space and that the similarities between species sometimes do and sometimes do not fit with their genetical relationships.

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*Since then D. orena is added.

Boulétreau, M. and C. Biémont. Université de Lyon I, Villeurbanne, France. Reproductive potential of a Hymenopteran parasite of Drosophila melanogaster.

Though natural Drosophila populations have been extensively studied, little attention has been paid to the possible ecological role of their hymenopteran parasites (see the partial list established by Basden, 1972). The present results show that one of these parasites (Cothonaspis boulardi) has the fecundity, egg deposition rate and egg retention capacity capable of rendering it efficient in limiting population size of the host.

The parasite studied is a Cynipid belonging to the new species Cothonaspis boulardi described by Barbotin et al. (1979). Females lay their eggs in the 2nd instar larvae of D. melanogaster and the adult wasp emerges from the empty host pupa 18 days later at 25°C. Adult specimens were captured in southern France and the stock derived has been maintained in the laboratory by mass culture.

For determination of offspring production, couples of newly emerged imagos were placed in 100 ml plastic cages, fed with honey and kept at 22°C under LD 12:12. Three experimental groups were tested for egg retention capacity: group (a) had hosts added from the first day on; group (b) from day 4; group (c) from day 10. Every second day each couple was provided with 0-48 hour old eggs and larvae of D. melanogaster in a sufficient amount to minimize superparasitization (deposition of more than one egg per host).

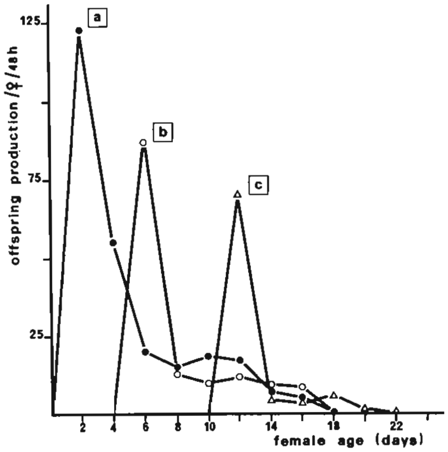

Fig. 1. Offspring production by females of C. boulardi. a: hosts present from the first day; b: from day 4; c: from day 10

Fig. 1 summarizes offspring production by females of the three groups. Females provided with hosts immediately after emergence (Fig. 1a) parasitize Drosophila larvae right away. Afterwards their production decreases rapidly and falls to 0 on day 16 though lifespan is 21 days on the average and can reach 40 days. This early egg deposition suggested preimaginal egg formation and maturation which was confirmed by dissection.

When host availability is delayed for 4 days (Fig. 1b) or 10 days (Fig. 1c) the same phenomenon is observed: intense, brief offspring production follows introduction of the host. However, the total offspring production is lower than in the first case and varies significantly with the duration of host deprivation, as shown in Table 1.

Table 1. Total offspring production in groups a, b, c

group a:	198.3 ± 9.6 (n=32)
group b:	134.8 ± 10.6 (n=25)
group c:	96.2 ± 10.0 (n=26)

In conclusion the main features of offspring production in this species are the following:

- preimaginal ovarian activity making adult females little dependent on food availability;
- fast deposition of the whole egg batch as soon as hosts are available;
- capacity for delaying egg laying: production is still 68% of normal after 4 days of host deprivation and 49% after 10 days.

These traits adapt the species to the exploitation of fluctuating host populations. Such parasites may be of importance in limiting seasonal demographic explosions. Moreover, the rather narrow specificity to melanogaster could favor other flies which compete for the same breeding sites, as suggested by Rouault (1979). This example shows that the parasitic complex associated to Drosophila populations should no longer be neglected in population dynamics studies.

We thank O. Terrier for valuable technical assistance and R. Grantham for help with the manuscript.

References: Barbotin, F., Y. Carton, F. Kellner-Pillaut 1979, Bull. Soc. Entomol. Fr. 84:19-26; Basden, E.B. 1972, DIS 48:70-72; Rouault, J. 1979, C. R. Acad. Sci. Paris (in press).

Bournias-Vardiabasis, N. and M. Bownes. City of Hope National Medical Center, Duarte, California, and University of Edinburgh. Cell death in the tumorous head mutant of Drosophila melanogaster. The tumorous head mutants of Drosophila melanogaster not only show homeotic transformations of head to genitalia and antenna to leg, but also have numerous duplications and deficiencies of head structures. Often the eyes are reduced or missing, and the palpi and head bristles can be absent or duplicated. The appearance of these defects suggested that they may result from cell death. Therefore, we have investigated the relationship between cell death observed in the eye-antennal disc and the adult abnormalities of the head.

Late third instar eye-antennal discs of six stocks were examined for cell death using a trypan blue/neutral red staining procedure. The dead cells were identified by their dark blue coloration.

Oregon R, tuh-1a; $\frac{Ubx^{130}}{TM1}$, and y tuh-1b; mwh jv showed occasional small areas of cell death (Fig. 1a) of the eye antennal discs stained from tuh-1a; tuh-3, y tuh-1b; tuh-3 and tuh-3 stocks 26%, 16%, and 21% showed cell death in the presumptive eye facet region, the vibrissae region, the antenna arista region, or the palpus rostrulhaut region (Fig. 1a). This suggests that the cell death is the result of the activity of the tuh-3 gene in these mutants and the cell death is located so that, according to eye-antennal disc fate maps, the defects seen in the adult could result from it.

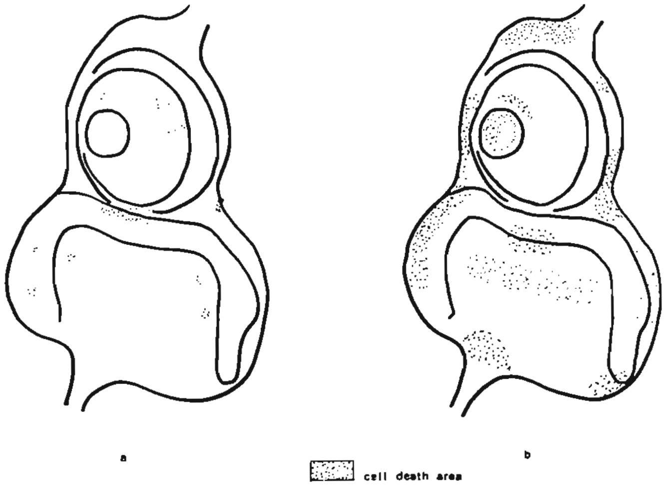

Fig. 1. Cell death areas (stippled) in whole mounts of eye-antennal discs of (a) Oregon R, (b) tuh-1a, tuh-3, y tuh-1b; tuh-3 and tuh-3 late third instar larva.

A comparison of the percentage of tumorous head eye-antennal discs showing cell death and the percentage of abnormalities found in the adult which may be attributable to cell death, from the same fly population, showed that there was a strong positive correlation between these two observations (Table 1) ($p = 0.05$). Temperature did not affect the frequency of cell death in discs.

In conclusion, many of the aspects of the tumorous head phenotype probably are the result of cell death in the eye-antennal disc. Thus, the tuh-3 gene is not only responsible for some embryonic lethality and homeotic transformations, but also for cell death in the eye-antennal disc of the larva.