

Part 35 Brachiopods

Christian C. Emig



Fig 35.0 *Glottidia audebarti*, a species from Pacific Costa Rica (Photo: Christian C. Emig)

C.C. Emig
Centre d'Océanologie, Rue de la Batterie-des-Lions, F-13007 Marseille (France).
Present address: 20, Rue Chaix, 13007 Marseille (France).
e-mail: brachnet@aliceadsl.fr

Abstract Ten brachiopod species have been recorded in the waters of Central America, and eight of these species occur on the Pacific coast of Costa Rica. Among the Linguliformea, two *Glottidia* species, *G. albida*, and *G. audebarti*, live in the Golfo de Nicoya (Costa Rica). Two discinid species occur in the Pacific waters, viz. *Discradisca strigata* and the deep-sea *Pelagodicus atlanticus*. Among the Rhynchonelliformea, all recorded species are living in the deep-sea, in the bathyal and abyssal zones: *Neorhynchia strebeli*, *Liothyrella clarkeana*, *L. moseleyi*, *Macandrevia diamantina*, *M. americana*, and *M. craniella*.

Introduction

Brachiopods, or lamp shells, are an exclusively marine group of lophophorate animals. They are sessile benthic suspension-feeders (Emig 1997a, b), bilaterally symmetrical, and they are solitary coelomates. They are enclosed within a shell formed by a dorsal and a ventral valve, and fixed to or into the substrate by a pedicle, lacking in some taxa, and cemented to the substratum by one of the valves. The pedicle has the capacity to adjust the position of the organism in relation to its surroundings (Richardson 1997; Emig 1997a). The lophophore of brachiopods varies in complexity, and is usually supported by the brachidium (Emig 1992). Larvae are either planktotrophic or non-planktotrophic.

Following the classification established in the “Treatise on Invertebrate Paleontology” (Kaesler 2000–2007), brachiopods are divided into three subphyla: the Linguliformea, the Craniiformea, and the Rhynchonelliformea. There are, at least, 114 extant brachiopod genera represented by 401 species. Representatives are found from littoral waters (generally subtidal) to the abyssal zone, and are generally epifaunal on hard substrata; only the lingulides are exclusively infaunal in soft substrata. In the waters of Central America, ten brachiopod species belonging to five genera have been recorded, only one species of which is known for the Caribbean (Species List 35.1).

Summary and Comments

Glottidia albida and *G. audebarti* are the only brachiopod species recorded in the Golfo de Nicoya (see Species List 35.2). Both species have been redescribed by Emig (1983) and by Emig and Vargas (1990), respectively. They also occur on the Pacific coast of Mexico with *G. palmeri*. *G. audebarti* has also been sampled on the Panama and Ecuador coasts. In the Caribbean and Atlantic waters another *Glottidia* species, *G. pyramidata*, occurs (Emig 1983). The genus *Glottidia* is restricted to the American coasts, while in the other tropical and temperate areas the genus *Lingula* occurs (Emig 1997a). Two discinid species occur in Central America: *D. strigata* has been studied in the intertidal zone of Panama (La Barbera 1985) and *P. atlanticus* off the Mexican and Peruvian coasts (Zezina 1961).

Species List 35.1 Brachiopoda species reported from the Caribbean coast of Costa Rica

Species	World distribution ^a	Central America	Oceanic distribution ^b	Depth (m) ^c	Habitat/Community ^d	References ^e
Order TEREBRATULIDA						
Suborder TEREBRATULIDINA						
Superfamily TERE-BRATULOIDEA						
Family TEREBRATULIDAE						
Subfamily TEREBRATULINAE						
<i>Liothyrella moseleyi</i> (Davidson, 1878)	EP,Car,IO		b,st	250–4,000	mb, sb	[2, 3]

^aCar = Caribbean; EP = eastern Pacific; IO = Indian Ocean

^bst = subtidal; b = benthic

^cUppermost and lowermost occurrences (in meters)

^dsb = sandy bottom; mb = muddy bottom

^eReferences are indicated by numbers according to the reference list

Species List 35.2 Brachiopoda species reported from the Pacific coast of Costa Rica

Species	World distri- bution ^a	Costa Rica		Oceanic dis- tribution ^d	Depth (m) ^e	Habitat/ Community ^f	References ^g
		Central America ^b	Pacific ^c				
<i>Subphylum LINGULIFORMEA</i>							
Class LINGULATA							
Order LINGULIDA							
Superfamily LINGULOIDEA							
Family LINGULIDAE							
<i>Glottidia albidia</i> (Hinds, 1844)	EP		PM	b,it,st	0-477	sb	[4,]
<i>Glottidia audebarti</i> (Broderip, 1835)	EP	P	PM	b,it,st	0-3	sb	[4, 5, 7]
Superfamily DISCINOIDEA							
Family DISCINIDAE							
<i>Discradisca strigata</i> (Broderip, 1834)	EP			it,b	0-33	rb	[6]
<i>Pelagodiscus atlanticus</i> (King, 1868)	cp			b,st	90-5,530	rb	[2, 3, 7, 8]
<i>Subphylum RHYNCHONELLIFORMEA</i>							
Class RHYNCHONELLATA							
Order RHYNCHONELLIDA							
Superfamily BASILOLOIDEA							
Family BASILOLIDAE							
Subfamily BASILOLINAE							
<i>Neorhynchia strebeli</i> (Dall, 1908)	Ant,EP		IC	b,st	1-4,513	mb	[2, 3]
Order TEREBRATULIDA							
Suborder TEREBRATULIDINA							
Superfamily TEREBRATULOIDEA							
Family TEREBRATULIDAE							
Subfamily TEREBRATULINAE							
<i>Liothyrella clarkeana</i> (Dall, 1895)	EP	P	IC	b,st	2,149-3,721	mb	[2, 3]
<i>Liothyrella moseleyi</i> (Davidson, 1878)	Car,EP,IO	P	IC	b,st	250-4,000	mb, sb	[2, 3]
Suborder TEREBRATELLIDINA							

Superfamily ZEILLERIOIDEA									
Family ZEILLERIDAE									
Subfamily MACANDREVIINAE									
<i>Macandrevia americana</i>	Dall, 1895	Ant,EP		IC	b,st	112-4,062	mb,sb	[2, 3]	
<i>Macandrevia craniella</i>	Dall, 1895	EP	P	IC type-locality	b,st	2,149	mb	[2, 3]	
<i>Macandrevia diamantina</i>	(Dall, 1895)	Ant,EP	P	IC type-locality	b,st	2,150-4,600	mb	[1, 2, 3]	

^a Ant = Antarctic; Car = Caribbean; cp = cosmopolitan; EP = eastern Pacific; IO = Indian Ocean

^b P = Panama

^c PM = Pacific mainland; IC = Isla del Coco

^d it = intertidal; st = subtidal; b = benthic

^e Uppermost and lowermost occurrences (in meters)

^f rb = rocky bottom; sb = sandy bottom; mb = muddy bottom

^g References are indicated by numbers according to the reference list

N. strebeli (= *N. profunda*) has been collected off Isla del Coco at a depth of 2,150 m on muddy bottom (type-locality, Species List 35.2), and SW Galapagos at 3,800 m, as well as off California and in the SE Pacific (Dall 1908; Cooper 1972) in the bathyal and abyssal zones (2,000–4,500 m depth), and in the Antarctic where this species occurs from the immediate subtidal to a depth of several hundred meters (Barnes & Peck 1997).

L. clarkeana has only been recorded from the two localities cited above, off the Gulf of Panama: off Isla del Coco at 2,150 m on muddy bottom (type-locality) and SW Galapagos at 3,724 m (Dall 1908). *L. moseleyi* is also a poorly known species collected near Isla del Coco at 250 m and in several other Pacific locations (from about 250–4,000 m deep). This species occurs also in the Atlantic off Martinique, at a depth of 310 m in the Caribbean (Species List 35.1), and in the Indian Ocean (type-locality is west of Kerguelen Island at 384 m) (Dall 1908).

Two *Macandrevia* species occur along the west coast of North and South America, extending from San Diego (California) to the Antarctic (Dall 1908, 1921; Cooper 1972, 1973, 1982): *M. diamantina* (= *Notorygmia abyssa*), off Isla del Coco at a depth of 2,150 m on muddy bottom (type-locality), and off the west coast of Colombia at a depth of 3,250–3,260 m. Depth distribution is known until 4,600 m. This species commonly has homeomorphic features with *N. strebeli*. The other species, *M. americana* (= *M. vanhoeffeni*, = *M. lata*) extends off Isla del Coco at a depth of 3,000 m on muddy bottom. The bathymetric range of this species is between 100 and 4,000 m.

The third species, *M. craniella*, has only been recorded off Isla del Coco at a depth of 2,150 m on muddy bottom (type-locality) in the Gulf of Panama (Dall 1908).

References

- Barnes DKA Peck LS (1997) An Antarctic shelf population of the deep-sea, Pacific brachiopod *Neorhynchia strebeli*. *J Mar Biol Ass UK* 77:399–407
- Cooper GA (1972) Homeomorphy in recent deep-sea brachiopods? *Smithson Contr Paleobiol* 11:1–25
1. Cooper GA (1973) *Vema's* Brachiopoda (Recent). *Smithson Contr Paleobiol* 17:1–51
 2. Cooper GA (1982) New Brachiopoda from the Southern hemisphere and *Cryptoptora* from Oregon (Recent). *Smithson Contr Paleobiol* 41:1–43
 3. Dall WH (1908). Reports on the Mollusca and the Brachiopoda. *Bull Mus Comp Zool Harvard Univ* 43(6):205–487
 4. Dall WH (1921) Annotated list of the recent Brachiopoda in the collection of the United States National Museum, with descriptions of thirty-three new forms. *Proc US Nat Mus* 57(2314):261–377
- Emig CC (1983) Taxonomie du genre *Glottidia* (Brachiopodes Inarticulés). *Bull Mus Nat Hist Nat Paris (Sér. 4) 5 (Sect.4) (n° 2):469–489*
- Emig CC (1992) Functional disposition of the lophophore in living Brachiopoda. *Lethaia* 25:291–302
- Emig CC (1997a) Ecology of inarticulated brachiopods. *Biogeography of inarticulated brachiopods*. In: Kaesler RL (ed) *Treatise on Invertebrate Paleontology. Part H, Revised, Brachiopoda*, Vol. 1. Geol Soc Am and Univ. Kansas Press. Boulder, Colorado & Lawrence, Kansas, pp 473–502
- Emig CC (1997b) Les Lophophorates constituent-ils un embranchement? *Bull Soc Zool Fr* 122:279–288

4. Emig CC Vargas JA (1990) Notes on *Glottidia audebarti* (Broderip) (Brachiopoda, Lingulidae) from the Gulf of Nicoya, Costa Rica. *Rev Biol Trop* 38(2A):251–258
- Kaesler RL (ed) 2000–2007 Treatise on Invertebrate Paleontology. Part H, Revised, Brachiopoda. Geol. Soc. Am. and Univ. Kansas Press, Boulder, Colorado/Lawrence, Kansas, Vol. 2-6
5. Kowalevski M, Dryreson E, Marcot JD, Vargas JA, Flessa KW & Hallman DP (1997). Phenetic discrimination of biometric simpletons: paleobiological implications of morphospecies in the lingulide brachiopod *Glottidia*. *Paleobiology* 23:444–469
6. La Barbera M (1985) Mechanisms of spatial competition of *Discinisca strigata* (Inarticulata: Brachiopoda) in the intertidal of Panama. *Biol Bull* 168:91–105
7. Owen R (1835) Mémoire sur l'anatomie des Mollusques Brachiopodes (Cuv.) et plus spécialement des Térébratules et Orbicules. *Ann Sci Nat* (2) 3:52–77
- Richardson J (1997) Ecology of articulated brachiopods. Biogeography of articulated brachiopods. In: Kaesler RL (ed) Treatise on Invertebrate Paleontology. Part H, Revised, Brachiopoda, Vol. 1. Geol Soc Am. and Univ. Kansas Press. Boulder, Colorado & Lawrence, Kansas, pp 441–472
8. Zezina ON (1961) Distribution of the deepwater brachiopod *Pelagodiscus atlanticus* (King) (in Russian). *Okeanologiya* 5:354–358

Specialists and Collections

Information on Brachiopoda, including directories of the specialists and references, is available at <http://paleopolis.rediris.es/BrachNet/> (or in the mirror sites at <http://emig.free.fr/BrachNet/> and at <http://www.marinespecies.org/brachiopoda/>). Except the present author on Lingulides, there is no specialist on the other extant brachiopods cited herein. Because most of the experts are retired, the directories at the web site Br@chnet remain the best way to contact a specialist (webmaster is Christian C. Emig, email: emig@free.fr and brachnet@aliceadsl.fr). The largest collection of American brachiopod specimens is located at the Smithsonian Institution, National Museum of Natural History, Washington DC (USA).