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# Lek behaviour in three species of the subgenus *Hirtodrosophila* of Australian *Drosophila*

LEK behaviour, or the use of courting territories, is well known in the patterned wing, Hawaiian species of the subgenus *Drosophila*, but not elsewhere in the genus[1]. Australian *Drosophila* comprise a major adaptive radiation in the subgenus *Scaptodrosophila*, and minor radiations in *Hirtodrosophila* and *Sophophora*[2,3]. We report here on three species of the subgenus *Hirtodrosophila*, two with patterned wings and one without, that show lek behaviour.

The species are found in rain forest habitats from eastern Victoria to northern Queensland, a latitude range of 37°S–16°S; floristic composition of the rain forests varies widely over this range[4]. In especially damp and shaded regions, however, bracket fungi (Polyporaceae) of various species occur, growing laterally from the sides of fallen logs or tree trunks close to the ground[5]. The three *Hirtodrosophila* species use the horizontal undersides of the fungi as leks. Males position themselves on the undersides of fungi at regular intervals; females from the surrounding vegetation occasionally land there, and courtship activities follow. The undersides of the fungi are white or light grey, strongly enhancing displays; flies have not been found on old fungi with dark undersides.

During courtship, wing display is prominent. Two species, *D. mycetophaga* and *D. polypori*, have patterned wings, and both are commonly found from eastern Victoria to southern Queensland (latitude 2°S)[3]. The third species, *D. mixtura*, however, occurs only in northern Queensland. Its wings are tinged brownish especially towards the costal margin, but in contrast to other Australian *Hirtodrosophila* species and the Hawaiian species, it is striking in appearance, being very dark above, and changing abruptly to unicolorous pale cream below. Like the patterned-wing species, therefore, flies stand out strikingly when displaying on the undersides of bracket fungi.

In addition, two other as yet undescribed and rarer species have been collected from under bracket fungi, one with patterned wings, and one very closely related to *D. mixtura*. Presumably, they too use the fungi as leks. It is remarkable that only three patterned-wing Australian *Hirtodrosophila* species are known, all apparently using the same defined courting territories.

The five species are somewhat larger than many other Australian endemic species[3]. In contrast to the Hawaiian patterned-wing species[1], sexual dimorphism has not evolved, except that males are somewhat smaller than females. A striking level of sexual dimorphism has presumably evolved in the Hawaiian species, because the advertising males occupy sites in foliage to attract females to these seemingly less well defined courting territories.

We conclude that two patterned-wing species in the southern part of Australia, and a non patterned-wing species in the north show lek behaviour, the leks being identical in type. Moreover Hawaiian lek species belong to the subgenus *Drosophila* suggesting that convergent evolution has occurred in two subgenera of the genus for a behavioural pattern of considerable evolutionary significance which is unreported elsewhere in the genus.

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# Longevity and lifetime body weight in mice selected for rapid growth

AN association between lifespan and early growth rate as affected by nutritional manipulation has been reported; high intake–rapid growth apparently contribute to shorter lifespan, and low intake–slow growth to longer lifespan[1,2]. Genetically determined rapid growth has also been reported to be associated with shortened lifespan[3].

A strain of mice with approximately double normal growth rate, and with modified food intake, body composition and reproduction patterns has been developed by selection for body weight gain from 21–42 d of age[4]. We report here data on the lifespan and lifetime body weight of this strain (G) developed by us, and of contemporary animals from an unselected random bred strain (C) from the same base population.

The study involved 30 litters of line C and 38 litters of line G, from generation 33 of both lines. Two mice of each sex were sampled from each litter, and weighed weekly beginning the day after birth, to 16 weeks. From weaning, at three weeks, they were housed four to a cage, by sex and strain. At 16 weeks, numbers were reduced by random sampling within litters to a total of 16 per sex per strain, representing 30 and 32 litters for C and G respectively, and the number per cage was reduced to two. 'White diet', with a guaranteed analysis of not less than 24% crude protein and 6% fat, and not more than 3.5% crude fibre, was fed *ad libitum* throughout the experiment.

The 64 animals selected at 16 weeks were weighed at 4-week intervals until they died from 'natural' causes. An autopsy was carried out on the majority of the animals, and the incidence and location of tumours and other abnormalities noted.

Mean life span for both lines, by sex, is given in Table 1. On average, animals from line G had a life span only 57% that of those from line C.

**Table 1** Mean lifespan (weeks) for two strains of mice: control (C) and rapid 3–6-week body weight gain (G)

| Line | Males | | Females | |
|---|---|---|---|---|
| | *n* | $\bar{X}\pm$s.e. | *n* | $\bar{X}\pm$s.e. |
| C | 16 | 112.1±5.4 | 16 | 119.5±3.8 |
| G | 16 | 51.1±5.7 | 16 | 82.3±3.2 |

Since all animals of both strains in this study had the same diet, the results are in agreement with the finding[2] that growth rate is more important than dietary composition in influence on lifespan.

There was a significant interaction between line and sex in that females in line G lived about 60% longer than males, while the two sexes in line C did not differ significantly in longevity.

Previous work with these strains had shown that line G mice have significantly higher food intake and body fat percentage than line C[5–8]. Based on data from nutritional