Short communication

Rapid removal of the pituitary gland of the sharptooth catfish *Clarias gariepinus* (Burchell)

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Abstract

The pituitary gland of the sharptooth catfish *Clarias gariepinus* has been shown to be a suitable substitute for that of the European common carp *Cyprinus carpio*, when used in the induced spawning of freshwater fish. However, problems may be encountered in the successfull removal of the gland from the strongly ossified skull of this fish species. This paper provides a brief description for the rapid removal of the pituitary gland of the catfish using a power drill and a hole saw.

Introduction

Since the first attempts at the induced spawning of teleost fish more than half a century ago (Houssay, 1931), considerable progress has been made and documented in research reports and reviews on the use of a variety of gonadotrophic hormones to stimulate freshwater fish to spawn in captivity (Shehadeh, 1975; Harvey and Hoar, 1979; Pullen and Kuo, 1980; Woynarovich and Horváth, 1980). Techniques initially developed for the artificial spawning of freshwater fish in hatcheries mainly involved the application of unpurified homogenised common carp (*Cyprinus carpio)* pituitary gland extract (PGE) (Shehadeh, 1975). This was followed by the use of partially purified fish gonadotrophins alone or in combination with human chorionic gonadotrophins (Atz and Pickford, 1959; Lin, 1974; Schoonbee *et al.*, 1978). As a result of problems encountered with the variability of the gonadotrophic potency of fish pituitaries and their scarcity, research workers were compelled to investigate substitute hormones such as human chorionic gonadotrophin (HCG) or LH-RH and RH-LH analogues to effect the final maturation of eggs and ovulation in fish species (Donaldson *et al.*, 1982). Apart from being useful, these synthetic hormones remained expensive and in most countries where carp farming is still practiced on a large scale, unpurified or GTH bio-assayed common carp PGE (Yaron *et al.*, 1985) is still used successfully by fish breeders.

The sharptooth catfish *Clarias gariepinus* is a promising candidate species for aquaculture in southern Africa (Safriel and Bruton 1985). The biology of the species is well-known (Van der Waal, 1972; Bruton, 1979), and significant progress has been made on its induced spawning (Schoonbee *et al.*, 1980; Hecht *et al.*, 1982; Hecht and Lublinkof, 1985) and larval rearing (Uys and Hecht, 1985). Research has also shown that *C. gariepinus* is a suitable substitute pituitary donor in place of the common carp, to induce spawning in a number of cyprinid species (Schoonbee and Prinsloo, 1986). The successfull and rapid removal of the pituitary glands from the strongly ossified skull of the fish is not easy and can lead to the destruction or damage of the gland with a loss of part of the material.

The use of a power or hand-operated circular saw to remove the pituitary glands from fish such as the common carp, *C. carpio,* and mullet, *Mugil cephalus,* is commonly practiced in Europe and the Far East (Schoonbee, personal observations), but the adaptation of the technique for the removal of the pituitary gland of the sharptooth catfish has not been described in any detail yet. In this paper a brief description is given for the rapid and efficient removal of the pituitary gland of *C. gariepinus* using this technique.

Materials and methods

Mature male and female donor fish are usually collected during the early spring, before the beginning of the rainy season and the commencement of the natural spawning process of this fish species. By using 110 mm mesh gill nets, mature fish of an average mass of approximately 1 kg can be caught. This is a convenient size for the removal of pituitary glands.

Although *C. gariepinus* is a tough fish and can survive for hours out of water without any apparent detrimental effects to the gonadotrophic quality of their pituitary glands, the glands are preferably removed as soon as possible after capture of fish. Each fish is carefully weighed to the nearest 10 g, prior to gland removal.

A portable 220V generator is used to drive a power drill with a 45 mm diameter circular hole saw attachment (Fig. 1 (A)). This size of hole saw is suitable to handle fish of up to 7 kg. The accurate location of the brain of the catfish is important. When the head of the fish is viewed from above it shows two distinctly visible cavities under the skin (Figs. 1 (A) and 2) viz. the anteriorly situated elongated fontanel (AF), which represents an incomplete closure of the medial suture between the frontal bones, and a posterior, middorsal oval-shaped indentation (PF) indicating an opening in the skull of the fish of an otherwise fused parietal bone structure (Fig. 2). The brain of the fish is located immediately below the parietal bone, and extends from the posterior fontanel to the posterior limit of the anterior portions of the frontal bones.

When operating the hole saw, the danger exists to drill too deep and in the process to penetrate the entire skull so that the brain, still encapsulated by its bony elements is stuck in the hole saw (Figs. 1 (C) and (D)). Difficulties are then experienced to dislodge the plug from the circular saw (Fig. 1 (C)) and subsequently to extricate the pituitary gland undamaged from the cranial cavity (Fig. 1 (D)). However, if the hole saw is manipulated to penetrate and dislodge only the bony frontal and parietal plates (Fig. 1 (E)), the brain has to be lifted from the cranial cavity with a spatula or forceps and although the pituitary

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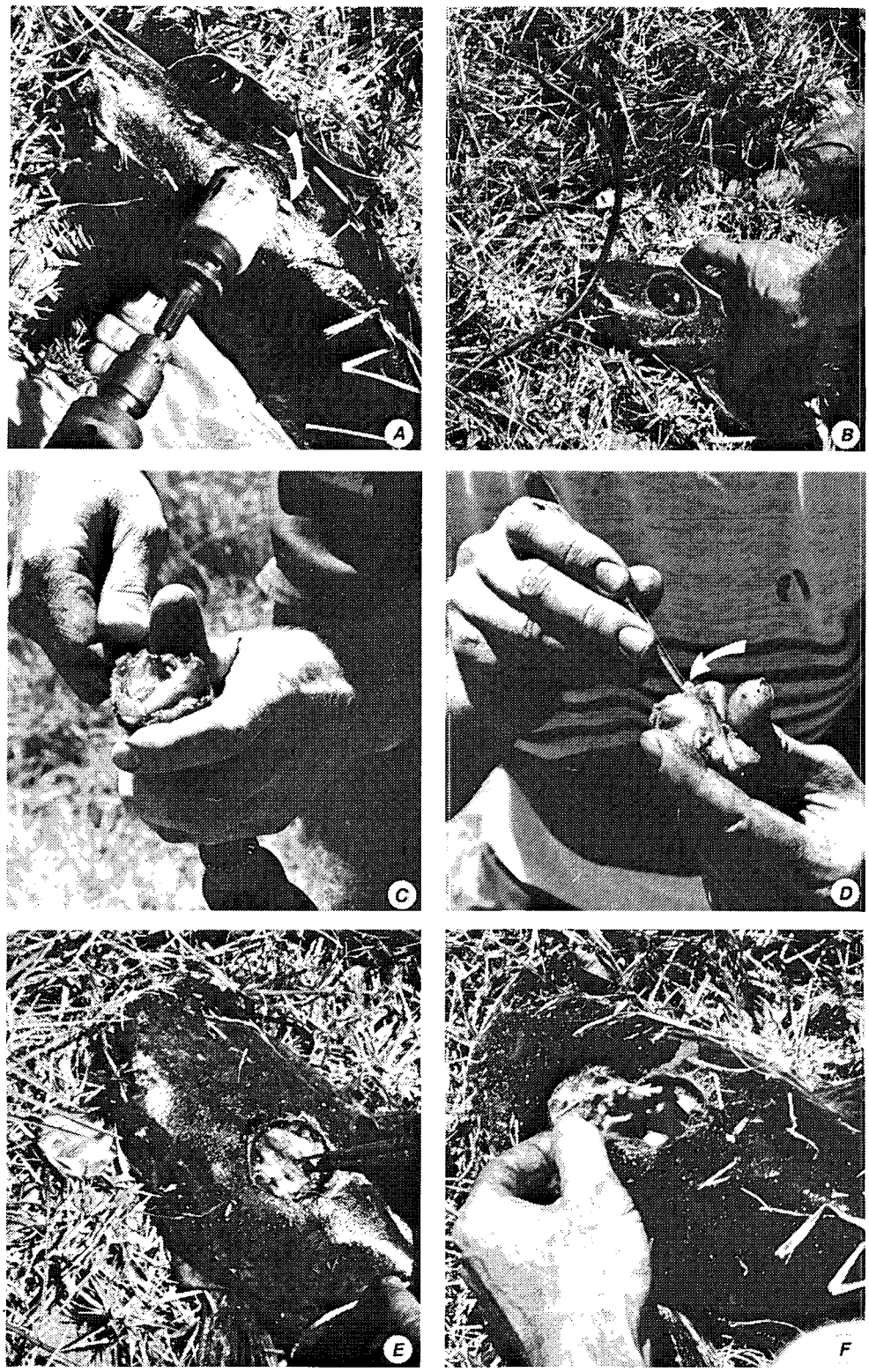

Figure 1
Removal of brain and pituitary gland of the sharptooth catfish Clarias gariepinus *with circular saw. A: Position of saw immediately in front of posterior fontanel, indicated with arrow; B: Hole drilled too deep showing cavity from where skull enclosing brain was removed; C: Portion of skull with brain enveloped by circular saw; D: Removal of pituitary gland (arrow) from brain using forceps; E: Hole drilled too shallow. Brain laid bare dorsally; F: Brain removed with circular piece of bone containing elements of the parietal and frontal bones as well as portions of the pro-otic and exoccipital plates. Arrow indicates pituitary gland.*

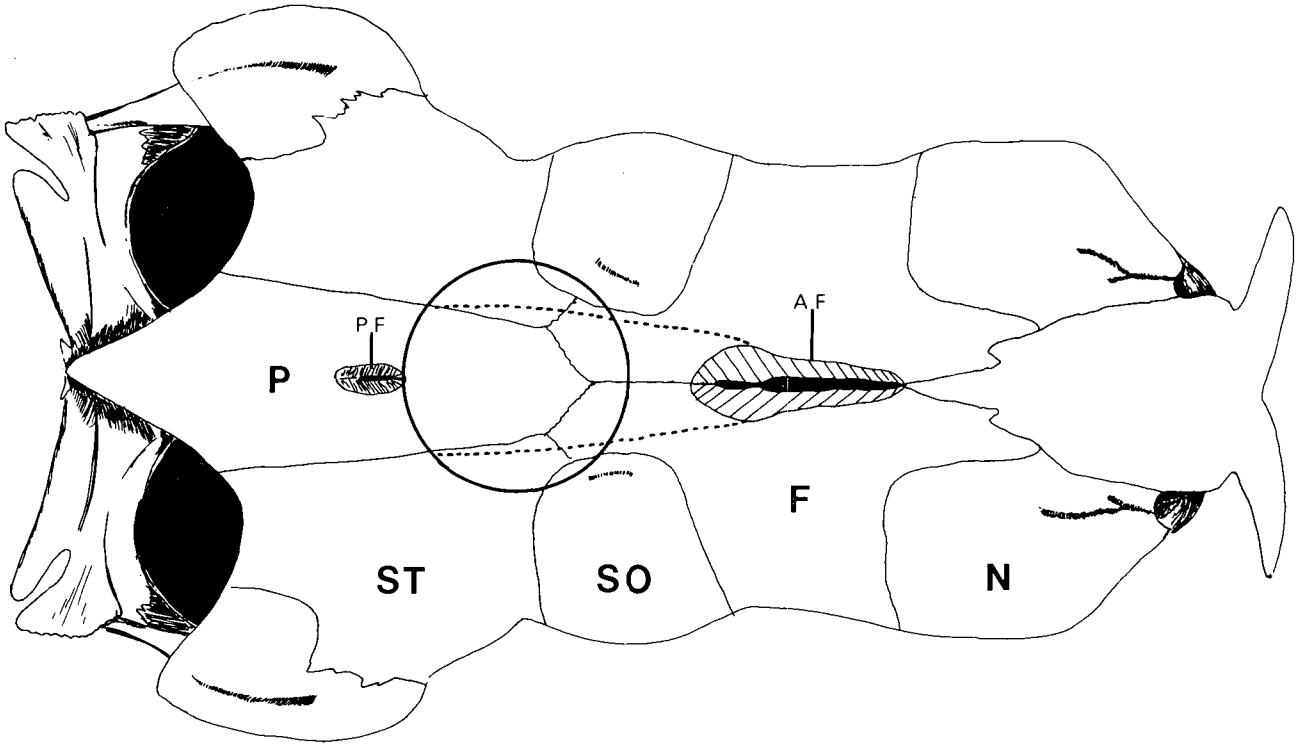

Figure 2
Schematic drawing of dorsal view of the skull of Clarias gariepinus *showing fontanellae, position of brain (dotted lines) and location of circular incision with hole saw to remove brain and pituitary gland. F: frontal; N: nasal; P: parietal; SO: supra-orbital; ST: supratemporal; PF: posterior fontanel; AF: anterior fontanel.*

gland can still be scooped out without damage, the process is time-consuming. According to our experience the best and quickest way to extract the pituitary gland is to extricate the gland still attached to the brain. To achieve this, the circular saw is allowed to penetrate through the top of the skull, through the frontal and parietal bone plates and then slightly deeper, through the pro-otic and exoccipital bones flanking the brain but stopping the saw before reaching the cranial floor formed by the parasphenoid bones on both sides. When the saw is removed and the circular piece of bone then dislodged, the brain and pituitary gland can be lifted intact from the cranial cavity. Inverting the brain, the pituitary gland will then be located on top (Fig. 1 (F)), and can be carefully removed without fear of damage, or loss of material.

Glands preserved in absolute alcohol after proper dehydration and refrigerated at below 4°C, are kept in separate labelled vials provided with the date of collection, size and sex of fish. Material can also be freeze-dried for later use. Glands preserved and refrigerated or freeze-dried in this way can be used for 2 to 3 years without serious loss in gonadotrophic potency.

Discussion

The work by Schoonbee and Prinsloo (1986) indicates that pituitary glands from the sharptooth catfish are not only a very suitable alternative for common carp pituitary gland but may even yield better results. In view of these results it is recommended that sharptooth catfish pituitary gland material be subjected to *in vitro* bio-assays according to procedures already developed, and tested for common carp glands (Yaron *et al.*, 1982; 1985). In this way the type of problems encountered by Schoonbee and Prinsloo (1986) on possible differences in potency of male and female pituitary glands of *C. gariepinus* may be avoided.

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