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Morphological and taxonomic revision of species of *Squatina* from the Southwestern Atlantic Ocean (Chondrichthyes: Squatiniformes: Squatinidae)

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Table of contents

Abstract	3
Introduction	3
Material and Methods	4
Systematic Account	5
Squatinae Bonaparte, 1938	5
<i>Squatina</i> Duméril, 1806	5
<i>Squatina occulta</i> Vooren and da Silva, 1991	5
<i>Squatina guggenheim</i> Marini, 1936	19
<i>Squatina argentina</i> (Marini, 1930)	34
<i>Squatina</i> sp.	45
<i>Squatina dumeril</i> Le Sueur, 1818	50
Morphology of Southwestern Atlantic <i>Squatina</i>	55
Acknowledgments	76
References	76
Appendix 1	79

Abstract

The morphology and taxonomy of species of *Squatina* from the southwestern Atlantic Ocean are revised. Species previously considered valid, *Squatina argentina* (Marini, 1930), *Squatina guggenheim* Marini, 1936 and *Squatina occulta* Vooren and da Silva, 1991, are investigated and described in detail, including a morphometric and meristic study of specimens from their recorded range. The taxonomic status of the doubtful nominal species *Squatina punctata* Marini, 1936 was also evaluated. This species was previously considered a junior synonym of *S. argentina*, a junior synonym of *S. guggenheim*, or a senior synonym of *S. occulta*. Although there is much morphological similarity between *Squatina* species, significant differences in dermal denticle patterns, dorsal coloration, tooth formula, and size at maturity are reported, enabling the recognition of *S. argentina*, *S. guggenheim* and *S. occulta* as valid species, and relegating *S. punctata* to the synonymy of *S. guggenheim*. Differences in skeletal morphology between valid species are described and considered supportive of the taxonomic hypothesis, corroborating a previous study of neurocrania. Additionally, an unidentified specimen is reported, as *Squatina* sp., from the continental shelf of Bahia state, Brazil, recognized by having more vertebral centra and a conspicuous dermal denticle morphology on interspiracular region, features not present in other South America angelshark species. A report on the only known syntype of *Squatina dumeril* Le Sueur, 1818 is presented, describing features that are still preserved and designating it as lectotype. Lateral-line sensory canals, skeleton, and cranial and hypobranchial muscles for the three valid species of *Squatina* from the southwestern Atlantic, as well as the brain and cranial nerves of *S. guggenheim*, are described and illustrated.

Key words: sharks, *S. argentina*, *S. dumeril*, *S. guggenheim*, *S. occulta*, dermal denticles, skeletal anatomy.

Introduction

The taxonomy of angelsharks is mostly based on external morphological characters including the shape of nasal barbels, pectoral, caudal and dorsal fins, morphological proportions of head, pectoral fins and tail, dorsal coloration, presence or absence of enlarged midline dorsal denticles, and dental formula (Bigelow and Schroeder, 1948; Compagno, 1984; Vooren and da Silva, 1991; Milessi *et al.*, 2001; Compagno *et al.*, 2005; Castro-Aguirre *et al.*, 2006; Walsh and Ebert, 2007; Last and White, 2008; Walsh *et al.*, 2011). At present, 23 species are recognized in *Squatina*, the only extant angelshark genus. However, the number and identification of valid South American species of *Squatina* from the Atlantic Ocean has been problematic since they were first described (Marini, 1930, 1936; Bigelow and Schroeder, 1948; Cousseau, 1973; Vooren and da Silva, 1991; Carvalho *et al.*, 2012).

The first reports of angel sharks from the Southwestern Atlantic were by Schreiner and Miranda Ribeiro (1903) and Miranda Ribeiro (1907), based on specimens from Rio de Janeiro. They identified these specimens as *Squatina squatina* (Linnaeus, 1758), a species endemic to the Mediterranean Sea. Although erroneously identified, Miranda Ribeiro (1907) reported differences among specimens, such as the presence or absence of a row of enlarged denticles along the dorsal midline. The first description of an angelshark species from the Southwestern Atlantic was *Squatina argentina* by Marini (1930), based on a single specimen originally from Quequén, a