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during the spring of 1963, but it is estimated that there were 10-12 adults; this would normally mean 6-8 females.

Nonbreeding was probably not the reason for the lack of young in 1967. Of 19 females killed and examined during May and June 1967 within about a mile from the Cedar Creek Natural History area, all 19 had bred. Of these 12 (63%) conceiving about April 16 another 4 (21%) conceived about April 28, and 3 (16%) conceived about May 6. This spread in conception dates was probably caused by cold periods during that spring. The young ground squirrels observed June 15 were probably from the early conception period. Litter sizes based on placental scar counts in 12 animals and from embryo counts in 7 animals ranged from 6 to 13, with a mean 10.2).

Employees at the Cedar Creek Natural History Area have observed litters of thirteen-lined ground squirrels on the lawn of the laboratory every summer from 1963 to 1967. Bull snakes have always been common on the area but no censuses have been taken and it is difficult to determine if they were any more abundant during 1967. If indeed the 1967 young ground squirrels were removed by the snakes, there is no explanation as to why that year was any different from others.

These observations were made during a period of employment as a research fellow at the Museum of Natural History, University of Minnesota, from funds under Atomic Energy Commission Contract to John R. Tester.

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ZOOLOGY

A 'New' Hybrid Minnow

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ABSTRACT — The specimen of a hybrid between the minnows *Chrosomus erythrogaster* and *Dionda nubila* is described. Taken in southeastern Minnesota near the known northernmost distributional limits of both parent species, this hybrid is between the parental extremes in most of the anatomical features examined.

Certain fresh water fishes, in which fertilization is external and spawning is often amidst related species, hybridize rather freely. This is especially true of minnows (Family Cyprinidae) and sunfishes (Centrarchidae). Hubbs (1955) discussed factors that promote hybridization among fishes and tabulated known hybrid combinations between different genera and subgenera.

Described herein is a hybrid between two minnows, the southern redbelly dace, *Chrosomus erythrogaster* Rafinesque, and the Ozark minnow, *Dionda nubila* (Forbes), both of which reach the known northern limits of their ranges in southern Minnesota. A single specimen of this hybrid was taken from Otter Creek at County Road 6, Mower County, Minnesota, on 24 October, 1964. It is on deposit (uncatalogued) at the University of Minnesota.

The authors know of no documented hybrid between *C. erythrogaster* and *D. nubila* previously. *C. erythrogaster* has been reported to hybridize with the following species: *Campostoma anomalum* (Hubbs and Bailey, 1952:143); *Chrosomus neogaeus* (as "*Pfrille neogaeus*," Hubbs and Brown, 1929:27); *Clinostomus elongatus* (as "Redside dace," Trautman, 1957:326); *Clinostomus funduloides* (as "Rosy dace," Trautman, *loc. cit.*); *Notropis cornutus* (Cross and Minckley, 1960:4; Minckley, 1959:431; Trautman, *loc. cit.*); and *Semotilus atromaculatus* (Cross and Minckley, *op. cit.*:7).

The hybrids of "*C. erythrogaster*" x *C. neogaeus* ("*Pfrille neogaeus*") mentioned by Hubbs and Brown (*loc. cit.*) were taken in Ontario, which is apparently beyond the range of *C. erythrogaster* (Hubbs and Lagler, 1958:80). Therefore it is suspected that these are instead hybrids between *C. neogaeus* and the northern redbelly dace, *C. eos*, which closely resembles *C. erythrogaster*. New (1962:147) treated them as *C. neogaeus* x *C. eos*.

D. nubila is known to hybridize with *Notropis pilsbryi* (as *Notropis zonatus pilsbryi*, Moore and Paden, 1950: 92). Hubbs (1955:11) listed in tabular form hybrids of *Dionda* with *Campostoma*, *Hybopsis*, and *Notropis*, without indicating species involved.

The *C. erythrogaster* x *D. nubila* hybrid was compared morphologically with five comparably-sized specimens of each parental species taken in the same collection.

The hybrid lies between the parental extremes in many of the bodily proportions and meristic characters examined (Table 1). However, its intestine is substantially

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TABLE 1. Comparison of the morphology and bodily proportions (ratios in thousandths) of a hybrid minnow, *Chrosomus erythrogaster* x *Dionda nubila*, with five specimens of each of the parent species.

Character	*C. erythrogaster* $\bar{X}$	hybrid	*D. nubila* $\bar{X}$
Sex	3♂♂, 2♀♀	♀	2♂♂, 3♀♀
Total length (Range)	56.3 mm (54.9-57.5)	56.0 mm	55.9 mm (54.8-56.6)
Standard length	45.3 mm (44.0-46.0)	45.0 mm	44.8 mm (44.0-45.5)
Length of intestine	80 mm (70-92)	61 mm	78 mm (74-83)
Head 1. / Standard 1.	249	251	241
Orbit 1. / Standard 1.	068	071	071
Snout 1. / Standard 1.	066	067	069
Snout 1. / Head 1.	265	265	287
Upper jaw 1. / Standard 1.	060	062	065
Upper jaw 1. / Head 1.	239	248	269
Postorbit 1. / Standard 1.	115	111	103
Postorbit 1. / Head 1.	460	442	426
Lateral scale rows	85	49	40
Lateral scale rows, caudal peduncle	23	15	13
Pharyngeal teeth	0,5-5,0	0,5-4,0	0,4-4,0

shorter than in either parent species among the specimens tested. The head length of the hybrid is proportionately greater than in either parent species among those measured, but this difference is slight. It has been suggested (Hubbs and Miller, 1943:373), that increased headsize in certain hybrid minnows may be caused by heterosis. In size and numbers, the scales of the hybrid resemble those of *D. nubila* more than *C. erythrogaster*.

In pigmentation the hybrid tends toward intermediacy between the parent species. As in both the Ozark minnow and the redbelly dace, the hybrid possesses a lateral stripe extending onto the snout. A dorsolateral stripe, well formed in *C. erythrogaster* but absent in *D. nubila*, is present but scarcely discernible in the hybrid. Darkened margins on the dorsal and lateral scales, strongly developed in *D. nubila* and weakly developed in *C. erythrogaster*, are present to an intermediate degree in the hybrid. The peritoneum, black in both parent species, is black in the hybrid as well.

The lateral line is complete in *D. nubila*. It is incomplete in *C. erythrogaster*, typically extending half the distance from the rear of the head to the tail. It is nearly complete in the hybrid, with only the five posteriormost lateral line scales unpored.

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