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The European Spruce Bark Beetle, *Ips typographus* (Linnaeus) (Fig. 1), is a widely distributed pest in Europe. This species' primary hosts are spruce trees (*Picea*) but it is known to be able to infest a number of other conifers including *Pinus* (pine), *Larix* (larch), *Abies* (fir), *Juniperus* (juniper), and *Pseudotsuga* (Douglas fir). Larvae feed in the cambium of tree branches and in the trunk, damaging the tree by girdling it and spreading blue stain fungus (Figs. 2-4). *Ips typographus* is considered the most economically destructive bark beetle in Europe. This species is often associated with *Pityogenes chalcographus* and the two will often emerge simultaneously and attack the same individual trees.



Fig. 1: *Ips typographus* on tree (photo by William S. Ciesla).

*Ips typographus* is a member of the Curculionidae (subfamily Scolytinae) which is comprised of weevils and bark beetles. Members of this family are highly variable but almost all species share a distinct club on the end of their antennae consisting of three antennomeres. The Scolytinae, to which *Ips* belongs, consists of the bark beetles. In general, members of Scolytinae are small (<10mm long) pill shaped beetles of a reddish brown, black or tan color. Some authors consider Scolytinae to be a distinct family (Scolytidae).

The tribe Ipini is a large and closely allied group of genera within Scolytinae. Members of this tribe have an excavated elytral declivity flanked by a number of spines on each side. The genus *Ips* contains 60 species, 23 of which are native to North America. The genus has a worldwide distribution, inhabiting every continent except South America and Antarctica. Adults can be distinguished by weakly bisinuate or strongly angulate sutures on their antennal clubs and the presence of three to six pairs of spines surrounding their elytral declivity. *Ips typographus* has not yet been detected in the United States. Non-targets often captured during *I. typographus* surveys include Nearctic members of the genus such as *I. pini* and *I. tridens* as well as the closely related *Orthotomicus latidens*. A quality, high powered microscope is required to examine the characters necessary to identify these beetles.

This aid is designed to assist in the sorting and screening of *I. typographus* suspect adults collected in CAPS Lindgren funnel traps in the continental United States. It covers basic Sorting of traps, First Level, and Second Level screening, all based on morphological characters. Basic knowledge of Coleoptera morphology is necessary to screen for *I. typographus* suspects.

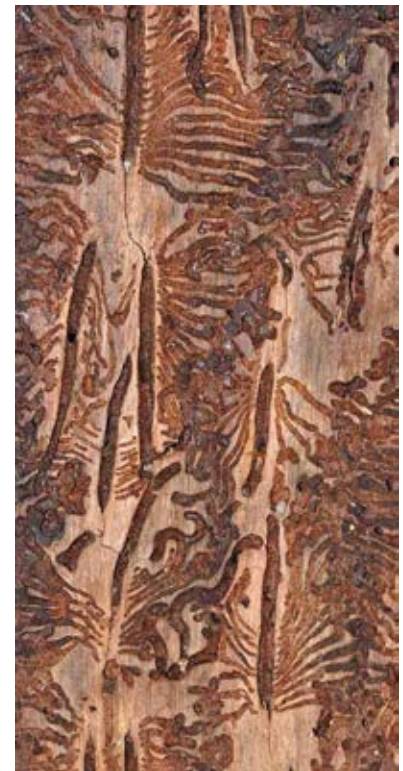


Fig. 2: *Ips typographus* galleries (photo by William M. Ciesla).

*Ips typographus* funnel traps should be sorted initially for the presence of beetles of the appropriate size color and shape. Traps containing beetles meeting all of the following requirements should be moved to Level 1 Screening (Page 3):

1. Beetles are less than 5mm (0.25 inches) long.
2. Beetles are pill-like in shape.
3. Beetles are black, reddish-brown, or tan colored.

Beetles meeting these requirements should be forwarded to Level 1 Screening.



Fig. 3: Trees attacked by *Ips typographus*. During a bark beetle attack trees will show little sign of damage other than a series of small bore holes. Often it is not apparent that bark beetles have infested a tree until after they have emerged from it (photo by Louis-Michel Nageleisen, Département de la Santé des Forêts, Bugwood.org).



Fig. 4: *Ips typographus* in galleries infected with bluestain fungus. Many types of bark beetle spread this symbiotic fungus which aids in the destruction of the trees cambium (photo by Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org).

Suspect adults should be pointed and properly labeled. Level 1 Screening is based on characteristics of the antennae, general dorsal surface, and elytral declivity. Specimens with these traits should be forwarded to Level 2 Screening.

## Antennae

Scolytids have relatively stout, geniculate, clubbed antennae. The clubs are made up of three antennomeres and can be solid, annulated, or occasionally lamellate. The scape will always be well developed (Fig. 5). Members of *Ips* have a strongly flattened club with two procurved sutures.



Fig. 5: Antennae of *Ips* species. Note the long scape and large three part club.

## General Dorsal Surface

Beetles in the tribe Ipini (Figs. 8-9) have the basal margins of their elytra unarmed and forming a straight line across the body (Fig. 6). The scutellum of tribe members is usually large and flat and the head is usually concealed at least partially by an enlarged pronotum. In *Ips* the anterior portion of the pronotum is coarsely aspartate.



Fig. 6: Base of elytra and scutellum of *Ips* species. members of the Scolytinae should have a broad scutellum and the base of the elytra should be unarmed.

## Elytral Declivity

The tribe Ipini is known for the multiple pairs of spines surrounding the elytral declivity (Fig 7). The number of spines ranges from 1-7 on each elytron, depending on species. Some spines may be capitate.



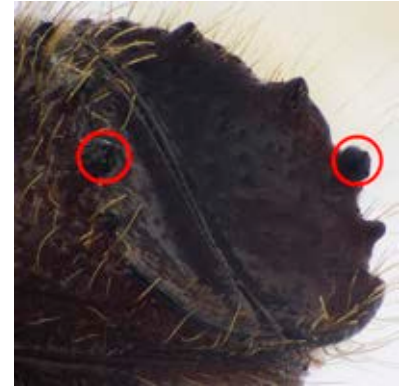
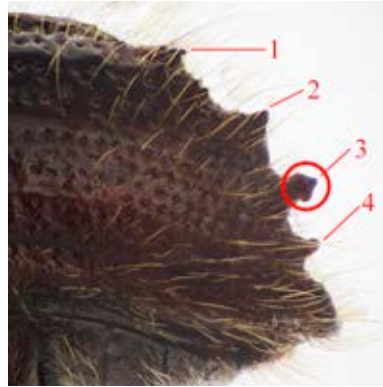
Fig. 7: *Ips* species. elytral declivity. Note the ring of spines and yellow hairs surrounding the declivity which is typical of the Ipini.



Figs. 8 and 9 (left): Dorsal and lateral views of the common North American species *Ips pini*. Note how the pronotum covers the head, the large wide scutellum, and the excavated and armed elytral declivity



Fig. 10 (left) : Dorsal view of *Ips typographus*.



Figs. 11 and 12 (above and above right): lateral and posterolateral view of *Ips typographus* elytral declivity. In *Ips typographus* suspects the declivity should be ringed by 8 spines (four on each side) with the third spine down from the top cylindrical and capitate (circled).

Level 2 screening is designed to separate potential *I. typographus* (Fig. 10) from other members of *Ips* (Figs. 15-20). Screening is based mostly on characters of the elytral declivity and frons. *Ips typographus* is similar in appearance to *I. perterbatus* (Fig. 16), to which it is closely related.

### Elytral Declivity

The elytral declivity of *I. typographus* (Fig. 21) is armed by four spines on each elytron for a total of eight spines forming a ring around the declivity. The third spine from the declivity top is the largest and is cylindrical and capitate (Figs 11-12). This character differentiates *I. typographus* from *I. perroti*, which lacks a cap on its third spines (Fig. 25). The elytral declivity of *I. typographus* should be dull when cleaned, differentiating it from *I. pini* and *I. perterbatus* (Figs. 22-24), both of which have shiny declivities. These features also distinguish *I. typographus* from more distantly related species of *Ips* (Figs. 26-28).

### Frons

The head of *I. typographus* bears a single prominent median tubercle (Fig. 13), differentiating it from *I. perturbatus* which has a pair of tubercles (Fig. 14). This trait is highly variable and may not correctly identify a suspect.

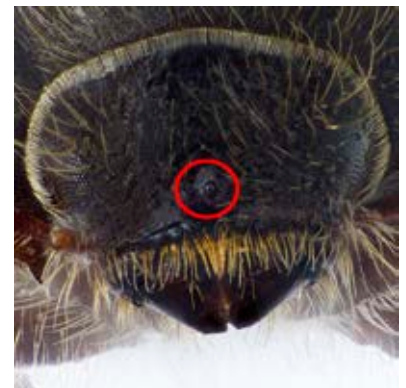


Fig. 13: Frons of *Ips typographus*. Note the median tubercle (circled).



Fig. 14: *Ips perterbatus* frons. The frons of this species bears two median tubercles (circled) rather than the single tubercle seen in most *Ips* species.



Fig. 15: *Ips integer*



Fig. 16: *Ips perturbatus*



Fig. 17: *Ips pini*



Fig. 18: *Ips perroti*



Fig. 19: *Ips hunteri*



Fig. 20: *Ips woodi*



Fig. 21: *Ips typographus* declivity, posterolateral view (target).



Fig. 22: *Ips perturbatus* declivity.



Fig. 23: *Ips pini* declivity.



Fig. 24: *Ips hunteri* declivity.



Fig. 25: *Ips perroti* declivity.



Fig. 26: *Ips woodi* declivity.



Fig. 27: *Ips integer* declivity.



Fig. 28: *Ips plastographus* declivity.

Suspect *Ips typographus* specimens (scolytids with a depressed elytral declivity ringed by four spines on each side with the third spine from the top being the largest and capitate) should be sent forward for identification. Specimens must be labeled and carefully packed to avoid damage during shipping.

## Key to Sort and Screen *Ips typographus* Suspects in the United States

1. Beetles approximately 4-5.5 mm long; pill shaped; and with black, brown, or tan coloration..... 2
- 1'. Beetles larger or smaller than 4-5.5 mm long; not pill shaped; or color not a shade of black, brown, or tan..... Not *I. typographus*
  
2. Antennae geniculate with a large club made up of three segments on the end (Fig. 5); basal margins of elytra unarmed and forming a straight transverse line across the body (Fig. 6); scutellum large and flat; head usually covered by pronotum; elytral declivity surrounded by multiple pairs of spines (Fig. 7)..... 3
- 2'. Antennae not geniculate or without a large club made up of three segments on the end; basal margins of elytra armed with ridge or forming strongly procurved ;scutellum small or absent; head may or may not be covered by pronotum; elytral declivity unarmed..... Not *I. typographus*
  
3. Each elytron armed with four spines the third of which is the largest and is capitate (Figs. 11-12); frons with single large tubercle in center (Fig. 13). ..... ***I. typographus suspect***
- 3'. Each elytron not armed with exactly four spines, or if armed with four spines the third of which is either not the largest or is not capitate (Figs. 21-28); frons with either one or two large tubercles (Fig. 14) ..... Not *I. typographus*

## Citation

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## References for more information on *I. typographus* and non-targets

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**Cognato, A. I.** 2015. *Biology, systematics, and evolution of Ips*. Pp. 351-370. In **Vega, F. E., & Hofstetter. R. W.** 2015, *Bark Beetles: Biology and Ecology of Native and Invasive species*. Elsevier, Amsterdam. 620 pp.

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**Wood, S. L.** 1982. The bark and ambrosia beetles of North and Central America (Coleoptera: Scolytidae) a taxonomic Monograph. *Great Basin Naturalist Memoirs No 6*. pp. 669-705.

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