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FIRST REPORT OF *HECATERA DYSODEA* (DENIS AND SCHIFFERMÜLLER) (NOCTUIDAE) IN THE PACIFIC NORTHWEST OF THE UNITED STATES

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ABSTRACT. New geographic records are reported for the noctuid moth *Hecatera dysodea* (Denis & Schiffermüller). It is a Palearctic species, but is now found in a broadly contiguous area of Oregon and Washington in the United States. This area is comprised of 7 counties across much of the north of Oregon and into 4 counties of southern Washington. Moths were captured in several types of survey traps baited with insect pheromones and feeding attractants, as well as blacklight traps, from 2003 to 2009. Larvae were collected on flower stalks of prickly lettuce, *Lactuca serriola* L. (Asteraceae), from June into September, suggesting multivoltinism. Collection records over time indicate a possibly rapidly expanding distribution of the species.

Additional key words: host plant, introduction, moth, trap, Oregon, Washington

Hecatera dysodea (Denis & Schiffermüller) has a widespread distribution in Europe and North Africa, east into Russia, western China and India (Wiltshire 1957; Poole 1989; Ivinskis & Miatleuski 1999; Hacker *et al*. 2002). The species was thought to have become extinct in England but has since reappeared (Skinner 1984; Pratt 1986; Agassiz & Spice 1998; Honey 2002), and may be expanding its distribution in other areas of Europe such as Denmark and Sweden (http://www.lepidoptera.dk/*dysodea*.htm (Hacker *et al*. 2002). Reasons for its prior decline in England are discussed by Pratt (1986).

The larvae feed on the flower buds, flowers, and seeds of species of *Lactuca* (lettuce), *Crepis* (hawksbeard) and *Sonchus* (sow thistle) (Asteraceae) (South 1920; Bretherton *et al*. 1979; Skinner 1984; Pratt 1986). Bretherton *et al*. (1979) report it as an occasional pest on domestic lettuce, *Lactuca sativa* L. However, Pratt (1986) logically suggests that such claims are in reference only to lettuce grown for seed production.

The larva is described by Beck (1999); the adult is illustrated by South (1920), Skinner (1984), and Hacker *et al*. (2002). The adult and male genitalia are also figured in this report (Fig. 1 & 2). We summarize first collections of *H. dysodea* in North America (e.g. Hodges *et al*. 1983), within Oregon and Washington of the United States.

METHODS AND RESULTS

Oregon. Collection information is summarized in Table 1 and Figure 3. First Oregon records for the species were in Wasco County, with the earliest moth capture in 2003 near Dufur, in a sticky wing type trap baited with a pheromone lure for trapping *Helicoverpa armigera* (Hübner), and placed as part of an insect survey by the Oregon Department of Agriculture. In 2005, 28 *H. dysodea* adults were captured in The Dalles area of Wasco County in Lindgren funnel traps (PheroTech Inc., Delta, BC, Canada) baited with ethanol lures and used in a survey for scolytid beetles. An additional 11 moths were captured between 5 June and 21 September 2006 in the same area with the same type of trap. In 2006, moths were also captured in the Dufur and The Dalles areas, in Universal Moth Traps (Great Lakes IPM, Vestaburg, MI) baited with a floral based chemical attractant, and in The Dalles in blacklight traps. The floral lure was a blend of phenylacetaldehyde, methyl salicylate, beta myrcene, and methyl-2-methoxy benzoate, developed for trapping flower-visiting Noctuidae such as the alfalfa looper *Autographa californica* (Speyer) (Landolt *et al*. 2007). The floral lure was tried as an attractant for *H. dysodea* because of the reported affinity of the moth for flowers (Bretherton *et al*. 1979). In 2006, seven larvae were collected from prickly lettuce, *Lactuca serriola* L.

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FIG. 1. Adult male moth of *Hecatera dysodea* reared from larva collected on *Lactuca serriola* in Dufur, Oregon.

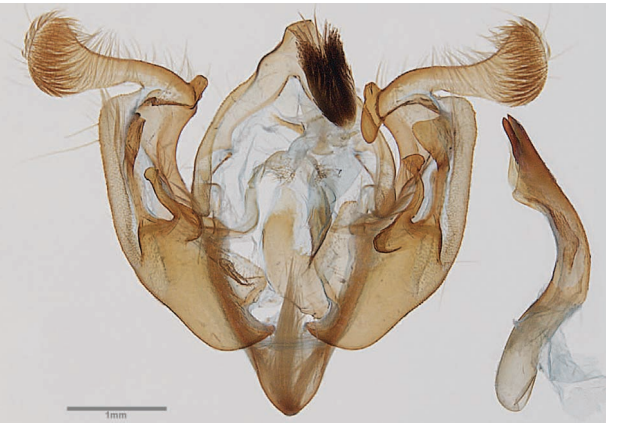


FIG. 2. Male genitalia with aedeagus removed and figured laterally. Note the slightly asymmetrical morphology of the valvae.

near Dufur and were reared to the adult stage following protocols similar to that described below for studies in Washington. However, these larvae were maintained in plastic bags instead of paper cups.

After 2006, *H. dysodea* were found over a wider area in Oregon. Moths were captured in survey traps baited with ethanol lures in Baker, Malheur, Umatilla, and Union Counties in 2007. In 2009, larvae were found on prickly lettuce flower stalks in Gilliam County, and two adults were collected from the side of a residence in the city of Portland, Multnomah County.

Washington. Collection information is summarized in Table 2 and Figure 3. In the state of Washington, the first collections of *H. dysodea* moths were two adult specimens at porch lights of a residence in Stevenson, Skamania County. In the summer of 2009, prickly lettuce flower stalks along several roadways in south central and southeastern Washington were searched for Lepidoptera larvae. This included: 1) State Route 14, which parallels the Columbia River, from Paterson west to Vancouver, 2) Interstate Highway 5 from Vancouver north to Tacoma, 3) U.S. Route 97 from the Columbia River north to Yakima, 4) Interstate Highway 82 from Yakima to Richland, 5) the vicinity of Yakima, 6) the vicinity of Pullman in Whitman County, and 7) State Route 24 from Colfax in Whitman County to Othello

TABLE 1. Collection information for *Hecatera dysodea* in the state of Oregon. Old world bollworm (OWB) trap was baited with the sex pheromone of *Helicoverpa armigera*.

County	Location	Date	Number	Stage	Collection Note
Baker	Baker City	27 VII 2007	1	adult	ethanol trap
Gilliam	Rts I-84 X SR 74	12 VIII 2009	several	larvae	on *L. serriola*
Malheur	Ontario	V to IX 2007	5	adult	ethanol trap
Multnomah	Portland	7 VIII 2009	2	adult	on wall
Umatilla	Hermiston	29 VI 2007	1	adult	ethanol trap
	Hermiston	15 X 2007	1	adult	ethanol trap
Union	La Grande	VII to IX-2007	9	adult	ethanol trap
Wasco	Dufur	24 IX 2003	1	adult	OWB trap
	The Dalles	V to VI 2005	28	adult	ethanol trap
	The Dalles	VI to IX 2006	11	adult	ethanol trap
	Dufur area	VI to IX 2006	10	adult	floral lure trap
	Dufur	2 VII 2006	7	larvae	on *L. serriola*
	The Dalles	VI to IX 2006	6	adult	floral lure trap
	The Dalles	VI toVII 2006	4	adult	blacklight trap

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in Adams County. Generally, when a patch of prickly lettuce was sampled, 30 plants were searched. Prickly lettuce plants are visually distinctive and are readily identified when flower stalks are developed (see Whitson *et al*. 1996). When captured, caterpillars were placed in 280 ml wax coated paper cups with plastic lids, along with cuttings of the host plant with flower buds and flowers. Cups with larvae were placed in an insulated chest for transport to the laboratory.

Larvae were reared to the adult stage in the laboratory, and were kept in the same wax-coated paper cups. Fresh cut sections of prickly lettuce flower stalks were placed in each cup with larvae daily, and any dead larvae or moldy frass and plant material were removed at that time. When larvae were ca 2 cm in length, 2 cm of potting soil (a one to one mixture of sand and peat moss) was placed in the bottom of the cup as a pupation medium. After larvae burrowed into and remained with the soil, the cups were transferred to screened cages for adult emergence. An emergence cage was maintained for each field site that yielded larvae. Emergence cages were checked daily for moths, which were killed and prepared as voucher specimens.

In 2009, from 9 July to 20 August, 99 Lepidoptera larvae were collected from flower stalks of prickly lettuce plants at eight sites in four counties in the state of Washington (Table 2). Seventy-two *H. dysodea* adult moths emerged from these samples from 28 July to 9 October 2009. Although some larvae died while held in the laboratory, we did not see the emergence of any parasitoids.



FIG. 3. Counties of the states of Oregon and Washington positive for collection of *Hecatera dysodea*.

Anecdotal observations were made of larvae during field sampling. Larvae varied in coloration and size, with smaller larvae green with a pale lateral stripe, and larger larvae tan to light brown. At several sites where multiple larvae per plant were encountered (Drano Lake, Mary Hill State Park, Roosevelt, Wishram), larvae collected on a single plant were of multiple sizes, indicating that oviposition on that plant occurred

TABLE 2. Collection information for *Hecatera dysodea* in the state of Washington.

County	Location	Date	Number	Stage	Collection Note
Benton	5 mi S Prosser	8 VII 2009	7	larvae	on *L. serriola*
Klickitat	Dallesport	18 VII 2009	7	larvae	on *L. serriola*
	Goldendale	8 VII 2009	1	larva	on *L. serriola*
	Goldendale	18 VII 2009	5	larvae	on *L. serriola*
	Mary Hill State Park	3 VII 2009	20	larvae	on *L. serriola*
	Mary Hill State Park	8 VII 2009	15	larvae	on *L. serriola*
	Mary Hill State Park	15 VIII 2009	6	larvae	on *L. serriola*
	Roosevelt	8 VII 2009	10	larvae	on *L. serriola*
	Wishram	18 VII 2009	13	larvae	on *L. serriola*
Skamania	Drano Lake	18 VII 2009	10	larvae	on *L. serriola*
	Stevenson	8 VIII 2008	1	adult	porch light
	Stevenson	9 IX 2008	1	adult	porch light
Yakima	Union Gap	12 VII 2009	1	larva	on *L. serriola*
	Union Gap	20 VIII 2009	2	larvae	on *L. serriola*

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over a period of at least several days (multiple oviposition bouts). All larvae burrowed into the potting soil and pupated within a cell made of soil. These cells were particles of soil loosely bound together to make an oblong sphere-shaped structure encompassing an air space holding the pupa. The pupae remained within this cell after eclosion and adult emergence.

DISCUSSION

The known distribution of *H. dysodea* in North America now includes a broad area within the Pacific Northwest of the United States, comprised of a contiguous area of seven Oregon and four Washington counties (Figure 3). Temporal and geographic aspects of the collection records suggest the distribution of the insect has expanded since 2006. However, the absence of positive collection records does not demonstrate its absence in an area. The host plant utilized, prickly lettuce, is widespread and can be extremely abundant. Collection sites near Dufur and in The Dalles in Wasco County of Oregon, as well as near Prosser in Benton County and in Union Gap of Yakima County, Washington are among abundant patches of prickly lettuce in areas of physical disturbance and irrigated agriculture. The population of this moth could very rapidly increase in those counties as well as in similar habitat of the Columbia River Basin to the north and the Palouse Prairie to the east. The host plant is also very abundant at disturbed sites in low elevation areas west of the Cascade Mountains, such as the Williamette Valley of Oregon and Puget lowlands of Washington.

At present, the introduction, range, and spread of this Eurasian species in the Pacific Northwest are not of particular concern. Prickly lettuce is itself an introduced Palearctic weed (Whitson *et al*. 1996). Two other introduced weeds that are potential hosts of *H. dysodea* in the Pacific Northwest are *Sonchus asper* (L.) (prickly sow thistle) and *Crepis setosa* (Haller) (rough hawksbeard). Two native species of wild lettuce, *Lactuca pulchella* (Pursch) (blue lettuce) and *Lactuca biennis* (Moench) Fernald are also potential hosts. There is commercial agricultural production of lettuce (*Lactuca sativa* L.) seed in the Pacific Northwest that may be at risk if the moth continues to expand its distribution. For example, commercial lettuce seed production occurs in Skagit County, Washington well to the north and west of the present known distribution of *H. dysodea*.

In Britain, the moth is reported to have one generation per year (Skinner 1984). The moth flight occurs there in late June and July, larvae are present on plants in July and August, and overwintering is in the pupal stage. However, in our Oregon and Washington records, the moth was collected in every month from May into October. Also, larvae were present on host plants at least from late June into late August. These observations suggest more than one generation of this insect per year in the Pacific Northwest of the United States.

Specimens of *H. dysodea* from Oregon were deposited in the Canadian National Collection of Insects, Ottawa, Ontario, and the United States National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM). Specimens of *H. dysodea* from Washington were deposited in the USNM, the collection of the Washington State Department of Agriculture, and the M. T. James Entomological Collection, Department of Entomology, Washington State University.

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