂, EJC.

TURKEY: Ankara Prov., Beynam, 1000 m alt. [32.88°E 39.70°N], 6.5.1962, leg. K.M. Guichard & D.H. Harvey, 1♀, NSMT; Antalya Prov., Antalya W 37 km, Saklıkent S, Bakırlıdağı (Bey Dağları), 1700 m alt. [30.33°E 36.84°N], 3.6.1998, leg. S.M. Blank, rearing no. Z42A/98 / *Pinus nigra pallasiana*, em. 8.4.1999, 1♂, DEI; same data, em. 9.4.1999, 1♀, DEI; same data, em. 12.4.1999, 1♂, DEI; same data, em. 13.4.1999, 3♀, MZHF; same data, em. 14.4.1998, 3♀ 1♂, DEI; same data, em. 16.4.1999, 1♂, DEI; same data, em. 19.4.1999, 1♀, DEI; Antalya Prov., Antalya W 37 km, Saklıkent S, Bakırlıdağı (Bey Dağları), 1700 m alt. [30.33°E 36.84°N], 3.6.1998, leg. S.M. Blank, rearing no. Z42B/98 / *Pinus nigra pallasiana*, em. 8.4.1999, 1♂, MZHF; same data, em. 12.4.1999, 1♀, DEI; same data, em. 14.4.1999, 1♀, DEI; Burdur Prov., Çardak E 10 km, Acigöl Salzsee [= salt lake] [29.78°E 38.86°N], 5.5.1992, leg. L. Behne, 23♀ 5♂, DEI; Konya Prov., Konya W 40 km, Valley W Kızılören (Kızılören Dağı, 1300 m alt. [32.00°E 37.88°N], 31.5.1998, leg. S.M. Blank, rearing no. Z33/98 / *Pinus nigra pallasiana*, em. 8.4.1999, 1♂, DEI.

UKRAINE: Zakarpazka Oblast, Karpaty, Tur'i Remety bliz [= near] Perechina [22.60°E 48.72°N], 15.5.1965, leg. A.P. Rasnitsyn, 2♀, ZMUM [including holotype of *X. nigrae*, Rasnitsyn 1965].

***Xyela heldreichii* Blank, sp. nov.**

ALBANIA: Gyalica Lums Mountains [= Kukës SE, Mount Gjalicë e Lumës], 2000–2500 m alt. [20.46°E 42.01°N], 14.7.1918, leg. Csiki, 3♀, HNHM; same data, 15.7.1918, 2♀, HNHM [reported as *Xyela julii* by Csiki 1923].

GREECE: Epirus, Mount Smolikas NW, Konitsa NE 16 km, Ag. Paraskevi S 5 km, 1500 m alt. [20.90°E 40.12°N], 31.5.2000, leg. S.M. Blank & C. Kutzscher, 1♀, DEI; same data, 31.5.2000, rearing no. Z12/00 / *Pinus heldreichii*, larvae, DEI; Macedonia, Konitsa E 28 km, Vasilitsa Ski Resort, 1830 m alt. [21.08°E 40.07°N], 30.5.2000, leg. S.M. Blank & C. Kutzscher, 6♀ 2♂, DEI; Macedonia, Olymp Mountains, Prionia, 1500 m alt. [22.41°E 40.09°N], 10.–16.6.1955, leg. J. Aubert, 1♀, MZLS; Macedonia, Olymp [= Olymp Mountains], 2000 m alt. [22.35°E 40.08°N], 6.6.1986, leg. E. Jansen, 1♀ 1♂, DEI; Macedonia, Pindos National Park E, Metsovo N 15 km, 1400 m alt. [21.23°E 39.90°N], 27.5.2000, leg. S.M. Blank & C. Kutzscher, rearing no. Z9/00 / *Pinus* *heldreichii*, larvae, DEI; Macedonia, Pindos National Park E, Metsovo N 15 km, Mount Blia, 1550 m alt. [21.20°E 39.90°N], 27.–28.5.2000, leg. S.M. Blank & C. Kutzscher, 47♀ 5♂, DEI [including holotype], MKC, MNHN, RSME, ZSM; same data, 1750 m alt., 27.5.2000, 3♀, DEI.

***Xyela helvetica* (Benson, 1961)**

AUSTRIA: North Tyrol, Hall in Tirol N, Karwendelgebirge, Haller Zunderkopf [11.51°E 47.34°N], 3.5.1953, leg. Pechlauer, 1♀, IZUI.

SWITZERLAND: Graubünden, Il Fuorn environs, Val Ftur, Grisons [10.28°E 46.65°N], 23.4.1953, leg. J. Aubert, 1♀, BNMC [holotype, Benson 1961].

***Xyela julii* (Brébisson, 1818)**

AUSTRIA: Austria, leg. Giraud, 2♀, MNHN; Lower Austria, Arbesbach W, Liebenau E, Tannermoor, 950 m alt. [14.88°E 48.50°N], 28.5.1998, leg. E. Altenhofer, rearing no. EA28.5.98-1 / *Pinus sylvestris*, em. 2.2000, 7♀ 5♂, DEI, ZIN; same data, rearing no. EA28.5.98-2 / *Pinus* x *rotundata*, em. 4.2000, 2♀ 4♂, DEI; Lower Austria, Bucklige Welt [16.30°E 47.50°N], leg. Mader, 1♀, NMW; same data, 2♀, ZMUH; Lower Austria, Hernstein [16.08°E 47.90°N], 5.1997, leg. E. Altenhofer, rearing no. EA5.97 / *Pinus nigra nigra*, em. 3.1998, 1♂, DEI; Lower Austria, Hörweix [15.07°E 48.55°N], 31.5.1996, leg. E. Altenhofer, rearing no. EA31.5.96 / *Pinus sylvestris*, em. 18.4.2098, 41♀ 25♂, DEI [including neotype of *Pinicola julii*], ZIN; Lower Austria, Kloster Melk, Stiftsgarten [15.63°E 48.20°N], 30. April, leg. G. Strobl, 1♂, NMBA [Strobl 1895]; Lower Austria, Krems [15.60°E 48.41°N], 10.5.1997, leg. E. Altenhofer, 1♂, SMBC; same data, 10.5.1997, rearing no. EA10.5.97 / *Pinus sylvestris*, em. 3.1998, 11♀ 5♂, DEI; Lower Austria, Langschlag [14.88°E 48.58°N], 23.5.1997, leg. E. Altenhofer, rearing no. EA23.5.97 / *Pinus sylvestris*, em. 17.4.1998, 33♀ 7♂, DEI; Lower Austria, Pressbaum [16.08°E 48.18°N], 4.5.1905, 1♀, ZSM; Lower Austria, Rekawinkel [16.02°E 48.18°N], 20.4.1914, 1♀, NMW; Lower Austria, Retz [15.95°E 48.76°N], 20.4.1916, leg. H. Zerny, 2♀, NMW; North Tyrol, Zirl NW, Reith bei Seefeld, 1050 m alt. [11.20°E 47.30°N], 25.5.1999, leg. S.M. Blank, rearing no. Z44/99 / *Pinus sylvestris*, em. 24.3.2000, 2♀, DEI; Upper Austria, Micheldorf [14.14°E 47.88°N], 29.4.1928, leg. H. Priesner, 1♀, NMW; Upper Austria, Zwettl [15.17°E 48.62°N], 25.5.1997, leg. E. Altenhofer, rearing no. EA25.5.97 / *Pinus sylvestris*, em. 10.3.1999, 3♀, DEI; Upper Austria, Zwettl, Langzwettl [14.27°E 48.48°N], 14.4.1990, leg. Martin Schwarz, 1♂, DEI; Vorarlberg, Feldkirch [9.60°E 47.24°N], 13.5.1941, leg. Moosbrugger, 1♀, NMW; same data, 15.4.1938, 1♀, NMW.

BELGIUM: Brabant, Boitsfort [4.40°E 50.80°N], 30.4.1933, leg. A. Crévecoer, 1♀, ISNB; same data, 1.5.1932, 3♀ 1♂, ISNB; Brabant, Forêt de Soignes [4.42°E 50.78°N], 7.5.1964, leg. P. Dessart, 1♀, ISNB; same data, 7.5.1965, 1♀, ISNB; Brabant, Terv. [= Tervuren] [4.52°E 50.82°N], 1♀, ISNB; Limburg, Venlo [6.17°E 51.37°N], 27.4.1942, leg. Teunissen, 1♀, RMNH; Luxembourg, Chatillon [5.70°E 49.63°N], 13.–19.4.1981, leg. J.P. Jacob, 1♂, ISNB.

BULGARIA: Rila Mountains, Govedartsi environs [42.25°N 2348°E], 25.5.1980, leg. Sander, 1♂, SMNG.

CROATIA: Krapina [15.87°E 46.17°N], leg. A. Hensch, 1♀ 1♂, HNHM [including lectotype of *X. henschii*, Moscáry 1912].

CZECHIAN REPUBLIC: Doksy environs, swamp [14.66°E 50.57°N], 24.5.1980, leg. J. Strejček, 3♀ 1♂, MKC; Frahelz [14.73°E 49.12°N], 2.5.1988, leg. Karas, 5♀, MKC; Hluboká nad Vitavou [14.43°E 49.05°N], 12.6.1979, leg. Karas, 1♀, MKC; Horusice [15.43°E 50.02°N], 9.5.1981, leg. Karas, 1♀, MKC; Kozly-Neratovice [14.52°E 50.27°N], 19.4.1953, leg. Bouček, 1♀, MKC; Lány [13.94°E 50.13°N], 9.4.1964, leg. Hoffer, 3♀, MKC; Lány-obora [= zoological garden] [13.94°E 50.13°N], 10.5.1963, leg. Z. Pádr, 6♀, MKC, OLML; Moravia, 1♂, MMBC; Moravia, Lednice [16.80°E 48.80°N], 20.4.1967, leg. Bouček, 1♀, HNHM; Planá u Mariánske Lázní [12.70°E 49.97°N], 4.5.1987, leg. J. Strejček, 7♀ 1♂, MKC, OLML; Praha, Modřany rokle [14.42°E 50.02°N], 2.5.1973, leg. Z. Pádr, 1♀, MKC; Praha, Roztocký haj [14.40°E 50.17°N], 7.5.1970, leg. J. Strejček, 1♀, OLML; same data, 7.5.1970, 2♀, MKC; Praha-Krč, Krčský les [14.45°E 50.03°N], 3.5.1970, leg. J. Strejček, 1♀, MKC; Veselí nad Lužnicí [14.70°E 49.18°N], 16.4.1989, leg. Karas, 3♀, MKC; Vlkov nad Lužnicí [14.72°E 49.15°N], 27.4.1986, leg. Karas, 1♀, MKC; Škvorecká obora [14.74°E 50.05°N], 5.5.1979, leg. J. Strejček, 7♀ 2♂, MKC, OLML.

DENMARK: Ellemosen, Tibirke [12.10°E 56.05°N], 14.5.1969, leg. O. Lomholdt, 1♀, ZMUC; Frederiksborg, Ørodde [8.88°E 56.78°N], 13.5.1921, leg. E.B. Hoffmeyer, 1♀, ZMUC; Frederiksborg, Strodam, 12 m alt. [12.28°E 55.95°N], 5.5.1996, leg. L. Vilhelmsen, 1♀ 1♂, USNM; Insel Lolland, Sandbjerg [11.18°E 54.90°N], 4.5.1892, leg. W.H.C.F. Wüstnei, 1♀, ZMUC; Mern, Ulfshale [12.07°E 55.05°N], 28.5.1972, leg. O. Lomholdt, 1♀, ZMUC; Nordsjalland [11.98°E 55.77°N], leg. J.M.C. Schiødte, 1♀, ZMUC; same data, 16.5.1934, leg. Drewsen, 1♀, ZMUC; Norholm [9.73°E 57.03°N], 20.5.1923, leg. J.P. Kryger, 1♀, ZMUC; Tisvilde [12.08°E 56.05°N], 6.–7.5.1916, 1♀, ZMUC; Tisvilde Hegn [12.08°E 56.05°N], 6.5.1985, leg. O. Lomholdt, 2♀, ZMUC.

FINLAND: Lapland, Lp. in. [= Laponia inariensis], leg. C.H. Boheman, 1 specimen, NHRS; Avenanmaa, Hammarland [19.72°E 60.23°N], leg. R. Forsius, 1♂, ZSM; FINNLAND, 1♀, MZLU; Hame, Hämeenlinna, Käikälä [24.45°E 61.00°N], leg. J. Kangas, 1♀, MZHF; same data, 22.5.1982, leg. M. Koponen, 3♀ 1♂, MZHF; Hame, Hattula [24.40°E 61.07°N], 21.5.1988, leg. M. Koponen, 2♀, MZHF; Hame, Janakkala [24.58°E 60.90°N], 5.6.1974, leg. J. Kangas, 1♀, MZHF; Hame, Juupajoki [24.47°E 61.80°N], 1.6.1987, leg. M. Koponen, 1♀, MZHF; Hame, Kuhmalahti [24.58°E 61.50°N], 6.5.1982, leg. J. Kangas, 1♀, MZHF; Hame, Pälkäne [24.27°E 61.33°N], 2.6.1966, leg. J. Kangas, 1♀, MZHF; same data, 23.5.1976, 16♀, MZHF; same data, 10.6.1976, 1♀, MZHF; same data, 5.5.1978, 1♀, MZHF; same data, 12.5.1979, 1♀, MZHF; Hame, Pälkäne, Kylä [27.47°E 61.55°N], 17.5.1970, leg. J. Kangas, 1♀, MZHF; Hame, Renko [24.27°E 60.90°N], 22.5.1982, leg. M. Koponen, 1♀, MZHF; Hame, Turenki, Rälssitie [24.63°E 60.91°N], 24.5.2008, leg. V. Vikberg, 54 larvae from *Pinus sylvestris*, DEI [1 specimen used for barcoding: DEI-GISHym 15641]; Lapland, Inari [28.00°E 69.00°N], 12.6.1937, leg. Nordman, 2♀, MZHF; same data, 6.7.1965, leg. V.J. Karvonen, 1♂, MZHF; Lapland, Inari, Näätämö [28.57°E 69.50°N], 4.7.1951, leg. Y. Kangas, 1♂, MZHF; same data, 5.7.1951, leg. J. Kangas, 1♀, MZHF; Lapland, Ivalo [27.60°E 68.65°N], 4.7.1965, leg. V.J. Karvonen, 2♀, MZHF; same data, 22.–23.6.1975, leg. A. Shinohara, 1♂, NSMT; Lapland, Kevo, Malaise trap (1) [27.00°E 69.76°N], 7.–11.6.2001, leg. A. Taeger & C. Kutzscher, 2♀ 1♂, DEI; Lapland, Kevo, Malaise trap (2) [27.00°E 69.76°N], 7.–11.6.2001, leg. A. Taeger & C. Kutzscher, 11♀ 5♂, DEI; same data, 11.–15.6.2001, 1♀ 1♂, DEI; Lapland, Kevo, Malaise trap (3) [26.99°E 69.74°N], 11.–15.6.2001, leg. A. Taeger & C. Kutzscher, 1♂, DEI; Lapland, Leppälä [27.08°E 69.67°N], 10.6.2001, leg. A. Taeger & C. Kutzscher, 2♀, DEI; Lapland, Muonio [23.66°E 67.97°N], 15.6.1964, leg. O. Ranin, 1♀ 1♂, NSMT; Lapland, Nuorgam 17 km SSE [28.04°E 69.94°N], 12.6.2001, leg. A. Taeger & C. Kutzscher, 21♀ 1♂, DEI, MHNN; Lapland, Utsjoki SW 46 km, Nuorbenjarga [25.94°E 69.69°N], 9.6.2001, leg. A. Taeger & C. Kutzscher, 1♀, MHNN; Lapland, Utsjoki, Karigasniemi [25.83°E 69.40°N], 26.6.1951, leg. J. Kangas, 1♀, MZHF; Lapland, Vuotso E 2 km [27.12°E 68.11°N], 5.6.2001, leg. A. Taeger & C. Kutzscher, 82♀ 35♂, CSFU, DEI [2 specimens used for barcoding: DEI-GISHym 15504–15505], NMNS; Mikkeli, Hartola [26.02°E 61.58°N], 10.6.1987, leg. M. Koponen, 1♀, MZHF; same data, 5.5.1980, leg. J. Kangas, 1♀, MZHF; same data, 6.5.1980, 1♀, MZHF; same data, 18.5.1980, 1♀, MZHF; same data, 21.5.1980, 1♀, MZHF; same data, 3.5.1983, 14♀ 2♂, MZHF; same data, 19.5.1982, 1♀, MZHF; same data, 21.5.1983, 2♀, MZHF; same data, 23.5.1982, 1♀, MZHF; same data, 13.5.1984, 1♀, MZHF; same data, 14.5.1983, 1♀, MZHF; same data, 1.5.1989, leg. M. Koponen, 3♀ 1♂, MZHF; same data, 5.5.1989, 1♀ 1♂, MZHF; same data, 6.5.1989, 1♀, MZHF; same data, 9.5.1989, 1♀, MZHF; same data, 22.4.1989, 1♂, MZHF; Turku ja Pori, Perniö [23.13°E 60.20°N], 3.5.1983, leg. M. Koponen, 16♀ 14♂, MZHF; Turku ja Pori, Turku [22.23°E 60.45°N], 19.5.1979, leg. M. Koponen, 4♀, MZHF; Turku ja Pori, Västanfjärd [22.68°E 60.05°N], 3.5.1983, leg. M. Koponen, 2♀ 4♂, MZHF; Uusimaa, Hanko [22.95°E 59.83°N], 19.5.1984, leg. M. Koponen, 1♀, MZHF; same data, 20.5.1989, 1♀ 1♂, MZHF; Uusimaa, Helsinge [= Helsinki] [24.93°E 60.18°N], 1.6.1964, leg. E. Lindqvist, 1♂, MZHF; same data, 20.5.1967, 2♀, MZHF; same data, 22.5.1967, 1♀, MZHF; Uusimaa, Helsingfors [= Helsinki] [24.93°E 60.18°N], 29.5.1964, leg. E. Lindqvist, 1♀, MZHF; Uusimaa, Helsingin pitäjä [= Helsinginpitäjä] [24.98°E 60.28°N], 18.5.1959, leg. J. Perkiömäki, 1♀, MZHF; same data, 21.5.1960, 1♀, MZHF; Uusimaa, Helsinki [24.93°E 60.18°N], 2.5.1960, leg. J. Perkiömäki, 2♂, MZHF; same data, 8.5.1960, leg. O. Ranin, 1♀ 1♂, NSMT; same data, 22.5.1976, leg. M. Koponen, 1♀, MZHF; same data, 8.5.1978, 2♂, MZHF; same data, 28.5.1980, 14♀, MZHF; same data, 1.6.1980, leg. O. Ranin, 1♀, ZMPA; same data, 13.5.1981, leg. M. Koponen, 1♀, MZHF; same data, 15.5.1981, 1♀, MZHF; same data, 30.5.1980, 2♀, MZHF; same data, 22.4.1983, 1♀ 1♂, MZHF; Uusimaa, Helsinki, Espoo [24.65°E 60.22°N], 5.6.1924, leg. V.J. Karvonen, 1♀, MZHF; same data, 5.5.1983, leg. M. Koponen, 1♀, MZHF; Uusimaa, Helsinki, Haaga [24.90°E 60.22°N], 21.4.1989, leg. M. Koponen, 1♀, MZHF; same data, 15.5.1989, leg. J. Perkiömäki, 1♀, MZHF; Uusimaa, Hyvinkää [24.87°E 60.63°N], 26.5.1982, leg. M. Koponen, 2♀, MZHF; same data, 23.5.1987, 1♂, MZHF; Uusimaa, Mäntsälä [25.32°E 60.63°N], 19.5.1987, leg. M. Koponen, 1♀ 1♂, MZHF; Uusimaa, Munksnäs [= Helsinki, Munksnäs]

[24.88°E 60.20°N], 8.5.1968, leg. E. Lindqvist, 1♂, MZHF; same data, 25.5.1968, 1♀, MZHF; Uusimaa, Nurmijärvi [24.80°E 60.47°N], 23.5.1964, leg. M. Koponen, 1♀, MZHF; same data, 13.5.1978, 3♀, MZHF; same data, 20.5.1979, 2♀, MZHF; same data, 26.5.1982, 1♀, MZHF; same data, 7.5.1983, 12♀ 2♂, MZHF; same data, 14.5.1983, 1♀ 1♂, MZHF; same data, 22.5.1983, 1♀, MZHF; same data, 30.5.1982, 2♀, MZHF; same data 12.5.1984, 1♀, MZHF; same data, 8.6.1985, 1♀, MZHF; same data, 27.4.1989, 1♀, MZHF; Uusimaa, Pohja [23.52°E 60.10°N], 3.5.1983, leg. M. Koponen, 8♀ 4♂, MZHF; Uusimaa, Rajamäki [24.75°E 60.53°N], 8.5.1964, leg. M. Koponen, 1♀, MZHF; same data, 28.5.1967, 1♀, MZHF; Uusimaa, Småland [24.53°E 60.00°N], leg. C.H. Boheman, 1♀ 1♂, NHRS; Uusimaa, Snappertuna, Strömsö [23.65°E 60.00°N], 25.5.1969, leg. M. Koponen, 1♀, MZHF; Uusimaa, Tuusula [25.03°E 60.40°N], 20.5.1982, leg. M. Koponen, 1♀ 1♂, MZHF.

FRANCE: Aquitaine, Combe de la Loubatière [0.30°E 44.92°N], 22.5.1970, leg. H. Chevin, 2♀ 2♂, INRA; Auvergne, Puy-de-Dôme, Sapchat, 850 m alt. [2.98°E 45.57°N], 24.5.2008, leg. S.M. Blank, H.-J. Jacobs, A.D. Liston & A. Taeger, 1♀, DEI [specimen used for barcoding: DEI-GISHym 15562]; Auvergne, Tence [4.28°E 45.12°N], 12.5.1927, leg. H. Maneval, 2♀, MNHN; same data, 16.5.1927, 1♀, MNHN; Bretagne, Réguiny [2.75°W 47.97°N], 22.5.1975, leg. H. Chevin, 1♀, INRA; Centre, Centre de Recherches forestières d'Orléans [1.90°E 47.90°N], 29.4.1985, leg. H. Chevin, 1♀, INRA; Centre, Montreau [2.05°E 48.30°N], 1919, leg. J. de Gaulle, 1♀ 1♂, MNHN; Haute-Normandie, Rouvray [1.33°E 49.07°N], 10.5.1985, leg. H. Chevin, 1♀, INRA; Île-de-France, Fontainebleau [2.70°E 48.40°N], April, leg. J. de Gaulle, 8♀ 2♂, MNHN; Picardie, Barleux [2.88°E 49.88°N], 15.4.1883, leg. L. Fairmaire, 3♀, MNHN; Picardie, Chaussée-Tirancourt [2.15°E 49.95°N], 2.–9.5.1984, leg. H. Chevin, 1♀, INRA; Provence-Alpes-Côte-d'Azure, Col de Braus [7.40°E 43.87°N], 19.5.1983, leg. C. Cocquempot, 1♀, INRA; Provence-Alpes-Côte-d'Azure, Gorges de Saint-Jean [= Saint-Jean-Saint-Nicolas] [6.22°E 44.67°N], 7.5.1975, leg. H. Chevin, 1♀, INRA; Rhone-Alpes, Issarles [4.03°E 44.83°N], 29.5.1928, leg. H. Maneval, 1♀, MNHN.

GEORGIA (GRUZIYA): Abkhaszkaya Respublika, Kavkaz zapovednik [= Caucasus reserve], Ozero ritsa [40.54°E 43.47°N], 12.4.1966, leg. A.P. Rasnitsyn, 1♀ 1♂, ZMUM [on *Pinus hamata*].

GERMANY: Baden-Württemberg, Erpfingen [9.20°E 48.35°N], 10.5.1984, leg. E. Jansen, 2♀, DEI; same data, 10.5.1986, leg. E. Jansen, 9♀, DEI, SMNS; Baden-Württemberg, Kaiserstuhl, Scheling, Ohrberg [7.67°E 48.10°N], 25.4.1960, 1♀, MZLU; Baden-Württemberg, Karlsruhe [8.39°E 49.01°N], 10.5.1941, leg. W. Stritt, 1♀, SMNK; Baden-Württemberg, Kusterdingen [9.12°E 48.52°N], 8.5.1986, leg. E. Jansen, 1♀, EJC; Baden-Württemberg, Neidlingen, Erkenberg [9.58°E 48.59°N], 6.5.1986, leg. E. Jansen, 14♀ 3♂, EJC, SMNS; same data, 12.5.1986, leg. E. Jansen, 2♀ 1♂, EJC, SMNS; Baden-Württemberg, NSG Federsee, Oggelshausener Wald [9.63°E 48.08°N], 29.5.1984, leg. E. Jansen, 7♀ 2♂, EJC; Baden-Württemberg, NSG Federsee, Wildes Ried [9.63°E 48.08°N], 6.4.1984, leg. E. Jansen, 1♀, EJC; same data, 18.5.1984, leg. E. Jansen, 2♀, EJC; same data, 5.5.1985, leg. E. Jansen, 3♀ 1♂, EJC; same data, 7.5.1986, leg. E. Jansen, 1♀, EJC; Baden-Württemberg, Sulz, Steingarten [8.63°E 48.37°N], 21.5.1991, leg. E. Jansen, 1♀, EJC; Baden-Württemberg, Tübingen SW, Bühl, Bühler Tal [9.02°E 48.48°N], 23.4.1985, leg. E. Jansen, 1♀ 1♂, EJC; same data 3.5.1985, leg. E. Jansen, 1♀, SMNS; same data, 6.5.1985, leg. E. Jansen, 2♀, EJC; same data, 6.5.1986, leg. E. Jansen, 7♀, SMNS; same data, 9.5.1986, leg. E. Jansen, 3♀, EJC, SMNS; same data, 16.5.1987, leg. E. Jansen, 3♀, EJC; same data, 4.5.1989, leg. E. Jansen, 1♂, EJC; same data, 26.4.1991, leg. E. Jansen, 6♀, EJC; same data, 27.4.1991, leg. E. Jansen, 4♀, EJC; same data, 28.4.1991, leg. E. Jansen, 3♀, EJC; Baden-Württemberg, Tübingen, Himbachtal [9.01°E 48.54°N], 6.5.1989, leg. E. Jansen, 1♀, EJC; Baden-Württemberg, Wutachschlucht near Bonndorf [8.30°E 47.85°N], 17.5.1951, leg. W. Stritt, 1♀, SMNK; Bavaria, Achselschwang [11.07°E 48.03°N], 1990, leg. Brunhofer, 1♀, DEI; Bavaria, Ebelsbach am Main [10.68°E 49.98°N], 1997, leg. Vytrisal, 1♀, MKC; Bavaria, Erlangen, Brucker Lache [10.98°E 49.57°N], 21.4.1952, leg. M. Kraus, 1♀, MKC; Bavaria, Fürth [10.97°E 48.48°N], 12.4.1920, leg. E. Enslin, 2♀ 3♂, DEI, ZSM; same data, 17.4.1920, leg. E. Enslin, 2♀, HNHM, MKC; Bavaria, Höhberg [= Höberg in coll. Sturm] [10.78°E 49.20°N], leg. Sturm, 3♀, ZSM; Bavaria, Mengkofen, Pramersbuch [12.37°E 48.73°N], 24.4.1983, leg. A.D. Liston, 1♀, RSME; Bavaria, Mittenwald N 3 km, 800 m alt. [11.27°E 47.48°N], 25.5.1999, leg. S.M. Blank, rearing no. Z41/99 / *Pinus sylvestris*, em. 24.3.2000, 1♀, USNM; same data, em. 27.3.1999, 2♀, DEI, USNM; Bavaria, Neuenreuth [11.60°E 49.88°N], 8.5.1991, leg. W. Arens, 3♀, MKC; Bavaria, Nürnberg [11.07°E 49.45°N], beginning of 5.1920, 1♀ 1♂, ZSM; Bavaria, Nürnberg, Tiergarten [11.13°E 49.45°N], 29.4.1989, leg. M. Kraus, 1♀, MKC; same data, 13.5.1989, leg. M. Kraus, 1♀, MKC; Bavaria, Oberbayern, untere Isar, 6.5.1880, 1♀, ZSM; Bavaria, Pechgraben [11.53°E 50.02°N], 9.5.1981, leg. W. Arens, 3♀, MKC; Bavaria, Schleissheim, Birket [11.55°E 48.25°N], 28.4.1934, leg. F. J. Asn, 1♀, ZSM; Bavaria, Thürnthenning [12.51°E

48.68°N], 14.4.1991, leg. A.D. Liston, 7♀ 2♂, DEI; Berlin, Berlin environs [13.42°E 52.53°N], 27.4.1930, 1♀, ZSM; Berlin, Berlin, Forst Grunewald [13.23°E 52.47°N], 26.4.1989, leg. K.-H. Kielhorn, 2♀ 1♂, EJC; Berlin, Berlin, Forst Jungfernheide [13.30°E 52.53°N], 14.4.1989, leg. K.-H. Kielhorn, 3♀ 3♂, EJC; Berlin, Berlin, Pichelsberg [13.38°E 52.52°N], 24.4.1898, leg. Oldenberg, 3♀ 1♂, DEI; Berlin, Berlin, Wannsee [13.13°E 52.42°N], 10.5.1909, leg. Oldenberg, 2♀, DEI; Berlin, Schildhorn [13.20°E 52.50°N], 5.1898, 2♀, DEI; Berlin, Tegel [= Berlin, Tegel] [13.28°E 52.58°N], 19.4.1904, leg. G. Enderlein, 1♀, ZMHB; Brandenburg, Berlin F. [= Berlin-Finkenkrug in coll. Oldenberg] [13.08°E 52.55°N], 5.5.1901, leg. Oldenberg, 2♀, DEI; same data, 29.4.1906, leg. Oldenberg, 12♀ 1♂, DEI; same data, 8.5.1910, leg. Oldenberg, 2♀, DEI; Brandenburg, Bredower Forst [13.00°E 52.58°N], 3.5.1925, leg. Bischoff, 1♀, ZMHB; Brandenburg, Chorin E, Mooskuten [13.92°E 52.92°N], 13.–20.4.1994, leg. DEI-Projekt, 17♀ 1♂, DEI; same data, 20.–26.4.1994, leg. DEI-Projekt, 3♀ 2♂, DEI; same data, 26.4.–04.5.1994, leg. DEI-Projekt, 2♀, DEI; Brandenburg, Dahnsdorf [12.67°E 52.10°N], 22.–26.4.1999, leg. C. Saure, 1♀ 1♂, DEI; same data, 27.4.–1.5.1999, leg. C. Saure, 4♀ 2♂, DEI; same data, 7.–11.5.1999, leg. C. Saure, 1♀, DEI; Brandenburg, Eberswalde [13.83°E 52.83°N], 29.4.1984, leg. A. Taeger, 1♀, DEI; Brandenburg, Eberswalde environs, Plagefenn [13.95°E 52.92°N], 4.5.1985, leg. J. Oehlke, 1♀, DEI; Brandenburg, Eberswalde, Waldfriedhof [13.82°E 52.83°N], end of 4.1971, 1♀, DEI; Brandenburg, Finowfurt W [13.65°E 52.85°N], 25.4.1995, leg. A. Taeger, 1♀, DEI; Brandenburg, Fürstenberg in Mecklenburg [13.17°E 53.18°N], leg. F.W. Konow, 8♀ 2♂, MNHN, NMBS, NSMT, SMTD, USNM, ZMAN; same data, 30.4.1886, leg. F.W. Konow, 1♂, USNM; same data, 7.5.1892, leg. F.W. Konow, 1♀ 1♂, DEI; Brandenburg, Gabower Hangkante near Altglietzen [14.12°E 52.82°N], 26.4.1998, leg. S.M. Blank, 2♀, DEI; same data, 13.5.2006, leg. S.M. Blank, 20 larvae from *Pinus sylvestris*, DEI [1 specimen used for barcoding: DEI-GISHym 15524]; Brandenburg, Groß Ziethen SE, Kernberge [13.93°E 52.95°N], 22.5.1996, leg. DEI-Projekt, 1♀, DEI; Brandenburg, Lübben environs, Neuzaucher Weinberg [14.08°E 51.93°N], 15.5.1980, leg. J. Oehlke, 5♀, DEI, NSMT; Brandenburg, Melchow [13.72°E 52.78°N], 17.4.1989, leg. J. Oehlke, 1♀, DEI; Brandenburg, Melchow NE 2,5 km [13.71°E 52.79°N], 3.5.1995, leg. K. Müller, 1♀, DEI; Brandenburg, Niederfinow [13.93°E 52.83°N], 18.5.1996, leg. S.M. Blank, larvae, drop; Brandenburg, Nördlich Britz [13.80°E 52.92°N], 13.–20.4.1994, leg. DEI-Projekt, 1♀, DEI; same data, 20.–26.4.1994, leg. DEI-Projekt, 1♀, DEI; Brandenburg, Nördlich Golzow [13.80°E 52.97°N], 4.–11.5.1994, leg. DEI-Projekt, 1♀, DEI; Brandenburg, Oderberg, Pimpinellenberg nature reserve [14.02°E 52.87°N], 12.5.1986, leg. A. Taeger, 2♀, DEI; Brandenburg, Ruhlsdorf [13.57°E 52.83°N], 7.5.1939, leg. Zwick, 1♀, ZMHB; Brandenburg, Spechthausen SE 2 km, Bornemanns Pfuhl [13.80°E 52.80°N], 21.4.2000, leg. Ch. Kutzscher, 1♀, DEI; Brandenburg, Stahnsdorf [13.21°E 52.39°N], 10.5.1920, leg. Oldenberg, 1♀, SMNK; Brandenburg, Stolzenhagen [14.10°E 52.95°N], 15.4.1938, leg. Zwick & Roehl, 4♀, HNHM, ZMHB; Brandenburg, Tornow W [13.87°E 52.82°N], 4.5.1995, leg. S.M. Blank & A. Taeger, 3♀, DEI [several dozend specimens swarming on *Pinus sylvestris*]; Brandenburg, Trampe N [13.83°E 52.78°N], 5.5.2006, leg. S.M. Blank, 21♀ 1♂, CSFU, DEI [2 specimens used for barcoding: DEI-GISHym 15510–15511]; Brandenburg, Wriezen, slopes of Oder river valley [14.13°E 52.79°N], 18.5.1996, leg. S.M. Blank, larvae, drop; Deutschland, Germania [= Germany] 3♀, USNM, RMNH, ZMUC; Hamburg, Neugraben [9.95°E 53.48°N], 28.4.1939, leg. E. Feldtmann, 1♀, ZMUH; Hesse, Darmstadt, Biologische Bundesanstalt [8.65°E 49.88°N], 11.4.1981, leg. H. Bathon, 2♀, HBC; Hesse, Vogelsberg, wood reserve Neuhof [9.62°E 50.43°N], 11.6.1991, 3♀, SMFD; same data, 17.5.1991, 1♀ 1♂, SMFD; same data, 14.5.1992, 2♀, SMFD; Lower Saxony, Gifhorn [10.53°E 52.49°N], 3.5.1954, leg. K. Hedwig, 1♀, ZSM; same data, 7.5.1954, leg. K. Hedwig, 1♀, ZSM; same data, 9.5.1956, leg. K. Hedwig, 1♀, ZMUH; same data, 13.5.1956, leg. K. Hedwig, 9♀ 1♂, ZMUH, ZSM; same data, 18.5.1956, leg. K. Hedwig, 2♀ 1♂, ZMUH; Lower Saxony, Spiekeroog, Friederikenwald [7.70°E 53.77°N], 30.4.1972, leg. Hohmann, 1♀, CRC; Mecklenburg-Vorpommern, Eggesin, Ahlbeck [14.20°E 53.67°N], 4.–5.1982, leg. Apel, 2♀ 1♂, DEI; Mecklenburg-Vorpommern, Mecklenburg [12.00°E 53.50°N], leg. F.W. Konow, 1♀, NHRS; same data, leg. W. H. C. F. Wüstnei, 1♀ 1♂, ZMUC; same data, leg. F.W. Konow, 1♀, USNM; Mecklenburg-Vorpommern, Nature reserve “Ostufer der Müritz”, Faule Ort [12.88°E 53.43°N], 6.5.1980, leg. A. Taeger, 1♂, DEI; same data, 7.5.1980, leg. A. Taeger, 2♀, DEI; same data, 8.5.1980, leg. A. Taeger, 1♀, DEI; Mecklenburg-Vorpommern, Randowbruch [14.20°E 53.33°N], 1♀, ZMHB; Mecklenburg-Vorpommern, Schönberg [in Mecklenburg-Vorpommern near Wismar / Lübeck, Klützer Ort] [10.93°E 53.85°N], 5.1877, leg. F.W. Konow, 1♀, EMAU; Mecklenburg-Vorpommern, Teschendorf in Mecklenburg [coll. Konow; near Neustrelitz] [13.37°E 53.45°N], 30.4.1904, leg. F.W. Konow, 1♀, ZMHB; same data, 6.5.1904, leg. F.W. Konow, 1♀, DEI; North Rhine-Westphalia, Bonn environs, Waldau, Höhenweg [6.92°E 50.62°N], 30.4.1958, leg. E. Schmidt, 1♂, ZSM; North Rhine-Westphalia, Crefeld [= Krefeld] [6.58°E 51.33°N], 4♀ 1♂, DEI, ZSM; same data, 4.1913, 1♀, ZSM; same data, leg. Ulbricht, 3♀ 1♂, NHRS, ZSM; Rhineland-Palatinate, Eifel, Adenau, Hohe Acht [7.02°E 50.38°N], 3.5.1953, leg. E. Schmidt, 1♀, ZSM; Sachsen-Anhalt, Dessau [12.25°E 51.85°N], 25.4.1916, 1♀, MCFS; Sachsen-Anhalt, Dessau environs, Klieken [12.38°E 51.90°N], leg. H. Zoerner, 1♂, DEI; Sachsen-Anhalt, Dessau, Salberge [12.28°E 51.85°N], 8.5.1950, leg. E. Heidenreich, 1♀, DEI; Sachsen-Anhalt, Hakel [11.32°E 51.88°N], 17.5.1980, leg. A. Taeger, 1♀, DEI; same data, 18.5.1980, leg. A. Taeger, 1♀, DEI; Sachsen-Anhalt, Halle an der Saale [11.97°E 51.48°N], 1♀, ZSM; Sachsen-Anhalt, Halle an der Saale, Dölauer Heide [11.88°E 51.52°N], 1.5.1940, leg. H. Köller, 1♀, DEI; same data, 2.5.1940, leg. H. Köller, 3♀ 1♂, DEI, MCK; Sachsen-Anhalt, Wittenberg N, Grabo [12.65°E 51.95°N], 24.4.1982, leg. A. Taeger, 2♀ 2♂, DEI; Sachsen-Anhalt, Wittenberg, Jahmo [12.70°E 51.95°N], 28.4.1974, leg. H. Zoerner, 2♀ 1♂, DEI; Sachsen-Anhalt, Wittenberg, Nudersdorf [12.60°E 51.93°N], 4.5.1980, leg. A. Taeger, 2♂, DEI; Saxony, Bad Lausick [= Bad Lausigk] [13.28°E 51.15°N], 22.4.1997, leg. E. Jansen, 2♀, EJC; Saxony, Dresden, Dresdner Heide, 200 m alt. [13.83°E 51.08°N], 15.4.1938, leg. Koksch, 2♂, SMTD; same data, 22.4.1937, 2♀, HNHM, ZMHB; same data, 23.4.1938, leg. Koksch, 3♀ 3♂, SMTD; same data, 26.4.1938, leg. Koksch, 4♀ 4♂, SMTD; Saxony, Naundorf, Kämmereiforst [12.52°E 51.48°N], 9.4.1994, leg. E. Jansen, 2♀ 1♂, EJC; same data, 15.4.1994, leg. E. Jansen, 1♀ 1♂, EJC; same data, 16.4.1994, leg. E. Jansen, 1♀, EJC; same data, 24.4.1994, leg. E. Jansen, 1♀, EJC; same data, 2.5.1995, leg. E. Jansen, 1♀, EJC; same data, 19.4.1997, leg. E. Jansen, 116♀ 41♂, EJC; same data, 24.4.1997, leg. E. Jansen, 3♀ 5♂, EJC; Saxony, Rotes Haus, Prellheide [12.54°E 51.58°N], 20.4.1997, leg. E. Jansen, 6♀ 5♂, EJC; same data, 23.4.1997, leg. E. Jansen, 13♀ 6♂, EJC; same data, 28.4.1997, leg. E. Jansen, 11♀ 2♂, EJC; Saxony, Sprotta N [12.70°E 51.48°N], 21.4.1997, leg. E. Jansen, 20♀ 12♂, EJC; Saxony, Waldsteinberg, Kohlenberg [12.62°E 51.32°N], 1.5.1997, leg. E. Jansen, 2♀, EJC; Saxony, Zwethau, Truppenübungsplatz [13.03°E 51.58°N], 25.4.1993, leg. E. Jansen, 4♀ 1♂, EJC; Schleswig-Holstein, Geesthacht W 3 km, Besenhorst [= Besenhorster Sanddünen] [10.32°E 53.44°N], 1♀, ZMUH; Thuringia, Jena, Leutratal [11.57°E 50.87°N], 8.–09.5.1974, leg. J. Oehlke, 1♀, DEI; Thuringia, Klettbach / Thüringen [11.15°E 50.91°N], 10.5.1993, leg. Weipert, 1♀, FCC; Thuringia, Rottleben N 1 km [11.03°E 51.37°N], 2.5.1998, leg. S.M. Blank, 2♀, DEI; Thuringia, Rottleben NW [10.98°E 51.38°N], 13.4.1998, leg. S.M. Blank, 1♀, DEI; Thuringia, Stadtroda, Zeitzgrund [11.72°E 50.87°N], 7.5.1974, leg. J. Oehlke, 2♀, DEI; Thuringia, Suhl, Vessertal nature reserve [10.78°E 50.60°N], 14.6.1988, leg. A. Taeger, 1♂, DEI; Thuringia, Thüringen [= Thuringia] 2♀, MNMS, ZSM; same data, leg. O. Schmiedeknecht, 3♀, ZMAN, ZMHB.

GREAT BRITAIN: England, Cheshire, Abbots Moss [2.68°W 53.23°N], 18.4.1976, leg. M. R. Shaw, 4♀ 1♂, RSME; 28.4.1976, leg. M. R. Shaw, 3♀ 2♂, RSME; England, Durham, Hamsterley [1.82°W 54.68°N], 3.5.1987, leg. A.D. Liston, 5♀ 1♂, RSME; Hertfordshire, Chipperfield [0.50°W 51.70°N], 4.5.1935, leg. R. B. Benson, 1♀ 2♂, NSMT, USNM; Rammamere Heath., 21.4.1953, leg. R.B. Benson, 1♂, NSMT; Scotland, Aberdeen, Grandhome Moss [2.12°W 57.15°N], 24.4.1982, leg. A.D. Liston, 3♀ 1♂, RSME; same data, 7.5.1982, leg. A.D. Liston, 3♀, DEI; Scotland, city of Edinburgh, Edinburgh SW, Balerno [3.33°W 55.88°N], 14.5.1981, leg. A.D. Liston, 1♀ 2♂, ZMHB; Scotland, city of Edinburgh, Edinburgh, Corstorphine Hill [3.28°W 55.95°N], 15.5.1977, leg. A.D. Liston, 1♀, RSME; same data, 15.5.1979, leg. A.D. Liston, 3♀ 1♂, RSME [on birch catkin]; same data, 20.4.1981, leg. A.D. Liston, 1♀ 1♂, RSME; same data, 25.4.1981, leg. A.D. Liston, 1♀, RSME; same data, 4.5.1995, leg. J. Schmitz, 1♂, CRC; same data, 28.4.1995, leg. J. Schmitz, 1♀, CRC; Scotland, Highlands, Abernethy Forest [3.63°W 57.25°N], 2.5.1981, leg. M. R. Shaw, 9♀ 6♂, RSME; same data, 3.5.1981, leg. M. R. Shaw, 1♀, RSME; Scotland, Highlands, Aviemore [3.83°W 57.20°N], 25.4.1944, leg. P. Harwood, 1♀ 1♂, RSME; 4.5.1981, leg. M. R. Shaw, 1♀, RSME; Scotland, Highlands, Beinn Eighe NNR [4.92°W 57.28°N], 11.–13.6.1988, leg. I. MacGowan, 1♀, RSME; Scotland, Highlands, Glen Strathfarrar [4.83°W 57.42°N], 5.1988, leg. I. MacGowan, 1♀, RSME; same data, 1.5.1988, leg. I. MacGowan, 1♀, RSME; Scotland, Highlands, Shieldaig [5.65°W 57.52°N], 5.1991, leg. I. MacGowan, 2♀, RSME; Scotland, Inverness, Aviemore S 5 km, Loch an Eilean [3.84°W 57.15°N], 1.5.1981, leg. M. R. Shaw, 1♀, RSME; Scotland, Inverness, Coylumbridge [3.83°W 57.07°N], 3.5.1981, leg. M. R. Shaw, 2♀, RSME; same data, 11.5.1991, leg. I. MacGowan, 1♀, RSME; Scotland, Inverness, Loch Garten [3.67°W 57.25°N], 1.–13.5.1985, leg. J. A. Owen, 3♀, RSME; Scotland, Lanarkshire, Carstair House [3.70°W 55.70°N], 6.4.1963, leg. R. A. Crowson, larvae, HMUG; Scotland, Perth and Kinross, Rannoch, Finnart [4.42°W 56.67°N], 1.5.1955, leg. E. C. Pelham-Clinton, 1♂, RSME; Scotland, Perth and Kinross, Tentsmuir NNR [2.82°W 56.45°N], 10.5.1987, leg. M. R. Shaw, 1♀, RSME; Scotland, Perth and Kinross, Tentsmuir NNR, Tayport, Fife [2.88°W 56.45°N], 24.5.1970, leg. E. C. Pelham-Clinton, 1♂, RSME; Scotland, Perth and Kinross, Torlom Hill near Crieff [3.83°W 56.37°N], 31.5.1958, leg. R. A. Crowson, larvae, HMUG;

GREECE: Grecia [= Greece], 1903, leg. O. Schmiedeknecht, 1♀, MNMS; Macedonia, Edessa NW 21 km, Mount Kajmakcalan (Mount Voras) E slope, 1680 m alt. [21.85°E 40.90°N], 3.6.2000, leg. S.M. Blank & C. Kutzscher, rearing no. Z13/00 / *Pinus sylvestris*, em. 4.3.2001, 2♂, DEI; same data, em. 6.3.2001, 1♀, DEI; same data, em. 8.3.2001, 1♀, DEI; Macedonia, Edessa WNW 21 km, Mount Kajmakcalan (Mount Voras) SW slope, 1820 m alt. [21.82°E 40.90°N], 26.5.2000, leg. S.M. Blank & C. Kutzscher, rearing no. Z14/00 / *Pinus sylvestris*, em. 1.3.2001, 2♀, DEI; same data, em. 4.3.2001, 1♀, DEI; Macedonia, Serres N 20 km, Vrondou Ski Resort, 1600 m alt. [23.60°E 41.27°N], 26.5.2000, leg. S.M. Blank & C. Kutzscher, rearing no. Z16/00 / *Pinus sylvestris*, em. 21.2.2001, 1♂, DEI; same data, em. 22.2.2001, 1♂, DEI; same data, em. 23.2.2001, 2♂, DEI; same data, em. 25.2.2001, 1♂, DEI; same data, em. 26.2.2001, 3♂, DEI; same data, em. 27.2.2001, 2♀, DEI; same data, em. 28.2.2001, 1♂, DEI; same data, em. 1.3.2001, 1♂, DEI; same data, em. 5.3.2001, 1♀, DEI.

IRELAND: Arhdown Co. WI., 2.5.1948, leg. A.W. Stelfox, 1♀, USNM; Clara Co. WI. [6.25°W 52.97°N], 23.4.1933, leg. A.W. Stelfox, 1♀, USNM; Enniskerry [6.18°W 53.20°N], 13.4.1933, leg. A.W. Stelfox, 1♀, USNM; Glenasmole DU [41.48°W 52.37°N], 3.5.1939, leg. A.W. Stelfox, 1♀, USNM; Nr. Emo Park Co. QC [= Emo] [7.22°W 53.08°N], 20.4.1936, leg. A.W. Stelfox, 8♀, USNM; Wicklow, Arklow District Co. WI. [6.15°W 52.80°N], 30.4.1926, leg. A.W. Stelfox, 1♀, USNM.

ITALY: Trentino-Alto Adige, Riva N, Lago di Tenno, 500–600 m alt. [10.84°E 45.94°N], 3.–6.5.1976, leg. A. Shinohara, 4♀, NSMT; Val d'Aosta, St. Pierre, Combetin, St. Pierre [= Aosta W 7 km, Combetin], 1700 m alt. [72.25°E 45.74°N], 1♂, MCFS ["su *Pinus silvestris*"].

MONGOLIA: Tov, Bogdo ul, Bugijn az achuj, 1650 m alt. [107.00°E 47.82°N], 31.5.1967, leg. Kaszab, 1♀, HNHM [Zombori 1971].

NETHERLANDS: 's-Gravenhage [4.30°E 52.08°N], April, 1♀, ZMAN; 't Harde [5.88°E 52.42°N], 29.4.1984, leg. B. van Aartsen, 2♀ 2♂, ZMAN; same data, 11.5.1984, 1♀ 1♂, ZMAN; Austerlitz, Bornea [5.31°E 52.08°N], 15.4.1988, leg. Ph. Pronk, 1♀, RMNH; Berghem [5.57°E 51.77°N], 20.4.1952, leg. H. Teunissen, 1♀, RMNH; Bloemendaal [4.62°E 52.40°N], 4.1895, leg. J.C.H. de Meijere, 1♂, ZMAN; Bussum [5.20°E 52.28°N], 26.4.1909, leg. van der Beek, 3♀ 5♂, ZMAN; same data, 17.4.1910, 2♀ 1♂, ZMAN; Colmschate [6.22°E 52.25°N], 2.5.1974, leg. B. van Aartsen, 1♀, RMNH; de Steeg [6.06°E 52.02°N], 22.4.1974, leg. B. van Aartsen, 7♀ 1♂, RMNH; Driebergen [5.28°E 52.05°N], 17. April, 1♀, ZMAN; Exc. Duurswoude heide [= Wijnjewoude] [6.18°E 53.05°N], 25.4.1957, 1♀, RMNH; Exc. Duurswoude, Hooiweg, Wijnjeterp [= Wijnjewoude] [6.18°E 53.05°N], 24.4.1957, 1♀, RMNH; Heerde [6.05°E 52.38°N], 4.5.1976, leg. B. van Aartsen, 1♂, RMNH; Hilversum [5.18°E 52.23°N], 5.1902, leg. J.C.H. de Meijere, 1♀, ZMAN; 23.4.1911, leg. J.C.H. de Meijere, 1♂, ZMAN; Hilversum, Kl. Wasmeer [5.18°E 52.23°N], 23.5.1953, leg. H. Wisring & P. Loof, 1♀, RMNH; Kennemerduinen [4.58°E 52.42°N], 22.4.1973, leg. B. van Aartsen, 1♀, RMNH; Meyendel [= The Hague Bierlap, Meyendel] [4.37°E 52.15°N], 23.4.1974, leg. M. Rÿken & H. Roskam, 1♀, RMNH; Nunspeet [5.80°E 52.38°N], 19.4.1976, leg. B. van Aartsen, 1♂, RMNH; 20.4.1976, leg. B. van Aartsen, 2♀ 1♂, RMNH; same data, 24.4.1976, 4♀ 1♂, RMNH; Nunspeet, Willensbosch, *Pinus* wood [5.80°E 52.38°N], 21.4.1985, leg. P. Thomas, 1♂, ZMPA; 22.4.1985, leg. P. Thomas, 1♀, ZMPA; Oisterwijk [5.20°E 51.58°N], 4.1914, 1♀, ZMAN; Otterlo [5.78°E 52.10°N], 8.5.1973, leg. B. van Aartsen, 1♀, RMNH; same data, 9.4.1974, 6♀ 3♂, RMNH, ZMAN; same data, 6.5.1978, 1♀, ZMAN; same data, 27.4.1984, 1♀ 1♂, ZMAN; Overveen [4.61°E 52.40°N], 10.4.1974, leg. B. van Aartsen, 9♀ 2♂, RMNH; Putten [5.61°E 52.27°N], 25.–28.4.1972, leg. J. van der Vecht, 1♀, RMNH; 5.5.1976, leg. J. van der Vecht, 1♀, RMNH; Rÿsbergen [4.70°E 51.52°N], 26.4.1974, leg. B. van Aartsen, 2♀ 1♂, RMNH; Tongeren [5.97°E 52.35°N], 11.4.1974, leg. B. van Aartsen, 50♀ 15♂, NSMT, RMNH, ZMAN; Vogelenzang, Duinen [4.58°E 52.32°N], 16.4.1974, leg. B. van Aartsen, 1♂, RMNH; Wapenveld [6.08°E 52.43°N], 1.5.1974, leg. B. van Aartsen, 1♀ 2♂, RMNH.

NORWAY: Akershus, Lørenskog, Aamodtdammen [10.98°E 59.93°N], 1.–24.5.1991, 1♀, ZMUB; Finnmark, Sirma 2 km E [27.43°E 70.03°N], 9.6.2001, leg. A. Taeger & C. Kutzscher, 1♀, DEI; Hedmark, Stor Elvdal, near end of Atnasjø where the river leaves the lake [11.03°E 61.53°N], 29.5.–5.6.1988, leg. J.O. Solem, 1♀, ZMUB; Hordaland Fylke, Åsane [5.33°E 60.48°N], 21.8.-30.9.2003, 1♀, ZMUB; Hordaland Fylke, Bergen, Flyundei Skogen [5.32°E 60.40°N], 1.5.1966, leg. Fjellberg, 1♀, ZMUB; Hordaland Fylke, Bergen, Martensgården [5.36°E 60.38°N], 4.1982, leg. A. Fjeldså, 1♀ 1♂, ZMUB; Hordaland Fylke, Voss, Mjøfjell, Solbakken, 670 m alt. [6.43°E 60.65°N], 1.–21.6.1991, leg. B. Økland, 1♀, ZMUB; same data, 21.6.–7.7.1991, 1♀, ZMUB; Ostfold, Fredrikstad [10.95°E 59.22°N], 1914, leg. Strand, 1♂, MNHN; Rogaland, Hå, Ogna [5.55°E 58.67°N], 14.–21.5.1992, leg. T.R. Nielsen & I. Greve Korsnes, 9♀ 6♂, ZMUB; same data, 15.4.–14.5.1996, 37♀ 27♂, ZMUB; Sor-Trondelag, Madsö [9.80°E 63.87°N], 13.5.1887, leg. W.H.C.F. Wüstnei, 1♀, ZMUC; Telemark, Langesund [9.75°E 59.00°N], 9.–11.5.1903, leg. Strand, 2♀, ZMHB; Telemark, Tinn, Håkenes [8.75°E 59.98°N], 5.1995, leg. B.A. Sagvolden, 2♀ 2♂, ZMUB; Vestfold, Tjøme [10.40°E 59.12°N], 12.5.1965, leg. Fjellberg, 1♀, ZMUB.

POLAND: Ostroleka, Ostrów Mazowiecka [21.90°E 52.80°N], 25.5.1980, leg. J. Sawoniewicz, 1♀, ZMPA; Bialostok, Topiło near Hajnówka [23.58°E 52.73°N], 7.5.1986, leg. Ekipa, 1♀, ZMPA; same data, 8.–24.5.1986, 90♀ 5♂, ZMPA; same data, 22.5.–3.6.1987, 3♀, ZMPA; Bydgoszcz, Linówek near Śliwice [18.23°E 53.73°N], 24.4.–17.5.1986, leg. Ekipa, 23♀ 1♂, ZMPA; same data, 9.5.1987, 2♀ 2♂, ZMPA; same data, 9.–23.5.1987, 5♀ 1♂, ZMPA; same data, 23.5.–6.6.1987, 1♀, ZMPA; Bydgoszcz, Łoboda near Ostrów Maz. [18.22°E 53.73°N], 24.4.–17.5.1986, leg. Ekipa, 24♀ 4♂, ZMPA; same data, 25.4.–9.5.1987, 1♀, ZMPA; same data, 9.–23.5.1987, 2♀, ZMPA; same data, 23.5.–6.6.1987, 2♀, ZMPA; Kielce, Nadl. Nidzica, Jeleń [= Nidzica] [20.68°E 50.22°N], 17.5.1982, leg. T. Hufleijt, 1♂, ZMPA; same data, 18.5.1982, 1♀, ZMPA; Lomza, Trzcianne-Werykle near Mońki [22.68°E 53.33°N], 20.5.1982, leg. J. Sawoniewicz, 1♀, ZMPA; Lublin, N. Aleksandr. Gorn. Niv. [= Puławy] [21.97°E 51.42°N], 18.4.1911, leg. A. Ilynskii, 1♀, ZMPA; Olsztyn, Gutkowo [20.40°E 53.80°N], 30.4.1989, leg. T. Hufleijt, 1♀ 1♂, ZMPA; same data, 1.5.1989, 1♀ 1♂, ZMPA; Olsztyn, Zazdrość [21.00°E 53.72°N], 15.5.1982, leg. T. Hufleijt, 1♀, ZMPA; Ostroleka, Dybki near Ostrów Mazowiecka [21.72°E 52.73°N], 3.–20.5.1986, leg. Ekipa, 33♀, ZMPA; same data, 20.5.–3.6.1986, ZMPA; same data, 23.5.–5.6.1987, 1♀, ZMPA; Ostroleka, Klembów [21.33°E 52.42°N], 24.5.1980, leg. J. Sawoniewicz, 1♀, ZMPA; Schlesien [= Silesia] [17.33°E 50.83°N], leg. Letzner, 1♀, DEI; Skierniewice, Radziejowice [20.55°E 52.00°N], 13.–18. May, leg. Ekipa, 1♂, ZMPA; Suwalki, Puszcza Borecka, Leśn. Kuty [22.13°E 54.13°N], 26.5.1984, leg. Ekipa, 1♀, ZMPA; Szczecin, Pommern, Karolinenhorst [= Chojna] [14.43°E 52.97°N], 26.4.1914, leg. E. Hanau, 2♀, ZMPA; Szczecin, Stettin [= Szczecin] [14.58°E 53.42°N], 27.4.1913, leg. G. Enderlein, 1♀, ZMPA; Szczecin, Stettin, Eckerburg [= Szczecin] [14.58°E 53.42°N], 1.5.1914, leg. E. Hanau, 1♀, ZMPA; Szczecin, Stettin, Wufrow [= Szczecin] [14.58°E 53.42°N], 3.5.1914, leg. E. Hanau, 1♀, ZMPA; Warszawa, Kampinoski Park Narodowy, grad las lípa [20.58°E 52.33°N], 7.–12.5.1980, leg. Ekipa, 1♂, ZMPA; Warszawa, Łomna Stacja [= Łomna near Warszawa] [20.80°E 52.38°N], 1.–15.5.1987, 1♂, ZMPA; Warszawa, Puszcza Kampinoska [20.58°E 52.33°N], 13.–18.5.1976, leg. Zoological Institute of the Polish Academy of Sciences, 1♀, ZMPA; Warszawa, Warszawa, Moktów [= Warszawa] [21.00°E 52.25°N], 2.5.1989, leg. J. Sawoniewicz, 1♀, ZMPA; Warszawa, Łomna near Warszawa [20.80°E 52.38°N], 5.5.1988, leg. T. Hufleijt, 1♀, ZMPA; same data, 26.4.1989, 1♀, ZMPA; Wizeciono, lipa [...], 17.–24.5.1982, 1♀, ZMPA; Zamosc, Zwierzyniec, Roztoczanski Park Narodowy [22.97°E 50.60°N], 29.4.–13.5.1987, leg. Ekipa, 4♀ 4♂, ZMPA; Zielona Gora, Babimost near Sulechów [15.82°E 52.17°N], 18.4.–11.5.1987, leg. Ekipa, 3♀, ZMPA; same data, 11.–25.5.1987, 3♀, ZMPA.

RUSSIA: Irkutskaya Oblast, Nizhnij-Ilimsk [103.25°E 57.18°N], 30.5.1965, leg. V. Zherichin, 2♀, ZMUM; Irkutskaya Oblast, Shelekhovskiy Rayon, D. B. Glubokaja [103.84°E 51.89°N], 21.5.1969, leg. B.N. Verzhutskii, 1♀, ZMUM [swept from *Pinus sylvestris*]; Irkutskaya Oblast, Slyudyanskiy Rayon, D. Tibel'ti [103.25°E 51.78°N], 3.6.1963, leg. B.N. Verzhutskii, 1♀, ZMUM [beaten from pine]; same data, 4.6.1963, 1♀, ZMUM [beaten from pine]; Irkutskaya Oblast, Yurty, Kansk. u. [= uezd, = area], Enis g. [= guberniya, = Enissey Gouvernement] [97.62°E 56.05°N], 26.5.1912, leg. M. Verkhov, 1♀, ZIN; Moskovskaja Oblast, Moscow environs, Ugtischi, 22.5.1935, leg. G. Kostylev, 1♀, ZMUM; Moskovskaya Oblast, Bakovka [37.33°E 55.67°N], 8.5.1967, leg. A.P. Rasnitsyn, 4♀, ZMUM; Moskovskaya Oblast, Losinyi ostrov [37.82°E 55.85°N], 9.5.1982, leg. A.P. Rasnitsyn, 1♀, ZMUM; same data, 23.5.1982, 10♀, ZMUM; same data, 30.5.1982, 6♀, ZMUM; same data, 30.4.1984, 12♀, ZMUM; same data, 5.5.1984, 4♀ 1♂, ZMUM; same data, 6.5.1984, 2♀ 2♂, ZMUM; same data, 30.5.1984, 11♀, ZMUM; Moskovskaya Oblast, Moscow environs, Cherepkovo [37.38°E 55.77°N], 9.5.1976, leg. A.N. Zhelochovtsev, 1♀, ZMUM; Moskovskaya Oblast, Moscow environs, Izmaylovo [37.77°E 55.78°N], 24.5.1939, leg. A.N. Zhelochovtsev, 1♂, ZMUM; Moskovskaya Oblast, Moscow, Tushino [37.43°E 55.85°N], 25.4.1962, leg. A.P. Rasnitsyn, 1♀, ZMUM; same data, 1.5.1969, 3♀, ZMUM; same data, 1.5.1970, leg. A.P. Rasnitsyn, 4♀ 1♂, ZMUM; Moskovskaya oblast, B... [illegible], 12.5.1963, leg. A.P. Rasnitsyn, 1♀, ZMUM [collected from pine]; Moskovskaya oblast, Bakovka stantsiya [37.33°E 55.68°N], 8.5.1967, leg. L. Prokhorova, 1♀, ZMUM; Moskovskaya Oblast, Rublëvskiy les [37.35°E 55.78°N], 3.5.1975, leg. A.N. Zhelochovtsev, 1♀, ZMUM; same data, 3.5.1975, leg. L. Zimina, 1♀, ZMUM; Moskovskaya Oblast, Serpukhovskiy Rayon, Luzhki [37.56°E 54.86°N], 17.5.1964, leg. A.P. Rasnitsyn, 3♀, ZMUM; 30.5.1964, leg. A.P. Rasnitsyn, 6♀, ZMUM; Moskovskaya Oblast, Tomilino [37.94°E 55.66°N], 25.5.1955, leg. D. Panfilov, 1♀, ZMUM; Moskovskaya Oblast, Zvenigorod [36.87°E 55.72°N], 23.5.1971, leg. Antonova, 1♀, ZMUM; Murmanskaya Oblast, bass. oz. [= ozera, =

sea] Vud'yavr, Chibip. g. Kol'sk [= Kola peninsula, Vud-Ozero] [31.87°E 67.00°N], 18.6.1931, leg. V. Fridolin, 1♀, ZIN; Murmanskaya Oblast, Kola-Halbinsel, Chibiny, Wudjaur [= Kola peninsula, Khibiny, sea Imandra] [33.22°E 67.67°N], 4.7.1931, leg. V. Fridolin, 2♀, NHRS; Respublica Gorno-Altay, Altai [= Altayskiy khrebet], ... [87.5°E 49.00°N], 7.5.1953, 1♀, ZMUM [on birch]; same data, 12.5.1953, 1♀, ZMUM [on birch; since label data "Alt.khr." (in Kyrilic) are sparse and the Altai Mountains cover a vast area of East Kazakhstan, North China, West Mongolia and the Russian Republic Gorno-Altay, the geographic association of this material is uncertain]; Respublica Gorno-Altay, Altayskiy Zapovednik [= Altai Reserve], Khrebet Tobsu [89.00°E 50.92°N], 2.5.1940, leg. M. Fedyay, 1♀, ZMUM; Ryazanskaya Oblast, Izhevskiy Rayon, Okskiy zapovednik [= Okskiy Reserve] [41.05°E 54.55°N], 24.5.1946, leg. A. Peredel'skiy, 1♀, ZMUM; same data, 27.5.1946, 1♂, ZMUM; Sankt Peterburg Oblast, Kchlise u. [= uezd; = area], r. Khrevitsa [= reka, = river Khrevits] [28.85°E 59.27°N], 8.6.1927, leg. M. Cheburova, 1♀, ZMUM; Sankt Peterburg Oblast, khd. st. Ozel'ki [= Stantsiya Osel'ki] [30.50°E 60.22°N], 23.5.1978, leg. A. Zinovjev, 1♀, ZIN; Sankt Peterburg Oblast, Vyritsa [30.35°E 59.42°N], 15.5.1978, leg. A. Zinovjev, 1♀, ZIN

SLOVAKIAN REPUBLIC: Marcelová [18.29°E 47.79°N], 28.5.1976, leg. J. Strejček, 1♀, MKC.

SPAIN: Aragón, Sierra de Gúdar, Rio Blanco, 1400 m alt. [0.70°W 40.45°N], 21.5.1959, leg. J. Aubert, 1♀, MZLS; Madrid Prov., Sierra de Guadarrama, Cercedilla, El Ventorrillo [4.07°W 40.73°N], 11.–20.4.1990, leg. Nieves & Rey, 1♀ 1♂, MNMS; same data, 20.–30.4.1990, 1♀ 5♂, MNMS; same data, 1.–7.5.1990, 2♀ 12♂, MNMS; same data, 7.–15.5.1990, 6♀, MNMS; same data, 15.–22.5.1990, 19♀ 6♂, MNMS; Madrid Prov., Tablada [= Cercedilla, estación de Tablada] [4.07°W 40.73°N], 14.5.1919, leg. J.M. Dusmet, 1♂, MNMS [Dusmet y Alonso 1935]; Teruel, Aragon, Moscardón [1.53°W 40.33°N], 31.5.1984, leg. H. Teunissen, 1♀, RMNH.

SWEDEN: Älvsborgs Län, Skepplanda s:n ravine of Grönan [12.25°E 58.03°N], 10.–20.5.1995, leg. M. Söderland, 2♀ 1♂, USNM; Älvsborgs Län, Västergötland [13.05°E 58.02°N], 2♀, MZLU; same data, leg. Gyllenhal, 1♀, MZLU; B. S., leg. C.H. Boheman, 1♀, NHRS; Blekinge Län, Kristianopel [16.03°E 56.25°N], 15.5.1989, leg. R. Danielsson, 1♀, MZLU; Gävleborgs Län, Loos [17.00°E 61.50°N], 23.5.1923, leg. O. Sjöberg, 1♀, NHRS; same data, 24.5.1923, 1♂, NHRS; same data, 26.5.1923, 1♀, NHRS; same data, 3.6.1923, 1♀, NHRS; Hallands Län, Enslöv, Årnilt [13.05°E 58.17°N], 21.5.1969, leg. H. Andersson, 2♀, MZLU; same data, 13.5.1972, 2♀ 2♂, MZLU; Hallands Län, Trönninge, Laxvik, Grusvik [12.92°E 56.60°N], 24.5.2053, leg. Ardö, 3♀, MZLU; Jämtlands Län, Jämtland [14.18°E 63.13°N], 1♀, ZMUH; Jämtlands Län, Östersund [14.63°E 63.18°N], 4.7.1931, leg. K. Fahlander, 1♀, MZLU; same data, 6.6.1933, 1♂, MZLU; Jönköpings Län, Växjö, Högaskruv [14.97°E 57.02°N], 29.4.1989, leg. R. Danielsson, 1♀ 1♂, MZLU; Jönköpings Län, Växjö, Södra Åreda [14.98°E 56.90°N], 29.4.1989, leg. R. Danielsson, 2♀, MZLU; Kopparbergs Län, Dalecarlia [= Dalarna] [14.07°E 61.02°N], leg. C.H. Boheman, 1♀ 1♂, NHRS; Kopparbergs Län, Falun, Strångt Järn [15.63°E 60.60°N], 1♀, NHRS; Kopparbergs Län, Lima [13.35°E 60.93°N], leg. T. Tjeder, 2♀, NHRS; Kopparbergs Län, Östanvik [15.22°E 61.17°N], 27.5.1975, leg. T. Tjeder, 1♀, MZLU; Kopparbergs Län, Rättvik, Draggen [15.10°E 60.88°N], 25.5.1975, leg. T. Tjeder, 1♀, MZLU; Lapponia intermedia [19.00°E 66.00°N], 2♀, MZLU; Malmöhus Län, Veberöd, Ljungen [13.48°E 55.63°N], 7.5.1981, leg. H. Andersson, 1♂, MZLU; same data, 17.4.1982, 3♀ 7♂, MZLU; same data, 15.5.1988, 1♀, MZLU; same data, 15.5.1992, 2♀ 3♂, MZLU; Malmöhus Län, Veberöd, Ljungen [13.48°E 55.63°N], 15.5.1976, leg. H. Andersson, 1♀, MZLU; Norrbottens Län, Kalixfors [20.20°E 67.73°N], 26. June, leg. R. Malaise, 1♀, NHRS; Norrbottens Län, Masugnsbyn [22.05°E 67.45°N], 3.7.1951, leg. Ander, Ardö, Berdén & Dahl, 1♀, MZLU; Norrbottens Län, Pajala by [23.37°E 67.20°N], 8.7.1951, leg. S. Berdén, 1♀, MZLU; Östergötlands Län, Östergötland [15.57°E 58.40°N], leg. C.J.E. Haglund, 4♀ 1♂, NHRS; Schweden [= Sweden], 1♀ 1♂, ZMUC; Stockholms län, Hlm. [= Stockholm] [18.05°E 59.33°N], leg. P. Wg., 2♂, NHRS; Stockholms län, Stockholm, Ingarö [18.47°E 59.27°N], 7.6.1936, leg. R. Malaise, 1♀, NHRS; Stockholms län, Stockholm, Möja [18.89°E 59.43°N], 3.6.1933, leg. R. Malaise, 4♀, NHRS; Stockholms län, Upplandia [= Uppland] [17.80°E 59.98°N], 20. May, 1♀, NHRS; same data, 3. June, 1♀, NHRS.

SWITZERLAND: Bern, Bgdf. [= Burgdorf] [7.63°E 47.07°N], leg. Meyer-Dür, 1♀, MNHN; Fribourg, Aclens [= Attalens] [6.23°E 46.48°N], 3.5.1959, leg. J. de Beaumont, 2♀, MZLS; Fribourg, Ecublens [6.80°E 46.60°N], 3.5.1964, leg. J. de Beaumont, 1♀, MZLS; Genève, Genève, Pace de Nations, de kiosqué vitré [6.17°E 46.20°N], 25.4.1994, leg. J. Steffen, 2♀, MHNG; Jura, Auvernier [6.87°E 46.97°N], 15.4.1960, leg. J. de Beaumont, 3♀, MZLS; same data, 13.5.1960, 3♀, MZLS; Valais, Visp. / Val D. [= Visperterminen] [7.90°E 46.25°N], leg. O. Sichel, 1♀, MNHN; same data, 3♀, MNHN.

TURKEY: Sivas Prov., KPD [= Taşlıdere, KDP karşısı, 1230 m alt., 39.65°N 37.03°E], 21.4.2001, leg. H.H. Başıbüyük, 1♀, CUBS.

UKRAINE: Poltavska Oblast, Poltava environs [34.57°E 49.58°N], leg. Kurdjumov, 1♀, ZMUM.

USA: New Jersey, McGuire Air Force Base (in aircraft from Germany), 6.5.1989, leg. B. Emans, 1♀, USNM [specimen originating from Germany, transported to US and intercepted at border control].

AMBIGUOUS: [no data] 44♀ 15♂, DEI, MMBC, MNHN, MZLS, MZLU, NHRS, NMW, SMFD, SMTD, ZMHB, ZSM; [no data], 8.5.1897, 1♀, MMBC; [no data], 9.5.1920, 1♀, NHRS; [no data], 20.3.1931, leg. J.A. Snyder, 2♀, RMNH; Itl. [= ?], leg. C.H. Boheman, 1♂, NHRS; Lapponia [Sweden or Finland?], 1♂, MZLU; [label data illegible], 4♀ 1♂, MZLU, SMFD; [label data illegible], 6.5.1900, leg. J.C.H. de Meijere, 1♀, ZMAN; [label data illegible], 15.5.1866, leg. W.H.C.F. Wüstnei, 2♀, ZMUC; [label data illegible], 18.5.1886, 1♀, MZLS; [label data illegible], 24.5.1917, 2♀, NHRS.

Xyela kamtshatica Gussakovskij, 1935

JAPAN: Honshu, Ishikawa Pref., Mount Haku [136.77°E 36.15°N], 22.7.1962, 1♀ ZMUM ["*X. ?kamtshatica*" of Rasnitsyn 1965, here only tentatively identified due to bad preservation]; same data, 22.7.1968, 2♀ 5♂, NSMT; same data, 2000–2700 m alt., 15.7.1981, leg. I. Togashi, 4♀ 4♂, NSMT; Ishikawa Pref., Mount Haku, Murodaira, 15.7.1981, leg. I. Togashi, 3♀ 1♂, NSMT; Honshu, Ishikawa Pref., Mount Haku, Ohana Matsubara, 22.7.1962, 1♂, NSMT.

RUSSIA: Kamchatskaya Oblast, sel [= village] Klyuchevskoe na r. [= na reka, on river] Kamchatk' [= Kamchatka, Klyuchi] [160.85°E 56.30°N], 6.6.1909, leg. A. Derzhavin, 1♀, ZIN [holotype, Gussakovskij 1935].

Xyela koraiensis Blank & Shinohara, sp. nov.

RUSSIA: Primorskiy Kray, Sikhote Alin, bas. r. Syakhobe [= basseyn reka, = basin of river Sankhobe], kl. [= klyuch, spring] Tigrovyy [136.31°E 45.29°N], 11.5.1937, leg. K. Grunin, 1♀, ZMUM; Primorskiy Kray, Sikhote Alin, bas. r. Syakhobe [= basseyn reka, = basin of river Sankhobe], kl. [= klyuch, spring] Podnebesi [136.31°E 45.20°N], 18.5.1937, leg. K. Grunin, 1♀; Primorskiy Kray, Sikhote-Alin, bas. r. [= basseyn reka, = basin of river] Takema [137.00°E 45.69°N], 6.6.1937, leg. K. Grunin, 1♀, ZIN; Primorskiy Kray, Ussuriysk SE 33 km, Ussuriysky Reserve [132.30°E 43.62°N], 21.–26.5.1994, leg. A. Shinohara, 3♀ 4♂, NSMT [including holotype].

SOUTH KOREA: Kangwon-do, Mirugam (Pugdaesa), Mount Odaesan, 1300 m alt. [128.57°E 37.80°N], 15.5.1990, leg. A. Shinohara, 1♀, NSMT; same data, 22.5.1992, 1♀, NSMT; same data, 28.5.1992, 3♀ 15♂, NSMT; same data, 30.5.1992, 1♀, NSMT.

Xyela longula Dalman, 1819

AUSTRIA: Lower Austria, Wiener Neustadt W 20 km, Hohe Wand [16.00°E 47.82°N], 24.4.1948, leg. Fulmek, 1♂, NMW [identified as *X. helvetica* by Blank 2002, fig. 7]; North Tyrol, Zirler Berg, Martinswand [11.20°E 47.32°N], 22.3.1980, leg. E. Heiss, 3♀ 3♂, DEI; 26.3.1980, leg. W. Schedl, 1♀, EJC.

CZECHIAN REPUBLIC: Vrané nad Vltavou [14.38°E 49.94°N], 12.4.1970, leg. J. Strejček, 1♂, MKC.

FINLAND: Hame, Hämeenlinna, Käikälä [24.45°E 61.00°N], 2.5.1982, leg. V. Vikberg, 1♀ 1♂, MZHF; Hame, P.-Pirkkala [23.58°E 61.47°N], 6.6.1910, leg. Th. Grönblom, 1♀, MZHF; Hame, Turenki [24.63°E 60.91°N], 30.6.2005, leg. V. Vikberg, 1♀ 2♂, DEI [2 specimens used for barcoding: DEI-GISHym 15643–15644]; Finland, Hame, Turenki, Konttila [24.66°E 60.90°N], 30.6.2005, leg. V. Vikberg, 39 larvae from *Pinus sylvestris*, DEI [1 specimen used for barcoding: DEI-GISHym 15657]; Uusimaa, Nurmijärvi [24.80°E 60.47°N], 18.5.1980, leg. M. Koponen, 1♂, MZHF.

FRANCE: Ile-de-France, Seine-et-Marne, F. de Fontainebleau [2.70°E 48.41°N], 12.5.1935, leg. A. Seyrig, 1♀, MNHN; Auvergne, Tence [4.28°E 45.12°N], 10.4.1927, leg. H. Maneval, 1♂, MNHN (tentative identification).

GERMANY: Bavaria, Fränkischer Jura [11.50°E 49.33°N], 1.5.1940, leg. E. Enslin, 1♀, MKC; Bavaria, Fürth [10.97°E 48.48°N], 20.4.1915, leg. E. Enslin, 1♀, ZSM; same data, 12.4.1920, 1♂, MKC; Bavaria, Steigerwald [10.50°E 49.80°N], 20.4.1939, leg. E. Enslin, 1♂, MKC; Bavaria, Vilstal, Poxau 2 km N [12.55°E 48.56°N], 25.3.2007, leg. A.D. Liston, 1♂, DEI; Brandenburg, Carls. [=Karlsruhe], Gyr. [= Kyritz] [12.40°E 52.95°N], leg. F.W. Konow, 2♀, DEI, SMFD; Brandenburg, Fürstenberg in Mecklenburg [13.17°E 53.18°N], leg. F.W. Konow, 1♂, ZMUC; same data, 17.4.1889, 1♀, HNHM; same data, 10.4.1891, 1♀, ZMUC; Mecklenburg-Vorpommern, T. [= Teschendorf in Mecklenburg, in coll. Konow] [13.37°E 53.45°N], 23.4.1898, leg. F.W. Konow, 1♂, DEI; same data, 28.3.1903, 1♂, DEI; Mecklenburg-Vorpommern, Waren / Müritz [12.68°E 53.52°N], 9.4.1931, 1♂, ZMUH; North Rhine-Westphalia, Crefeld [= Krefeld] [6.58°E 51.33°N], 4.1913, 1♀, MKC; Sachsen-Anhalt, Halle an der Saale [11.97°E 51.48°N], 1♀, MKC; Sachsen-Anhalt, Halle an der Saale, Dölauer Heide [11.88°E 51.51°N], 19.4.1914, leg. Schlüter, 1♀, MKC.

NETHERLANDS: Noordwijk [4.43°E 52.25°N], April, leg. S.C. Snellen van Vollenhoven, 1♀, ZMAN.

RUSSIA: Moskovskaya Oblast, Losinyi ostrov [37.82°E 55.85°N], 6.5.1984, leg. A.P. Rasnitsyn, 1♀, ZMUM; Sankt Peterburg Oblast, Dep. Maruya, Novoladozhsk. u. [= uezd, = area], Petrogradskoy guberniy [= province] [31.85°E 60.08°N], 29.6.1917, leg. W. Barovskiy, 1♀, ZIN; Sankt Peterburg Oblast, Luga [29.85°E 58.74°N], 15.4.–15.5.1914, leg. A. Gutbir, 1♀, ZIN; Sankt Peterburg Oblast, Vyritsa [30.35°E 59.42°N], 2.5.1977, leg. A. Zinovjev, 1♀, ZIN.

SWEDEN: Gävleborgs Län, Gästrikland [16.66°E 60.68°N], leg. C.H. Boheman, 2♀ 1♂, NHRS; Jämtlands Län, Jämtland [14.18°E 63.13°N], leg. C.H. Boheman, 1♀ 1♂, NHRS; Jönköpings Län, Småland, Hultsjö [14.70°E 57.32°N], 4.5.1927, leg. S. Pontin, 1♀, MZLU; Kopparbergs Län, Dalarna, Rättvik, Mun. samh:t [15.13°E 60.89°N], 11.5.1977, leg. T. Tjeder, 1♂, MZLU; Kopparbergs Län, Småland, Hornberga, Trambroan till Nyavägen [14.59°E 61.20°N], 26.4.1926, 1♀, NHRS; Lpl. [= Lappland] [20.17°E 61.20°N], leg. C.G. Thomson, 1♀, MZLU [lectotype of *X. piliserra*, Thomson 1871]; Vestrogothia [= Skaraborgs län or Älvborgs län], 1♀, UUZM [lectotype of *X. longula*, Dalman 1819]; Västerbottens Län, Lyksele Lappmark, Sorsele [17.54°E 65.54°N], 17.5.1921, leg. D. Gaunitz, 1♂, MZLU.

SWITZERLAND: Vaud, Peney [6.55°E 46.80°N], 16.4.1886, 1♀, MHNG.

AMBIGUOUS: [no data], 2♀, MZLU; [no data], 1 specimen, MZLU [additional label: "*Xyela erichsoni* är sunno liktblatten varietet af *longula*"]; [no data], 15.4.1895, 1♀, MMBC.

Xyela lugdunensis (Berland, 1943)

FRANCE: Midi-Pyrénées, Cabrerets [1.65°E 44.53°N], 1.–5.4.1983, leg. H. Tussac, 1♀, INRA [reported as *X. curva* by Chevin & Tussac 1992]; Rhone-Alpes, Écully, Rhône [4.77°E 45.77°N], leg. G. Audras, 1♀, MHNL; same data, 4.1954, leg. G. Audras, 1♀, MHNL; Rhone-Alpes, Lyon [4.84°E 45.74°N], 1919, leg. J. de Gaulle, 1♀, MNHN [holotype of *Xyelatana lugdunensis*, Berland 1943].

HUNGARY: Szeged, Újszeged, Népliget (City Park) [46.248°N 20.162°E], 14.3.2011, leg. H. Gyurkovics, 1♀, SCMK [holotype of *Xyela nigroabscondita*, Haris & Gyurkovics 2011]; same data, 15.3.2011, 1♀1♂, HNHM [paratypes of *X. nigroabscondita*, Haris & Gyurkovics 2011].

Xyela meridionalis Shinohara, 1983

TAIWAN: Nantou-Hsien, Puli E 15 km, Nanshanchi, 800 m alt. [121.10°E 24.00°N], 15.3.1979, leg. A. Shinohara, 1♀, UOPJ [holotype, Shinohara 1983]; same data, 15.3.1991, 1♀, NSMT; same data, 17.3.1991, 1♂, NSMT; same data, 21.3.1991, 1♀, NSMT.

Xyela menelaus Benson, 1960

AUSTRIA: Lower Austria, Dürnstein [15.52°E 48.38°N], 7.–9.4.1994, leg. E. Altenhofer, rearing no. EA7.–9.5.95 / *Pinus nigra nigra*, em. 24.4.1996, 3♀ 5♂, DEI; same data, 7.5.1994, rearing no. EA7.5.94 / *Pinus nigra nigra*, em. 23.4.1996, 1♂, DEI; same data, 7.5.1994, rearing no. EA7.5.94 / *Pinus nigra nigra*, em. 1.5.1996, 1♂, DEI.

CROATIA: Moscenice—Sv. Jelena, 150 m alt. [14.23°E 45.22°N], 7.4.1999, leg. S.M. Blank, 1♀, DEI [swept from gras under *Pinus nigra* and *P. halepensis*].

FRANCE: Corse, Haute-Corse, Forêt communale de Vivario [= Vivario], 800 m alt. [9.16°E 42.16°N], 9.5.2004, leg. A.D. Liston, 1♀, DEI [*X. graeca* in Liston & Späth 2005]; Corse, Haute-Corse, Haut Ascu [= Haut Asco], 1200 m alt. [9.03°E 42.45°N], 1.5.2004, leg. A.D. Liston, 4♂, DEI [*X. graeca* in Liston & Späth 2005]; same data, 2.5.2004, 1♀ 6♂, DEI [*X. graeca* in Liston & Späth 2005].

GREECE: Epirus, Kónitsa ENE 23 km, Samarína NW 3 km, 1670 m alt. [20.98°E 40.13°N], 13.5.2007, leg. S.M. Blank & A. Taeger, 1♀ 1♂, DEI [2 specimens used for barcoding: DEI-GISHym 15629, 15637]; Epirus, Konitsa NE, 1350 m alt. [20.82°E 40.05°N], 2.5.1999, leg. S.M. Blank & C. Kutzscher, 14♀, DEI [1 specimen used for barcoding: DEI-GISHym 15542]; Epirus, Konitsa, 650 m alt. [20.75°E 40.05°N], 2.5.1999, leg. S.M. Blank & C. Kutzscher, rearing no. Z36/99 / *Pinus nigra pallasiana*, em. 20.3.2000, 25♂, DEI, ZIN; same data, em. 21.3.2000, 1♀ 3♂, DEI; same data, em. 22.3.2000, 8♀ 4♂, DEI; same data, em. 23.3.2000, 7♀ 3♂, DEI; same data, em. 27.3.2000, 1♂, DEI; Epirus, Konitsa S 6 km, 650 m alt. [20.77°E 40.10°N], 4.5.1999, leg. S.M. Blank & C. Kutzscher, rearing no. Z37/99 / *Pinus nigra pallasiana*, em. 20.3.2000, 9♂, DEI; same data, em. 21.3.2000, 2♀ 3♂, DEI; same data, em. 22.3.2000, 3♀ 1♂, DEI; same data, em. 23.3.2000, 8♀, DEI; same data, em. 24.3.2000, 1♀, DEI; Epirus, Metsovo NW 19 km, Vovoussa SW 7 km, 1500 m alt. [21.02°E 39.88°N], 26.5.2000, leg. S.M. Blank & C. Kutzscher, rearing no. Z8/00 / *Pinus nigra pallasiana*, em. 18.–19.2.2001, 1♂, DEI; same data, em. 20.2.2001, 2♀ 1♂, DEI [1 specimen used for barcoding: DEI-GISHym 18738]; Macedonia, Litochoron E, 780 m alt. [22.48°E 40.10°N], 5.5.1999, leg. S.M. Blank & C. Kutzscher, rearing no. Z38/99 / *Pinus nigra pallasiana*, em. 20.3.2000, 6♂, DEI; same data, em. 21.3.2000, 1♀, DEI; same data, em. 22.3.2000, 2♀ 4♂, DEI; Peloponnes, Kastanica [22.65°E 37.27°N], leg. W.H. Muche, 2♂, SMTD; Peloponnes, Parnon, Vamvakou environs [22.63°E 37.20°N], leg. W.H. Muche, 1♀ 1♂, SMTD; same data, May, 2♂, MKC; Peloponnes, Taygéte [= Taygetos Mountains] [22.30°E 37.10°N], 21.5.1955, leg. J. Aubert, 1♀, MZLS [holotype, Benson 1960]; Thessalia, Mount Ossa, Anatoli N, 1200 m alt. [22.70°E 39.78°N], 24.5.2000, leg. S.M. Blank & C. Kutzscher, rearing no. Z5/00 / *Pinus nigra pallasiana*, em. 16.2.2001, 2♂, DEI; same data, em. 17.2.2001, 1♂, DEI; same data, em. 18.–19.2.2001, 1♀ 9♂, DEI; same data, em. 20.2.2001, 6♀ 5♂, DEI; same data, em. 22.2.2001, 7♀, DEI; same data, em. 23.2.2001, 3♀, DEI; same data, em. 24.2.2001, 2♀, DEI; same data, em. 25.2.2001, 1♀, DEI.

HUNGARY: Pest Megye, Budapest NW 15 km, Nagykovácsi [18.88°E 47.58°N], 25.4.1993, leg. L. Zombori, 15♀ 7♂, HNHM; Pest Megye, Budapest SW 9 km, Budaörs, Csiki-hegyek [= Csiki Mountains] [18.97°E 47.45°N], 21.4.1977, leg. L. Zombori, 1♂, HNHM; Pest Megye, Budapest, Cinkota, Naplás-to [= Lake Naplas] [19.18°E 47.50°N], 22.4.1993, leg. L. Zombori, 28♀ 4♂, HNHM; Pest Megye, Nagykovácsi [18.88°E 47.58°N], 1.5.1993, leg. L. Zombori, 11♀, HNHM; same data, 25.4.2002, 2♀, HNHM.

ITALY: Sicily, Etna Massif N, Linguaglossa SW ca 10 km, Piano Provenzana, 1600 m alt. [15.03°E 37.80°N], 16.5.2010, leg. A.D. Liston, 3♀ 2♂, DEI [2 specimens used for barcoding: DEI-GISHym 15552, 15558].

TURKEY: Antalya Prov., Antalya W 37 km, Saklıkent S, Bakırlıdağı (Bey Dağları), 1700 m alt. [30.33°E 36.84°N], 3.6.1998, leg. S.M. Blank, rearing no. Z42B/98 / *Pinus nigra pallasiana*, em. 6.4.1999, 1♂, MZHF; same data, em. 7.4.1999, 3♀ 1♂, DEI; same data, em. 8.4.1999, 1♀, DEI; same data, em. 12.4.1998, 1♀ 1♂, DEI; same data, em. 14.4.1999, 1♀, DEI; Antalya Prov., Antalya W 37 km, Saklıkent S, Bakırlıdağı (Bey Dağları), 1700 m alt. [30.33°E 36.84°N], 3.6.1998, leg. S.M. Blank, rearing no. Z42A/98 / *Pinus nigra pallasiana*, em. 30.3.1999, 1♂, DEI; same data, em. 31.3.1999, 1♂, DEI; same data, em. 1.4.1999, 1♂, DEI; same data, em. 6.4.1999, 6♀ 3♂, DEI; same data, em. 7.4.1999, 1♀, MZHF; same data, em. 9.4.1999, 1♀ 1♂, DEI; same data, em. 12.4.1999, 1♂, DEI; Burdur Prov., Çardak E 10 km, Acigöl Salzsee [= salt lake] [29.78°E 38.86°N], 5.5.1992, leg. L. Behne, 19♀ 4♂, DEI.

Xyela obscura **(Strobl, 1895)**

AUSTRIA: Carinthia, Karawanken, Petzen massive, Knirps summit W [14.78°E 46.51°N], 1060 m alt., 8.7.2004, leg. L. Zerche, 3♀, DEI; North Tyrol, Trins [11.42°E 47.08°N], 24.6.1988, leg. C. Saure, 1♀, EJC; Salzburg, Krumltal, Rauris [12.99°E 47.24°N], 5.7.1995, leg. E. Altenhofer, rearing no. EA5.7.95 / *Pinus mugo*, em. 4.5.1997, 30♀ 37♂, DEI, MZHF, ZIN; Salzburg, Obertauern [13.54°E 47.25°N], 5.7.1995, rearing no. EA5.7.95 / *Pinus mugo*, em. 19.5.1997, 1♀ 2♂, RMNH; same data, em. 14.2.1997, 2♀ 11♂, DEI; same data, em. 18.2.1997, 3♀, DEI, same data, em. 19.2.1997, 2♂, DEI; same data, em. 20.2.1997, 4♀ 2♂, DEI, MVC; same data, em. 24.2.1997, 3♀, DEI; Styria, Admont SE 4,5 km, Scheibleggerhochalpe, 1600 m alt. [14.50°E 47.54°N], leg. G. Strobl, 1♀, NMBA [lectotype, Strobl 1895]; Styria, Admont SE 5,5 km, Gesäusealpen, Kalblinggatterl [14.52°E 47.54°N], leg. H. Franz, 1♂, NMW; Styria, Admont SE 5,5 km, Kalbling, 1600 m alt. [14.52°E 47.54°N], 8.6.1895, leg. G. Strobl, 1♀, NMBA [Strobl 1895]; Styria, Hall N 5 km, Haller Mauern [14.45°E 47.65°N], leg. H. Franz, 3♀ 3♂, NMW; Styria, Hall NE 5 km, Natterriegel [14.49°E 47.64°N], 8. June, leg. G. Strobl, 2♀ 3♂, NMBA; Styria, Hohentauern WNW 3,5 km, Scheiblstein, 1600 m alt. [14.44°E 47.44°N], 6.6.1895, leg. G. Strobl, 1♀, NMBA [Strobl 1895]; Styria, Ramsau NW, Dachsteinsüdwandhütte [= Dachstein Glacier, way to Südwandhütte], 1700–1850 m alt. [13.61°E 47.45°N], 1.7.2011, leg. S.M. Blank, 50 larvae from *Pinus mugo*, DEI [2 specimens used for barcoding: DEI-GISHym 15515–15516]; Styria, Rottenmannertauern, Scheiplsee [= Scheibelsee] environs, 1600 m alt. [14.41°E 47.65°N], 26.5.1890, leg. G. Strobl, 1♂, NMBA [♂ syntype of *Pinicola alpigena*, Strobl 1895]; Styria, Stoderzinken [= Gröbming, Dachstein Mountains, Stoderzinken] [13.82°E 47.45°N], 8.7.1994, leg. E. Altenhofer, rearing no. EA8.7.94 / *Pinus mugo*, em. 7.5.1996, 1♀, DEI; Styria, Styr. alp. [= Styrian Alps], leg. G. Strobl, 3♀, HNHM, NHRS, SMFD; Styria, 1♀, MNMS.

BULGARIA: Pirin Mountains, Goli Wrach, 2000 m alt. [23.50°E 41.68°N], 11.6.1990, leg. F. Menzel, 1♀, DEI; Pirin Mountains, Sandanski NE 20 km, environs of Begovica hut, 1800 m alt. [23.45°E 41.70°N], 10.6.1990, leg. A. Taeger & F. Menzel, 35♀ 3♂, DEI, MHNG; Rila Mountains, environs of Maljovica hut, 1800 m alt. [23.38°E 42.18°N], 20.6.1989, leg. L. Zerche & L. Behne, 1♂, DEI;; same data, 2300 m alt. 20.6.1989, 2♀ 1♂, DEI; Rila Mountains, Rila monastery [= Rilski Manastir], 1200–2000 m alt. [23.35°E 42.13°N], 20.6.1990, leg. A. Taeger & F. Menzel, 1♀, DEI; Sitnjakowo, Tschetèr Tepe [= Samokov SSE 10 km, Sitnjakovo, Tshadjar Tepe], 1750 m alt. [23.63°E 42.26°N], 7.1917, leg. S. B. von Bötticher, 1♀, ZMHB.

GERMANY: Bavaria, Lusenblockfeld, 1370 m alt. [13.45°E 48.94°N], 20.6.2000, leg. S.M. Blank, larvae, DEI; Bavaria, Berchtesgaden national park, Pfaffenkegel, Malaise trap 1, 1740 m alt. [13.04°E 47.57°N], 20.6.1999, leg. J. Voith, 18♀, DEI [1 specimen used for barcoding: DEI-GISHym 4786], ZIN; same data, Malaise trap 2, 1740 m alt., 31.7.1999, 1♀, DEI; Bavaria, Schachen, Alpengarten of the Botanic Institute, Malaise trap 1, 1840 m alt. [11.17°E 47.43°N], 30.6.1999, leg. J. Voith, 4♀ 1♂, DEI; 27.7.1999, leg. J. Voith, 2♀, DEI; Malaise trap 2, 1840 m alt., 30.6.1999, leg. J. Voith, 2♀, DEI.

ITALY: Lombardia, Bergamo NE 58 km, Schilpario environs, Passo Campelli, 1600 m alt. [102.17°E 46.05°N], 22.6.1986, leg. F. Pesarini, 1♀, MCFS; Trentino-Alto Adige, Monte Tremalzo [=Tremalso; = Termalzo err.], Cima Avèz, 1870 m alt. [10.63°E 45.83°N], 17.6.1958, 1♀, ZSM; Trentino-Alto Adige, Sexten [= Sesto]—Mount Helm, mountain station [12.38°E 46.72°N], 17.7.1998, leg. E. Altenhofer, rearing no. EA17.7.98 / *Pinus mugo* / *P. uncinata*, em. 3.2000, 11♀ 4♂, DEI [Altenhofer et al. 2001]; Veneto, Malcesine E 4 km, Monte Baldo, Bocca di Tratto Spino S, 1830 m alt. [10.86°E 45.75°N], 26.6.2008, leg. A.D. Liston, 1♀, DEI; Monte Baldo, 1900 m alt. [11.53°E 45.93°N], 26.6.2004, leg. A.D. Liston, 1♀, DEI [specimen used for barcoding: DEI-GISHym 18741].

SLOVAKIAN REPUBLIC: Magas Tátra, Pátria [Mount Patria] [20.07°E 49.15°N], 5.7.1974, leg. Szelènyi, 1♀, HNHM; Štrbské Pleso [20.05°E 49.12°N], leg. Obenberger, 2♀, HNHM; Liptovský Mikulás S 14 km, Demänovská valley S, Konský grún, 1770 m alt. [19.60°E 48.95°N], 20.6.2005, leg. S.M. Blank, 2♀, DEI [1 specimen used for barcoding: DEI-GISHym 18742, Roller et al. 2006].

SWITZERLAND: Graubünden, Engadine, Swiss National Park [10.28°E 46.65°N], 6.–9.6.1960, leg. J.E. & R.B. Benson, 1♀, BMNH; same data, 1800 m alt., 4.6.1960, 1♀ 1♂, BNMC; same data, 1800 m alt., 12.6.1960, 2♀, BNMC; same data, 1800 m alt., 13.–15.6.1960, 2♀, BMNH, NSMT [Benson 1961]; same data, 1850 m alt., 2.–3.6.1960, 1♂, BNMC; same data, 2000 m alt., 8.6.1960, 1♀, BNMC; same data, 2000 m alt., 16.6.1960, 1♂, NSMT.

AMBIGUOUS: [no data], 1♀, NHRS; [no data], 1♀, NMW; [label data illegible], 8. June, leg. G. Strobl, 2♀, HNHM [possibly syntypes].

Xyela peuce Blank, sp. nov.

BULGARIA: Pirin Mountains, Sandanski NE 20 km, environs of Begovica hut, 1800 m alt. [23.45°E 41.70°N], 10.6.1990, leg. A. Taeger & F. Menzel, 10♀, DEI [holotype], USNM; Pirin Mountains, Wichren hut, 1000 m alt. [23.45°E 41.73°N], 7.6.1986, leg. L. Zerche & L. Behne, 1♀, DEI; same data, 2050 m alt., 2050 m alt., 11.6.1986, 1♀, DEI; same data, 2050 m alt., 13.6.1988, 1♀, DEI; same data, 2100 m alt., 10.6.1989, 1♀, DEI; same data, 2100 m alt., 10.6.1991, 1♀, USNM; Rila Mountains, Borovec S, 2000 m alt. [23.62°E 42.23°N], 19.6.1988, leg. L. Zerche & L. Behne, 1♀, DEI; Rila Mountains, Borovez, above Sitnijakovo, Solenija Dol, 1865 m alt. [23.59°E 42.26°N], 15.5.2000, leg. L. Zerche, 1♂, DEI [collected close to edge of snow patches in open *Pinus*-*Picea*-wood]; Rila Mountains, Granschar environs [23.62°E 42.10°N], 15.6.1986, leg. L. Zerche & L. Behne, 3♀, DEI [collected close to edge of snow patches]; same data, 2185 m alt., 13.6.1986, 1♀, DEI [close to edge of snow patches].

Xyela pumilae Blank & Shinohara, sp. nov.

JAPAN: Hokkaido, Kamikawa, Mount Piyashiri [142.58°E 44.43°N], 23.6.1990, leg. A. Shinohara, 2♀, DEI NSMT [including holotype]; Hokkaido, Yuubari-city, Mount Yuubari [142.25°E 43.13°N], 1.7.1995, leg. G. Ito, 1♀ 1♂, NSMT.

Xyela rasnitsyni Blank & Shinohara, sp. nov.

CHINA: Jilin Prov., Erdaobaihe, way to nature reserve in Changbai Mountains, ca 700 m alt. [128.11°E 42.42°N], 13.6.1980, leg. E.J. Fittkau, 1♀, ZSM [collected in a mixed forest, among others with *Pinus koraiensis*; E.-J. Fittkau pers. comm.].

RUSSIA: Primorskiy Kray, Komarovskiy Zapovednik [= Ussuriysky Reserve], Grabovaya sopka [132.42°E 43.67°N], 22.5.1984, leg. A.P. Rasnitsyn, 4♀ 1♂, ZIN [collected near *Pinus koraiensis*]; Primorskiy Kray, Okeanskaya [132.03°E 43.25°N], 28.5.1994, leg. A. Shinohara, 1♀ 2♂, NSMT; Primorskiy Kray, Ussuriysk SE 33 km, Ussuriysky Reserve [132.30°E 43.62°N], 21.–26.5.1994, leg. A. Shinohara, 1♀, NSMT [holotype]; Primorskiy Kray, Vladivostok 70 km E, Anisimovka, foot of Mount Litovka, 400 m alt. [132.68°E 43.12°N], 30.5.1994, leg. A. Shinohara, 1♀, NSMT.

SOUTH KOREA: Kangwon-do, Mirugam (Pugdaesa), Mount Odaesan [128.57°E 37.80°N], 27.5.1992, leg. A. Shinohara, 1♂, NSMT; same data, 28.5.1992, 2♀ 8♂, NSMT; same data, 29.5.1992, 1♀, NSMT; same data, 1300 m alt., 13.5.1990, 2♂, NSMT; same data, 1300 m alt., 28.5.1992, 1♀, NSMT; Kyonggi-do, Suwon [127.02°E 37.28°N], 29.4.1987, leg. S.M. Ryu, 1♂, YUIC.

Xyela sibiricae Blank, sp. nov.

MONGOLIA: Tov, Bogdo ul, Bugijn az achuj, 1650 m alt. [107.00°E 47.82°N], 31.5.1967, leg. Kaszab, 2♀, HNHM [Zombori 1971]

RUSSIA: Irkutskaya Oblast, Shelekhovskiy Rayon, D. B. Glubokaja [= Bolshaya Glubokaya] [103.84°E 51.89°N], 9.4.1969, leg. B.N. Verzhutskii, 1♂, ZMUM [flying in coniferous wood]; same data, 18.5.1969, 1♂, ZMUM [beaten from *Pinus sibirica*]; same data, 20.5.1969, 1♀ 1♂, ZMUM [shaken from *Pinus sibirica*]; same data, 26.5.1969, 1♂, ZMUM [collected on *Pinus sibirica*]; same data, 26.5.1969, 1♂, ZMUM [holotype; "s *Pinus sibirica* pri okolote" = beaten from *Pinus sibirica*].

Xyela sinicola Maa, 1947

CHINA: Fujian Prov., Chung-An Hsien, Bohea Hills, Sin-Yang-Tsuen, 250 m alt. [117.48°E 27.33°N], 15.3.1940, leg. T. Maa, 1♀, [holotype of *X. sinicola*, Maa 1947]; Fujian Prov., Shaowu, Shuibei [= Shui-Pei-Chieh] [117.50°E

27.30°N], 16.3.1943, leg. T. Maa, 1♀, [Maa 1949]; Jiangsu Prov., Jiangsu Sheng [120.00°E 33.00°N], 1.4.1986, leg. Li Shangshu, 1♀ 1♂, CSFU; Jiangsu Prov., Nanking [= Nanjing] [118.78°E 32.06°N], 18.3.1984, leg. Li Shangshu, 1♀ 1♂, CSFU [paratypes of *X. lii*, Xiao 1988]; Xianggang, Hong Kong, Sai Kung Station [114.26°E 22.38°N], 10.2.1965, leg. W.J. Voss & Hui Wai Ming, 1♂, BPBM [additional material from this collecting series (from other days in February 1965) indicates that these specimens have most likely been labelled with the obviously wrong collecting date 10.V.1965 instead of 10.II.1965]; same data, 12.2.1965, 2♀, BPBM; same data, 19.2.1965, 1♀ 1♂, BPBM.

Xyela uncinatae **Blank, sp. nov.**

ANDORRA: Soldeu SE 7 km, Pic Blanc d'Envalira, 2500 m alt. [1.72°E 42.54°N], 23.6.1991, leg. C. Dufour, W. Geiger & J.-P. Haenni, 1♀, DEI; St. Julia [= Sant Julià de Lòria], 920 m alt. [1.49°E 42.47°N], 6.6.1983, leg. P.J.L. Roche, 1♀, RMNH.

FRANCE: Provence-Alpes-Côte-d'Azure, Mount Ventoux [5.28°E 44.17°N], 31.5.1936, leg. H. Maneval, 1♀ 1♂, MNHN; Provence-Alpes-Côte-d'Azure, Thorame-Haute [= Thorane-Haut] [6.55°E 44.10°N], 28.5.1995, leg. T. Noblecourt, 7♀ 2♂, TNC [including holotype]; same data, 2000–2020 m alt., 1.6.1996, 2♀ 6♂, DEI, TNC; same data, 2000–2020 m alt., 5.6.1995, 1♀ 2♂, TNC; Provence-Alpes-Côte-d'Azure, Thorame-Haute [= Thorane-Haut], L'Orgeas, 2000 m alt. [6.55°E 44.10°N], 31.5.1999, leg. L. Micas, 5♀ 8♂, DEI, TNC [in part of material collecting date erroneously given as "31.4.1999"]; 11.6.1999, leg. L. Micas, 4♀, TNC; same data, 21.6.1999, 2♀, TNC; Pyrénées-Orientales, Porté-Puymorens [1.83°E 42.55°N], 19.5.1994, leg. J. Lacourt, 5♀, JLC.

SPAIN: Aragón, Baldi Panticosa [= Panticosa], 2100 m alt. [0.28°W 42.73°N], 17.5.1948, leg. P. Brinck, 1♀, MZLU.

SWITZERLAND: Graubünden, Engadine, Swiss National Park, 1800 m alt. [10.28°E 46.65°N], 4.6.1960, leg. J.E. & R.B. Benson, 1♀, DEI; same data, 2.–3.6.1960, 1♂, MZLS; Graubünden, Il Fuorn (Labo), 1790 m alt. [10.22°E 46.67°N], 12.6.1986, leg. J.-P. Haenni, 1♀, MHNN; Valais, Aletschwald, 2000–2300 m alt. [8.03°E 46.37°N], 7.–17.6.1959, leg. J.E. & R.B. Benson, 1♀, MZLS.

Xyela ussuriensis **Rasnitsyn, 1965**

RUSSIA: Primorskiy Kray, Komarovskiy Zapovednik [= Ussuriysky Reserve], Grabovaya sopka [132.42°E 43.67°N], 22.5.1984, leg. A.P. Rasnitsyn, 4♀ 1♂, ZIN [collected near *Pinus koraiensis*]; Primorskiy Kray, Okeanskaja b. Wladivostok [= Okeanskaya near Vladivostok] [132.03°E 43.25°N], 28.5.1994, leg. A. Shinohara, 1♀ 1♂, NSMT; Primorskiy Kray, Sikhote Alin, bas. r. Syakhobe [= basseyn reka, = basin of river Sankhobe], kl. [= klyuch, spring] Tigrovyy [136.31°E 45.29°N], 11.5.1937, leg. K. Grunin, 1♀ 2♂, ZMUM; Primorskiy Kray, Sikhote Alin, bas. r. Syakhobe [= basseyn reka Syakhobe, = basin of river Sankhobe], S. [= selo, village] Chernokovka [= D. Chernokov] [136.41°E 45.11°N], 21.5.1936, leg. K. Grunin, 1♀, 21.5.1936, leg. K. Grunin, 1♀, ZMUM [1♀ doubtfully identified, not included in paratype series]; Primorskiy Kray, Sikhote-Alin, bas. r. [= basseyn reka, = basin of river] Takema [137.00°E 45.69°N], 6.6.1937, leg. K. Grunin, 1♀, ZMUM [holotype of *X. ussuriensis*, Rasnitsyn 1965]; Primorskiy Kray, Suputinskiy Zapovednik [= Ussuriyskiy Reserve], r. [= reka, = river] Kamenka [132.28°E 43.66°N], 23.5.1967, leg. A. Tikhomirova, 1♀, ZMUM; Primorskiy Kray, Ussuriysk SE 33 km, Ussuriysky Reserve [132.30°E 43.62°N], 21.–26.5.1994, leg. A. Shinohara, 2♂, DEI, NSMT.

SOUTH KOREA: Kangwon-do, Mirugam (Pugdaesa), Mount Odaesan [128.57°E 37.80°N], 13.5.1990, leg. A. Shinohara, 1♀ 2♂, NSMT; same data, 15.5.1990, 3♀ 2♂, NSMT; same data, 28.5.1992, 1♀ 12♂, NSMT; Kyonggi-do, Suwon [127.02°E 37.28°N], 29.4.1987, leg. H.K.K., 1♀, YUIC; same data, 29.4.1987, leg. S.M. Ryu, 1♀, YUIC [holotype of *X. suwonae*, Ryu & Lee 1992]; Muju-gun, Mount Togyu [= Togyu-san] [127.68°E 35.77°N], 18.8.1999, leg. S.J. Suh, 1♀, YUIC.