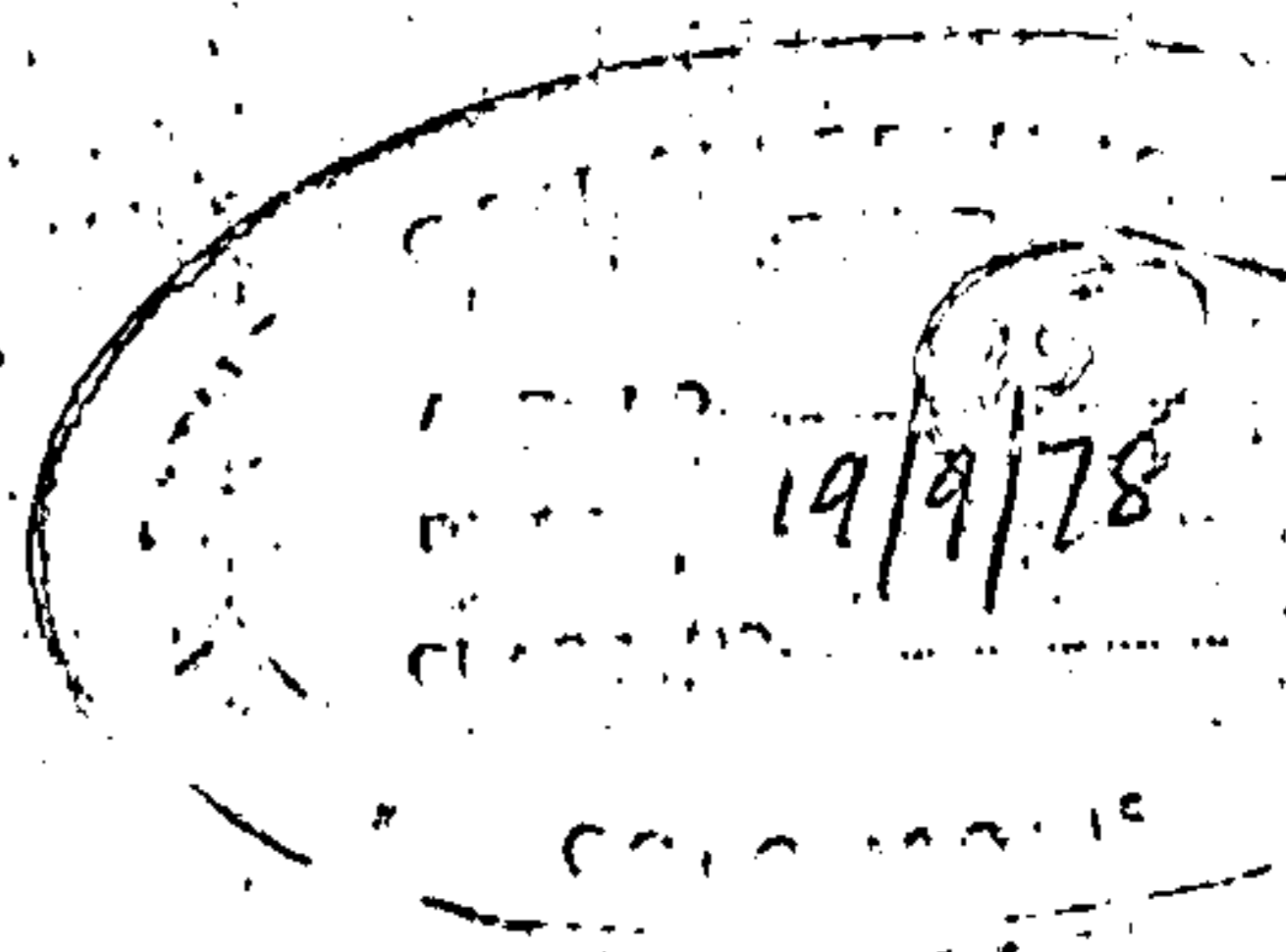


# SHARKS, RAYS, SKATES, AND CHIMAERAS

By

J. R. Thompson and Stewart Springer



## INTRODUCTION

Sharks, skates, rays, and, to a lesser extent, chimaeras--all grouped by zoologists in the single vertebrate class Chondrichthyes (cartilaginous fishes)--have been the subjects of interest for many years. On the negative side, the interest in many of these fishes has arisen largely from fear--fear of injury to fishermen and swimmers, fear of damage to fishing gear and equipment, and the fear that is a natural accompaniment of a lack of knowledge. On the positive side, the interest has arisen as a result of attempts to turn some of these fishes to economic advantage, and out of man's innate curiosity concerning the world around him.

Despite widespread interest, accumulation of adequate knowledge concerning sharks and their close relatives has been slow, and a large body of speculation and "old wives' tales" has arisen as a result of attempts to fill in the gaps. Obstacles to the study of cartilaginous fishes are many. Most of these fishes are pelagic, and many of them inhabit the open waters of the high seas where large ocean-going vessels are needed for their study. Many species are confined to relatively great depths where collection is difficult and expensive. Even those species that inhabit shallower, coastal waters

require special collecting and handling techniques. They are difficult to keep in captivity, and their collection and study as living animals is quite expensive. But over the years, zoologists have succeeded in amassing sufficient data to outline, in greater or lesser detail, the characteristics and habits of many of the cartilaginous fishes.

This paper has been written as an introduction to the members of the class Chondrichthyes. The information contained has been drawn from the literature, from zoologists and fishermen of many countries, and from the personal experiences and observations of the authors. The purpose of the paper is to answer the many general questions asked fishery zoologists each year concerning sharks, skates, rays, and chimaeras, or if not to answer, at least to suggest further, more detailed sources of information. Toward this end, the text has been kept brief and general, and an annotated list of references has been included. In most cases, the reader who is sufficiently interested to pursue the subject beyond the confines of this circular, will find more material in the references listed. He may also find clues to further research sources in the bibliographies contained in the references examined. To facilitate use, the references are listed by topic in an arrangement roughly paralleling the arrangement of the subheadings of the text.

Note.--J. R. Thompson, Fishery Biologist (Research), Bureau of Commercial Fisheries Exploratory Fishing Base, Pascagoula, Miss., and Stewart Springer, Fishery Biologist (Research), Bureau of Commercial Fisheries Ichthyological Field Station, Stanford, Calif.

Terms commonly applied to cartilaginous fishes and other large marine