

TABLE 1—Reported anomalous deep-water gastropods from California Neogene deposits (Recent examples are noted). Present depth distributions from these sources: (1) Kohl, 1974, (2) McLean, 1978, (3) Lindberg and Kellogg, 1982; S = southern California, N = northern California.

GASTROPOD SPECIES	PRESENT DEPTH DISTRIBUTION	REFERENCE
<i>Buccinum</i> cf. <i>B. strigillatum</i> Dall 1891	S:150-732m (1)	Kohl, 1974
<i>Cancellaria cooperi</i> (Gabb 1865)	S:rare, offshore (2)	Recent, Lindberg and Kellogg, 1982
<i>Fusinus</i> aff. <i>F. barbarentis arnoldi</i> (Cossman 1903)	S:80-400m (3)	Emerson and Addicott, 1953
<i>Fusitriton oregonensis</i> (Redfield 1848)	S:>140m (3)	Emerson and Addicott, 1953
<i>Megasurcula carpenteriana</i> (Gabb 1865)	S:50-365m (2)	Addicott, 1969
<i>Polinices reclusianus</i> (Deshayes 1839)	N:183m, 549m (1)	Kohl, 1974
<i>Trophonopsis dalli</i> (Kobelt 1878)	intertidal mostly (2)	Recent, Lindberg and Kellogg, 1982
<i>Trophonopsis fleenerensis</i> (Martin 1914)	N:293m, 365m, 569m (1)	Kohl, 1974
	N:183m, 329m, 366m (1)	Kohl, 1974

TABLE 2—Bathymetric ranges of hermit crabs from the Bering Sea to Baja California, Mexico (after McLaughlin, 1974).

FAMILY AND SPECIES	DISTRIBUTION	BATHYMETRIC RANGE
Diogenidae		
<i>Paguristes ulreyi</i>	Mexico, Baja California California; San Diego; San Nicolas Island	intertidal-56m
<i>Paguristes turgidus</i>	British Columbia, Chukchi Sea, San Diego	subtidal-420m
<i>Isocheles pilosus</i>	Bodega Bay, California to Baja California	low intertidal-100m
Paguridae		
<i>Pagurus armatus</i>	Alaska to San Diego	11-46m
<i>Pagurus quaylei</i>	British Columbia; Baja California	2-97m
<i>Pagurus capillatus</i>	Bering Sea; British Columbia; California	4-432m
<i>Pagurus setosus</i>	Kodiak, Alaska; Santa Cruz Island, California	9-476m
<i>Pagurus beringanus</i>	Bering Sea, Aleutian Islands to Monterey, California	intertidal-82m
<i>Pagurus granosimanus</i>	Alaska to Ensenada, Baja California	intertidal-32m
<i>Pagurus samuelis</i>	Vancouver Island to Baja California	intertidal (depth range unknown)
<i>Pagurus hirsutiusculus</i>	Siberia; Japan; Pribolof Islands to California	intertidal-110m

other bionts that produce fossilizable skeletons or traces that also indicate a hermit crab-occupied shell (i.e., a pagurized shell, after Seilacher, 1969). Three other gastropod species, *Polinices* (= *Neverita*) *reclusianus*, *Megasurcula carpenteriana*, and *Fusitriton oregonensis* are usually reported as anomalous deep-water species in shallow-water Pleistocene deposits (e.g., Addicott, 1969; Kohl, 1974). I have observed biont fossils and/or traces on fossil gastropods of these species collected from shallow-water deposits.

For example, pagurized *Polinices reclusianus* have a spionid

trace fossil located above the aperture notch (where aperture and last whorl meet) (Fig. 2A). These bore holes are similar to spionid bore holes on Recent *Polinices* shells inhabited by the burrowing diogenid hermit crab, *Isocheles pilosus* (Fig. 2B). This spionid trace fossil has not been reported previously; fossil shells with this bore hole above the aperture notch, then, indicate that an infaunal hermit crab occupied the shell (Walker, unpub. data). Shells that have many spionid bore holes on the outer lip (Fig. 2C, 2D) or encrusting bryozoa on the columella (Fig. 2D) indicate the occurrence of an epifaunal hermit crab.