Distribution of economically important, wood-infesting anobiid beetles in the Pacific Northwest

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ABSTRACT

Structure-infesting anobiid beetles were surveyed in Washington State homes and outbuildings during 1987-91. *Hemicoelus* (=*Hadrobregmus*) *gibbicollis* (LeConte) was found in virtually all of the 90 structures inspected and is the predominant species infesting building timbers. This anobiid is known primarily from coastal areas of western North America. *Hadrobregmus quadrulus* (LeConte) was discovered in 5.5% of infested structures while *Xestobium affine* LeConte and *Priobium punctatum* (LeConte) were found in only 2% of infested buildings. The curculionid, *Rhyncolus brunneus* Mannerheim, also infests structural timbers and was present in 8% of buildings examined in this study.

INTRODUCTION

Wood-infesting beetles in the family Anobiidae are serious structural pests in many areas of the world. Larvae cause extensive damage by feeding and tunneling within timbers resulting in weakened structures. Considerable resources are often expended for wood replacement and/or chemical controls. Unfortunately, little is known about most species despite the extensive damage they cause. Long life cycles and extreme difficulty in rearing the beetles has resulted in this dearth of information.

Certain anobiid species are well known, and many notable infestations have been recorded from wooden structures during the 20th century. Baines (1914) reported a serious infestation of the deathwatch beetle, *Xestobium rufovillosum* (De Geer), in oak timbers supporting the slate roof of Westminster Hall in London. The widespread damage resulted in extensive replacement of wood with steel supports and provided a major impetus to conduct the first biological studies on anobiid beetles. Prior to that time anobiids were mostly considered to be a curiosity. While in dry dock for repairs, H.M.S. Victory, an 18th century wooden ship of the British Navy, was found to be infested by the same beetle species (Fisher 1940). In order to address damage caused to oak timbers and furniture in England by *X. rufovillosum*, the Forest Products Research Laboratory was created (Fisher 1938). An attack by this insect on oak timbers in the Old South Meeting House in Boston, Massachusetts was reported by Muirhead (1941). Engineers assessing the damage to tower supports noted that the hurricane of 1938 would probably have destroyed them if the building had not undergone earlier repairs.

Another anobiid, *Euvrilletta peltata* (Harris) [=*Xyletinus peltatus* (Harris)], was identified as infesting a home in North Carolina (Wright 1959) and stimulated interest in wood-destroying species in the United States. Moore (1968, 1970), Williams (1977, 1983), Williams and Mauldin (1974, 1981), and Williams and Waldrop (1978) conducted research projects on *E. peltata*, including life cycle studies, types of wood infested, and control options. Earlier work by Simeone (1960) found *Hemicoelus carinatus* (Say) to be the most frequently encountered wood-infesting anobiid in northeastern North America. Doane et al. (1936) cited examples of structures in the western states being damaged by various anobiid beetles, including *Hadrobregmus quadrulus* (LeConte), *Hemicoelus* (=*Hadrobregmus*) *gibbicollis* (LeConte), and *Priobium punctatum* (LeConte).

The furniture beetle, *Anobium punctatum* (De Geer), is probably the best known wood-infesting anobiid. Various researchers (Becker 1940; Kelsey et al. 1945; Hickin 1949, 1960, 1981; Bletchly 1952, 1957; Spiller 1952; Fisher 1958; Berry 1976) have published on this species. This is the most serious wood-destroying pest throughout England and much of

northern Europe, far more damaging than termites or any other group of insects (Hickin 1975). Additionally, Denne et al. (1944) noted that the furniture beetle was a widespread problem in New Zealand. Antique furniture shipped to the United States from Europe has typically been fumigated with methyl bromide to prevent the beetle's spread.

Anobiid beetles in the Pacific Northwest (PNW) are largely unidentified (Hatch 1962). However, infestations of these insects are regularly reported to various agencies throughout the region. An initial goal of this research was to identify those species causing structural damage in the PNW.

MATERIALS AND METHODS

Collection data.

Anobiid beetles are difficult to collect (White 1969). Cryptic coloration and a tendency to remain immobile, except when seeking a mate, contribute to this difficulty. Therefore, efforts were initially concentrated on reviewing collection specimen data from researchers and coleopterists who had made anobiid collections in the PNW. Entomologists from seven major collections were contacted, and the most prevalent beetle species were then tallied. In addition, pest control operators and extension specialists submitted specimens to us from 1987 to 1991.

Collection and rearing of beetles.

Ninety anobiid-infested structures were examined, primarily in western Washington, although collections were also made in eastern Washington, western Oregon, and Oakland, California. Infested wood was removed from crawl spaces and basements, transported to the laboratory at Washington State University, Pullman, and stored in 33 gal emergence containers where environmental conditions simulated the moderate temperatures and high relative humidity found in western Washington. Emergence containers remained under constant temperature and relative humidity (18 ± 1°C and 65 ± 3% RH). Certain containers were placed out-of-doors from 1987-91 to observe the effects of extreme heat and cold (as found in eastern Washington) on beetle survival. Maximum and minimum temperatures attained within the containers were recorded during 1987-90. Emerging beetle adults were collected throughout the year and identified. A standard size sweep net (38 cm diam) was used during summer months to sample forested areas for beetle adults in western Washington and Oregon.

RESULTS AND DISCUSSION

Primary, structure-infesting anobiid beetles.

After much correspondence, analyses of various insect collections, and visits to anobiid-infested structures, it became apparent that one species predominated over all others combined. *Hemicoelus gibbicollis*, the most common species, was recovered from all 90 study sites and is known to infest structures from Alaska to California (Linsley 1943). This anobiid has caused extensive damage in subfloor areas of buildings (Doane et al. 1936). Nevertheless, Furniss and Carolin noted in 1977 that the biology of *H. gibbicollis* was still incompletely recorded. Thus, when the overall importance of this species was studied, efforts were also focused on its distribution.

Hemicoelus gibbicollis was initially described from collections made in California by LeConte (1859), and in succeeding years the records became more widespread. Doane et al. (1936) first reported this anobiid as vigorously attacking beams of Douglas-fir, *Pseudotsuga menziesii* (Mirbel), in old bridges, barns, and basement timbers in the San Francisco area. Linsley (1943) referred to this species as the California deathwatch beetle and documented a number of infested structures in California and Oregon. Hatch (1946) produced the first evidence of this insect attacking wooden timbers in Washington. Spruce boards in the porch of a residence on the Olympic Peninsula were badly infested and required replacement. This beetle is probably the primary wood-infesting anobiid in California, Oregon, and Washington. Building inspections conducted during 1984 by Jan and Red Butler, Angeles Pest Control, showed *H. gibbicollis* to be the only species collected in Port Angeles and Sequim,

Clallam County, Washington (Suomi 1992: appendix 1). These localities are within some of the most heavily infested areas of the state.

Melville H. Hatch, the preeminent coleopterist in the Pacific Northwest, collected a significant number of *H. gibbicollis* near the Long Beach Peninsula of southwestern Washington (Hatch and Kincaid 1958). His records do not indicate whether these insects were captured while sweeping forested areas, or if he gathered infested wood and later collected emerging adults. In our experience it is extremely difficult to sweep heavily forested areas for these beetles, so beating trays or other collecting methods may have been utilized. The greatest collecting successes result when wood from infested structures is obtained, and emerging adults are captured under controlled conditions.

Most collections of *H. gibbicollis* have been made along coastal areas of the western United States, Canada, and Alaska (Suomi 1992: appendix 2). No collections have been reported from coastal areas south of California probably because the climatic conditions are too dry to favor larval survival. Two unusual sites were reported from Glacier National Park, Montana and Yellowstone National Park, Wyoming (Fig. 1). These probably represent atypical records, and the native range for this insect is along the Pacific Coast of North America. One other noteworthy collection site was in Yakima County, Washington, near Mt. Rainier National Park. Although *H. gibbicollis* can survive the extreme climatic conditions found in eastern Washington (Table 1), most collections were made in the milder climatic zones along coastal areas (Fig. 2, Suomi 1992: appendix 3).

Table 1

Temperature extremes (°C) in emergence containers and numbers of *H. gibbicollis* that emerged in eastern Washington.

Year	Maximum	Minimum	No. Emerged
1987	35.0	−19.0	4
1988	34.5	−20.5	14
1989	39.5	−27.0	16
1990	36.5	−18.0	82

Secondary, structure-infesting anobiid beetles.

Linsley (1943) and White (1982) described a number of anobiid species as capable of causing structural damage in the western states. However, during the building inspections conducted, only three anobiid species, in addition to *H. gibbicollis*, were recovered. *Hadrobregmus quadrulus* is a known wood-infesting species but was only found in 5.5% of infested structures. This beetle is commonly associated with the wood-destroying fungus, *Meruliporia incrassata* (Berkeley and Curtis) Murrill [= *Poria incrassata* (Berkeley and Curtis) Burt], which produces dry, rotten wood (Hatch 1962). Chamberlin (1949) recovered *H. quadrulus* from Douglas-fir beams in Oregon, while Spencer (1958) reported this species from numerous houses in Vancouver, British Columbia.

Xestobium affine LeConte was somewhat less abundant and occurred in 2% of homes investigated. This anobiid had not previously been reported to infest structural timbers. On five separate occasions, adults of *X. affine* tapped their frons on a glass surface, approximately 20-30 times during a 5 sec period, and repeated this procedure 3-4 times. Rapid tapping with a wooden pencil also elicited a tapping response from the insect. Birch and Keenlyside (1991) reported similar behavior by *X. rufovillosum* which probably serves in mate location. At one time this tapping was associated with a death in the household and led to the name deathwatch beetles for the family Anobiidae (Gahan and Laing 1932). These, along with *H. gibbicollis*, were the only anobiids captured while sweeping forested areas.

Figure 1. *Hemicoelus gibbicollis* distribution, western United States.

Figure 2. *Hemicoelus gibbicollis* collection sites(+); Washington, 1987-91.

Priobium punctatum was found in 2% of the homes examined. Chamberlin (1949) reported this anobiid from oak flooring and furniture in California. The beetle was more common in eastern Washington and readily appeared at blacklight traps. Another structure-infesting member of this genus, *P. sericeum* (Say), had been collected in eastern Washington homes and damaged flooring, woodwork, and furniture (White 1982). It was not found in any structure during this study. No collections were made of *A. punctatum* or *X. rufovillosum*. Hatch (1938) reported *A. punctatum* as occurring in Washington, but this may have been a result of wood being imported from infested areas.

An unexpectedly large number of collections were made of the curculionid beetle, *Rhyncolus brunneus* Mannerheim. Although Hatch (1971) described members of this genus as living under the bark of dead trees, these insects were discovered in 8% of infested structures and appeared to move in after the wood had been attacked by an anobiid, usually *H. gibbicollis*. Larvae and adults were found in surface layers of the wood and produced round, shiny, golden brown frass that is quite distinct from that of anobiids. Chamberlin (1949) noted that *Rhyncolus* larvae live in sapwood and damage wood in much the same way as anobiid larvae. This species is found in the wood of many conifers but prefers the drier portions. Little is known about its habits (Hatch 1962).

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