

SCIENTIFIC NOTE

The Introduction and Establishment of *Anaphes (Patasson) calendrae* (Gahan) in Hawaii (Hymenoptera: Mymaridae)**John W. Beardsley**Department of Entomology, University of Hawaii, 3050 Maile Way, Honolulu, HI 96822, USA.
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Abstract: The history of introductions of the mymarid egg parasitoid *Anaphes (Patasson) calendrae* (Gahan) into Hawaii for biological control of sphenophorine weevils (Coleoptera: Curculionidae) is reviewed, and its establishment on the islands of Oahu, Maui and Hawaii is documented.

In 1928, the late C. E. Pemberton, then Head of the Entomology Department of the Hawaiian Sugar Planters' Association Experiment Station in Honolulu, sent the late F. X. Williams, Entomologist, to the U. S. Department of Agriculture, Bureau of Entomology, laboratory at Webster Grove, Missouri, to obtain the mymarid egg parasitoid *Anaphes (Patasson) calendrae* (Gahan) (then known as *Anaphoidea calendrae* Gahan) for release as a biological control agent against the New Guinea sugarcane weevil, *Rhabdoscelus obscurus* (Boisduval), in Hawaii (Satterthwait 1931, Williams 1929b). *A. calendrae* was a known parasitoid of the eggs of weevils of the genus *Sphenophorus* Schoenherr (then known as *Calendra* Clairville and Schellernberg) in the southeastern U.S., and H.S.P.A. entomologists thought that it might also attack eggs of the New Guinea sugarcane weevil, a member of the same taxonomic group (Tribe Sphenophorini). Williams returned to Honolulu with a culture of *A. calendrae* in *Sphenophorus* eggs. He later reported that "emergence was satisfactorily accomplished, but evidence of the parasites attacking the eggs of *Rhabdocnemus obscurus* was lacking" (Satterthwait 1931). Williams (1929a, 1929b) reported liberating "about 600" of these wasps at Paauhau (Hawaii Island) and 40 at the H.S.P.A. substation in Manoa Valley, Honolulu (now the Lyon Arboretum) during August 1928. At that time no species of *Sphenophorus* were known to occur in Hawaii. The parasitoid apparently failed to become established (Pemberton 1948).

More recently, two North American species of *Sphenophorus* weevils were accidentally introduced and became established in Hawaii; *S. cariosus* (Olivier) in 1956 (reported as *Calendra cariosa*, Beardsley 1957), and *S. venatus vestitus* Chittenden in 1960 (Chilson 1961). *S. cariosus* is known to attack only purple nut sedge, *Cyperus rotundus* L., a pest weed in Hawaii, but *S. venatus vestitus* became a serious pest of *Zoysia* and *Zoysia* hybrid lawn and turf grasses on Oahu, and later also became a major problem in Kikuyu grass (*Pennisetum clandestinum* Chiov.) on cattle ranches on Maui and Hawaii islands (Davis 1968). These species were not tested as hosts of *A. calendrae* by Satterthwait (1931), but both later proved to be excellent hosts in insectaries in Hawaii.

During 1963, because of increased damage by *R. obscurus* in Hawaiian sugarcane fields, as well as damage by *S. venatus vestitus* to lawn grasses, the introduction of *A. calendrae* was again attempted. During the spring and summer of that year the parasitoid, then known as *Patasson calendrae* (Gahan), was shipped from Columbia, Missouri in parasitized *Sphenophorus* eggs, by Mr. F. A. Bianchi, and received by me at the H.S.P.A. Experiment

Station in Honolulu, where the wasps were propagated on eggs of *S. cariosus* (*Patasson* Walker is now generally treated as a subgenus of *Anaphes* Haliday by most mymarid taxonomists [Schauff 1984]). Several hundred adult wasps were released in Hawaiian sugarcane fields, mostly on Oahu. Although this project was terminated at the end of 1963, without reported field recovery of the parasitoid, evidence cited below suggests that it did become established at that time.

In 1995, in collaboration with Dr. Carl Yoshimoto and others, I began a taxonomic review of Hawaiian Mymaridae. During examination of available specimens I found four slide-mounts determined by Dr. Yoshimoto as *Patasson calendrae* (Gahan). These slides contained field-collected specimens (three females and one male) from two Honolulu locations (Bishop Museum grounds, and Mt. Tantalus) which were taken in malaise traps during October 1963. These collections provide evidence that the parasitoid was established on Oahu at that time. This is the first published record of these recoveries.

Additional introductions, propagation and releases of *A. calendrae* were carried out during 1967 and 1968 by entomologists of the Hawaii State Department of Agriculture, who apparently were unaware that the parasitoid had been previously recovered on Oahu. The target pest of the new introductions was the hunting billbug, *S. venatus vestitus*, in range grasses on Maui and Hawaii islands. Introductions were made from Missouri in 1967, and from Florida in 1968 (Davis 1968, Davis and Chong 1969, Funasaki 1969). Six males that appear to be this species were collected in a D-vac sample taken at Kahua Ranch, Hawaii Island by Dr. F. Haramoto, University of Hawaii entomologist, on 30 January 1968. The slide-mounted specimens were sent to the late Dr. B. D. Burks at the U.S. National Museum, Washington, D.C. who determined them as *Anaphes* sp. This apparent recovery of *A. calendrae* on Hawaii Island was not reported.

Additional specimens which support the establishment of *A. calendrae* on Oahu include two males from Hickam A.F.B., 19.V.1988; one female and six males from the University of Hawaii Manoa campus, 3.VII.1995, J.W. Beardsley, sweeping weeds and grasses; one female, Barbers Pt., 16.XI.1996, J.W. Beardsley and W.D. Perreira, sweeping, and one female, Campbell Industrial Park, 5-17.II.1997, J.W. Beardsley and W.D. Perreira, yellow pan trap. A single male from Maui, Haleakala Highway, el. 90 ft, 18.XI-2.XII.1995, W.D. Perreira, yellow sticky trap, probably is this species, and suggests that it is probably established on that island.

I assume that *A. calendrae* develops in Hawaii on the eggs of *Sphenophorus cariosus* and *S. venatus vestitus*. It has been propagated on both of these hosts in insectaries there, although apparently there are no recorded rearings from field-collected hosts in Hawaii. Bianchi (1964) and Pemberton (1964) stated that this species was reared in the laboratory on eggs of *Rhabdoscelus obscurus*, but there is no evidence that it attacks eggs of that species in the field.

S. venatus vestitus is no longer a serious range pest in Hawaii, although it is an occasional pest of turfgrass. The impact that *A. calendrae* may have on *Sphenophorus* populations in Hawaii is unknown, as is its impact, if any, on the New Guinea sugarcane weevil. Additional research is needed to evaluate the effectiveness of *A. calendrae* in Hawaii.

REFERENCES

- Beardsley, J. W. 1957. Note on *Calendra cariosa* (Olivier). Proc. Hawaii. Entomol. Soc. 16:190.
 Bianchi, F. A. 1964. Note on *Patasson calendrae* (Gahan). Proc. Hawaii. Entomol. Soc. 18:346.
 Chilson, L. M. 1961. Note on *Sphenophorus venatus vestita* Chittenden. Proc. Hawaii. Entomol. Soc. 17:326.
 Davis, C. J. 1968. Note on billbug egg parasite. Proc. Hawaii. Entomol. Soc. 20:16-17.
 Davis, C. J. and M. Chong. 1969. Recent introductions for biological control in Hawaii XIV. Proc.

- Hawaii. Entomol. Soc. 20:317-322.
- Funasaki, G.** 1969. Note on *Patasson calendrae* (Gahan). Proc. Hawaii. Entomol. Soc. 20:285.
- Pemberton, C. E.** 1948. History of the Entomology Department Experiment Station, H.S.P.A. 1904–1945. Hawaii Planters' Rec. 52:53–90.
- Pemberton, C. E.** 1964. Highlights in the history of entomology in Hawaii. Pacific Insects 6:689–729.
- Satterthwait, A. F.** 1931. *Anaphoidea calendrae* Gahan, a parasite of eggs of weevils of the genus *Calendra*. J. N. Y. Entomol. Soc. 31:171–190.
- Schauff, M. E.** 1984. The Holarctic genera of Mymaridae. Entomol. Soc. Wash., Mem. 12:1–67.
- Williams, F. X.** 1929a. Note on *Anaphoidea calendrae* Gahan. Proc. Hawaii. Entomol. Soc. 7:227.
- Williams, F. X.** 1929b. The introduction of *Anaphoidea calendrae* Gahan into Hawaii as a possible egg parasite of our sugar cane beetle borer, *Rhabdocnemus obscurus* (Boisd.). Hawaii. Planters' Rec. 33:29–33.