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A LATE PLEISTOCENE MARINE INVERTEBRATE FAUNA FROM BANDON, OREGON

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In the early 1900's Bruce Martin collected a small assortment of fossils from a marine terrace near the town of Bandon on the Oregon coast. This collection is in the California Academy of Sciences (CAS) and bears locality number 23. The deposit was later recorded by Arnold and Hannibal (1913) and by Addicott (1964). Subsequently, Addicott (1966, p. 17) published a list of species based on the Academy's collection. In 1960 a party from the Department of Paleontology, University of California at Berkeley, visited the Bandon area and relocated Martin's locality. The collection obtained at that time was given University of California Museum of Paleontology (UCMP) locality number B-7493, and is that referred to by Addicott (1966, p. 17, footnote).

The fossiliferous deposit is composed of a 10- to 20-foot-thick bed of unconsolidated, poorly sorted, angular, fine-grained, feldspathic sandstone, containing subrounded sandstone and chert pebbles and numerous well preserved invertebrate fossils. The deposit is located about three-fourths of a mile southwest of Bandon at Grave Point (fig. 1) about 15 feet below the top of a 50- to 80-foot sea cliff. This bed is essentially horizontal, rests upon a truncated wave-cut surface of the underlying altered volcanics (?Myrtle Formation), and is overlain by presumed terrestrial gravel, sand, and surface soil. The sand and gravel of the fossiliferous terrace were apparently derived from the underlying bedrock. Fossils were observed laterally along the face of the sea cliff over a distance of approximately 100 feet, but the majority of the collected specimens came from

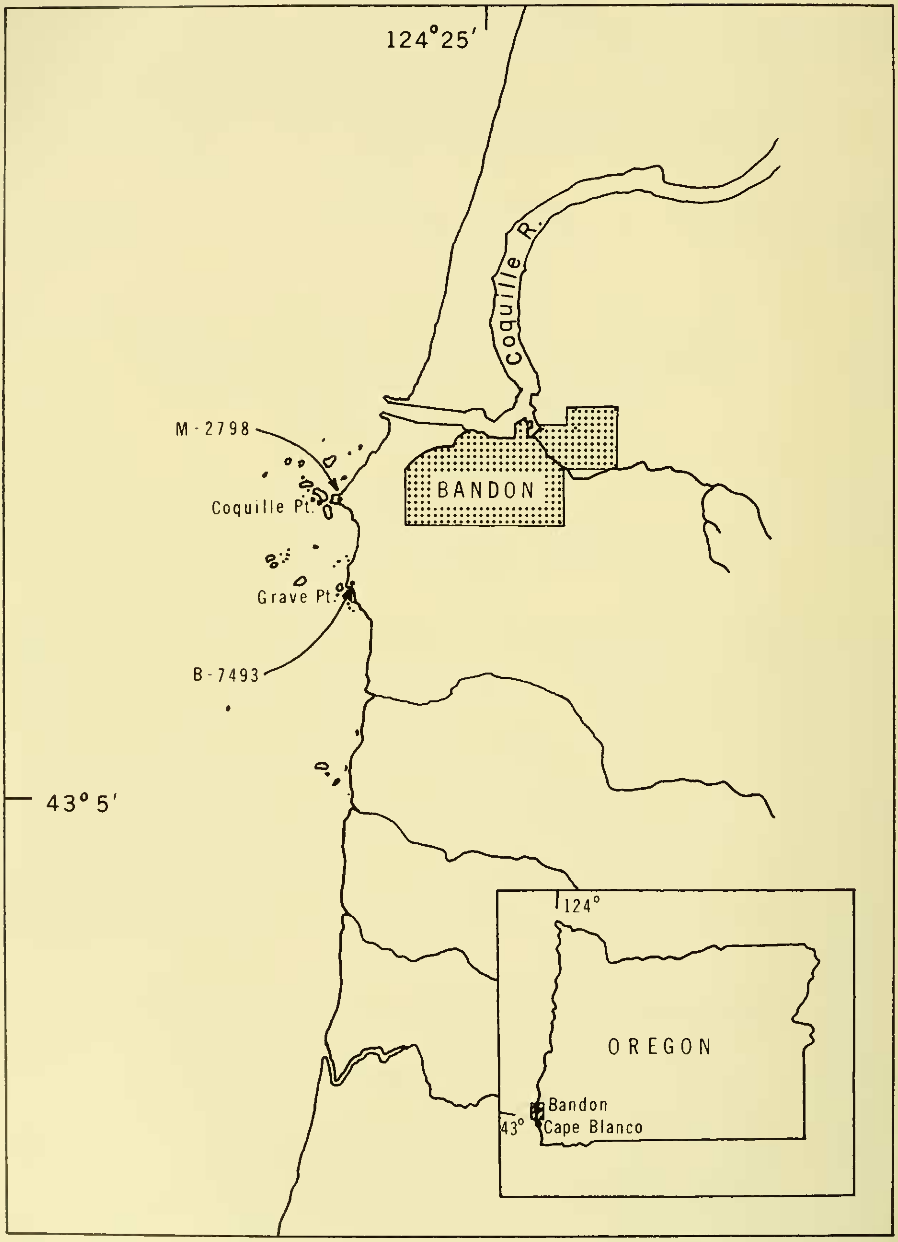

Figure 1. Location of the Grave Point and Coquille Point fossil localities in the late Pleistocene Bandon terrace. Inset map indicates location of the Bandon area in Oregon.

a single lens about 10 feet wide near the center of observed extent of the fossiliferous bed.

About 100 pounds of screened and of bulk material were collected, and from this sample 58 invertebrates have been recognized (table 1). They include 21 gastropods, 12 pelecypods, at least 4 chitons, 8 cirripeds, 4 decapod crustaceans, at least 3 foraminifers, 2 bryozoans, 2 echinoids, 1 brachiopod (a second is present in the CAS collection), and 1 ahermatypic coral. The compartmental plates and opercular valves of cirripeds, especially those of *Balanus cariosus,* are the most conspicuous element in the fauna and make up the bulk of the fossils, but are exceeded in number by the pelecypod *Hiatella arctica*, the gastropods *Margarites pupillus, Fusitriton oregonensis* (especially young adults), and *Oenopota tabulata,* and the two species of Bryozoa. The material from CAS locality number 23 has been re-examined in the light of this larger and better preserved collection. Presumed equivalents to the taxa determined by Addicott (1966) (the CAS collection was unlabelled) are indicated in table 2.

Another fossiliferous pocket in the Bandon marine terrace was recently discovered by Drs. Warren O. Addicott and Richard Janda, of the U. S. Geological Survey, Menlo Park, California in 1966 and 1967 on the south side of Coquille Point (fig. 1, U. S. Geological Survey (USGS) locality no. M-2798). This collection, which was made available for inclusion in this study through the kindness of Dr. Addicott, includes at least 37 invertebrates of which 7 were not recorded from the Grave Point locality. Of the additional records, the presence of *Mya japonica* is particularly noteworthy. According to MacNeil (1965, p. 33) this species, which is presently unknown from the eastern Pacific, has been found in Pleistocene deposits at Nome and Cape Kruzenstern, Alaska, near Vancouver, British Columbia, and on the north side of Willapa Bay, Washington. Its occurrence in the Bandon fauna is the most southerly Pleistocene record of this species in the eastern Pacific.

Table 1 includes a summary of the general habitats, in terms of exposure, substrata, and vertical distribution, preferred by the extant counterparts of the taxa present in the Bandon fauna. These data indicate that the Bandon fauna was derived predominantly from the lower intertidal and subtidal reaches of a rocky coast that was well protected from wave shock. The absence of surf is attested to by the presence of such forms as *Mytilus edulis glomeratus, Mopalia ciliata*, the large, heavy-shelled variety of *Pododesmus macroschisma, Fusitriton oregonensis*, and the conspicuously frilled variety of *Nucella lamellosa*. In this and other respects the fauna is not unlike that found now in Puget Sound.

Judging from the lack of external wear, these remains were transported but a short distance downslope and deposited in hollows in the veneer of sand rapidly accumulating on the wave-cut terrace. Some of the species in the

TABLE 1. *Checklist of fossils from Bandon Oregon.*[2]

	Locality			Ecology		
	CAS 23	UCMP B-7493	USGS M-2798	Exposure	Substratum	Tide level
PHYLUM MOLLUSCA						
CLASS POLYPLACOPHORA						
Katharina tunicata (Wood, 1815)	R	R		E	rk	L
Mopalia ciliata (Sowerby, 1840)		R		P	rk	L
M. ciliata group		C		P	rk	L
M. species, aff. *M. cirrata* (Berry, 1919)		R			rk	
Mopalia species, indeterminate		F				
?*Mopalia* species		C				
Tonicella lineata (Wood, 1815)		F		P	rk	L
CLASS PELECYPODA						
Chlamys rubida (Hinds, 1845)			R	E, P	rk	S
Hiatella arctica (Linnaeus, 1767)	R	A	F	P	rk	L
Lyonsiid species		R				
Macoma incongrua (von Martens, 1865)	R	C	C		se	S
M. inquinata (Deshayes, 1854)	C	C	C	P	se	L–S
Mya japonica Jay, 1856 (figs. 5–6)			R	P	se	L
M. truncata Linnaeus, 1758	C	C	C		n.a.	
Mytilus edulis glomeratus Gould, 1851 (fig. 8)	R	F		P	rk	L
Mytilus species, indeterminate			R			
Ostrea species, indeterminate		R				
Penitella penita (Conrad, 1837) (fig. 4)			R	P	rk	L
Pholadid species		R				
Pododesmus macroschisma (Deshayes, 1839) (fig. 7)	R	F	R	P	rk	L
Protothaca staminea ruderata (Deshayes, 1853)			R	P	rk	M
Psephidia lordi (Baird, 1863) (figs. 2–3)	C	C	C	P	rk	M
Saxidomus giganteus (Deshayes, 1839)		C	F	P	se	L
Tresus capax (Gould, 1850)		C	F	P	se	L
CLASS GASTROPODA						
Acmaea (*Collisella*) *digitalis* Eschscholtz, 1833		R		E, P	rk	H
A. (*C.*) *pelta* Eschscholtz, 1833		F		P	rk	L
Boreotrophon clathratus gunneri (Lovén, 1846) (fig. 24)		R			rk	S
Buccinid species		R				
Cerithiopsis species, indeterminate		F				
Crepidula nummaria Gould, 1846 (fig. 23)	R	C	R	P	rk	L
Diodora aspera Eschscholtz, 1833		R		E	rk	L
Fusitriton oregonensis (Redfield, 1846) (fig. 11)	R	A	F	P	rk	L
Lepeta concentrica (Middendorff, 1851) (figs. 9–10)	R	C	F		rk	

[2] Explanation of symbols. Abundance: *R*—1 to 5 specimens, *F*—6 to 20, *C*—21 to 100, *A*—over 100. Ecology: *P*—protected from wave shock, *E*—exposed to heavy wave shock, *rk*—epifaunal elements living on hard surfaces such as rock, *se*—infaunal elements of muddy and/or sandy bottoms, *H*—high intertidal, *M*—mid intertidal, *L*—low intertidal, *S*—subtidal, *n.a.*—ecological data not available to me.

TABLE 1. *Continued.*

	Locality			Ecology		
	CAS 23	UCMP B-7493	USGS M-2798	Exposure	Substratum	Tide level
Littorina species, cf. *L. atkana* Dall, 1886		R			rk	
Margarites (*Pupillaria*) *pupillus* (Gould, 1849) (figs. 12–13)	C	A	C	P	rk	M–S
Melanella (*Balcis*) species, aff. *M.* (*B.*) *columbiana* Bartsch, 1917 (fig. 18)		R		(footnote 3)		
Nucella canaliculata (Duclos, 1832)		C	R	P	rk	M
N. emarginata (Deshayes, 1839)			R	E	rk	L
N. lamellosa (Gmelin, 1792) (fig. 22)	R	F	R	P	rk	M
Ocenebra interfossa Carpenter, 1864 (fig. 16)		C	F	P	rk	M–L
Odostomia (*Amaura*) *satura* Carpenter, 1864		R		(footnote 3)		
O. (*Evalea*) *baranoffensis* Dall & Bartsch, 1909 (fig. 15)		R		(footnote 3)		
Odostomia species, indeterminate			R			
Oenopota (*Propebela*) *tabulata* (Carpenter, 1864) (fig. 14)		A			rk	S
Oenopota species indeterminate			R			
Puncturella cucullata (Gould, 1848)		R	R		rk	S
Searlesia dira (Reeve, 1846)			R	P	rk	M
Trichotropis cancellata Hinds, 1843 (fig. 17)	R	C	R	P	rk	L
Velutina species, cf. *V. laevigata* (Linnaeus, 1758)		R		P	rk	L
PHYLUM ARTHROPODA						
CLASS CRUSTACEA: MALACOSTRACA						
Cancer oregonensis (Dana, 1852)		C		P	rk	L–S
?*Haplogaster* species		F				
?*Phyllolithodes* species		R				
Pugettia gracilis Dana, 1851			R	P	rk	L
Brachyuran chelae		C				
CLASS CRUSTACEA: CIRRIPEDIA						
Balanus (*Balanus*) *balanus* (Linnaeus, 1758) (figs. 33–34)		F	R	P	rk	L–S
B. (*B.*) *crenatus* Bruguière, 1789		R		P	rk	L–S
B. (*B.*) *glandula* Darwin, 1854		R		E, P	rk	H
B. (*B.*) *nubilus* Darwin, 1854 (figs. 27–28)		F		P	rk	L–S
B. (*B.*) *rostratus apertus* Pilsbry, 1916 (figs. 35–39)	R	C	F	P	rk	L–S
B. (*Semibalanus*) *cariosus* (Pallas, 1788) (figs. 29–32)		A	F	P	rk	M–L
B. (*Solidobalanus*) *engbergi* Pilsbry, 1921 (fig. 25)		F	R		rk	S
B. (*S.*) *hesperius* Pilsbry, 1916		F			rk	S
Balanus species, indeterminate			R			

[3] *Melanella* and *Odostomia* are commensals of such organisms as molluscs, polychaetes, and holothurians and are thus dependent upon their host species for distribution. *Melanella columbiana* has been reported as a commensal of *Fusitriton oregonensis* (Burch, 1945, Minutes, Conchological Club of Southern California, no. 53, p. 9).

TABLE 1. *Continued.*

	Locality			Ecology		
	CAS 23	UCMP B-7493	USGS M-2798	Exposure	Substratum	Tide level
PHYLUM ECHINODERMATA						
CLASS ECHINOIDEA						
Strongylocentrotus droebachiensis (Müller, 1776)		F		P	rk	L–S
S. purpuratus (Stimpson, 1857)		R		E	rk	M–L
Strongylocentrotus spines			F			
PHYLUM BRACHIOPODA						
CLASS ARTICULATA						
Hemithiris species, cf. *H. psittacea* (Gmelin, 1790) (fig. 21)	R				n.a.	
Terebratulina unguicula (Carpenter, 1864) (fig. 20)	F	C	R		n.a.	
PHYLUM BRYOZOA						
Costazia ventricosa (Lorenz, 1886)	C	A			n.a.	
Heteropora species, indeterminate	C	A	C			
PHYLUM CNIDARIA						
CLASS ANTHOZOA						
Balanophyllia elegans Verrill, 1864 (fig. 19)		R	R	P	rk	M–L
PHYLUM PROTOZOA						
Foraminifera (3+ spp.)		C	F			
PHYLUM CHORDATA						
Fish otolith	R					

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FIGURE 2. *Psephidia lordi* (Baird), interior of hypotype UCMP 10137, UCMP locality B-7493, height 9.4 mm.

FIGURE 3. *Psephidia lordi* (Baird), interior of hypotype UCMP 10138, UCMP locality B-7493, height 7.1 mm.

FIGURE 4. *Penitella penita* (Conrad), exterior of hypotype USNM 651144, USGS locality M-2798, length 44 mm.

FIGURES 5 and 6. *Mya japonica* Jay, interior of left valve and exterior of right valve of hypotype USNM 651145, USGS locality M-2798, length 73 mm.

FIGURE 7. *Pododesmus macroschisma* (Deshayes), exterior of hypotype UCMP 10139, UCMP locality B-7493, height 92 mm.

FIGURE 8. *Mytilus edulis glomeratus* Gould, exterior of hypotype CAS 13129, CAS locality 23, length 22 mm.

FIGURE 9. *Lepeta concentrica* (Middendorff), side view of hypotype UCMP 10140, UCMP locality B-7493, length 18.2 mm.

FIGURE 10. *Lepeta concentrica* (Middendorff), dorsal view of hypotype UCMP 10141, UCMP locality B-7493, length 12.8 mm.

FIGURE 11. *Fusitriton oregonensis* (Redfield), juvenile, hypotype CAS 13130, CAS locality 23, height 18.7 mm.

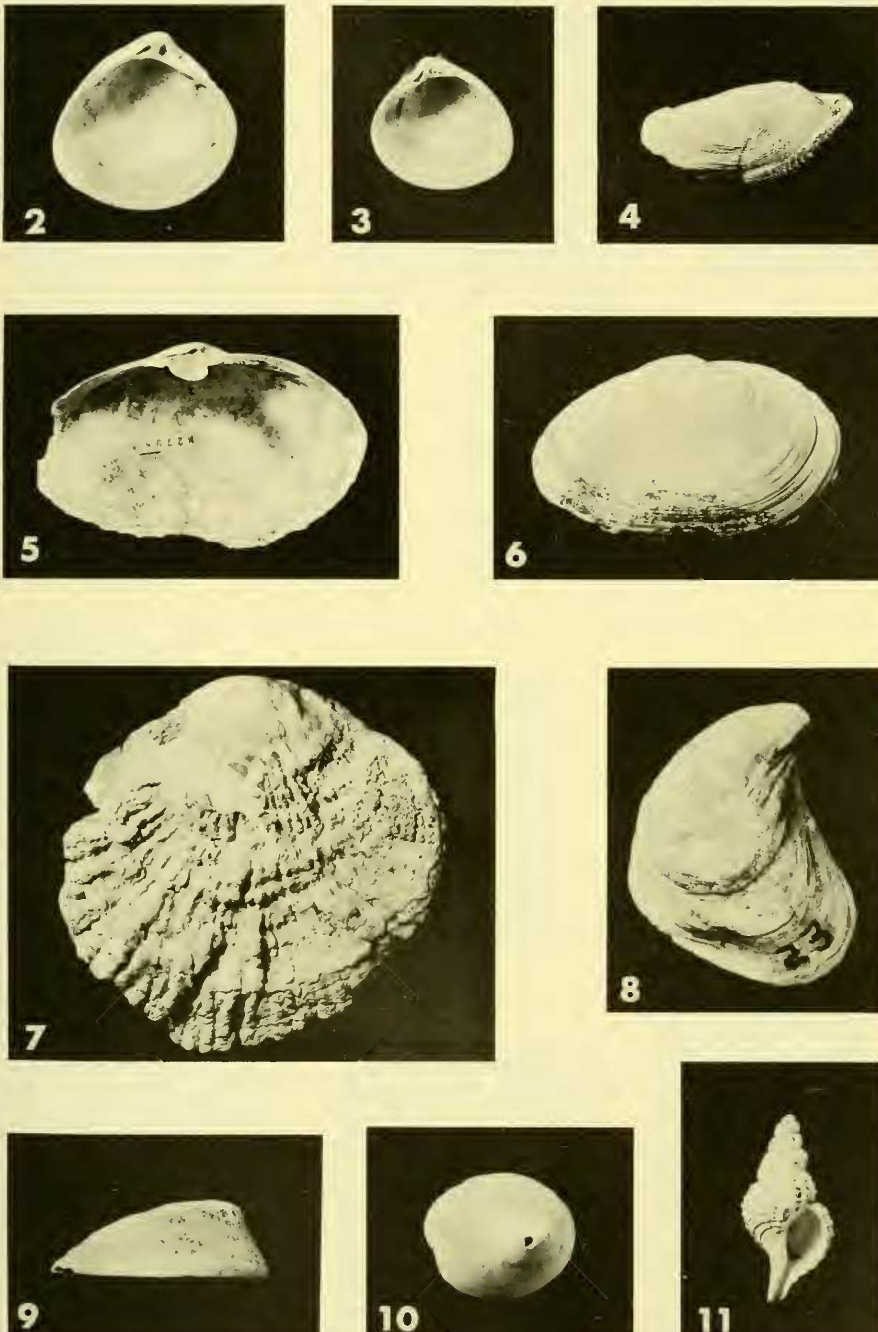
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TABLE 2. *Comparison of species-group determinations from CAS locality number 23.*

Addicott (1966)	This paper
Lepeta concentrica	*Lepeta concentrica*
?*Pupillaris* species	*Margarites* (*Pupillaria*) *pupillus*
Crepidula cf. *C. grandis* Middendorff	*Crepidula nummaria*
Trichotropis cf. *T. insignis* Middendorff	*Trichotropis cancellata*
Fusinus species	*Fusitriton oregonensis*
Thais lamellosa	*Nucella lamellosa*
Mytilus cf. *M. edulis* forma *glomeratus*	*Mytilus edulis glomeratus*
Pododesmus macroschisma	*Pododesmus macroschisma*
Transenella tantilla (Gould)	*Psephidia lordi*
Macoma cf. *M. incongrua*	*Macoma incongrua*
Macoma inquinata	*Macoma inquinata*
Mya truncata	*Mya truncata*
Hiatella species	*Hiatella arctica*
Hemythiris species	*Hemithiris* sp., cf. *H. psittacea*
Terebratulina unguicula	*Terebratulina unguicula*
Balanus species	*Balanus rostratus apertus*

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FIGURES 12 and 13. *Margarites* (*Pupillaria*) *pupillus* (Gould), apertural and basal views of hypotype UCMP 10142, UCMP locality B-7493, height 11.7 mm.

FIGURE 14. *Oenopota* (*Propebela*) *tabulata* (Carpenter), hypotype UCMP 10143, UCMP locality B-7493, height 12 mm.

FIGURE 15. *Odostomia* (*Evalea*) *baranoffensis* Dall & Bartsch, hypotype UCMP 10144, UCMP locality B-7493, height 10 mm.

FIGURE 16. *Ocenebra interfossa* Carpenter, hypotype UCMP 10145, UCMP locality B-7493, height 18.5 mm.

FIGURE 17. *Trichotropis cancellata* Hinds, hypotype UCMP 10146, UCMP locality B-7493, height 12.5 mm.

FIGURE 18. *Melanella* (*Balcis*) sp., aff. *M.* (*B.*) *columbiana* Bartsch, hypotype UCMP 10147, UCMP locality B-7493, height 5 mm.

FIGURE 19. *Balanophyllia elegans* Verrill, hypotype UCMP 10148, UCMP locality B-7493, greatest diameter 14 mm.

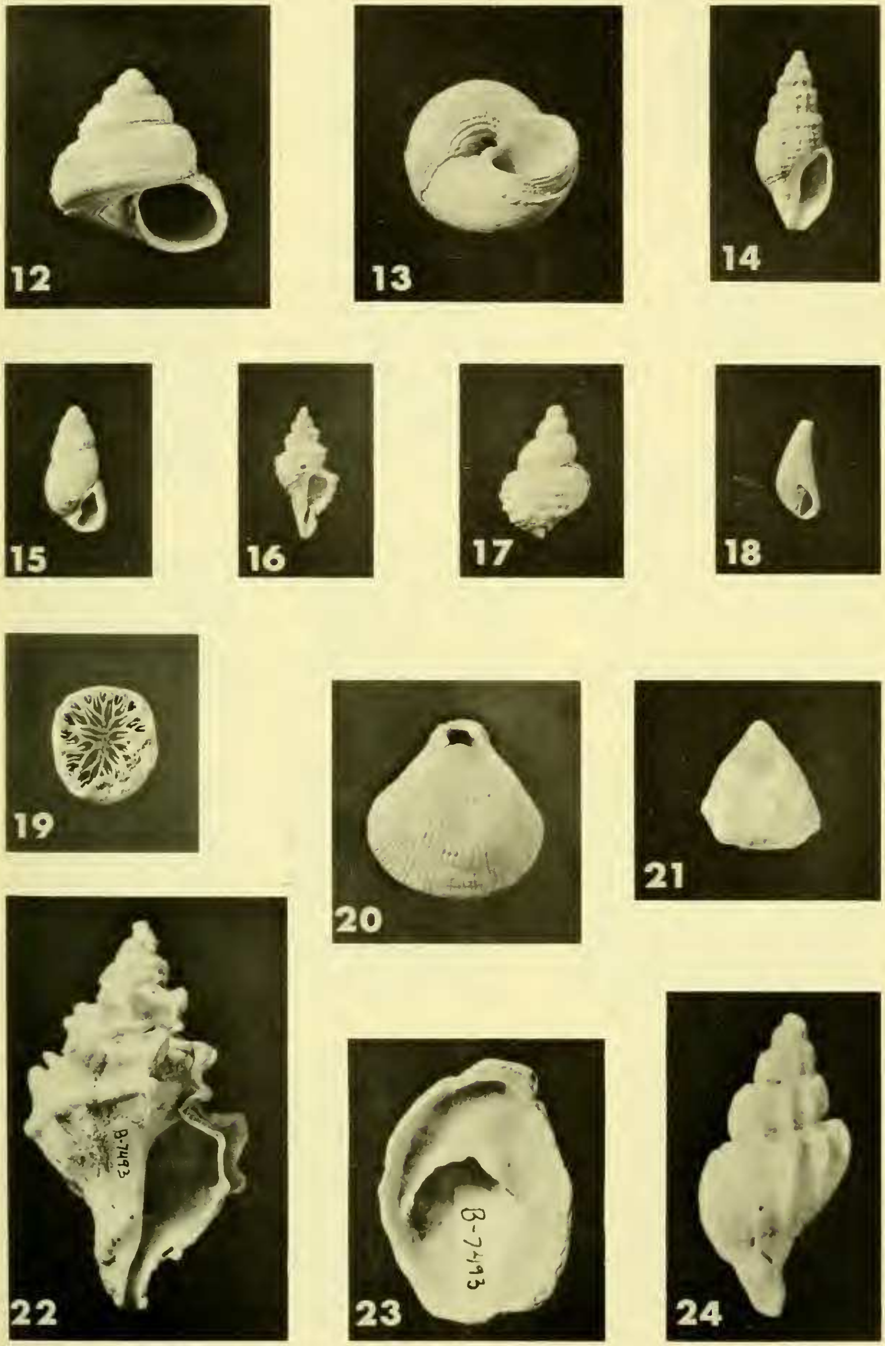
FIGURE 20. *Terebratulina unguicula* (Carpenter), hypotype UCMP 10149, UCMP locality B-7493, length 15 mm.

FIGURE 21. *Hemithiris* sp., cf. *H. psittacea* (Gmelin), hypotype CAS 13131, CAS locality 23, length 15 mm.

FIGURE 22. *Nucella lamellosa* (Gmelin), hypotype UCMP 10150, UCMP locality B-7493, height 65.5 mm.

FIGURE 23. *Crepidula nummaria* Gould, hypotype UCMP 10151, UCMP locality B-7493, length 30 mm.

FIGURE 24. *Boreotrophon clathratus gunneri* (Lovén), hypotype UCMP 10152, UCMP locality B-7493, height 21.5 mm.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Bandon fauna, notably those of *Macoma, Mya,* and *Tresus,* were probably living in the sand and sandy mud in the vicinity of the site of deposition.

The nearest assemblage of similar size and age is found at Cape Blanco, Oregon, about 20 miles southwest of Bandon. Addicott (1964) described the geology and paleoecology of this terrace deposit and identified 41 molluscs and barnacles[1] which he concluded were derived predominantly from an exposed, sandy, inner sublittoral habitat. Less than 30 percent (19) of the species found in the Bandon fauna are common to both assemblages. These species include the infaunal element of the Bandon fauna that lived near the site of deposition and part of the shallower water element of the Cape Blanco fauna that was washed downslope. The high degree of difference in the composition of the two faunas most probably reflects the habitat from which the bulk of each assemblage was derived, rather than any significant difference in the ages of the deposits.

[1] The occurrence of *Balanus engbergi* in the Cape Blanco terrace fauna, based on a list provided by me, is in error.

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FIGURE 25. *Balanus* (*Solidobalanus*) *engbergi* Pilsbry, hypotype UCMP 10153, UCMP locality B-7493, greatest diameter 17 mm.

FIGURE 26. ?*Phyllolithodes* sp., dactyl, hypotype UCMP 10154, UCMP locality B-7493, length 21.5 mm.

FIGURE 27. *Balanus* (*Balanus*) *nubilus* Darwin, interior of scutum, hypotype UCMP 10155, UCMP locality B-7493, height 29 mm.

FIGURE 28. *Balanus* (*Balanus*) *nubilus* Darwin, interior of tergum, hypotype UCMP 10156, UCMP locality B-7493, height 33.5 mm.

FIGURE 29. *Balanus* (*Semibalanus*) *cariosus* (Pallas), interior of scutum, hypotype UCMP 10157, UCMP locality B-7493, height 13 mm.

FIGURE 30. *Balanus* (*Semibalanus*) *cariosus* (Pallas), interior of tergum, hypotype UCMP 10158, UCMP locality B-7493, height 14.5 mm.

FIGURES 31 and 32. *Balanus* (*Semibalanus*) *cariosus* (Pallas), exterior and interior of rostral plate, hypotype UCMP 10159, UCMP locality B-7493, height 41 mm.

FIGURES 33 and 34. *Balanus* (*Balanus*) *balanus* (Linnaeus), exterior and interior of lateral plate, hypotype UCMP 10160, UCMP locality B-7493, height 14.6 mm.

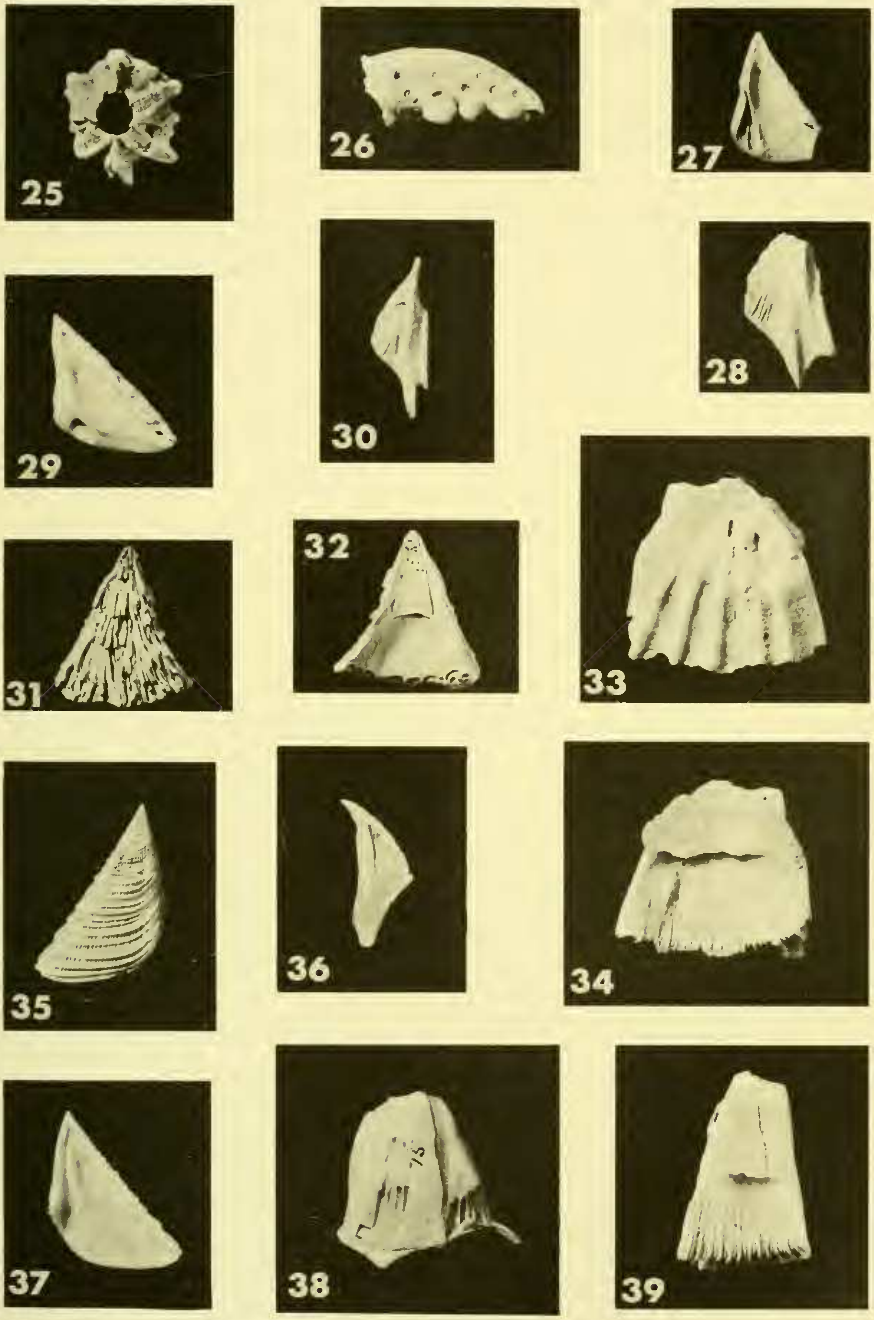
FIGURE 35. *Balanus* (*Balanus*) *rostratus apertus* Pilsbry, exterior of scutum, hypotype UCMP 10161, UCMP locality B-7493, height 14.8 mm.

FIGURE 36. *Balanus* (*Balanus*) *rostratus apertus* Pilsbry, interior of tergum, hypotype UCMP 10162, UCMP locality B-7493, height 13.5 mm.

FIGURE 37. *Balanus* (*Balanus*) *rostratus apertus* Pilsbry, interior of scutum, hypotype UCMP 10163, UCMP locality B-7493, height 10 mm.

FIGURE 38. *Balanus* (*Balanus*) *rostratus apertus* Pilsbry, shell from the upper brown sandstone member of the Elk River Formation, Cape Blanco, Oregon ground to show transverse septa in parietal tubes, hypotype CAS 13132, CAS locality 15, height 35 mm.

FIGURE 39. *Balanus* (*Balanus*) *rostratus apertus* Pilsbry, interior of lateral plate, hypotype UCMP 10164, UCMP locality B-7493, height 23.3 mm.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Valentine (1961, p. 392) summarized available data on composition and distribution of late Pleistocene molluscan faunas and defined three shallow water provinces: 1) a transitional Panamic-Californian overlap analog, the *Magdalenan* Province, from Bahía Magdalena, Baja California (28° N. lat.) south; 2) a Californian analog, the *Verdean* Province, north of Bahía Magdalena to about the latitude of Ventura, California (34° N. lat.); and 3) an Oregonian analog, the *Cayucan* Province, from the Ventura Basin north into Oregon. The northern boundary of the Cayucan Province could not be determined because of the lack of data from northern California and the Pacific Northwest. Valentine (cited above) also noted that embayed shallow water faunas of these provinces are more readily distinguished than are those from outer coasts which tend to be similar in composition through broad latitudinal ranges.

On the basis of new data from central California to southern Oregon, Addicott (1966, pp. 16–19) restricted the Cayucan Province to the region south of Santa Cruz, California and defined another province, the *Nuevan*, analogous to the Aleutian, for northern California and southern Oregon outer coast faunas. Besides the Point Año Nuevo and Santa Cruz faunas that are the standard of reference, late Pleistocene faunas from Crescent City, California and Cape Blanco and Bandon, Oregon were also considered to represent the Nuevan Province. Assemblages from the Nuevan Province are characterized by such molluscs as *Lepeta concentrica*, species of *Trichotropis, Saxidomus giganteus, Tresus capax, Macoma inquinata,* and *Mya truncata*, and the occurrence of species whose extant distribution is restricted to the Aleutian Province (north of 48° N. lat.). To this list of characteristic species should be added the barnacle *Balanus rostratus* Hoek, which presently does not occur south of Puget Sound, but is found in Nuevan assemblages from Point Año Nuevo and Santa Cruz north to Cape Blanco and Bandon.

The single significant protected bay fauna within the geographic boundaries of the Nuevan Province is that of the Millerton Formation in Tomales Bay, California. As indicated both by Valentine (1961) and Addicott (1966) this fauna includes several elements characteristic of more southerly provinces, and if contemporaneous with outer coast faunas of the Nuevan Province, suggests a situation similar to that presently found in the area of overlap between the Panamanian embayment and Californian outer coast faunas of southern Baja California.

Considerable confusion has been introduced in the characterization of Pleistocene assemblages through the indiscriminate usage of the terms "exposed," "outer," "open," and "protected." These terms have been applied either 1) when comparing an embayment with oceanic coastal waters, or 2) when comparing a quiet water habitat with one in which heavy surf is a factor. In the former case the differences seen usually reflected differences in temperature regimes. An embayment, being a shallow body of water with restricted circulation, can maintain higher annual temperatures through solar insolation than can adjacent coastal waters whose circulation is virtually unrestricted both vertically and laterally. A classic example of this situation is found presently along the southern Baja California coast, where small embayments and lagoons are sufficiently warm to maintain Panamic communities, whereas adjacent outer coast localities support a cooler water Californian fauna.

In the second usage, observed differences in faunal composition reflect the effect or lack of wave shock both on the habitat from which the fauna was derived and on the site of deposition. An example of the effects of wave shock is to be found in the comparison of the extant distribution of the exposed coast *Mytilus californianus-Pisaster-Pollicipes* community with that of the protected coast or embayment *Mytilus edulis-Ostrea-Ceratostoma* community (see Valentine, 1961, pp. 329–335).

In this connection Ricketts and Calvin (1956) employed a classification of littoral habitats that is particularly helpful in crystallizing the usage of these terms. The coastline is physically divided into the *outer* coast and *bays and estuaries.* The outer coast is further divided into an *open* (or *exposed*) coast that is subject to the full force of oceanic waves, and a *protected* outer coast where the force of the waves is buffered by the presence of offshore islands or protective headlands. Bays and estuaries are, by their nature, *protected* environments. Thus, the terms "outer," "bays," and "embayment" are geographic features, whereas "exposed," "open," and "protected" refer to degree of wave shock. A protected habitat can be found either in an embayment or on the outer coast in the lee of offshore land masses, but an exposed habitat is usually associated only with outer coast localities.

In his discussion of the paleoecology of Nuevan assemblages Addicott (1966, pp. 11–15) differentiated between an Outer Coast Biotope and a Protected (i.e., embayment) Biotope. The Cape Blanco and Bandon assemblages were considered to be representatives of inner sublittoral exposed-coast habitats of the Outer Coast Biotope. Although the Cape Blanco fauna probably does represent such an environment, especially at the site of deposition, the Bandon fauna does not. The site of deposition of the Bandon fauna differed from that of the Cape Blanco in existing in shallower water in an area protected from wave shock by some form of offshore emergent land mass, and in being closer to shore and the habitat that contributed the greatest number of species. The lack of significant wave action minimized abrasion and fragmentation of the remains and permitted a more rapid accumulation of sediment. As indicated by Addicott (1964) the Cape Blanco fauna had a more complex depositional history. The littoral remains were largely accumulated and sorted above wave base by a transgressive sea, and formed part of the substratum that supported the infaunal component of the fauna at a later time when the site of deposition was below wave base.

Table 3. *Northern extralimital species of the Bandon fauna.*

Species	Present southern limit
Pelecypoda	
Macoma incongrua	Puget Sound
Mya japonica	?Nome, Alaska
Mya truncata	Puget Sound
Gastropoda	
Lepeta concentrica	Puget Sound
Littorina atkana	Aleutians
Melanella columbiana	British Columbia
Odostomia baranoffensis	Southeast Alaska
Echinoidea	
Strongylocentrotus droebachiensis	Puget Sound
Cirripedia	
Balanus balanus	British Columbia
Balanus rostratus	Puget Sound (subspecies *alaskensis* Pilsbry)

The composition of the Bandon fauna is typically Nuevan in consisting of a large Oregonian component and a smaller, but significant number of elements now restricted to the Aleutian Province (table 3). On the basis of the 54 species-group taxa identified from this larger sampling, the percentage of Aleutian elements is smaller (18.5 percent) than the 31 percent indicated by Addicott (1966, p. 18), and more in keeping with percentages (8 to 19 percent) given for the other known Nuevan faunas at Point Año Nuevo, Santa Cruz, Crescent City, and Cape Blanco.

The two known late Pleistocene assemblages from the Oregon coast thus provide information on the faunal composition of two of the three major habitats of the Nuevan Province: an exposed outer coast habitat (Cape Blanco) and a protected outer coast habitat (Bandon). Still to be located are contemporary embayed faunas that might shed some light on the distributional problems exhibited by the Millerton fauna of Tomales Bay.

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