

Short Communications

Note on artificial fertilization and early development of *Synodontis nigromaculatus* (Pisces: Mochokidae)

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Eggs obtained from a wild gravid spotted squeaker (*Synodontis nigromaculatus* Boulenger, 1905) were fertilized and incubated in plastic containers. Eggs are non-sticky, negatively buoyant and hatch after 35 h at water temperatures between 24 and 27°C. Development up to 228 h is described.

Eiers van 'n vrylewende, geslagsryp splkkel-skreeubaber (*Synodontis nigromaculatus* Boulenger, 1905) is bevrug en in plastiekhouders uitgebroei. Die eiers is nie-klewerig en nie-drywend. Na 35 h broei die eiers uit by watertemperature van 24 – 27°C. Die ontwikkeling tot op 228 h word beskryf.

Cichlids, clariids and cyprinids have been propagated in captivity in South Africa by simulating natural spawning stimuli, (Groenewald 1961; Le Roux 1968; Mulder & Franke 1973; Polling 1972a,b; 1982a,b; Van der Waal 1974). Clariids, schilbeids and cyprinids have also been spawned artificially by making use of hormonal stimulation (Wright & Coke 1975a,b; Van der Waal 1978; Schoonbee, Hecht, Polling & Saayman 1980; Van der Merwe 1981; Bok & Heard 1982; Cambray 1983; Kruger & Polling 1984). These fish were bred for aquacultural, recreational or conservation purposes. Little attention has been given in Southern Africa to the spawning and early development of Mochokidae, despite their commercial value as aquarium fish, and the trade is still solely supplied with juveniles collected in the wild in tropical parts of Africa (Polling 1985, pers. comm.).

Six *Synodontis* species are found in Southern Africa (Jubb 1967) of which *S. leopardinus* Pellegrin, 1914, *S. woosnami* Boulenger, 1911, *S. macrostigma* Boulenger, 1911 and *S. nigromaculatus* Boulenger, 1905 occur in the Upper Zambezi and Okavango Systems (Bell-Cross 1968; Jubb & Gaigher 1973; Van der Waal & Skelton 1984; Skelton, Bruton, Merron & Van der Waal 1985). The taxonomy of this group is presently under revision and there may be more species present (White 1985, pers. comm.).

Ripe-running specimens of *S. nigromaculatus* were collected with gill nets (60-mm mesh) in the Kwai River, Moremi National Park, north of Maun (19°15'S/23°30'E) during a fish collection expedition to the Okavango Swamps, Botswana. One female (180 mm standard length) was stripped of more than 3 000 eggs at 09h00 on 22 March 1984. Eggs

were collected in a dry plastic cup, crushed testes of one ripe male mixed with the eggs and then 50 ml river water was added. After two minutes the eggs were washed and fragments of testes were removed. The eggs were incubated in an open half-filled 20 l plastic bucket containing *Trapa natans* plants. About 100 eggs were kept separately for easy inspection in a 1 l plastic bottle filled with river water, and stored in a closed container. Water temperatures during and after incubation varied between 24 and 27°C. Upon stripping, the eggs measured about 1,4 mm in diameter (estimated with a ruler) and had a bright translucent, green colour. After 1 h the eggs had absorbed water and swollen to about 2,5 mm in diameter (estimated with a ruler), with a lighter green coloured cap of cytoplasm at the animal pole of the eggs. Fertilized eggs were demersal but not adhesive.

The collection is presently housed in the Albany Museum, Grahamstown. Developing eggs and larvae were transported over bush tracks in the Okavango Swamps and back to South Africa, without any suitable incubating facilities. In spite of this, nine larvae in the plastic bottle hatched and two survived to an age of 10 days, when the yolk sac had been completely absorbed, whilst all embryos in the bucket died before reaching 54 h. The larvae were offered live *Artemia* nauplii and small cladocerans, but did not feed. Table 1 summarizes some developmental stages of eggs and larvae and Figures 1–5 several stages of development after preservation. Figure 6 is a photograph of a living mesolarva. Live newly hatched protolarvae measure 3,0 mm total length and have downwards bent tails with no finfold present (Figure 4). They have translucent green yolk sacs and a whitish body and tail. When sorting larvae from dead eggs, it was noted that egg shells had gathered small quantities of detritus on them (Figure 3), indicating a slightly adhesive nature. One day after hatching, larvae started undulating their tails and hid under detritus in the container. One reason for the high mortality in the open bucket may lie in the photosensitivity of *Synodontis* eggs as observed by Brichard (1982). A crepuscular and nocturnal behaviour is also common in many *Synodontis* species (Brichard 1982).

Development from fertilized eggs into protolarvae is rapid — 35 h — and comparable to that of *Clarias gariepinus*

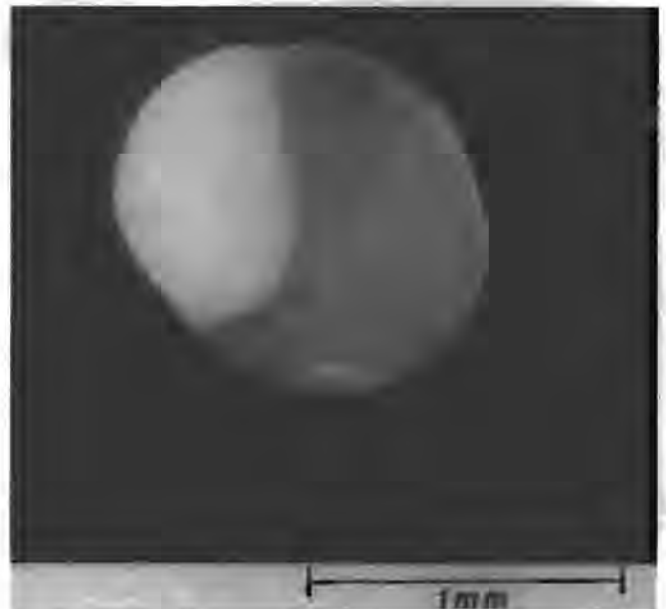


Figure 1 Developing embryo of *Synodontis nigromaculatus*, 7 h after fertilization. Outer membrane not visible.

Table 1 Development of eggs and early larvae of *Synodontis nigromaculatus* held at 24–27°C in a 1 l un-aerated plastic bottle from 22 March to 2 April 1984: Terminology after Snyder (1976; 1985, pers. comm.)

| Age (hours) | Total length (mm) | Morphology | Behaviour and Notes |
|-------------|-------------------|---|---|
| 0 | 1.4 | Freshly stripped and fertilized, non-sticky, demersal with small perivitelline space (0.05 mm). Eggs bright bottle green and translucent. Yolk contained no visible oil globules or blastoderm. | Slowly sinking |
| 5 | 2.5 (2.2–2.7) | Large quantities of water between inner and outer membranes. Blastomeres whitish (in live eggs) ISO+ and concentrated as a cap on the animal pole. | Eggs loose on substrate |
| 7 | 2.6 | Gastrulation begins (Figure 1) | Eggs loose on substrate |
| 10 | 2.6 | Gastrulation halfway completed (Figure 2) Blastodermal cap in equatorial position. | Eggs loose on substrate |
| 22 | 2.1 | Gastrulation complete, notochord formed, some somites (4–6) visible, tail starts to form (Figure 3). | Small amounts of detritus attached to outer egg membranes |
| 30 | 2.3 | Somites well formed, tail well developed, loose from yolk. Optic placode visible but not pigmented. | Embryos moved tails slowly inside egg shells |
| 35 | 3.0 | First protolarvae hatched, with tail bent downwards. No finfold, pectoral fin buds or pigment cells present. (Figure 4) | Protolarvae unattached on substrate moved tails slowly. Empty egg shells slightly adhesive. |
| 54 | 3.2 | Postanal part of tail bent upwards. Yolk sac nearly spherical. Finfold visible. (Figure 5). | Slight movements of protolarvae |
| 59 | – | Absorption of yolk sac noticeable. | Protolarvae swam actively on bottom |
| 83 | – | Finfold prominent, absorption of yolk sac continued. Melanophores present on dorsal side of head and body. | Hidden under debris |
| 168 | – | Pigmentation of eyes, head and dorsal surface. Two pairs of circumoral barbels visible. Mouth and pectoral fin primordia present. | Hidden under debris |
| 192 | 5.6 | Yolk sac completely absorbed. Pectoral fins, mouth and two pairs of barbels. Flexion occurred and finfold became discontinuous, 37 myomeres visible. | Protolarvae hid actively under debris. Live food items introduced |
| 228 | 7.1 | Mesolarvae with rayed fins in dorsal and caudal regions. Whole body lightly pigmented. Eye movement visible. | Mesolarvae hid under debris, refused food offered |

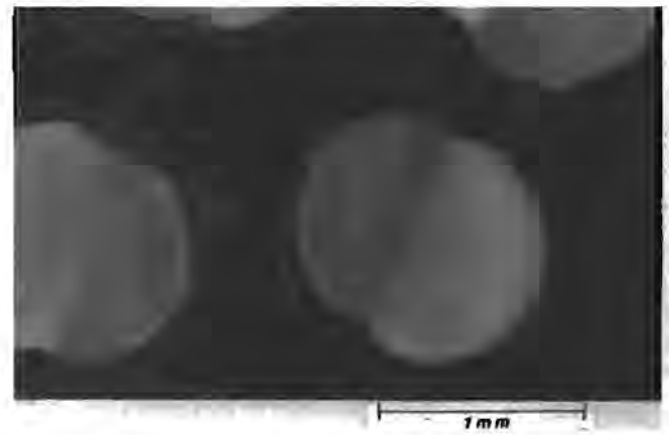


Figure 2 Embryos 10 h after fertilization. Blastodermal cap in equatorial position.

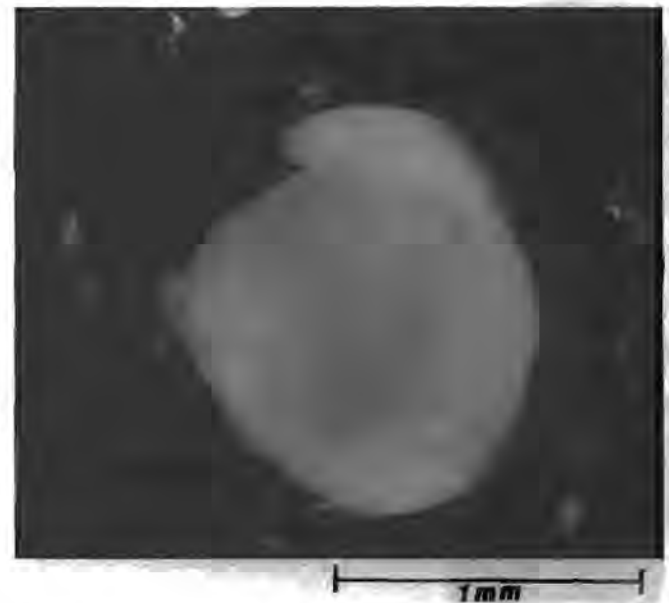


Figure 3 Embryo 22 h old. Note outer perivitelline membrane with some debris attached.

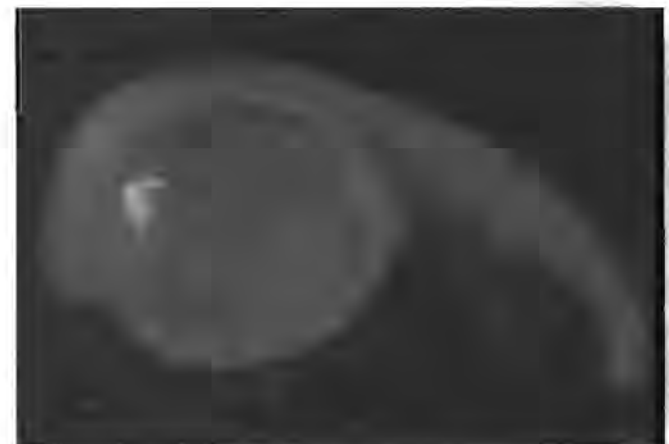


Figure 4 Protolarvae just after hatching, 35 h after fertilization, 3.0 mm long. Note drooping tail.

(Greenwood 1955; Van der Waal 1978 (31 h at 23–26°C) and *Eutropius depressirostris* (Kruger & Polling 1984 (32 h at 24°C), which spawn in freshly inundated areas where a



Figure 5 Protolarvae 54 h old with slightly developed finfold.

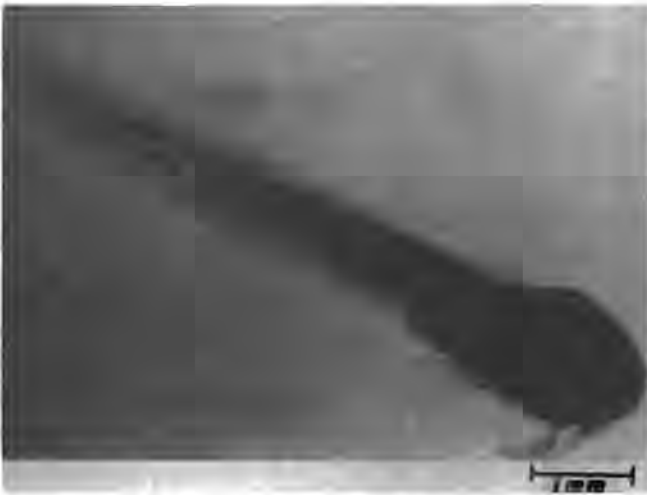


Figure 6 Mesolarva, 228 h old and 7,2 mm long with well developed pectoral fins and two pairs of circumoral barbels.

rapid larval development rate has survival value, (Bruton 1979).

S. nigromaculatus has a late summer months spawning season, after flooding has started (Van der Waal 1985), and is possibly not dependent on flood conditions. Although the non-adhesiveness of the eggs compared to the highly adhesive chorionic membranes of *C. gariepinus* and *E. depressirostris*, indicates a different spawning substratum, this is not necessarily the case because Cambray (1985) collected non-adhesive eggs (*Labeo capensis*) with adhesive eggs (*C. gariepinus*) on the same substratum, in this case stony shallows.

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