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Abstract

Twenty species of colonial rugose and tabulate corals from the Late Ordovician Ely Springs Dolomite of the Eastern Great Basin in Nevada and Utah are described. Included are two new tabulate species, *Agetolites budgei* and *Catenipora sheehani*. The colonial corals from the basal, Ibex Member include *Calapoecia anticostiensis* and *Nyctopora* sp. Colonial corals from the Lost Canyon Member are *Calapoecia anticostiensis, Paleofavosites poulseni, P. okulitchi, P.* sp. cf. *P. capax, P. mccullochae, Palaeophyllum* sp. cf. *P. raduguini, P. gracile, P. humei,* ? *Billingsaria parvituba, Agetolites budgei* n. sp., *Catenipora workmanae, C.* sp. cf. *C. foerstei,* and *Tollina sp.* Colonial corals from the Floride Member include *Calapoecia anticostiensis, C.* sp. cf. *C. coxi, Paleofavosites poulseni, P. mccullochae, P. okulitchi, P.* sp. cf. *P. transiens, P.* sp. cf. *P. capax,* and ? *Billingsaria parvituba*. The colonial corals from the Ely Springs Dolomite are characteristic of the 'Arctic Ordovician' faunal belt.

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Introduction

This study examines Eastern Great Basin Late Ordovician colonial corals from the Ely Springs Dolomite of the Silver Island range, Utah and the Northern Egan Range, Nevada (Fig. 1). These two localities were located high on a Late Ordovician carbonate ramp (Ahr, 1973), in a subtidal normal marine environment (Carpenter, 1981a. 1981b; Pandolfi, 1981, 1982; and Carpenter, Pandolfi, and Sheehan, in press). No organic build-ups have been noted in the Upper Ordovician of the Eastern Great Basin, either in the shallow water environment or at the shelf margin where bioherms most likely would occur. There is no faunal or lithologic evidence for a sharp change in slope, and a carbonate ramp model adequately explains the data. The westward-facing continental margin may not have been suitable for any type of organic build-up in the study area during the Late Ordovician. This hypotheses is discussed in more detail in the Paleontology section of this paper.

Geographic and Geologic Setting

Upper Ordovician strata of this study lie within the Eastern Great Basin region of the Basin and Range physiographic province (Fenneman, 1931). The study area (Fig. 1) lies between parallels 39° and 42° N and meridians 111° and 117° W. The physiography is characterized by elongate, northward-trending mountain ranges caused by Tertiary extensional block-faulting. The mountain ranges, separated by alluvial valleys, are generally 8-24 km (5-15 miles) wide and rise 300-1500 m (1000-5000 ft) above adjoining valleys which are about as wide as the mountain ranges (Stewart, 1980). Mountain ranges included in the study area are commonly 1800-3500 m (6000-10,000 ft) above sea level with the adjacent alluvial valleys 1200-1500 m (4000-5000 ft) above sea level.

Late Ordovician strata examined correspond to the Eastern Assemblage of miogeosynclinal strata discussed by Roberts and others (1958). Ross (1977) summarized Ordovician paleogeography of the western United States and noted that during the Ordovician, the North American continent rotated so that the region moved from the Equator to the drier, more evaporitic environment of the Horse latitudes. The Great Basin was near 20° South latitude during the Late Ordovician. Ordovician transgressions inundated more of western N.A. than at any other time during the Paleozoic (Ross 1977). The flooding associated with the Ordovician transgressions may have stopped the flow of quartz sand from the Canadian Shield (Ross, 1977). Late Ordovician strata are composed of very clean carbonates with the only appreciable clastic input represented by a sand horizon near the Ordovician/Silurian boundary originally discovered by Mullens and Poole (1972). Minor amounts of clastic material occur at the base of the Ely Springs Dolomite in the Silver Island Range and regionally at the base of the Floride Member of the Ely Springs Dolomite.

Stewart (1980) recognizes four provinces of Ordovician strata in the eastern Great Basin. These are, from east to west: 1) a carbonate and quartzite province, 2) a shale and limestone province, 3) a shale and chert province, and 4) a chert-shale-quartzite-greenstone province. Late Ordovician strata from the study area include lithofacies of the carbonate and quartzite province of Stewart (1980).

An up to date account of pre- and post-Ordovician Great Basin geology is given in Carpenter (1981), Stewart (1980), and Carpenter, Pandolfi and Sheehan (in press) and will not be considered in detail here. Work on the geological history of the Great Basin is prolific; Hintze (1973) and Stewart (1980) give a comprehensive geologic setting that is relevant to the study area. Sheehan (1973, 1975), Berry and Boucot (1973), and Lenz (1976) have discussed a Late Ordovician extinction event caused by a worldwide glaciation. Pertinent faunal studies are those of Harris and others (1979) on conodonts, Chamberlain (1977) on trace fossils, and Sheehan (1969, 1976, 1980) on brachiopods.

Previous Investigations

Little work has been done on Ordovician corals of the Great Basin. Duncan (1956) provided a preliminary account of Late Ordovician corals found in the Great Basin. She noted that because the corals had not been described in strictly paleontologic papers, the existence of published information on these coral faunas had been overlooked by many workers. Her study represents field investigations and identification of numerous Ordovician and Silurian coral faunas throughout the western United

States. Duncan (1956) concluded that western United States Ordovician coral faunas are extraordinarily similar in their species composition and that certain coral forms, which are almost invariably present in any representative collection, can be used reliably in determining the age of the Ordovician and Silurian carbonates in which they occur. Analysis of colonial corals of the eastern Great Basin verifies this conclusion.

Bassler (1950) recorded coral faunules from 3 localities in the Upper Ordovician rocks of the west: 1) the Maravillas Formation of Texas, 2) the Bighorn Dolomite of the Bighorn Mountains, Wyoming, and 3) the Whitewood Dolomite of western South Dakota and northeast Wyoming.

Hill (1959) documented Upper Ordovician corals from the Upham Dolomite and Cutter Formation of New Mexico, the "Longfellow Limestone" (actually Upham Dolomite of the Montoya Group) of Arizona, and the Aleman Dolomite of Texas. Flower (1961), in a detailed report on the Montoya Group, illustrated 27 species of colonial corals from New Mexico, Texas and Arizona. Budge (1972), in an unpublished Ph.D. dissertation, described Late Ordovician and Silurian colonial and solitary rugose corals from the eastern Great Basin.

Paleoenvironmental studies which include Late Ordovician strata of the Great Basin include Miller (1977), Miller and Walch (1977), Dunham (1977) Dunham and Olson (1980), and Nichols and Silberling (1977). Ordovician sedimentation and paleogeography of the western United States have been studied by Ross (1976, 1977).

Methods

Field work in the Eastern Great Basin was undertaken during May and June, 1980. Lithologic and faunal composition were examined in eight Late Ordovician stratigraphic sections in Utah and Nevada. Collections of brachiopods and corals were made at approximately 35 horizons. Outcrops examined included 6 stratigraphic sections that had been previously measured by other workers and 2 stratigraphic sections that had not been previously measured. Stratigraphic sections in the Northern Egan Range and in the Lakeside Mountains were measured using a 30m tape and a Brunton compass. Thickness of the stratigraphic sections and the units comprising the sections was computed using the methods described by Mertie (1922). Lithologic descriptions of measured sections may be found in Carpenter (1981a), and Carpenter, Pandolfi and Sheehan (in press).

Silicified fossils were etched from the dolomite matrix using dilute HCL (muriatic acid). A mixture of 2 parts water to 1 part acid dissolved the carbonate matrix. Specimens were then hardened using alcohol based Butvar-98. All coral specimens from Late Ordovician strata of the Eastern Great Basin were prepared in this manner so that external morphology of the corals could be observed. Specimens selected for sectioning were photographed, then encased in an epoxy before sectioning. Ordinary thin-sectioning techniques were adequate for the coral specimens encased in the epoxy.

The epoxy used to impregnate the silicified coral specimens is made by Reickhold Chemicals, Inc. of White Plains, New York and is distributed in two parts, Epoxy Resin Liquid and Epoxy Hardener Liquid. For small specimens (up to 3 cm in any one dimension) a ratio of 4 parts resin to 1 part hardener was adequate. For large specimens (greater than 3 cm in any one dimension) a ratio of 8-10 parts resin to 1 part hardener produced the most satisfactory results. All specimens, upon immersion in the epoxy were placed under a vacuum. Pressure induced by the vacuum served to liberate the air bubbles from the epoxy. An intial vacuum pressure of 27 inches Hg was placed upon the specimens and then released. This was repeated from five to twelve times depending on the size of the specimen. This process brought all the air bubbles to the external surface of the epoxy. Afterward, a pressure of 10-15 inches Hg was maintained for 10-15 minutes or until the air bubbles on the external surface of the epoxy were cleared. This process insured a clean, clear epoxy, totally free of air bubbles. After all of the air bubbles were cleared, the specimens were removed from the vacuum and left to harden at room temperature for 24 hours. Some of the larger specimens with a greater resin to hardener ratio did not totally solidify after the 24 hour period and were heated (120° for 2 hours) to attain total hardening.

Photographs were taken of the external morphology of the whole coral and of the thin sections. Stereo pairs were taken of the whole specimens to clearly represent the external morphology in three dimensions.

Stratigraphy

Budge and Sheehan (1980a) divided the Ely Springs Dolomite into four members which are, from base to top, the Ibex, the Barn Hills, the Lost Canyon, and the Floride Members (Fig. 2). The basal three units were named by Budge and Sheehan (1980a), the top unit by Osterwald (1955). Lithologic descriptions of each member may be found in Budge and Sheehan (1980a), while description of measured sections of Late Ordovician strata are given in Budge and Sheehan (1980b), Carpenter (1981), and Carpenter, Pandolfi, and Sheehan (in press). Harris and others (1979) dated the Ely Springs Dolomite as Late Ordovician (upper Caradoc-Ashgill)-Early Silurian based on conodonts. Mullens and Poole (1972) placed the Ordovician/Silurian boundary at an oolite and sand horizon in the upper portion of the formation. The Ely Springs Dolomite was sampled in many mountain ranges in the eastern Great Basin. Colonial corals were recovered from the Silver Island and Northern Egan Ranges.

Sheehan (1969) assigned a Late Ordovician age to the Ely Springs Dolomite in the Silver Island Range based on the presence of the brachiopods *Diceromyonia* and *Lepidocyclus* and in the Egan Range on the presence of the braciopods *Thaerodonta* and *Lepidocyclus*. Sheehan (1969) noted a marked affinity of the brachiopod assemblages of eastern Nevada to those from the mid-continent of North America.

Paleoecology

Late Ordovician colonial corals were recovered at four sampling localities from the Ely Springs Dolomite in the Eastern Great Basin. The four localities are: 1) Ibex Member, Northern Egan Range, Nevada, MPM locality 3227, 2) Lost Canyon Member, Silver Island Range, Utah, MPM localities 3208 and 3209, 3) Lost Canyon Member, Northern Egan Range, Nevada, MPM locality 3231, and 4) Floride Member, Northern Egan Range, Nevada, MPM locality 3229.

Ibex Member, Northern Egan Range (MPM locality 3227)

Colonial corals recovered from the Ibex Member of the Northern Egan Range include two specimens of *Calapoecia anticostiensis* and two specimens of *Nyctopora*.

Dasyclad algae are represented by the genera *Vermiporella* and *Rhabdoporella*. The few colonial corals occur with a diverse brachiopod fauna in a sandy dolomite in the basal member of the Ely Springs Dolomite. The sand was presumably derived from reworking of the underlying Middle Ordovician Eureka Quartzite. The assemblage of which this fauna is part has been interpreted (Carpenter, 1981a, Pandolfi, 1982, Carpenter, Pandolfi, and Sheehan, in press) as occurring in a normal marine subtidal environment. Colonial corals collected from this horizon probably existed in an environment that fluctuated from below to above wave base.

Lost Canyon Member, Silver Island Range (MPM localities 3208, 3209)

Colonial corals recovered from the Lost Canyon Member in the Silver Island Range include *Calapoecia anticostiensis, Agetolites budgei, Paleofavosites mccullochae, okulitchi* (?), sp. cf. P. capax, Cyathophylloides spp. A and B, *Catenipora workmanae,* and *Tollina* sp. Dasyclad algae are represented by the genera *Vermiporella, Rhabdoporella, Cyclocrinus* and *Mastopora* and specimens from the tribe Verticilloporeae (Johnson, 1982).

Colonial corals from the Ibex Member in the Northern Egan Range and from the Lost Canyon Member in the Silver Island Range occur in bioclastic sheets and lenses. These bioclastic beds alternate with a finer-grained burrow-mottled encrinite. The associated biofacies is interpreted as representing a high energy sedimentary regime, probably above wave base. Many of the colonial corals were not in growth position and were overturned and broken, indicating post-mortem transport. Solitary rugose corals are commonly found in the intervening burrowed units that alternate with the bioclastic sheets and lenses. The solitary rugose corals are commonly in growth position.

Lost Canyon Member, Northern Egan Range (MPM locality 3231)

Colonial corals recovered from the Lost Canyon Member in the Northern Egan Range include *Calapoecia anticostiensis, Paleofavosites poulseni, P. okulitchi,* ? *Billingsaria parvituba, Agetolites budgei, Saffordophyllum crenulatum, Catenipora* sp. cf. *C. foerstei, Catenipora sheehani, Palaeophyllum* sp. cf. *P. raduguini, P. gracile* and *humei*. Dasyclad algae are not common, but there are a few specimens of *Rhabdoporella* and *Mastorpora* and one specimen from the tribe Verticilloporeae (Johnson, 1982). The diverse colonial coral assemblage occur with abundant solitary Rugosa, stromatoporoids, brachiopods, and lesser numbers of gastropods. The fauna was recovered from a burrow-mottled encrinite. Most of the large body fossils, including colonial corals and stromatoporoids, were broken, whereas the smaller solitary Rugosa, gastropods, and brachiopods were intact. The fauna probably existed in a normal subtidal marine environment that was periodically affected by storms. These storms uprooted and fragmented many of the corals and stromatoporoids.

The largest corals found in the study area were from the Lost Canyon Member in the Northern Egan Range. *Palaeophyllum humei* is the largest colonial coral recovered in the present study, but is not complete and was probably transported.

Floride Member, Northern Egan Range (MPM locality 3229)

Colonial corals recovered from the Floride Member in the Northern Egan Range include *Calapoecia anticostiensis, Calapoecia* sp. cf. *C. coxi, Paleofavosties poulseni, P. mccullochae, P. okulitchi, P.* sp. cf. *P. transiens, P.* sp. cf. *P. capax,* ? *Billingsaria* *parvituba,* and *Nyctopora.* Dasyclad algae are abundant and include the genera *Vermiporella, Rhabdoporella, Cyclocrinus, Mastopora,* and specimens from the tribe Verticilloporeae (Johnson, 1982). The diverse dasyclad algae flora and colonial coral fauna occur with high and low spired gastropods, brachiopods, solitary rugose corals, stromatoporoids and a few nautiloids. The fauna lived in a normal marine environment at or below wave base. Many of the large colonial corals are in growth postion and were probably buried in situ. One large, unidentified whole favositid colony is 7 cm in diameter. Many of the smaller corals were overturned and may have been reworked before they were buried.

One specimen of ? *Billingsaria parvituba* is club-shaped and has corallites on all but one side of the coralla (Plate 4, Fig. 2). It probably initially encrusted on a club-shaped object.

The colonial corals from all localities are commonly fragmented and generally occur in bioclastic lenses and sheets. Dasyclad algae, stromatoporoids, disarticualted bivalves and brachiopods, and gastropods are also commonly fragmented. The large number of broken fossils reflects mechanical transport, probably by storms.

Colony Size — Eastern Great Basin whole coralla of *Calapoecia anticostiensis* are generally smaller and have smaller corallites than those reported elsewhere in the literature. They also display a horizontal growth habit with growth in the vertical plane reduced. No large specimens of *C. anticostiensis* were observed in the field. Other taxa, including *Paleofavosties poulseni,* the most common favositid, likewise have small colony diameters and have dominantly horizontal growth with a reduced vertical component when compared to published accounts of Late Ordovician colonial corals. In addition, the larger corals such as *Palaeophyllum humei* and *Catenipora workmanae* are predominantly horizontal and smaller in height than published accounts of these species, thus indicating a restriction in growth.

There are five plausible explanations for the small colony size and horizontal growth habits of eastern Great Basin colonial corals. These are: 1) the small coral colonies are from young populations, 2) the corals grew in response to high energy conditions, 3) the corals existed on the *western* edge of the North American paleocontinent, 4) the coral colonies were subjected to closely spaced storms, and 5) the coral colonies were affected by local salinity differentials existing on the carbonate ramp.

The small coralla may be the result of young populations which were subjected to closely spaced storms. Sedimentologic data fails to support this hypothesis. In addition, the fact that there is no variation between the four sample localities reduces the probability that all populations encountered were young. Also, corallite size is not dependent on the size of the colony in Eastern Great Basin colonial corals.

Reduced coralla size and predominance of horizontal growth over vertical growth may be the result of growth in shallow water high energy wave conditions. In a high energy environment, coralla may expand laterally as a buttress to the surf. Vertically growing corals would risk being toppled over. Lake (1981) suggested horizontal growth form in agitated waters for species of *Paleofavosites* and *Palaeophyllum* from mounds of the Upper Ordovician Ellis Bay Formation of Anticosti Island, Quebec, but he did not mention the size of the corals.

Small coralla may be associated with the paleogeography of the carbonate shelf in the Great Basin the Late Ordovician. Scotese and others (1979) show the positions of the paleocontinents during the Middle Ordovician (Llandelian-earliest Caradocian) and the Middle Silurian (Wenlockian). Using the Scotese and others (1979) paleogeographic reconstruction, the Late Ordovician shelf margin postulated for the study area is oriented north-south, with the shelf-to-basin transition oriented east to west (Carpenter, 1981; Pandolfi, 1982; Carpenter, Pandolfi and Sheehan, in press). Most prolific development of reef corals (the largest corals) and large coral taxa occurs today on the eastern edges of continents. This is due to the present day wind circulation which favors coral development on the eastern sides of continents (e.g., Florida Reef Tract, Great Barrier Reef, etc.). If we assume similar atmospheric circulation in the Ordovician equatorial latitudes as present day equatorial latitudes, the westward facing Eastern Great Basin shelf may not have been exposed to a favorable nutrient supply thus causing restricted growth of the colonial corals.

Lastly, reduced coralla size may be associated with local salinity differentials on the carbonate ramp at various times during the Late Ordovician. Regional analysis dealing with local microenvironments are needed to test this hypothesis.

Interaction of other organisms with the colonial corals. Several species of colonial corals commonly occur in association with other organisms. *Calapoecia anticostiensis* and *Paleofavosites poulseni,* the two most common Eastern Great Basin colonial corals, colonized a hard substrate composed of stromatoporoids, gastropods or brachiopods. *Calapoecia anticostiensis* occassionally displays a special relationship with the stromatoporoids. In a few specimens it is found encrusting a stromatoporoid with a layer of the stromatoporoid a few mm above it (Plate 1, fig. 2). The stromatoporoid may have already been dead and had been abraded forming a cavity in which the coral planulae settled. Alternatively, the coral planuale may have settled on the living stromatoporoid (or a dead portion) and later the coral was itself overgrown by the stromatoporoid.

Seventy-five percent of the specimens of *Agetolites budgei* grew completely around a crinoid stem (Plate 9, fig. 2). This suggest that a commensal relationship may have existed between these two organisms. The only occurrences of articulated crinoid stems are those preserved with *A. budgei.* The stems were apparently quickly disarticulated upon death. *Agetolites budgei* may have preferentially selected attachment to crinoid stems above the sediment-water interface in order to occupy an intermediate feeding position above the substratum between benthic filter-feeders and detritovores and filter-feeding organisms that occur well above the substrate, such as crinoids. *Agetolites budgei* also encrusted bivalves, stromatoporoids, and tabulate corals (Plate 18, below). The bivalves, stromatoporoids, and tabulate corals were probably elevated from the substratum thereby enabling the planulae to settle upon them.

The only complete colony of *Catenipora sheehani* used a favositid colony as its hard substrate (Plate 20, below).

Faunal Analysis

Introduction

The colonial coral fauna recovered from the Ely Springs Dolomite (Table 1) in the Eastern Great Basin provides a link in the "Arctic Ordovician" fauna (Teichert, 1937; Nelson, 1959, 1959b, 1963, 1975a, 1981; Bolton, 1977; Elias, 1981, 1982, 1983) between New Mexico and southern Manitoba. The Eastern Great Basin lies within the Red River-Stony Mountain faunal province which includes New Mexico and Texas, southern Manitoba, the Hudson Bay Lowlands, the Northwest Territories and the Canadian Arctic, Alaska, Greenland, Anticosti Island, Percé, Quebec, and

Maine (Foerste, 1929, 1932; Teichert, 1937; Flower, 1965, 1970; Bolton, 1977; Elias, 1982).

Table 1.

Distribution and Abundance of "Arctic Ordovician" Colonial Coral Specimens of the Ely Springs Dolomite in the Eastern Great Basin, Nevada and Utah.

Species	Ibex Member Northern Egan Range MPM locality 3227	Lost Canyon Member Silver Island Range MPM localities 3208, 3209	Lost Canyon Member Northern Egan Range MPM locality 3231	Floride Member Northern Egan Range MPM locality 3229
Calapoecia anticostiensis	2	1	3	38
Calapoecia sp. cf. *C. coxi*			2	4
Paleofavosites poulseni			2	63
Paleofavosites mccullochae			9	10
Paleofavosites okulitchi		1	1	4
Paleofavosites sp. cf. *P. transiens*				4
Paleofavosites sp. cf. *P. capax*		1		1
? *Billingsaria parvituba*			4	2?
Nyctopora sp.	2			13
Agetolites budgei		16	1	
Saffordophyllum crenulation			1	
Catenipora workmanae		6		
Catenipora sheehani			3	
Catenipora sp. cf. *C. foerstei*			2	
Tollina sp.		2		
Palaeophyllum humei			*	
Palaeophyllum gracile			*	
Palaeophyllum sp. cf. *P. raduguini*			*	
Cyathopylloides sp. A		1		
Cyathopylloides sp. B		1		
Total number of species — 20	2	8	13	9

**numerous groups of the corallites and coralla fragments*

Scotese and others (1979) have published geographic reconstructions of the positions of Paleozoic continents. The Middle Ordovician (Llandeilo-Caradoc) paleogeographic reconstruction shows Siberia well eastward of Laurentia and the "Arctic Ordovician" faunal belt. By Middle Silurian (Wenlock) Siberia was northeastward of the faunal belt. The similarity of the coral faunas of the Canadian Arctic region and northeastern Asia has been noted by Sokolov (1960). This similarity suggests that the Siberian plate may have migrated westward during the Late Ordovician.

Within the "Arctic Ordovician" fauna, two horizons have been distinguished: the "Red River Arctic Fauna" and the younger "Stony Mountain Arctic Fauna" (Nelson, 1959b). The problem of distinguishing the ages of the Red River and the Stony Mountain faunas has been difficult due to similarity of faunal constitutents. Nelson (1981) discussed this problem and reiterated that the faunas are temporarily very closely related. The present study has little to add to the problem of differentiating the ages of the two faunas other than to note that the collections made in the Eastern Great Basin were from strata located close to the Ordovician/Silurian system boundary. There are, however, some interesting trends in the distribution of colonial corals through the stratigraphic column of the Ely Springs Dolomite that may aid future workers.

Table 1 shows the distribution and abundance of colonial corals at the four sampling localities which include the Ibex, Lost Canyon and Floride Members of the Ely Springs Dolomite. Collections from MPM localities 3229, 3231 and 3208-3209 were recovered from samples of fossiliferous rock approximately equal in weight. The weight of the sample of fossiliferous rock from MPM locality 3227 was considerably smaller than the others.

Calapoecia anticostiensis, long regarded as a characteristic Upper Ordovician coral (Cox, 1936; Bassler, 1950; Flower, 1961), is very abundant in the uppermost Floride Member but relatively rare in the underlying Lost Canyon and Ibex Members. This species ranges throughout the Ely Srpings Dolomite. *Paleofavosites poulseni* is extremely abundant in the Floride Member and rare elsewhere (Table 1). The presence of these two species in large numbers may indicate either a late Late Ordovician age in the Great Basin, or an environment which was well suited for these two species.

The Lost Canyon Member is characterized by the presence of ? *Billingsaria parvituba,* a species that has been reported from the late Middle Ordovician Bad Cache Rapids Formation of the Melville Peninsula (Bolton, 1977) and from the Lourdes Formation of western Newfoundland (Copeland and Bolton, 1977). *Agetolites budgei* is abundant in the Lost Canyon Member and absent from the overlying Floride Member. All described specimens of the halysitid corals and all species of *Palaeophyllum* are found in the Lost Canyon Member.

The difference between the coral constituents of the members of the Ely Springs Dolomite may aid future work in delineating older and younger "Arctic Ordovician" faunas. It must be noted, however, that the coral assemblages reported from the Eastern Great Basin generally occur in bioclastic lenses and sheets and may have been transported. The various coral constituents may only reflect differing facies which represent various environmental conditions. Therefore, although samples from the Lost Canyon and Floride Members were taken from similar lithologies (i.e., bioclastic beds), they may have been transported from various environments and the distribution of the colonial corals may reflect spatial variation rather than temporal variation. In addition, the possible presence of the Middle Ordovician *Bil-*

lingsaria parvituba in the Late Ordovician of the eastern Great Basin may be due to temporal mixing, but this seems unlikely since the entire Late Ordovician Ely Springs Dolomite is underlain by the Middle Ordovician Eureka Quartzite which does not contain tabulate corals. The apparent temporal trends need to be corroborated with related reports elsewhere.

There are 20 species of colonial corals collected from the Ely Springs Dolomite in the Eastern Great Basin. There are 9 species from the Floride Member, 18 from the Lost Canyon Member and 2 from the Ibex Member. Seven species are common to the Lost Canyon and Floride Members, 1 species is common to all members and 2 species are common to the Ibex and Floride Members (Table 1).

New Mexico, Arizona, and Texas

Flower (1961) reported 27 species of colonial corals from the Upper Ordovician Montoya Group of the southwestern United States. Of the 20 species from the Eastern Great Basin, 5 species and two genera with unidentified species are present in the Montoya Group. These are *Catenipora workmanae, Calapoecia anticostiensis, C.* sp. cf. *C. Coxi, Paleofavosites mccullochae, Palaeophyllum gracile, Tollina* and *Nyctopora*.

Flower (1970) dated the Second Value Formation as early Richmond that may include late Maysville, and the stratigraphically higher Cutter Formation as late Richmond. Of the 17 colonial coral species Flower (1961) reported from the Second Value Formation, only *Calapoecia anticostiensis, Catenipora workmanae* and *Palaeophyllum gracile* are common to the Lost Canyon Member of the Ely Springs Dolomite. In the eastern Great Basin, *Calapoeica anticostiensis* ranges throughout the Ely Springs. Only one specimen of *C. anticostiensis* was found in the Lost Canyon Member. Of the 5 species Flower (1961) reported from the Cutter Formation, *Paleofavosites mccullochae* and *Calapoecia* sp. cf. *C. coxi* are common to the Floride Member of the Ely Springs.

Barnes, Cloud and Duncan (1953) dated the Burnam as Richmondian based on the presence of the colonial corals *Calapoecia, Catenipora* and *Cyathophylloides* and the solitary coral *Streptalasma rusticum*. Duncan *in* Barnes, Cloud and Duncan (1953) reported the colonial genera *Saffordophyllum, Nyctopora, Cyathophylloides, Calapoecia* and *Catenipora* from the Burnam Limestone of Central Texas. All these genera are common to the Ely Springs Dolomite.

Manitoba

Stearn (1956) reported 13 species of colonial corals from the Ordovician Stony Mountain and Stonewall Formations and the Silurian Interlake Group of southern Manitoba. Four favositid species are common to the Ely Springs Dolomite. These are *Paleofavosites poulseni, P.* sp. cf. *P. capax, P. okultichi* and *P.* sp. cf. *P. transiens*. Stearn (1956) noted that *P. poulseni* is characteristic of both the Ordovician Stonewall and directly overlying Silurian Fisher Branch Formations. *Paleofavosites poulseni* is also the characteristic favositid of the Floride Member of the Ely Springs Dolomite in the Northern Egan Range.

Hudson Bay Lowland

Nelson (1963) reported 30 species of colonial corals from the Churchill River Group of the Northern Hudson Bay Lowland. Five species and three aditional genera from the Churchill River Group are also found in the Ely Springs Dolomite. These are the species *Palaeophyllum* sp. cf. *P. raduguini, Calapoecia anticostiensis, Paleofavosites okulitchi, P.* sp. cf. *P. capax, Catenipora foerstei* and the genera *Tollina, Nyctopora,* and *Saffordophyllum.*

Northwest Territories

Bolton (1977) reported 12 species of "Arctic Ordovician" colonial corals from the Middle Ordovician Bad Cache Rapids Formation of the Melville Peninsula. One of these species, ? *Billingsaria parvituba,* is also found in the Lost Canyon Member and questionably found in the Floride Member of the Ely Springs Dolomite. In the same paper, Bolton (1977) reported *Paleofavosites okulitchi* from an Upper Ordovician unnamed reefal unit in the Melville Peninsula. *Paleofavosites okulitchi* occurs in both the Lost Canyon and Floride Members of the Ely Springs Dolomite.

Roy (1941) reported an "Arctic Ordovician" fauna from Baffinland which included *Calapoecia anticostiensis,* a species that ranges throughout the Ely Springs Dolomite.

Bolton and Nowlan (1979) described a Late Ordovician fossil assemblage from an outlier on the Canadian Shield in the District of Keewatin which included 10 species of colonial corals. Most of the coral species are characteristic of the Churchill River Group of the Hudson Bay area (Bolton and Nowlan, 1979). Corals from the Eastern Great Basin common to the District of Keewatin are the species *Palaeophyllum raduguini,* and the genera *Nyctopora, Saffordophyllum, Calapoecia, Paleofavosites* and *Tollina.*

Dixon (1975) reported an "Arctic Ordovician" fauna that included 28 species of colonial corals from the upper part of the Lang River Formation on Somerset Island and the lower part of the Allen Bay Formation on Prince of Wales Island. Species common to Dixon's "Arctic Ordovician" fauna and the Ely Springs Dolomite are *Calapoecia anticostiensis, Paleofavosites poulseni, P. okulitchi* and *Palaeophyllum raduguini,* while additional shared genera include *Catenipora* and *Tollina.*

Workum, Bolton and Barnes (1976) reported 6 species of colonial corals from strata which they dated as early Upper (Maysvillian) Ordovician from Akpatok Island in the District of Franklin. Eastern Great Basin colonial corals which also occur at Akpatok Island include the species *Calapoecia* sp. cf. *C. coxi,* and the additional genera *Palaeophyllum* and *Catenipora.*

Teichert (1937) described 13 species of colonial corals from Arctic Canada, of which *Paleofavosties poulseni* and *Catenipora* are found in the Eastern Great Basin.

Eastern Canada

Twenhofel (1928) and Bolton (1981) have reported colonial corals from the Late Ordovician Ellis Bay Formation from Anticosti Island, Quebec. Species which are also present in the Ely Springs Dolomite are *Calapoecia anticostiensis,* and *Paleofavosites* sp. cf. *P. capax* and additional shared genera are *Catenipora* and *Cyathophylloides.*

Bolton (1979, 1980) reported colonial corals from the Honorat Group and the White Head Formation from Gaspé Peninsula. Eastern Great Basin corals which also appear in the Honorat Group are *C. anticostiensis, Saffordophyllum,* and *Paleofavosites.* Eastern Great Basin corals which are also present in the White Head Formation are *Calapoecia anticostiensis, Paleofavosites* sp. cf. *P. capax,* and *Catenipora.*

Copeland and Bolton (1977) reported 2 species of colonial corals from the Middle Ordovician Lourdes Formation in western Newfoundland. *Billingsaria parvituba* possibly occurs in the Ely Springs Dolomite and does occur in the Lourdes Formation.

Sinclair (1961) described *Palaeophyllum humei* from the Liskeard Formation (Ordovician-Trentonian) near Lake Timiskaning, Ontario. *Palaeophyllum humei* occurs in the Lost Canyon Member of the Ely Springs Dolomite in the Eastern Great Basin.

North-Central Kentucky

Browne (1965) reported ten species of Upper Cincinnatian colonial corals from north-central Kentucky. Kentucky colonial corals which are also found in the Eastern Great Basin are *Calapoecia* sp. cf. *C. coxi, Saffordopyllum,* and *Cyathophylloides.*

Alaska

Oliver (*in* Oliver and others 1975) reported *Agetolites (Agetolites budgei?), Catenipora, Cyathophylloides, Paleofavosites, Tollina, Saffordophyllum* and *Calapoecia* from Ordovician strata of Alaska. Definitive faunal analysis concerning provincial affinities must await specific determinations of the colonial corals. It seems clear from the genera present, however, that Alaska will be included as part of the "Arctic Ordovician" faunal belt.

Greenland

Scrutton (1975) reported *Palaeophyllum, Cyathophylloides, Catenipora, Paleofavosites* and *Calapoecia* sp. cf. *C. coxi* from the Late Ordovician Centrum Formation of northeastern Greenland. He suggested that the Greenland fauna is more closely allied with the North American fauna than with the European fauna.

Asia

The discovery of *Agetolites* in the North American Ely Springs Dolomite indicates faunal affinities with the Asian continent. *Agetolites* has been reported from China (Lin, 1960, 1963; Kim, 1965, 1966; Kim and Apekin, 1978) and the Siberian Platform (Sokolov, 1955, 1960). Other Late Ordovician Siberian colonial corals (Sokolov, 1960) that also occur in the Eastern Great Basin are *Palaeophyllum* sp. cf. *P. raduguini, Calapeocia anticostiensis, Tollina, Billingsaria, Paleofavosites, Catenipora, Nyctopora* and *Saffordophyllum. Palaeophyllum raduguini* has been reported from western Siberia (Raduguin, 1936) and the Sayano-Altai Mountains of Siberia (Cherepnina, 1960). Sokolov (1960) noted that the Late Ordovician coral faunas of Northern Asia are most nearly related to those of the Canadian Arctic region (i.e. "Arctic Ordovician" fauna). He further noted that the Baltic region stands apart, a suggestion corroborated by the paleogeographic reconstructions of Scotese and others (1979). The similarity of coral faunas between Northern Asia and the "Arctic Ordovician" faunal belt suggests that the Siberian platform lay within the equatorial carbonate belt close to Laurentia during Late Ordovician time.

Preservation

Colonial corals from the Ely Springs Dolomite in the Eastern Great Basin are either dolomitized or silicified. Many specimens collected were only partly silicified (the other portions dolomitized) and much of the detail of tabulae, septa, and initial ontogenetic growth stages was lost. Where silicification is complete, the fossil is usually well preserved, but original microstructure is always lost.

Many Late Ordovician genera, including *Calapoecia, Nyctopora, Trabeculites,* and *Saffordophyllum* are differentiated, in part, by wall microstructure. Preservation of wall microstructure in colonial corals from the Eastern Great Basin is poor to non-existent, presumably due to recrystallization during the silicification process. It is assumed that since the Ely Springs Dolomite consistently reflects paleoenvironments on a normal marine shallow carbonate ramp, dolomitization was post-depositional (see Carpenter, 1981 and Carpenter, Pandolfi and Sheehan, in press, for extended discussion). Silicification probably occurred before dolomitization because the dolomitized specimens do not show the distinctness of structures that is typical of the silicified specimens.

The colonial corals studied are deposited in the Department of Geology at the Milwaukee Public Museum, abbreviated MPM.

Biometrical Methods

Biometrical data and methods for Late Ordovician colonial corals vary among workers. Methods used for one genus may not be appropriate for another. In a few instances biometrical methods used in the description of Late Ordovician colonial coral species are inconsistent from worker to worker. Certain biometrical methods for some species are inappropriate and do not lend themselves to verifiable specific comparisons because they are dependent on ecophenotypic variability rather than genetic variability. The difference between the genome and the environmental expression of those genes is seldom apparent. There are times, however, when these differences can be inferred (see *Calapeocia*).

The diameter of the corallite, as used in this study, refers to the greatest distance from the middle of the wall on one side of the corallite to the middle of the wall on the other side of the corallite. In the halysitids, which have a thickened corallite common wall, the *corallite* diameter (length) is measured from the middle of the common wall on one end of the corallite to the middle of the common wall on the opposite end of the corallite. Where corallites are free, as in the phacelo-ceroid *Palaeophyllum,* the corallite diameter is measured from the outside of the wall on one side of the corallite to the outside of the wall on the opposite side of the corallite. Corallite diameter was used for specific determination in *Palaeophyllum* instead of the tabularia diameter because the latter may become obscure and imprecise due to the development of the septa and the septal stereozone.

Measurement of the diameter or length of the *tabularia* as used in this study refers to the greatest distance between the inner wall on one side of the corallite to the inner wall on the opposite side of the corallite. No part of the corallite wall is used in the measurement of the diameter of the tabularia. Diameter of the tabularia is the parameter which defines the actual physical size of the polyp in colonial corals, and as such, may be more reliable in specific determinations than corallite diameter (see *Calapoecia* for example).

Mural pores occur in two places in the corallites of *Paleofavosites*. Some mural pores occur in the face of the corallite walls between the corners of the corallite. These are referred to as wall pores. Other mural pores occur at the intersection of the walls of two or more adjacent corallites. These mural pores occur in the corallite corners or angles, where the walls of adjacent corallites intersect and are referred to either as corner pores or as angle pores. Sometimes the wall of one corallite intersects another corallite at the middle of the wall, and not at a corallite corner. Where this situation arises, a vertical row of pores coinciding with the trace of the intersection is commonly present. These are also referred to as corner pores, because they occur at the intersection of the walls of corallites. A section cut through the corallite perpendicular to the trace of this intersection may suggest the presence of wall pores, when they are, in reality, corner pores occurring at the intersection of two adjacent corallites.

Systematic Paleontology

In all cases the classification set forth by Hill (1981) was adopted. Hill (1981) provided a reference point from which consistent comparisons may be made should future work based on a larger data base suggest alternative classification schemes. In this vein, I have merely followed her classification without evaluating any alternate hypothetical classification schemes.

Phylum COELENTERATA Frey and Leuckart, 1847
Class ANTHOZOA Ehrenberg, 1843
Subclass TABULATA Milne-Edwards and Haime, 1850
Order SARCINULIDA Sokolov, 1950
Family SYRINGOPHYLLIDAE Roemer, 1883
Subfamily CALAPOECINAE Radugin, 1938
Genus *CALAPOECIA* Billings, 1865
Genolectotype: *Calapoecia anticostiensis* Billings, 1865

1865 *Calapoecia* Billings, Can. Nat. and Geol., n. ser., v. 2, p. 425.
1915 *Calapeocia* Bassler, U.S. Nat. Mus., Bull. 92, v. 1, p. 154.
1936 *Calapoecia* Cox, Nat. Mus. Can., Bull. 80, Geol. Ser. 53, p. 2ff.
1950 *Calapoecia* Bassler, Geol. Soc. Amer., Mem. 44, p. 275.

Calapoecia is an enigmatic tabulate coral which Cox (1936) regards as an aberrant form. Cox (1936) proposed a radical revision of the genus, reducing it to one species. Bassler (1950) recognized five described species, *Calapoecia canadensis, C. huronensis, C. ungava, C. anticostiensis,* and *C. arctica* and, in addition, described a new species, *C. coxi.* Nelson (1963) and Flower (1961) gave detailed accounts of the distinctions between the species. Flower (1961) eloquently refuted the monospecific concept of Cox (1936) and called for another comprehensive revision of the genus, although he did not attempt this revision himself. The present author agrees with Flower (1961) in recognizing more than one species of *Calapoecia* but is in doubt over the taxonomic validity of *C. ungava,* a species originally defined as sharing characteristics of both *C. canadensis* var. *anticostiensis* (*C. anticostiensis*) and *C. canadensis,* in which ". . . there are coralla that show in different parts the structure of both of these." (Cox, 1936, p. 12). Bassler (1950) states only that *C. canadensis* var. *ungava* Cox 1938 ". . . seems worthy of specific rank, but at any rate the corallites now become separated by spaces occupied by a coenenchyma." (Bassler, 1950, p. 276).

Bassler (1950) characterizes *C. canadensis* as having polygonal corallites and *C. anticostiensis* as having circular corallites. Most published accounts of *C. ungava* illustrate specimens with predominantly circular corallites, similar if not identical to those of *C. anticostiensis* (see Flower 1961, Pl. 33, fig. 6; Bolton & Nowlan, 1979, Pl. 5, fig. 3; Nelson 1963, Pl. 10, fig. 3). Therefore, the problem lies in differentiating between the two species, *C. ungava* and *C. anticostiensis,* or in deciding, if, in fact there is any real difference between the two "species." Flower (1961) attempts a definitive description of the two species, but notes more similarity than difference. For example, Flower (1961) notes:

Calapeocia ungava
corallites well rounded
corallite diameter: 3-3.5 mm and 3.5-4 mm
corallite spacing: 3.5-4.5 mm and rarely 5.0 mm
7-8 wall pores/5 mm
horizontal wall elements regular
tabulae irregular and quite commonly adjacent ones fused
9-11 tabulae/5 mm

Calapoecia anticostiensis
corallites well rounded
up to 3 mm
corallite spacing: up to 5.5 mm
7-9 wall pores/5 mm
horizontal wall elements regular
tabulae irregular, extensively joined and anastomising
10-14 tabulae/5 mm

Perhaps the greatest difference in the two species descriptions given by Flower (1961) is the spacing value between the corallites, commonly referred to in the literature as "center to center spacing." However, Flower (1961) refers a specimen to *Calapoecia* sp. cf. *anticostiensis* from the Second Value Formation of New Mexico that shows ". . . slightly broader coenenchyme than is indicated by other material, but it is not evident that this alone would justify its recognition as a distinct species." (Flower, 1961, p. 67). Center to center spacing values of *Calapoecia anticostiensis* from the Late Ordovician of the Eastern Great Basin average 2.4-2.5 mm. This value is well below that reported by Flower (1961) for *C. anticostiensis* from Akpatok Island and from the Selkirk Limestone of Manitoba, in which the center to center spacing may be as large as 5.5 mm. Flower (1961) refers to the corallites of these specimens as well separated. Corallites of the Eastern Great Basin specimens may also be well separated, with center to center spacing values of up to 4.4 mm; however, the spacing is commonly only 2.5 mm and some of the circular corallites are in contact, a feature characteristic of *C. canadensis*.

Specimens referred to *C. anticostiensis* from the Eastern Great Basin display the small corallite diameters typical of *C. anticostiensis,* but also display corallites that may be interpreted as closely spaced, a characteristic of *C. ungava*. Other characteristics of the two species, as described by Flower (1961) are very similar.

Any discussion of spacing of corallites must take into account the diameter of the tabularia. It is within the tabularia that the polyp lived and where the organism maintained communication inside the corallum through its porous wall structure. The biologically functional diameter is that of the polyp since this was the living and feeding portion of the colony. Therefore, measurement of the tabularia diameter is most appropriate. *Calapoecia anticostiensis* often exhibits rims occurring at the perimeter of the tabularia that extend upward. The rims represent the upward extension of the corallite wall. The thickness of the rims (and consequently of the corallite wall) display both intra- and intercolony variation. Corallites with the same tabularia diameter will not necessarily display the same outer corallite wall diameter due to the variation of the thickness of the corallite wall. Such variation strongly reduces the utility of measurement of corallite diameters from the outer walls of the corallites for specific determination. It is therefore suggested that future workers use tabularia diameter as a basis for specific determination in *Calapoecia* instead of corallite diameter as used by previous workers (Flower, 1961; Bolton, 1980, 1981).

Both *Calapoecia anticostensis* and *ungava* have a wide distribution and considerable morphologic variation is reported. *Calapoecia anticostiensis* has been reported by Cox (1936), Hill (1959), Flower (1961), Nelson (1963), Copper (1978) and Bolton (1980, 1981). *Calapoecia ungava* has been reported by Cox (1936), Flower (1961), Nelson (1963), Jull (1976), and Bolton and Nowlan (1979). All accounts of *C. anticostiensis* report circular corallites, commonly with 20 septa. Cox (1936) reported 10-12 tabulae/5 mm in the holotype; Bolton reported colonies of *C. anticostiensis* from the Honorat Group of Gaspé Peninsula with a range of from 7-12 and from 8-10 tabulae in 5 mm. The Honorat specimens have circular corallites 2.4-3.0 mm in diameter (corallite diameter), but, near the base of one small colony, the corallite diameter is 1.5-2.0 mm. Corallites from Plate 2.1 of Bolton (1980) were measured by the present author to determine the tabularia diameter. Tabularia diameters in Fig. 4 (Bolton, 1980) are 2.4, 2.4, 2.0, 1.8, and 1.8 mm; in Fig. 3, 1.1, 1.4, 1.6, and 1.8 mm; and in Fig. 6, 2.4 mm. These values of tabularia diameter for *C. anticostiensis* from Gaspé are only slightly higher than those of the specimens from the Eastern Great Basin. The figures of *C. anticostiensis* from Bolton (1980) clearly show the variability of thickness of the corallite wall with no apparent link to tabularia diameter. In the same paper, Bolton (1980) reported two distinct corallite diameters from specimens of *C. anticostiensis* from the White Head Formation. One group of coralla ranges from 2.2-2.5 mm in corallite diameter, the other from 2.5-3.0 mm in corallite diameter. The diameter of the tabularia for the first group of corallites (corallite diameter ranging from 2.2-2.5 mm) illustrated in Bolton (1980) on Plate 2.3 gives values of 2.2, 2.0, and 1.8 mm in Fig. 4, and 2.0, 2.0, and 2.0 mm in Fig. 7. These values are slightly larger than those of *C. anticostiensis* from the Eastern Great Basin.

Cox (1936) reported that the holotype of *C. anticostiensis* has corallites with a maximum diameter of 2.5 mm. Tabularia diameters of *C. anticostiensis* from the Late Ordovician of the Eastern Great Basin average 1.5 mm. Flower (1961) did not give any values for the diameter of corallites in *C. anticostiensis* from the Second Value Formation of New Mexico. Close scrutiny of the specimen of *C.* sp. cf. *anticostiensis* figured by Flower (1961, Plate 34, Figs. 1-6, 10, 14, and 15) gives the same average diameter of the tabularia, 1.5 mm, as that found in Eastern Great Basin forms of *C. anticostiensis.*

Nelson (1963) noted two distinct kinds of coralla of *C. anticostiensis* from the Portage Chute Formation, the Surprise Creek Formation, the Caution Creek Formation and the Chasm Creek Formation of the northern Hudson Bay Lowlands. The first type, which he considers typical of *C. anticostiensis,* has corallites with a diameter varying between 2.0 and 3.0 mm. The second type has much smaller corallites that average 1.5 mm in diameter. He reported that corallites of the second type are surrounded by relatively wide zones of coenenchyme. Examination of illustrations in Nelson (1963) suggest that he measured the tabularia diameter.

In all published accounts of *C. anticostiensis,* tabulae are described as irregular and anastomising. There is also wide variation in spacing of the tabulae.

From the foregoing discussion, it is clear that there is much variation in accounts of *C. anticostiensis,* especially in tabularia diameter. The variation in tabularia diameter further insures variation of the specific character of center to center spacing, for center to center spacing is directly related not only to the thickness of the coenenchyme plus the wall, but also diameter. Fig. 3 illustrates this concept. Fig. 3 shows two tabularia 3.0 mm in diameter each with corallite wall thickness of .25 mm separated by 1.0 mm of coenenchyme. The center to center spacing value is 1.5 mm + .25 mm + 1.0 mm + .25 mm + 1.5 mm or 4.5 mm. Fig. 3 shows two tabularia 1.5 mm in diameter also separated by 1.0 mm of coenenchyme also with corallite wall thickness of .25 mm. The center to center spacing value is .75 mm + .25 mm + 1.0 mm + .75 mm + .25 mm or 3.0 mm. This means that even though the two sets of corallites are equally spaced within their respective coralla, the center to center spacing values of the two coralla are significantly different. The center to center spacing value, in attempting to define a specific character of the organism, is assumed to be a measure of the density and distribution of the corallites within the coralla. But coralla with the same distribution of corallites with corallites of different mean diameters will display different center to center spacing values.

Bolton (1980) reports center to center spacing values of from 3.0-4.0 mm in White Head specimens of *C. anticostiensis* with diameters between 2.2 and 2.5 mm and spacing values for 4.0-5.0 mm in corallites 2.5-3.0 mm in diameter. It is clear that by definition, larger corallites will yield larger center to center spacing values than smaller corallites.

It is suggested that measurement of center to center spacing be replaced by measurement of the width of the coenenchyme plus the two corallite walls between two adjacent tabularia (t_c). When discussing species as variable as *C. anticostiensis,* it becomes clear that the mean tabularia diameter is not sufficent and the center to center spacing value, in its dependence on the corallite diameter, is not reliable in differentiating species, and a reliable and independent measurement of corallite distribution within the corallum must also be used. The new biometric parameter, t_c, provides this reliable measurement of the corallite distribution within the corallum, since it is independent of corallite size.

Illustrations of *Calapoecia ungava* from the District of Keewatin (Bolton and Nowlan, 1979) reveal that the only difference between *C. ungava* of this area and *C. anticostiensis* from the Eastern Great Basin is that *C. ungava* has larger tabularia and, as a direct consequence, larger center to center spacing values. Jull (1976) studied specimens of *C. ungava* from the Credit River and reported tabularia diameters from 1.8-2.0 mm. These diameters are not much larger than those of *C. anticostiensis* from the Eastern Great Basin (1.5 mm). Jull (1976) reported that the coenenchyme was usually less than 1.0 mm in width between the corallite walls. This figure may be somewhat smaller than the t_c value because it does not include the width of the corallite walls. Again, there is minimal difference between the Credit River *C. ungava* and the Eastern Great Basin *C. anticostiensis*.

There is considerable similarity between published accounts of *C. anticostiensis* and *C. ungava*. This variability is due, in part, to the ambiguous measurements that have traditionally been used in describing *Calapoecia*. Future workers are urged to use the diameter of the tabularia and the coenenchyme plus wall thickness (t_c) for biometrical analysis of *Calapoecia*.

Calapoecia ungava may prove to be a variation of *C. anticostiensis*. The types of these two species need to be compared before their relationship can be properly understood.

Calapoecia anticostiensis **Billings, 1865**

Pl. 1, figs. 1, 2; Pl. 2, fig. 1; Pl. 18, fig. 1

1865 *Calapoecia anticostiensis* Billings, Can. Nat. and Geol., n. ser., v. 2, p. 426.

1936 *Calapoecia canadensis* var. *anticostiensis* (Billings). Cox, Nat. Mus. Can., Bull. 80, Geol. Ser. 53, p. 12, Pl. 1, fig. 6; Pl. 3, fig. 1a-c, 3d, 5a-c, 6, 7 (includes synonomy list).

1941 *Calapoecia canadensis var. anticostiensis* (Billings). Roy, Field Mus. Nat. History, Geol. Mem., v. 2, p. 74, figs. 38a-d.

1950 *Calapoecia anticostiensis* Billings. Bassler, Geol. Soc. Amer., Mem. 44, p. 276, Pl. 20, figs. 9, 10.

1959 *Calapoecia* sp. Hill, New Mexico Bur. Mines, Bull. 64, p. 15, Pl. 2, fig. 9.

1961 *Calapoecia* sp. cf. *anticostiensis* Billings. Flower, New Mexico Bur. Mines, Mem. 7, Pl. 1, p. 67-8, Pl. 34, figs. 1-6, 10, 14, 15.

1963 *Calapoecia anticostiensis* Billings. nelson, Geol. Soc. Amer., Mem. 90, p. 48-9, Pl. 8, fig. 5, Pl. 10, fig. 4.

1976 *Calapoecia anticostiensis* Billings. Workum, Bolton, and Barnes, Can. J. Earth Sci., v. 13, n. 1, p. 169-170, Pl. 2, figs. 5, 6.

1979 *Calapoecia anticostiensis* Billings. Bolton and Nowlan, Geol. Surv. Can., Bull. 321, p. 10, Pl. 5, figs. 5, 8 (holotype).

1980 *Calapoecia anticostiensis* Billings. Bolton, Current Research, Pt. C, Geol. Surv. Can., Paper 80-1C, p. 13, 14, 18, Pl. 2.1, figs. 3, 4, 5, 6; Pl. 2.3, figs. 4, 5, 7, 8, 9.

1981 *Calapoecia anticostiensis* Billings. Bolton, IUGS Subcommittee on Silurian Stratigraphy, Field Meeting, Anticosti-Gaspé, Quebec, U. II, Strat. and Paleo., p. 110, Pl. I, figs. 1-3.

Diagnosis — Tabularia have a mean diameter of 1.5 mm. Coenenchyme plus wall thickness (t_c) is commonly between 1.0 and 2.0 mm. There are 20-23 septa per corallite. Tabulae are irregular and anastomising. Mean center to center spacing is 2.6 mm.

Description — Coralla are usually fragmented, but whole specimens are very small, commonly only up to 3.0 cm in the longest dimension with a height of 2.0 cm or less. Coralla are massive or encrusting. All specimens observed were silicified, and consequently both tabulae and septa are poorly preserved. Intra-colony variation is as common as inter-colony variation. Tabularium diameter is small and ranges from 0.9-2.2 mm. A diameter between 1.3 and 1.7 mm is most common and the mean tabularia diameter is 1.5 mm.

Rims are prominent extensions of the corallite walls and may rise as much as 3.0 mm above the surface of the corallum, although most rims rise only 1.0 mm or less above the corallum surface.

Corallite walls are porous and are typical of the genus. The pores in the walls are circular, and have a maximum diameter of 0.2 mm. Tabulae are not preserved well in the specimens but where they do occur are domed and anastomising. T_c values range fro 0.33-2.57 mm, but commonly range from 1.0-2.0 mm. Mean t_c value is 1.2 mm. There is a loose correlation between increased development of corallite rims with increasing distance between corallites. Coralla with well developed rims have t_c values greater than coralla whose corallites show little or no rim development. Protection afforded by closely spaced corallites may have offset the functional advantage of the rims when the corallites are further apart. The relationship also holds true within colonies, with widely separated corallites having rims of greater height than corallites that are close together. Some corallites were observed to be in contact with one another. Septa are not well preserved. Where septa do occur there are from 20-23 per corallite. Center to center spacing values, included herein only as a basis of comparison with the previous literature, have a mean of 2.6 mm and range from 1.4 to 5.1 mm.

Discussion — Eastern Great Basin specimens of *Calapoecia anticostiensis* are set apart from other species of *Calapoecia* by 1) the large coenenchymal plus wall thickness (t_c), 2) the raised rims of the corallites above the surface of the coralla and 3) the small diameter of the tabularia. Eastern Great Basin specimens are most similar to those from the Northern Hudson Bay Lowland reported by Nelson (1963) in which mean tabularia diameter is 1.5 mm. Flower (1961) illustrated a specimen *C.* cf. *C. anticostiensis* from New Mexico that closely resembles *C. anticostiensis* from the Eastern Great Basin.

Calapoecia canadensis has polygonal corallites that are in contact and is easily distinguished from *C. anticostiensis*. Similarly, *C. coxi* has polygonal corallites and thick, wedge-shaped septa that are arranged back to back in adjacent corallites.

Material — Forty-three specimens representing as many coralla were collected and examined in the present study.

Figured Specimens — MPM 27785, 27786, 27788, and 27827.

Occurrence — MPM localities 3227, 3228, 3231 and 3209.

Calapoecia **sp. cf.** ***C. coxi*** **Bassler, 1961**

Pl. 1, fig. 3; Pl. 2, fig. 2

1936 *Calapoecia canadensis* Cox, Canada Geol. Surv., Bull. 80, p. 7, Pl. 2, fig. 2a-b.

1950 *Calapoecia coxi* Bassler, Geol. Soc. Amer., Mem. 44, p. 276, Pl. 20, figs. 5-6, Pl. 17, fig. 20.

1961 *Calapoecia coxi* Bassler. Flower, New Mexico Bur. Mines, Mem. 7, p. 68-9, Pl. 34, figs. 7-9, 11, 13.

1965 *Calapoecia* cf. *C. coxi* Bassler. Browne, Jour. Paleo., v. 39, p. 1185, Pl. 147, figs. 2a-b, Pl. 152, fig. 3.

1976 *Calapoecia coxi* Bassler. Workum, Bolton and Barnes, Can. J. Earth Sci., v. 13, N. 1, p. 168, Pl. 2, figs. 1-3, 8, 9.

The collections from the Ely Springs Dolomite contain four specimens of *Calapoecia* in which there is little or no coenenchyme and in which there are thickened corallite walls. Corallite walls show the porous structure that is typical of the genus. Tabularia diameters range from 1.1-2.7 mm. Combined mean tabularium diameter for all four colonies is 1.6 mm with a range of 1.4-2.0 mm. Corallites are subpolygonal to polygonal. Septa are short, thick and wedge-shaped. They number 20 per corallite and commonly point upward. Inter-tabularia distance is composed of two adjacent corallite walls which coelesce, and there appears to be little or no coenenchyme. Mean t_c value is 0.8 mm. Tabulae are not preserved on any of the Eastern Great Basin forms. Mean center to center spacing value for all four colonies is 2.8 mm with a range of 2.5-3.2 mm.

Two specimens are unusually large with an encrusting growth form. The colonies are club-shaped, and the encrusted material has not been preserved. All colonies are silicified and none were suitable for sectioning.

Discussion — The Eastern Great Basin specimens are tentatively assigned to *coxi* because of the characteristic wedge-shaped septa of this species. Eastern Great Basin forms have tabularia with smaller diameters than those from other regions, and consequently they have a lower center to center spacing value. The specimens are differentiated from *C. anticostiensis* from the same locality on the basis of septal geometry, the lack of a well developed coenenchyme, and predominance of polygonal corallites.

Material — Four specimens representing as many coralla were collected and examined in the present study.

Figures Specimen — MPM 27787.

Occurrence — MPM locality 3229.

Subfamily LYOPORINAE Kiaer, 1930

Genus *NYCTOPORA* Nicholson, 1879

Type Species: *Nyctopora billingsii* Nicholson, 1879

***Nyctopora* sp.**

Pl. 3, figs. 1, 2; Pl. 4, figs. 1, 2

Nyctopora was recovered from two localities. It is extremely poorly preserved and represented by 15 small fragments. Four of the specimens show vertical rows of mural pores, and their generic assignment is questionable. Other specimens have *Nyctopora*-like septa; however, quantitative measurement is precluded by poor preservation. Tabularia diameter, the only parameter that can be reliably measured in this material, varies from 0.8 to 2.0 mm. It is very likely that more than one species is represented in the Eastern Great Basin, but species differentiation and taxonomic assignment must await either better preserved material or substantially increased numbers of specimens. Mention of *Nyctopora* in this paper is for the purpose of a complete faunal list from the study area.

Figured Specimens — MPM 27790 and 27791.

Occurrence — MPM localities 3227 and 3229.

Family BILLINGSARIIDAE Okulitch, 1936

Subfamily BILLINGSARIIDAE Okulitch, 1936

Genus *BILLINGSARIA* Okulitch, 1936

Type Species: *Columnaria P.* Billings, 1859

***?Billingsaria parvituba* (Troedsson), 1928**

Pl. 4, figs. 1, 2

1928 *Columnaria parvituba* Troedsson, Medd. om Gronland, v. 72, pt. 1, no. 1, p. 114, Pl. 28, fig. 6; Pl. 29, fig. 4.

1950 *Nyctopora (? Billingsaria) parvituba* (Troedsson). Bassler, Geol. Soc. Amer., Mem. 44, p. 263, Pl. 14, fig. 7.

1961 *Billingsaria parvituba* (Troedsson). Flower, New Mexico Bur. Mines, Mem. 7, p. 18.

1974 *Billingsaria parva* (Billings). Kay, in Bergstrom and others, Can. J. Earth Sci., v. 11, no. 12, p. 1629.

1977 *Billingsaria parvituba* (Troedsson). Copeland and Bolton, Geol. Surv. Can., Paper 77-1B, p. 4, Pl. 1.4, figs. 1, 4-7.

1977 *Billingsaria parvituba* (Troedsson). Bolton, Geol. Surv. Can., Bull. 269, p. 28, Pl. 2, figs. 1-3, 7, 9-11.

Diagnosis — Coralla are cerioid with four-, five- and six-sided corallites. Mean tabularia diameter is 1.3 mm. Walls are from 0.2-0.3 mm thick. Septa are long, extending nearly to the center in well preserved forms where they may meet to form an axial columnella. Many septa have bulbous tips.

Description — Six poorly preserved specimens were recovered. Coralla are usually flattened but one colony is club-shaped and appears to have encrusted a club-shaped object (Pl. 4, fig. 2). Diameter of the tabularia ranges from 1.0-1.5 mm and the mean is 1.3 mm. One tabularia is 1.7 mm in diameter. Septa are commonly not well preserved. Some corallites have septa which meet in the center to form an axial columnella, but these are rare. It was not possible to determine the number of septa in the corallites. Many septa have bulbous tips, others are long and thin, while still others are wedge-shaped. It is difficult to ascertain the relative abundance of each septal shape because preservation is so poor; in addition, the various septal shapes may merely be an artefact of preservation rather than representing true variation within the colony. In other words, silicification could have affected septal shape. No tabulae are preserved. Preservation is poor but a few mural pores may have been present in some of the corallite corners. These corner pores are 0.1 mm in diameter.

Discussion — The specimens are questionably assigned to *B. parvituba* because mural pores have not been previously found in this species, nor any species of *Billingsaria*. If the corner pores are true mural pores, then the specimens would represent a new genus.

Bolton (1977) has described *Billingsaria parvituba* from the Bad Cache Rapids Formation of the Melville Peninsula. Copeland and Bolton (1977) have described the species from the Lourdes Formation of western Newfoundland. Eastern Great Basin specimens agree closely with those illustrated in these two reports. it is worth noting the presence of *B. parvituba* in exclusively the Lost Canyon Member of the Ely Springs Dolomite. This species has been reported in other regions from rocks considered to be of late Middle Ordovician age (Bolton, 1977; Copeland and Bolton, 1977). This suggests the possibility that the Lost Canyon Member is of late Middle Ordovician age and the Floride Member, which contains typical Late Ordovician colonial corals, is younger. If this is correct, the Ely Springs Dolomite spanned the late Middle and Late Ordovician. Alternatively, *B. parvituba* may be a long-ranging species that underwent little evolutionary change.

Material — Six coralla were collected and examined in the present study.

Figured Specimens — MPM 27792 and 27793.

Occurrence — MPM locality 3231.

Order FAVOSITIDA Wedekind, 1937
Suborder FAVOSITINA Wedekind, 1937
Superfamily FAVOSITICAE Dana, 1846
Family FAVOSITIDAE Dana, 1846
Subfamily PALEOFAVOSITINAE Sokolov, 1950

Genus *SAFFORDOPHYLLUM* Bassler, 1950
Type Species: *Saffordophyllum deckeri* Bassler, 1950

Saffordophyllum crenulatum (Bassler), 1950

Pl. 4, fig. 3

1932 *Columnaria crenulata* Bassler, Tennessee Div. Geol. Bull. 38, Pl. 13, gis. 3, 4.

1935 *Columnaria crenulata* Bassler, Washington Acad. Sci. Proc., v. 25, p. 405.

1950 *Nyctopora crenulata* Bassler, Geol. Soc. Amer., Mem. 44, p. 261, Pl. 13, figs. 11-14.

1961 *Saffordophyllum crenulatum* (Bassler). Flower, New Mexico Bur. Mines, Mem. 7, p. 59-60, Pl. 31, figs. 7-12.

Diagnosis — Corallites have a mean diameter of 1.4 mm. Walls are severely crenulated with convexities extending as much as 0.3 mm into the tabularia. Small mural pores, 0.1 mm in diameter, occur at corallite walls and corners, but are not abundant. Short septal ridges occur on the inner corallite walls.

Description — This species is represented by a single, silicified, whole colony that is hemispherical, 9.0 mm long and 4.4 mm high. The exact outline of the corallites is obscured by the servere crenulations of the wall, but the corallites appear to be subpolygonal. Septal ridges occur on the inner wall where the wall is convex toward the corallite center. The septal ridges are commonly very faint and not well preserved. Corallite diameters range from 1.0-1.7 mm with most corallites between 1.3 and 1.6 mm in diameter. The mean corallite diameter for the colony is 1.4 mm.

Mural pores, 0.1 mm in diameter, are not abundant and are scattered throughout the colony. The mural pores do not occur in vertical rows. The mural pores occur more often in the corallite corners, at the junction of the angles of two or three corallites, than in the corallite walls.

The corallite walls display very distinctive crenulations. The portion of the wall that is convex in one corallite is concave in the adjacent corallite. The convexity caused by the crenulations of the wall may extend as much as 0.3 mm into the tabularia. The thickness of the wall is 0.1 mm. Tabulae and wall microstructure are not preserved in this silicified specimen.

Discussion — Flower (1961) assigned this species to *Saffordophyllum* based on specimens from the Hermitage Limestone of Tennessee because of the fibrous wall microstructure and the presence of mural pores. The species was originally assigned to *Columnaria* (Bassler, 1932) and later to *Nyctopora* (Bassler, 1950). Despite the reported occurrences of pores in *Nyctopora* (see Jull, 1976 and herein) the assignment of the species to *Saffordophyllum* seems logical because of the differentiation based on wall microstructure. *Nyctopora* has trabecular walls while *Saffordophyllum* has fibrous walls.

Saffordophyllum crenulatum may be distinguished from other species in the genus by its small corallite diameter, and the severely crenulated walls.

Figured Specimen — MPM 27794.

Occurrence — MPM locality 3231.

Genus *PALEOFAVOSITES* Twenhofel, 1914
Type Species: *Favosites asper* D'Orbigny, 1850

1914 *Paleofavosties* Twenhofel, Nat. Mus. Canada, Bull. 3, p. 24.
1928 *Paleofavosites* Twenhofel, Geol. Surv. Can. Mem. 154, p. 125.

Paleofavosites poulseni Teichert, 1937
Pl. 5, figs. 1-3; Pl. 6, figs. 1, 2; Pl. 7, figs. 1, 3, 5; Pl. 8, gis. 1, Pl. 22

1937 *Paleofavosites poulseni* Teichert, Rept. 5th Thule Exped. 1921-24, vol. 1, no. 5, p. 130, Pl. 6, fig. 1
1956 *Paleofavosites poulseni* Teichert. Stearn, Geol. Surv. Can. Mem. 281, p. 62-3, Pl. IV, figs. 6, 11, Pl. X, fig. 16.

Diagnosis — Coralla are discoidal to hemispherical. Corallites are polygonal, commonly hexagonal, with a mean diameter of 1.7 mm. Corallite walls are variable in thickness, commonly from 0.1-0.2 mm. Walls are usually curved, but may be locally corrugated or straight. Mural pores are rare in corallite walls, abundant in corallite corners, 8-10 in 5 mm, without rims, and commonly 0.1-0.15 mm in diameter. Septal spines may extend up to 0.3 mm toward the center of the corallite and are inclined slightly upward. Tabulae are irregular, commonly arched upward, but also sinuous and horizontal.

Description — Most specimens are fragmented coralla. The largest whole specimen is discoidal and is 5.5 cm long, 4.7 cm side and 1.8 cm in height. The surfaces of the coralla are irregular with depressions which may only be an artefact of preservation. Specimens of this species vary widely in their quality of preservation. Recrystallization has affected the distribution of the preserved septal spines. Septal spines can be found on virtually all of the specimens but may be well developed (up to 0.3 mm) in corallites on one part of the corallum and vestigial (0.1 mm) in corallites on another part of the same corallum. The spines are commonly inclined slightly upward.

Mature corallites are commonly hexagonal and uniform in size. The corallites range in diameter from 1.1-2.5 mm, but most corallites have diameters between 1.5 and 1.9 mm. The mean corallite diameter for all colonies is 1.7 mm. Thickness of the corallite wall varies from 0.1-0.4 mm both among and within colonies. Thickened corallite walls are probably the result of recrystallization. The corallite wall thickness is commonly 0.1-0.4 mm. In longitudinal section, corallite walls are usually curved and may be locally corrugated as a result of the moderately developed poral processes. Mural pores are abundant in the corallite corners and rare in the corallite walls. Poral processes are poorly to moderately developed. The mural pores occur in vertical rows in the corallite corners, where they are commonly spaced 8-10 in 5 mm. The pores are commonly 0.1-0.15 mm in diameter but they are sometimes enlareged to 0.2 mm in diameter. The mural pores do not have rims.

Tabulae are not preserved well in the specimens. Where preserved they number approximately 10 in 5 mm but this number may be lower than what was actually a part of the organism due to the obliteration of tabulae from recrystallizatin. The tabulae are irregular in form but are most commonly arched upward. They also may be sinuous or horizontal.

Discussion — Teichert (1937) originally described this species from southeastern King William Land Island. Since then it has been reported only from southern Manitoba (Stearn, 1956). Eastern Great Basin specimens agree well in all aspects with those reported by Teichert (1937). Southern Manitoba forms (Stearn, 1956) are similar to those from the Eastern Great Basin in corallite size and shape, wall thickness and form, and size and distribution of mural pores. Septal spines are slightly larger (up to 0.5 mm) and tabulae are more closely spaced in Southern Manitoba specimens compared to those of the Eastern Great Basin, but these differences may be an artefact of poor preservation associated with silicified Eastern Great Basin forms.

Stearn (1956) described a new species, *Paleofavosties kirki* and noted that it is one of only two species of *Paleofavosites* (the other, *Favosites marginatus* Hill) which displays a longitudinally corrugated wall. However, longitudinally corrugated walls are a feature of *P. poulseni* originally illustrated by Teichert (1937, Pl. V., fig. 4, Pl. VI, fig. 1) and supported by data from specimens from the Eastern Great Basin. Longitudinally corrugated walls may not be useful taxonomically, at least in differentiating between *P. kirki* and *P. poulseni*. *Paleofavosites kirki* has larger corallites and more common mural pores in the corallite walls than *P. poulseni*.

Material — Sixty-five whole or partial coralla were collected and examined in the present study. This is the most common coral in collections made in the Eastern Great Basin.

Figured Specimens — MPM 27795, 27796, 27797, and 27798.

Occurrence — MPM locality 3231 and 3229.

Paleofavosites okulitchi **Stearn, 1956**

Pl. 7, fig. 2

1956 *Paleofavosites okulitchi* Stearn. Geol. Surv. Can., Mem. 281, p. 61-2, Pl. III, figs. 4, 6; Pl. VIII, fig. 3.

1963 *Palaeofavosites okulitchi* Stearn. Nelson, Geol. Soc. Amer., Mem. 90, p. 53, Pl. 7, fig. 6.

1975 *Paleofavosites okulitchi* Stearn. Dixon, Bull. Can. Petrol. Geol., v. 23, n. 1, p. 176.

1977 *Paleofavosites okulitchi* Stearn. Bolton, Geol. Surv. Can., Bull. 269, p. 31, Pl. 8, figs. 10, 12; Pl. 9, figs. 1-4.

Diagnosis — Corallites are polygonal, and 3.4 mm in mean diameter. Walls are straight or slightly curved and 0.2 mm thick. Mural pores are from 0.15-0.3 mm in diameter, and occur abundantly in both corallite walls and corners. Pores are smaller and more abundant in the corallite corners, where they number 7-8 in 5 mm, than in the corallite walls. Tabulae may be straight, slightly sagging or domed, or marginally deflected. Septa are absent.

Description — Corallites range in size from 1.7 to 5.3 mm, and are commonly either hexagonal or pentagonal.* The mean diameter of the corallites is 3.4 mm and mature corallites are commonly between 3.0 and 4.0 mm in diameter. The corallite walls are commonly straight and 0.2 mm thick.

Mural pores are variable in diameter and are larger in the corallite walls than in the corallite corners. Pores occur in most corallite walls and there may be up to three vertical rows of pores on a corallite wall that occur with two additional vertical rows of pores, one row at each of the adjacent corallite corners. Corallite walls with one vertical row of pores are as common as corallite walls with two vertical rows of pores. Some of the large corallites have corallite walls that contain three vertical

*The largest variation in corallite diameter found in any one specimen was from 2.0 to 4.6 mm.

rows of mural pores. The mural pores are more closely spaced in the corallite corners than in the corallite walls. There are 7-8 pores in 5 mm in the corallite corners.

Tabulae are highly variable in form and may be straight or sinuous, or they may be marginally deflected. The tabulae are poorly preserved and it was not possible to determine an accurate spacing value.

Discussion — Paleofavosites okulitchi has been reported from the Stonewall Formation (Stearn, 1956) and the directly underlying Stony Mountain Formation of southern Manitoba (Okulitch, 1943). Specimens from the Stonewall Formation (Stearn, 1956) commonly display two rows of mural pores on the corallite walls, whereas specimens from the Stony Mountain Formation (Okulitch, 1943) commonly display one row of mural pores on the corallite walls, although Stearn (1956), upon re-examining the holotype, found one corallite with two rows of mural pores on the corallite wall. Stearn (1956) notes that this difference in the number of vertical rows of mural pores contained in the corallite walls between Stonewall and Stony Mountain specimens illustrates the general trend towards more pores in the walls in younger species than in older species. Stonewall specimens, with a mean diameter of 3.73 mm, are also larger than Stony Mountain specimens.

Specimens of *P. okulitchi* from the Eastern Great Basin are similar to Stonewall forms because they commonly display two rows of mural pores in the corallite walls. There are, however, Eastern Great Basin forms that display three rows of mural pores in the corallite walls. The mean diameter of corallites having three rows of pores on the corallite walls is 4.1 mm with a range of 3.8-4.6 mm. Stratigraphically, specimens from the Ely Springs Dolomite in the Eastern Great Basin with a larger number of pores in the corallite walls may be younger than those reported from the Stonewall Formation. The difference between the Stonewall and Ely Springs specimens does not require separating them into two distinct species.

Material — A total of six fragmented coralla were collected and examined. One specimen collected from the Silver Island Range is tentatively assigned to *P. okulitchi*.

Figured Specimen — MPM 27802.

Occurrence — MPM localities 3229, 3231 and 3208.

Paleofavosites mccullochae Flower, 1961

Pl. 8, fig. 2; Pl. 9, figs. 1, 3; Pl. 10, fig. 1

cf. 1956 *Paleofavosites prolificus* (Billings). Stearn, Geol. Surv. Can., Mem. 281, p. 60, Pl. IV, fig. 1; Pl. X, fig. 13.

1961 *Paleofavosites mccullochae* Flower, New Mexico Bur. Mines, Mem. 7, p. 75-6, Pl. 37 figs. 2, 6-9.

Diagnosis — Mean diameter of corallites is 2.4 mm. Budding individuals appear initially as small rounded tubes. Walls are thin, commonly 0.1 mm, straight in transverse section, and may be straight, slightly curved or corrugated in longitudinal section. Mural pores, 0.1-0.2 mm in diameter, are commonly spaced 0.5-1.0 mm apart in the corallite corners and are rare in the walls. Tabulae are complete and commonly depressed at their margins. Septal spines are absent.

Description — Coralla are commonly hemispherical but others are massive and irregular. Corallite diameters for all coralla range from 1.3-3.7 mm, with a mean of 2.4 mm. Most corallites range from 2.3-2.8 mm, though corallites as large as 3.1 mm are not uncommon. Budding individuals initially occur as round tubes. These rounded tubes develop into triangulate corallites which subsequently assume a polygonal growth form. Corallite walls are usually very thin, 0.1 mm, but are up to 0.2 mm in thickness where recrystallization has secondarily enlarged segments of the wall. In transverse section wall segments are always straight except where budding is initiated. In longitudinal section, much variation exists. Where sections cut through corallite angles, the wall appears corrugated because of the well developed poral processes. In other longitudinal sections corallite walls vary from straight to slightly curved.

Mural pores commonly occur in vertical rows at the corallite angles. Pores rarely occur in the corallite walls. The mural pores range from 0.1-0.2 mm in diameter. Spacing of the mural pores in the corallite angles is variable, and within the same vertical row spacing may range from 0.5-1.0 mm.

Septal spines were not observed. Tabulae are not well preserved, but where they do occur they are commonly depressed at their margins. Where they could be measured tabulae are 0.5-1.0 mm (most commonly 0.5 mm) apart.

Discussion — Eastern Great Basin specimens of *Paleofavosites mccullochae* agree closely in all aspects to those reported from the Cutter Formation in New Mexico and Texas (Flower, 1961). In the Eastern Great Basin mature corallite diameters may be slightly smaller than Cutter forms, but close inspection and measurement of Cutter forms (Flower, 1961, Pl. 37, fig. 12) reveals corallites of similar diameters in New Mexico and in the Eastern Great Basin. Any discrepancy is probably due to the individual author's conception of a "mature" corallite. In this study corallites were assumed to be mature when growth went beyond the triangulate condition (see description). There is variation in ontogenetic growth form of the individual corallite, and, as a result, some corallites less than 1.0 mm in diameter which display a rectangular growth form were not considered to be mature corallites.

Stearn (1956) reported specimens of *P. prolificus* from the Stony Mountain Formation of southern Manitoba. Laub (1979) notes, however, that the corallites of the Stony Mountain specimens are too large for the specimens to represent *P. prolificus* as that species is presently understood. The specimens of *P. prolificus* figured by Stearn (1956) agree well in corallite diameter, nature of walls and pores, and tabulae with Eastern Great Basin specimens here assigned to *P. mccullochae*. Southern Manitoba *P. prolificus* (Stearn, 1956) is tentatively placed in synonomy with *P. mcculochae* from the Eastern Great Basin pending examination and comparison of types. I would unquestionably place southern Manitoba *P. prolificus* in synonomy with *P. mccullochae* but Stearn (1956) reports the Manitoban forms to have septal spines. No septal spines were observed in Eastern Great Basin specimens of *P. mccullochae,* nor were they reported by Flower (1961).

The closest species to *P. mccullochae* is *Paleofavosites kuellmeri* Flower (1961) from the Aleman Formation of Texas which has smaller corallites and corallite walls that are curved in transverse section. Also, the tabulae of *P. kuellmeri* are not predominantly depressed marginally as they are in *P. mccullochae*. *Paleofavosites sparsus* Flower (1961) from the Second Value Formation of Texas has more widely spaced tabulae than *P. mccullochae,* and also has curved wall segments in transverse section. Walls of *P. mccullochae* are straight in transverse section.

Material — Nineteen specimens of whole and fragmented coralla were collected and examined in the present study.

Figured Specimens — MPM 27805, 27806, 27807 and 27809.

Occurrence — MPM localities 3209 and 3229.

Paleofavosites sp. cf. _P. transiens_ Stearn, 1956
Pl. 11, fig. 3; Pl. 16, fig. 3

1956 *Paleofavosites transiens* Stearn, Geol. Surv. Can., Mem. 281, p. 62, Pl. IV, figs. 2, 3; Pl. VIII, fig. 9; Pl. X, fig. 15

Diagnosis — Coralla are hemispherical and have hexagonal corallites with a mean diameter of 2.2 mm. Walls are 0.2 mm thick and either straight or curved in longitudinal section. Mural pores are abundant in both corallite walls and corners. Mural pores are commonly 0.1-0.2 mm in diameter, although where they occur in the corallite wall they may reach a diameter of 0.3 mm. Pores in the wall are between 0.8 and 1.0 mm apart in a single row, or irregularly scattered. Pores at the corners are set in small poral processes and are commonly 0.5 mm apart, but three may occur in 1.0 mm. Septal spines may be present. Tabulae, where preserved, are variable in form.

Description — Two complete coralla and two fragments were recovered. The whole coralla are hemispherical, one 12 mm long and 6 mm in height, the other 16 mm long and 12 mm in height. The latter specimen grew on the outside of a gastropod shell.

Corallite size varies from 1.2 to 3.4 mm but the diameter of most mature corallites ranges from 1.7-2.4 mm. Mean corallite diameter of mature corallites is 2.2 mm. Corallites are commonly hexagonal but may be quite variable in shape. Mural pores are most abundant in the corallite corners. Mural pores are also common in the corallite walls and may occur in a row in the corallite wall or they may be scattered throughout the wall. Mural pores, where they occur in the corners are commonly 0.1-0.2 mm in diameter, and where they occur in the corallite wall are up to 0.3 mm in diameter. Pores in the wall are between 0.8 and 1.0 mm apart, while pores in the corners are commonly 0.5 mm apart, although three may occur in 1.0 mm. Corallite walls are commonly thin, 0.2 mm thick, but may be locally thickened (up to 0.35 mm), probably due to recrystallization of septal spines during the silicification process.

Where septal spines are preserved they are very short, occurring in many series as minor perturbations on the inner corallite wall. Where tabulae are preserved they are variable in form and may be convex, concave, horizontal or sinuous.

Discussion — This species is distinguished from other North American species of *Paleofavosites* by the abundance of mural pores in the corallite walls. Abundant pores also occur in the corallite walls of *P. okulitchi,* but the corallite size in *P. okulitchi* is much larger than in this species. *Paleofavosties transiens* has been previously reported from the early Middle Silurian Fisher Branch Dolomite, Grand Rapids, southern Manitoba (Stearn, 1956), where it is the most abundant coral. Eastern Great Basin specimens differ from the Manitoban type material by having a larger corallite diameter and tabulae more variable in form. Therefore, the Eastern Great Basin forms are only tentatively assigned to *P. transiens.*

Material — Four silicified specimens were collected and examined in the present study.

Figured Specimens — MPM 27813 and 27824.

Occurrence — MPM locality 3229.

Paleofavosites sp. cf. *P. capax* (Billings), 1866

1866 *Favosites (?) capax* Billings, Cat. Sil. Foss. Anticosti, p. 6.
1899 *Favosites aspera* D'Orbigny (partim). Lambe, Geol. Surv. Can., Contr. Can. Paleo., v. 4, p. 4.
? 1928 *Paleofavosites capax* (Billings). Twenhofel, Geol. Surv. Can. Mem. 154. p. 125.
1943 *Paleofavosites capax* (Billings). Okulitch, Trans. Roy. Soc. Can. Ser. 3 v. 37, sec. 4, Pl. 1, fig. 17.
1956 *Paleofavosites capax* (Billings). Stearn, Geol. Surv. Can., Mem. 281, p. 61, Pl. 10, fig. 12.
1963 *Palaeofavosites capax* Billings. Nelson, Geol. Soc. Amer. Mem. 90, p. 52-3, Pl. 7, fig. 4.
1980 *Paleofavosites capax* (Billings). Bolton, Cur. Research, Pt. C., Geol. Surv. Can., Paper 80-1C, p. 22, Pl. 2.7, figs. 1, 4-6.
1981 *Paleofavosites capax* (Billings). Bolton, Field Meet., Anticosti-Gaspé, Quebec, V. II: Strat. and Paleo., Pl. I., fig. 8, Pl. IX, fig. 10.

Two poorly preserved corallum fragments are tentatively assigned to this species. Corallite diameters are variable within the colonies, ranging from 1.5-4.2 mm. Corallite walls are thin, 0.1 mm, and straight or curved in longitudinal section. Corallite walls are corrugatd where longitudinal sections cut through the wall at the corallite corner. The corrugation of the walls occurs where poral processes are developed. Mural pores commonly occur in vertical rows at the corners of the corallites and rarely in the corallite walls. The mural pores are 0.2 mm in diameter and are spaced from 0.5-1.0 mm apart in the corallite corners. No septal spines were observed. Tabulae are not preserved in the two colonies collected.

Discussion — Paleofavosites capax has been reported from the Upper Ordovician Ellis Bay Formation of Anticosti Island by Billings (1866), Twenhofel (1928) and Bolton (1981). Bolton (1981) also reported this species from the Lower Silurian Gun River Formation of Anticosti Island. Bolton (1980) reported *P. capax* from the Upper Ordovician White Head Formation of the Gaspé Peninsula. Nelson (1963) reported this species from Upper Ordovician strata of the northern Hudson Bay Lowland. Stearn (1956) reported it from the Upper Ordovician Stonewall and Stony Mountain Formations of southern Manitoba.

Twenhofel (1928), Okulitch (1943), and Stearn (1956) reported wide variation for the diameter of corallites in *Paleofavosites capax*. Nelson (1963) examined specimens reported by Okulitch (1943) and Stearn (1956) and reported that they were nearly identical to his specimens from the northern Hudson Bay Lowland which he reported as having a large size distribution in corallite diameter. Therefore, variability of corallite diameter is a characteristic of every reported occurrence of *P. capax* except that of Twenhofel (1928) from Anticosti Island. For this reason, Twenhofel (1928), is only questionably placed in synonomy with *P. capax*.

Nelson (1963) reported *P. capax* with corallite diameters having a bimodal size distribution, mature corallites which range from 4.0-5.0 mm, and immature corallites which range 2.0-3.0 mm. Ellis Bay forms also display corallite diameter bimodality, one size class ranging from 3.2-4.0 mm, the other ranging from 1.5-1.8 mm. White Head forms have a size class ranging from 3.3-4.0 mm in corallite diameter, and a size class ranging from 0.6-1.3 mm in corallite diameter. Eastern Great Basin forms most closely resemble those reported from Anticosti Island (Bolton, 1981) and the

Gaspé Peninsula (Bolton, 1980). The Eastern Great Basin forms have corallite diameters that could not be separated into two distinct classes. The bimodal corallite diameter distribution appears to be a characteristic aspect of *P. capax*.

Specimens from the Eastern Great Basin are only tentatively assigned to *Paleofavosites capax* because only two small coralla were collected, and these do not have any tabulae preserved. In addition, bimodality in corallite diameter was not displayed in the specimens, although the range in corallite diameter encompassed the two size classes reported by other workers. Further, examination of type material may reveal the presence of more than one species assigned to *P. capax,* and Eastern Great Basin forms may be referred to another species at some future point.

Occurrence — MPM localities 3209 and 3229.

Genus *Tollina* Sokolov, 1949

Tollina sp.

Pl. 11, fig. 1; Pl. 12, fig. 2; Pl. 19

Two small fragments of *Tollina* were recovered in the Eastern Great Basin. They are characterized by monoserial ranks of corallites which form agglutinated patches where they intersect. Corallite shape is variable and may be: 1) trapezoidal when the common walls on either side of the corallites are sub-parallel, 2) elliptical when the common walls on either side of the corallite are parallel, or 3) subquadrate when the common walls are parallel and the outer walls are straight. The three corallite shapes grade into one another. Corallites in agglutinated patches are commonly six-sided in transverse section with two sides elongated and parallel intersected at each end by two smaller sides like the roof on a house. Outer and common walls are thick, commonly from 0.2-0.3 mm, but may be up to 0.4 mm. Corallites usually number 3 in 7 mm, but 2 in 5 mm is not uncommon. Septa may be present as crenulations on the inside of the corallite wall but poor preservation precludes adequate determination of their abundance. The common walls are commonly smooth at the margins of the tabularia, but may be slightly crenulate. Corallites have a mean length, mid-length width, and common wall width of 2.2, 1.5 and 1.2 mm, respectively. Tabulae may be horizontal, domed (some with severely downturned edges), or slightly sagging. Tabulae are commonly spaced 9-10 in 5 mm.

Discussion — The straight and thickened common walls, the thick corallite outer walls and the hexagonal habit of the corallites forming the agglutinated patches separate this species of *Tollina* from all others reported from North America. The Eastern Great Basin specimens of *Tollina* are not specifically named because the present material is too fragmentary and because of the possibility of a similar form outside of North America.

Material — Two fragmented coralla were collected and examined in the present study.

Figured Specimens — MPM 27811 and 27815.

Occurrence — MPM locality 3209.

Family AGETOLITIDAE Kim, 1962
Genus *AGETOLITES* Sokolov, 1955
Type Species: *Agetolites mirabilis* Sokolov, 1955
Agetolites budgei n. sp.

Pl. 9, fig. 2; Pl. 11, fig. 2; Pl. 12, fig. 1; Pl. 13, figs. 1, 2; Pl. 18, fig. 2
? 1975 *Agetolites* sp. Oliver *in* Oliver, Merriam, and Churkin, U.S. Geol. Surv. Prof. Sap. 823-B, Pl.2, figs. 1, 2.

Diagnosis — Coralla are hemispherical or completely encrusted around a rod-like object, usually a crinoid stem. Mean corallite diameter is 4.1 mm. Major septa are long and commonly fused in the center of the corallite, sometimes forming a weak axial columnella. There are 19-22 septa in each corallite. Corallite walls are thin, 0.1-0.2 mm, and strongly corrugated, both longitudinally and transversely. Mural pores range from 0.1-0.4 mm in diameter and occur in vertical rows at the corallite angles, where they may open into two or three corallites. Less commonly, mural pores are found in the corallite walls. Tabulae are commonly domed and are spaced 1.0 mm apart.

Description — Corallites are commonly either five or six sided. Mean corallite diameter is 4.1 mm. Mature corallites range from 2.6-7.0 mm in diameter, but a range of 3.3-4.5 mm represents the most common corallite diameters. Major septa are long and thin. They extend to the center of the corallite and commonly fuse to form a weak axial columnella. There are between 19 and 22 major septa per corallite. This figure should be taken as approximate because the septa are poorly preserved. No well developed minor septa were observed, but this may also be due to lack of preservation.

Corallite walls are crenulated in transverse section as a consequence of the major septa alternating between adjacent corallites. Walls appear crenulated in longitudinal section when the seciton cuts through a corallite angle with mural pores. The mural pores are set in well developed poral process, giving the wall a corrugated appearance in longitudinal section. Tabulae are complete and commonly domed. Doming of the tabulae is not always symmetrical, and the upward arch of the individual tabula may be skewed to the right or left side of the corallite. Some tabulae are sinuous, but the arches and depressions are commonly subdued when compared to a predominantly domed tabula. A few tabulae observed were horizontal or arched downward. Tabulae are spaced about 1.0 mm apart, with the most common spacing as 6 tabulae in 5 mm.

Initial growth stages of many coralla are found surrounding a crinoid stem. Coralla may also be hemispherical, but when these forms were sectioned they were found to encrust brachiopods, bivalves, and tabulate corals in their initial growth stages. Later the coralla grew outward from all sides of the encrusted organism.

Mural pores, 0.1-0.4 mm in diameter, are more common in the corallite angles than in the corallite walls. They may open up into two or three corallites where they occur at the corallite angles. Mural pores that occur in rows at the corallite angles are spaced between 0.5 and 1.0 mm apart.

Name — This species is named for David R. Budge, who recognized *Agetolites* in Late Ordovician strata from the Eastern Great Basin (Budge, 1972).

Discussion — *Agetolites* has been reported from Late Ordovician strata in the southwestern foothills of the Changiz Range (Sokolov, 1955)[1], Upper Ordovician

1. Sokolov originally dated the strata from which *Agetolites* was recovered as the Llandovery, however Kim (1966) reported that the deposits containing *Agetolites* from which Sokolov recovered the genus are now considered by many investigators to be Upper Ordivician.

strata of the Yu-Shan region in the province of Tziansi, China (Lin, 1960), Upper Ordovician deposits of the Shanyan districts, Shensi Province, China (Lin, 1963), Upper Ordovician strata of the Chekiang and Kiungsi Provicnes, China, and from strata of the Zapafshano-Gissarskoi mountain district (Kim, 1966), and from Late Ordovician strata in the Alta Mountains (Kim and Apekin, 1978). Kim (1965) described additional Asian forms. Oliver, Merriam and Churkin (1975) illustrated *Agetolites sp.* from Upper Ordovician rocks of the Seward Peninsula, Alaska. Budge (1972), in an unpublished Ph.D. dissertation, described and illustrated this species of *Agetolites* from Late Ordovician strata of the Eastern Great Basin.

Agetolites is an interesting genus among the Anthozoans because it has characteristics of both the Tabulata and Rugosa. The long major septa with denticulated edges fused at the center of the corallite to form a columnella is a characteristic of the Rugosa. The mural pores and crenulated walls are characteristics of the Tabulata.

The long major septa point to a Rugosan affinity. Budge (1972) noted denticulated inner edges of the septa of *Agetolites*. He considered these reminiscent of the silicified trabeculae seen in his solitary rugose coral specimens from Nevada and Utah. Specimens of *Agetolites* I have collected from the Eastern Great Basin also show this denticulation of the inner edges of the septa (Plate 12, fig. 1). The presence of mural pores points to a Tabulata affinity. Budge (1972) noted that the crenulated, *Saffordophyllum*-like walls of *Agetolites* were also suggestive of the Tabulata. *Agetolites* may provide a clue to the question of the ancestry of the two great Paleozoic subclasses, but it has not been found in rocks older than Late Ordovician. Budge (1972) has suggested that *Agetolites* may represent a coral of Tabulata origin which has evolved to the point of attaining Rugosa Grade. This interpretation implies that the Rugosa are a polyphyletic group, which Budge (1972) argued for in his dissertation. However, consideration of the Rugosa as a polyphyletic group is dependent on the inclusion of *Agetolites* and if *Agetolites* is classified with the Tabulata, then both the Rugosa and Tabulata can be considered monophyletic. An alternative consideration is that *Agetolites* may have given rise to the rugosans (Oliver, pers. comm. 1984). Hill (1981) classified *Agetolites* with the Tabulata.

The implications of finding this genus in the Eastern Great Basin are discussed in the Faunal Analysis section of this paper.

Eastern Great Basin *Agetolites budgei* n. sp. is conspecific with an invalid, manuscript name used by Budge (1972) in his unpublished Ph.D. dissertation. *Agetolites sp.* from Upper Ordovician rocks of the Seward Peninsula illustrated by Oliver, Merriam, and Churkin (1975) is tentatively placed in synonomy with *A. budgei* pending comparison of type material. The figured specimen from the Seward Peninsual agrees well in corallite diameter and overall appearance.

Types—Holotype (MPM 27814); Paratypes (MPM 27808, 27812, 27816 and 27817)

Material—Eighteen specimens were collected and examined in the present study.

Figured Specimens — MPM 27814, 27808, 27812, 27816 and 27817.

Occurrence — MPM localities 3208, 3209 and 3231.

Order HELIOLITIDA Frech, 1897

Suborder HALYSITINA Sokolov, 1947

Family HALYSITIDAE Milne-Edwards and Haime, 1849

Subfamily CATENIPORINAE Hamada, 1957

Genus *CATENIPORA* Lamarch, 1816

Type Species *Catenipora escharoides* Lamarch, 1816

Catenipora workmanae Flower, 1961

Pl. 13, fig. 3, Pl. 21

1961 *Catenipora workmanae* Flower, New Mexico Bur. Mines, Mem. 7, p. 49-51, Pl. 5, 6, 7; Pl. 8, figs. 8, 13; Pl. 9-12, in part, with attached organisms.

Diagnosis — Corallite walls are thick, commonly 0.2-0.3 mm. The ratio of the width of the corallite wall to the mid-length width of the tabularia ranges from 0.29-0.35. The outer wall surface is convex around each corallite. The mean corallite mid-length width and width at the common wall is 1.2 mm and 0.8 mm, respectively. Corallites are commonly spaced 3 in 5 mm. Corallites have a mean length to mid-length width ratio of 1.45. The mid-length width of the tabularia is one-half to two-thirds the length of the tabularia. Tabulae are variable in form and occur 7-10 in 5 mm.

Description — One whole large specimen and several fragments were recovered from the Eastern Great Basin. The whole specimen is the largest chain coral recovered in the Eastern Great Basin collections, and has a maximum length of 70 mm and a height of 38 mm. The coralla are cateniform and have a convoluted holotheca which display growth lines (Plate 13, fig. 3).

Coralla are composed of single ranks of corallites. Corallites are never found in double rows or agglutinated patches. The ranks of the corallites are closely packed. The corallites are thick walled (0.2-0.3 mm). The ratio of the corallite wall thickness to the tabularia mid-length width varies from 0.29 to 0.35. The outer corallite wall is convex and the tabularia are elliptical. Common walls between adjacent corallites are thick, usually 0.3 mm but as much as 0.4 mm and are oriented perpendicular to the attitude of the rank. The mean corallite mid-length width is 1.7 mm while the mean width at the common wall is 0.8 mm. The mean length of the corallite from the middle of the common wall on one end of the corallite to the middle of the common wall on the other end of the corallite is 1.8 mm. Corallites are commonly spaced 3 in a length of 5 mm, but there may be as many as 3 in 4.2 mm and as few as 3 in 6 mm. Corallites have a length to mid-length width ratio that is comonly 1.45, but this varies with a range from 1.3 to 1.7. The mid-length width of the tabularia is one-half to two-thirds the length of the tabularia. The mean ratio of the corallite width at the common wall to the width at the mid-length of the corallite is 0.7, but this varies in a range from 0.57 to 0.9, although these extremes are rare.

Lacunae are irregular and have a length to width ratio of between 2:1 and 4:1. The lacunae have a maximum length of 10.3 mm and a maximum width of 10 mm. Lengths of the lacunae range from 4.4 to 19.3 mm and widths range from 3.4 to 10 mm. The number of corallites bounding a lacuna varies from 8 to 27 with an average value of 16. Balken structures, typical of the species, were not preserved, presumably because they were altered during the silicification process. Spheres of poikiloplasm were observed in some corallites (Plate 21, above). Septal spines are not preserved well, but may occur as faint perturbations of the inner corallite wall. Tabulae, as with most species of this genus, are variable both in form and spacing. The tabulae are transverse and may be flat, slightly arched or slightly sagging, diagonal, or sinuous. The tabulae are commonly spaced 7-10 in 5 mm (the mean spacing of the tabulae is 8.3 in 5 mm).

Discussion — Eastern Great Basin specimens of *Catenipora workmanae* are biometrically very similar to the specimens originally described by Flower (1961) from the Second Value Formation in Texas and New Mexico. The only difference lies in the presence of balken structures in the Second Value material, and the absence of these structures (presumably due to silicification) from the Eastern Great Basin specimens.

Catenipora robusta (Wilson) has similar geometry of coralla and corallites as *C. workmanae* but the corallite width at the common wall is slightly larger (1.0 mm) in *C. robusta,* giving the corallites a subquadrate appearance in cross-section. *C. robusta* also has thinner corallite outer walls and thinner common walls than *C. workmanae. Catenipora rubra* Sinclair and Bolton has thin corallite walls and tabularia that are subquadrate in cross-section.

Catenipora flexa was described by Hall (1975) from the Uralba Beds of New South Wales. Hall distinguished the new species from *C. workmanae* as follows:

> "This species closely resembles *C. workmanae* Flower (1961) from the Second Value Formation, New Mexico but differs in having larger, more open lacunae bounded by curved ranks of corallites . . . *C. flexa* is readily distinguished by the ranks of uniform, oval corallites forming elongated, labyrinthine lacunae and the frequent development of spines." (Hall, 1975, p. 90).

The most distinct difference between *C. workmanae* and *C. flexa* is that the latter has better developed septal spines. Curved ranks of corallites are common in *C. workmanae* from the Eastern Great Basin and from New Mexico (see Flower, Pl. 5, fig. 6; Pl. 8, fig. 13).

Material — Five specimens of whole and fragmented coralla were collected and examined in the present study.

Figured Specimen — MPM 27818.

Occurrence — MPM localities 3208 and 3209.

Catenipora sp. cf. *C. foerstei* Nelson, 1963

Pl. 7, fig. 4; Pl. 10, fig. 2

1963 *Catenipora foerstei* Nelson, Geol. Soc. Amer., Mem. 90, p. 59, Pl. 14, figs. 16, 17.

Two small fragments of *Catenipora* from the Eastern Great Basin are tentatively assigned to *Catenipora foerstei.* The corallites are arranged in monoserial ranks. In transverse section, the outer wall of the corallites is biconvex (Plate 7, fig. 4) and the geometry of the corallites varies from elliptical to subelliptical to subquadrate. Corallite common walls are thick, commonly 0.2-0.3 mm, with a maximum thickness of 0.4 mm. Mean tabularia length is 1.45 mm, with a range from 1.2-1.8 mm.

Mean corallite width at the mid-length of the corallite is 0.9 mm, while mean corallite width at the common wall is 0.7 mm. Corallite walls are commonly 0.15 mm thick, with a range from 0.1-0.2 mm. The outline of the tabularia is commonly elliptical, but subquadrate forms also occur. Tabulae are not preserved in the present material. Only two complete lacunae were observed. One lacuna is bounded by 11 corallites and is 4.8 mm long and 2.9 mm wide; the other lacuna is bounded by 12 corallites and is 8.2 mm long and 4.8 mm wide. Both lacunae are elliptical in transverse section.

Discussion — Nelson (1963) first described *Catenipora foerstei* from the Richmondian Caution Creek Formation of the northern Hudson Bay Lowlands. The size and shape of the corallites from the Eastern Great Basin are very similar to those from the Hudson Bay Lowlands. The Hudson Bay specimens have thicker walls and larger lacunae than the Eastern Great Basin forms. *Catenipora* sp. cf. *C. foerstei* from the Eastern Great Basin is similar to *C. aequabilis* (Teichert) buy may be distinguished by it's larger corallites and by its higher number of corallites per rank. *Catenipora agglomeratiformis* (Whitfield) and *C. robusta* (Wilson) have similarly shaped corallites as *C.* sp. cf. *C. foerstei,* but have smaller and larger corallites, respectively.

This species identification is made with reservation because of: 1) insufficient numbers of well preserved specimens, 2) the dissimilarity in wall thickness and size of lacunae with type material (compare Nelson, 1963), and 3) the lack of preserved tabulae. *Catenipora foerstei* has been previously reported only from the northern Hudson Bay Lowland (Nelson, 1963).

Material — Two fragments of coralla were collected and examined in the present study.

Figured Specimens — MPM 27803 and 27810.

Occurrence — Ely Springs Dolomite, Lost Canyon Member, Northern Egan Range, MPM locality 3231.

Catenipora sheehani **n. sp.**

Pl. 20, figs. 1, 2

Diagnosis — Coralla are characterized by monoserial ranks of corallites that are joined with trilobate corallites that form T-shaped junctions. Other corallites are commonly ellipsoidal. Mean tabularia length of the corallite is 1.9 mm. Mean mid-length width and common wall width of the corallites is 1.6 and 1.0 mm, respectively. The mean corallite wall thickness is 0.3 mm and the mean thickness of the common wall is 0.5 mm. Tabulae are variable in form and are commonly spaced 8 in 5 mm. Septal spines are prominent and there are from 12-16 per corallite. Spines extend from 0.1 to 0.3 mm from the inner corallite wall. Lacunae are commonly small and trilobate.

Description — One whole specimen and several coralla fragments were recovered. The whole specimen is 40 mm long and 20 mm high. The longest single corallite is 19 mm in height. The single ranks of corallites form T-shaped junctions where they intersect (Plate 20, above). These junctions are composed of corallites that are trilobate to sub-triangulate.

Tabularia length of corallites forming T-junctions is commonly less ($\bar{x}$ = 1.64 mm) than other corallites ($\bar{x}$ = 1.9 mm). Also, the common wall between corallites forming a T-junction is commonly thicker ($\bar{x}$ = 1.64 mm) than that between other corallites ($\bar{x}$ = 0.51 mm). Mean corallite width at the mid-length of the corallite is 1.6 mm with a range from 1.25-1.85 mm; mean corallite width at the common wall is 1.0 mm with a range from 0.8-1.2 mm. Length of tabularia ranges from 1.5 to 2.5 mm but the extremes are rare. Most corallites have a tabularia length from 1.7 to 2.2 mm. Corallites within the corallite ranks are commonly ellipsoidal, but also may be circular, or convexi-planate with one outside wall convex and the other straight.

Corallite walls are thick, with a mean thickness of 0.3 mm, and a range of 0.2-0.4 mm. The mean thickness of the common wall is 0.5 mm with a range from 0.4 to 0.6 mm. The thickness of the common wall of the T-junctions ($\bar{x}$ = 0.65 mm) was slightly larger than that of the corallites found within the monoserial ranks. Septal spines extend from 0.1 to 0.3 mm into the tabularia. As seen in transverse section, there are commonly from 12-16 spines in each corallite. The septal spines are either wedge shaped or long and straight. The tabulae are irregular in form and may be horizontal, medially depressed, or arched upward. There are commonly 8 tabulae in 5 mm, but there may be from 7 to 10 tabulae in that length.

Six complete lacuane were observed. The mean length of these lacunae is 5.3 mm (range, 2.8-8.9 mm) the mean width, 3.2 mm (range 2.4-4.3 mm) and the mean number of surrounding corallites is 9 (range, 5-12). The shape of the lacunae is trilobate, ellipsoidal, round, or irregular. The perimeter of the lacunae is commonly very irregular, appearing corrugated due to the curvature of the ranks and the corallite walls. One large incomplete lacuna is over 16 mm in length and is bounded by more than 20 corallites. This lacuna appears to be trilobate.

Discussion — This species may be distinguished from others that have been described and illustrated in North America by the characteristic T-shaped junctions which occur at most intersections of the corallite ranks. A similar species occurs in the Maluchi's Hill Beds of central-western New South Wales (Webby, 1976). *Catenipora clausa* Webby is very similar to *C. sheehani,* but differs in having slightly smaller corallites, and less prominent septal spines. *Catenipora obliqua* (Fishcer-Benzon) is also similar but has smaller corallites and larger lacunae than *C. sheehani.*

Name — This species is named in honor of Dr. Peter Sheehan, Milwaukee Public Museum, who first introduced me to the geology of the Great Basin.

Types — Holotype (MPM 27828).

Material — One whole colony and numerous fragments of coralla were collected and examined in the present study. The whole specimen was sectioned while it was in the rock.

Figured Specimen — MPM 27828.

Occurrence — MPM locality 3231.

Subclass RUGOSA Milne-Edwards and Haime, 1850

Order STAURIIDA Verrill, 1865

Suborder STAURIINA Verrill, 1865

Family STAURIIDAE Milne-Edwards and Haime, 1850

Genus *PALAEOPHYLLUM* Billings, 1858
Type Species *Palaeophyllum rugosum* Billings, 1858

Palaeophyllum humei Sinclair, 1961
Pl. 14, Pl. 24, figs. 1, 2

1961 *Palaepophyllum humei* Sinclair, Geol. Surv. Can., Bull. 80, pt. II, p. 11-12, Pl. III, figs. 1-6.

Diagnosis — Corallites are commonly between 4.0 and 5.0 mm in diameter. The corallites are predominantly arranged in biserial ranks that may form large agglutinated patches where they intersect. The tabulae are strongly sinuous with their center and edges depressed. There are commonly 12-14 tabulae in 10 mm. Major septa extend between ½ and ¾ the distance to the corallite axis and may or may not be fused at their tips. Where fusion of major septa occurs, their tips join in groups of 2 or 3. An axial depression is always clearly evident. Minor septa, where present, are short and wedge-shaped and are up to ⅙ the length of the major septa.

Description — This is the largest species of *Palaeophyllum* that was recovered, both in corallite size and colony size. The largest colony is incomplete, but has a height of 75 mm and a length of 100 mm. There are no free individuals in the coralla. The colonies are tolliniform to phacelo-cerioid. The corallites are large, with a mean diameter of 4.7 mm. The range of corallite diameters is 3.0-6.1 mm, but most corallites are between 4.0 and 5.0 mm. The large corallites occur where they have become elongated parallel to a rank or chain, or where the biserial ranks intersect to form agglutinatued patches.

Corallite ranks are composed of double rows or biserial chains of polygonal and, to a lesser degree, cateniform corallites which are elongated parallel to the trend of the double row chain. Biconvex corallites occasionally occur in single rows or monoserial chains. Some corallites are hexagonal. Where ranks of corallites intersect, they may form agglutinated patches. The tabulae, with downturned margins and a central depression, are typical of the genus. The central depressions are variable in form, width, and depth. Occasionally there occurs a flat tabulae adjacent to a typical one and two commonly anastomise at the corallite wall. Tabulae are commonly spaced 12-14 in 10 mm.

There are from 16-19 major septa in each corallite. The major septa may be fused at their tips in groups of two or three. Major septa may be back to back in adjacent corallites or they may alternate. They commonly extend from ½ to ¾ the distance to the center of the corallite. An axial depression is well-developed in each corallite. Short, wedge-shaped minor septa extend up to ⅙ the length of the major septa. They are commonly blunt perturbations of the corallite wall that occur between two adjacent major septa. Minor septa are absent in some corallites.

Budding occurs as lateral increase. The lacunae are complex and irregular in shape. The outside walls of the corallites show both horizontal growth lines and vertical septal grooves corresponding to septa on the inner side of the wall.

Discussion — The large corallite size and unique growth pattern make this species distinctive among the Eastern Great Basin members of this genus. *Palaeophyllum cateniforme* Flower from the Second Value Formation of Texas superficially resembles *P. humei* from the Eastern Great Basin, but monoserial chains of corallites are much more common than biserial chains of corallites in this species. The corallites of *P. cateniforme* are also much larger than *P. humei*. Shape and spacing of tabulae are similar in both species. *Palaeophyllum humei* has fewer septa, which less commonly fuse at their tips, than *P. cateniforme*.

Palaeophyllum halysitoides (Troedsson) consists mainly of single row ranks of biconvex corallites and may be easily distinguished from *P. humei*. *Palaeophyllum troedssoni* Poulsen has larger corallites than *P. humei,* and also lacks a tendency toward cateniform growth. The Eastern Great Basin specimens assigned to *P. humei* agree closely in all aspects to the original figures and description given by Sinclair (1961) for specimens from the Trentonian Liskeard Formation of Ontario.

Material — One whole colony and several coralla fragments were collected and examined in the present study.

Figured Specimen — MPM 27819.

Occurrence — MPM locality 3231.

***Palaeophyllum gracile* Flower, 1961**

Pl. 15, fig. 1; Pl. 23, figs. 1, 2

1961 *Palaeophyllum gracile* Flower, New Mexico Bur. Mines, Mem. 7, p. 89-90, Pl. 46, 47, figs. 1-8.

Diagnosis — Coralla are fasciculate and the mean corallite diameter is 3.1 mm. The corallites have 14 long major septa. The tips of the major septa are commonly fused in groups of two or three. Minor septa are vestigial or absent. Tabulae are commonly arched upward and 8-9 tabulae occur in 5 mm.

Description — All coralla are incomplete, but the largest is 52 mm long and 60 mm high. The longest single corallite is 37 mm in length. The corallites have a mean diameter of 3.1 mm with a range of 3.0 to 3.4 mm. Most corallites are between 3.0 and 3.2 mm in diameter. Mature corallites have circular outlines in transverse section. Corallite walls vary from 0.1-0.3 mm in thickness and are commonly 0.2 mm thick.

The corallites have predominantly 14 but may have 15 major septa which extend almost to the center of the corallite. The major septa are commonly fused at their tips into groups of two or three. These groups may be fused with one another, obscuring the axial depression. Most corallites have at least a small central region free of septa, and many corallites have a large well-developed axial depression. Plate 23 shows corallites which contain septa that fuse in the center of the corallite to form an axial structure. Major septa appear short in transverse sections that cut the calice above the floor of the corallite. Minor septa are not common, but where they are present they occur as low ridges on the inner corallite wall between two adjacent major septa.

The tabulae are commonly arched upward and some have a slight axial depression. Longitudinal sections display tabulae that are displaced up or down by intersecting septa. The spacing of the tabulae is constant, with 8-9 tabulae occurring in 5 mm.

New corallites are produced by lateral increase. Offsets are distinctive in their elongation in one dimension.

Discussion — Flower (1961) named this species from the Second Value Formation in El Paso, Texas. *Palaeophyllum gracile* is not comon in the Montoya Group (Flower, 1961), nor is it common in the Eastern Great Basin. Specimens from the Eastern Great Basin agree well with those from Texas in their small corallite diameter, the number of major septa in mature corallites, the fusion of the tips of septa into groups of two or three, and the form and spacing of the tabulae. Specimens from the two localities differ from one another in the number of major septa in offsets. Flower (1961) reported offsets with 12 major septa. Both mature corallites and offsets from the Eastern Great Basin have 14 major septa.

This species is easily distinguished from other species of *Palaeophyllum* by the common lack of minor septa and the small corallite size. *Palaeophyllum thomi* Flower has larger corallites and more sinuous tabulae than *P. gracile*. *Palaeophyllum margaretae* Flower from the Second Value Formation, has long, well-developed minor septa.

Material — Numerous corallites and coralla fragments were collected and examined.

Figured Specimen — MPM 27831.

Occurrence — MPM locality 3231.

***Palaeophyllum* sp. cf. *P. raduguini* Nelson, 1963**

Pl. 15, fig. 2; Pl. 14, figs. 1, 2

1936 *Columnaria halysitoides* Raduguin, Rec. Geol. West Siberian Reg., n. 35, p. 100, Pl. 2, fig. 12.

1960 *Palaeophyllum radugini* Cherepnina, Trans. Siberian Sci. Res. Inst. Geol. Geophys. and Min. Row. Mat. (SNIGGIMS), USSR Ministry Geol. and Cons. of Min. Res., n. 19.

1963 *Palaeophyllum raduguini* Nelson, Geol. Soc. Amer., Mem. 90, p. 32, Pl. 6, fig. 7.

1979 *Palaeophyllum raduguini* Nelson var. Bolton, Geol. Surv. Can.; Bull. 321, p. 6, Pl. 3, figs. 1, 2, 5.

Diagnosis — Coralla are phaceloid to tolliniform. Mean corallite diameter is 3.5 mm. There are 14-16 major septa in each corallite. The tips of the major septa are fused at the center of the corallite where they commonly form an axial structure. Minor septa alternate with the major septa and extend as much as 0.2 mm inward from the corallite wall. Outside corallite walls are corrugated. The tabularia are surrounded by a stereozone that may be as much as 0.3 mm thick. Tabulae are variable in form and are spaced 7-10 in 5 mm.

Description — The largest complete specimen recovered is 80 mm long, 51 mm wide, and 54 mm high. Corallites are either free and phaceloid or occur in short chains and agglutinated patches and exhibit a tolliniform growth habit. Corallite diameter ranges from 2.5-4.7 mm, but most corallites are from 3.2-3.8 mm in diameter. Corallites greater than 4.7 mm or less than 3 mm are rare. The mean diameter of the corallites is 3.5 mm. In transverse section, the shape of the corallites is variable and may be elliptical, circular, irregular, or, when they occur in agglutinated patches, polygonal. The outside wall of the corallite is distinctly corrugated.

The major septa are long, and their tips are fused at the center to form an axial structure. Fusion of the major septa into groups of two and three before reaching the center of the corallite is common. Each corallite has from 14-16 septa. Major septa are commonly short and unfused in transverse sections which cut the calyx. Where the calyx is preserved, it is commonly between 1.0 and 2.0 mm deep. In transverse sections which cut the floor of the calyx, the fusion of the major septa is apparent. Minor septa are almost always present, and they are short, extending 0.2 mm or less toward the center of the corallite. The minor septa alternate with the major septa. The short minor septa may become completely obscured by a thick, peripheral stereozone, or may be present as blunt ridges protruding from the inside of the corallite wall.

Tabulae are typically varied and are described under two main types: 1) convex upward with downturned edges and 2) flattened or platformal with downturned edges. Both types may have a medial depression commonly with less than 0.2 mm relief. There are 7-10 tabulae in 5 mm.

The only mode of increase observed in several silicified coralla fragments is lateral increase. Outer corallite walls display traces of the septa (septal grooves) and may also show faint horizontal growth lines.

Discussion — *Palaeophyllum raduguini* has been previously reported from western Siberia (Raduguin, 1936), the Hudson Bay Lowlands (Nelson, 1963) and from an outlier on the Canadian Shield (Bolton and Nowlan, 1979). Nelson (1963) gives a summary of the description of the Western Siberian forms (Raduguin, 1936). Eastern Great Basin forms agree closely in corallite diameter to those of Western Siberia.

Western Siberia corallite diameters range form 3.5-4.0 mm while those from the Eastern Great Basin range from 3.2-3.8 mm. Bolton and Nowlan (1979) report specimens with two corallite diameter size ranges, one from 2.3-3.5 mm and the other from 3.4-4.4 mm. Nelson (1963) reports corallite diameters with a range from 2.5-3.5 mm for Hudson Bay specimens. Cherepnina (1960) reports a corallite diameter range from 2.9 to 4.0 mm. There appears to be large variation in corallite diameters in all reports of *P. raduguini*. There is also some variation in number of major septa. Eastern Great Basin and Sayano-Altai Mountain specimens have 14-16 major septa. Canadian Shield specimens have 11-14 major septa while Hudson Bay specimens have 16-18 major septa. All forms have long centrally fused major septa and very short minor septa.

Eastern Great Basin specimens of *Palaeophyllum* sp. cf. *P. raduguini* are tentatively assigned to this species based on biometrical analysis and comparison with published accounts. Eastern Great Basin forms are not positively identified as *P. raduguini* due to the inadequate illustrations found in published accounts. Comparison with type material is needed before a confident assignment can be made.

The closest Ordovician species to *Palaeophyllum raduguini* is *P. vaurealensis* Twenhofel which has longer minor septa than *P. raduguini* and common large aggregates of corallites (Bolton, 1979). *Palaeophyllum proliferum* Webby is also similar to *P. raduguini* but differs in it's longer minor septa and greater number of major septa. *Palaeophyllum halysitoides* is cateniform and has larger corallites and more major septa than *P. raduguini*.

Material — Numerous coralla fragments were collected and examined in the present study.

Figured Specimens — MPM 27821, 27822 and 27823.

Occurrence — MPM locality 3231.

Genus *CYATHOPHYLLOIDES* Dybowski, 1873

Type Species: *Cyathophylloides kassariensis* Dybowski, 1873

Cyathophylloides spp. A, B

Pl. 17, figs. 1, 2

Cyathophylloides is included here so that the faunal list from the study area is complete. Identification to the species level and species level comparison of these specimens was not possible due to poor preservation. Inadequate preservation also precluded any quantitative measurements of septa or tabulae.

Cyathophylloides sp. A. (Plate 17, fig. 1). Two coralla have long major septa that unite in the center of the corallite. The major septa alternate with shorter minor septa. The mean corallite diameter is 5.1 mm. The corallite walls are thick and are crenulated due to the alteration of major and minor septa (Plate 17, fig. 1).

Figured Specimen — MPM 27825.

Occurrence — MPM locality 3209.

Caythophylloides sp. B. (Plate 17, fig. 2). One colony also has long major septa that unite in the center of the corallite and shorter minor septa that alternate with the major septa. The mean corallite diameter is 3.6 mm. A few pores occur in the corallite walls near the corner of a corallite. *Cyathophylloides* sp. B. is differentiated from *Agetolites* by its poor development of pores which do not occur in rows. Bolton (1979) reported pores in *Cyathophylloides lyterion* from the Ellis Bay and Vaureal Formations of Eastern Canada.

Figured Specimens — MPM 27826.

Occurrence — MPM locality 3208.

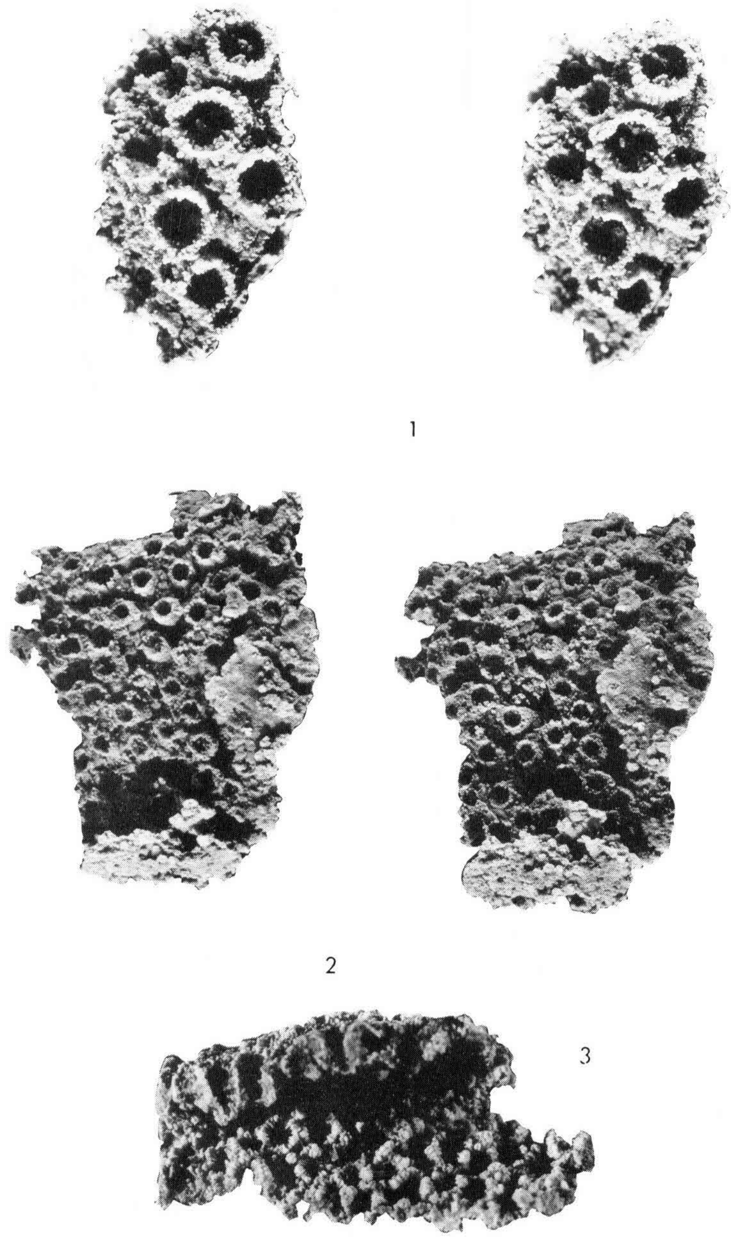


Plate 1

PLATE 1

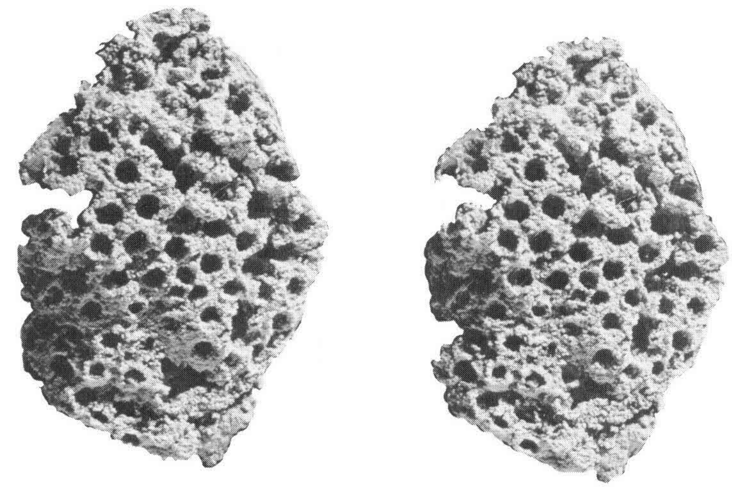
Calapoecia anticostiensis Billings

Fig. 1. Figured specimen, (MPM 27785), Ibex Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3227. View of top of colony which shows well developed corallite "rims" extending out from the surface of the corallum. Stereo-pair X 4

Fig. 2. Figured specimen, (MPM 27786), Floride Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3229. Top view of a colony which has grown, in part, between the layers of a stromatoporoid. Stereo-pair X 1.5

Calapoecia sp. cf. *C. coxi* Bassler

Fig. 3. Figured specimen, (MPM 27787), Floride Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3229. View of bottom of U-shaped colony which shows the characteristic wedge-shaped septa. X 1.5



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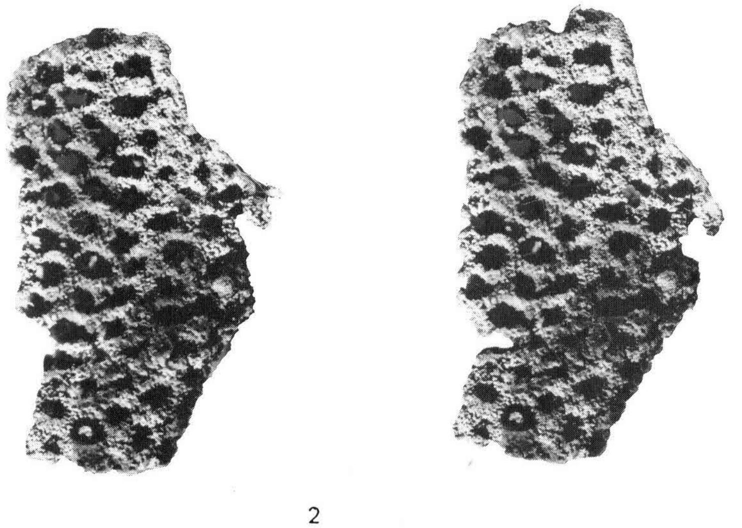

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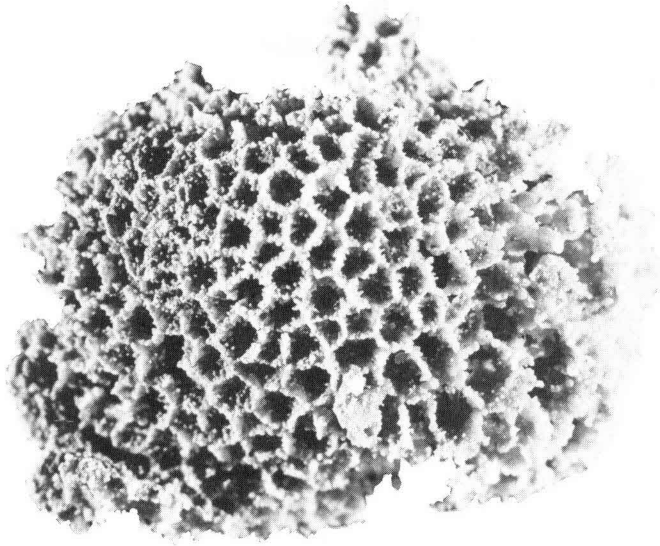
Plate 2

PLATE 2

Calapoecia anticostiensis Billings

Fig. 1. Figured specimen, (MPM 27788), Floride Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3229. Top view of colony. Note wide spacing of the corallites. Stereo-pair X 2

Fig. 2. Figured specimen, (MPM 27787), Floride Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3229. View of side of U-shaped colony. Note thickened corallite walls, wedge-shaped septa and lack of coenenchyme. Stereo-pair X 1.5



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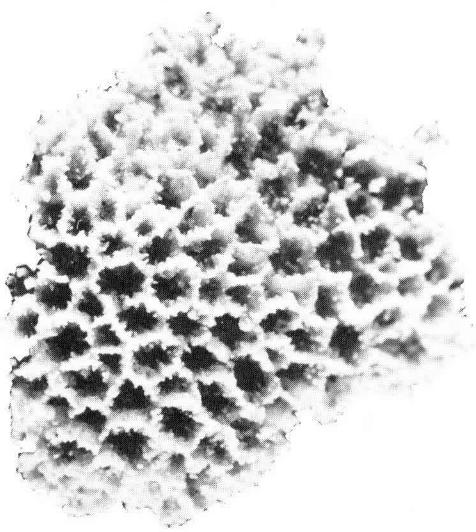

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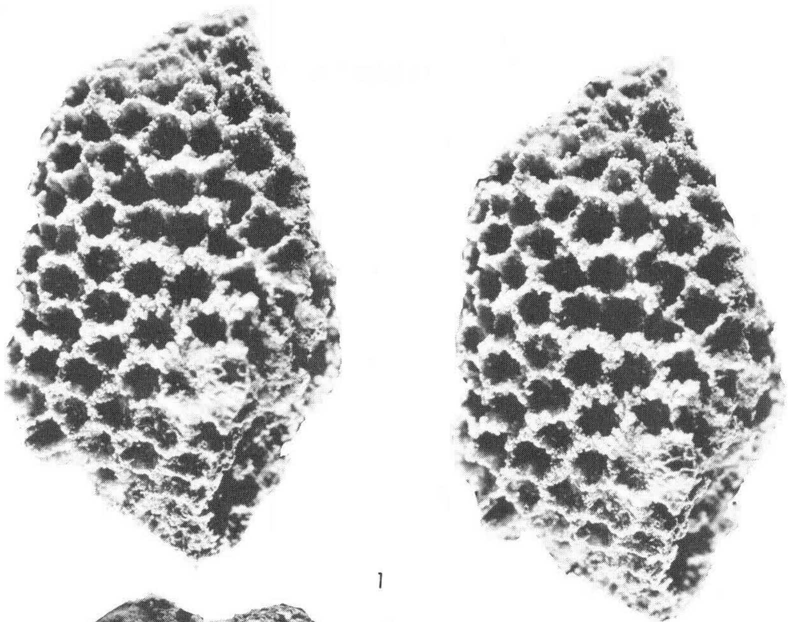
Plate 3

PLATE 3

Nyctopora sp.

Fig. 1 and 2. Figured specimens, Floride Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3229.

1. Top view of colony (MPM 27790) showing variation in preservation of septa. X 4
2. Top view of colony (MPM 27791) showing septa and thickened walls. X 4.5



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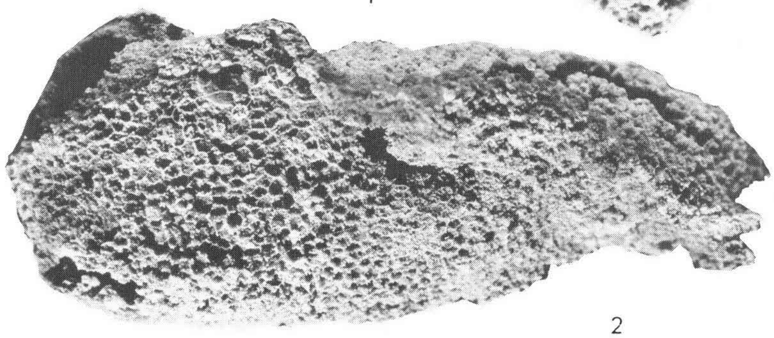

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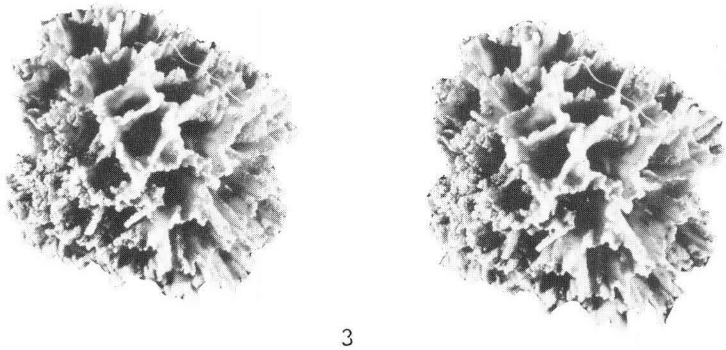

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Plate 4

PLATE 4

? *Billingsaria parvituba* (Troedsson)

Fig. 1 and 2. Figured specimens, Lost Canyon Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3231.

1. Side view of club-shaped specimen (MPM 27792). Septa are poorly preserved. Stereo-pair X 4.5

2. Side view of another club-shaped specimen (MP 27793). Septa can be seen, but none are preserved which extend to the center and unite. X 1.5

Saffordophyllum crenulatum (Bassler)

Fig. 3. Figured specimen, (MPM 27794), Lost Canyon Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3231. Top view showing severely crenulated corallite walls. A wall pore can be seen in the corallite furthest to the left in the stereo pair. Stereo-pair X 5.

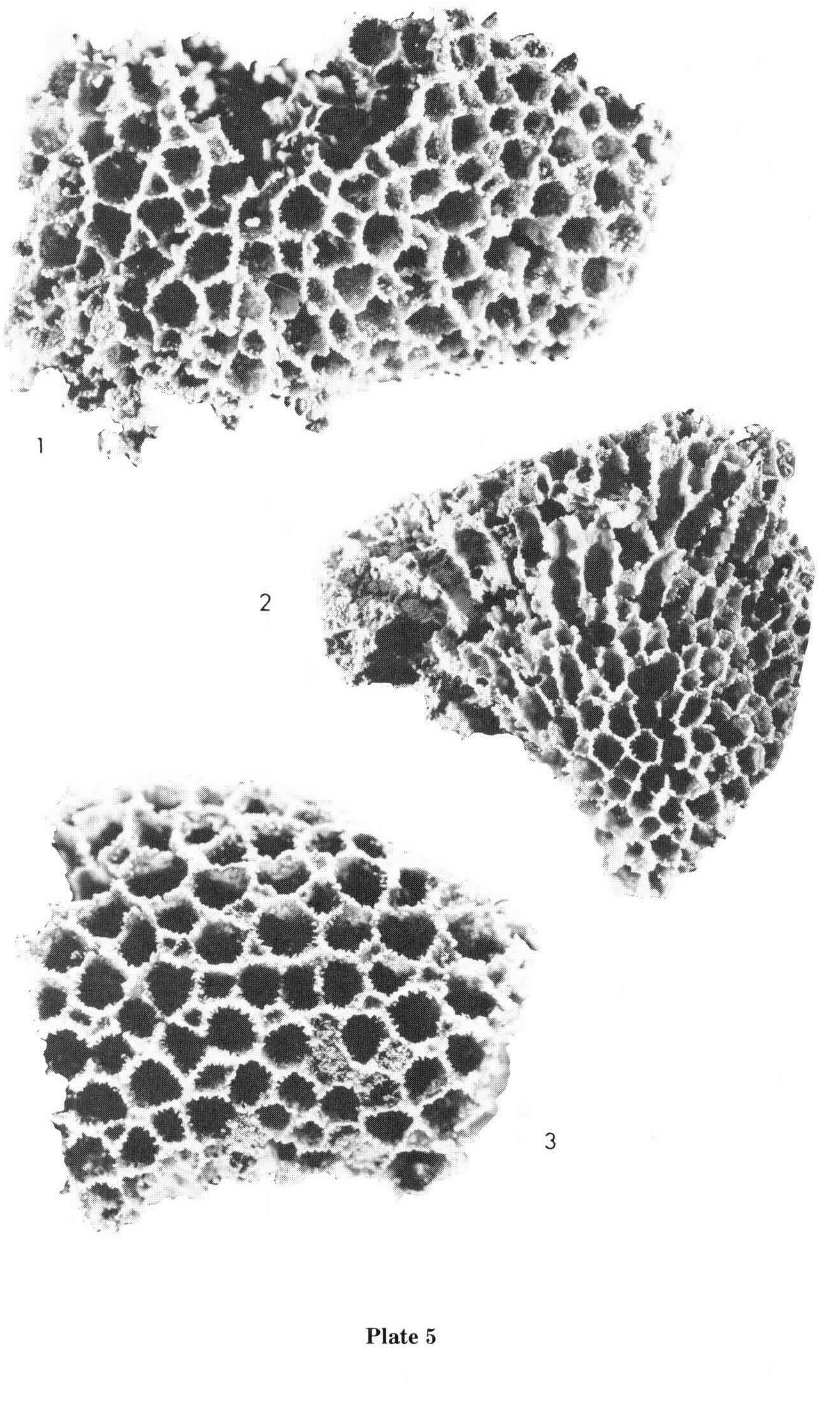


Plate 5

PLATE 5

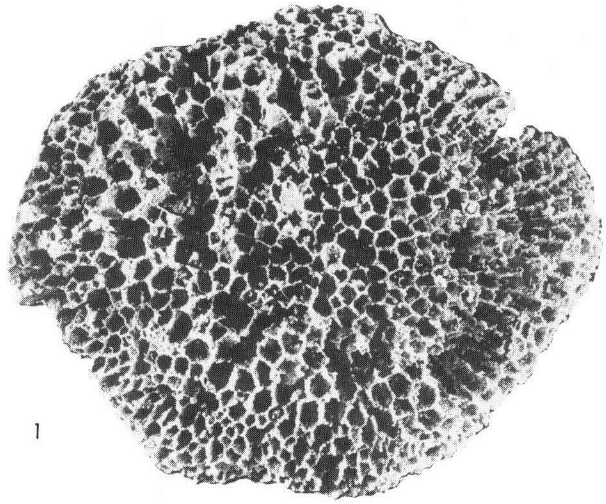
Paleofavosites poulseni Teichert

Fig. 1, 2, 3. Figured specimens, Floride Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3229.

1. Top view of colony (MPM 27795) showing septal spines and polygonal shape of corralites. X 3

2. Oblique view (MPM 27796) illustrating variable nature of corallite walls from straight to corrugated. X 2.25

3. Top view of colony (MPM 27797) showing well preserved septal spines. Note, however, the variability of preservation of the spines within the colony. X 4



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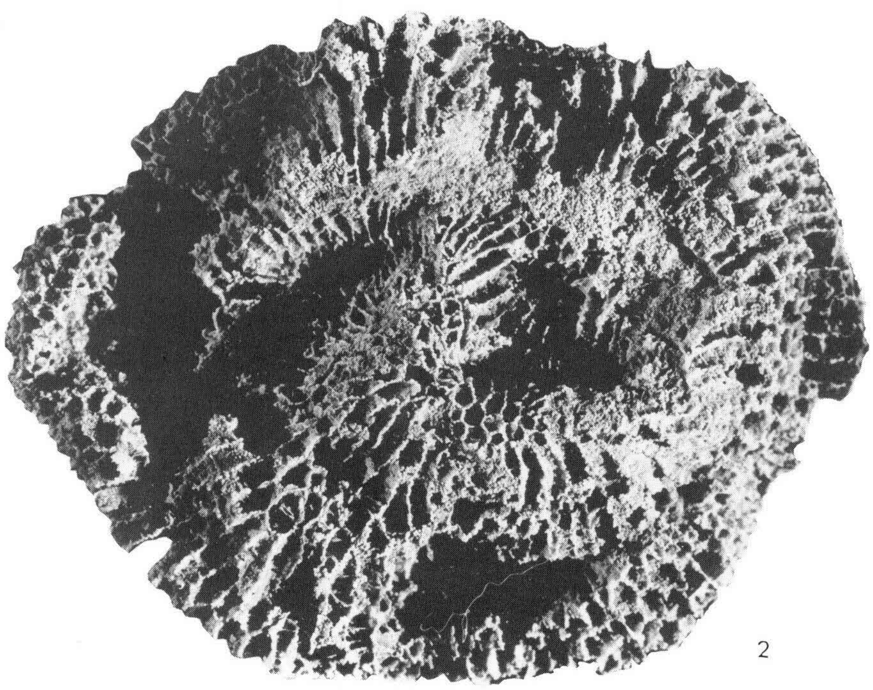

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Plate 6

PLATE 6

Paleofavosites poulseni Teichert

Fig. 1 and 2. Figured specimen, (MPM 27798), Floride Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3229.

1. Top view of colony. Note the variability of corallite shape. Most large corallites are either polygonal or hexagonal. X 1.4

2. Underside of same colony showing longitudinally straight, curved and corrugated corallite walls. Note the presence of a few tabulae in the bottom-left portion of the colony. X 2

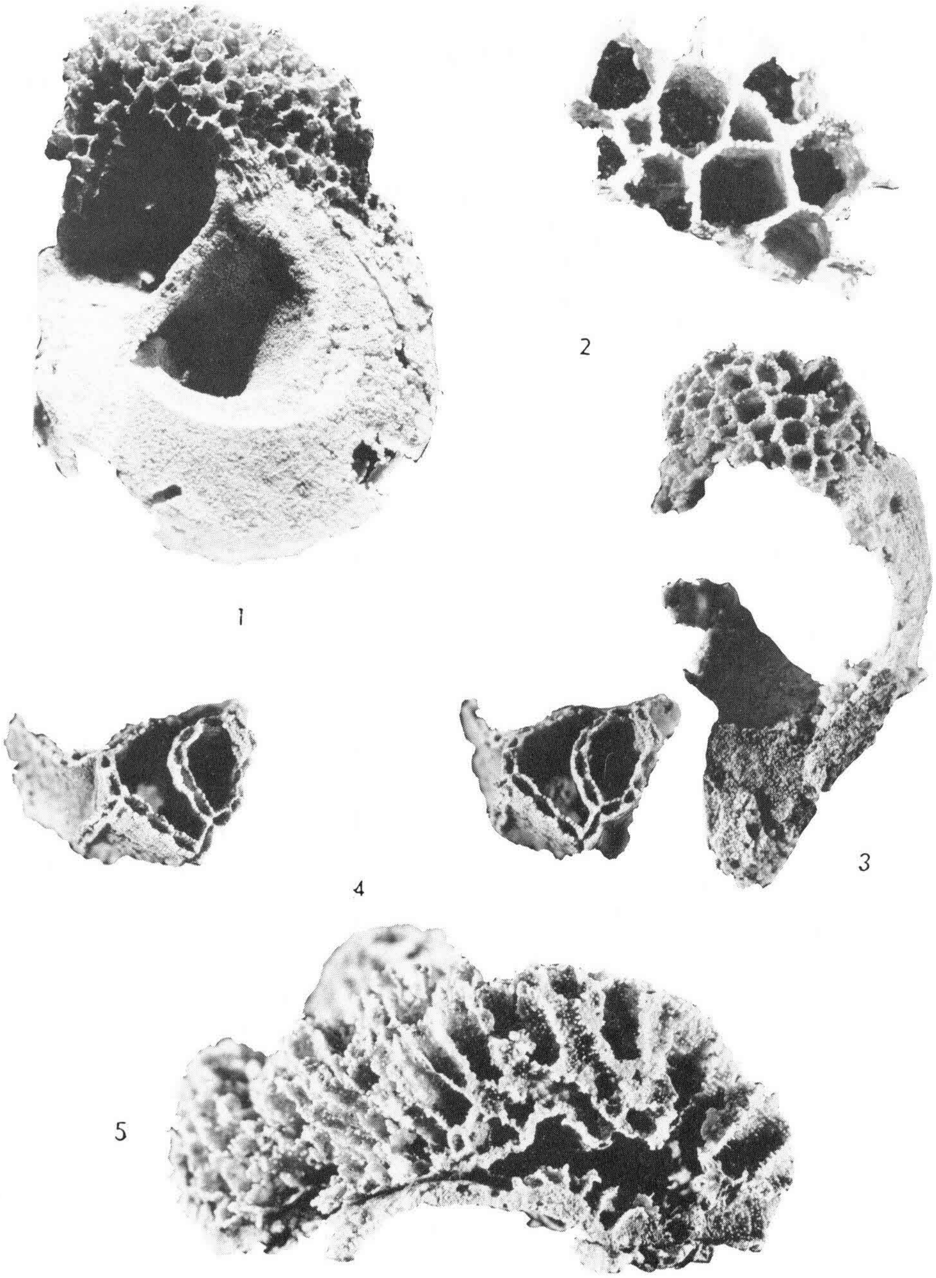


Plate 7

PLATE 7

Paleofavosites poulseni Teichert

Fig. 1, 3, 5. Figured specimens, Floride Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3229.

1. Coral colony (MPM 27799) which grew on a gastropod. Note mural pores at corallite angles. X 2

3. Another colony (MPM 27800) which used a gastropod for attachment. X 2.5

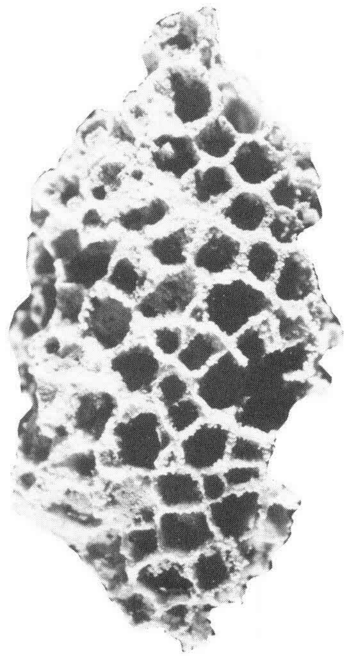
5. Coral colony (MPM 27801) which used a bivalve for attachment. Septal spines form a meshwork on the inner corallite wall surface. Spines are inclined slightly upward. Mural pores are well developed at the corallite angles. X 3

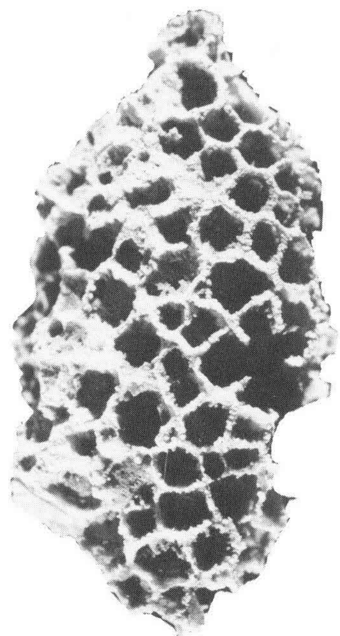
Paleofavosites okulitchi Stearn

Fig. 2. Figured specimen, (MPM 27802), Floride Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3229. Top view of colony showing large, polygonal corallites and the presence of both corner pores and wall pores. X 3

Catenipora sp. cf. *C. foerstei* Nelson

Fig. 4. Figured specimen, (MPM 27803), Lost Canyon Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3231. Top view of incomplete corallum. Stereo-pair X 2.5





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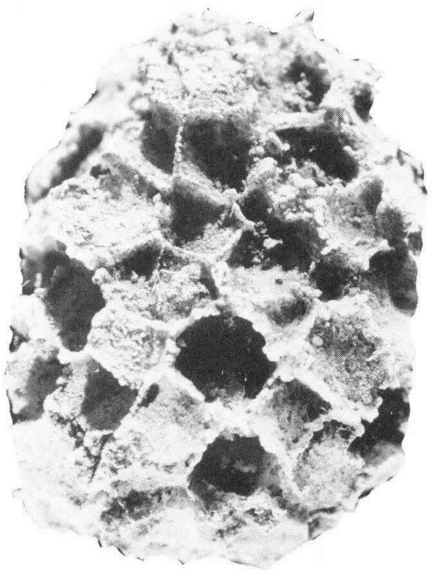


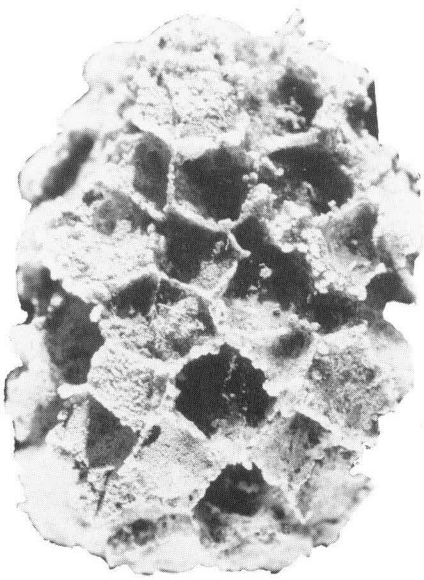


Plate 8

PLATE 8

Paleofavosites poulseni Teichert

Fig. 1. Figured specimen, (MPM 27804), Floride Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3229. Top view of colony showing a few large hexagonal corallites. Septal spines are from poorly to moderately preserved. Again, note the variability of preservation of the septal spines. Stereo-pair X 1.75

Paleofavosites mccullochae Flower

Fig. 2. Figured specimen, (MPM 27805), Lost Canyon Member of the Ely Springs Dolomite, Silver Island Range, Utah, MPM loc. 3209. Top view of colony. Stereo-pair X 4

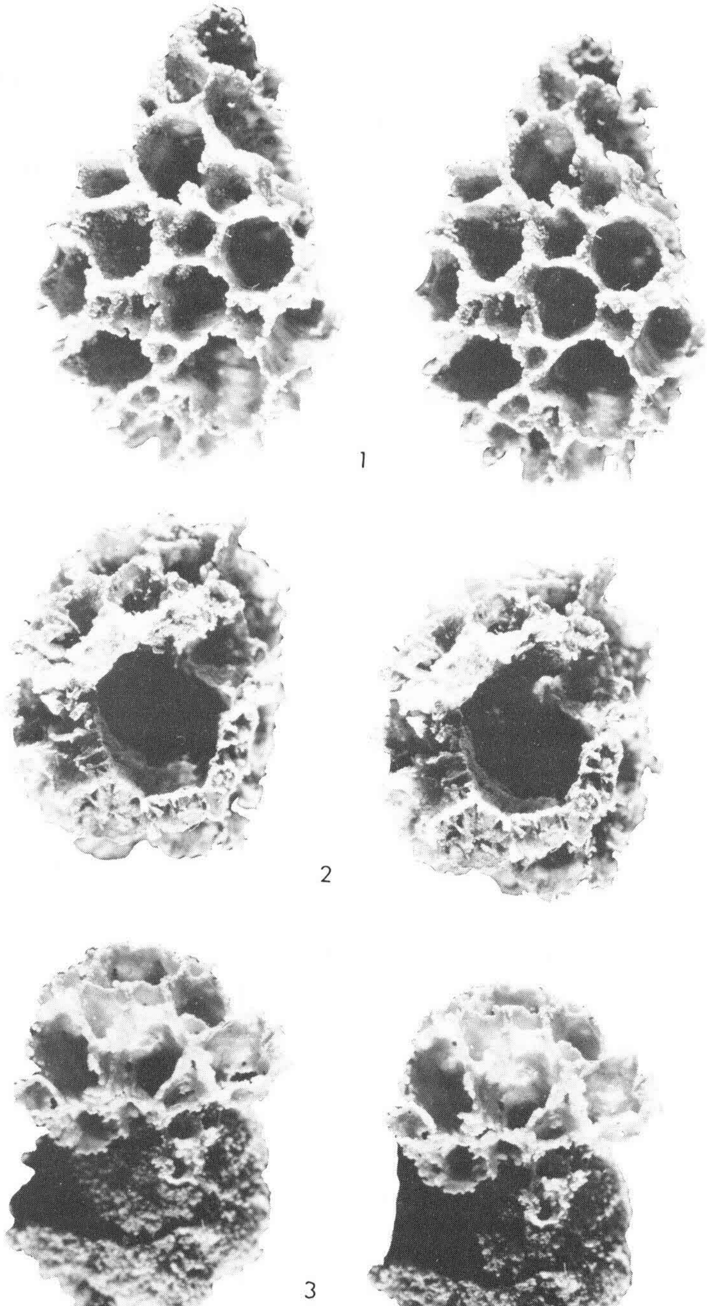


Plate 9

PLATE 9

Paleofavosites mccullochae Flower

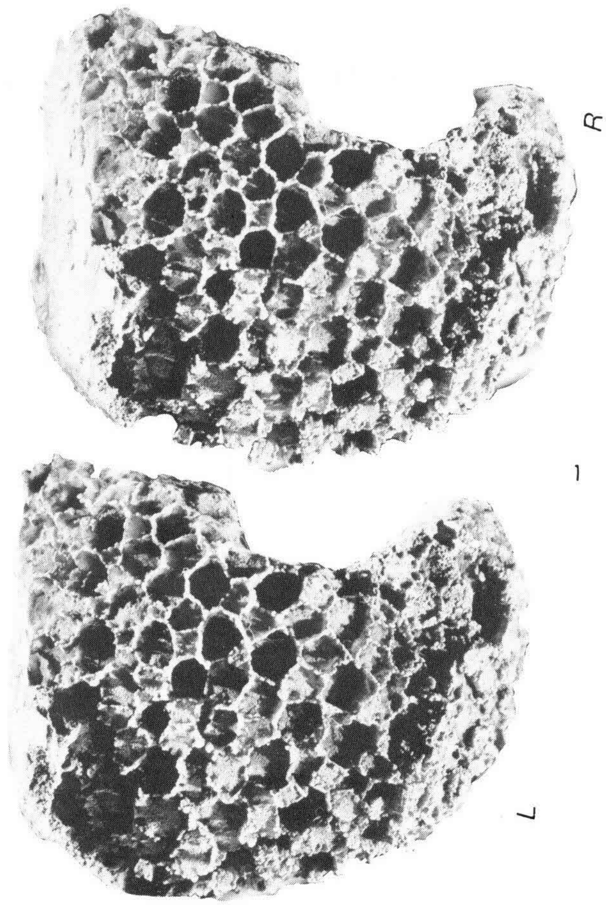
Fig. 1, 3. Figured specimens, Floride Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3229.

1. Top view of colony (MPM 27806). All ontogenetic stages are represented. Budding individual starts out circular (upper left and lower central). This stage is followed by triangulate stage (lower left). Mature individuals are large, polygonal corallites. Note rows of vertical pores at corallite angles and the presence of a few wall pores (upper central). Stereo-pair X 4

3. Coral colony (MPM 27807) which used a stromatoporoid fragment for attachment. Note vertical rows of corner pores, singular wall pores and range in tabularia diameter from circular to triangulate juveniles to polygonal mature individuals. Stereo-pair X 4

Agetolites budgei n. sp.

Fig. 2. Paratype, (MPM 27808), Lost Canyon Member of the Ely Springs Dolomite, Silver Island Range, Utah, MPM loc. 3208. View down the axis of a crinoid stem which coral used for attachment. Stereo-pair X 3.5



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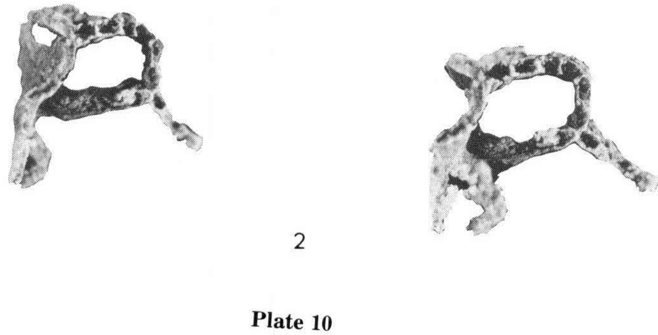

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Plate 10

PLATE 10

Paleofavosites mccullochae Flower

Fig. 1. Figured specimen, (MPM 27809), Lost Canyon Member of the Ely Springs Dolomite, Silver Island Range, Utah, MPM loc. 3209. Top view of colony showing large polygonal and hexagonal corallites. Stereo-pair X 2

Catenipora cf. *C. foerstei* Nelson

Fig. 2. Figured specimen, (MPM 27810), Lost Canyon Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3231. Top view of colony showing subelliptical to subquadrate corallites. Stereo-pair X 2

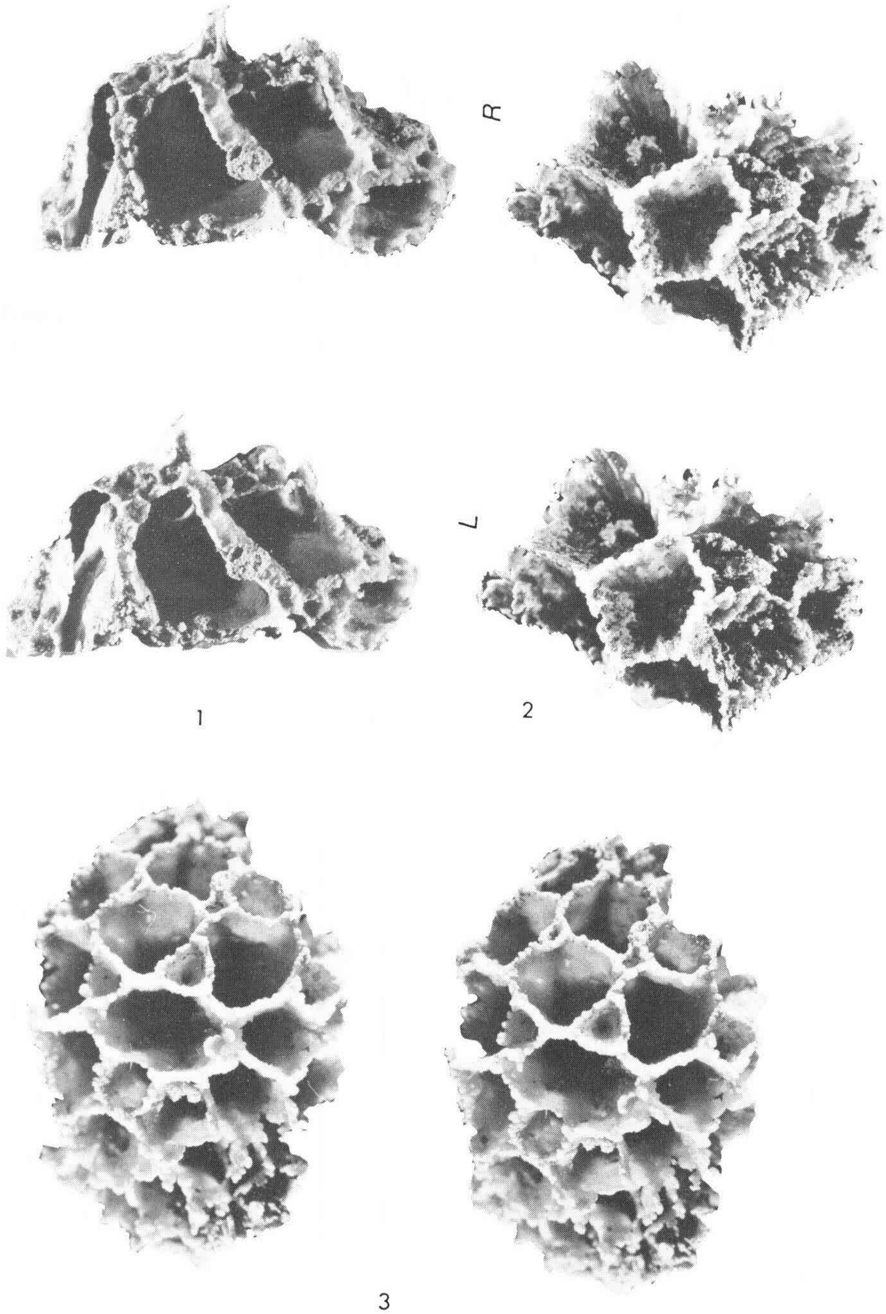


Plate 11

PLATE 11

Tollina sp.

Fig. 1. Figured specimen, (MPM 27811), Lost Canyon Member of the Ely Springs Dolomite, Silver Island Range, Utah, MPM loc. 3209. Top view of colony showing two small agglutinated patches. Stereo-pair X 1.7

Agetolites budgei n. sp.

Fig. 2. Paratype, (MPM 27812), Lost Canyon Member of the Ely Springs Dolomite, Silver Island Range, Utah, MPM loc. 3209. Top view of colony showing septal ridges and mural pores in a vertical row at the corallite angles (center corallite). Stereo-pair X 3.5

Paleofavosites sp. cf. *P. transiens* Stearn

Fig. 3. Figured specimen, (MPM 27813), Floride Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3229. Top view of colony showing abundant mural pores both at the corallite corners and in the corallite walls. Stereo-pair X 5

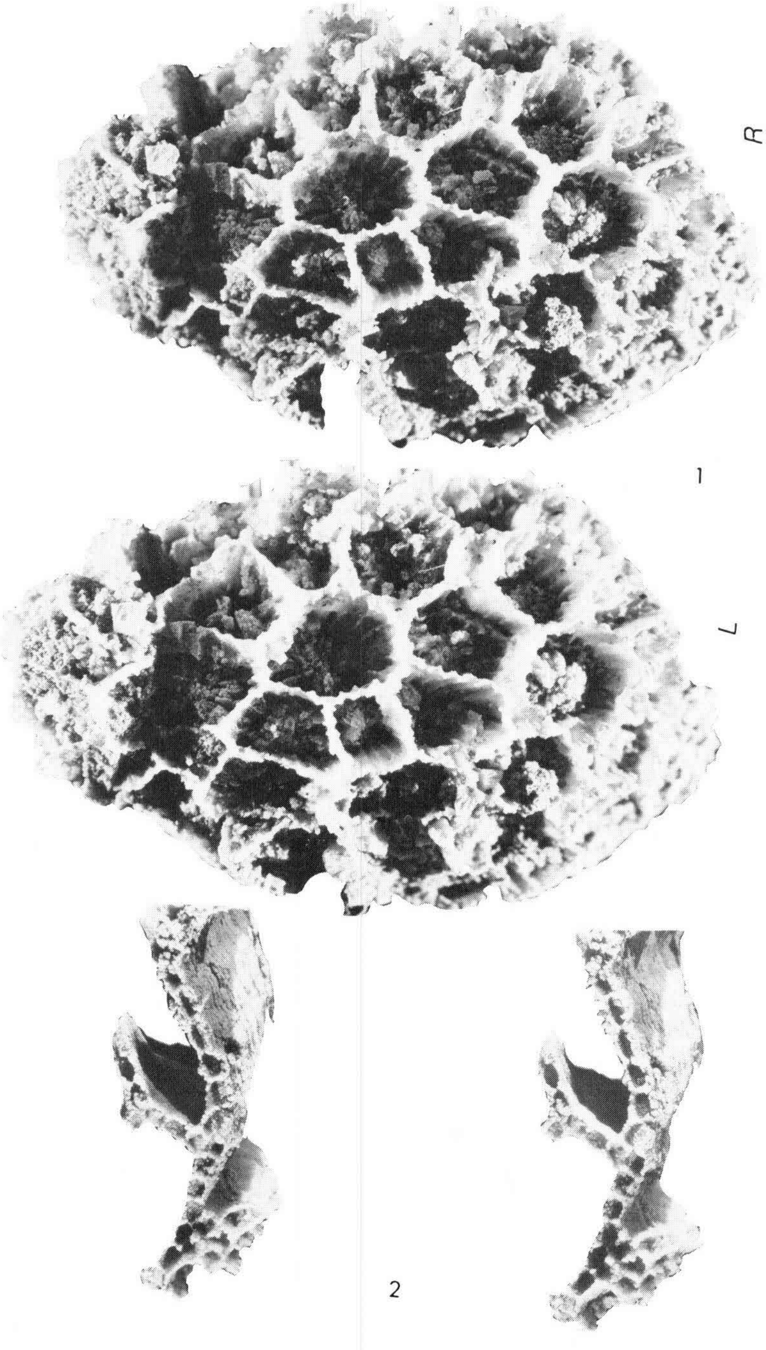


Plate 12

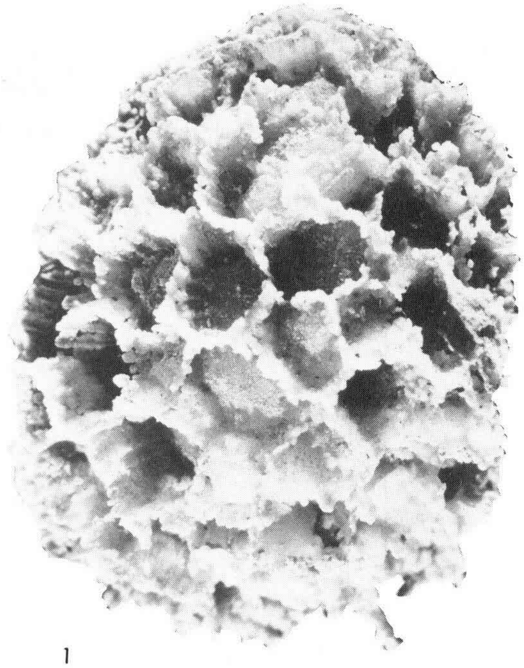
PLATE 12

Agetolites budgei n. sp.

Fig. 1. Paratype, (MPM 27816), Lost Canyon Member of the Ely Springs Dolomite, Silver Island Range, Utah, MPM loc. 3208. Top view of colony showing numerous septal ridges which are denticulated. Vertical rows of mural pores occur at corallite angles (lower right). Note crenulation of walls due to alternation of major septa bewteen adjacent corallites. Stereo-pair X 3

Tollina sp.

Fig. 2. Figured specimen, (MPM 27815), Lost Canyon Member of the Ely Springs Dolomite, Silver Island Range, Utah, MPM loc. 3209. Top view of colony showing large agglutinated patch. Note variability in tabularia shape especially between monoserial ranks and agglutinated patches. Stereo-pair X 2



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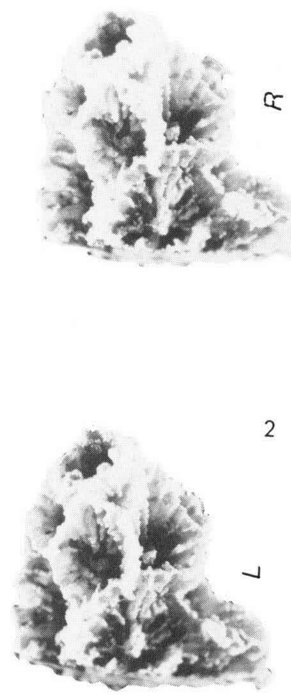

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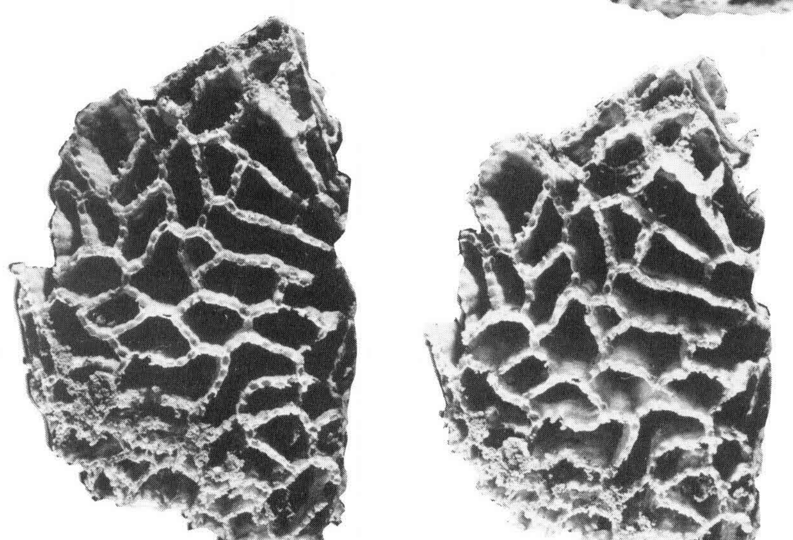

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Plate 13

PLATE 13

Agetolites budgei n. sp.

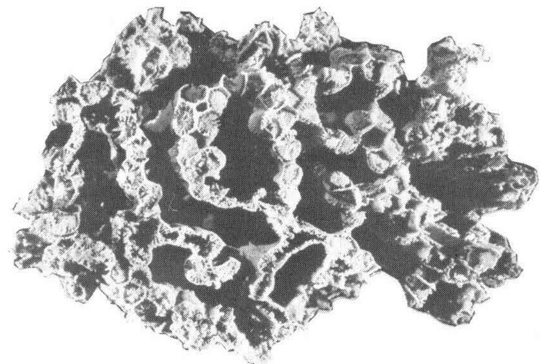
Fig. 1 and 2. Holotype, (MPM 27814) and Paratype, (MPM 27817), Lost Canyon Member of the Ely Springs Dolomite, Silver Island Range, Utah, MPM loc. 3209 and 3208, respectively.

1. Top view of colony (MPM 27814) showing domed tabulae, denticulate septal ridges, and mural pores (left corner). X 2.5

2. Top view (MPM 27817) showing well developed axial structure (left). Note denticulated septal ridges. Stereo-pair X 4

Catenipora workmanae Flower

Fig. 3. Figured specimen, (MPM 27818), Lost Canyon Member of the Ely Springs Dolomite, Silver Island Range, Utah, MPM loc. 3209. Top view of colony showing elliptical, triangulate and trilobate lacunae. Stereo-pair X 0.8



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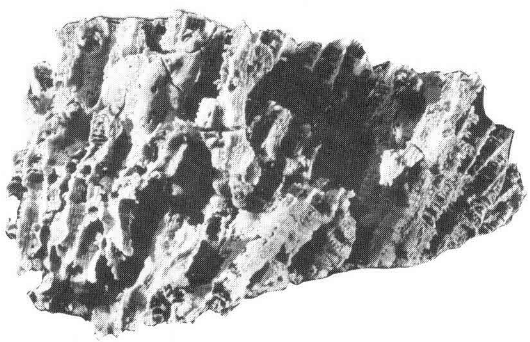

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Plate 14

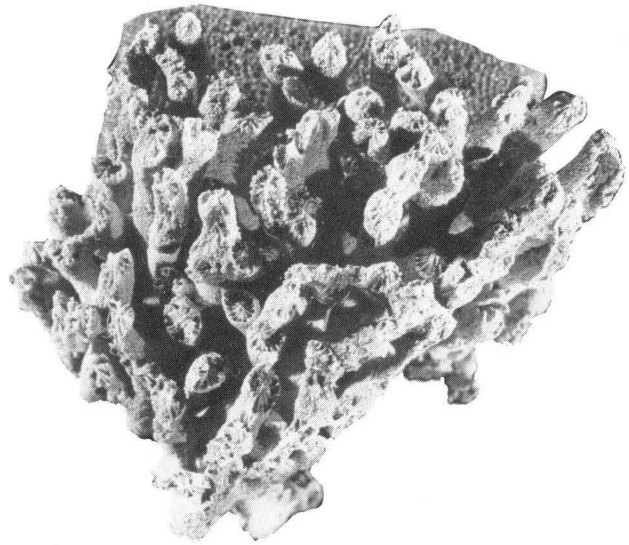
PLATE 14

Palaeophyllum humei Sinclair

Fig. 1 and 2. Figured specimen, (MPM 27819), Lost Canyon Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3231.

1. Top view of colony showing biserial ranks and agglutinated patches of corallites. Note irregular lacunae. X 0.6

2. Side view of same colony showing tabulae. Tabulae are domed, domed with a medial depression, flat, or sinuous. X 0.6



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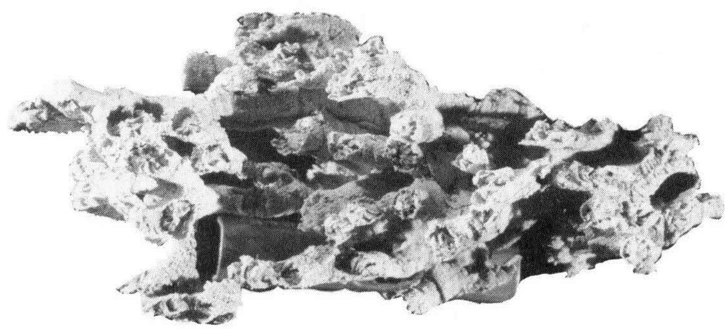

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Plate 15

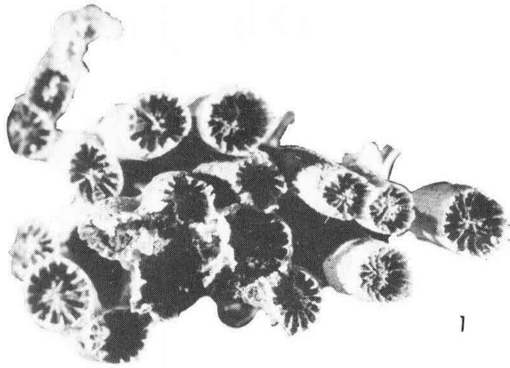
PLATE 15

Palaeophyllum gracile Flower

Fig. 1. Figured specimen, (MPM 27831), Lost Canyon Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3231. Top view of colony showing circular corallites. X 1.25

Palaeophyllum sp. cf. *P. raduguini* Nelson

Fig. 2. Figured specimen, (MPM 27821), Lost Canyon Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3231. Side view of colony. Note extension of the septa to the center of the corallites. X 1.25



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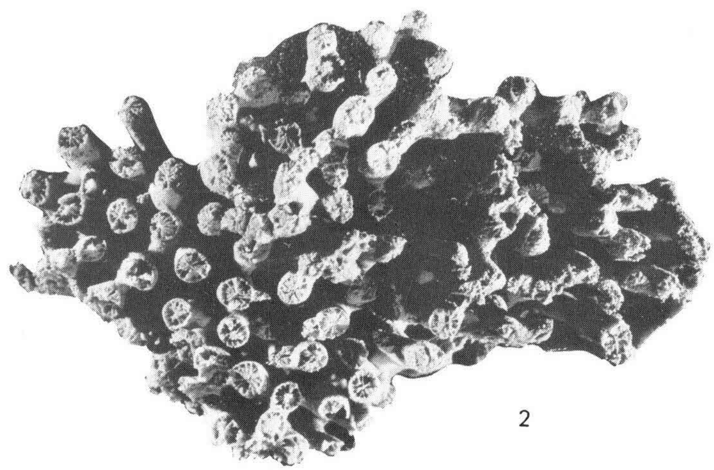

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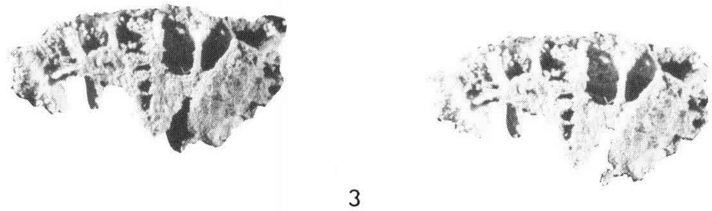


3

Plate 16

PLATE 16

Palaeophyllum sp. cf. *P. raduguini* Nelson

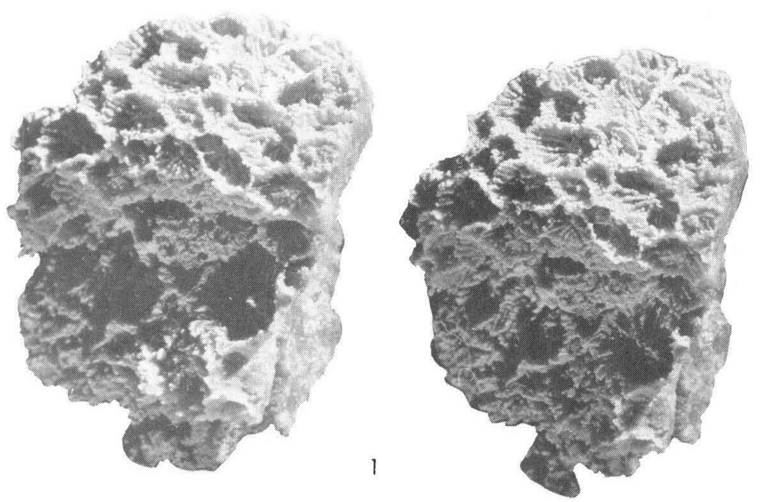
Fig. 1 and 2. Figured specimens, Lost Canyon Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3231.

1. Top view of colony (MPM 27822). Note thick stereozone surrounding the tabularia. Minor septa, though small, alternate with the major septa. X 2.5

2. Top view of colony (MPM 27823) showing variability in corallite shape, from circular to elliptical to irregular. Note corallites occur singularly, in short monoserial ranks, and in agglutinated patches. X 1.25

Paleofavosites sp. cf. *P. transiens* Stearn

Fig. 3. Figured specimen, (MPM 27824), Floride Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3229. Side view showing horizontal tabulae. Note mural pore on right. Stereo-pair X 3



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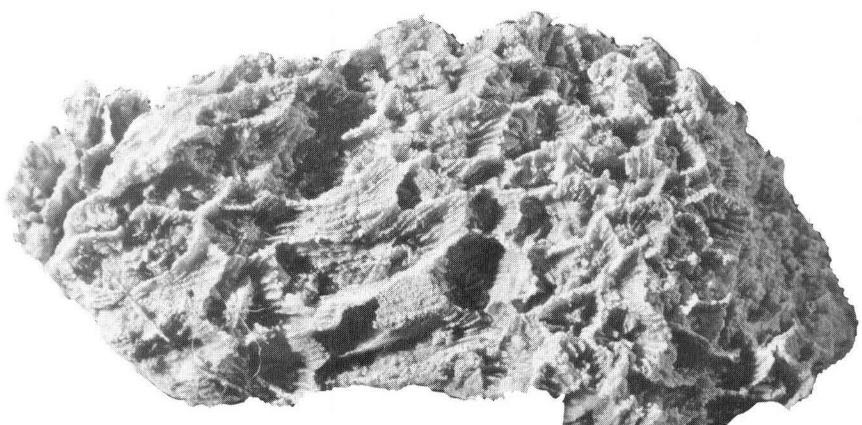


2

Plate 17

PLATE 17

Cyathophylloides sp. A

Fig. 1. Figured specimen, (MPM 27825), Lost Canyon Member of the Ely Springs Dolomite, Silver Island Range, Utah, MPM loc. 3209. Top view of poorly preserved colony showing major septa which unite in the center of the corallite. Stereo-pair X 1.75

Cyathophylloides sp. B

Fig. 2. Figured specimen, (MPM 27826), Lost Canyon Member of the Ely Springs Dolomite, Silver Island Range, Utah, MPM loc. 3208. Top view of colony. X 2.25

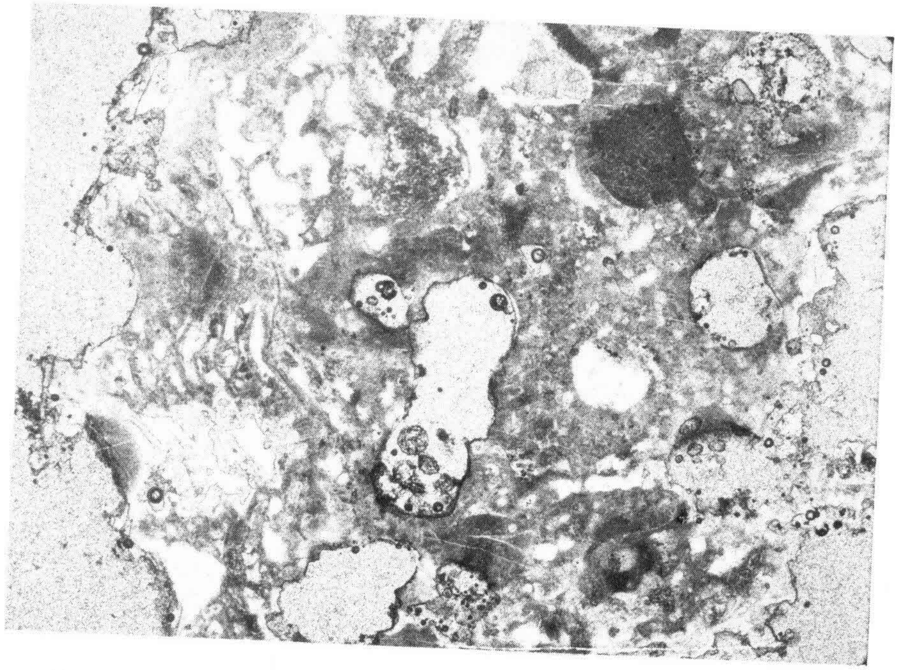


Plate 18

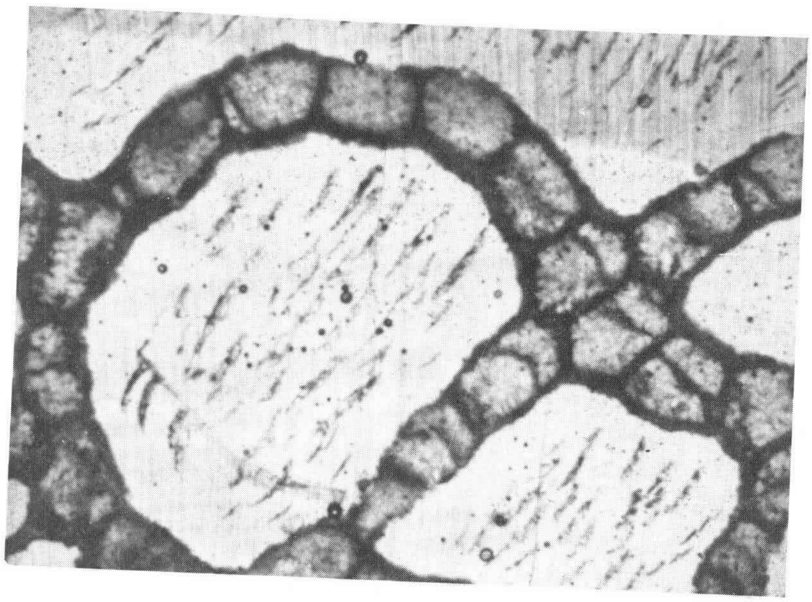
PLATE 18

Calapoecia anticostiensis Billings

Fig. 1 (above). Figured specimen, (MPM 27827), Floride Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3229. Oblique section showing circular corallites with large amount of coenenchyme between them. X 9.5

Agetolites budgei n. sp.

Fig. 2 (below). Holotype, (MPM 27814), Lost Canyon Member of the Ely Springs Dolomite, Silver Island Range, Utah, MPM loc. 3209. Cross section showing corallites growing in all directions after initial attachment to a tabulate coral. The tabulate coral was elevated above the substratum enabling the colony of *Agetolites* to initiate growth. Note domed tabulae and mural pores. X 6.5



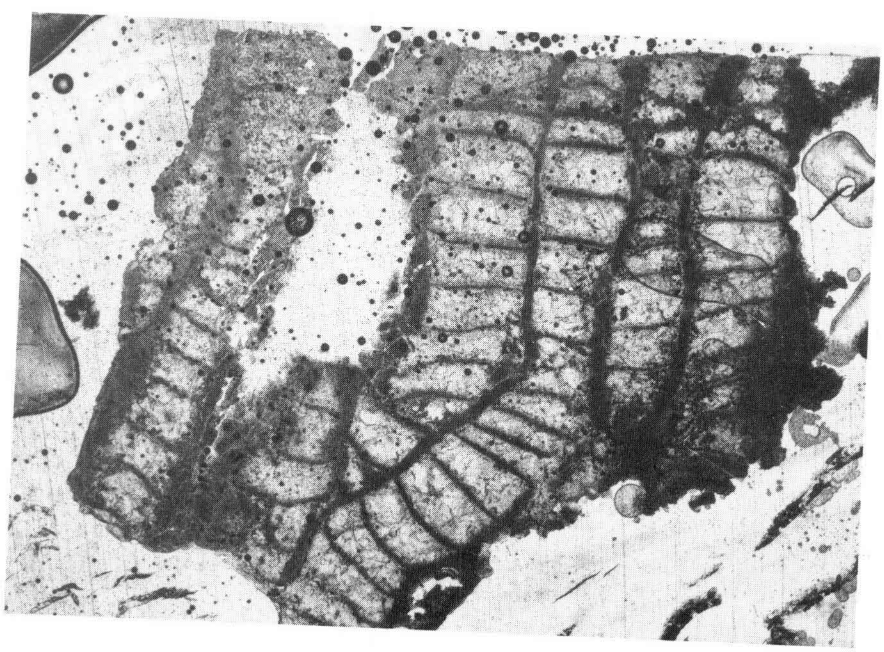


Plate 19

PLATE 19

Tollina sp.

Fig. 1 (above) and Fig. 2 (below). Figured specimen, (MPM 27811, 27815), Lost Canyon Member of the Ely Springs Dolomite, Silver Island Range, Utah, MPM loc. 3209.

Fig. 1. Transverse section of colony (MPM 27811) showing variability in corallite shape and also in preservation of spines. Note agglutinated patch. X 6.5

Fig. 2. Longitudinal section of colony (MPM 27815) showing lateral increase of new corallites and spacing and form of tabulae. X 8

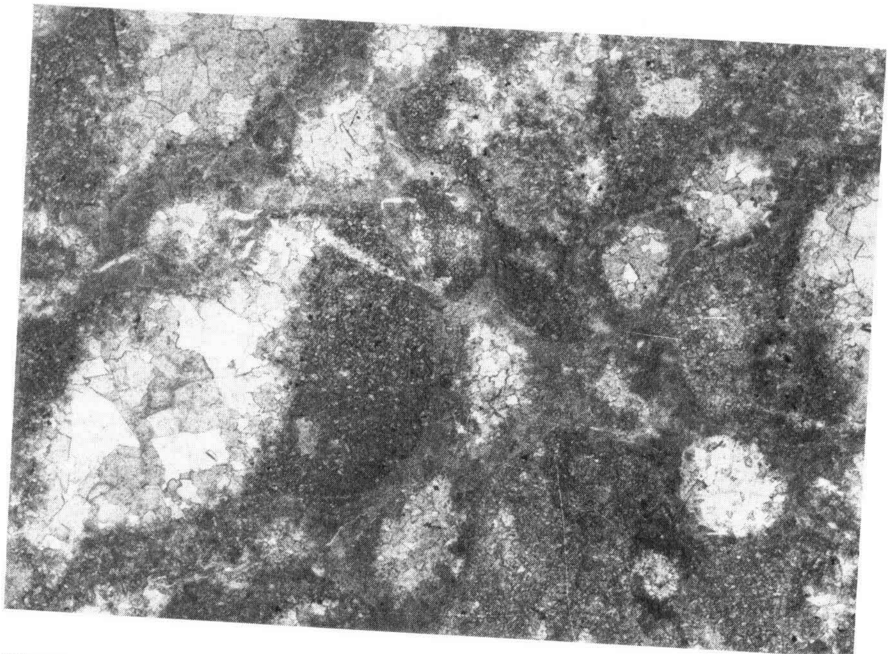


Plate 20

PLATE 20

Catenipora sheehani n. sp.

Fig. 1 (above) and Fig. 2 (below). Holotype, (MPM 27828), Lost Canyon Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3231.

Fig. 1. Transverse section showing characteristic T-junctions at the intersection of corallite ranks. Note thickened corallites walls and the presence of septal spines. X 9

Fig. 2. Longitudinal section showing form and spacing of tabulae. The colony used a favositid for attachment. X 5

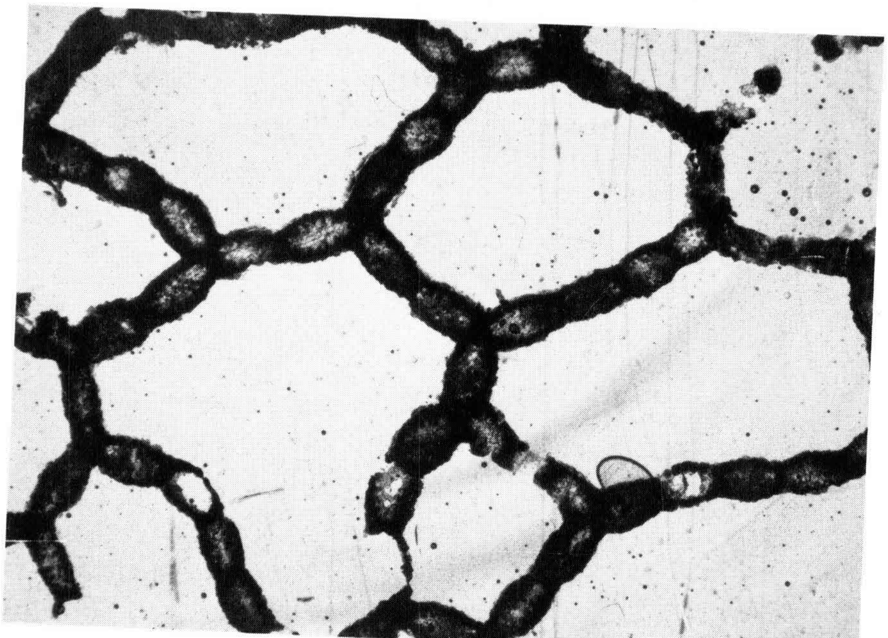


Plate 21

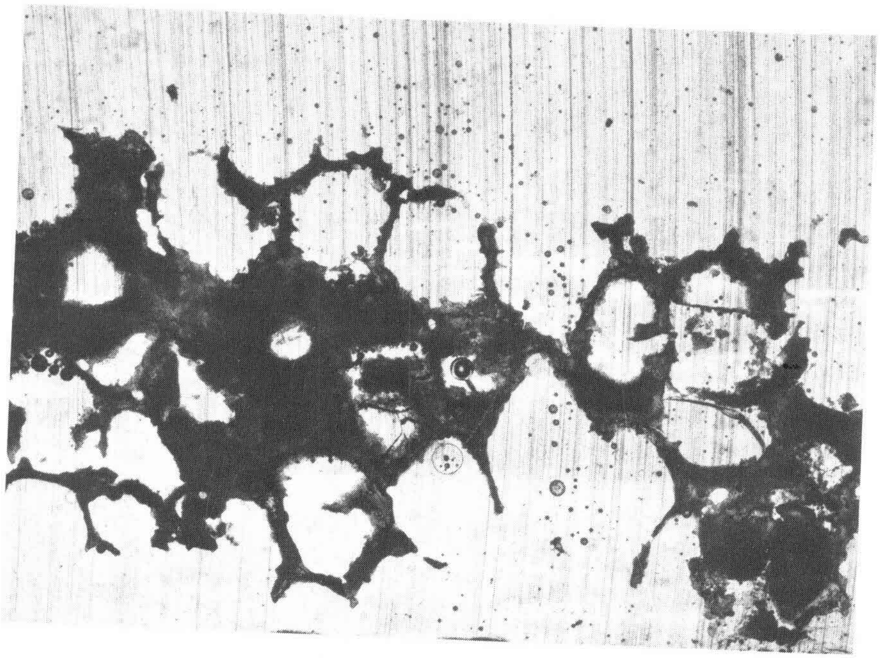
PLATE 21

Catenipora workmanae Flower

Fig. 1 (above) and Fig. 2 (below). Figured specimen, (MPM 27818), Lost Canyon Member of the Ely Springs Dolomite, Silver Island Range, Utah, MPM loc. 3209.

Fig. 1. Transverse section showing elliptical tabularia and development of spines. Note presence of spheres of poikiloplasm (Flower, 1961). X 5

Fig. 2. Longitudinal section showing form and spacing of tabulae. Note corrugation of the outer wall. X 3.7



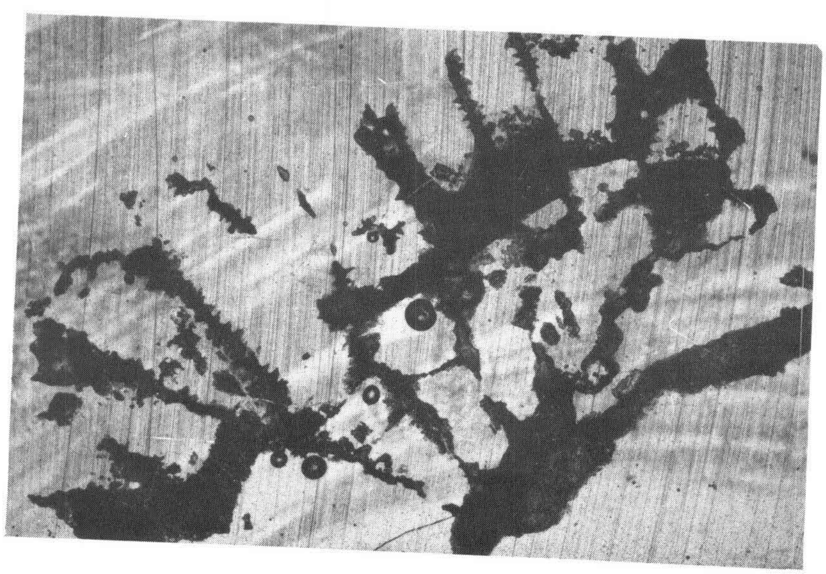


Plate 22

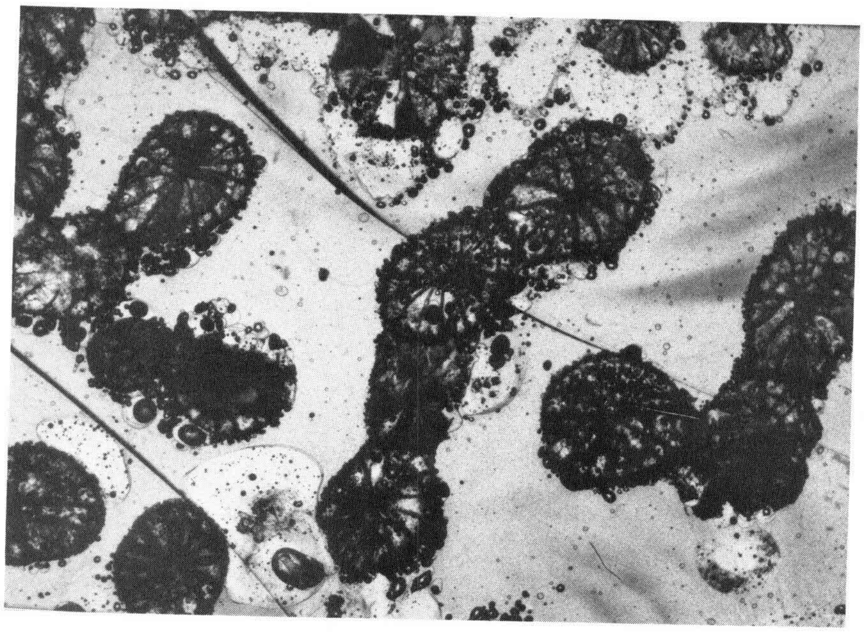
PLATE 22

Paleofavosites poulseni Stearn

Fig. 1 (above) and Fig. 2 (below). Figured specimens, Floride Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3229.

Fig. 1. Transverse section of poorly preserved colony (MPM 27824) showing shape of corallites and septal spines. X 8

Fig. 2. Longitudinal section showing colony (MPM 27830) using a stromatoporoid for attachment. Many septal spines are inclined upward. X 6.5



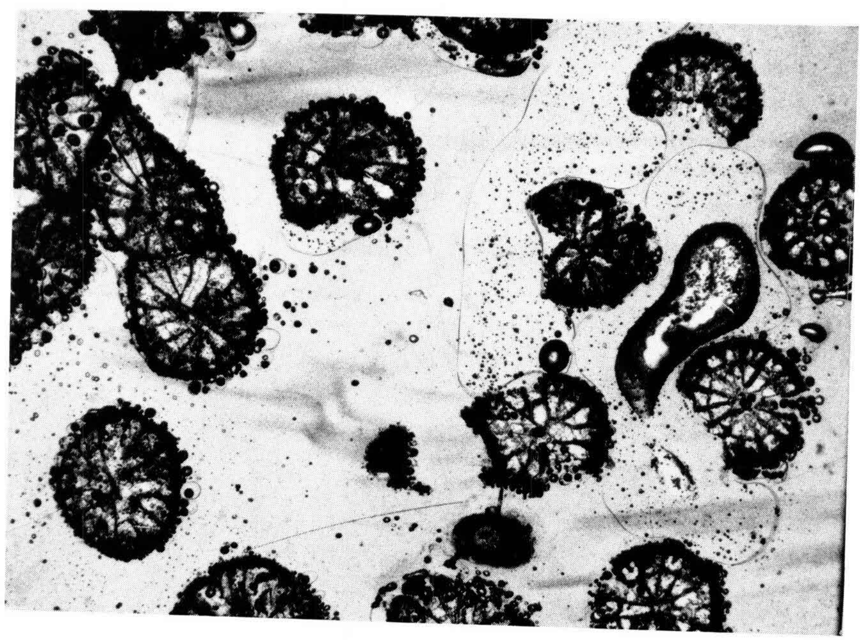


Plate 23

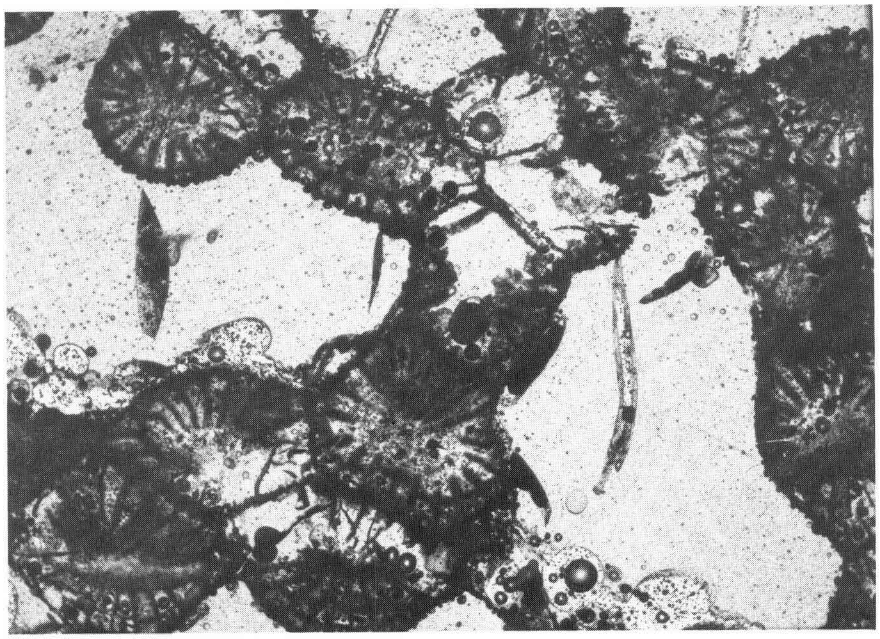
PLATE 23

Palaeophyllum gracile Flower

Fig. 1 (above) and Fig. 2 (below). Figured specimen, (MPM 27831), Lost Canyon Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3231.

Fig. 1. Transverse section of colony showing 14 major septa which fuse in groups at the center of the corallite to form an axial structure. X 5

Fig. 2. Longitudinal section of another part of same colony showing corallites with a well-developed axial depression. Septa fuse into groups at the center of the corallites. X 5



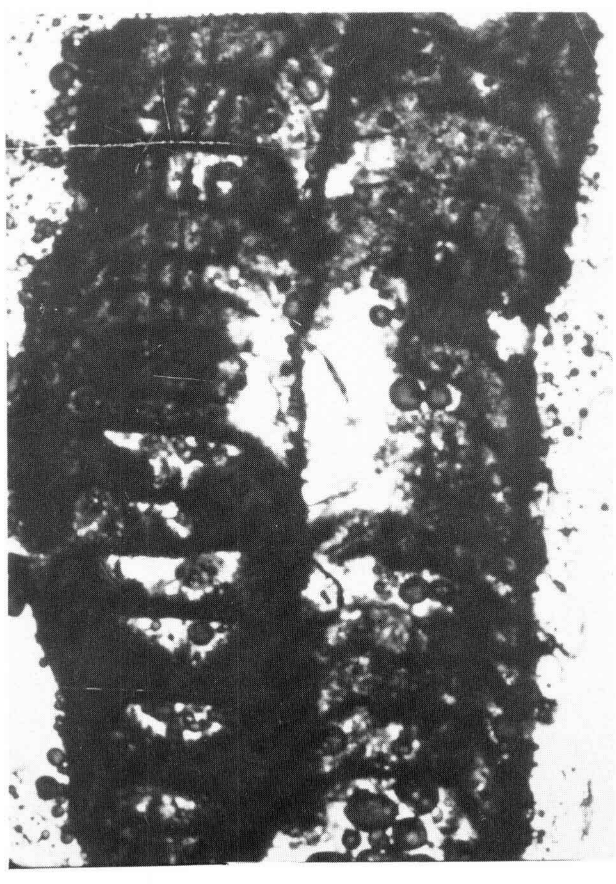


Plate 24

PLATE 24

Palaeophyllum humei Sinclair

Fig. 1 (above) and Fig. 2 (below). Figured specimen, (MPM 27819), Lost Canyon Member of the Ely Springs Dolomite, northern Egan Range, Nevada, MPM loc. 3231.

Fig. 1. Transverse section of poorly preserved colony showing large number of septa. Note how corallites form double-row ranks surrounding lacunae. X 5

Fig. 2. Longitudinal section of same specimen showing form and spacing of tabulae. X 9

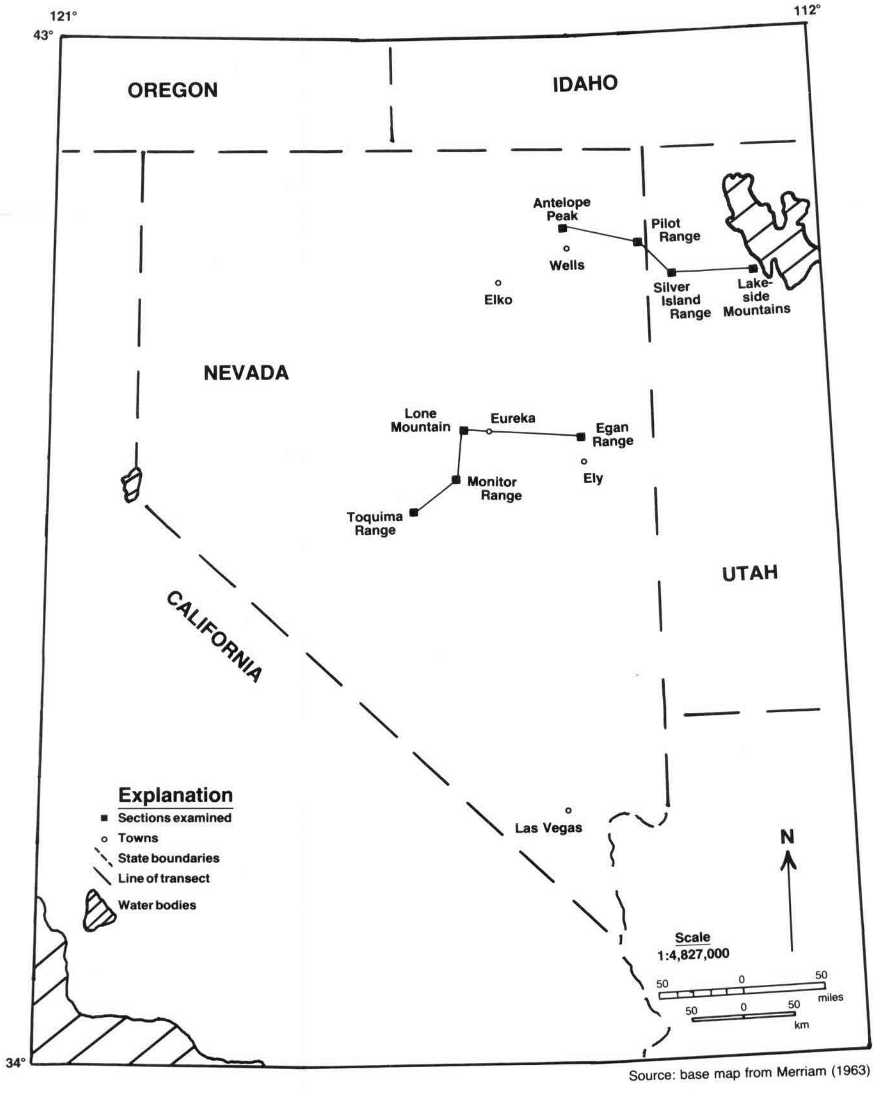


Fig. 1 Index map showing location of geologic sections of western Utah and Nevada.

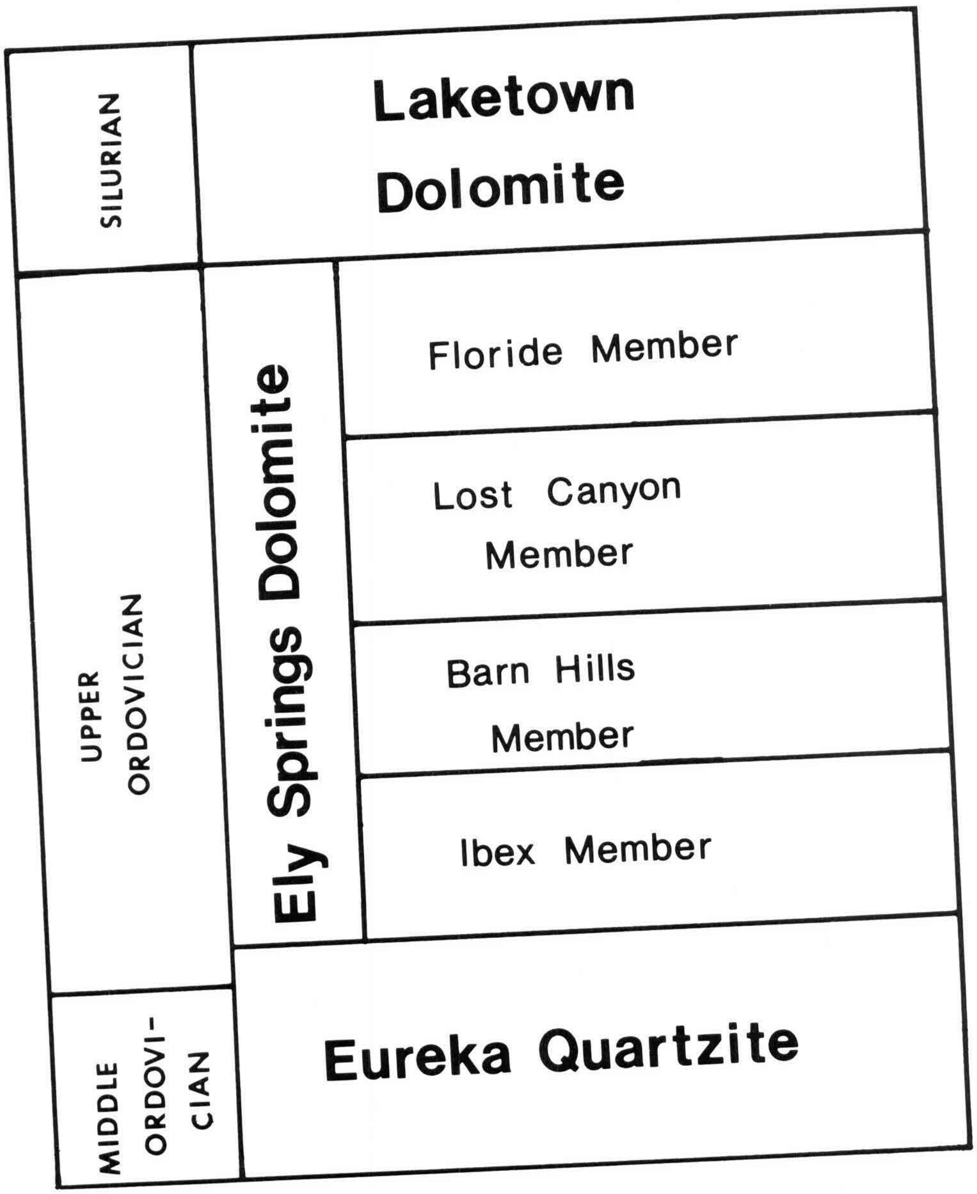


Fig. 2 Stratigraphic column of the Ely Springs Dolomite in the Eastern Great Basin.

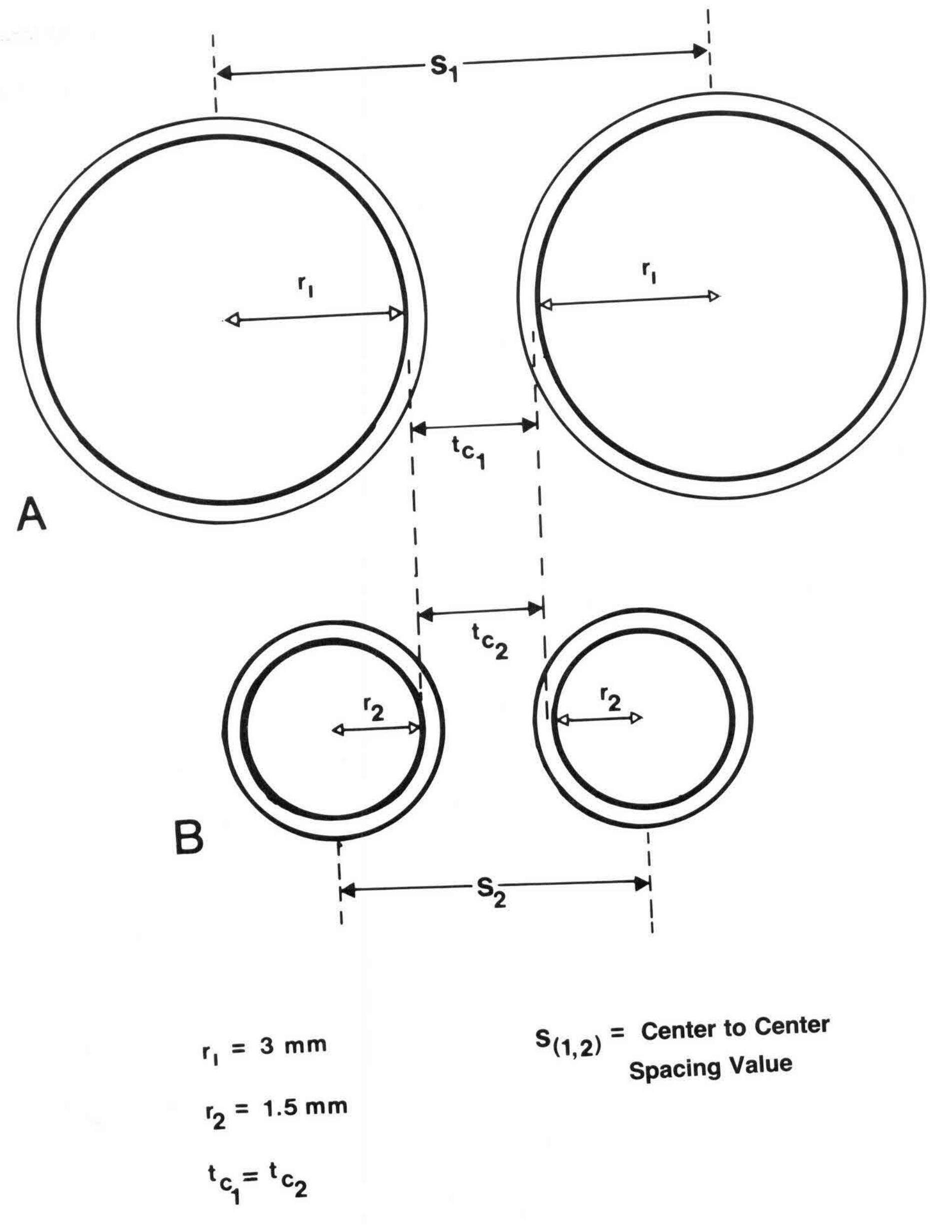


Fig. 3 Measurement of the "center-to-center spacing value" in *Calapoecia*. See text for discussion.

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