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ADDITIONAL RELEASES OF LARCH CASEBEARER PARASITES FOR BIOLOGICAL CONTROL IN THE WESTERN UNITED STATES

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ABSTRACT

Additional Chrysocharis laricinellae[6] *and four new parasites,* Necremnus metalarus,[6] Elachertus argissa,[6] Dicladocerus "*A*",[6] *and* Diadegma laricinella,[7] *were released for biological control of the larch casebearer in Washington, Idaho, and Montana.*

KEYWORDS: *Biological control (-forest pests, larch casebearer,* Coleophora laricella, Chrysocharis laricinellae, Necremnus metalarus, Elachertus argissa, Dicladocerus "*A*", Diadegma laricinella.

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[6]Hymenoptera: Eulophidae.

[7]Hymenoptera: Ichneumonidae.

INTRODUCTION

The larch casebearer, *Coleophora laricella* (Hbn.), is a minor pest of larch in Europe. It was inadvertently introduced into eastern North America, where the subsequent defoliation of eastern larch (*Larix laricina* (Du Roi) Koch.) prompted a parasite introduction program in the 1930's (Dowden 1962, McGugan and Coppel 1962). Two of the five species released, the braconid, *Agathis pumila* (Ratz.), and the eulophid, *Chrysocharis laricinellae* (Ratz.), became established. Casebearer populations dropped considerably following the establishment of these parasites and have generally remained low enough to cause little or no concern, making it an example of successful biological control (Turnbull and Chant 1961, DeBach 1964).

Now that the casebearer has invaded western larch (*Larix occidentalis* Nutt.) stands in the Western United States, attempts are being made to extend biological control to this infestation. *A. pumila* was introduced in 1960 (Denton 1972), and *C. laricinellae* and *Dicladocerus westwoodii* Westw. were released in 1972 (Ryan and Denton 1973).[8] Additional releases of *C. laricinellae* from several sources were made in 1973 and 1974 and four new species were released in 1974. The purpose of this note is to record details of the sources of these populations, dates, and locations of these new releases.

ACQUISITION AND IDENTITY OF RELEASED MATERIAL

All parasites originated from collections of *Coleophora laricella* (Hbn.) (Lepidoptera: Coleophoridae) in Europe or Wisconsin or *C. longisignella* Moriuti in Japan taken from larch (*Larix*), the species of larch depending on the locality. Parasites were identified by C. M. Yoshimoto, Canadian Forestry Service, Department of Environment, Ottawa, and B. D. Burkes[9] and R. W. Carlson, U.S. National Museum, Washington, D.C. Voucher specimens are available at the U.S. National Museum or the Beneficial Insect Research Laboratory, Newark, Delaware.

The *Chrysocharis laricinellae* material which was released originated from several different localities. At the time of their collection there was some uncertainty as to how many species of *Chrysocharis* parasitize the larch casebearer. Stock known as *C. novellus* (Jagsch 1973) was obtained from Austria; stock obtained from Sweden was known

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[8]Both *C. laricinellae* and *D. westwoodii* are reported to be present in western larch stands. See Ryan et al. (1974) and Miller and Finlayson (1974).

[9]Retired.

as *C. nitetis* (Eidmann 1965). *C. laricinellae* was also obtained from England and from Wisconsin. In view of the taxonomic uncertainties, populations from the four source locations were considered different and were cultured and released separately. However, subsequent biosystematic study has since shown these to be conspecific (Ryan and Yoshimoto, in press).

Parasites from the Tyrolian and Styrian Alps of Austria and North Tirol of northern Italy were obtained from 1972 to 1974 through the cooperation of H. Pschorn-Walcher of the European Station, Commonwealth Institute of Biological Control, Delemont, Switzerland, and collectors Jagsch, Blumel, and Altenhofer. Collections in England in May of 1972 were made by personnel of the Forest Research Station, Farnham, at Staple Edge, Edgehill, and Crabtree Hill, all near Cinderford, Gloucestershire. H. Eidmann, Royal College of Forestry, Stockholm, and the Stockholm Biological Laboratory made collections in Uppland, Sweden, in March and April of 1973. Collections in northern Wisconsin in May and June of 1972 were made by H. C. Coppel and J. W. Mertins, University of Wisconsin, Madison. Collections in the Nagano and Gifu prefectures of central Honshu, Japan, were made in May and June of 1974 by N. Morimoto, Shinshu University, Ina, and K. Kanamitsu, Tokyo University, respectively.

Adult parasite shipments from abroad or infested material from which parasites subsequently emerged in quarantine were received at Belleville, Ontario, by J. S. Kelleher and G. D. Williamson, Agriculture Canada, Ottawa; or at Moorestown, New Jersey, or Newark, Delaware, by W. H. Day and L. R. Ertle, Beneficial Insect Research Laboratory, Newark, Delaware.

LOCATION, TIMING, AND SIZE OF RELEASES

Details of the releases are presented in table 1. Releases were timed to coincide with the presence of susceptible host stages. *Diadegma laricinella* (Strobl) parasitizes needlemining larvae, whereas *C. laricinellae*, *Necremnus metalarus* (Walker), *Elachertus argissa* (Walker), and *Dicladocerus* "A" attack casebearing larvae. Although highly dependent upon elevation, casebearing larvae were actively feeding from late April until early June and again from mid-September through October.

Parasites were released on study plots on which data on host density and parasitization are being taken by the several agencies cooperating in the work. Thus, evaluation of the introductions will be available.

Table 1.--Releases of *Chrysocharis laricinellae*, *Necremnus metalarus*, *Elachertus argissa*, *Dicladocerus* "A," and *Diadegma laricinella* in Washington, Idaho, and Montana, 1973-74

Liberation site	Date of release	Number released		
		Male	Female	Total
Chrysocharis laricinellae (Ratz.) (Hymenoptera: Eulophidae)				
Idaho[1]				
U.S. Hwy. 95,25 mi N. Moscow 47°02' N. 116°52' W.	Apr. 25, 1973	192	433	625
	May 2, 1973	75	136	211
	May 5, 1973	62	111	173
	May 16, 1973	127	203	330
	May 30, 1973	160	220	380
	Sept. 11, 1973	33	172	205
	Oct. 5, 1973	140	67	207
4.6 mi N. Troy 46°47' N. 116°48' W.	May 4, 1974	263	244	507
5.6 mi N. Troy 46°48' N. 116°47' W.	May 16, 1974	151	154	305
6 mi N. Troy 46°48'N. 116°47' W.	May 22, 1974	147	159	306
Lochsa River, Eagle Mountain Pack Bridge 62.2 mi E. Kooskia 46°26' N. 115°8' W.	May 30, 1974	147	154	301
3.4 mi E. Bovill 46°51' N. 116°20' W.	Sept. 27, 1974	33	276	309
Montana[2]				
4 mi N. Evaro 47°05' N. 114°04' W.	May 2, 1973	283	403	686
	May 11, 1973	81	116	197
	May 18, 1973	122	134	256
	May 23, 1973	93	102	195
	May 16, 1974	196	219	415
	May 31, 1974	80	92	172
	June 7, 1974	63	123	186
Washington				
Colville Indian Reservation, E. Round Lake[3] 48°17' N. 118°18' W.	April 27, 1973	238	472	710
	May 9, 1973	185	159	344
	May 17, 1973	85	89	174
	May 24, 1973	179	72	251
	May 7, 1974	187	230	417
	May 24, 1974	131	115	246
	May 31, 1974	89	78	167
	Sept. 26, 1974	1	112	113

See footnotes at end of table.

Table 1.--Releases of *Chrysocharis laricinellae*, *Necremnus metalarus*, *Elachertus argissa*, *Dicladocerus* "A," and *Diadegma laricinella* in Washington, Idaho, and Montana, 1973-74--continued

Liberation site	Date of release	Number released		
		Male	Female	Total
Chrysocharis laricinellae (Ratz.) (Hymenoptera: Eulophidae) (continued)				
Charley Creek, 15 mi S. Pomeroy[4] 46°15' N. 117°30' W.	May 11, 1973	195	58	253
	Sept. 25, 1973	119	81	200
	Oct. 10, 1973	292	182	474
	May 10, 1974	659	573	1,232
	May 23, 1974	108	131	239
	May 30, 1974	155	185	340
	June 7, 1974	123	157	280
	Sept. 20, 1974	122	192	314
	Sept. 25, 1974	143	124	267
Necremnus metalarus (Walk.) (Hymenoptera: Eulophidae)[1]				
Idaho				
4.6 mi N. Troy 46°47' N. 116°48' W.	May 4, 1974	3	409	412
5.6 mi N. Troy 46°48' N. 116°47' W.	May 16, 1974	0	145	145
6 mi N. Troy 46°48' N. 116°47' W.	May 22, 1974	1	139	140
Lochsa River, Eagle Mountain Pack Bridge 62.2 mi E. Kooskia 46°26' N. 115°8' W.	May 30, 1974	0	135	135
3.4 mi N. Bovill 46°51' N. 116°20' W.	Sept. 27, 1974	6	825	831
	Oct. 9, 1974	5	386	391
Montana				
4 mi N. Evaro 47°05' N. 114°04' W.	May 16, 1974	1	406	407
	May 31, 1974	0	175	175
	June 7, 1974	1	162	163
	Sept. 24, 1974	1	275	275
	Oct. 3, 1974	0	211	211
Washington				
Colville Indian Reservation, E. Round Lake 48°17' N. 118°18' W.	May 7, 1974	1	378	379
	May 24, 1974	0	124	124
	May 31, 1974	0	124	124
	Sept. 26, 1974	0	357	357
	Oct. 1, 1974	0	238	238

See footnotes at end of table.

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Liberation site	Date of release	Number released		
		Male	Female	Total
Necremnus metalarus (Walk.) (Hymenoptera: Eulophidae)[1] (continued)				
Charley Creek, 15 mi S. Pomeroy	May 10, 1974	1	445	446
46°15' N. 117°30' W.	May 23, 1974	1	139	140
	May 30, 1974	0	95	95
	June 7, 1974	0	92	92
	Sept. 20, 1974	0	116	116
	Sept. 25, 1974	0	173	173
	Oct. 4, 1974	0	135	135
Elachertus argissa (Walk.) (Hymenoptera: Eulophidae)[1]				
Idaho				
3.4 mi E. Bovill	Sept. 27, 1974	10	141	151
46°51' N. 116°20' W.	Oct. 9, 1974	3	74	77
	Oct. 18, 1974	12	51	63
Montana				
4 mi N. Evaro	Sept. 24, 1974	7	105	112
47°05' N. 114°04' W.				
Washington				
Colville Indian Reservation, E. Round Lake	Sept. 26, 1974	7	102	109
48°17' N. 118°18' W.				
Charley Creek, 15 mi S. Pomeroy	Sept. 20, 1974	8	81	89
46°15' N. 117°30' W.	Sept. 25, 1974	2	43	45
	Oct. 4, 1974	1	31	32
Dicladocerus "A" (Hymenoptera: Eulophidae)[5]				
Idaho				
3.4 mi E. Bovill	Sept. 27, 1974	0	65	65
46°53' N. 116°20' W.				
Diadegma laricinella (Strobl) (Hymenoptera: Ichneumonidae)[6]				
Idaho				
4.6 mi N. Troy	July 23, 1974	0	10	10
46°47' N. 116°48' W.				

[1]Parasite strain originated in Austria-northern Italy.
[2]Parasite strain originated in England.
[3]Parasite strain recolonized from Wisconsin.
[4]Parasite strain originated in Sweden.
[5]Adults reared from material collected in Japan. The species is believed distinct from *Dicladocerus westwoodii* Westw. and *Dicladocerus* spp. already present (see Miller and Finlayson 1974).
[6]Adults reared from material collected in Austria-northern Italy.

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