



Gulf of Mexico

Origin, Waters, and Biota

Volume 1, Biodiversity

Edited by **Darryl L. Felder**
and **David K. Camp**

Gulf of Mexico Origin, Waters, and Biota

Volume 1, Biodiversity



Harte Research Institute for Gulf of Mexico Studies Series

Sponsored by the Harte Research Institute for Gulf of Mexico Studies,

Texas A&M University–Corpus Christi

John W. Tunnell Jr., General Editor

Funding from the Center for Coastal Studies and Harte Research Institute for Gulf of Mexico Studies at Texas A&M University–Corpus Christi helped make this book possible.

Gulf of Mexico Origin, Waters, and Biota

Volume 1, Biodiversity

Edited by

Darryl L. Felder and

David K. Camp

Texas A&M University Press
College Station

Cover: The orange-cup coral, *Tubastraea coccinea* Lesson, 1829. The beautifully delicate live polyps featured here represent a nonindigenous species of current concern, exemplifying the urgent need for the biodiversity baseline provided in this volume. Native to the Indo-Pacific region, this species has been introduced into the Western Atlantic and the Gulf of Mexico by the activities of man (Global Invasive Species Database, www.issg.org/database). Photograph by Harley Moody.

Copyright © 2009 by Texas A&M University Press
Manufactured in the United States of America
All rights reserved
First edition

This paper meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper).
Binding materials have been chosen for durability.



Library of Congress Cataloging-in-Publication Data

Gulf of Mexico origin, waters, and biota / [edited by John W. Tunnell Jr., Darryl L. Felder, and Sylvia A. Earle] — 1st ed.

v. cm — (Harte Research Institute for Gulf of Mexico Studies Series)

Includes indexes.

Taken from the Harte Research Institute for Gulf of Mexico Studies website: Gulf of Mexico origin, waters, and biota, is an updated and enlarged version of the Gulf of Mexico: its origin, waters, and marine life, first published by U.S. Fish and Wildlife Service in Fishery bulletin, v. 89, 1954. Contents: V. 1. Biodiversity / edited by Darryl L. Felder and David K. Camp ISBN-13: 978-1-60344-094-3 (cloth : alk. paper) ISBN-10: 1-60344-094-1 (cloth : alk. paper)

I. Mexico, Gulf of. 2. Marine biology—Mexico, Gulf of. 3. Geology—Mexico, Gulf of. 4. Oceanography—Mexico, Gulf of. I. Tunnell, John Wesley II. Felder, Darryl L. III. Earle, Sylvia A., 1935– IV. Camp, David K. V. Series.

QH92.3.G834 2009

578.77'364—dc22

2008025312

Contents

List of Plates	xi
Foreword: 50-Year Update of Bulletin 89 <i>John W. Tunnell Jr., Darryl L. Felder, and Sylvia A. Earle</i>	xv
1 An Introduction to Gulf of Mexico Biodiversity Assessment <i>D. L. Felder, D. K. Camp, and J. W. Tunnell Jr.</i>	1
2 Prokaryotic Microbes (Archaea and Bacteria, Excluding Cyanobacteria) of the Gulf of Mexico <i>A. Y. Chistoserdov</i>	15
3 Benthic Cyanoprokaryota (Cyanobacteria) of the Gulf of Mexico <i>H. León-Tejera, M. Gold-Morgan, and G. Montejano</i>	47
4 Ciliated Protists (Ciliophora) of the Gulf of Mexico <i>D. W. Coats and J. C. Clamp</i>	57
5 Free-Living, Saprobic, Filamentous Fungi of the Gulf of Mexico <i>M. C. González</i>	81
6 Foraminifera of the Gulf of Mexico <i>B. K. Sen Gupta, L. E. Smith, and M. L. Machain-Castillo</i>	87
7 Dinoflagellates (Dinoflagellata) of the Gulf of Mexico <i>K. A. Steidinger, M. A. Faust, and D. U. Hernández-Becerril</i>	131
8 Diatoms (Bacillariophyta) of the Gulf of Mexico <i>D. M. Krayesky, E. Meave del Castillo, E. Zamudio, J. N. Norris, and S. Fredericq</i>	155
9 Seaweeds of the Gulf of Mexico <i>S. Fredericq, T. O. Cho, S. A. Earle, C. F. Gurgel, D. M. Krayesky, L. E. Mateo-Cid, A. C. Mendoza-González, J. N. Norris, and A. M. Suárez</i>	187

10	Plants (Embryophyta) of the Gulf of Mexico <i>D. H. Les, R. R. Haynes, and A. Novelo-Retana</i>	261
11	Sponges (Porifera) of the Gulf of Mexico <i>K. Rützler, R. W. M. van Soest, and C. Piantoni</i>	285
12	Cnidaria: Introduction <i>S. D. Cairns and D. G. Fautin</i>	315
13	Octocorallia (Cnidaria) of the Gulf of Mexico <i>S. D. Cairns and F. M. Bayer</i>	321
14	Scleractinia (Cnidaria) of the Gulf of Mexico <i>S. D. Cairns, W. C. Jaap, and J. C. Lang</i>	333
15	Actiniaria, Corallimorpharia, and Zoanthidea (Cnidaria) of the Gulf of Mexico <i>D. G. Fautin and M. Daly</i>	349
16	Antipatharia (Cnidaria) of the Gulf of Mexico <i>D. M. Opresko</i>	359
17	Ceriantharia (Cnidaria) of the Gulf of Mexico <i>T. N. Molodtsova</i>	365
18	Medusozoans (Cnidaria: Cubozoa, Scyphozoa, and Hydrozoa) of the Gulf of Mexico <i>L. Segura-Puertas, L. Celis, and L. Chiaverano</i>	369
19	Hydroids (Cnidaria: Hydrozoa) of the Gulf of Mexico <i>D. R. Calder and S. D. Cairns</i>	381
20	Siphonophorae (Cnidaria) of the Gulf of Mexico <i>P. R. Pugh and R. Gasca</i>	395
21	Ctenophora of the Gulf of Mexico <i>A. G. Moss</i>	403
22	Turbellarians (Acoelomorpha and Free-Living Platyhelminthes) of the Gulf of Mexico <i>M. D. Hooge and L. J. Newman</i>	413
23	Trematoda (Platyhelminthes) of the Gulf of Mexico <i>R. M. Overstreet, J. O. Cook, and R. W. Heard</i>	419
24	Cestoda (Platyhelminthes) of the Gulf of Mexico <i>K. Jensen</i>	487
25	Dicyemida of the Gulf of Mexico, with Comments on the Orthonectida <i>R. M. Overstreet and F. G. Hochberg</i>	523
26	Gnathostomulida of the Gulf of Mexico <i>M. V. Sørensen and W. Sterrer</i>	529
27	Rotifera of the Gulf of Mexico <i>M. V. Sørensen</i>	533
28	Acanthocephala of the Gulf of Mexico <i>G. Salgado-Maldonado and O. M. Amin</i>	539

29	Nemertea of the Gulf of Mexico <i>J. L. Norenburg</i>	553
30	Mollusca: Introduction <i>F. Moretzsohn, J. W. Tunnell Jr., W. G. Lyons, E. B. Baqueiro Cárdenas, N. Barrera, J. Espinosa, E. F. García, J. Ortea, and M. Reguero</i>	559
31	Aplacophora (Mollusca) of the Gulf of Mexico <i>D. L. Ivanov and A. H. Scheltema</i>	565
32	Polyplocophora (Mollusca) of the Gulf of Mexico <i>W. G. Lyons and F. Moretzsohn</i>	569
33	Gastropoda (Mollusca) of the Gulf of Mexico <i>G. Rosenberg, F. Moretzsohn, and E. F. García</i>	579
34	Cephalopoda (Mollusca) of the Gulf of Mexico <i>H. L. Judkins, M. Vecchione, and C. F. E. Roper</i>	701
35	Bivalvia (Mollusca) of the Gulf of Mexico <i>D. D. Turgeon, W. G. Lyons, P. Mikkelsen, G. Rosenberg, and F. Moretzsohn</i>	711
36	Scaphopoda (Mollusca) of the Gulf of Mexico <i>J. N. Kraeuter</i>	745
37	Polychaeta (Annelida) of the Gulf of Mexico <i>K. Fauchald, A. Granados-Barba, and V. Solís-Weiss</i>	751
38	Marine Leeches (Hirudinida) of the Gulf of Mexico <i>E. M. Burreson</i>	789
39	Vestimentifera and Pogonophora (Annelida) of the Gulf of Mexico <i>K. Fauchald</i>	793
40	Echiura of the Gulf of Mexico <i>J. F. Pilger</i>	797
41	Sipuncula of the Gulf of Mexico <i>M. E. Rice</i>	803
42	Tardigrada of the Gulf of Mexico <i>F. A. Romano III</i>	809
43	Pycnogonida and Xiphosura (Cheliceriformes) of the Gulf of Mexico <i>C. A. Child</i>	815
44	Cephalocarida and Mystacocarida (Crustacea) of the Gulf of Mexico <i>J. W. Martin</i>	821
45	Cirripedia (Crustacea) of the Gulf of Mexico <i>S. R. Gittings</i>	827
46	Branchiura (Crustacea) of the Gulf of Mexico <i>W. J. Poly</i>	837
47	Free-Living Copepoda (Crustacea) of the Gulf of Mexico <i>E. Suárez-Morales, J. W. Fleeger, and P. A. Montagna</i>	841

48	Myodocopan Ostracoda (Crustacea) of the Gulf of Mexico <i>E. Harrison-Nelson and L. S. Kornicker</i>	871
49	Podocopan Ostracoda (Crustacea) of the Gulf of Mexico <i>R. F. Maddocks, M. L. Machain-Castillo, and F. R. Gío-Argáez</i>	877
50	Leptostraca (Crustacea) of the Gulf of Mexico <i>J. W. Martin and T. A. Haney</i>	895
51	Stomatopoda (Crustacea) of the Gulf of Mexico <i>M. L. Reaka, D. K. Camp, F. Álvarez, A. G. Gracia, M. Ortiz, and A. R. Vázquez-Bader</i>	901
52	Lophogastrida (Crustacea) of the Gulf of Mexico <i>W. W. Price, R. W. Heard, P. Aas, and K. Meland</i>	923
53	Mysida (Crustacea) of the Gulf of Mexico <i>W. W. Price and R. W. Heard</i>	929
54	Amphipoda (Crustacea) of the Gulf of Mexico <i>S. E. LeCroy, R. Gasca, I. Winfield, M. Ortiz, and E. Escobar-Briones</i>	941
55	Isopoda (Crustacea) of the Gulf of Mexico <i>M. Schotte, J. C. Markham, and G. D. F. Wilson</i>	973
56	Tanaidacea (Crustacea) of the Gulf of Mexico <i>R. W. Heard and G. Anderson</i>	987
57	Cumacea (Crustacea) of the Gulf of Mexico <i>R. W. Heard and D. Roccatagliata</i>	1001
58	Euphausiacea (Crustacea) of the Gulf of Mexico <i>I. A. Castellanos and E. Suárez-Morales</i>	1013
59	Decapoda (Crustacea) of the Gulf of Mexico, with Comments on the Amphionidacea <i>D. L. Felder, F. Álvarez, J. W. Goy, and R. Lemaitre</i>	1019
60	Gastrotricha of the Gulf of Mexico <i>R. Hochberg</i>	1105
61	Free-Living Marine Nematoda of the Gulf of Mexico <i>W. D. Hope</i>	1111
62	Priapulida of the Gulf of Mexico <i>T. C. Shirley</i>	1125
63	Loricifera of the Gulf of Mexico <i>T. C. Shirley</i>	1127
64	Kinorhyncha of the Gulf of Mexico <i>T. C. Shirley</i>	1129
65	Phoronida of the Gulf of Mexico <i>S. Santagata</i>	1133
66	Brachiopoda of the Gulf of Mexico <i>S. Santagata and J. W. Tunnell Jr.</i>	1137

67	Entoprocta of the Gulf of Mexico <i>C. Nielsen</i>	1143
68	Bryozoans (Ectoprocta) of the Gulf of Mexico <i>J. E. Winston and F. J. Maturo Jr.</i>	1147
69	Planktonic Chaetognatha of the Gulf of Mexico <i>R. M. Hernández-Flores, J. A. McLelland, and E. Suárez-Morales</i>	1165
70	Hemichordata of the Gulf of Mexico <i>C. B. Cameron</i>	1173
71	Echinodermata of the Gulf of Mexico <i>D. L. Pawson, D. J. Vance, C. G. Messing, F. A. Solís-Marín, and C. L. Mah</i>	1177
72	Cephalochordata of the Gulf of Mexico <i>C. B. Cameron</i>	1205
73	Tunicata (Urochordata) of the Gulf of Mexico <i>L. Cole and G. Lambert</i>	1209
74	Appendicularia (Urochordata) of the Gulf of Mexico <i>I. A. Castellanos and E. Suárez-Morales</i>	1217
75	Fishes (Vertebrata: Pisces) of the Gulf of Mexico <i>J. D. McEachran</i>	1223
76	Reptiles (Vertebrata: Reptilia) of the Gulf of Mexico <i>G. R. Zug</i>	1317
77	Birds (Vertebrata: Aves) of the Gulf of Mexico <i>J. C. Gallardo, V. Macías, and E. Velarde</i>	1321
78	Mammals (Vertebrata: Mammalia) of the Gulf of Mexico <i>D. J. Schmidly and B. Würsig</i>	1343
79	Population Genetics and Biogeography of the Gulf of Mexico <i>J. E. Neigel</i>	1353
	Illustration Credits	1371
	Contributors	1375
	Index	1385