BIOECOLOGY OF *LYDELLA THOMPSONI* HERTING, [DIP. TACHINIDAE] WITHIN THE RHONE DELTA IN SOUTHERN FRANCE

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*Lydella thompsoni* Herting, *Tachinidae*, is an endoparasitoid frequently associated in southern France with larvae of *Ostrinia nubilalis*, *Pyralidae*, *Sesamia nonagrioides*, *Noctuidae*, *Archanara geminipuncta* and *A. dissoluta*, *Noctuidae*. The tachinid was reared successfully at 21°C in the laboratory by providing the adult flies with a high humidity, a light intensity of 8,000-10,000 lux for mating and a mixture of casein proteolysate and honey as food. Under such conditions, the flies lived for about 30 days and about half of them mated successfully. Hosts were infested by dissecting mature tachinid females and placing 1-2 of the extracted planidia onto each moth larva. Half of the planidia successfully entered their larval hosts.

The biology of the tachinid larvae was studied on the 2 main hosts, *O. nubilalis* and *S. nonagrioides*. At 21°C, 25°C and 28°C, larval development took less time on *O. nubilalis* than on *S. nonagrioides*. At 25°C, female larvae on *O. nubilalis* required 9.0 ± 0.5 days and on *S. nonagrioides* 10.5 ± 0.3 days, male larvae on *O. nubilalis* required 8.3 ± 0.5 days and on *S. nonagrioides* 10.6 ± 0.6 days. Pupal duration was also influenced by the larval host. In winter, 2nd instar larvae of *L. thompsoni* entered a resting or quiescent condition. This condition is terminated sooner (December-January) in larvae developing on *S. nonagrioides* than in those developing on *O. nubilalis* (February-March).

The life cycle of the tachinid in the field was studied by trapping flies in water dishes and by collecting parasitized host larvae from various plants. Flies were caught from April to October, mainly in September. Larvae of the spring generation of the parasitoid developed on larvae of species of *Archanara* that fed on the reed, *Phragmites communis*. From 1976 to 1982, parasitism averaged about 16 %. Parasitism by summer generation on *S. nonagrioides* was highest (4-5 %) in June. Parasitism of *O. nubilalis* did not change by more than 2 fold in either of the 2 summers studied (10-17 % in 1981, 6-10 % in 1982). By September the numbers of host larvae had increased to 10-20 times the number available earlier in the season. Larval populations of *L. thompsoni* similarly increased from 3-400 larvae per ha in June to 4-5,000 per ha in September.

The stability of the relationship between this parasitoid and its hosts in southeastern France is discussed and compared to relationship described elsewhere.

KEY WORDS : Parasitoids, host parasite relationships, parasite biology, life cycle, *Tachinidae*, *Lydella thompsoni*, *Ostrinia nubilalis*, *Sesamia nonagrioides*, *Archanara spp.*, *Corn.*
The genus *Lydella* Robineau-Desvoidy was recently revised by Herting (1959) who redescribed the tachinid parasite of European corn borer, *Ostrinia nubilalis* Hübn., and named it *Lydella thompsoni* n. sp. Herting. Although Herting’s nomenclature was readily adopted, some American entomologists still refer to *Lydella grisescens* R.D. or *Lydella stabulans grisescens* R.D. as the tachinid species imported from Europe. According to Grenier & Nardon (1983), larvae of the European corn borer can be parasitized in France by 5 different tachinid species. During the present 5-year survey in the Rhone delta, although 1 000 of host larvae were examined, the only tachinid species found was *Lydella thompsoni* Hert. This fly is of eurasiatic origin and has been reported in Europe from Spain to southern Russia, notably in Italy, Yugoslavia, Hungary and Rumania. The fly was 1st collected in southern France by Thompson & Thompson (1923). Over the last 30 years, however it has followed the corn and corn borer progression towards the north and east.

This paper describes laboratory studies on the biology of flies collected from the Rhone delta and also includes observations made in both corn and sorghum fields and in more natural habitats.

**BREEDING**

Five to 10 pairs of newly emerged flies were released into each breeding cages (65 × 35 × 35 cm). Each cage was made from plastic sheet and contained wire netting apertures for ventilation. The temperature in the air conditioned rearing room was nominally 21°C, but under artificial light reached 28-30°C inside the cages. To mate, the flies needed a light intensity of at least 8,000-10,000 lux, much higher than the light intensity of many winter days. Light from incandescent bulbs (Mixopal Claude 250 W and H.W.L., 150-250 W) and luminescent tubes (Claude day light 40 W) was turned on periodically during the day. The natural light intensity ranged from 6,000 lux on cloudy days to more than 8,000 lux on sunny days. Humidity was kept high using water soaked sponges. Food consisted of jellyfied casein proteolysate and honey. Under the above conditions, the flies lived for about 30 days and half of them mated. The 1st matings occured within hours of emergence. Females stopped mating when they were 4 days-old.

Thompson (1930) found that European corn borer larvae could be parasitized by placing on their integuments larvae dissected from gravid tachinid flies. This method was therefore adopted for rearing the parasites in this study. Eggs of *L. thompsoni* matured in about 15 days under the conditions described above. The abdomens of gravid females were then opened in physiological liquid. The uterus, containing the well-developed larvae inside their egg shells, was ruptured and 1 to 2 planidia were removed with a thin brush and placed onto each corn borer larva. The larva and parasites were then transferred without food to a cabinet at 18°C. At this temperature, the corn borer larvae were less active and this facilitated penetration by the larvae of the parasitoid. On the following day, the temperature was raised to 25°C and artificial diet (Poitout & Bues, 1970) was provided for the corn borer larvae.

**EFFECT OF TEMPERATURE AND HOST SPECIES ON PARASITOID DEVELOPMENT**

**LARVAL DEVELOPMENT**

Development of the parasitoid larvae was studied at temperatures from 15°C to 28°C on 2 hosts, *O. nubilalis* and *Sesamia nonagrioides* (table 1). At 21, 25 and 28°C, parasitoid larval development took less time (P < 0.01) in *O. nubilalis* than in *S. nonagrioides*. At temperatures of 15 and 18°C, *O. nubilalis* often pupated before the parasitoid had completed its larval development. The use of diapausing corn borer larvae extended the period of development of the tachinid larvae to more than 2 months. It appears therefore that the rate of development of the parasitoid was influenced by the physiological status of its host.