

Studies On The Histerid Beetles (Histeridae - Coleoptera) Feeding On Dung In Egypt

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The present study dealt with the ecology, biology and taxonomy of the dung beetles of family Histeridae in Egypt covered the following points:

- 1- Survey and geographical distribution of the dung inhabitant species of family Histeridae: The survey of dung inhabitant species of histerid beetles was carried out all over the Egyptian territories including the different ecological regions: Nile Delta, Nile Valley, Western and Eastern deserts and Northern coast of the Mediterranean sea. Excursions over such a wide area were continued about three years. Beetles were collected from fresh and dry dung of some animals in addition to human faeces. The survey revealed the existence of nine species belonging to two genera of the family Histeridae. These species were *Hister bimaculatus* Linné., *Hister scutellaris* Erichson, *Saprius molse* Illers, *Saprius blancheti* Erichson, *Saprius punctatus* Fabricius, *Saprius semistriatus* Soriba, *Saprinus olivaceus* Germ., *Saprius politus* Brehm and *Saprius cherrus* Jansons. ----- 191
- 2- These beetles were collected from 11 types of animal dung namely, buffalo, cow, sheep, camel, donkey, poultry, chicken, duck, mixed dung and human faeces. The local distribution of each species of histerid beetles in Egypt, has been illustrated in detail on separate maps, showing their geographical distribution in 18 Governorates in our country.
- 3- Abundance of histerid beetles in different types of animal dung: Fifteen types of animal dung were examined for the presence of histerid beetles. The maximum number of species was collected from cow dung being 9 species followed by buffalo dung 8 species, human faeces being 4 species, donkey dung 3 species. Poultry, horse and mixed dung, 2 species each and sheep, camel, chicken and duck dung, one species each. whereas pigeon, rabbit, rat and pig dung were found to be free from histerid beetles. The most common species occurred in animal dung was *Hister scutellaris* Er., which occurred in 8 types of animal dung, followed by *H. bimaculatus* L. and *Saprinus blancheti* Er., which existed in 5 types of dung. *Saprius molse* Er. occurred in 4 types of animal dung, while *S. calcitrans* and *S. pulcherrimus* occurred in 3 types.
- 4- *S. politus* L., *S. semistriatus* Soriba, and *S. semipunctatus* F. were found to exist in 2 types of animal dung.
- 5- Fluctuation of population density of histerid beetles occurring in buffalo dung: at two different localities: Fluctuation of population density of some histerid species occurring in buffalo dung was studied in two different localities in Egypt, Abu Rawash (Giza Governorate) and Imailia (Matruh Governorate) throughout the year 1980. Collection of beetles were undertaken periodically in the two areas, twice monthly during the period of investigation. (Samples of buffalo dung were chosen randomly, measured and all the histerid beetles present were collected, identified and recorded. The seasonal abundance of histerid beetles was determined and expressed as the number of beetles per one square meter of dung per half monthly collection. The average monthly temperature and relative humidity were recorded during the period of investigation. The results obtained showed that: a) *H. bimaculatus* L., *H. scutellaris* Er., *S. molse* Illers, *S. blancheti* Er., *S. punctatus* Fab., *S. semistriatus* Soriba, *S. cherrus* Jansons, *S. politus* L., *S. semipunctatus* F., *S. calcitrans* and *S. pulcherrimus* were abundant during the summer months and increased during Spring and Autumn. It has three peaks of abundance during March, May and October. *Saprius* species came next in abundance, they were found all over the year except late December and the beginning of January. They have four peaks of abundance during February, April, June and September. The most abundant peaks were on February and September. *H. scutellaris* Er. was always found in low numbers and in only few masses of

buffalo dung. This species reaches its peaks during March, May and October, showing itself at a lowest population during the summer months and disappeared in August.

b) Observations at Ismailia: *Saprinus* species and *Jl. bimaculatus* L. were the most active species in the vicinity of Ismailia, while *Jl. scutellaris* Er. was less active and less abundant. All Histerid species were found all the year except the most winter period, December and January. *Jl. scutellaris* Er. has four peaks of abundance during the months March, June, September and November, and disappeared in August. Also *H. bimaculatus* L. has four peaks at March, June, September and October, disappeared also in August. *Saprinus* species were the most fluctuating species all the year with relatively high numbers, they have also four peaks of abundance during March, June, August and September. The individuals of these species disappeared only during December and January.

IV- The predatory effects of Histerid beetles on the developmental stages of the house fly: A study on the predatory effects of Histerid beetles on the dung-breeding fly *Musca domestica* L. was initiated by raising laboratory colonies of collected Histerid species as well as by raising a standard colony of the house fly on artificial diets in the laboratory. A series of experiments were conducted under laboratory conditions, (23-27°C, and 50-70 % R.H.) to evaluate the susceptibility of immature stages of the house fly (eggs, 1st, 2nd and 3rd instar larvae) to predation by six species of Histerid beetles, these species were: *Hister bimaculatus* L., *D. scutellaris* Br., *Saprinus bimaculatus* L., *S. semipunctatus* F., *S. semistriatus* Sc., and *S. blanchei* Mars.

a) Daily consumption of eggs and larvae: Eggs and larvae of known ages were offered daily in groups of 20 preys to individual beetles for 10 successive days. The most effective species on the house fly eggs was *Saprinus semipunctatus* F., consumed about 9.96 eggs/beetle/day, followed by *S. semistriatus* Sc., consumed about 8.38 eggs/beetle/day, then *Jl. scutellaris* Er., which consumed about 7.64 eggs/beetle/day. While the least effective species was *S. blanchei* Mars., consumed about 6.5 eggs/beetle/day. *Saprinus semipunctatus* F. was also the most effective species in preying on the 1st-instar larvae • consumed about 9.56 larvae/beetle/day, followed by both *S. semistriatus* Sc., and *Jl. scutellaris* Br., which they consumed about 7.2 and 7.14 larvae/beetle/day respectively. The least effective species were, *S. blanchei* Mars. and *S. bimaculatus* L., consumed about 5.12 and 3.66 larvae/beetle/day respectively. *H. bimaculatus* L. came in between and consumed about 6.16 larvae/beetle/day. *Jl. scutellaris* Er. was the most effective species in preying on the 2nd-instar larvae, consumed about 5.8 larvae/beetle/day, followed by *S. semipunctatus* F. consumed about 5.62 larvae/beetle/day, then *H. bimaculatus* L., 4.96 and *S. semistriatus* Sc., 4.9. *Saprinus blanchei* Mars. came after them, 4.62, while *S. blanchei* Mars. was the least active and efficient in preying on that stage and consumed about 2.98 larvae/beetle/day. The mean numbers of 3rd instar larvae consumed per beetle per day were 4.22, 4.1, 3.9, 3.48, 2.86 and 2.2 for *S. semipunctatus* F., *S. semistriatus* Sc., *Jl. scutellaris* Er., *H. bimaculatus* L., *S. blanchei* Mars. and *S. bimaculatus* L. respectively.

b) Predation on the developmental stages of the house fly (from egg and instar larvae to pupae): When eggs, 1st, 2nd and 3rd instar larvae of the house fly *Musca domestica* L. were exposed to a single predator of adult Histerids for a period of 24 hours for the pupal formation, *Saprinus semipunctatus* F. was the most efficient general predator, reducing fly population about 71% from the eggs to pupae; 86% from the first instar larvae to pupae, 38-95 individual from 2nd instar larvae to pupae, and 22.8 individual/beetle from 3rd instar larvae to pupae. *H. bimaculatus* L. also appeared to be an efficient predator, especially on the house fly eggs; predation accounted 59.65 individual from eggs to pupae, and accounted 42.55 individual from 1st-instar larvae to pupae. Predation on the 2nd and 3rd instar larvae to pupae accounted 27.6 and 17.2 individuals respectively. Predation of *S. semistriatus* on the developing stages of the house fly from eggs, 1st, 2nd and 3rd instar larvae to pupae accounted 53.1, 38.35, 25.5 and 12.65 individual/beetle respectively. *Jl. scutellaris* Er. on the other hand was most effective in preying on the developing stages from eggs and 1st-instar larvae to pupae. The mean numbers of population reduction were 50.35 and 50.4 individual/beetle respectively. The population reduction was 33.5 and 19.4 individual when 2nd and 3rd instar larvae were exposed to a single predator of *Jl. scutellaris* Er. The mean reduced number of developing flies from eggs to pupae was 42.95 individual when eggs were exposed to the predator *Jl. scutellaris* Er., which it was 34.45 from 1st instar larvae to pupae and it was 17.6 and 13.25 individual from 2nd and 3rd instar larvae to pupae respectively.

Blattella germanica L. on the developing stages ~ 0.3 eggs. Lat. ~. am Jrd instars to pupae accounted 29.4. 27. 20.8 am 13.65 individual/bee Uer respectively. v- The life history of two Rister species: Life history studies of the two species of family Risteridae. *Rister 8cutellaris* Erichson and *Rister bimaculatus* Linne were initiated by the collections of adults from bovine manure droppings in nature. A group of adult beetles of the same species were confined together in glass jars partially filled with sand. periodically supplied with house fly eggs as food source for the beetles. Observation were undertaken to determine oviposition. As eggs were detected they were removed and isolated singly either in plastic containers or in petri-dishes partially filled with sand and covered with muslin to provide ventilation. The study was carried out in the laboratory at room temperature of about $25 \pm 2^\circ\text{C}$. -----
 ----- 200 are about 2.36 mm. 10% 16 am about 0.91 mm wide. The incubation period was about 2.6 days under laboratory conditions (23-27 °C • 50-70 % R.H.).
 Larva 1. development required from 12 to 26 days with an average of 19.4 days. At the larval stage attained the maximum length, they entered the prepupal stage in a Collins type chamber, 5 cm deep. of manure and sand particles. The duration of the pupal stage was about 9.8 days. The total time of the life cycle from egg to adult was completed in 22-43 days, the average time was 29.8 days at $25 \pm 2^\circ\text{C}$. VI- Taxonomy: Diagnosis. key of the dung species of histerid beetles as well as descriptions accompanied with adult illustrations of the species are given. file sheet was based on 6 species of major economic importance which are host material in Egypt. These species were *Rister bimaculatus* L. • *R. 8cutellaris* Bi- • *R. apr:fm!blanchei* ~., §~J!OT!" "-.r8 • *R. emipungtatg*, p. aDd~. *R. semistriatus* se,