

H. Glenn Wylie*

**October 15, 1927, Wingham, Ontario – December 1, 2015
Winnipeg, Manitoba**

Neil J. Holliday and Robert J. Lamb

Department of Entomology, University of Manitoba, Winnipeg, Manitoba R3T 2N2

H. Glenn Wylie had a long and productive career specializing in parasitoid biology and the biological control of insect pests. His interest in biology began on the family farm in southwestern Ontario, and in insects as a student assistant at the Canada Department of Agriculture laboratory at Belleville, Ontario in the summer of 1948. He graduated from the University of Toronto, Honours Zoology, in 1949, and was immediately hired by the Canada Department of Agriculture as a Technical Officer in the Entomology Laboratory at Belleville. From April 1950, Glenn was seconded to the Commonwealth Institute of Biological Control, Feldmeilen, Switzerland to collaborate in efforts to find biological control agents against the balsam woolly aphid in the Atlantic Provinces (Wylie 1958a, b). In addition to six months at Feldmeilen, Glenn was stationed in the Vosges Mountains of France for the summers of 1950 and 1951. The result of these efforts was "...a list of European predators and detailed information on the biology and life history of each species" (Bulletin of the Entomological Society of Canada 19 [1988]: 91–92). Six aphid predators that he identified were imported to eastern Canada, four of which established successfully.

Instead of the expected return to Canada in fall 1951, Glenn was encouraged to enrol in graduate studies at the University of Oxford. In his doctoral thesis, under the guidance of Professor George Varley, he described host-finding by the house fly parasitoid, *Nasonia vitripennis* (Walker). Professor Niko Tinbergen had recently arrived at Oxford, and stimulated Glenn's interest in animal behaviour. A condition of Glenn's Department of Agriculture support during his doctoral studies was that he be involved in Varley's research on the winter moth, *Operophtera brumata* (Linnaeus). This insect had become a major pest of broad-leafed trees in Nova Scotia, and Glenn was required to spend about six weeks each summer in 1952 and 1953 on studies that might lead to its biological control. Because of the workload, Glenn was initially reluctant to take on both thesis research and the winter moth project. Nevertheless, he successfully juggled these two responsibilities and additionally found time to court Jean Mary Hodges. Jean typed Glenn's D. Phil. thesis, which was submitted in May 1953, and in September 1953, they

* This article is also published in the Bulletin of the Entomological Society of Canada in an abbreviated form without citations or bibliography.

were married and moved to Belleville. So, from 1950–1953, by his 26th birthday, Glenn completed a major study of the biological control of balsam woolly aphid, completed a D. Phil. on the behaviour of a house fly parasitoid in 22 months, met and married Jean Hodges, and laid the ground work for biological control of winter moth.

Biological control of the winter moth was Glenn's full-time project from 1954–57. Between 1952 and 1956, over 182,000 winter moths were shipped to Belleville for parasitoid rearing and other studies. Although Glenn made some of the first collections, most were done by European collaborators with visiting entomologists from Belleville to coordinate: Harold Welch in 1954, Harold and Glenn in 1955, and James McLeod in 1956. Glenn's thorough knowledge of the European literature (Wylie 1955), and the work at Belleville, resulted in a catalogue of 63 parasitoids of the moth in its native range (Wylie 1960c), and improved understanding of geographic variation in the moth's phenology and population ecology (Wylie 1960a, b). As early as 1953, Glenn concluded that the tachinid, *Cyzenis albicans* (Fallén), and the ichneumonid, *Agrypon flaveolatum* (Gravenhorst), were promising candidate biological control agents, and Glenn and Jean, along with Glenn's assistant, Leon Chivers, made the first releases of *C. albicans* in Nova Scotia in 1954. Glenn was always quick to acknowledge the assistance of colleagues in Europe and North America (Wylie 1960c), but without Glenn's efforts, the declines in the population of winter moth that were documented by Embree (1965, 1966) would not have happened. The two parasitoids recommended by Glenn established quickly and went on to control the damage of winter moth in Nova Scotia and Prince Edward Island. Embree (1971) estimated that the total cost of the research leading to this result was \$160,000 and saved, in Nova Scotia alone, a forest resource valued at \$12,000,000 (current value \$75,000,000). When winter moth was introduced to Victoria, B.C., Douglas Embree repeated the process, collecting parasites in Nova Scotia, and sending them to Victoria with similar rapid success (Lucarotti 2013).

After completion of the winter moth project, Glenn returned to the study of pteromalid parasitoids of muscid flies. First, he published his thesis research on *N. vitripennis* (Wylie 1958c), and followed this with studies of the effect of host age, size and density on this parasitoid. He also investigated the effects of intraspecific and interspecific interactions of pteromalid parasitoids within the same host. An early benefit of this research was its utilization "...by the USDA in developing mass rearing procedures for parasites released in inundative control programmes against house fly and other pest fly species" (Bulletin of the Entomological Society of Canada 19 [1988]: 91). From 1958 to 1979, Glenn published 21 papers reporting on his studies of pteromalid parasitoids and these have been cited more than 700 times. They continue to be important in the field of host-parasitoid interactions, with more than 50 citations since 2009, some 30–60 years after their publication dates.

In 1972, Agriculture Canada transferred Glenn and many of his colleagues at the Belleville laboratory to the Integrated Pest Management Section of the Winnipeg Research Station. In Winnipeg, Glenn quickly developed a research program on the parasites of key pests of oilseed rape or canola, then a rapidly expanding crop in Western Canada with many little known insect pests. With Gordon Bucher, Glenn used field surveys to assess the role of pathogens and parasitoids in the population dynamics of

bertha armyworm, *Mamestra configurata* Walker (Wylie and Bucher 1977). Glenn went on to document the prevalence and biology of armyworm parasitoids in a series of six papers produced from 1977 to 1979. By 1979 he had begun work on the life history of flea beetles in canola, in preparation for investigating opportunities for their biological control (Wylie 1979b, 1981a). He initially focussed on the biology of an already active parasitoid, *Microctonus vittatae* Muesbeck, and later studied other euphorine braconids, including the European *Microctonus bicolor* Wesmael. This work resulted in a series of 10 papers from 1980 to 1985. From 1978 to 1983, the European parasitoid, *Townesilitus bicolor* Wesmael, was released for biological control of flea beetles, but this species apparently did not establish (Wylie 1988). By 1985, Glenn was working with his technician and graduate student, Frank Matheson, on the parasitoids of aphids that infest alfalfa and field peas (Matheson and Wylie 1985; Wylie and Bisdee 1987). As part of this programme, over 100,000 *Aphidius smithi* Sharma *et* Subba Rao were released against pea aphid, *Acyrtosiphon pisum* (Harris), between 1983 and 1987; assessments in 2001 indicated that this parasitoid had become established (Wylie *et al.* 2005).

Besides his many contributions to biological control of insect pests, Glenn contributed in other ways to entomology. He was a quiet man, not given to self-promotion, but was a valued and willing reviewer and source of expertise and advice for his colleagues. He was Secretary of the Entomological Society of Canada (1982–1984), and chaired the ESC's By-Laws Committee. For the Entomological Society of Manitoba, Glenn chaired the Annual Meeting Committee and Publicity Committee at various times, and was President of the Society in 1976–1977. Glenn was an Adjunct Professor in the Department of Entomology, University of Manitoba from 1982 to 1988. Reflecting the respect he was given by the entomological community in Canada, he was named an Honorary Member of the Entomological Societies of Canada (1988) and Manitoba (1987).

Glenn retired in January 1987 after 37 years working at Agriculture and Agri-Food Canada. He was an active retiree. He volunteered his time at the Fort Whyte Alive Environmental Education Centre, and was a member of the Friends of the Delta Marsh Research Station. He continued to take an interest in entomologists and entomology and, until shortly before his death, encounters with Glenn and his dog were welcome punctuations for some of his former colleagues on their walk home.

Bibliography

- Wylie, H.G. 1953. Experimental study of the searching behaviour of an insect parasite. D. Phil. Thesis, University of Oxford, Oxford, U.K.
- Wylie, H.G. 1955. Annotated bibliography of the winter moth *Operopthera brumata* (L.) (Lepidoptera: Geometridae). Report, Project E.69.12-1, Entomology Laboratory, Belleville, Ontario.
- Wylie, H.G. 1958a. *Adelges nusslini* (Borner) (Homoptera: Phylloxeridae) and its predators in eastern France. Proceedings of the 10th International Congress of Entomology (Montreal 1956) 4: 789.

- Wylie, H.G. 1958b. Observations on *Aphidecta oblitterata* (L.) (Coleoptera: Coccinellidae), a predator of conifer-infesting Aphidoidea. The Canadian Entomologist 90: 518–522.
- Wylie, H.G. 1958c. Factors that affect host finding by *Nasonia vitripennis* (Walk.) (Hymenoptera: Pteromalidae). The Canadian Entomologist 90: 597–608.
- Arthur, A.P., and H.G. Wylie. 1959. Effects of host size on sex ratio, development time and size of *Pimpla turionellae* (L.) (Hymenoptera: Ichneumonidae). Entomophaga 4: 297–301.
- Wylie, H.G. 1960a. Some factors that affect the abundance of the winter moth, *Operophtera brumata* (L.) (Lep., Geometridae) in western Europe. Entomologist's Gazette 11: 133–143.
- Wylie, H.G. 1960b. Some factors that affect the annual cycle of the winter moth, *Operophtera brumata* (L.) (Lepidoptera: Geometridae) in western Europe. Entomologia experimentalis et applicata 3: 93–102.
- Wylie, H.G. 1960c. Insect parasites of the winter moth, *Operophtera brumata* (L.) (Lepidoptera: Geometridae) in western Europe. Entomophaga 5: 111–129.
- Maybee, G.E., and H.G. Wylie. 1961. Effects of temperature and moisture on survival of parasites in stored winter moth, *Operophtera brumata* (L.) (Lepidoptera: Geometridae). The Canadian Entomologist 93: 851–855.
- Wylie, H.G. 1962. An effect of host age on female longevity and fecundity in *Nasonia vitripennis* (Walk.) (Hymenoptera: Pteromalidae). The Canadian Entomologist 94: 990–993.
- Wylie, H.G. 1963. Some effects of host age on parasitism by *Nasonia vitripennis* (Walk.) (Hymenoptera: Pteromalidae). The Canadian Entomologist 95: 881–886.
- Wylie, H.G. 1964. Effect of host age on rate of development of *Nasonia vitripennis* (Walk.) (Hymenoptera: Pteromalidae). The Canadian Entomologist 96: 1023–1027.
- Wylie, H.G. 1965a. Discrimination between parasitized and unparasitized house fly pupae by females of *Nasonia vitripennis* (Walk.) (Hymenoptera: Pteromalidae). The Canadian Entomologist 97: 279–286.
- Wylie, H.G. 1965b. Effects of superparasitism on *Nasonia vitripennis* (Walk.) (Hymenoptera: Pteromalidae). The Canadian Entomologist 97: 326–331.
- Wylie, H.G. 1965c. Some factors that reduce reproductive rate of *Nasonia vitripennis* (Walk.) at high adult population densities. The Canadian Entomologist 97: 970–977.

- Wylie, H.G. 1966a. Some effects of female parasite size on reproduction of *Nasonia vitripennis* (Walk.) (Hymenoptera: Pteromalidae). *The Canadian Entomologist* 98: 196–198.
- Wylie, H.G. 1966b. Survival and reproduction of *Nasonia vitripennis* (Walk.) at different host population densities. *The Canadian Entomologist* 98: 275–281.
- Wylie, H.G. 1966c. Some mechanisms that affect sex ratio of *Nasonia vitripennis* (Walk.) (Hymenoptera: Pteromalidae) reared from superparasitized housefly pupae. *The Canadian Entomologist* 98: 645–653.
- Wylie, H.G. 1967. Some effects of host size on *Nasonia vitripennis* and *Muscidifurax raptor* (Hymenoptera: Pteromalidae). *The Canadian Entomologist* 99: 742–748.
- Wylie, H.G. 1970. Oviposition restraint of *Nasonia vitripennis* (Hymenoptera: Pteromalidae) on hosts parasitized by other hymenopterous species. *The Canadian Entomologist* 102: 886–894.
- Wylie, H.G. 1971a. Observations on intraspecific larval competition in three hymenopterous parasites of fly puparia. *The Canadian Entomologist* 103: 137–142.
- Wylie, H.G. 1971b. Oviposition restraint of *Muscidifurax zaraptor* (Hymenoptera: Pteromalidae) on parasitized housefly pupae. *The Canadian Entomologist* 103: 1537–1544.
- Wylie, H.G. 1972a. Oviposition restraint of *Spalangia cameroni* (Hymenoptera: Pteromalidae) on parasitized housefly pupae. *The Canadian Entomologist* 104: 209–214.
- Wylie, H.G. 1972b. Larval competition among three hymenopterous parasite species on multiparasitized housefly (Diptera) pupae. *The Canadian Entomologist* 104: 1181–1191.
- Wylie, H.G. 1972c. Chemical, visual and behavioral clues to host habitat and host location. Symposium paper, Joint meeting of Entomological Societies of Quebec, Canada and America, Montreal.
- Wylie, H.G. 1973a. Parasites of face fly, *Musca autumnalis* (Diptera: Muscidae), and associated Diptera near Belleville, Ontario. *The Canadian Entomologist* 105: 257–261.
- Wylie, H.G. 1973b. Control of egg fertilization by *Nasonia vitripennis* (Hymenoptera: Pteromalidae) when laying on parasitized house fly pupae. *The Canadian Entomologist* 105: 709–718.
- Wylie, H.G. 1976a. Interference among females of *Nasonia vitripennis* (Hymenoptera: Pteromalidae) and its effect on sex ratio of their progeny. *The Canadian Entomologist* 108: 655–661.

- Wylie, H.G. 1976b. Observations on life history and sex ratio variability of *Eupteromalus dubius* (Hymenoptera: Pteromalidae), a parasite of cyclorrhaphous Diptera. The Canadian Entomologist 108: 1267–1274.
- Wylie, H.G. 1977a. Insect parasites reared from bertha armyworm, *Mamestra configurata* Walker, collected from artificial field populations near Winnipeg, Manitoba. Manitoba Entomologist 11: 50–55.
- Wylie, H.G. 1977b. Observations on *Athrycia cinerea* (Diptera: Tachinidae), a parasite of *Mamestra configurata* (Lepidoptera: Noctuidae). The Canadian Entomologist 109: 747–754.
- Wylie, H.G., and G.E. Bucher. 1977. Bertha armyworm, *Mamestra configurata* (Lepidoptera: Noctuidae), mortality of immature stages on the rape crop, 1972–1975. The Canadian Entomologist 109: 823–837.
- Wylie, H.G. 1977c. Observations on *Mericia ampelus* (Diptera: Tachinidae), an occasional parasite of bertha armyworm, *Mamestra configurata* (Lepidoptera: Noctuidae), in western Canada. The Canadian Entomologist 109: 1023–1024.
- Wylie, H.G. 1977d. Preventing and terminating pupal diapause in *Athrycia cinerea* (Diptera: Tachinidae). The Canadian Entomologist 109: 1083–1090.
- Wylie, H.G., and G.K. Bracken. 1977. Observations on *Ichneumon canadensis*, a parasite of noctuid pupae in southern Manitoba. The Canadian Entomologist 109: 1295–1296.
- Wylie, H.G. 1979a. Sex ratio variability of *Muscidifurax zaraptor* (Hymenoptera: Pteromalidae). The Canadian Entomologist 111: 105–109.
- Wylie, H.G., and G.L. Ayre. 1979. Hosts of *Banchus flavescens* (Hymenoptera: Ichneumonidae) and *Athrycia cinerea* (Diptera: Tachinidae) in Manitoba. The Canadian Entomologist 111: 747–748.
- Wylie, H.G. 1979b. Observations on distribution, seasonal life history, and abundance of flea beetles (Coleoptera: Chrysomelidae) that infest rape crops in Manitoba. The Canadian Entomologist 111: 1345–1353.
- Wylie, H.G. 1980a. Factors affecting facultative diapause of *Microctonus vittatae* (Hymenoptera: Braconidae). The Canadian Entomologist 112: 747–749.
- Wylie, H.G. 1980b. Colour variability among females of *Microctonus vittatae* (Hymenoptera: Braconidae). The Canadian Entomologist 112: 771–774.
- Wylie, H.G. 1981a. Effects of collection method on estimates of parasitism and sex ratio of flea beetles (Coleoptera: Chrysomelidae) that infest rape crops in Manitoba. The Canadian Entomologist 113: 665–671.
- Wylie, H.G. 1981b. Insect predation by parasites. Proceedings of the Entomological Society of Manitoba 36 (1980): 18.

- Wylie, H.G., and G.L. Ayre. 1982a. Obituary. Gordon Edward Bucher 1917–1982. *Bulletin of the Entomological Society of Canada* 14: 52.
- Wylie, H.G., and G.L. Ayre. 1982b. Obituary. Gordon Edward Bucher 1934[sic]–1982. *Bulletin of the Entomological Society of America* 28: 265.
- Wylie, H.G. 1982. An effect of parasitism by *Microctonus vittatae* (Hymenoptera: Braconidae) on emergence of *Phyllotreta cruciferae* and *Phyllotreta striolata* (Coleoptera: Chrysomelidae) from overwintering sites. *The Canadian Entomologist* 114: 727–732.
- Wylie, H.G. 1983a. Oviposition and survival of the European parasite *Microctonus bicolor* (Hymenoptera: Braconidae) in crucifer-infesting flea beetles (Coleoptera: Chrysomelidae) in Manitoba. *The Canadian Entomologist* 115: 55–58.
- Wylie, H.G. 1983b. Delayed development of *Microctonus vittatae* (Hymenoptera: Braconidae) in superparasitized adults of *Phyllotreta cruciferae* (Coleoptera: Chrysomelidae). *The Canadian Entomologist* 115: 441–442.
- Wylie, H.G. 1984. Oviposition and survival of three Nearctic euphorine braconids in crucifer-infesting flea beetles (Coleoptera: Chrysomelidae). *The Canadian Entomologist* 116: 1–4.
- Wylie, H.G., and C. Loan. 1984. Five Nearctic and one introduced euphorine species (Hymenoptera: Braconidae) that parasitize adults of crucifer-infesting flea beetles (Coleoptera: Chrysomelidae). *The Canadian Entomologist* 116: 235–246.
- Wylie, H.G., W.J. Turnock, and L. Burgess. 1984. *Phyllotreta* spp., flea beetles (Coleoptera: Chrysomelidae). In *Biological control programmes against insects and weeds in Canada 1969–1980*. Edited by J.S. Kelleher and M.A. Hulme. Commonwealth Agricultural Bureaux, Farnham Royal, U.K. pp. 73–76.
- Matheson, F.O., and H.G. Wylie. 1985. Parasitoids of *Acyrtosiphon pisum* (Harris) (Homoptera: Aphididae) in Manitoba. *Proceedings of the Entomological Society of Manitoba* 40 (1984): 21.
- Wylie, H.G. 1985. Posterior dispersal of eggs and larvae of *Microctonus vittatae* (Hymenoptera: Braconidae) in crucifer-infesting flea beetles (Coleoptera: Chrysomelidae). *The Canadian Entomologist* 117: 541–545.
- Wylie, H.G., and H.E. Bisdee. 1987. Primary and secondary parasites of an alfalfa-infesting aphid, *Therioaphis* sp., in Manitoba. *The Canadian Entomologist* 119: 857–858.
- Matheson, F.O., and H.G. Wylie. 1987. Parasitoids of *Acyrtosiphon pisum* (Harris) (Homoptera: Aphididae) in Manitoba. *Proceedings of the Entomological Society of Manitoba* 42 (1986): 25.

- Wylie, H.G. 1988. Release in Manitoba, Canada of *Townesilitus bicolor* (Hym.: Braconidae), an European parasite of *Phyllotreta* spp. (Col.: Chrysomelidae). *Entomophaga* 33: 25–32.
- Turnock, W.J., and H.G. Wylie. 1996. Obituary. Gordon Leonard Ayre (1930–1996). *Bulletin of the Entomological Society of Canada* 28: 152–153.
- Wylie, H.G., F.O. Matheson, M.J. Uddin and N.J. Holliday. 2005. Release and establishment studies in Manitoba, Canada, of *Aphidius smithi* (Hymenoptera: Aphidiidae), a parasitoid of *Acyrtosiphon pisum* (Hemiptera: Aphididae). *The Canadian Entomologist* 137: 91–97.

Additional references

- Embree, D.G. 1965. The population dynamics of the winter moth in Nova Scotia, 1954–1962. *Memoirs of the Entomological Society of Canada* 46.
- Embree, D.G. 1966. The role of introduced parasites in the control of the winter moth in Nova Scotia. *The Canadian Entomologist* 98: 1159–1168.
- Embree, D.G. 1971. The biological control of the winter moth in eastern Canada by introduced parasites. *In* *Biological Control*. Edited by C.B. Huffaker. Springer, New York. pp. 217–226.
- Lucarotti, C. 2013. Douglas Gordon Embree (1924–2013). *Bulletin of the Entomological Society of Canada* 45: 175–176.