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Laboulbeniales associated with the *Drosophila affinis* subgroup in central New York.

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Introduction

The fungal parasites of insects are not well known and those host-parasite lists that have been published (*e.g*., Leatherdale, 1970) usually fail to incorporate the most diverse groups of entomogenous fungi, including members of the ascomycete order Laboulbeniales. These fungi form fruiting structures on the integument of a wide range of insects and other arthropods, and are considered to be obligate ectoparasites. Most of the described parasite species are associated with beetles (Coleoptera) as hosts. The Laboulbeniales parasites of flies (Diptera) have received less attention. Fungal parasites of Diptera include species in the large genus *Stigmatomyces*, with more than 100 described species. These are known on a range of families including Agromyzidae, Chloropidae, Diopsidae, Dolichopodidae, Ephydridae, Muscidae, and Sphaeroceridae. The very first *Stigmatomyces* species to be described from North America was recorded from New York on a species of *Drosophila* (Peck, 1885, as *Appendicularia*). In this report we document the incidence of Laboulbeniales in a temporal study of temperate drosophilids in central New York, USA.

Methods

Adult *Drosophila* and related species were captured by netting and aspirating flies from compost and decaying mushrooms in and around Green Lakes State Park, New York, during late September 1999 and during the Spring and Summer of 2000. Individuals were inspected under CO_2 anesthesia with a Wild M-5 binocular microscope at 25-50_.

Results

Only flies in the *Drosophila affinis* subgroup of the *obscura* group were found to have Laboulbeniales associated with them. Table 1 details the incidence and proportion of the adults carrying the fungi.

Approximately 10% of the flies were infected. However, males captured outnumbered females 1058 to 154. Considering the sexes separately, the proportion ± s.e. of infected individuals (averaged over date collected and according to sex) was 0.008 ± 0.006 for females and 0.105 ± 0.030 for males (pooled species). The percentage of males and females infected increased then decreased with month during 2000 (Table 2).

Table 1. Incidence of Laboulbeniales on *Drosophila affinis* subgroup.Collections from compost and mushrooms on the border of Green Lakes State Park, NY. Females = f, Males = m.

Date	Species	Sex	No	Yes	Total	Proportion
9/28/99 to						
9/30/99	*D. affinis sg.*	f	0	0	0	
	D. athabasca	m	4	0	4	0.000
	D. algonquin	m	0	0	0	
	D. affinis	m	0	0	0	
4/16/00	*D. affinis sg.*	f	6	0	6	0.000
	D. athabasca	m	64	0	64	0.000
	D. algonquin	m	0	0	0	
	D. affinis	m	0	0	0	
5/01/00 to						
5/04/00	*D. affinis sg.*	f	18	0	18	0.000
	D. athabasca	m	87	0	87	0.000
	D. algonquin	m	28	0	28	0.000
	D. affinis	m	3	0	3	0.000
5/07/00 to						
5/11/00	*D. affinis sg.*	f	25	0	25	0.000
	D. athabasca	m	110	1	111	0.009
	D. algonquin	m	17	0	17	0.000
	D. affinis	m	15	1	16	0.063
5/30/00 to						
5/31/00	*D. affinis sg.*	f	24	0	24	0.000
	D. athabasca	m	120	28	148	0.189
	D. algonquin	m	25	2	27	0.074
	D. affinis	m	10	0	10	0.000
6/01/00 to						
6/04/00	*D. affinis sg.*	f	8	0	8	0.000
	D. athabasca	m	13	6	19	0.316
	D. algonquin	m	0	0	0	
	D. affinis	m	0	0	0	
6/08/00 to						
6/11/00	*D. affinis sg.*	f	18	1	19	0.053
	D. athabasca	m	89	34	123	0.276
	D. algonquin	m	15	1	16	0.063
	D. affinis	m	14	1	15	0.067
6/18/00	*D. affinis sg.*	f	26	1	27	0.037
	D. athabasca	m	136	17	153	0.111
	D. algonquin	m	14	1	15	0.067
	D. affinis	m	10	3	13	0.231
7/05/00	*D. affinis sg.*	f	4	0	4	0.000
	D. athabasca	m	43	3	46	0.065
	D. algonquin	m	6	0	6	0.000
	D. affinis	m	22	3	25	0.120
7/10/00	*D. affinis sg.*	f	16	0	16	0.000
	D. athabasca	m	39	5	44	0.114
	D. algonquin	m	6	0	6	0.000
	D. affinis	m	19	1	20	0.050
7/25/00	*D. affinis sg.*	f	4	0	4	0.000
	D. athabasca	m	14	4	18	0.222
	D. algonquin	m	3	0	3	0.000
	D. affinis	m	3	1	4	0.250
7/31/00	*D. affinis sg.*	f	3	0	3	0.000
	D. athabasca	m	16	1	17	0.059
	D. algonquin	m	0	0	0	
	D. affinis	m	0	0	0	
Total			1097	115	1212	0.095

Table 2. Percentage of infected *Drosophila affinis* subgroup over months during 2000.

	April	May	June	July
Males	0	7.2%	17.8%	9.5%
Females	0	0	3.7%	0

Table 3. Other species (sexes combined) collected that did not have any Laboulbeniales.

Species	Number examined
D. melanogaster/simulans	265
D. putrida	228
D. immigrans	241
D. robusta	149
D. falleni	115
D. neotestacea	128
D. melanica	9
D. quinaria	7
D. funebris	5
D. busckii	5
D. hydei	5
D. virilis	1
D. ripunctata	16
Chymomyza amonea	57
Mycodrosophila dimidiata	11
M. claytonae	68
Hirtodrosophila duncani	40
Total	1350

Seventeen additional species in the family Drosophilidae were inspected (Table 3) and none was infected.

Discussion

Earlier inspection (Starmer, Polak, and Weir, unpublished) of *Drosophila* species in the Smoky Mountains of North America revealed *Stigmatomyces* infecting *affinis* subgroup drosophilids
in that region, while other *Drosophila* species observed did not carry these fungi. These observations coupled with this report and with earlier records showing *D. obscura*, *D. subobscura* are hosts in Europe (Dainat, *et al.*, 1974) indicate that within the genus *Drosophila* there is potentially a unique association of the fungus with *obscura* group *Drosophila* species. Other drosophilids known to have Laboulbeniales (*i.e.*, *Stigmatomyces* species) associated with them are *Drosophila funebris* (Thaxter, 1896; Blair, 1947; Picard, 1913), *D. nigricornis* (according to Wheeler this name has uncertain validity) (Weir and Rossi, 1995), *D. confusa* (= *Hirtodrosophila confusa*) (Dainat, *et al*., 1974) and species in *Scaptomyza* (Dainat and J.-F. Manier, 1974), *Leucophenga,* and *Zaprionus* (Tavares, 1985).

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