

Etheostoma (Boleosoma) longimanum and E. (Catonotus) obeyense, Two More Darters Confirmed as Egg-clusterers

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ABSTRACT

Egg-clustering and guarding by males are reported for the first time in the longfin darter, *Etheostoma longimanum*, and the barcheck darter, *E. obeyense*.

Darters either bury their eggs in the substrate and abandon them, or they attach them to an object, usually a rock or plant, above the substrate. Some species attach their eggs singly or in small groups and then abandon them; others arrange the eggs in a cluster on the underside of a stone or log and the male guards them until hatching.

Egg-clustering, which includes parental care, is the most complex form of breeding behavior in darters and has evolved in at least three unrelated subgenera (i.e., nonsister-groups) of *Etheostoma*: *Boleosoma*, *Nothonotus*, and *Catonotus*. It appears to be characteristic of all species of the subgenera *Catonotus* and *Boleosoma*, and of one or more (but not all) species of *Nothonotus*. Among *Boleosoma*, egg-clustering is known in *E. olinstedii* (Seal 1892), *E. nigrum* (Hankinson 1919), *E. perlongum* (D. G. Lindquist, J. R. Shute and P. W. Shute, pers. comm.), and *E. longimanum* (noted below). The only other species in the subgenus, *E. podostemone*, is a sibling of *E. longimanum* and almost certainly exhibits egg-clustering.

In *Catonotus*, egg-clustering has been documented for *E. flabellare* (Hankinson 1932), *E. squamiceps* (Page 1974), *E. kennicotti* (Page 1975), *E. smithi* (Page and Burr 1976), *E. neopteron* (Page and Mayden 1979), *E. strintulum* (Page 1980), *E. olivaceum* (Page 1980), *E. virgatum* (L. E. Kornman, pers. comm.), and *E. obeyense* (noted below). The only other taxonomically described species of *Catonotus* is *E. barbouri*.

Among *Nothonotus*, *E. maculatum* is

an egg-clusterer (Raney and Lachner 1939); *E. tippecanoe*, *E. camurum*, and *E. rufilineatum* are egg-buriers (Trautman 1957, Mount 1959, Stiles 1972). Breeding habits of the other nine species of *Nothonotus* are unknown but *E. aquali* and *E. microlepidum*, close relatives of *E. maculatum*, are probably egg-clusterers.

Nests of the longfin darter, *E. longimanum*, were sought in Craig Creek, both above and below New Castle, Craig County, Virginia, on 23 May 1980. Only one nest of eggs was found, although several large males in breeding coloration were captured and most females captured appeared to have spawned already. The nest, guarded by an almost totally black, 56-mm male, was found on the underside of a stone in moderately swift water, at 17.5°C and a depth of about 50 cm. The nest contained about 600 eggs in a single-layer cluster and averaging 1.5 mm in diameter. Raney and Lachner (1943) studied the life history of *E. longimanum* but did not comment on the site of egg deposition.

Nests of the barcheck darter, *E. obeyense*, were sought in Smith Creek at the Route 696 bridge, 3 km SE Albany, Clinton County, Kentucky, on 21 May 1980. Most individuals of *E. obeyense* captured were ripe females indicating the 1980 spawning period had not peaked. Two large breeding males were captured under slab stones. The first male apparently had established a breeding territory under the stone, but no eggs were present on the stone. The second male was guarding a nest of about 100 eggs on the

underside of a stone at a depth of 40 cm in slow-flowing water at 18°C. The eggs were about 2 mm in diameter and many contained advanced (eyed) embryos. The guarding male was 64 mm SL.

Clustering and guarding eggs involves complex, derived behavior and the distribution of this behavior among darters is valuable information on their phylogenetic relationships. That egg-clustering has evolved in at least three subgenera of *Etheostoma* attests to its contribution to reproductive success among darters.

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