is one of the most diverse so far reported and includes some gastropod taxa not reported from any other seep, modern or ancient (Peckmann et al. 2002). Some of the gastropods (and most likely the new species of *Deltocyathus*) were dependent on some food source that was either restricted to or enhanced in some way by this particular seep.

Schwartz et al. (2003) reported specimens of an unidentified species of *Flabellum* associated with ancient methane-seep sites in the Maastrichtian-Danian Moreno Formation in California. It is suspected that *Flabellum* was attracted to the vicinity of the seep sites by the greater amount of food production by the seep paleocommunity (Schwartz et al. 2003).

Some coral species such as *Caryophyllia wynoocheensis* were apparently opportunists better able to take advantage of a variety of bottom conditions because it is also found at localities away from seeps. Living species of *Caryophyllia* commonly have wide geographic distributions (e.g., Cairns 1994).

It cannot be excluded that some of these corals, like the bivalves and tubeworms found at methane-seeps, had the ability to host and derive nutrients from endosymbiotic chemotrophic bacteria. This is, however, unlikely because this trophic strategy has not yet been demonstrated for living corals.

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Appendix 1

SYSTEMATIC PALEONTOLOGY

Order Scleractinia

Superfamily Caryophyllioidea Dana, 1846

Family Caryophylliidae Dana, 1846

Genus *Deltocyathus* Milne Edwards and Haime, 1848

Type species.—*Turbinolia italica* Michelotti, 1838, by monotypy.

Deltocyathus insperatus n. sp.

Figs. 2a, 3a-d

2002 *Deltocyathus* n. sp. – Peckmann, Goedert, Thiel, Michaelis, Reitner, p. 858, Fig. 3G

Description.- A small *Deltocyathus* with septa arranged in four cycles, appearing to have 48 septa in all specimens complete enough to count. Costae of unworn specimens have an uneven, smooth to sharply serrate appearance. Base of unworn specimens with a blunt central granule. Septa exsert, with S_1 being the most highly exsert, S_2 less so, and S_{3-4} least exsert. Lateral septal faces with irregular arrangement of low, pointed to blunt spines.

Material.- Holotype, LACMIP 12981 (Peckmann et al. 2002: Fig. 3G); paratypes UWBM 97521-97523; referred specimen UWBM 97520.

Occurrence.- Found in only one methane-seep deposit on the Middle Fork of the Satsop River, Mason County, Washington, LACMIP loc. 17426 (= UWBM loc. B6781), Lincoln Creek Formation, Late Oligocene.

Etymology.- From Latin, *insperatus*, meaning surprising or unexpected, in reference to the occurrence in a methane-seep deposit.

Remarks.- *Deltocyathus insperatus* new species is similar to *D. conicus* and *D. italicus* in conical form, but the costae are less spinose. The septal faces of *D. insperatus* are also less spinose than those of *D. conicus*. *Deltocyathus insperatus* is a very small species, with the largest specimens all being less than 6 mm in diameter, and only 2.5 to 3.3 mm in height. There is no other fossil coral from western North America that can be confused with the new species. The only other West Coast species is *D. whitei* Durham, 1943, from the Paleocene age Lodo Formation in California, and it is much larger, with a flattened, discoid corallum. There is apparently no living species of *Deltocyathus* found in the eastern North Pacific Ocean (Cairns 1994).

Appendix 2

Locality descriptions

UWBM B6781: (= LACMIP loc. 17426) Lincoln Creek Formation, Late Oligocene
Map: Dry Bed Lakes, WA USGS Quad., 7.5' Ser., Topo., Provisional Edition 1990. MAP PUB ID 2509
Methane-seep carbonate deposit at water level, east bank of the Middle Fork of the Satsop River, approximately 80 m south and 240 m east of the northwest corner of Sec. 32, T. 21 N., R. 6 W., Mason County, Washington. (= SR4 of Peckmann et al. 2002).

UWBM B6782: Lincoln Creek Formation, Early Oligocene
Map: Dry Bed Lakes, WA USGS Quad., 7.5' Ser., Topo., Provisional Edition 1990.
Very small methane-seep carbonate, less than 50 cm in diameter (as exposed in 2002), south bank of the Middle Fork of the Satsop River, approximately 800 m south and 310 m east of the northwest corner of Sec. 20, T. 21 N., R. 6 W., Mason County, Washington.
(= SR1 of Peckmann et al. 2002).

UWBM B6783: Lincoln Creek Formation, Oligocene? (float)
Map: Grisdale, WA USGS Quad., 7.5' Ser., Topo., Provisional Edition 1990.
Methane-seep carbonate block found as float on a gravel bar in the Canyon River, SW1/4 SW1/4 NW1/4 of Sec. 36, T. 20 N., R. 7 W., Grays Harbor County, Washington.
Collected by J.L. Goedert and K.L. Kaler, 13 August 1994.

UWBM B6784: Lincoln Creek Formation, Late Eocene - Early Oligocene
Map: Dry Bed Lakes, WA USGS Quad., 7.5' Ser., Topo., Provisional Edition 1990.
Solitary coral found in carbonate deposit (methane-seep?), north side of the Middle Fork of the Satsop River, at upstream end of bend in river, approximately 460 m south and 820 m west of the northeast corner of Sec. 20, T. 21 N., R. 6 W., Mason County, Washington.
Collected by J.L. Goedert and F. Gill, 12 July 2003.

LACMIP 5842: Lincoln Creek Formation, Late Oligocene
Map: Knappton, WA USGS Quad., 7.5' Ser., Topo., 1973 Edition.
Fossils found as float on beach northeast of the townsite of Knappton, north shore of the Columbia River, N½ N½ Sec. 9, T. 9 N., R. 9 W., Pacific County, Washington.

LACMIP 5843: Lincoln Creek Formation, Late Oligocene
Map: Knappton, WA USGS Quad., 7.5' Ser., Topo., 1973 Edition.
Fossils found as float on beach northeast of the townsite of Knappton, north shore of the Columbia River, approximately 305 m south and 430 m east of the northwest corner of Sec. 9, T. 9 N., R. 9 W., Pacific County, Washington.