Gulf and Caribbean Research

Volume 22 | Issue 1

2010

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DOI: 10.18785/gcr.2201.08

Gulf and Caribbean Research Vol 22, 67-69, 2010 Manuscript received August 12, 2009; accepted December 2, 2009

SHORT COMMUNICATION

NOTES ON THE BIOLOGY OF AN ADULT FEMALE *CHIMAERA CUBANA* CAPTURED OFF ST. CROIX, U.S. VIRGIN ISLANDS

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Introduction

Within the western North Atlantic Ocean there are at least 4 genera and 5 species of chimaeroids occurring in deep waters generally associated with outer continental slopes or areas of high bathymetric relief (Didier 2002; Didier 2004). Two chimaeroids, *Chimaera cubana* and *Hydrolagus alberti*, are known to be indigenous to the Caribbean Sea in waters associated with the Greater and Lesser Antilles. While *H. alberti* occurs throughout the Gulf of Mexico and the Caribbean Sea, *C. cubana* is thought to be endemic to an area bounded by Cuba and Colombia (IUCN 2009). These two chimaeras are readily differentiated by the presence or absence of an anal fin and species–specific branching patterns of cranial lateral line canals (Didier 2004). Since the description of *C. cubana* by Howell–Rivero (1936), only 10 specimens have been reported in the primary literature with another 11 specimens located in museum collections (Bunkley–Williams and Williams 2004). The dearth of biological information on *C. cubana* led the International Union for the Conservation of Nature to recommend that "basic data be collected on all captures" (IUCN 2009).

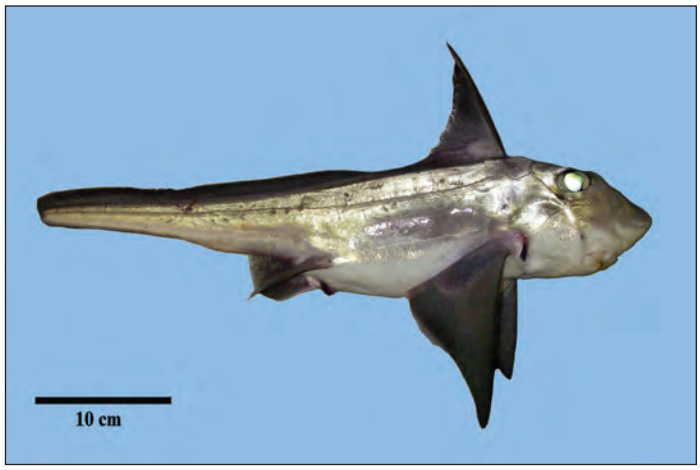

Figure 1. *Lateral view of the adult female Chimaera cubana collected south of St. Croix, U.S. Virgin Islands, on 25 March 2009. The right side of the fish is presented due to damage to the left pectoral and pelvic fins. Note that the preopercular and horizontal canals have separate branching points from the suborbital canal.*

Materials and Methods

On 25 March 2009 an adult female *C. cubana* was captured on longline gear off St. Croix, U.S. Virgin Islands, at 17°38.25'N, 64°48.26'W between 2017–2144 h at a depth of 280 m. The bottom temperature, dissolved oxygen and salinity at the site were 18.3°C, 5.7 mg/l and 36.5, respectively. An incision was made through the abdominal musculature and the gastrointestinal and reproductive organs were excised. Fresh material was used for all examinations and photographs. The specimen was frozen after inspection, and later deposited in the museum at the University of Southern Mississippi, Gulf Coast Research Laboratory (accession number GCRL 36376). Anatomical terms used in descriptions follow Dean (1906), Wourms (1977) and Jones et al. (2005).

Results and Discussion

The specimen's anal fin, caudal fin and tail filament were missing (Figure 1), and thus a total length measurement was not taken. The distances from the snout to the pectoral fin origin and snout to the pelvic fin origin were 103 mm and 338 mm, respectively.

The digestive tract contained numerous *Clypeaster subdepressus* tests and ambulatory spines, suggesting these echinoderms could represent a significant prey item of *C. cubana*. Eight gyrocotylidean cestodes were distributed throughout the spiral intestine. Bunkley–Williams and Williams (2004) reported the presence of 2 specimens of a gyrocotylidean cestode in the spiral intestine of a *C. cubana* caught off La Parguera, Puerto Rico, and identified the specimens as *Gyrocotyle rugosa* or *G. urna*. We obtained the specimens reported by Bunkley–Williams and Williams (2004) from the United States National Parasite Collection (USNPC No. 92730) and found them to be conspecific with the specimens we collected. Based on diagnostic characters used to differentiate among the species within the genus (i.e., shape of the lateral body margin), we identified all of the specimens as *G. urna*. A forthcoming study will examine 28S rDNA fragments from the Caribbean, Norwegian and Australian specimens of *G. urna* to thoroughly assess the identity of Caribbean *Gyrocotyle* fauna.

The reproductive tract was typical of a female chimaeroid

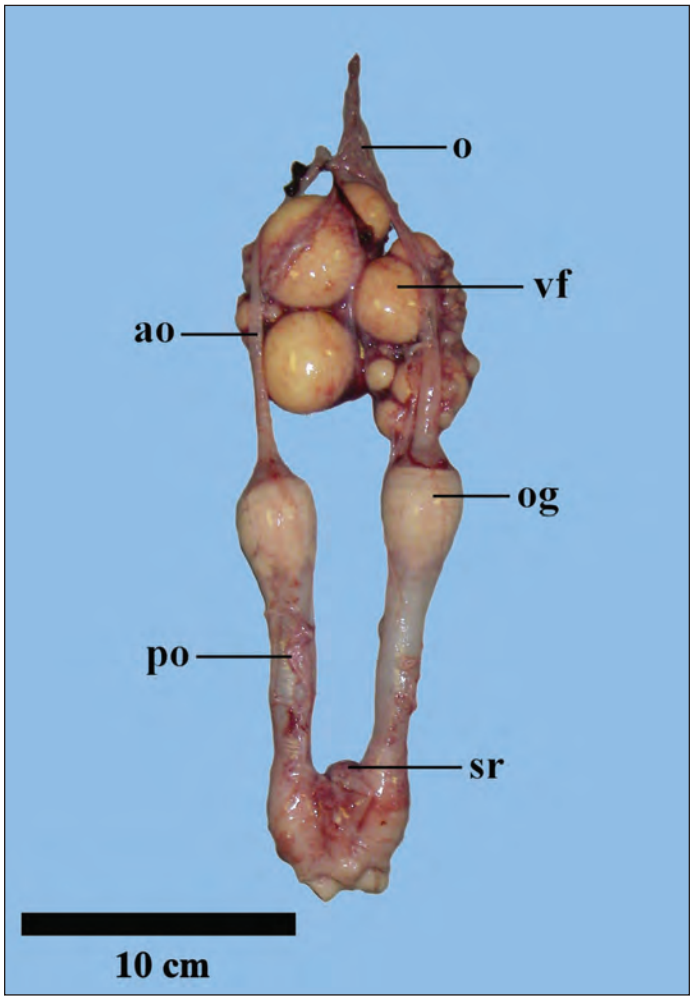

Figure 2. *Reproductive tract of the adult female Chimaera cubana collected south of St. Croix, U.S. Virgin Islands on 25 March 2009. Note vitellogenic follicles in varying stages of development. ao = anterior oviduct, o = ostium, og = oviducal gland, po = posterior oviduct, sr = seminal receptacle, vf = vitellogenic follicle.*

(Dean 1906; Figure 2). No oocytes or developing egg cases were present within either oviducal gland. Fifty-eight follicles were visible in the 2 ovaries and no corpora lutea were observed. Non-vitellogenic follicles ranged in diameter from 1 to 7 mm (mean = 3.65; sd = 1.96). Vitellogenic follicles ranged in diameter from 9 to 35 mm (mean = 17.58; sd. = 9.96) and appeared to be separable into 6 size cohorts (Figure 3). The follicle pair of greatest diameter were in the right ovary and consisted of 2 follicles with diameters of 35 and 32 mm. The next largest cohort was in the left ovary with follicle diameters of 26 and 25 mm. Cohort 3 was in the right ovary and consisted of a single 21 mm follicle. The remaining cohorts continued to show a pattern of decreasing diameters in alternating ovaries. To our knowledge, this is the first report of oocytes maturing in ovary-specific series for any chondrichthyan.

The presence of oocytes in various stages of development strongly suggests that C. *cubana* is reproductively active over a relatively protracted period and is consistent with the reproductive biology of other chimaeroids, such as *Callorhyncus callorhyncus* and *Hydrolagus colliei* (DiGiácomo and Raquel Perier 1994, Barnett et al. 2009). The absence of corpora lutea in the ovaries or egg case development in the oviducal glands or posterior oviducts suggests the specimen had not recently ovulated. Therefore, the number of vitellogenic follicles present in the ovaries indicates that the C. *cubana* we collected was capable of an annual fecundity of at least 12 young, assuming all vitellogenic oocytes eventually became fertilized, encased and deposited. In the absence of additional data on the reproductive biology of this species we must assume this is an estimate of maximum fecundity. It is likely, however, that the maximum annual fecundity is higher since vitellogenesis appears to be relatively rapid, as indicated by follicles of varying sizes and the simultaneous presence of vitellogenic and non-vitellogenic follicles.

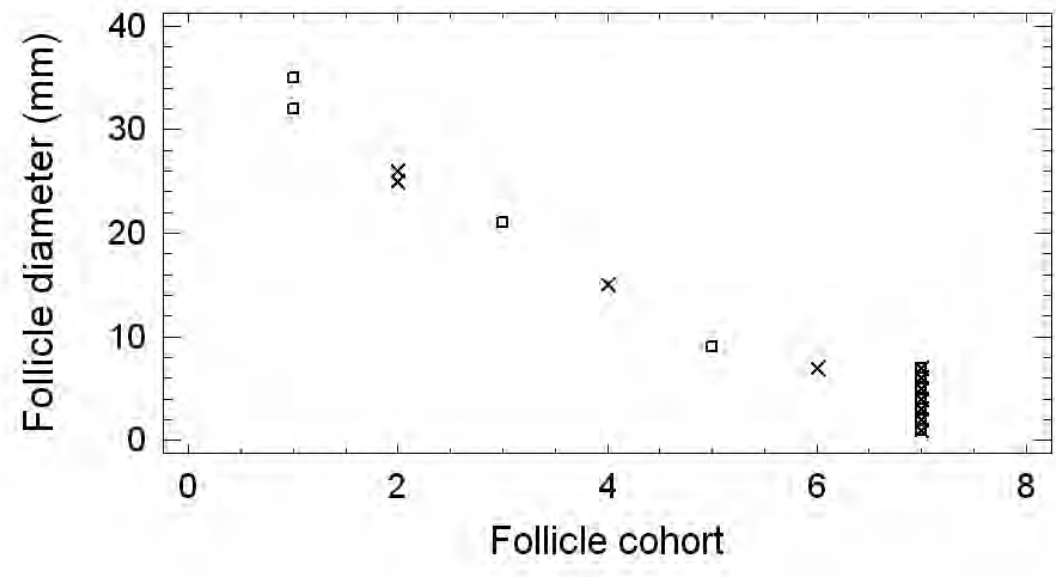

Figure 3. *Ovarian follicle diameter and oocyte cohort assignment as observed in an adult female Chimaera cubana collected south of St. Croix, U.S. Virgin Islands on 25 March 2009. All oocytes in cohort 7 were non-vitellogenic. □ = right ovarian follicle diameter, X = left ovarian follicle diameter.*

Acknowledgements

We thank the crew of the NOAA Ship *Oregon II* for assistance in collection of the specimen.

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