than passing interest that B was collected in the same field in the same week as the mother of A. Both specimens show some streaky mosaicism, with patches of male scales on the female side and conversely.

Specimens C through E have abnormal, asymmetrical black markings which are confined to the upper surface. (Mosaics of this sort are very rare on the ventral surface. I have only one *rapae*, a female, with an abnormal black marking confined to the ventral surface and this is a "ray" similar to and perhaps homologous with the Mendelian character found in the *protodice* group (Shapiro 1973, Wasmann J. Biol. 31: 301–311).) In specimen E the shape of the spot suggests homeosis, but it is located in an inappropriate interspace; moreover its position corresponds to an obvious crimp in the dorsal lamina, of the sort to be expected from a deformation of the pupal wing-case. Such injuries may occur when an unhardened pupa slips in its silken girdle. In *Colias* they routinely result in melanization of the area around the injury; if the adult is able to eclose, the resulting pattern is grossly abnormal (compare female figured by Shapiro 1970, Entomol. News 81:50/data document p. 5).

Braun (1939, Biol. Bull. 76: 226–240) showed that as pigment precursor spread outward across the wing from the body, deposition took place in those scales which were sufficiently chitinized at that time. Control of pattern thus depends on the rate of scale maturation, which may be accelerated around injuries—contributing to mosaics such as these. Since injuries are most likely on the dorsal surfaces, especially of the forewings, it is not surprising that mosaicism is commonest there. The black streaking near the costa of specimen D could have arisen in several ways, but that near the hindwing apex of C suggests an injury resulting in pigment deposition in the corresponding scales as a wave of melanin precursor moved across the wing.

All of the specimens figured are in the collection of the University of California at Davis.

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A MALE-LETHAL GENETIC FACTOR IN *PHYCIODES THAROS* (NYMPHALIDAE)

During the course of four years of rearing studies using *Phyciodes tharos* Drury, a total of 17 broods was reared of stock from Upper Tyrone Township, Fayette Co., Pennsylvania. Of these, 15 were derived from wild-collected females and the remaining 2 from wild-laid egg patches found on leaves of the foodplant, *Aster simplex*. Exact egg-hatch data were kept on 16 of the broods, viability and sex ratio data on 13. Of the 17 broods, 3 showed almost total male inviability. In 2 of these 3, most mortality appeared to be during embryonic development, whereas in the third there was normal embryonic viability but about 50% mortality between the first and fourth larval instars. An additional brood (77-63) reared from a wild female collected in Rochester Mills, Indiana Co., Pennsylvania, showed greatly reduced embryonic viability and an almost total absence of male adults (Table 1).

Female progeny from two of the abnormal Fayette Co. broods (74-4, 76-2) were mated to males from normal broods of the same population. Each of these isofemale lines (A and B) showed a tendency toward lowered egg fertility ($P < .001$, Wilcox on

TABLE 1. Egg fertility, embryonic viability, adult sex ratio, and prepupal and pupal mortality in broods of *Phyciodes tharos* from wild-collected eggs and females. "Male-lethal" broods indicated by asterisks.

Brood No.	No. of Eggs	Proportion Fertile	Proportion Hatched	Total Adults	Proportion Males	Proportion Mortality
73-1	199	1.000	1.000	75	0.493	0.053
73-2	167	1.000	1.000	140	0.464	0.021
73-3*	557	0.978	0.724	207	0.010	0.019
73-4	638	1.000	1.000			
73-29	229	1.000	1.000	56	0.428	0.036
73-30				21	0.523	0.381
74-1	162	1.000	1.000			
74-2	472	0.998	1.000			
74-3	243	0.992	0.984			
74-4*	45	1.000	1.000	~23	0.000	0.000
75-5				161	0.578	0.012
75-7	220	1.000	1.000	212	0.524	0.042
75-8	258	0.992	0.976	126	0.484	0.008
75-54	289	0.990	0.996	160	0.519	0.025
75-66	135	1.000	0.985	77	0.416	0.130
75-67	25	1.000	1.000	21	0.762	0.000
76-2*	72	1.000	0.444	118	0.000	0.025
77-63*	484	0.983	0.736	174	0.023	0.172

TABLE 2. Egg fertility, embryonic viability, adult sex ratio, and prepupal and pupal mortality in "male-lethal" isofemale lines of *Phyciodes tharos*.

Brood No.	No. of Eggs	Proportion Fertile	Proportion Hatched	Total Adults	Proportion Males	Proportion Mortality
			Isofemale Line A			
74-15	131	0.191	0.333			
74-16	417	0.858	0.640			
			Isofemale Line B			
76-10	106	0.066	0.714			
76-11	746	1.000	0.614	126	0.000	0.103
76-13	611	0.988	0.778	79	0.076	0.025
76-14	84	0.060	0.800			
76-15	226	0.279	0.714	24	0.083	0.000
76-16	1048	0.995	0.715	150	0.000	0.033

two-sample test) and sharply reduced embryonic viability ($P < .001$) compared with the normal broods. Four broods were reared through to adults in Line B. Each of these showed almost total male inviability ($P = .001$) (Table 2). In none of the "male-lethal" broods was there an unusually high incidence of mortality during the prepupal and pupal stages. The male lethal crisis appears to occur during embryonic or larval development.

Robinson (1971, Lepidoptera Genetics, Pergamon, New York, 687 p.) has discussed male-deficient broods in several species of Lepidoptera. In *Abraxas grossularia* L. (Geometridae), a karytotypic aberration in females gives a tendency to produce nearly unisex but normally viable broods. In *Hypolimnas misippus* L. (Nymphalidae), females from some small island populations produce all female broods with reduced embryonic viability. Here a dominant sex-linked gene has been postulated.

Owen (1966, Heredity 21: 443–451) has investigated East African populations of *Acraea encedon* L. (Acraeidae), some of which contained only 0.6 to 6.2% males. Eggs produced by wild-collected females showed normal viability. Parthenogenesis was ruled out, and the genetic basis of the unisexual broods remains unknown.

The present case in *P. tharos* appears to be similar to that in *H. misippus*. Presumably, in both cases the disadvantage of heavy selection against male progeny is offset by some selective advantage to the females carrying the tendency toward unisexual broods.

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OVIPOSITION BEHAVIOR OF COLONIZED *HYALOPHORA GLOVERI GLOVERI* (SATURNIIDAE)

Efficient collection of eggs is an important aspect of maintaining small colonies of giant silkworm moths as breeding stock. This can be accomplished by establishing an oviposition profile for the species being reared and collecting eggs only during the period of peak oviposition. Experience in rearing many species of Nearctic giant silkworm moths has shown that most eggs are deposited during the first few nights after mating. Oviposition profiles reported for *Hyalophora cecropia* (Linnaeus) (Taschenberg & Roelofs 1970, Ann. Entomol. Soc. Amer. 63: 107–111) and *Callosamia promethea* (Drury) (Miller & Cooper, 1977, J. Lepid. Soc. 31: 282–283) are specific examples of this pattern. This paper reports oviposition data for a small breeding-stock colony of *Hyalophora gloveri gloveri* (Strecker) maintained on wild black cherry (*Prunus serotina*) in Frederick County, Maryland. Because of the small size of the colony ($\leqslant$12 individuals) observations were limited to five individuals.

Five female moths, each of which mated on the first night after emergence, were placed in brown paper bags (lunch size) on the first night after mating; and were transferred to new paper bags each night thereafter until death. After a period of time sufficient to allow all eggs to hatch, the bags were opened to record the number of eggs deposited and the number hatched.

The average longevity of the females after mating was 6.6 days; two individuals lived for 6 days and three lived for 7 days. The females deposited a total of 776 eggs during the study. The maximum number of eggs deposited by a single female was 198; the minimum number was 114. The average number of eggs deposited per female was 155.2. Percent hatch was moderate for eggs deposited during the first 4 nights after mating, the average ranging from 60.7% to 78.4%. The total number of larvae produced per female ranged from 60 to 137; the average being 103.2. The