Ent. Tidskr. 143 (2022)

Four beetle (Coleoptera) species imported to Sweden with bamboo

MATS JONSELL & BO AULIN

Jonsell, M. & Aulin, B.: Four beetle (Coleoptera) species imported to Sweden with bamboo. [**Fyra skalbaggsarter (Coleoptera) importerade med bambu.**] – Entomologisk Tidskrift 143(3): 157–162. Björnlunda, Sweden 2022. ISSN 0013-886x.

With the worldwide trade many organisms are unintentionally transported to new parts of the world. Here we report four Asian beetle (Coleoptera) species that were imported from China to Norrköping, Sweden in a container load of bamboo: *Dinoderus minutus* (Fabricius, 1775) and *Heterobostrychus pileatus* Lesne, 1899 in the family Bostrichidae and *Zotalemimon ciliatum* (Gressitt, 1942) and *Niphona furcata* (Bates, 1873) (Cerambycidae). The three latter are found for the first time in Sweden. All species are herbivores with bamboo as host plant. The beetles were found in the package despite it being treated with gas. This shows that the risk of spreading problematic organisms with worldwide trade is large even when we try to mitigate the problems.

Mats Jonsell, Sveriges lantbruksuniversitet, Institutionen för ekologi, Box 7044, 750 07 Uppsala, Sweden. E-mail: mats.jonsell@slu.se

Bo Aulin, Växtkontrollenheten, Jordbruksverket, 551 82 Jönköping, Sweden. E-mail: bo.aulin@jordbruksverket.se

Worldwide trade is gigantic and when goods are transported between continents many small organisms follow. This report is about a load of bamboo, shipped from China to Norrköping, Sweden. A large number of live beetles were encountered in the package. The sample that was taken from the package included four different species, all associated with bamboo, using it as a substrate for their larvae.

When new plant-feeding species arrive in areas outside their natural distribution they might cause considerable harm to the native ecosystems (Stenlid & Oliva 2016). Plants might be more susceptible to new herbivores as they lack evolved defense mechanisms against non-native species (Stenlid & Oliva 2016). One frightening example is the emerald ash borer *Agrilus planipennis* Fairmaire 1888. This species originates from China but was released in North America and Eastern Europe, and has caused massive mortality of ash (*Fraxinus* spp.) trees across both continents (Evans et. al. 2020). Another famous example is Dutch elm disease.

In order to mitigate the problems with unintentionally transported organisms, we have legislation on how traded goods should be handled. One of the most important frameworks is the Plant Health Regulation (PHR) (EU 2016). It is a complex network of rules, which can be summarized as: certain types of wooden products from certain countries need to be treated in specific ways, and certain serious pest species, termed "quarantine pests", are not allowed to be imported in any way. Summaries of the rules from a Swedish perspective are made by Jordbruksverket (Swedish Board of Agriculture). Sometimes various treatments, such as heating or gassing of the goods, are employed in order to kill off live insects. In the example reported here, the bamboo-load had been gas treated with methyl bromide. Such treatment was not obligatory in this case, but it is often applied as a standard

Figure 1. *Heterobostrychus pileatus* (Bostrichidae) is a polyphagous species that feeds on wood of many species. It was the first record for Sweden. Scale bar = 1mm.

Figur 1. *Heterobostrychus pileatus* i familjen kapouschongbaggar (Bostrichidae) lever i många olika typer av torr död ved och hittades i en bambulast från Kina. Det var första fyndet i landet. Skalstrecket är 1 mm.

procedure to decrease the export of insects from Asia. Apparently, the treatment failed.

Here we report the species found in this package of bamboo imported from China. Three of them are as far as we know encountered in Sweden for the first time.

Material and methods

A 20 foot-container (33 m^3) filled with bamboo packed in 5026 sacs was imported from China to Norrköping, Sweden in November 2021. The material, which was around 1m long bamboo sticks, was to be sold as flower pins. The sender was a company with an address somewhere close to Beijing, and most probably the bamboo originated from that area as well. Personnel at the harbor that opened the container found several insects. They called a pest-control company who in their turn called for the personnel at the Swedish Board of Agriculture (Jordbruksverket) (=BA) to determine if there were some regulated pests included in the load. At the inspection, about 1/5th of the load had been brought out from the container and many of those sacs were inspected both on the inside and the outside. The visible surfaces within the container were also searched for insects. All insects collected by the pest company and during the inspection by BA were preserved in ethanol. The sample was given the number B258 and was thereafter transported to MJ at the Swedish University of Agriculture (SLU) in Uppsala for identification. The identification was mainly done by experts in other parts of the world based on pictures taken at the lab in Uppsala. The specimens are stored in the insect collection at SLU and reported at Artportalen (https://www.artportalen.se).

Results

In total 25 beetles belonging to four species were found. Two of the species were from family Bostrichidae, and the other two from Cerambycidae subfamily Lamiinae.

The most common species in the samples was “the bamboo borer”; a bostrichid, Dinoderus minutus (Fabricius, 1775), of which more than 20 individuals were found. It is native to China but has spread all over the world with the trade of especially bamboo (Liu 2021). It may also feed on other dry products: rice, cassava, sugarcane and wood of many different species are examples mentioned by Liu (2021). It is commonly introduced in Europe and therefore included in standard identification keys and was determined by the first author according to those (Freude et al. 1969). It has also been encountered in Sweden previously, with records from four provinces (Lundberg & Gustafsson 1995).

One individual of a second bostrichid species was found: *Heterobostrychus pileatus* Lesne, 1899 (Fig. 1). It has, to our knowledge, not been recorded in Sweden before. It was keyed out using Lompe (2022) and the determination was kindly verified by Jerzy Borowski in Warzaw, Poland, from pictures taken of the specimen. The species is common in Asia and polyphagous on woody products of many different species (Liu 2021, Borowski pers. comm). Other species in the genus with similar association

to dry wooden products (e.g. *H. brunneus* (Murray, 1867) and *H. aequalis* (Waterhouse, 1884)) are more commonly imported than this species (Azmi et al. 2011, Freude et al. 1969).

The sample included two specimens of the longhorn beetle (Cerambycidae) *Zotalemimon ciliatum* (Gressitt, 1942) (Fig. 2). The species was kindly identified by Mei-Ying Lin and Wen-Xuan Bi from a photograph of one of the specimens. This species is distributed in large parts of China (Lin et al. 2021). *Dendrocalamus latiflorus* Munro (Taiwan Giant Bamboo) and *Xylosma* sp. (Salicacae) are mentioned as host plants (Lin et al. 2021).

The last species was another cerambycid, *Niphona furcata* (Bates, 1873) (Fig. 3), represented by one specimen. This species was also identified by Mei-Ying Lin from a photo. It is associated with bamboo (Lim et al. 2014), and has previously been imported to Germany (Brandt 1957). A closely related species, *Niphona hookeri* Gahan, 1900 has earlier been imported to Sweden with bamboo (Cocquempot 2006, Lundberg 2006). Both species lay eggs on recently cut bamboo and the larvae develop in the center of the stems and are therefore regarded as pests (Zhang & Zuo 1988). *N. furcata* is distributed in large parts of eastern China and in Japan (Zhang & Zuo 1988), whereas *N. hookeri* is found in the southern parts of China (Zhang 1953). The two species are rather similar but can be distinguished on the shape of the apical part of elytra (Zhang 1953).

Figure 2. *Zotalemimon ciliatum* (Cerambycidae) which lives on bamboo and species of Salicacae, recorded for the first time in Sweden. Scale bar = 1mm.

Figur 2. Långhorningen *Zotalemimon ciliatum* som lever på bambu-arter och arter i videfamiljen hittades också för första gången i Sverige. Skalstrecket är 1 mm.

Discussion

The finding of so many beetles in one load of imported goods despite treatment to eliminate living organisms in the material, shows very conspicuously that global trade is problematic. Even though we try to mitigate the problems, small organisms like insects will sooner or later follow as there might be mistakes somewhere in the transport chain. Why the elimination failed in this case is not possible to say, but the material was very densely packed and therefore the gas might have failed to reach all the way into the packages.

In this case, with bamboo-associated species from tropical parts of the world, the risk of an introduction in Sweden seems low. First, because bamboo species does not occur in Swedish nature and second, because the Nordic climate usually is too cold for tropical species to survive long-term. However, it is difficult to predict which species have the potential to establish and become a pest in new areas. None of the species found in this case are monophagous on bamboo, and might therefore be able to colonize an unexpected host in a new area. With a warmer climate, the risk of introducing southern species will increase in nemoral and boreal countries like Sweden (Stenlid & Oliva 2016).

The introduced species might also be a problem in indoor environments. Many tropical species are adapted to very dry conditions, and they might therefore tolerate the indoor climate of heated houses which usually is too dry for the indigenous species. They might breed in wood-constructions which are destroyed by the tunnelling. An example from bamboo is the longhorn beetle *Chloroporhus*

Figure 3. *Niphona furcata* (Cerambycidae) was found for the first time in Sweden, but is very similar to *Niphona hookeri* which was found in imported bamboo 20 years ago. Scale bar = 1mm.

Figur 3. Långhorningen *Niphona furcata* hittades också för första gången i Sverige, men är lik *Niphona hookeri* som hittades för ungefär 20 år sen och också lever på bambu, men med en sydligare utbredning i Kina. Skalstrecket är 1 mm.

annularis (Fabricius, 1787) which destroyed several pairs of ski poles of bamboo in Helsinki in the 1940s (Saalas 1941).

Although the risk that a species is introduced from one individual package of bamboo is very low, the massive trade that continuously exposes species to new parts of the world will sooner or later make unlikely things happen. The registered records of introductions that we can find in databases are at most the tip of an iceberg. A thorough search for records of the Asian bamboo borer *Chlorophorus annularis* revealed many "unknown" records (Seidel m. fl. 2021). So most probably, the three species reported as new for Sweden here have been imported earlier but remained undetected.

Acknowledgements

We are very thankful to the taxonomic experts that helped identifying the beetles: Mei-Ying Lin, Wen-Xuan Bi and Jerzy Borowski. We are also most thankful to Yayuan Chen who translated the text in the cited Chinese papers and to Michelle Nordkvist who commented the text.

References

Azmi, M.S.M., Abood, F. & Razi, N.A. 2011. World distribution of *Heterobostrichus aequalis* Waterhouse (Coleoptera, Bostrychidae). – Journal of Entomology 8: 497–511.

Brandt, H. 1957. *Niphona furcata* Bates (Col. Cerambycidae) in importiertem Bambusrohr. – Anzeiger fur Schadlingskunde 30: 153–154.

Cocquempot, C. 2006. Alien longhorned beetles (Coleoptera Cerambycidae): Original interceptions and introductions in Europe, mainly in France, and notes about recently imported species. – Redia 89: 35–50.

EU. 2016. Regulation (EU) 2016/2031 of the European Parliament of the Council. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32016R2031 (accessed 2022–01–20).

Evans, H.F., Williams, D., Hoch, G., Loomans, A. & Marzano, M. 2020. Developing a European Toolbox to manage potential invasion by emerald ash borer (*Agrilus planipennis*) and bronze birch borer (*Agrilus anxius*), important pests of ash and birch. – Forestry 93: 187–196.

Freude, H., Harde, K.W. & Lohse, G.A. 1969. Die Käfer Mitteleuropas band 8. – Goecke & Evers, Krefeld.

Lan-Yu, L. 2021. An annotated synopsis of the powder post beetles (Coleoptera: Bostrichidae) of Mainland China. – Zootaxa 5081: 389–419.

Lim, J., Jung, S.Y., Lim, J.S., Jang, J., Kim, K. M., Lee, Y.M. & Lee, B.W. 2014. A Review of Host Plants of Cerambycidae (Coleoptera: Chrysomeloidea) with new Host Records for Fourteen Cerambycids, Including the Asian Longhorn Beetle (*Anoplophora glabripennis* Motschulsky), in Korea. – Korean Journal of Applied Entomology 53: 111–133.

Lin, M.-Y., Perissinotto, R. & Clennell, L. 2021. Census of the longhorn beetles (Coleoptera, Cerambycidae and Vesperidae) of the Macau SAR, China. – ZooKeys 1049: 79–161.

Lompe, A. 2022. Käfer Europas Heterobostrychus. http://coleonet.de/coleo/texte/heterobostrychus.htm (accessed 2022–01–20).

Lundberg, S. 2006. Nytillkomna och strukna skalbaggsarter sedan 1995 års Catalogus Coleopterorum Sueciae. – Entomologisk Tidskrift 127: 101–111.
Lundberg, S. & Gustafsson, B. 1995. Catalogus Coleopterorum Sueciae. – Naturhistoriska riksmuseet, Stockholm.
Saalas, U. 1941. Larvae of *C. annularis* destroying Ski Sticks of Bamboo in Helsinki. – Annales entomologici Fennici 1941: 112–115.
Seidel, M., Lüttke, M., Cocquempot, C., Potts, K., Heeney, W.J. & Husemann, M. 2021. Citizen scientists significantly improve our knowledge on the non-native longhorn beetle *Chlorophorus annularis* (Fabricius, 1787) (Coleoptera, Cerambycidae) in Europe. – BioRisk 16: 1–13.
Stenlid, J. & Oliva, J. 2016. Phenotypic interactions between tree hosts and invasive forest pathogens in the light of globalization and climate change. – Philosophical Transactions of the Royal Society of London B 371: 20150455.
Zhang, S. 1953. Bamboo pest in China: longhorn beetles. – Nonglin xuebao 2: 171–190.
Zhang, X.-K. & Zuo, Y.-X. 1988. A preliminary study on *Niphona furcata* (Bates). – Entomological Knowledge 25: 218–220.

Sammanfattning

I den otroligt omfattande och globala handeln med varor döljer sig många små organismer som därmed riskerar att släppas ut i nya delar av världen. Där kan de ställa till stor skada om ekosystemen i den nya världsdelen inte är anpassade till arten. I den här artikeln rapporteras fyra arter av skalbaggar som importerats till Norrköping i en last av bambu: två kapuschongbaggar (Bostrichidae); *Dinoderus minutus* och *Heterobostrychus pileatus* och två långhorningar (Cerambycidae: Lamiinae) *Zotalemimon ciliatum* och *Niphona furcata. D. minutus* har påträffats flera gånger tidigare i Sverige i olika bambusubstrat. De tre andra rapporteras för första gången från landet.

Risken att bambulevande arter från tropikerna ska etablera sig i Sverige är låg, både eftersom värdväxten saknas i vår natur och eftersom vårt klimat oftast är för kallt för sydliga arter. Det är dock väldigt svårt att förutsäga vilka arter som har potential att etablera sig och ännu svårare att förutsäga vilka som kan skapa stora problem. De arter som hittades här lever inte enbart i bambu, vilket gör att de kanske kan finna något lämpligt värdsusbtrat även i vårt land. Med den massiva exponeringen som den globala handeln utgör kommer vi få åtskilliga nya problematiska etableringar.

Åtgärder för att minska risken görs. Till exempel gasbehandlas trävaror från andra kontinenter och den last som denna rapport handlar om var certifierat som gasbehandlat och därmed insektsfritt. Att insekter påträffas i denna typ av laster är ganska vanligt, men likväl är förmodligen de fynd som görs och registreras bara toppen på isberget. Förmodligen har de tre arter som rapporterats som nya för Sverige importerats tidigare utan att någon upptäckte det.